INDIAN OCEAN GALATHEIDS

(CRUSTACEA: ANOMURA)

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INTRODUCTION

Very little is known about the Indian Ocean galatheids, with the exception of the report of 'John Murray' expedition (Tirmizi, 1966), our knowledge of the Indian Ocean Galatheidae has been derived primarily from the work of early 20th century, which however, does not meet the requirements of the recent systematics, furthermore, even this is not easily accessible.

Members of the family Galatheidae are generally beautifully sculptured, often have iridescent setae and some are very thorny; the skeleton is almost always strongly chitinized. They occur widely, from tropical seas to high latitudes and from the littoral zone down to the abyssal depths, usually as members of the benthic fauna.

The material at hand, comprises of 535 specimens belonging to two subfamilies, ten genera and forty species, out of which four species are new to science, and ten species mentioned by an asterisk (*) are recorded for the first time from the Indian Ocean. The species are charted with the stations at which they were collected in maps 1-3 and listed below:-

Family Galatheidae Dana

Subfamily Munidopsinae Ortmann

Genus *Munidopsis* Whiteaves, 1874
M. ciliata Wood-Mason, 1891
M. valdiviae (Balss, 1913)

Subfamily Galatheinae Dana

Genus *Nanogalathea* Tirmizi & Javed, 1980
N. raymondi Tirmizi & Javed, 1980

Genus *Fennerogalathea* Baba, 1988
F. chirostyloides sp. nov.

Genus *Lauriea* Baba, 1971
L. gardineri (Laurie, 1926)

Genus *Allogalathea* Baba, 1969
A. elegans (Adams & White, 1848)

Genus *Phylladiorhynchus* Baba, 1969
P. bengalensis Tirmizi & Javed, 1980
P. integrirostris (Dana, 1939)

Genus *Coralliogalathea* Baba and Javed, 1974
C. humilis (Nobili, 1905)

Genus *Galathea* Fabricius, 1793
* *G. yamashitai* Miyake & Baba, 1967
G. affinis Ortmann, 1892
G. balssi Miyake & Baba, 1964
G. keiji sp. nov.
G. brevimana Paulson, 1875
* *G. australiensis* Stimpson, 1858
* *G. whiteleggei* Grant & McCullock, 1906
G. spinosorostris Dana, 1852
G. aegyptiaca Paulson, 1875
* *G. tanegashimae* Baba, 1969
* *G. dispersa* Bate, 1859
* *G. intermedia* Lilijeborg, 1851
G. pubescens Stimpson, 1858
G. omanensis sp. nov.
* *G. lenis* Baba, 1969
G. bengala sp. nov.
* *G. platycheles* Miyake, 1953
G. ternatensis de Man, 1902

Genus *Munida* Leach, 1820
M. elegantissima de Man, 1902
M. arabica Tirmizi & Javed, 1992
M. janetae Tirmizi & Javed, 1992
M. incerta Henderson, 1888
M. roshanei Tirmizi, 1966
M. japonica Stimpson, 1858
* *M. heteracantha* Ortmann, 1892
M. andamanica Alcock, 1894
M. babai Tirmizi & Javed, 1976
M. antonbruuni (Tirmizi & Javed, 1980)
M. sp.

Genus *Paramunida* Baba, 1988
* *P. scabra* (Henderson, 1885)
P. sp.

In the present study attention has been paid to structures of specific importance such as carapace, pterygostomian flap, sternum and appendages of head and thorax, and presence or absence of epipods. In addition to these, male pleopods are carefully studied, where juveniles were present they have been examined with extra care.

As far as possible, we have refrained from establishing new species, several specimens put away as new, during the first sorting, after a careful study were described as a variations of the already known species, nevertheless, such specimens are fully de scribed and illustrated.

In determining the genera, we found Prof.Dr. Keiji Baba's studies most useful and agreeing with our own observations. The old genera *Galathea* and *Munida* have been

split into various new genera (Baba, 1969, 1971, 1988; Baba & Javed, 1974). The present classification is more natural and convenient, it has also been followed by other eminent researchers like Dr. Janet Haig (1973). Genus *Munida* forms the major part of the present collection, consisting of 291 specimens. It is of interest to point out that in the present much larger collection genus *Munidopsis* is represented by only two species whereas in the "John Murray" collection this genus was represented by twelve species outnumbering those of the others.

The abbreviations used in the text are: IIOE - International Indian Ocean Expedition; Sta - station; Cr - Cruise; Lat - latitude; Long - longitude; Carapace length including rostrum (cl+r) is measured along the midline from the tip of the rostrum to the posterior margin of the carapace; carapace length (cl) from the orbit to the posterior margin of the carapace; rostral length (rl) along the middorsal line from the tip of the rostrum to the base; cheliped length (chl) from the tip of the thumb (immovable finger) to the proximal margin of the coxa; palm length (pl^1) from the base of the movable finger to the proximal margin of the propodus; finger length (fl) from the apex of the movable finger to the base. Dimensions of lengths are given in millimeters (mm.) and depth of capture of the species is given in meters (M).

Where only 'carapace length' is used, rostral length is also included, unless mentioned otherwise. Similarly, pereopods include chelipeds and the four pairs of walking legs, while 'walking legs' is used for legs only.

Various terms used in the descriptive accounts are shown in the diagrammatic figures 1-3.

The specimens were examined using a PZO, Mst 130 binocular microscope, all the illustrations are original, made directly from the specimens with the help of a 12x MS eye piece, in the same binocular microscope. Extremely small structures such as pleopods of small sized males, and different parts of juveniles were examined and illustrated using the PZO monocular microscope.

REMARKS ON DISTRIBUTION:

The principal aim of this study, has been to improve our understanding of the taxonomy of the Galatheidae, however, attention has also been paid to the species distribution. Geographical distributions of the species adhere closely to the expected pattern, with the better known species extending from India to China, Japan, Australia and the mid-Pacific Islands. The present collection has enabled us to extend the known distribution of a number of species.

Two species, *Galathea intermedia* and *Galathea dispersa* are found to have extended their range of distribution from Atlantic and South African coast to the Indian Ocean, and other species, *Galathea brevimana* previously restricted to the Red Sea, is now known to be distributed over a wider range in the Indian Ocean. Further, it is noted that most of the Japanese species extend well into the Indian Ocean.

From the available data (missing or incomplete for a few species) bathymetric distribution is also charted. It seems that the species of *Galathea* and *Fennerogalathea* are widely distributed ranging from 0-2417M, the species *Galathea whiteleggei* Grant & McCulloch and *Fennerogalathea chirostyloides* sp. nov. are recorded from 2417M which is the maximum depth, from which samples for the present collection were obtained. Moreover, maximum number of species as well as specimens are recorded from the depths ranging between 59-100M. Largest haul of 174 specimens, all belonging to *Munida arabica* Tirmizi & Javed, 1992 was taken at Sta.447 located in the Arabian Sea, recorded depth is 59-61M.

REMARKS ON THE MATERIAL:

The available collections were made by the ship 'Anton Bruun' under the U.S. Programme in Biology - International Indian Ocean Expedition, on Cruises 1,2,4B,7,8 and 9 during the years 1963-64. Some details of the areas explored are given below:

Cruise 1 Bay of Bengal, eastern Indian Ocean
19th March to 3rd May 1963.

Cruise 2 Western Indian Ocean
23rd May to 17th July 1963

Cruise 4B Arabian Sea
13th November to 4th May 1963

Cruise 7 South West Indian Ocean
29th July to 19th September 1964.

Cruise 8 African coast and northern Madagascar
25th September to 8th November 1964

Cruise 9 Arabian Sea, Islands of southwest Indian Ocean
15th November to 27th December 1964.

Although most of the specimens are in good condition, locomotory appendages were very rarely intact; those which got separated while studying were put together in small tubes. A few specimens seemed to have lost their setae, whereas some were almost in fragmentary conditions, nevertheless they too have been examined carefully.

The present collection will eventually be returned and housed in the USNM, Smithsonian Institution, Washington.

TAXONOMY

KEY TO SUBFAMILIES AND GENERA OF GALATHEIDAE
(After Baba, 1988)

1. Eyes usually well developed;exopod of first maxilliped with lash. Subfamily Galatheinae 2

- Eyes usually reduced; exopod of first maxilliped without lash. Subfamily Munidopsinae ..... *Munidopsis*

2. Rostrum triangular; unarmed or weakly armed 3

- Rostrum mostly spiniform with dorsal and ventral spines 12

3. Lateral margins of rostrum nearly unarmed, finely serrate or with rudimentary teeth 4

- Lateral margins of rostrum with distinct teeth 7

4. Rostral margin finely serrate ..... *Nanogalathea*

- Rostral margin with 4 indistinct or rudimentary denticles 5

5. Carapace lacking distinct transverse ridges; eyestalk relatively narrow and elongate ..... *Fennerogalathea*

- Carapace with transverse ridges; eyestalk relatively wide 6

6. Carapace with 1-3 lateral marginal spines; antenna well developed, second segment with 2 terminal spines ..... *Liogalathea*

- Carapace with 6 lateral marginal spines; antenna much reduced, second segment unarmed ..... *Allomunida*

7. Endopod of uropod extremely wide ..... *Lauriea*

- Endopod of uropod normal, about as long as wide 8

8. Rostrum extremely elongate, with 5-9 lateral teeth ..... *Allogalathea*

- Rostrum moderate in length with 1-5 lateral teeth 9

9. Rostrum dagger-shaped with supraocular spines 10

- Rostrum with 3-5 distinct spines 11

10. Carapace with epigastric spines, lateral limit of orbit produced... *Phylladiorhynchus*

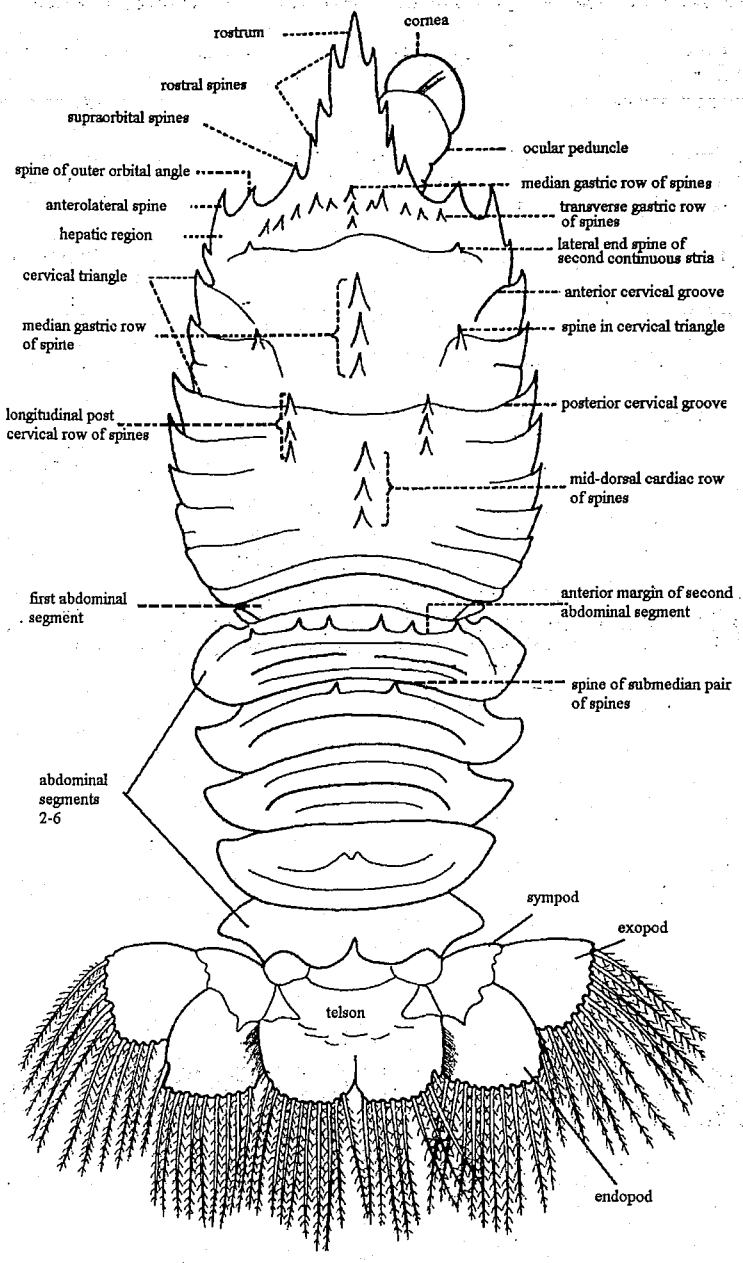

Fig. 1. Diagramatic galatheid showing terms used in descriptions.

- Carapace lacking epigastric spines, lateral limit of orbit not produced.....*Alainius*

11. Rostrum with 3 lateral teeth on each side; second segment of antennal peduncle lacking distomedian spine; third thoracic sternum strongly produced anteriorly, nearly triangular.....*Coralliogalathea*

- Rostrum with 4 lateral teeth; second segment of antennal peduncle with 2 terminal spines; third thoracic sternum relatively short and narrow, anterior margin distinctly or indistinctly bilobed.....*Galathea*

12. Pterygostomian flap visible in dorsal view.....*Pleuroncodes*

- Pterygostomian flap not visible in dorsal view.....13

13. Two supraorbital spines on each side.....*Sadayoshia*

- One supraorbital spine on each side.....14

14. Rostrum with dorsal and ventral teeth.....*Cervimunida*

- Rostrum without dorsal and ventral teeth.....15

15. Rostrum spiniform, well developed; transverse ridges of carapace distinct.....
.....*Munida*

- Rostrum extremely short; transverse ridges of carapace usually reduced.....16

16. Carapace with abnormally developed gastric and cardiac spines; first segment of antennal peduncle with short process .....*Bathymunida*

- Carapace covered wtih granules or spinules, lacking abnormally developed gastric and cardiac spines; first segment of antennal peduncle with elongate, anteriorly directed process.....*Paramunida*

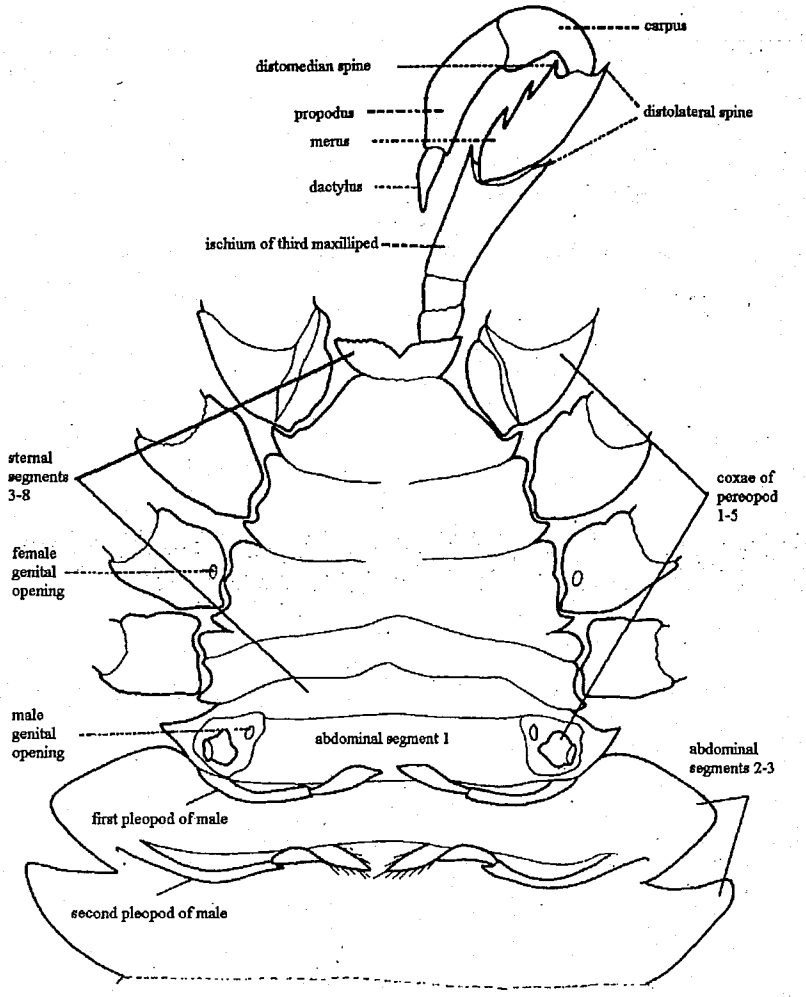

Fig. 2. Diagramatic sketch of sternum with third maxilliped, coxae of pereopods 1-5 and abdominal segments 1-3.

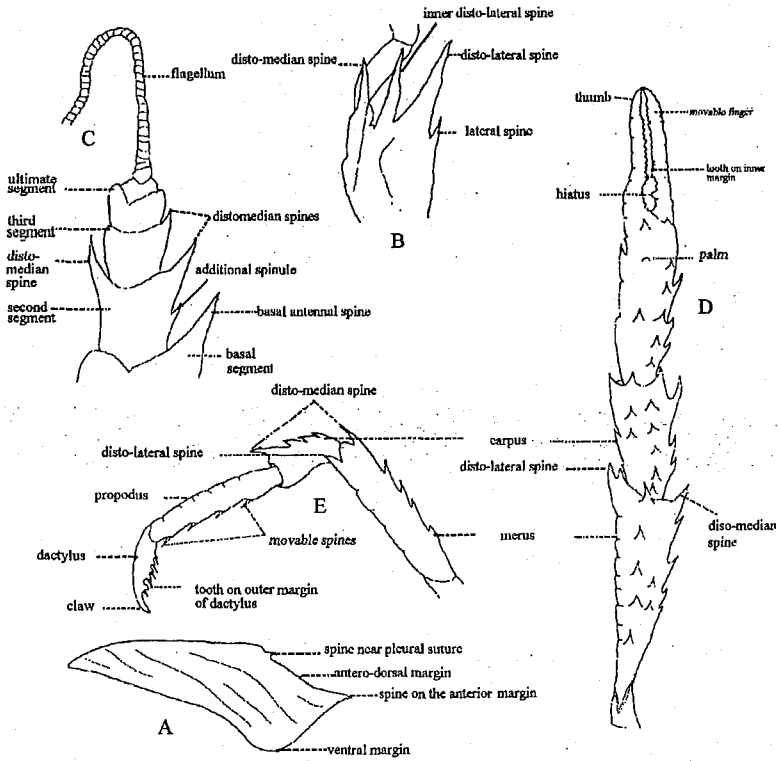

Fig. 3. Diagramatic sketches showing terms used in descriptions: A. pterygostomian flap; B. basal segment of antennule; C. antennal peduncle; D. cheliped, E. walking leg.

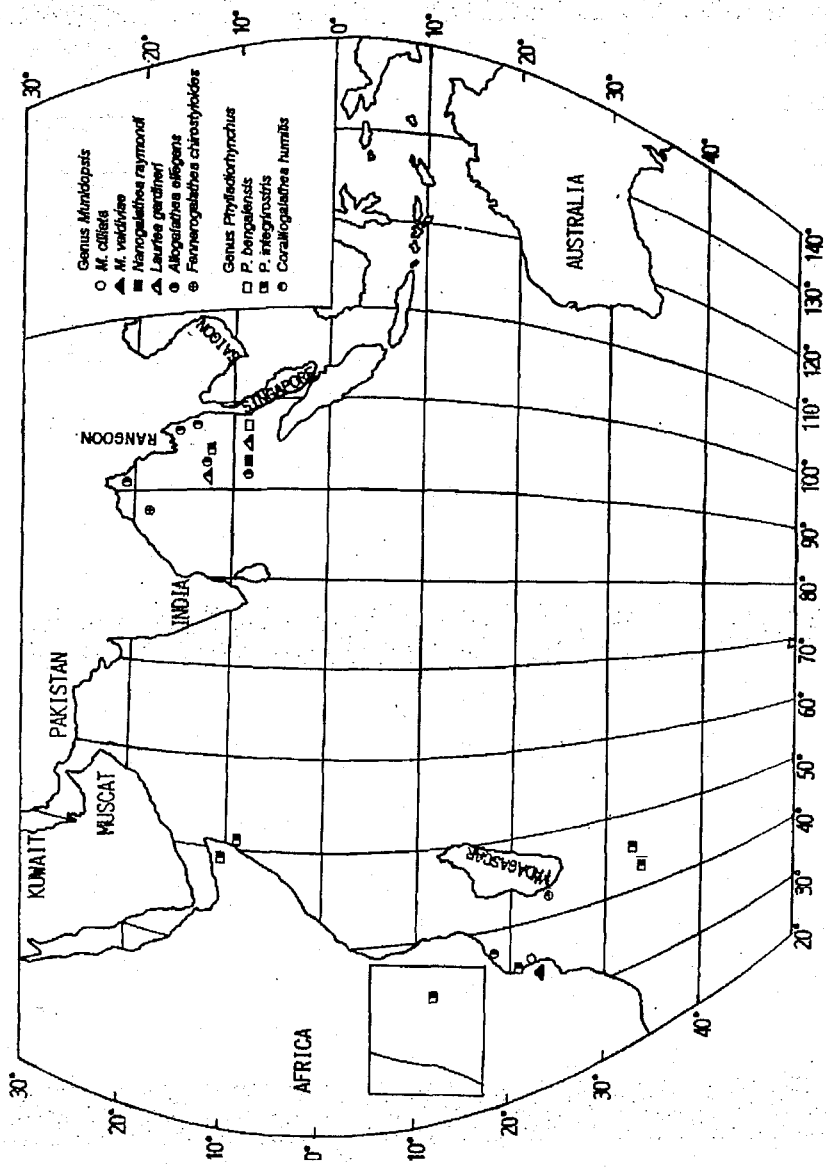

Fig. 4. Stations at which species of *Munidopsis, Nanogalathea, Lauriea, Fennerogalathea, Allogalathea* and *Phylladiorhynchus* were taken.

Depth (M)	*Munidopsis valdiviae*	*Lauriea gardineri*	*Nanogalathea raymondi*	*Munidopsis ciliata*	*Allogalathea elegans*	*Phylladiorhynchus integrirostris*	*Phylladiorhynchus bengalensis*
27-30					3	1	
38						6	
40						1	
55-40						6	
62					1	40	
66		1					
68					1		
72					1		
77			2		8		1
138						1	
177		2					
1510-1600	1			1			

Fig. 5. Chart indicating depth of capture and number of individuals of five genera of Galatheidae from four cruises of Anton Bruun in the Indian Ocean.

Genus *MUNIDOPSIS* Whiteaves, 1874

Diagnosis.-

"Rostral process spiniform, horizontal; no long spiniform supraorbital spines, and no large spine in middle of carapace. Carapace strongly indurated, without transverse setose ridges. Eyes not faceted and not pigmented. Exopod of maxilliped 1 without flagellum" (Barnard, 1950:493).

Remarks.-

Doflein and Balss (1913 :117) had tabulated the known geographical and bathymetric distribution of 106 species. Chace in 1942 (p.69) reported 115 species. Since then, as far as we know the additions to this genus are as follows:

M. okadai Yanagita, 1942
M. sundi Sivertsen & Holthuis, 1956
M. latimana Miyake & Baba, 1966
M. granulata Miyake & Baba, 1967
M. tropeorhyncha Miyake & Baba, 1970
M. bispinata Miyake & Baba, 1970
M. alaminos Pequegnat & Pequegnat, 1970
M. geyeri Pequegnat & Pequegnat, 1970
M. gulfensis Pequegnat & Pequegnat, 1970
M. bradleyi Pequegnat & Pequegnat, 1971
M. colombiana Pequegnat & Pequegnat, 1971
M. ramathtaylorae Pequegnat & Pequegnat, 1971
M. subspinoculata Pequegnat & Pequegnat, 1971
M. transtridens Pequegnat & Pequegnat, 1971
M. bispinoculata Baba, 1988
M. carinimarginata Baba, 1988
M. crenatirostris Baba, 1988
M. plumatisetigera Baba, 1988
M. similior Baba, 1988

KEY TO THE SPECIES OF *MUNIDOPSIS* WHITEAVES, 1874

1. Abdomen unarmed, 2 eye spines present; epipod present on pereopod 1..... ..... *M. ciliata*

2. Abdomen with strong median spine on 2-4 segments; eye spine absent; epipods present on 1-3 pereopods..... *M. valdiviae*

Munidposis ciliata Wood-Mason, 1891
(Fig. 6)

Munidopsis ciliata Wood-Mason,1891:200; Faxon, 1895:84, Benedict, 1902:318; Baba, 1982b:114,pl.2: fig.1; 1988: 147, fig.56 (see for synonymy);
Munidopsis brevimana Henderson, 1885:414; 1888:154, pl.XVII; figs.1,2;

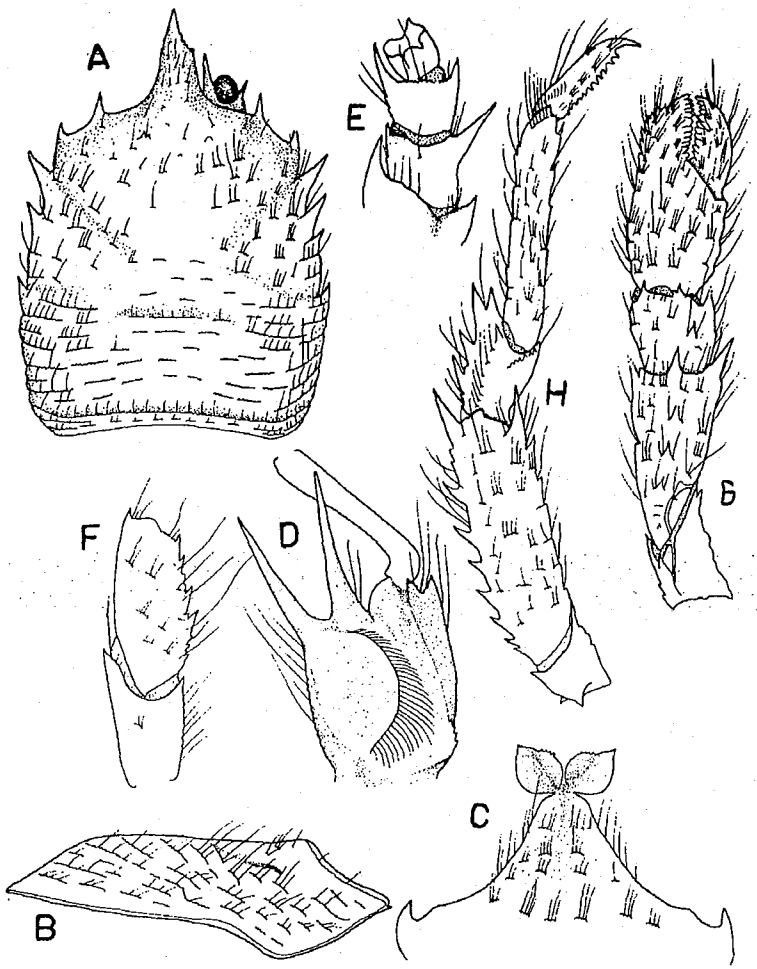

Fig. 6. *Munidopsis ciliata* Wood-Mason, 1891, female, cl+r, 21.5mm; A, carapace and right eye, dorsal view; B, right pterygostomian flap; C. anterior part of sternal segments; D, basal segment of left antennule, dorsal view; E, left antennal peduncle, ventral view; F, ischium and merus of right third maxilliped, ventral view; G, left cheliped; H, right detached walking leg.

Munidopsis (Orophorhynchus) ciliata: Alcock, 1901: 267; Illus. Zool. Investigator, Crust.pl.XI, figs.3,3a; MacGilchrist, 1905:248; Tirmizi, 1966:216, fig.31.

Material and measurements.-

Sta.399C; Cruise 8; Long.36°18'E; Lat.21°18'S; Depth 1510-1600M; Date 18-2-1964; 1 female, cl+r, 21.5mm; chl, 20.5mm.

Descriptive remarks.-

It is surprising that a fairly large genus *Munidopsis* is represented by a single female, referable to *Munidopsis ciliata*. The specimen, however, agrees fairly well with the descriptions given by previous authors a few minor differences are noted in the following account:

The rostrum (Fig.6A) is not normal probably as a result of some injury. It, however, differs from earlier descriptions in being rather broad having no distinct carina and more elevated near the apex. According to Henderson (1988:154) the rostrum is narrow, acute, slightly elevated towards the apex and carinated superiorly (1888:154) a similar condition is reported by Baba (1988:148) only the carina is said to be 'usually' present. Although a few serrations can be noticed but due to its abnormality it is not exactly as described and illustrated for the 'John Murray' specimen (Tirmizi, 1966: 217, Fig.31A). Baba, 1988, has mentioned these serrations for only one specimen, out of a series of ten specimens. Further the long setae mentioned by Tirmizi (1966:217) are present in large number. The gastric region is armed, on the left with a bifurcated spine, on the right the spine is represented by a tubercle. The right anterolateral spine is followed by four spines, that on the left by three.

The pterygostomian flap (Fig.6B) has a subapical spine, its surface is furnished with broken and setose striae.

A deep notch separates the third thoracic sternite (Fig.6C) into two petaloid lobes with partly serrated anterior margin, and spinose anterolateral angles.

The distal spines of the basal segment of the antennule differ from those illustrated for the 'John Murray' specimen (Tirmizi, 1966,Fig.31B) in having the outer spine long, slender, needle like and subequal (Fig.6D). The armature of the antennal peduncle (Fig.6E) agrees perfectly well with the description given by Tirmizi (1966:216).

The merus of the third maxilliped is longer than the ischium as can be seen in figure 6F. Both the distal angles of the latter are armed with small spines, the outer margin of the merus is smooth with the distal angle produced into an acute spine while the inner margin is variably spinose (Baba, 1988:148). In the present specimen it is irregularly denticulate with four well defined spinules, as such it differs from "Challenger" specimen (Henderson,1888,pl.xvii, Fig.2a) and agrees with the "John Murray" specimen (Tirmizi,1966, Fig.31C).

The chelipeds are short and stout being a trifle shorter than the carapace (chl 20.5mm, cl+r, 21.5mm). The fingers of chela are slightly shorter than the palm. The outer margin of the movable finger is smooth while that of the thumb is provided with a row of spines (Fig.6G). All the walking legs are detached. They are setose, stout and moderately long. The outer margins of the dactylus of all the legs are each with a constant number of eleven spines excluding the terminal claw. The same margin of the propodus (Fig.6H) of four legs is each provided with two spines whereas in two legs only one distal spine is present. The other segments of the legs are more or less as illustrated in figure 6H.

Epipods are present on the chelipeds only.

Distribution.-
Indo-Pacific: Srilanka, Andaman, Gulf of Aden, east coast of Africa; Bay of Bengal, Japan and eastern Pacific (see Baba,1988).

Munidopsis valdiviae (Doflein & Balss, 1913) (Fig.7)

Galacantha valdiviae Doflein & Balss, 1913:147,pl.xvi, fig.2; Baba, 1982b:112, pl.1: fig.1.

Munidopsis valdiviae: Baba, 1988:173,fig.71.

Material and measurements.-
Sta.399C; Cruise 8; Lat.21°18'S;Long.36°18'E; Depth 1510-1600M; Date 10-2-1964; 1 female (ovigerous), cl+r, 27mm, chl, 38mm.

Descriptive remarks.-
In the present collection is a large stout female, it is probably the largest known specimen, being larger than the holotype and the 'Albatross' specimens. It agrees with earlier descriptions. The posterior lateral spines are situated behind the cervical groove, a character used by Doflein & Balss (1913:148) in differentiating the *valdiviae* from all the species known to them. The specimen at hand has simple (non spinose) tubercles all over the carapace, three well developed spines in the gastric region, the posterior being very large and a spine on the anterior margin of the cardiac region (Fig.7A). The abdominal segments are rather smooth, 2-4 segments are each with a stout, curved median spine.

The pterygostomian flap is acutely pointed at both ends, and is furnished with numerous setose scales (Fig.7B).

The third thoracic sternite is with a long, narrow, neck-like basal portion, it is partially subdivided, the much wider distal portion is as illustrated in figure 7C.

The cornea of the eye (Fig.5A') is wider than the stalk and is oriented on a short and mobile ocular peduncle.

The basal segment of the antennule (Fig.7D) is with three strong and divergent spines. Armature of the antennal peduncle (Fig.7E) is less developed, the basal spine is of moderate size, the following segment has a sharp spinose distolateral angle, the spination of the segment is of interest, since both the distal angles are armed, the outer one bears a long anteriorly directed spine.

The merus of the third maxilliped (Fig.7F) differs from Doflein and Balss' specimen in having three instead of two spines on the inner margin.

The spinosity and sculpturing of the chelipeds and walking legs (Figs.7G & H) appears to be the same as illustrated by Doflein and Balss (1913,pl.xvi,Fig.2).

Epipods are present on 1-3 pereopods.

Distribution.-
Indo-Pacific: East coast of Africa, Molucca Sea, Palwan Passage, Japan.

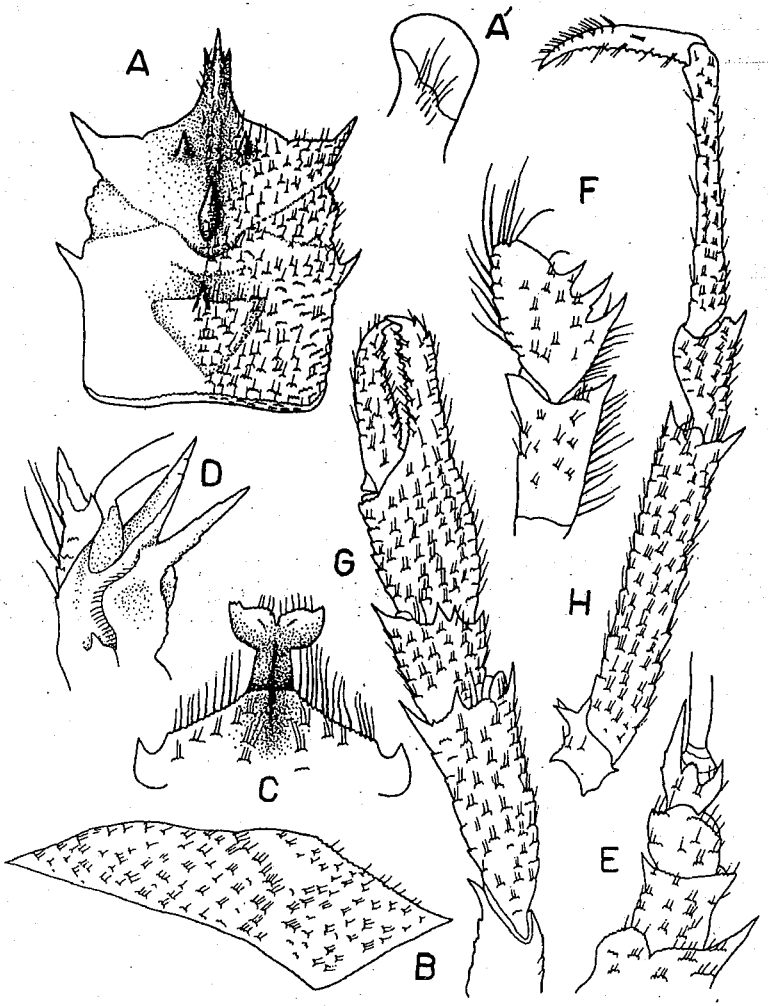

Fig. 7. *Munidopsis valdiviae* (Doflein & Balss, 1913), ovigerous female, cl+r, 27mm, A, carapace, dorsal view; A', right eye, dorsal view; B, right pterygostomian flap; C, anterior part of sternal segments; D, basal segment of right antennule, dorsal view; E, right antennal peduncle, ventrral view; F, ischium and merus of right third maxilliped, ventral view; G, right cheliped; H, left detached walking leg.

Genus *NANOGALATHEA* Tirmizi & Javed, 1980

Diagnosis.-

Rostrum broadly triangular, concave dorsally and carinated on the ventral side, with inely serrated lateral margins, and a well developed notch near the apex; dorsal urface of carapace coarse, unarmed and with weak striation, branchial region with six aarginal spines, outer orbital angle armed, abdomen unarmed, ocular peduncle short nd dilated, cornea cap-like, basal antennular segment globular, short and stout, econd segment of antennal peduncle produced distally to form an outer and an inner aarginal spine, third maxilliped moderately setose and spinose, ischium of triangluar hape in cross section. Third thoracic sternite not as wide as the anterior margin of he fourth.

Type species: *Nanogalathea raymondi* Tirmizi & Javed, 1980

Remarks.-

Nanogalathea resembles both *Liogalathea* Baba, 1969, and *Phylladiorhynchus* Baba, 1969. Basically the genera of the Galatheidae, especially of the subdivisions of the ormerly recognized *Galathea* sl. are characterized by the shape of the rostrum. Apart from the complete absence of the rostral teeth from this new genus, there is no distinct character to separate it from the closest relative, *Phylladiorhynchus*: the basal segment of the antennule and the third maxilliped are common and characteristic to both. However, the occurrence of two specimens suggests that the character of the absence of rostral teeth might be constant. The new genus agrees with *Liogalathea* in lacking rostral teeth but it differs clearly in having (1) the outer orbital angle armed and distinctly produced, (2) the third thoracic sternum narrower than the anterior margin of the fourth, (3) the basal antennular segment with at least four spines terminally, and (4) the merus of the third maxilliped very much shorter than the ischium. At present *Nanogalathea* includes only the type species.

Nanogalathea raymondi Tirmizi & Javed, 1980 (Fig.8)

Nanogalathea raymondi Tirmizi & Javed, 1980:128, figs.1-6.

Material and measurements.-

Sta.18A; Cruise 1; 08°34'N; Long.98°00'E; Depth.77M; Dated 21-3-1963; 2 females (1 ovigerous), cl+r, 1.5-2mm, cb, 1-1.5mm; rl, 0.5mm.

Descriptive remarks.-

The rostrum (Fig.8A) is broadly triangular, it is carinated ventrally, the lateral margins are finely serrated posterior to the well defined notch, situated near the tip. The dorsal surface is concave and with plumose setae, some of which are arranged in a neat row along the lateral margin. The outer orbital angle is armed with a stout pyramidal spine. The anterolateral spine is smaller, followed by seven spines, the hepatic region is armed with a minute spine which is rather dorsal in position.

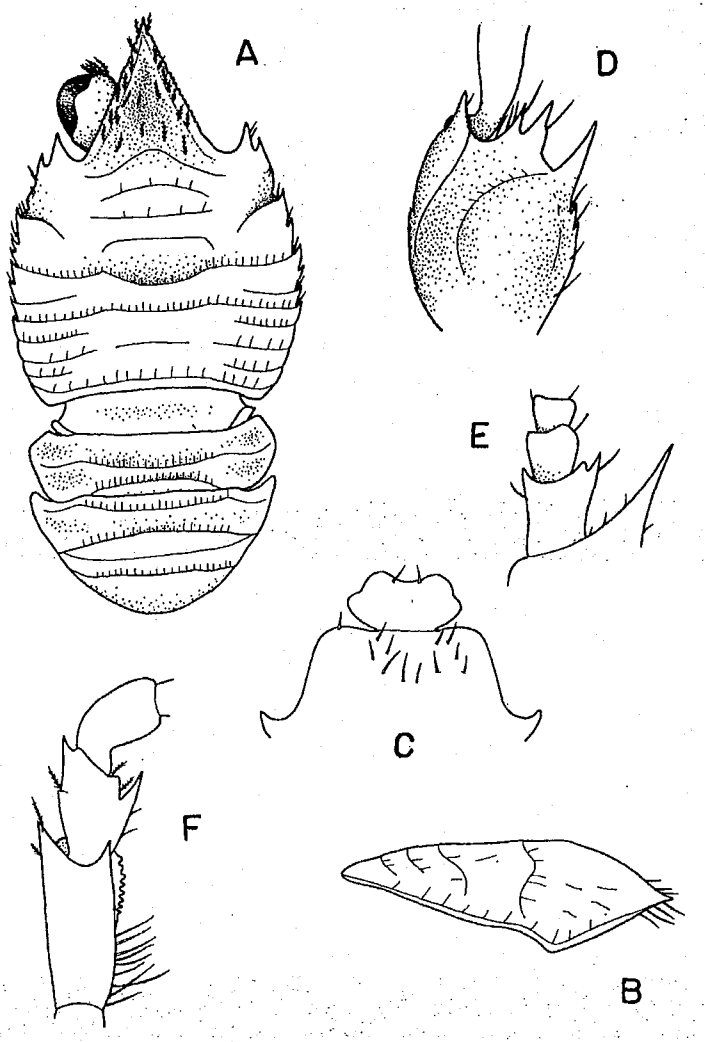

Fig. 8. *Nanogalathea raymondi* Tirmizi & Javed, 1980, female (holotype), cl+r, 2mm; A, carapace and abdomen, dorsal view; B, right pterygostomian flap; C, anterior part of sternal segments; D, basl segment of right antennule, dorsal view; E, right antennal peduncle, ventral view; F, part of endopod of right third maxilliped, ventral view.

The pterygostomian flap (Fig.8B) is narrow posteriorly and acutely pointed anteriorly, striae are few and with very fine setae.

The third thoracic sternite (Fig.8C) is slightly depressed, rather broad and with sinuous margins.

The eyes are rather characteristic having a short, broad ocular peduncle and with a tuft of plumose setae on the margin, anteriorly. The cornea is light brown in colour.

The basal segment of the antennule (Fig.8D) is armed with five spines on the outer margin, the third being the largest the proximal two are quite small. The distomedian angle is produced into a well defined spine, with serrated margins. A pronounced tuft of hairs is present on the distal segment of the antennular peduncle. The distomedian angle of the basal segment of the antenna (Fig.8E) is produced into a large and pointed spine slightly extending beyond the second segment. The second segment is longer than the others, its distal angles are produced into spines. The left antennal peduncle is with a small spine on the distomedian angle of the third segment.

The merus of the third maxilliped (Fig.8F) is shorter than the ischium, armed with a strong inner marginal spine and a small outer distal spine. Both distal angles are produced into well developed spines.

The chelipeds and all the walking legs are missing from the holotype as well as the paratype.

Epipods are absent from all the pereopods.

Distribution.-

Known only from the Indian Ocean: Bay of Bengal.

Genus *FENNEROGALATHEA* Baba, 1988

Diagnosis.-

Rostrum triangular, flat, with small spines near the base; dorsal surface of carapace armed with spines. Outer orbital angle spinose. Abdominal segments with transverse ridges. Eyestalks long and slender. Propodus of third maxilliped expanded.

Thoracic sternite distinctly bilobed.

Antennular basal segment globular, with spines. Basal segment of antennal peduncle without spine. Chelipeds long, slender and spinose. Walking legs slender with serrated dactyli (see Baba, 1988).

Type species.- *Fennerogalathea chacei* Baba, 1988

Fennerogalathea chirostyloides sp. nov.
(Fig.9)

Material and measurements.-

Sta.60; Cruise 1; Lat.17°55'N; Long.86°31'E; Depth 2417M; Date 9-4-1963; 3 males, cl+r, 4.5-5.5mm; cb, 2.5-3mm; rl, 1.4-1.5mm.

The male measuring 5.5mm in carapace length is selected as the holotype.

Measurements of the holotype.-

Male, cl+r, 5.5mm; cb, 3mm; rl, 1.5mm.

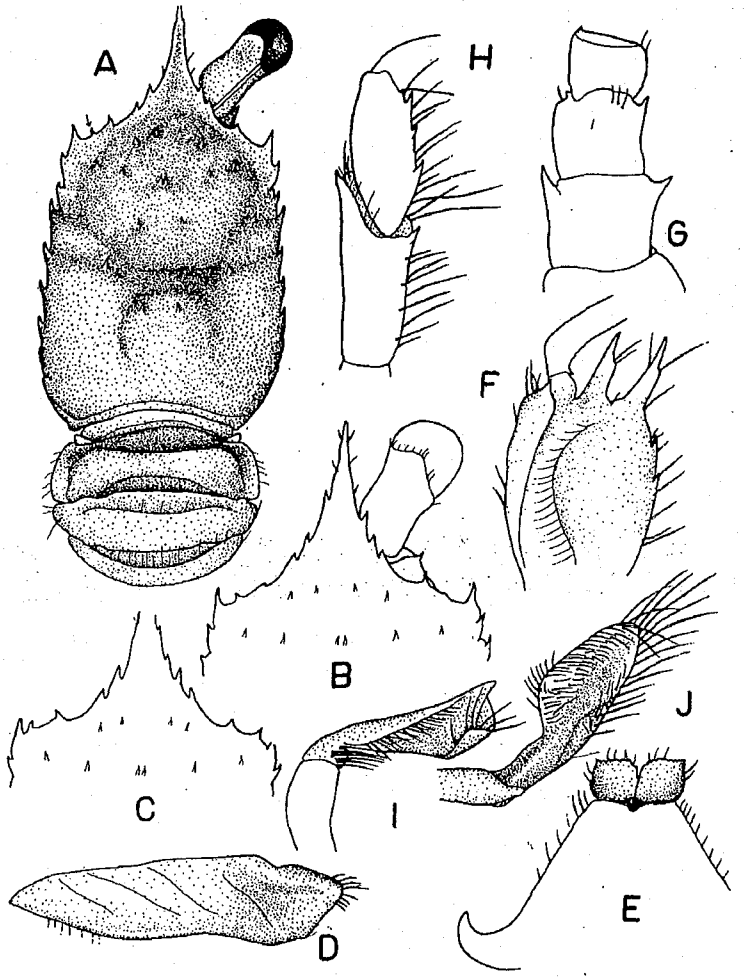

Fig. 9. *Fennerogalathea chirostyloides* sp. nov., holotype male, cl+r, 5.5mm, A, carapace and abdomen, dorsal view; male, cl+r, 5mm; B, anterior part of carapace and right eye, dorsal view, Holotype, male, cl+r, 5.5mm; D, right pterygostomian flap; E, another part of sternal segments; F, basal segment of right antennule, dorsal view; G, right antennal peduncle, ventral view; H, ischium and merus of right third maxilliped, ventral view; I, right first pleopod; J, right second pleopod.

Description.-

Three very interesting specimens are present in the IIOE collection. The largest is 5.5mm in carapace length, it is illustrated in figure 9A. The rostrum has a wide flat base with two teeth on each lateral margin, beyond the distal pair it becomes narrow, elongated and almost smooth laterally on the right half a small tooth represents the outer orbital angle, on the left there is an additional spine (marked by an arrow). Each anterolateral spine is followed by six spines. The surface of the carapace has well defined regions and several anteriorly curved spines, the striae and setae are absent.

The pterygostomian flap (Fig.9D) is provided with a few ridges, a broadly rounded tip, fringed with setae, and a few fine setae can also be seen near the posterior pointed end.

The third thoracic sternite (Fig.9E) is distinctly bilobed, each lobe being bulbuous with a serrated anterior margin and an acute anterolateral tip.

The eyes are borne on long and slender ocular peduncles.

The distomedian spine of the basal segment of the antennule (Fig.9F) is minute, the two lateral ones are of medium size, further the outer margin is furnished with two small spines. The antennal peduncle is characteristic in being without a spine, both distal margins of the following two segments are armed as shown in figure 9G.

The merus of the third maxilliped (Fig.9H) is nearly as long as the ischium, the inner margin is armed with three small spines, one specimen has on the left side, the middle spine represented by a tubercle.

Chelipeds and all the walking legs are missing.

Epipods are present on the chelipeds only.

The first pleopod (Fig.9I) is narrow, with a triangular reflected lobe, and with fairly long setae. The second pleopod (Fig.9J) is club-shaped and densely setose.

Remarks.-

The anteior portion of the carapace of each, of the other two males is illustrated in figures 9B&C. It can be seen that number, position and size of the spines on the lateral margins of the rostrum and the anterior margin of the carapace varies in all the three specimens, other features are more or less the same.

Genus *LAURIEA* Baba, 1971

Diagnosis.-

"Carapace weak and broken in striation, in most cases spinous and setose above. Its lateral margin armed with spines. Basal antennular segment with three terminal spines. Second segment of antennal peduncle produced distally to form an outer and an inner marginal spine, its inner margin having a distinct spine medially. Anterior margin of third thoracic sternite produced forwards.

Chelipeds stout and setose, with the wrist strongly spined internally. Dactylus of walking leg curved inward distally, with a well-developed claw on inner margin. Endopod of uropod elongated and concealed both beneath the protopod of uropod and telson at its inner side, and consequently its outer margin becoming posterior in natural condition" (Baba, 1971:511).

Type - species: *Lauriea gardineri* (Laurie, 1926)

In the IIOE collection, this monospecific genus is represented by seven specimens.

Lauriea gardineri (Laurie, 1926) (Figs. 10,11)

Galathea gardineri Laurie, 1926:131,pl.9, figs.1-5;
Galathea gardineri: Tirmizi, 1966:177,fig.2; Lewinsohn, 1969:112; Haig, 1974:447.
Galathea biunguiculata Miyake,1953:199,figs.1,2;
Lauriea gardineri: Baba, 1971:53,fig.1; 1988:80; 1989:961.

Material and measurements.-

Sta.9-456; Cruise 9; Lat.11°15'N; Long.51°08'E; Date 17-12-1964;1 female (ovigerous), cl+r, 4mm; cb, 3mm; rl, 1mm.
Sta.18A; Cruise 1; Lat.07°34'N; Long.98°00'E; Depth 177M;Date 21-3-1963;1 female, cl+r, 1.5mm; cb, 1mm;1 male, cl+r, 1.5mm; cb, 1mm; rl, 0.5mm.
Sta.9-453; Cruise 9; Lat.11°14'N;Long.51°14'E; Date 17-12-1964; 2 females (ovigerous), cl+r, 3.5mm; rl, 1mm, chl, 6mm; pl, 1.8mm; fl, 1.2mm.
Sta.28A, Cruise 1; Lat.11°52'N; Long.92°49'E; Depth 66M; Date 27-3-1963; 1 female, cl+r, 2mm.
Sta.M-10; Date 19-9-1967; 1 female (ovigerous), cl+r, 4mm; cb, 3mm; rl, 1mm.

Descriptive remarks.-

L.gardeneri has been adequately described and illustrated by earlier workers. It is, however, being briefly described and illustrated here for comparison with other genera. Also careful examination of the available specimens shows some slight variations which are accounted below:

L. gardeneri is rather a small sized species, the carapace (Fig.10A) is covered by scant, setose or spinose, granulated striae. The rostrum is armed with four lateral spines, besides this there is a small spine on the outer orbital angle, and each anterolateral spine is followed by five spines. Abdominal segments (Fig.10A) are with long setae, deep transverse groove and a prominent setose ridge.

The pterygostomian flap (Fig.10B) is with a partly serrated upper margin, and with one long and two small striae on the surface.

The anterior margin of the third thoracic sternite (Fig.10C) is produced forwards and bears a deep notch or sinus. The sternite differs from that of the Japanese specimen (Miyake, 1953:199) in having acute lateral angles, also each posterolateral angle of the following sternite is produced into a curved and sharply pointed spine.

Each of the two outer spines of the antennule (Fig.10D) is with a slight projection, at what might be termed as near the base of the spine. In Miyake's specimen this condition is illustrated only for the outer most spine (Miyake, 1953, Fig.2a). The second segment of the antennal peduncle (Figs.10E & 10F) may or may not be, with an additional spine at the base of the large inner spine.

The inner margin of the merus of the third maxilliped (Fig.10F) is armed with two strong and acutely pointed spines. In one ovigerous female (cl+r, 3.5mm), the distomedian angle of the ischium is armed with a fairly developed spine.

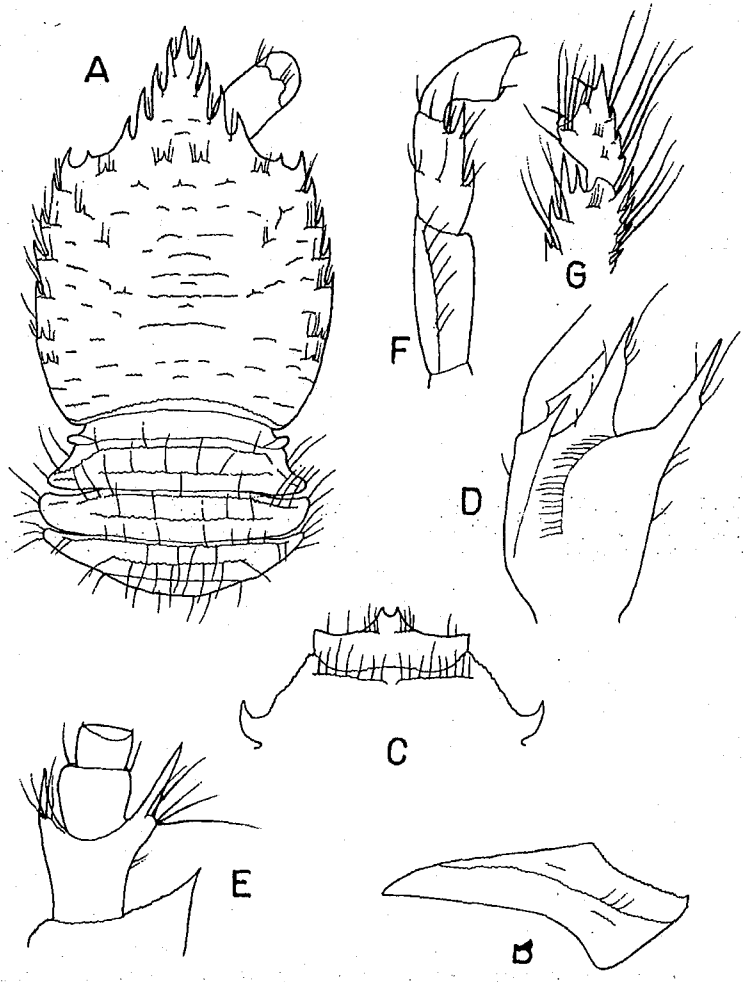

Fig. 10. *Lauriea gardineri* (Laurie, 1926), female, cl+r, 3mm, A, carapace and abdomen, dorsal view; B, right pterygostomian flap; C, anterior part of sternal segment; D, basal segment of right antennule, dorsal view; E, right antennal peduncle, ventral view; F, part of endopod of right third maxilliped, ventral view; G, part of merus and carpus of left first walking leg.

A detached and incomplete cheliped is present which is very similar to the one described and illustrated by Miyake (1953,Fig.1). Only one left first walking leg is present and is still attached to the body, the dorsal surface of the carpus bears granular scales (Fig.10G).

One ovigerous female from Sta.M-10 needs special mention since there are only three lateral spines, including the supraorbitals (Fig.11A). The armature of the antennule, antennal peduncle and the third maxilliped (Figs.11E,F & G) falls within the variation, noted in other specimens referred to the species under consideration. The tip of the pterygostomian flap (Fig.11C) is rounded instead of being truncated the third thoracic sternite (Fig.11D) is however not deeply notched. Only one detached leg (Fig.11H) is available which appears to be more thorny than the first leg of the female from Sta.9-953.

Epipods are absent form all the pereopods.

Remarks.-

Although the number of rostral teeth is one of the important characters for separating the genera, however, since only one specimen is available, and the main difference lies in the number of teeth, other characters being more or less, as in *Lauriea gardineri*, it seems reasonable to place the specimen, with two lateral teeth, as a variation from the typical three tooth condition.

Distribution.-

Indo-Pacific: Red Sea, Madagascar, Providence Island, Scychelles Island, Bay of Bengal, Malay Archipelago, Japan and western Australia.

Genus *ALLOGALATHEA* Baba, 1969

Diagnosis.-

"Rostrum elongated and carinated ventrally, with five to nine lateral teeth of small size. Carapace with many transverse ridges fringed with fine but coarse setae. Branchial region with six or seven spines marginally. Orbit small, its outer angle spinulate.

Basal antennular segment short, stout with three terminal spines. Third maxilliped stout, its ischium of triangular shape in cross section. Chelipeds rather depressed, squamiferous, spinose and setose. Ambulatory legs likewise squamiferous and very setose marginally. Third thoracic sternite roughly triangular. Eyestalk of moderate length, corneal region slightly dilated distally. Abdominal segments unarmed dorsally.

Epipods present on first or first three pairs of pereopods" (Baba, 1969:5).

Type-species: *Allogalathea elegans* (Adams & White, 1948)

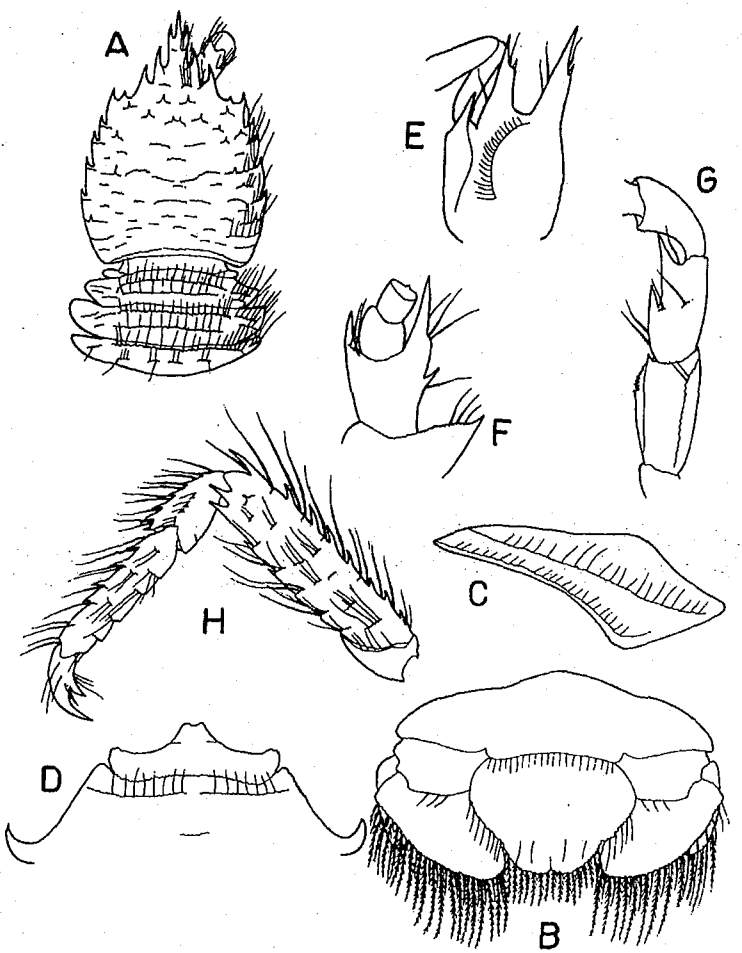

Fig. 11. *Lauriea gardineri* (Laurie, 1926), ovigerous female, cl+r, 4mm, A, carapace, and abdomen, dorsal view; B, last abdominal segment, telson and uropods in dorsal view; C, right pterygostomian flap; D, anterior part of sternal segments; E, basal segment of right antennule, dorsal view; F, right antennal peduncle, ventral view; G, part of endopod of left third maxilliped, ventral view; H, left detached walking leg.

Allogalathea elegans (Adams & White,1948) (Figs.12,13)

Galathea elegans White, 1847:66 (nomen nudum), Adams & White, 1848,pl.12,fig.7; Balss, 1913b:4, figs.2,3; 1921 :22; Miers, 1884:278; Grant and McCulloch,1906 :43, pl.4, figs.6; Potts, 1915:83,pl.1, figs.5,4A; Miyake, 1938:37, table.2, fig.1,A-C; Melin, 1939 :77, figs.48-53; Miyake, 1947:733, fig.2188; Barnard, 1947:379; 1950:487, fig.91 i-k; Utinomi, 1956:63, pl.32, fig.4; Miyake 1965,: 635, fig.1045; Tirmizi, 1966:198; Miyake & Baba, 1967b:228, fig.3; McNeill, 1968:33; Gillett, 1968:15; Lewinsohn, 1969:123, fig.24; Healy and Yaldwyn, 1970:68, pl.31;
Galathea deflexifrons Haswell, 1882a:761; 1882b:163;
Galathea elegans ?, Haswell, 1882b:163;
Galathea longirostris Yokoya, 1936:138,fig.6;
Allogalathea elegans: Baba, 1969a:6, fig.I; 1977a:252; 1979b: 654; 1988: 54; Haig, 1973:275; 1974:447, fig.3; Miyake, 1982, pl.50, fig.5.

Material and measurements.-

Sta.402-A; Cruise 8; Lat.10°09'S;Long.036°20'E; Depth 27-30M; Date 9-10-1964; 2 male, cl+r, 9-11mm; cb, 5-6mm; rl, 4-4.5mm; cl, 19-21mm; pl, 4.5-5.5mm; fl, 4-4.5mm; 1 female, cl+r, 12.5mm (tip of rostrum broken) chl, 22mm; pl, 6mm; fl, 4.5mm.

Sta.AB-38; Cruise 1; Date 31-7-1963; 1 male, cl+r, 7.5mm; cb, 4.5mm; cl, 3.5mm; chl, 14.5mm; pl, 4mm; fl, 3mm.

Sta.28A; Cruise 1; Lat.11°52'N; Long.92°49'E; Depth 68M; 1 male, cl+r, 5.5mm.

Sta.18A; Cruise 1; Lat.07°34'N; Long.98°00'E; Depth 77M; Date 21-3-1963; 3 males, cl+r, 3mm; 5 females (1 ovigerous), cl+r, 2-8.5mm; cb, 1.2-5mm; rl, 1-3.5mm.

Sta.AB-47B; Cruise 1;Lat.19°50'N; Long.92°55'E; Depth 22M; Date 31-7-1963; 1 male, cl+r, 3mm; cb, 1.5mm; rl, 1.5mm.

Sta.37; Cruise 1; Lat.13°28'N; Long.97°19'E; Depth 72M; Date 30-8-1963; 1 female, cl+r, 2.5mm; cb, 1.4mm; rl, 1mm.

Descriptive remarks.-

Baba (1969a:6) has discussed the systematic position of the species described as *Galathea elegans, deflexifrons* Haswell, *longirostris* Dana, *grandirostris* Stimpson and *longirostris* Yokoya, and in his description of *A.elegans* included only those specimens which had epipods on the chelipeds. In the collection at hand, there are altogether fifteen specimens available for study, of which seven specimens have distinct epipods on their chelipeds, other specimens are rather small and even a careful examination under high power microscope leaves the presence of epipods rather doubtful. It may also be pointed out here that the 'John Murray' specimen (Tirmizi,1966) was very kindly checked by Dr. Ingle of the British Museum (Natural History) who has informed us that "the 'John Murray' *Galathea elegans* has a prominent epipod on the right cheliped; the one on the left is missing". This removes the doubt regarding the validity of the "John Murray" specimen (personal communication).

A large male (cl+r, 11mm) is illustrated in figure 12A as can be seen, it agrees rather well with the specimen described and illustrated by Miyake & Baba (1967:229). The large specimens show only slight variations in the number of rostral

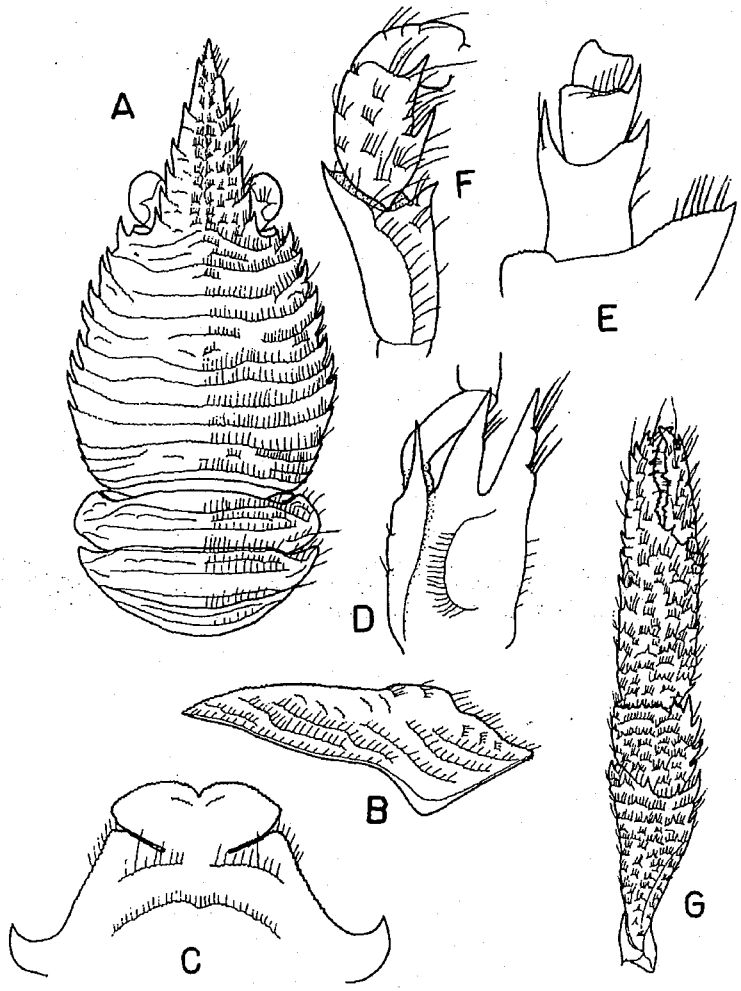

Fig.12. *Allogalathea elegans* (Adams & White, 1948), male, cl+r, 11.0mm, A, carapace and abdomen, dorsal view; B, right pterygostomian flap; C, anterior part of sternal segments; D, basal segment of right antennule, dorsal view; E, right antennal peduncle, ventral view; F, part of endopod of right third maxilliped, ventral view; G, left cheliped.

spines which vary from 7-9 and may also differ on the two sides of the same specimen. The spines on the lateral margins of the carapace show similar variation.

The pterygostomian flap, the third thoracic sternite, the basal segment of the antennule and the antennal peduncle (Figs. 12B-E) do not show any significant variations, either amongst themselves or with those described earlier.

The inner margin of the third maxilliped (Fig.12F) is armed with two spines except in a male (cl+r, 9mm) where three spines are present; this condition has been reported by Miyake and Baba (1967, Fig.3C). Baba (1988: 54) considers the presence of 2-3 spines a variable character.

Specimens, measuring 3mm and less in carapace length, including rostrum, are considered here as juveniles, although the presence of epipods could not be ascertained with any surity.

A male from Sta.AB-47B, measuring 2.5mm in carapace length, including rostrum (Fig.13A) shows a striking resemblance to the adult; the spines are however, not so well developed, also the striae are less in number and without setae.

The pterygostomian flap (Fig.13B) has only three striae. The third thoracic sternite (Fig.13C) is not fully developed.

The spines of the basal segment of the antennule, antennal peduncle and the merus of the third maxilliped are as illustrated in figures 13D,F.

The cheliped (Fig.13G) has fewer spines and setae than in the adult.

The first pleopod (Fig.13H) is very small, broadened near the tip and somewhat membranous, the second is fairly large, slender and rod-like.

In still younger specimens, two females (cl+r, 2mm), the spination is very much reduced, the lateral rostral spines (Fig.13I) are represented by more serrations, the striae on the carapace are also fewer in number.

The pterygostmian flap (Fig.13J), as far as can be seen, is without striae, the third thoracic sternite (Fig.13H) is as yet strip-like but the beginning of the adult shape can be perceived.

The eye (Fig.13I) has as yet not acquired the characteristic beak-like projection of the stalk.

The armature of the basal segment of the antennule, the antennal peduncle and the merus of the third maxilliped is extremely rudimentary (Figs.13L,M & N).

Distribution.-

Indo-Pacific: Red Sea, East coast of Africa, Eastwards to Malayan Archipelago, the Fiji Islands, Japan, Eastern and western Australia.

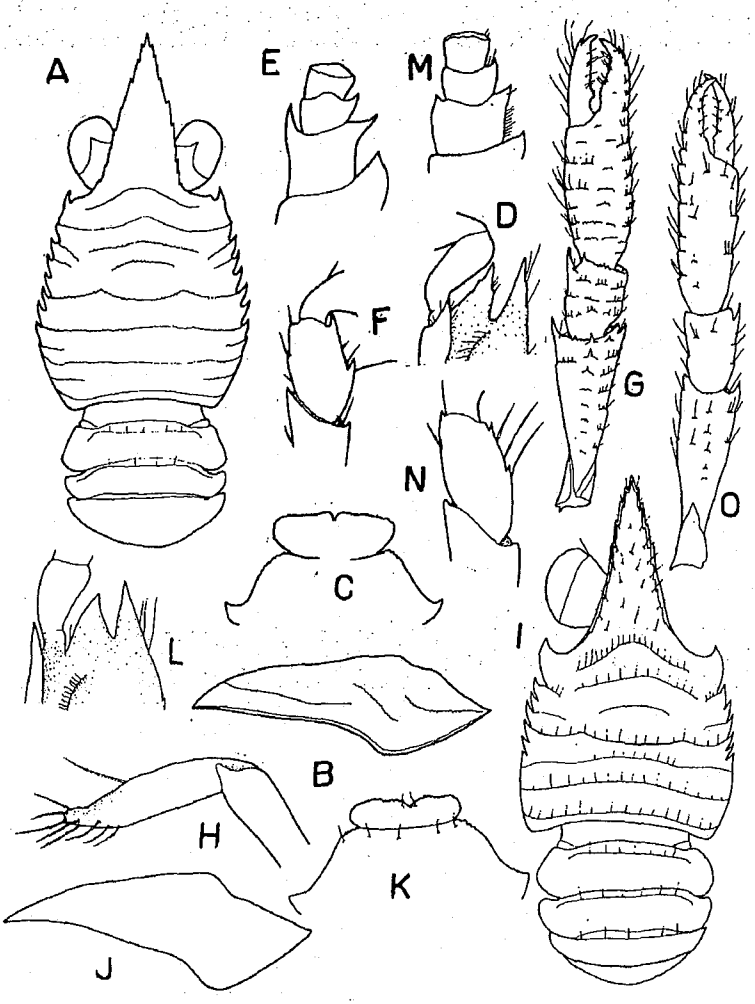

Fig. 13. *Allogalathea elegans* (Adams & White, 1948), A-H male, cl+r, 2.5mm; I-O, female, cl+r, 2mm; A, carapace and abdomen, dorsal view; B, right pterygostomian flap; C, anterior part of sternal segments; D, distal part of basal segment of right antennule, dorsal view; E, right antennal peduncle, ventral view; F, part of ischium and merus of right third maxilliped, ventral view; G, right cheliped, H, right second pleopod; I, carapace and abdomen; J, right pterygostomian flap; K, anterior part of sternal segments; L, distal part of basal segment of right antennule, dorsal view; M, right antennal peduncle, ventral view; N, part of ichium and merus of right third maxilliped, ventral view; O, left cheliped.

Genus *PHYLLADIORHYNCHUS* Baba, 1969

Diagnosis.-

Rostrum flat and leaf-like, with one large lateral tooth at the base and a small one near the apex, carapace with setose striae or scales, armed with small spines, branchial region with about five marginal spines, outer orbital angle with or without a spine. Abdomen unarmed. Third thoracic sternite sub-oval or strip-like not as wide as the anterior margin of the fourth. Eyestalk short, basal antennular segment globular or elongated, with four or five terminal spines, third maxilliped moderately setose, merus elongated or short, spinose, chelipeds thorny and of moderate length, walking legs also spinose. Epipods absent from all the pereopods.

Type-species: *Phyladiorhynchus pusillus* (Henderson, 1885)

KEY TO SPECIES OF *PHYLLADIORHYNCHUS*
(After Baba, 1991)

1. Two epigastric spines.....*P. integrirostris*
- More than 2 epigastric spines.....2

2. Four epigastric spines.....*P. pusillus*
- Five epigastric spines.....3

3. Anterior margin of third thoracic sternite nearly transverse with median and lateral projections.....*P. bengalensis*
- Anterior margin of third thoracic sternite moderately convex with feeble median excavation.....*P. ikedai*

Phylladiorhynchus bengalensis Tirmizi & Javed, 1980
(Fig.14)

Phylladiorhynchus bengalensis Tirmizi & Javed, 1980: 258, fig.2; Baba, 1991: 485 (key).

Material and measurements.-

Sta. 18A, cruise 1, Lat. 17°34'N, Long.98°00'E, depth 77mm, 21 March 1963; 1 male (holotype), cl+r, 3mm.

Descriptive remarks.-

The rostrum (Fig.14A) is triangular, with hardly perceptible distal spines; the basal spines are, however, acute and well developed. The outer orbital angle is a small tooth-like projection, the anterolateral spine of the carapace is long, sharply pointed and followed by five spines, excluding a spine slightly dorsal to the marginal level, in

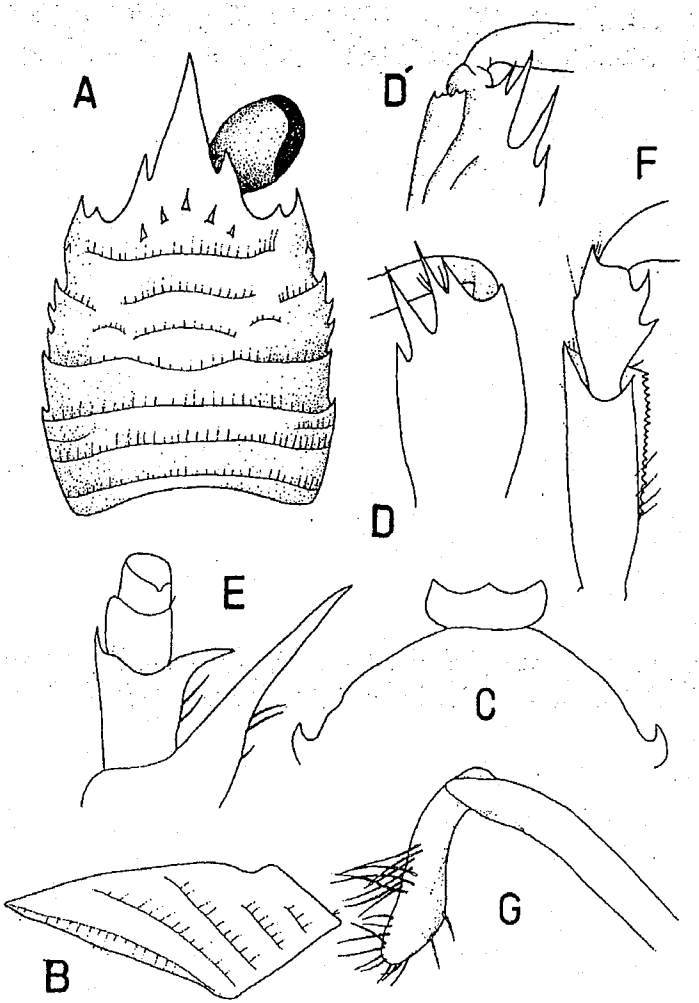

Fig.14. *Phylladiorhynchus bengalensis* Tirmizi & Javed, 1980, male (holotype), cl+r, 3mm. A. carapace and right eye, dorsal view; B, right pterygostomian flap; C, anterior part of sternal segments; D, basal segment of right antennule, ventral view; D', distal part of same; E, right antennal peduncle, ventral view; F, ischium and merus of right third maxilliped; G, right second pleopod.

front of the end of the cervical groove. The gastric region is armed with five spines arranged in an arc, most of the striae on the carapace are continuous and furnished with fairly long setae. The abdomen is unarmed.

The pterygostomian flap (Fig.14B) is rather broad, with distinct, uninterrupted striae.

The third thoracic sternite (Fig.14C) is relatively wider, the anterior margin is smooth and produced medially and laterally.

The ocular peduncles are globular, the cornea is narrow and without 'lashes'. The basal segment of the antennule (Fig.14D,D') is armed with five distal spines. The basal antennal spine (Fig.14E) attains a considerable size, distinctly exceeding the end of the peduncle; the second segment is armed with both inner and outer terminal spines; the third segment is unarmed.

The armature of the third maxilliped (Fig.14F) is very similar to that of *P. ikedai*, except that the lateral margin of the merus is weakly serrated, with the distolateral angle produced into a much stronger spine.

Both chelipeds and all walking legs are wanting. Epipods are absent from all pereopods.

The first pleopod is absent, the second pleopod (Fig.12G) bears a setose blade-like distal segment.

Distribution.-
Indian Ocean: Known only from type locality - Bay of Bengal.

Phlladiorhynchus integrirostris (Dana,1853)
(Fig.15)

Galathea integrirostris Dana, 1853: 482, pl.30, fig.12a-b.
? Galathea integrirostris: Edmondson, 1933:228.
Galathea serrirostris Melin, 1939:72, figs.43-47; Miyake & Baba,1965:590, figs.5,6; Miyake & Baba, 1966: 67, fig.8;
Phylladiorhynchus serriorostris: Baba, 1969:4; Baba, 1977: 251; Tirmizi & Javed, 1980 :260.
Phylladiorhynchus integrirostris: Lewinsohn, 1982: 295, fig.1.

Material and measurements.-

Sta.400C; Cruise 8; Lat.20°30'S; Long.35°43'E; Depth 62M; Date 3-10-1964; 18 males, cl+r, 1.2-3.5mm; (ovigerous females), cl+r, 1.2-2.5mm; 22 specimens (mutilated).

Sta.381-B; Cruise 7; Lat.33°13'S; Long.43°51'E; Depth 38M; Date 30-8-1964; 2 males, cl+r, 2-2.5mm; cb, 1.5mm; rl, 0.5mm; 4 females, cl+r, 2mm; cb, 1.5mm; rl, 0.5mm.

Sta.445; Cruise 9; Lat.09°41'N; Long.051°03'E; Date 16-12-1964; 1 male, cl+r, 3mm.

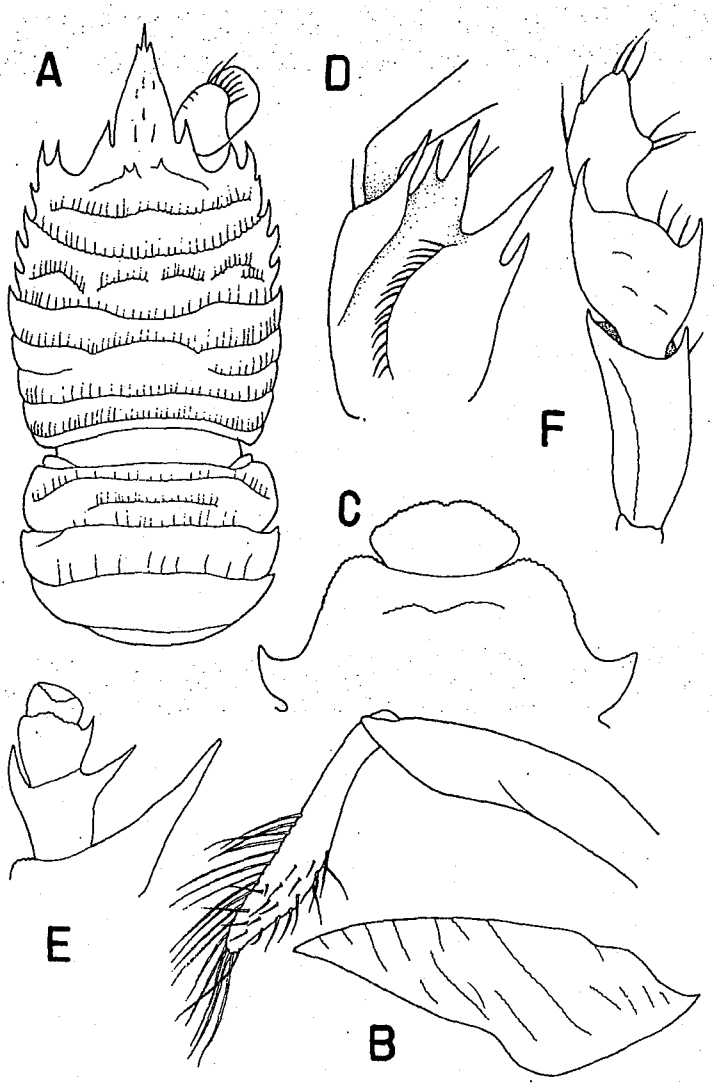

Fig. 15. *Phylladiorhynchus integrirostris* (Dana, 1853), male, cl+r, 2.5mm. A, animal, dorsal view; B, right pterygostomian flap; C, anterior part of sternal segments; D, basal segment of right antennule, dorsal view; E, right antennal peduncle, ventral view; F, part of endopod of right third maxilliped; G, right second pleopod.

Sta.390 S; Cruise 7; Lat.29°35'S; Long.31°42'E; Depth 138M; Date 9-9-1964; 1 female.

Sta.447; Cruise 9; Lat.10°00'N; Long.51°15'E; Depth: Benthic Trawl: Date 16-12-1964; 10 males, cl+r, 2-3.5mm; cb, 1.5-2.5mm; rl, 0.5mm; 12 females (7 ovigerous), cl+r, 2.3-3.5mm.

Sta.381 C; Cruise 7; Lat.33°13'S; Long 43°53'E; Depth 40M; Date 30-8-1964; 1 female, cl+r, 2mm; cb, 1.5mm; rl, 0.5mm.

Sta.29; Cruise 1; Lat.11°23'N; Long.93°31'N; Depth 55-40M; Date 28-3-1963; 1 male, cl+r, 2.5mm; cb, 2mm; rl, 0.5mm; 5 females (2 ovigerous), cl+r, 1-2.5mm.

Descriptive remarks.-

The specimens at hand agree rather well with the previous descriptions and illustrations of the species. A male, from Sta.381B measuring 2.5mm in carapace length, including rostrum, is illustrated in figure 15A. As pointed out by Miyake & Baba (1966:68), the rostrum is not serrated at the base of the lateral margin. The spines on the lateral margin of the carapace are subject to slight variation, in most specimens they are four in number on the branchial region, but in some they are reduced to three, as mentioned earlier for material from the Ryukyu Islands (Miyake & Baba, 1966:67). The gastric area bears a pair of small spines; in the male from Sta. 381B however an additional spine is present inside the left of the pair.

The pterygostomian flap is as illustrated in figure 15B.

The third thoracic sternite (Fig.15C) has the same characteristic shape as illustrated by Melin (1939) for the Bonin Islands specimens, but the anterior margin of the following sternite in our specimen is only slightly concave.

The spination of the antennule, antenna and the third maxilliped (Fig.15D-F) are as illustrated for the Bonin Islands material (Miyake & Baba, 1965, fig.6A-C)

Epipods are absent from all the pereopods.

The second pleopod (Fig.15G) is elongated and slender, its tip is narrow and slightly produced.

Distribution.-

Indo-Pacific: The species is widely distributed in the Indo-Pacific from the western Indian Ocean between the Red Sea and South Africa, to Iman Fernindez and Easter Islands in the eastern Pacific, via Madagascar Providence Island, Malay Archipelago, Andaman Sea, Moluccas, Ternate, Palau Islands, Ryukyu Islands, Japan, Bonin Islands, Marshall Islands and Hawaiian Islands.

Genus *CORALLIOGALATHEA* Baba & Javed, 1974

Diagnosis.-

"Rostrum broad at base, with three lateral teeth of small size. Outer orbital angle pyramidal. Abdominal segments smooth without dorsal spines. Tail fan moderately developed; endopod normal. Eyestalk short, distally not swollen.

Thoracic sternite bearing third maxilliped anteriorly produced like a betel leaf.

Antennular basal segment globular, more or less depressed, with three distal spines. Basal segment of antennal peduncle with an inner distal marginal spine developed; second segment unarmed at inner distal margin, armed with a distinct spine at outer distal margin. Third maxilliped not so well developed; merus triangular in cross section with a normal row of denticles on inner cutting edge. First pleopod of male absent" (Baba & Javed, 1974).

Type-species: *Coralliogalathea humilis* (Nobili, 1905)

Remarks.-

This genus is characterised by the three rostral teeth, including the supraorbital; normal endopod, a very interesting as well as important character is that the only distolateral angle of second antennal segment is armed, while the distomedian one is unarmed. In other new genera (Baba, 1969; Baba,1971) formerly known as *Galathea*, the distomedian angle is armed as already has been discussed by Baba & Javed (1974:62).

Only second pair of pleopods in male is present, this character also differentiates the present genus from the *Galathea* proper, which is characterised by the presence of the first and second pairs of pleopods.

Coralliogalathea humilis (Nobili, 1905)
(Fig.16)

Galathea humilis Nobili, 1905:396; 1906:124, pl.8,figs.8, 8a; Riddell, 1911:262; Lewinsohn, 1969:117,fig.22;
Galathea megalochira Nobili, 1907:376, pl.1,figs.12, 12a,12b;
Galathea tridentirostris Miyake, 1953:202, figs. 3,4.;
Caralliogalathea humilis: Baba & Javed 1974:62, Fig.1; Baba, 1977:250; 1982:61; 1989 :952.

Material and measurements.-

Sta.Tulear, Medagascar; Cruise 7; Lat.23°45'S; Long.43°10'E; Depth 298M; Date 5-8-1964; 3 males, cl+r, 2.3mm; 4 females (2 ovigerous), cl+r, 1.5-3mm.

Descriptive remarks.-

This species was first described by Nobili (1905a: 396). Later, Nobili described an other new species *G.megalochira* (1907:376) and Miyake described, *G.tridentirostris* (1953:202). Lewinsohn (1969:117), regarded later the two above mentioned species as synonym of the present species.

The specimens available for study are rather small, measuring 1.5-3mm in carapace length, including rostrum. Out of the seven specimens four are females, two ovigerous. The largest ovigerous female with a carapace length of 3mm is illustrated in figure 16A. The specimens at hand, agree rather well with the descriptions and fig-

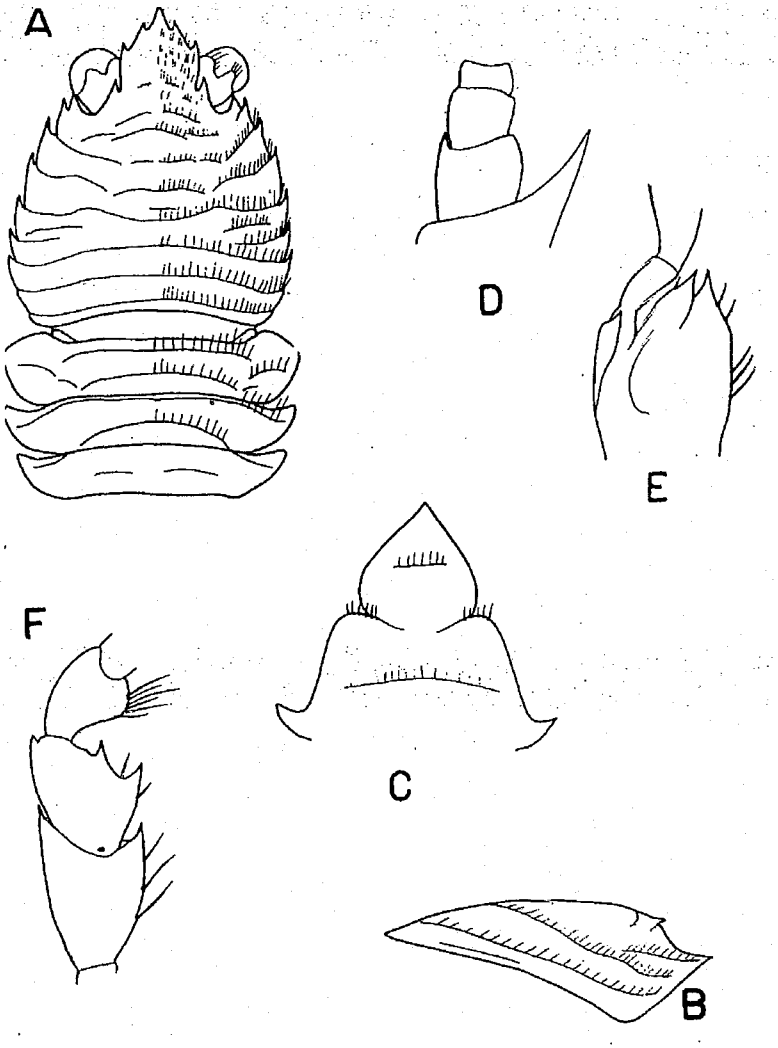

Fig. 16. *Coralliogalathea humilis* (Nobili, 1905), female, cl+r, 3mm, A, carapace and abdomen, dorsal view; B, right pterygostomian flap; C, anterior part of sternal segments; D, right antennal peduncle; E, basal segment of right antennule, dorsal view; F, part of endopod of right third maxilliped, ventral view.

ures given by Miyake (1953: 202, Fig.3) and Lewinsohn (1969:118, Fig.22). The only differences that can be seen are in the spinosity of the antennal peduncle, merus of the third maxilliped of the two ovigerous females and also in the shape of the third thoracic sternite of the two specimens.

A stout spine situated near the pleural suture of the pterygostomian flap (Fig.16B), is a good identifying character. This spine is also present in the *G.affinis* Ortmann, which is also a common species of coral reefs.

The third thoracic sternite is as illustrated in figure 16C, except in a male and a female which have third thoracic sternites similar to those of the specimens from Ryuku Islands (Miyake, 1953, Fig.4 d).

As already pointed out by Baba & Javed (1974), the distolateral angle of the second segment of the antennal peduncle (Fig.16D) is armed, the spine is rather small and needs a careful examination.

The inner margin of the merus of the third maxilliped is armed with one spine, but the merus is armed with two spines in the two ovigerous females (Fig.16F).

Unfortunately, not a single cheliped and walking leg is available for study.

Epipods are absent from all the pereopods.

Distribution.-

Indo-Pacific: Red Sea, Gulf of Aden, Madagascar, New Guinea, Japan and Polynesia (see Baba, 1989).

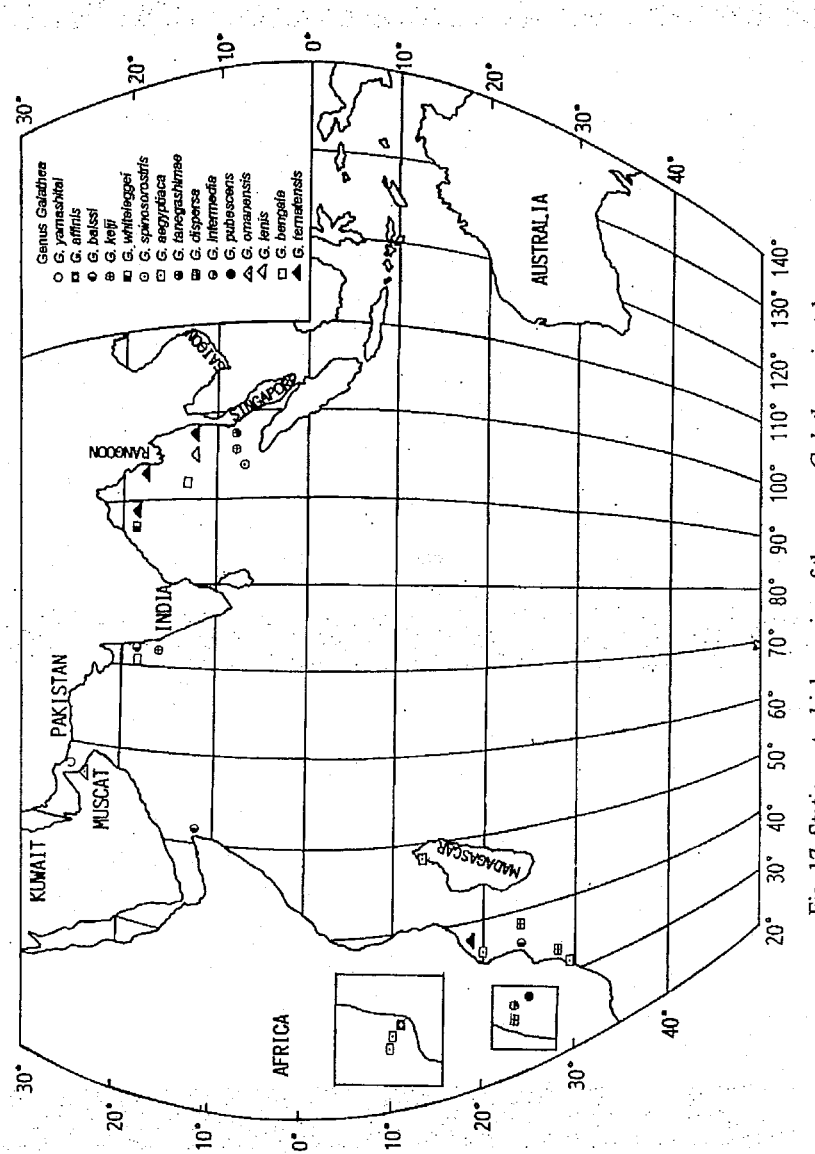

Fig. 17. Stations at which species of the genus *Galathea* were taken.

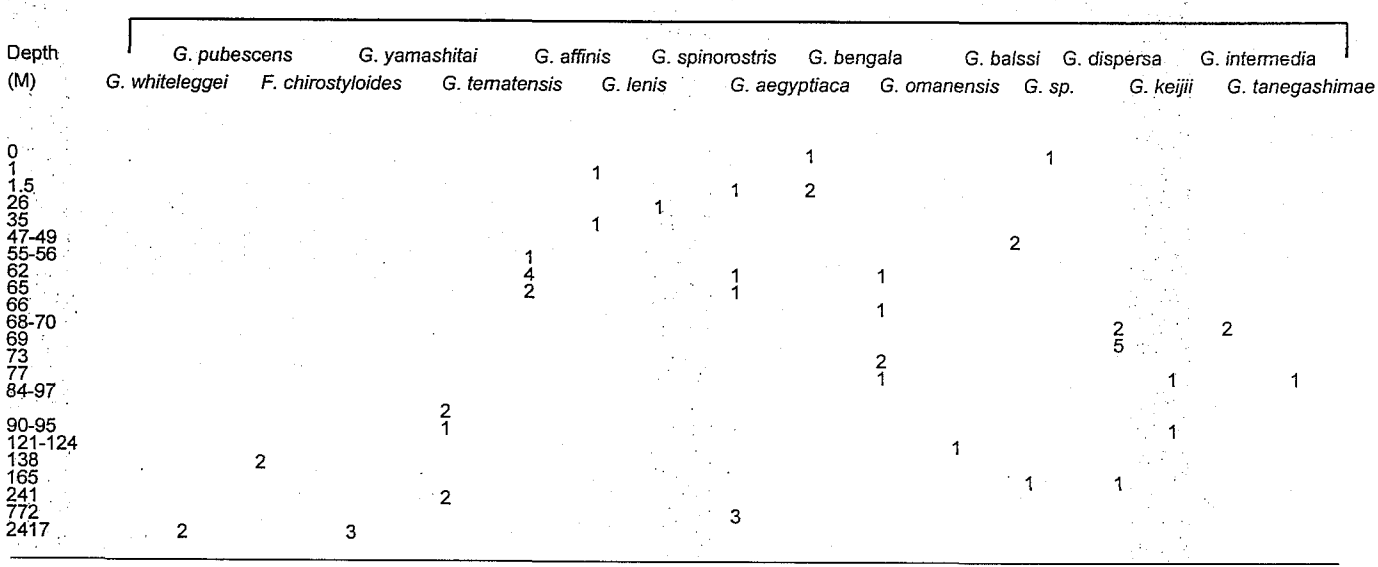

Fig. 18. Chart indicating the depth of capture and number of individuals of the genera *Galathea* and *Fennerogalathea* from six cruises of Anton-Bruun in the Indian Ocean.

Genus *GALATHEA* Fabricius, 1793

Diagnosis.-

"Rostrum flat dorsoventrally, triangular with four lateral teeth (including supra-orbital). Carapace furnished with many transverse ridges fringed with short setae. Cervical groove distinct or not distinct. Outer orbital angle rounded or spiniform or pyramidal. Orbit delimited ventrally with a denticulated crest.

Basal antennular segment with two or three distal spines. Third maxilliped moderately setose, ischium usually triangular in cross section, with inner toothed ridge, merus with spinose margins. Chelipeds moderately long and spinulose. Ambulatory legs spinose, dactylus with broad setae on inner toothed or unguiculate margin, but without a row of plumose setae. Third thoracic sternite roughly triangular. Eyestalk short, corneal region somewhat dilated distally and well pigmented. Abdomen not spinose dorsally.

Epipods sometimes absent from all pereopods or present on first pair or first three pairs of pereopods". (Baba, 1969a:9).

Type-species: *Cancer strigosus* Linnaeus, 1776

Remarks.-

Genus *Galathea* in the IIOE collection is represented by eighteen species, which is the largest number for any of the present genera. Three species: *G. keijii, G. omanensis, G. bengala,* are described as new, and another eight: *G. yamashitai, G. australiensis, G. whiteleggei, G. tanegashimae, G. dispersa, G. intermedia, G. lenis* and *G. platycheles* are recorded for the first time from the Indian Ocean.

It is notable that members of this genus range from 0-2417M which appears to be the maximum depth recorded in the available data for galatheids.

KEY TO THE SPECIES OF THE GENUS *GALATHEA* FABRICIUS, 1793

1. Anterior gastric spines present.....2
- Anterior gastric spines absent.....14

2. Only one pair of anterior gastric spines.....3
- More than one pair of anterior gastric spines.....12

3. Epipods absent from all pereopods.....4
- Epipods present on pereopods.....7

4. Distomedian angle of basal antennular segment with a minute spine.....*Galathea yamashitai*
- Distomedian angle of basal antennular segment with a small developed spine.....5

5. Third thoracic sternite not triangular; anterior margin of pterygostomian flap without a distinct spine near pleural suture.....6
- Third thoracic sternite triangular;anterior margin of pterygostomian flap with a well developed spine near pleural sutrue.....*Galathea affinis*

6. Basal antennal spine outreaching spine of following segment. Anterior margin of pterygostomian flap armed with a row of spines.....
.....*Galathea balssi*
- Basal antennal spine not outreaching spine of following segment. Anterior margin of pterygostomian flap unarmed.....*Galathea keijii* sp.nov.

7. Pereopods 1-3 with an epipod.....8
- Only chelipeds with an epipod.....9

8. Rostrum with supraocular and proximal rostral pair of spines very short; eyes broad; distal angles of ischium of third maxilliped unarmed.....
.....*Galathea brevimana*
- Rostrum with subequal spines; eyes comparatively narrow; distomedian angle of ischium of third maxilliped armed.....*Galathea australiensis*

9. Inner margin of merus of third maxilliped with three spines; third thoracic sternite rounded.....*Galathea whiteleggei*
- Inner margin of merus of third maxilliped with two spines; third thoracic sternite, more or less, triangular.....10

10. Lateral teeth of rostrum not deeply incised; hepatic region without spines; distolateral angle of ischium of third maxilliped unarmed, lateral margin of merus smooth.....11
- Lateral teeth of rostrum deeply incised; hepatic region with 1-2 spines; lateral margin of merus spiny.....*Galathea spinosorostris*

11. Rostrum as long as broad; carapace with long, plumose setae; merus of third maxilliped shorter than ischium.....*Galathea aegyptiaca*
- Rostrum longer than broad; carapace without long plumose setae; merus of third maxilliped longer than ischium.....*Galathea tanegashimae*

12. Distomedian angle of basal antennular segment produced into a large spine.....
.....*Galathea dispersa*
- Distomedian angle of basal antennular segment armed with a short spine.....13

13. Gastric region only with four spines; anterodorsal margin of pterygostomian flap with a row of well developed spines; merus of third maxilliped much longer than ischium.....*Galathea intermedia*
- Gastric region with many spines; anterodorsal margin of pterygostomian flap unarmed; merus of third maxilliped shorter than ischium.....
.....*Galathea pubescence*

14. Epipods wanting on all pereopods.....15
- Epipods present on chelipeds only.....17

15. Fourth thoracic sternite is as wide as third; eyes narrow; basal antennal spine

long, outreaching distal margin of fourth segment.....
.....*Galathea omanensis* sp.nov.

- Fourth thoracic sternite wider than third; eyes moderately broad; basal antennal spine not outreaching fourth segment.....16

16. Carapace slightly longer than broad; cornea wider than ocular peduncle; disto-lateral angle of ischium of third maxilliped unarmed, inner margin of merus armed with three spines.....*Galathea lenis*

- Carapace not longer than broad; cornea narrower than ocular peduncle; disto-lateral angle of ischium of third maxilliped armed, inner margin of merus armed with two spines.....*Galathea bengala* sp.nov.

17. Ocular peduncle wider than cornea; third thoracic sternite triangular; inner margin of merus of third maxilliped armed with two spines.....
.....*Galathea platycheles*

- Ocular peduncle not wider than cornea; third thoracic sternite with a median notch and rounded laterally; inner margin of merus of third maxilliped armed with three spines.....*Galathea ternatensis*

Galathea yamashitai Miyake & Baba, 1967 (Fig.19)

Galathea yamashitai Miyake & Baba, 1967:239, figs.9-10.

Material and measurements.-

Sta.255A; Cruise 4B; Lat.25°50'N; Long.57°07'E; Depth 92-95M; Date 30-11-1963; 1 male, cl+r, 4.8mm; cb, 3mm; rl, 1.2mm.
Sta.60; Cruise 1; Lat.17°54'N; Long.86°31'E; Depth 241M; Date 9-4-1963; 2 females, cl+r, 4.3 - 4.5mm; cb, 2.4 - 2.6mm; rl, 1.4 - 1.6mm.

Descriptive remarks.-

Galathea yamashitai was so far known only from the east China Sea (Miyake & Baba,1967:239). The specimens at hand afford the first subsequent record of the species and also extend its range of ditribution. There are altogether three specimens, one male and two females. They agree rather well with the description and illustrations of the holotype, except in some minor details.

The rostrum (Fig.19A) is longer than broad, its dorsal surface is furnished with setose scales. It is of interest to note that in one female (cl+r, 4.3mm) an extra rostral spine is present on the right side. The gastric region is armed with two spines in the male, as described for the holotype, whereas in the two females there are four spines, the extra pair of spines is minute, and is situated between the main gastric spines. The anterolateral spines are followed by four spines. The transverse striae of the carapace are more or less as illustrated for the east China Sea specimen (Miyake & Baba, 1967, Fig.9). The second and third abdominal segments each have four transverse grooves in the present specimens, whereas, in the holotype several grooves can be seen (Miyake & Baba 1967, fig.9).

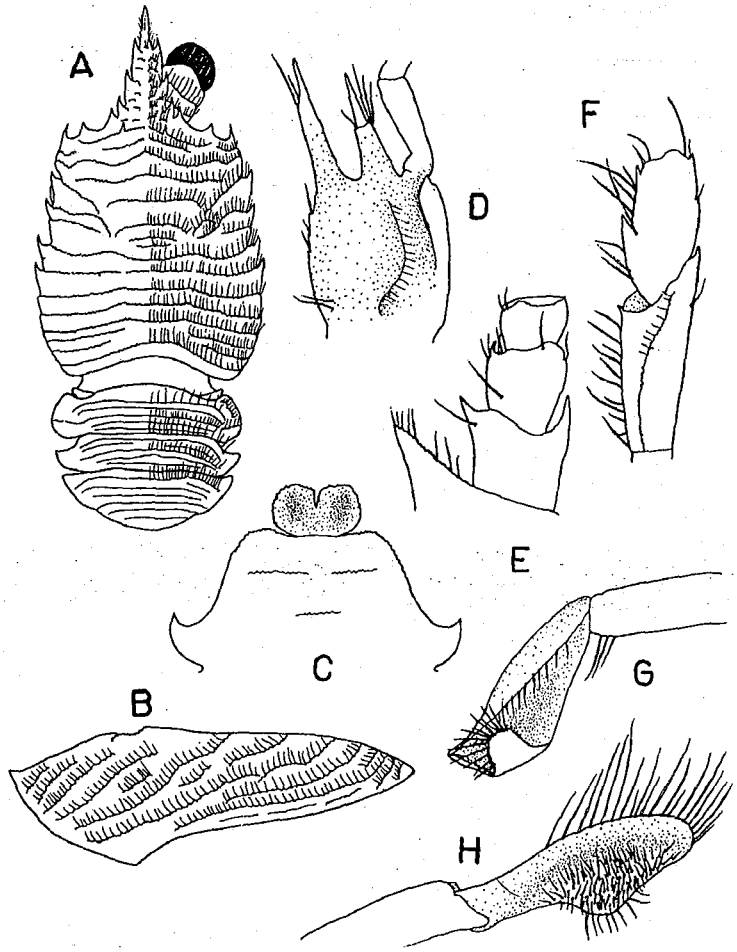

Fig. 19. *Galathea yamashitai* Miyake & Baba, 1967, male, cl+r, 4.8mm; A, carapace and abdomen, dorsal view; B, left pterygostomian flap; C, anterior part of sternal segments; D, basal segment of left antennule, dorsal view; E, left antennal peduncle, ventral view; F, ischium and merus of left third maxilliped, G, left first pleopod; H, left second pleopod.

The pterygostomian flap (Fig.19B) is broad, with rows of complete and incomplete setose striae, and an acutely pointed tip.

The third thoracic sternite (Fig.19C) is globular, with a median slit-like notch and convex lateral margins, that of the holotype has a small 'V'-shaped notch and is not as globular as in the specimens at hand.

The eyes are provided with rather a characteristic arrangement of long setae or 'lashes'.

The basal antennular segment (Fig.19D) is characteristic in having a minute disto-median spine while the other two distolateral spines are large and well developed, at the base of the lateral spine the margin is serrated. The armature of the antennal peduncle (Fig.19E) agrees with the illustration given by Miyake & Baba (1967, Fig.10b).

The ischium of the third maxilliped (Fig.19F) is longer than the merus, and is armed with spines on both the distal angles. The inner margin of the merus is armed with two spines, of which the distal one is smaller. The IIOE specimens differ from those described earlier, in having an almost smooth outer margin, in the holotype it is strongly serrated.

The pereopods of *Galathea yamashitai* still remain unknown, since they were missing from the type and in the present collection also not a single pereopod is present.

Epipods are lacking from all the pereopods.
The first and second pleopods of the male are as illustrated in figures 19G and H respectively.

Distribution.-

Indo-Pacific: The range of distribution of *Galathea yamashitai* now extends from east China sea to the Indian Ocean.

Galathea affinis Ortmann, 1892
(Fig.20)

Galathea affinis Ortmann, 1892:252, pl.11, fig.9; Borradaile, 1898:463; 1899:421; de Man, 1902:711; Nobili, 1905C:3; 1907:375, pl.1,fig.11; Doflein & Balss, 1913:169 (distribution only); Miyake & Baba, 1966:57, figs. 1,2; Lewinsohn, 1967:176; 1969:112, fig.21; Haig, 1973:281 (key); Baba, 1989a: 953.
Galathea mauritiana Bouvier, 1915:23, fig.10-11; Laurie, 1926:125;
Galathea agyptiaca Pesta, 1927:72;
? *Galathea affinis*: Gordon 1935: 4,5, figs.1,3C.

Material and measurements.-

Sta.JR-30; Lat.13°26'S; Long.48°21'E; Depth 1.0M; Date 12-1-1964; 1 male, cl+r, 4.5mm; cb, 3mm; rl, 1.5mm; chl, 8.5mm; pl, 2mm; fl, 2mm.
Sta.363T; Cruise 7; Lat.23°18'S; Long.43°36'E; Depth 35M; Date 6-8-1964; 1 ovigerous female, cl+r, 4mm; cl, 2.5mm; rl, 1.5mm.

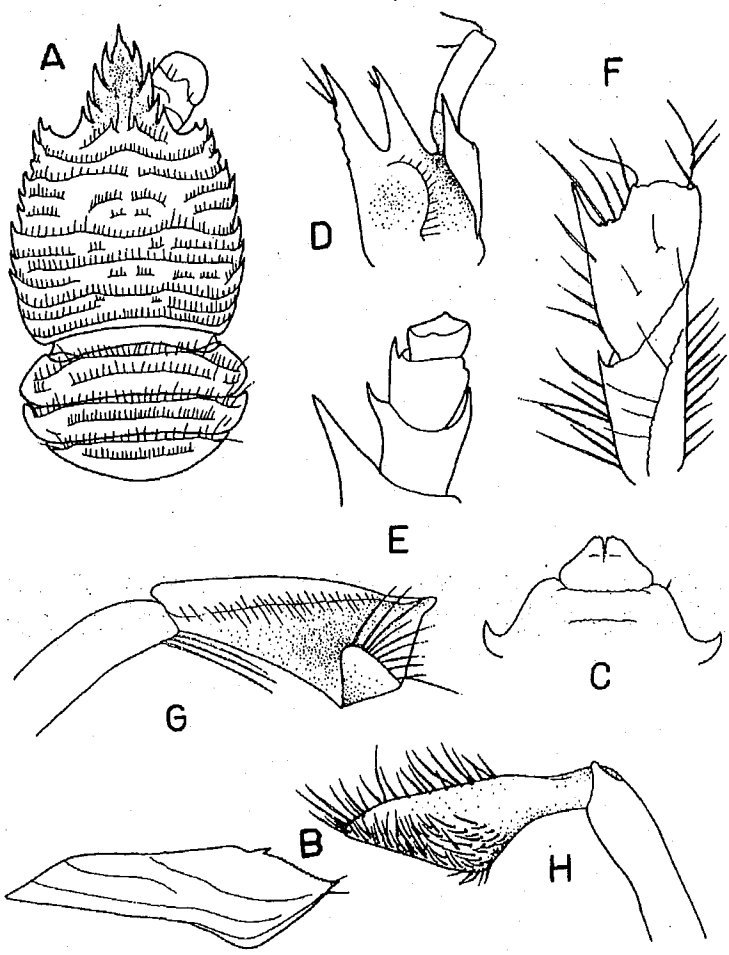

Fig. 20. *Galathea affinis* Ortmann, 1892, male, cl+r, 4.5mm, A, carapace and abdomen, dorsal view; B, right pterygostomian flap; C, anterior part of sternal segments; D, basal segment of left antennule, dorsal view; E, left antennal peduncle, ventral view; F, ischium and merus of left third maxilliped, ventral view; G, right first pleopod; H, right second pleopod.

Sta.Arsenal Bay; Cruise 2; Date 16-6-1963; 13 males, cl+r, 2-4.5mm; cb, 1.2-3mm; rl, 0.5-1.1mm; 10 females (7 ovigerous), cl+r, 2.4-4mm; cb, 2-2.5mm; rl, 0.6-1mm.

Descriptive remarks.-

A fairly large series of specimens is available, the smallest specimen is a male measuring 2mm in carapace length, including rostrum, the largest specimen is also a male with the carapace length of 4.5mm, two females, each measuring 4mm in carapace length, are ovigerous.

G.affinis has been adequately described and illustrated by earlier workers (Miyake & Baba 1966, Lewinsohn, 1969); and it can be easily diagnosed by the characteristic tip of the rostrum (Fig.20A); a spine which is always present on the anterodorsal margin of the pterygostomian flap (Fig.20B), and the strong single spine on the inner margin of the merus of the third maxilliped (Fig.20F), in several specimens the margin, distal to the spine may be more or less tuberculated.

The third thoracic sternite (Fig.20C) is produced forwards, thus assuming a somewhat triangular shape, showing a close similarity to that of the Red Sea specimen (Lewinsohn, 1969:113,Fig.21e) rather than the Japanese specimen where Miyake & Baba have described the anterior margin as being rounded, this can also be seen in their illustration (1966:59, Fig.2 D).

The antennal peduncle and antennule are as illustrated in figures 20D and E, respectively.

The chelipeds are almost twice the length of the carapace, they differ from Miyake & Baba's description and illustration in having two spines on the inner margin of the palm, whereas the outer margin of the merus, proximal to the two distal spines is weakly serrated, there are, however, more spines on the upper surface of this segment. Unfortunately very few pereopods, all detached, are available for study.

Epipods are wanting from all the pereopods.

The two pleopods from a male measuring 4.5mm in carapace length, are as shown in figures 20G and H.

Distribution.-

Indo-Pacific: Red Sea, Zanzibar Island, Madagascar Island, Arsenal Bay, Mauritius Island, Farguhar Gruppe, Coetivy Island, Saya de Malha Bank, Chagos Archipelago, north coast of New Guinea, Bandanaira, Ternate, Timer, Pali Island, Marshal Island, Ryukuyu Islands, Lifu, (Loyalty Islands) Fiji Islands, Tuamotu Islands, Rotuma island and Ellice Islands. and Tuamotu Archipelago.

Galathea balssi Miyake & Baba, 1964
(Fig.21)

Galathea australiensis Balss, 1913:13, fig.13. (not *G. australiensis* Stimpson, 1858:251).
Galathea balssi: Miyake & Baba, 1964:205, figs.1-2; Haig,1973:278, fig.2; Baba, 1988:69.

Galathea whiteleggei: Tirmizi, 1966:175,fig.9.

Material and measurements.-

Sta.9-453; Cruise 9; Lat.11°11'N; Long.51°14'E; Depth 47-49M; Date 17-12-1964; 2 females (1 ovigerous), cl+r, 4-5mm; cb, 2.5-3mm; rl, 1.5-2mm; chl, 10mm; pl, 2mm; fl, 2mm.

Sta.371D; Cruise 7; Lat.24°46'S; Long.35°20'E; Depth 165M; Dated 18-8-1964, 1 ovigerous female, cl+r, 5mm; cb, 3mm; rl, 1.5mm.

Sta.202C; Cruise 4B; Lat.18°27'S Long.71°13'E; Depth 84-97M; Date 14-11-1963; 1 female, cl+r, 4.5mm; cb, 3mm; rl, 1.5mm, 1 male (infected by some species of bopyrid), cl+r, 4mm; rl, 1.5mm; chl, 7mm; pl, 1.5mm; fl, 1.5mm.

Descriptive remarks.-

Galathea balssi was first described by Miyake & Baba in 1964 for a specimen from East China Sea. Haig (1973:278) referred a female from "Endeavour" collection and pointed out some difference suggesting that since "*G.balssi* is known from only a few specimens, and it is too soon to determine whether these differences fall within the normal range of variation for the species".

The Indian Ocean specimens at hand also show some variation, on the whole they seem to agree more closely with Haig's specimen, particularly in having less developed broken striae and scales on the carapace (Fig.21A). It may also be pointed out here that the long setae, so clearly shown in the holotype, are almost absent in the present specimens, the few which are still there indicate their presence in living or freshly preserved specimens. Similarly the two long characteristic setae of the eye, when not present, their position is clearly marked. The rostrum, on the other hand, agrees with that of the holotype in being a little more than half as long as broad. The gastric region is armed with two spines in all the specimens except one ovigerous female (cl+r, 5mm), where an extra spinule is present near the left gastric spine. Haig's specimen has four spines in this region. A spine on each lateral end of the second transverse stria, present in all the previously described specimens, is totally wanting in the present collection; the anterolateral spines are followed by 4-6 spines, six spines are seen in only one specimen where the extra spine is present in the hepatic region. The second and third abdominal segments are each provided with a median transverse groove.

The pterygostomian flap is acutely pointed anteriorly, it is beset with complete and incomplete setose striae, and has a strongly serrated dorsal margin as shown in figure 21B.

The third thoracic sternite is heart-shaped as can be seen in figure 21C.

The armature of the basal segment of the antennule and the antennal peduncle (Figs.21D, E) is similar to that of the holotype (Miyake & Baba,1964:207, Figs.2 A,B).

The spination of the merus of the third maxilliped, however, shows some variations. In a female the merus is armed with three spines on the inner margin, in another specimen there are two spines on the right side and three on the left, whereas in the

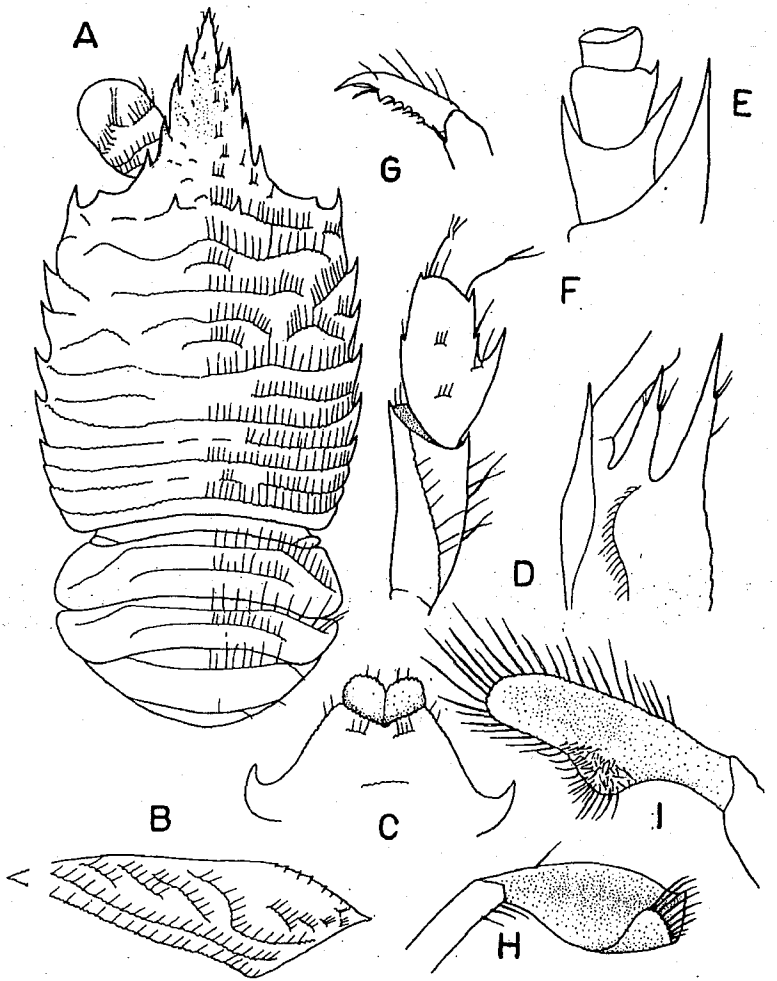

Fig. 21. Galathea balssi Miyake & Baba (1964), A-G, female, cl+r, 4mm; H,I, male, cl+r, 4mm; A, carapace and abdomen, dorsal view; B, right pterygostomian flap; C, anterior part of sternal segments; D, basal segment of right antennule, dorsal view; E, right antennal peduncle, ventral view; F, ischium and merus of right third maxilliped, ventral view; G, part of propodus and dactylus of a walking leg; H, right first pleopod; I, right second pleopod.

male it is armed with three spines on the left side, and on the right side there is a tubercle between the two spines (Fig.21F). The outer margin is with the usual two spines.

Only two detached chelipeds are present, one in the collection from Sta.9-453 and another from Sta.202C. The cheliped from Sta.9-453 is 10mm long whereas the larger female in the same collection is with a carapace length of 5mm. The cheliped from Sta.202C is smaller, being 7mm long. The larger specimen in this tube is a female with a carapace length of 4.5mm. In both cases the smaller specimen is 4mm in carapace length, as such the cheliped from Sta.202C is less than twice the length of the carapace, including rostrum, whereas the one from Sta.8-453 may be twice the length of the carapace. Both chelipeds have the finger as long as the palm. In the holotype the palm is longer than the movable finger. The chelipeds measuring 10mm in length agrees with the type, in having a tooth near the base of each finger, whereas the smaller cheliped has the inner margins of the fingers serrated, being without a tooth or a hiatus. Like the chelipeds the walking legs are also detached, dactylus of one of the legs is illustrted in figure 21G.

Epipods are absent from all the pereopods.

The male pleopods are normal (Fig.21H,I).

Remarks.-

It may be pointed out here that Tirmizi (1966:186) doubtfully referred one specimen to *G.whiteleggei*. Later, Haig (1973:278) hesitantly included it in *G. balssi* because the number of epipods were not known. It was very kind of Dr.Ingle, British Museum (Natural History) to check the "John Murray" specimen and inform that "I am unable to detect epipods on any of the thoracic appendages of 'John Murray' specimen" (personal communication). Thus the "John Murray" specimen is referable to the species under consideration.

Distribution.-

Indo-Pacific: Known from Japan, East China Sea, South China Sea off south western Lunzon, east of Masbate, Sulu Archipelago, Queensland and now from West Indian Ocean.

Galathea keijii sp.nov.
(Fig.22)

Material and measurements.-

Sta.18A; Cruise 1; Lat.07°34'N; Long.98°00'E; Depth 77M; Date 21-3-1963; 1 female, holotype, cl+r, 3mm; cb, 1.8mm; rl, 0.8mm.
Sta.202B; Cruise 4B; Lat.17°41'N; Long.71°33'E; Depth 90M; Date 14-11-1963; 1 female, cl+r, 2.5mm; cb+r, 2.5mm; cb,1.5mm; rl, 0.8mm.

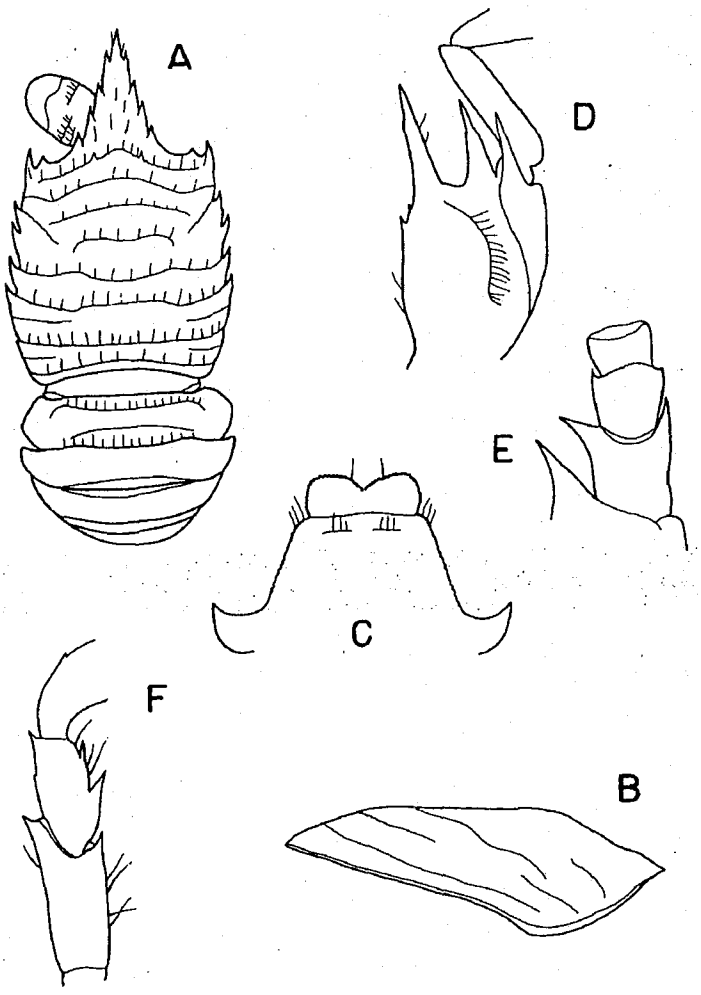

Fig. 22. *Galathea keiji* sp. nov., holotype ovigerous female, cl+r, 3mm; A, carapace and abdomen, dorsal view; B, right pterygostomian flap; C, anterior part of sternal segments; D, basal segment of left antennule, dorsal view; E, left antennal peduncle, ventral view; F, ischium and merus of right third maxilliped, ventral view.

The specimens, one ovigerous female and a male, present in the IIOE collection, appear to be different from all the species of *Galathea* that are known to us, they are therefore being described as a new species. The species is dedicated to Prof.Dr.Keiji Baba of Kumamoto University, Japan. The female is selected as the holotype and the male as paratype.

Measurements of the holotype ovigerous female.-

cl+r, 3mm; cb, 1.8mm; rl, 0.8mm.

Description.-

The rostrum (Fig.22A) is flat and about twice as long as broad, and with a few setae on its dorsal surface, the gastric region is armed with a pair of small spines, the outer orbital angle is also spinulated; each anterolateral spine is followed by four spines. The striae on the carapace are found sparsely setose. Only the second abdominal segment is with a median transverse groove.

The pterygostomian flap (Fig.22B) is also with a few striae, it is acutely pointed anteriorly.

The third thoracic sternite (Fig.22C) is band-like being as broad as the anterior margin of the fourth sternite. Its free margin is crenulated, the anterior margin has a 'V'-shaped notch on either side of which it is strongly convex.

The cornea is nearly as wide as the ocular peduncle and bears a few setose striae which can only be seen with some difficulty.

In addition to the three well developed distal spines, additional small spines are also present on the outer margin of the basal segment of the antennule (Fig.18D), in the case of male, this margin is merely serrated. The armature of the antennal peduncle (Fig.22E) is fairly strong.

The ischium of the third maxilliped (Fig.22F), which is longer than the merus, has both its distal angles produced into acute spines. The merus is armed with two spines on the inner margin, a tubercle may also be present between the two spines. The distolateral angle is produced into a well developed spine, a small projection can also be seen about half way on the outer margin. Only one detached cheliped is present in the jar containing the male specimen. The palm is as long as the finger. The fingers are spoon-shaped distally and with serrated inner margins. A small tooth is present near the base of each finger, the outer margins of the fingers are setose but without any spine, the palm however, is with three rows of spinules, the carpus has two dorsal rows of spinules while the inner margin of this segment is armed with two large spines in the distal half. The merus is provided with three rows of spines, the distal three spines being larger. A detached walking leg is present, the outer margin of the dactylus has a pointed unguiculus, and five small teeth, each with a stout seta-like movable spine at the base.

Epipods are not present on any of the pereopods.

Remarks.-

The present species closely resembles *G.lenis* Baba (1969:13), from which it can be differentiated by the armed gastric region, and distolateral angles of the ischium and merus of the third maxilliped.

Galathea brevimana Paulson,1875
(Fig.23)

Galathea brevimana Paulson, 1875:95 (1961:101); Benedict, 1902:301 (list only); Nobili,1906b:128; Doflein & Balss, 1913:169 (distribution only); Lewinsohn, 1967:175; 1969:105,fig.19;
Galathea australiensis Balss, 1915:2 (part) (not *Galathea australiensis* Stimpson,1858).

Material and measurements.-

Sta.10-M; Date 19-9-1967; 2 males, cl+r, 2.2-3mm; cb, 1.5-1.7mm; rl, 0.6mm; 1 male without carapace; 1 ovigerous female, cl+r, 2.5mm; cb, 2mm; rl, 0.5mm.

Descriptive remarks.-

The present series turned out to be the most difficult however, after a careful examination they are being placed under *G.brevimana,* which is so far known only from the Red Sea. The Indian Ocean specimen, a male (cl+r, 2.5mm) is illustrated in figure 23A. As can be seen, it differs from the Red Sea specimen, in having most of the striae of the carapace complete, only five instead of seven lateral spines behind each anterolateral spine, and very few iridescent setae, this might be due to preservation. It may be pointed out that the gastric spines are so small that they were not detected when first examined.

The pterygostomian flap (Fig.23B) tapers to a spiniform tip and is beset with several complete and incomplete, setose striae.

The third thoracic sternite (Fig.23C) is oval, but for the arched, and crenulated anterior margin, notched in the middle. In Lewinsohn's specimen (1969,Fig.19d), the anterior margin is less convex.

The distomedian spine of the basal segment of the antennule (Fig.23D) is smaller than the lateral spine. The basal antennal spine outreaches the distal margin of the second segment, the armature of the following segment is as shown in figure 19E.

The only spines of the third maxilliped (Fig.23F) are the two spines present on the inner margin of the merus.

The specimens are without chelipeds and walking legs.

Epipods are present on 1-3 pereopods.

The first male pleopod (Fig.23G) is with a few but long setae, particularly on the inverted cup-shaped lobe,the second pleopod (Fig.23H) is with a broadly rounded tip.

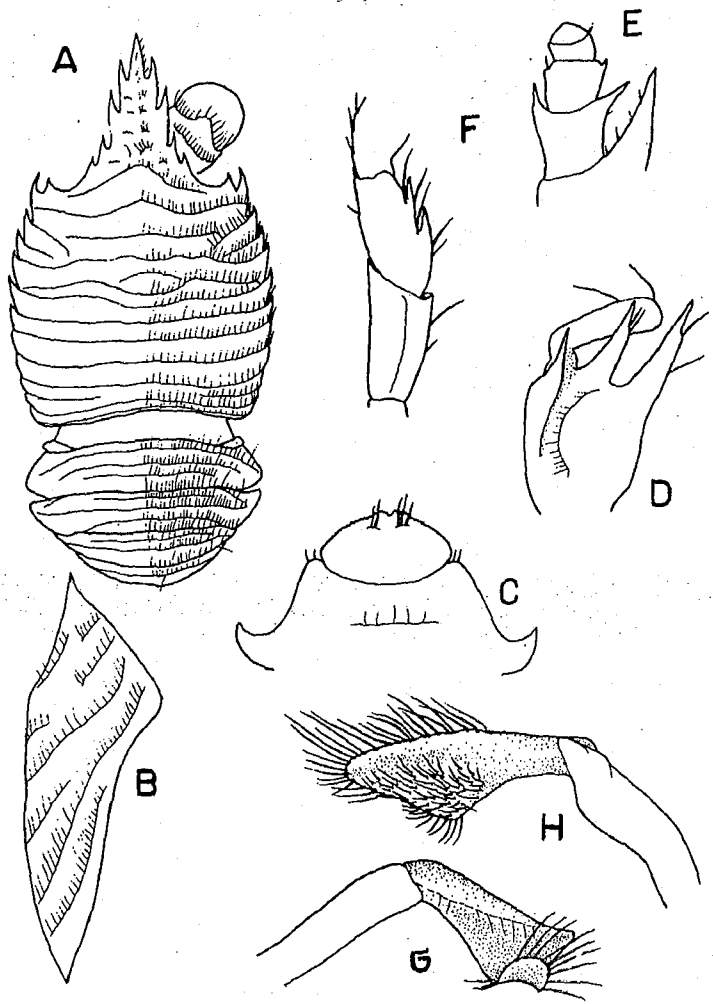

Fig. 23. *Galathea brevimana* Paulson, 1875, male, cl+r, 2.5mm; A, carapace and abdomen, dorsal view; B, right pterygostomian flap; C, anterior part of sternal segments; D, basal segment of right antennule, dorsal view; E, right antennal peduncle, ventral view; F, ischium and merus of right third maxilliped, ventral view; G, right first pleopod; H, right second pleopod.

Distribution.-

Indian Ocean: Previously recorded only from the Red Sea; Tor or Ras Mohammad, Sinai Halbinsel, Dahab, Berenice, Egypt, Elath, Israel and now the known range of distribution extends to a wider area in the Indian Ocean.

Galathea australiensis Stimpson,1858
(Fig.24)

Galathea australiensis Stimpson, 1858:238,251, 1907:230; Haswell, 1882b:161; Miers,1884:277 (in part),pl.31, fig.B (not fig.A as stated); Whitelegge, 1900:189; Sayce, 1902:155; Grant & McCulloch, 1906:43, (in part), pl.4, figs.1, 1a; Lewinsohn,1967 :178, figs. 1-13; 1969:103, fig.18f; Haig, 1973: 277.
Galathea australiense: Hale, 1927:78, fig.74.

Material and measurements.-

Sta.M-5; Date 10-9-1967; 1 female, cl+r, 4mm (tip of rostrum broken, infected by some bopyrid species).

Descriptive remarks.-

In the available collection, *G.australiensis* is represented by a single female of 4mm carapace length (tip of rostrum broken). The specimen at hand , agrees quite well with the account given by Lewinsohn (1969:103) and Haig (1973:277). The variations discussed by these authors are carefully checked and incorporated in the following brief account of the Indian Ocean specimen.

The rostrum (Fig.24A) which is a little longer than broad, is furnished with scales having short setae. As already pointed out by Lewinsohn (1969:103) the outer orbital angle is produced into a strong spine. The anterolateral spine is followed by seven spines on the right side, the margin on the left is distorted due to a bopyrid parasite. The hepatic lateral spine is slightly dorsal in position. The third abdominal segment is with three transverse grooves, as described by Haig whereas the second one has only two. Further, the anterior and posterior transverse grooves of the second abdominal segment are broken into short striae. A few iridescent setae are present on the carapace and abdomen.

The pterygostomian flap (Fig.24B) is acutely produced anteriorly, the setose striae are more or less continuous.

The anterior margin of the third thoracic sternite (Fig.24C) is bulging, crenulated and with a slight median notch.

The eye is with a thin row of 'lashes' and the ocular peduncle bears two setose striae.

The basal segment of the antennule (Fig.24D) is armed with three strong spines, one on the distomedian angle and two on the lateral side distally. The basal antennal spine (Fig.24E) is well developed, both the distal angles of the second segment are

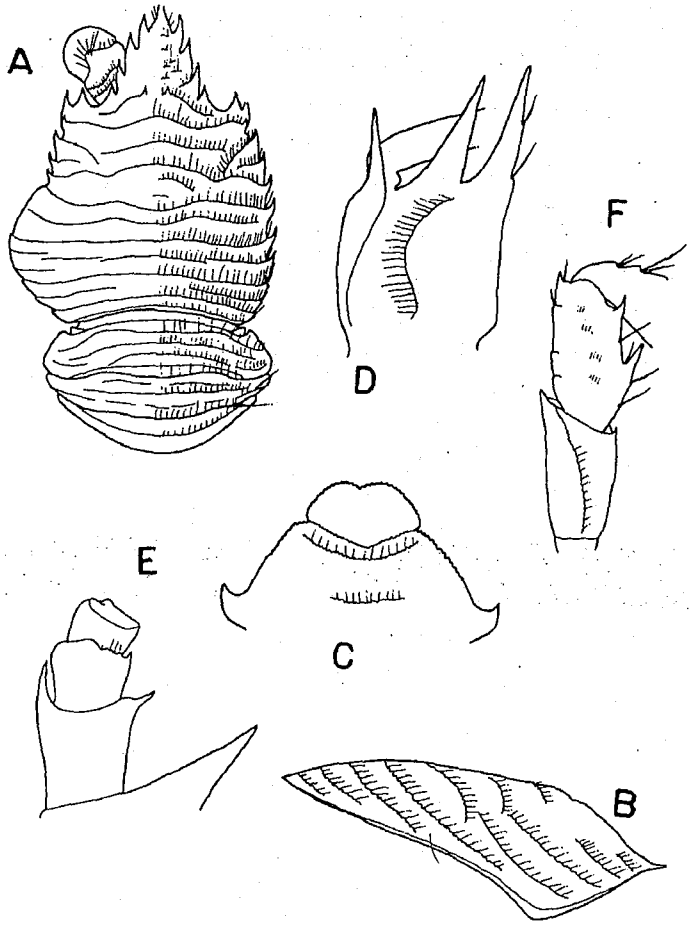

Fig. 24. *Galathea australiensis* Stimpson, 1858, female, cl+r, 4mm, A, carapace & abdomen, dorsal view; B, right pterygostomian flap; C, anterior part of sternal segments; D, basal segment of right antennule, dorsal view; E, right antennal peduncle, ventral view; F, ischium and merus of the right third maxilliped, ventral view.

produced into spines, the median one being smaller than the lateral spine. The distomedian angle of the third segment is also armed with a small spine.

The ischium of the third maxilliped (Fig.24F) is nearly as long as the merus. The distomedian and the distolateral angles of the ischium are armed with small spines, whereas the armature of the merus is strong, the inner margin being with two large spines, that on the distolateral angle is also well developed.

The chelipeds and all the walking legs are missing.

Epipods are present on 1-3 pereopods.

Distribution.-

Haig (1973) has discussed in detail about the authenticity of the existing records, the range of distribution now is limited to New South Wales at Port Stephens, Port Jackson, Port Phillip, Victoria, Flinders Islands, Shark Bay, western Australia, off the coast of South Australia and the Indian Ocean.

Galathea whiteleggei Grant & McCulloch, 1906
(Fig.25)

Galathea sp. Whiteleggei, 1900:191.
Galathea whiteleggei Grant & McCulloch, 1906:45, pl.4. fig.2.

Material and measurements.-

Sta.60;Cruise 1; Lat.17°54'N; Long.86°31'E; Depth 2417M; Date 9-4-1966, 2 females, cl+r, 4mm; cb, 2.5mm; rl, 1.2mm.

Descriptive remarks.-

This species in the IIOE collection is represented by two specimens, both females. The systematic position of *Galathea whiteleggei* is not absolutely clear, this has been discussed in detail by Haig (1973:278,under *G.balssi*). For this reason the specimens at hand are being described in detail.

The rostrum (Fig.25A) is a little less than half the length of the carapace (cl, 2.2mm, rl, 1.2mm), its upper surface is slightly concave and covered with setose scales. The outer orbital angle is armed. The gastric region has four spines of which the two median spines are minute. A small spine is present in each hepatic region, near the lateral ends of the second continuous stria. The anterolateral spines are followed by six spines. As already suggested by Haig (1973:280), the transverse grooves on the second and third abdominal segemnts are probably subject to variation, since in the illustration given by Grant & McCulloch (1906, fig.2), there are two transverse grooves on each segment, Haig mentioned three in all the specimens studied. However, the present specimens agree with Haig's material, in having three transverse grooves on each segment.

The pterygostomian flap (Fig.25B) has an acute point anteriorly, the setose striae are few and continuous.

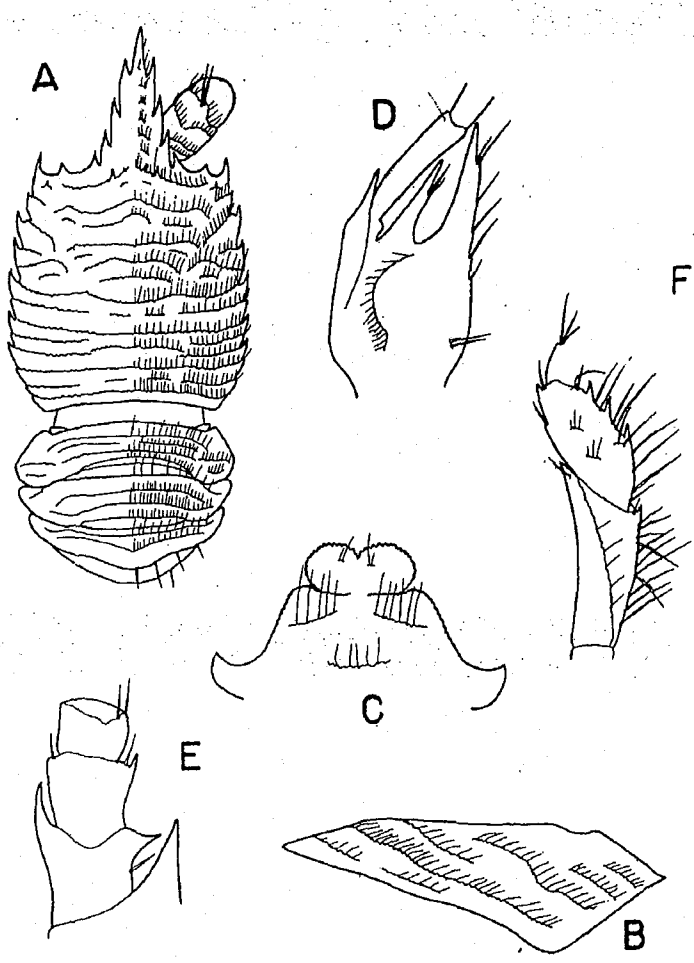

Fig. 25. *Galathea whiteleggei* Grant & McCulloch, 1906, female, cl+r, 4mm A, carapace and abdomen, dorsal view; B, right pterygostomian flap; C, anterior part of sternal segments; D, basal segment of right antennule, dorsal view; E, right antennal peduncle, ventral view; F, ischium and merus of right third maxilliped, ventral view.

The third thoracic sternite (Fig.25C) is somewhat bean-shaped, with an anterior median notch and rounded, crenulated margins.

The eyes are elongated, with setose striae on the ocular peduncle and a fringe of 'lashes'.

The basal segment of the antennule is armed with three well developed distal spines, one median and two lateral spines as illustrated in figure 25D. The basal antennal spine (Fig.25E) is sharply pointed, reaching as far as the distal margin of the second segment which is armed with a pyramidal spine on its distomedian angle and a long sharp spine on the distolateral angle. The inner distal angle of the third segment is also produced into a well developed spine.

Distribution.-

Indo-Pacific: This species has been recorded from the Arafura Sea, East Australian coast, and now from the Indian Ocean.

Galathea spinosorostris Dana, 1852
(Fig.26)

Galathea spinoso-rostris Dana, 1852: 480; 1855; pl.30, figs.9a, 9c.
Galathea spinosorostris: Laurie, 1926:124; Tirmizi, 1966: 181, figs.4B,5; Baba, 1969: 11.
Galathea longimana: Lewinsohn, 1969: 107, fig.20.
Galathea algae Baba, 1969a:11, fig.2; 1977a:248; 1979b:646; 1982a: 59.

Material and measurements.-

Sta.16; Cruise 1; Lat.07°31'N; Long.96°11'E; Depth 772M; Dated 20.5.1965, 1 ovigerous female, cl+r, 4.5mm; cb, 3mm; rl, 1.5mm; chl, 9.5mm; pl, 3mm, fl, 2mm; 2 males cl+r, 3-4mm; cb, 2-2.8mm; rl, 1-1.5mm; chl, 6mm; pl, 1.8mm; fl, 1.5mm.
St.JR-5; Cruise-; Lat.13°24'S; Long.48°18'E; Depth 1.5-3.0M; Dated 7.11.1979, 1 ovigerous female, cl+r, 4mm; cb, 2.5mm; rl, 1.5mm.

Descriptive remarks.-

This species can easily be diagnosed by the well developed and deeply incised rostral spines, shape of the eyes and armature of the third maxilliped.

The rostrum is about half as long as the carapace except in one female from St.JR-5, where it is a trifle longer, in the same female the hepatic armature is missing, in others there are three spines in each hepatic region, a condition not seen in Lewinsohn's illustration (1969,Fig.20). The carapace (Fig.26A) is furnished with complete and incomplete striae. Each anterolateral spine is followed by 4-5 spines. A median transverse groove is present on each of the second and third abdominal segment.

The pterygostomian flap (Fig.26B) has rather narrow and acutely pointed anterior margin. The surface is furnished with granular striae beset with fine setae.

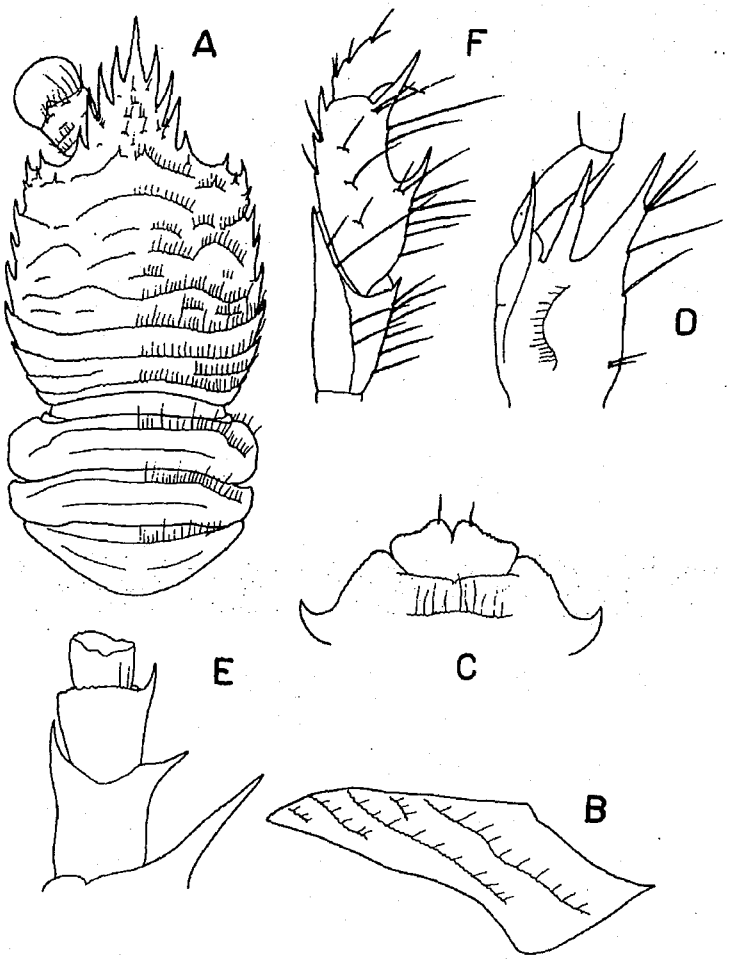

Fig. 26. *Galathea spinosorostris* Dana, 1852, ovigerous female, cl+r, 4.5mm; A, carapace and abdomen, dorsal view; B, right pterygostomian flap; C, anterior part of sternal segments; D, basal segment of right antennule, dorsal view; E, right antennal peduncle, ventral view; F, ischium and merus of right third maxilliped, ventral view.

The third thoracic sternite is as represented in figure 26C.

The cornea is globular and slightly wider than the ocular peduncle, which is furnished with granular setose scales, and a few very fine 'lashes'.

The basal segment of the antennule (Fig.26D) is armed with three distal spines. The basal antennal spine (Fig.26E) is long and slender, both angles of the following segment are armed distally, while the spine on the distomedian angle of the third segment is strong and well developed.

The merus of the third maxilliped (Fig.26F) is provided with a strong armature; there being two strong spines on the inner margin, and 2-3, relatively smaller spines on the outer margin, both the distomedian and the distolateral angles of the ischium are spinose.

The chelipeds are almost twice the carapace length, they are thorny and setose, the inner margins of the fingers of a cheliped, measuring 6mm are serrated whereas the larger cheliped (9.5mm) has well developed hiatus and teeth. It is noticeable that the fixed finger is armed with a row of spines while the movable finger has an unarmed outer margin. Detached walking legs are present, the dactyli are each armed with 4-5 teeth, beset with a movable spine at the base and distally produced into an unguiculus.

Epipods are present on the chelipeds only.

Distribution.-

Indo-Pacific: Known from the Red Sea, Zanzibar, Providence, Amirante, Seychelles, Coetivy, Saya de Malha Bank, Cargados Carajos, Chagos, Timor, Moluccas, Obi Island, Ternate, off northehrn and southwestern Luzon, Palau Islands, Japan, Hawaiian Islands and now its range extends to Madagascar and Bay of Bengal.

Galathea aegyptiaca Paulson, 1875
(Fig.27)

Galathea aegyptiaca Paulson, 1875:94,pl.12, fig.1; Benedict, 1902:300 (list only); Nobili, 1906b:126, fig.8, pl.7,fig.3; Riddell, 1911:262; Doflein and Balss, 1913:169, (distribution); Gurney, 1938:82; Lewinsohn, 1967:175;1969:98, fig.18; Baba,1977:244, 1979:645, 1989a: 952.
Galathea australiensis: Ortmann, 1892:251, pl.11, fig.8; Borradaile, 1899:421; Balss, 1915:2 (in part); Melin, 1939:56, figs.32-35; Miyake & Baba, 1966:60, figs.3-5;
Galathea australiensis: de Man, 1902:710; Balss,1927:224; Ramadan, 1936:3,24;
Galathea strigosa Heller, 1861a:260 (in part).
Galathea aegyptiaca: Pesta, 1927:72 (=*Galathea affinis* Ortmann).

Material and measurements.-

Sta.JR29; Lat.13°23'S; Long.48°13'E; Depth 1.5M; Date 11-1-1964; 2 females, cl+r, 2-3.5mm; cb, 1.5-2.5mm; rl, 0.5-1mm.
Sta.400C; Cruise 8; Lat.20°30'S; Long.35°43'E; Depth 62M;Date 3-10-1964; 1 male, cl+r, 4.5mm; cb, 3mm; rl, 1mm.
Sta.JR-25A; Lat.13°24'S; Long.48°17'E; Date 5-1-1964; 1 male (mutilated).

Descriptive remarks.-

Although *G.aegyptiaca* has been collected on several occasions, yet there seems a need for a detailed description. The four specimnes available for study are in fairly good condition. Unfortunately, their chelipeds and walking legs are missing.

The rostrum is broad and with a few long and plumose setae, the gastric region is armed with a pair of spines, the second transverse stria is armed with a spine near each lateral end, except in a female from Sta.JR 29(Fig.27A), the stria in question is arched in the middle, moreover, it is beset with several long setae. In a few specimens, these setae may not be present but their position can clearly be seen. Each anterolateral spine is followed by six spines, including the spine in the hepatic region which is not exactly lateral in position. Most of the striae on the carapace are continuous, very few being incomplete. The second and third abdominal segments have each a median groove, except in one male where an additional, interrupted groove is present on the posterior half of the second segment.

The striae on the pterygostomian flap (Fig.27B) are few but more or less, complete. In one specimen, the short setae are interspersed with a few long setae.

The ocular peduncle is considerably broad and the cornea is nearly as broad as the ocular peduncle, a setose stria is present on the peduncle and also a few short setae can be seen on the line separating the peduncle from the cornea.

The third thoracic sternite (Fig.27C) is broadly triangular, and with a slit-like notch in the middle.

The basal segment of the antennule (Fig.27D) is distally armed with two rather stout lateral, and a sharply pointed needle-like median spine. The basal antennal spine (Fig.27E) is strong, acutely pointed and with setose margin, both the distal angles of the second segment are armed, the following segment is however without spine.

The armature of the merus and ischium shows only minor variations. The inner margin of the merus of the third maxilliped (Fig.27F) is armed with two spines, the distolateral angle may be acute or produced into a small spine. The distomedian angle of the ischium is spinose, and the distolateral angle may be armed or unarmed.

Epipods are present on the chelipeds only.

Remarks.-

Galathea aegyptiaca Paulson, 1875, shows a close relationship to *Galathea australiensis* Stimpson, 1858 with which it has been confused in the past. Since both these species are available for study, their examination reveals that the two species can easily be separated; *G. spinosorostris* Paulson, 1875, is also a closely related species. Characters distinguishing them are given in table 1.

Distribution.-

Indo-Pacific: Red Sea; Madagascar, Amirante, Saya de Malha Bank, Cargados, Carajos, Ternate, Timor, Obi Island, Taland Island, Hollandia Bay (New Guinea), Loyalty Island, western Australia, Palau Islands, Ryukyu Islands, Bonin Islands, Marshall Islands and now from the Mozambique channel.

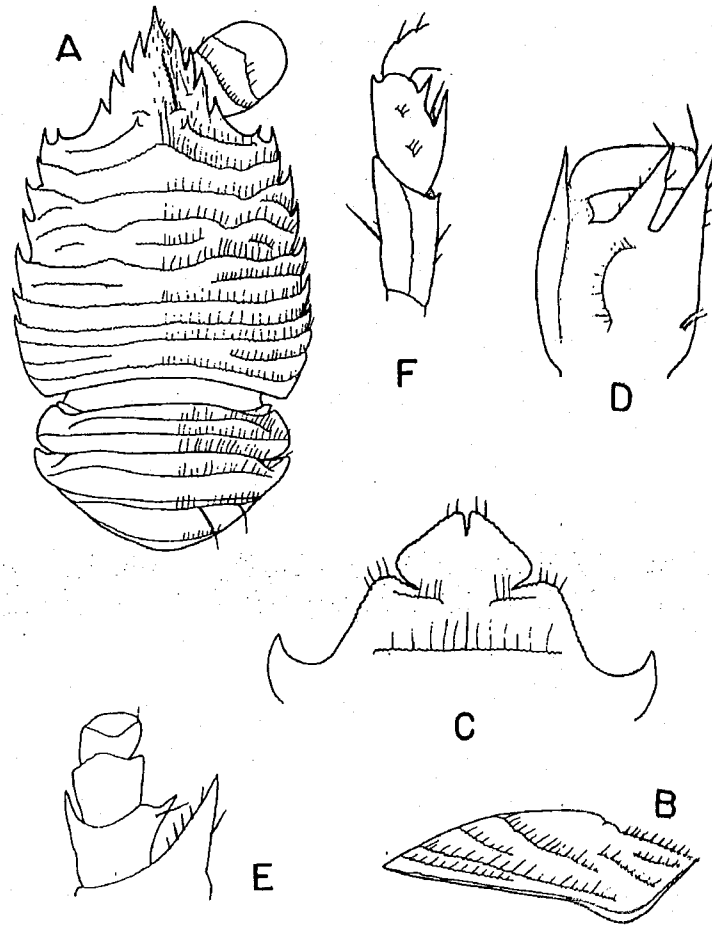

Fig. 27. *Galathea aegyptiaca* Paulson, 1875, female, cl+r, 3.5mm; A, carapace and abdomen, dorsal view; B, right pterygostomian flap; C, anterior part of sternal segments; D, basal segment of right antennule, dorsal view; E, right antennal peduncle, ventral view; F, ischiumand merus of right third maxilliped, ventral view.

TABLE I

Features	*G. australiensis*	*G. spinosorostris*	*G. aegyptiaca*
Rostrum	comparatively narrow with spines not deeply incised, having no long setae.	with deeply incised acute spines and short setae	rostrum broad, with few long plumose setae, spines not deeply incised.
Transverse striae on anterior portion of the carapace.	second stria not arched anteriorly, third one ending near anterior cervical groove, no tuft of long setae.	few stria present which are broken and provided with short setae	second stria arched anteriorly provided with a tuft of long setae in the middle, third one being continuous with the anterior cervical groove and on each lateral margin of the carapace.
Second abdominal segment	with more than one transverse grooves not reaching upto the lateral margin of the segment.	with a median transverse groove not reaching upto the lateral margin of the segment	with a median transverse groove, reaching upto the lateral margins of the segment.
Eyes	comparatively narrow	rather elongated, with cornea slightly broader than the ocular peduncle.	comparatively broad, not much elongated.
Third thoracic sternite	bulging, with a slight median notch	median notch broad, divides the sternite into two triangular structures	produced anteriorly, narrow notch.
Antennal peduncle	basal antennal spine not setose and not cylinderical	basal antennal spine, cylinderical, without setae.	basal antennal spine setose not cylinderical.
Third maxilliped	distolateral angles of ischium and merus armed, inner margin of merus with two spines.	merus and ischium with strong armature having 2-3 large spines	distolateral angles of ischium and merus are mostly unarmed, or with very blunt and small spines.
Epipods	pereopods 1-3 with epipods.	only chelipeds with epipods.	only chelipeds with epipods.

Galathea tanegashimae Baba,1969
(Fig.28)

Galathea tanegashimae Baba, 1969:16,fig.4.

Material and measurements.-

Sta.18A; Cruise 1;Lat.07°34'N; Long.98°00'E; Depth 77M; Date 21-3-1963; 1 female, cl+r, 2.5mm; cb, 2mm; rl, 1mm; chl, 6mm; pl, 1.2mm; fl, 1mm.

Descriptive remarks.-

A single specimen belonging to this Japanese species is present in the IIOE collection. The specimen, a female, is in a poor condition. Nevertheless, it is possible to identify it. The specimen agrees well with the description and illustration of the holotype (Baba,1969:16, Fig.4), since the coxae of the chelipeds are wanting, the presence of the epipods on the chelipeds cannot be ascertained.

The variations mentioned below, seem to be more due to the much smaller size of the Indian Ocean specimen rather than individual variation. The carapace illustrated in figure 28A, is with only a few striae and scant hairs, Further, as far as can be seen, there is no trace of a median groove on the third abdominal segment.

The pterygostomian flap (Fig.28B) 'like the carapace' is also with a few striae and almost without hairs.

The third thoracic sternite (Fig.28C) is very much like that of the holotype (Baba, 1969, fig.4-e) except that the median notch is deep, narrow, slit-like and the margin on either side is strongly serrated.

The basal segment of the antennule (Fig.28D) is armed with three well developed spines, the distomedian one being smaller. The basal antennal spine (Fig.28E) is small, both distal angles of the following and the distomedian angle of the third segment are armed.

The merus of the third maxilliped (Fig.28F) is armed with two spines, of which the distal one is very small, the distolateral angle is also produced into a small spine, the ischium is armed only on its distomedian angle.

The detached chelipeds are of equal size, they are more than twice the carapace length. The spinosity of the chelipeds is as illustrated for the Japanese specimen, except that the fingers have neither a hiatus nor teeth. The fingers in one specimen are spoon-shaped and with serrated inner margins. One detached walking leg is present, which resembles the third leg of the holotype, as shown in Baba's Fig.4a(1969).

Distribution.-

Indo-Pacific: Off Nishino-omote, Tanega-shima I, southern Kyushu, Japan, and now from the Indian Ocean.

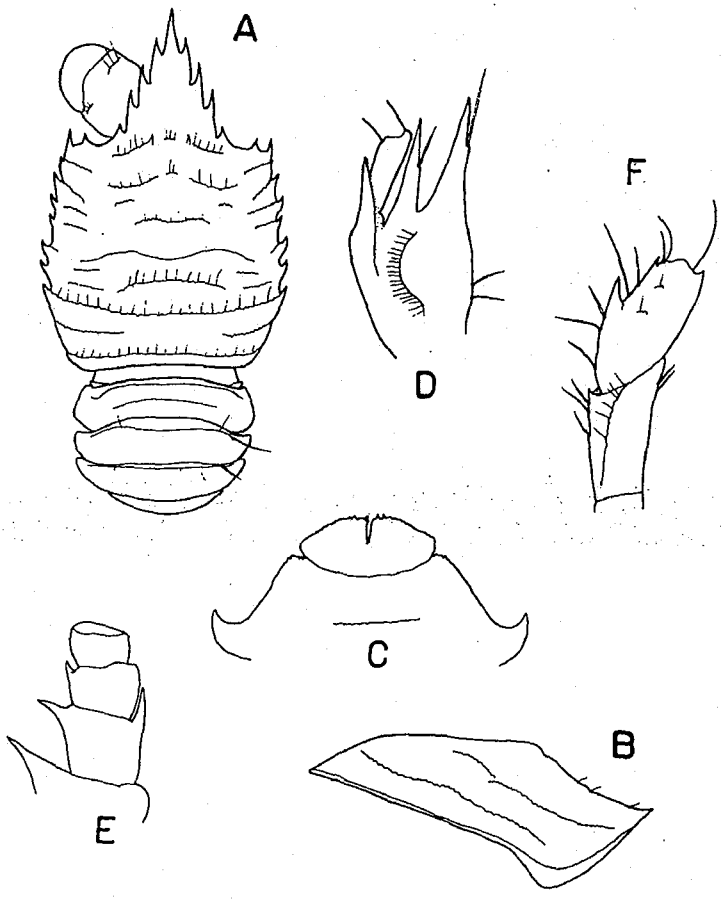

Fig. 28. *Galathea tanegashimae* Baba, 1969, female, cl+r, 2.5mm; A, carapace and abdomen, dorsal view; B, right pterygostomian flap; C, anterior part of sternal segments; D, basal segment of right antennule, dorsal view; E, left antennal peduncle, ventral view; F, ischium and merus of left third maxilliped, ventral view.

Galathea dispersa Bate, 1859
(Fig.29)

Galathea dispersa Bate,1859:3; Bonnier, 1888a:1688; 1888b:124; Milne-Edwards & Bouvier, 1894a:252; 1894b:79; 1899:72;1900:278, pl.29,figs.2-3; 1922:42; Stebbing, 1910:364; Bull,1936:46,pl.1,figs.4-6; pl.3,fig.3; pl.4,figs.1,4; pl.5; figs.5-8; pl.6, figs.2, 3,6; Barnard, 1947:378; 1950:486, fig.91; Nunes-Ruivo, 1961:4; Miyake & Baba, 1970:90 (list only).

Material and measurements.-

Sta.371D; Cruise 7; Lat.24^{O}'S; Long.35^{O}20'E; Depth 165M; Date 18-8-1964; 1 ovigerous female, cl+r, 8mm; cb, 5mm; rl, 2.5mm; chl, 16mm; pl, 4mm; fl, 3mm.

Sta.394B; Cruise 8; Lat.29^{O}27'S; Long.31^{O}31'E; Depth 68-70M;Date 25-9-1964; 2 males, cl+r, 10.5-11mm; cb, 6.7-7mm; rl, 3-3.5mm; chl, 27-28mm; pl, 7mm; fl, 6mm.

Sta.357B; Cruise 7; Lat.29^{O}11'S; Long.32^{O}02'E; Depth 69M; 2 ovigerous females, cl+r, 6mm; cb, 3.6-4mm; rl, 2mm; 3 males (one mutilated), cl+r, 6-8.5mm; cb, 3.5-5mm; rl, 2-2.5mm.

Descriptive remarks.-

Several specimens of this rather widely distributed species are present in the IIOE collection. As can be seen in figure 29A, the rostrum is characterized in having the distal spines larger, followed by spines which diminish gradually towards the base. The gastric region is armed, the spines of this region vary from 4-6. The hepatic region is with several spines. In all the available specimens, the second continuous stria of the carapace is armed with one spine near each lateral end, except in one female from Sta.357B, where two spines are present at each end. The cervical triangle is also armed, in a male these spines are represented by tubercles, whereas another male is without a spine in the left cervical triangle. A sharp spine is present near the outer orbital angle, the anterolateral spines are followed by 7-9 lateral spines. The number of spines on the two lateral margins of the carapace may also vary in the same specimen. The second and third abdominal segments are each provided with a median transverse groove; in most of the specimens an additional and interrupted transverse groove is also present on the anterior half of the same segment.

The pterygostomian flap is provided with complete and incomplete setose striae. In one male and one female the anterior margin of the flap is not sharply pointed as can be seen in figure 29B, it is somewhat acutely rounded.

The third thoracic sternite (Fig.29C) is bean-shaped with pointed lateral angles.

The eyes are with fine rows of 'lashes'.

The armature of the basal segment of the antennule and the antennal peduncle is almost without variation, it is as illustrated in figures 29D and E respectively.

The spinosity of merus and ischium of the third maxilliped (Fig.29F), like the gastric spines, is subject to variations, particularly that of the inner margin of the merus, where the number of spines vary from 2-4. The distal spines are generally smaller than the basal ones, in some specimens the spines between the distal and basal spines may even be represented by mere tubercles. The distomedian angle of the ischium is armed with a small and acutely pointed spine.

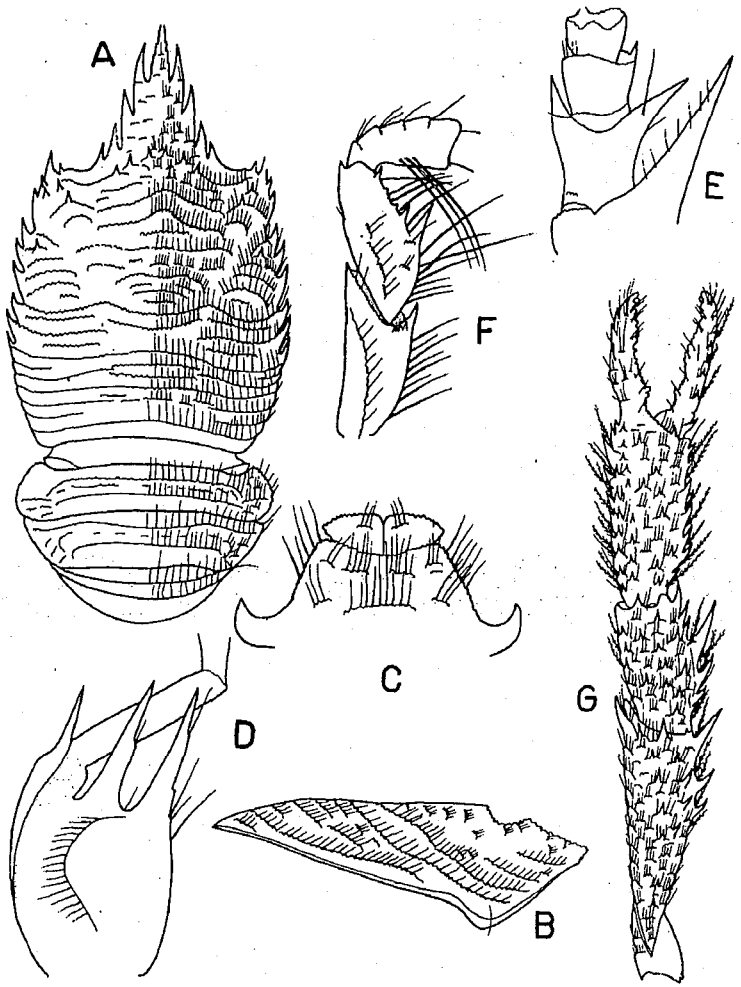

Fig. 29. *Galathea dispersa* Bate, 1859, ovigerous female, cl+r, 8mm. A, carapace and abdomen, dorsal view; B, right pterygostomian flap; C, anterior part of sternal segments; D, basal segment of right antennule, dorsal view; E, right antennal peduncle, ventral view;

The detached chelipeds of three specimens, one female from Sta.371D and two males from Sta.394B are present. The cheliped of the female is illustrated in figure 29G. As far as can be seen, the armature of the other chelipeds is the same. The fingers are spoon-shaped with strongly serrated inner margins and a tooth near the base of each finger. The fixed finger is provided with a row of spines on its lateral margin, the movable finger of the female alone has a row of three spines on the dorsal surface, they are wanting in the two males, the lateral margins are however, strongly serrated. The dorsal surface of the palm in the female is covered with spinose scales, chelipeds of males have simple scales on the palm, both lateral margins of the palm, the inner margins of the carpus and the merus are armed with rows of spines. The dorsal surfaces of carpus and the merus are furnished with granular and setose scales, several of which are spiny.

Epipods are present on 1-3 pereopods.

Distribution.-

Atlantic, Indian Ocean: Taken from the Norwegian fjords southwards to the Gulf of Cadiz, the Mediterranean, the Canary Islands, Madeira, South African coast and now from the South eastern coast of Africa.

Galathea intermedia Lilljeborg, 1851
(Fig.30)

Galathea intermedia Lilljeborg, 1851:21; Bonnier, 1888a:1687; 1888b:123; Ortman, 1892:250, pl.11,fig.5; Milne Edwards & Bouvier, 1894a:252; 1894b:81,pl.8, figs.1-10; 1899:74; 1900:277; Appellof, 1906:138; Hansen,1908:30; Selbie, 1914:60, pl.11, figs.1-12; Balss,1916:40; Bouvier, 1922:41; Schellenberg, 1928:83, figs. 63-64, Bull.1936:49; Eales, 1939:130; Barnard, 1947:378; 1950:483, fig.91; Holthuis & Gottlieb, 1958:73; Holthuis, 1961:36, fig.11b; Nunes Ruivo, 1961:6; Riedl,1963:28.1, pl.96; Forest, 1965:348. Miyake & Baba, 1970:62;
Galathea parroceli Gourret, 1887:1034.
Galathea giardi Barrois, 1888:21,pl.2,fig.1.

Material and measurements.-

Sta.394B; Cruise 8; Lat.29°27'S; Long.31°31'E; Depth 68-70M; Date 25-9-1964; 1 male, cl+r, 4.7mm; cb, 3mm; rl, 1.5mm; 1 ovigerous female, cl+r, 4mm; cb, 2.5mm; rl, 1mm; chl, 14mm; pl, 3.7mm; fl, 3.7mm.

Descriptive remarks.-

G.intermedia is represented by two specimens in the IIOE collection. In general they agree with Barnard's description (1950:483), however, the variations which are noted are included in the account given below:

The rostrum (Fig.30A) is less than half the carapace length armed with acute lateral spines. As already noted by Barnard (1950:483), the basal spine or the supraocular

spine is very small. The gastric region is armed with four spines, the lateral pair of spines being minute. Each anterolateral spine is followed by six spines whereas in the South African speciemns, Barnard has mentioned 7-8 lateral spines (1950:483). The second and third abdominal segments are each with one median transverse groove.

The pterygostomian flap (Fig.30B) is very characteristic. The anterodorsal margin is armed with a row of spines which become stronger and stouter posteriorly. The number of these spines is variable, since in the illustration given by Barnard there are ten spines, excluding the distal one (1950:484, fig.91d) whereas in our specimens, the male is with eight spines, and the female with six, the apical spine of the right flap of the male is bifurcated.

The third thoracic sternite (Fig.30C), is with a median 'V' shaped notch, distinctly bilobed, and each half thus formed is with a shallow notch near the crenulated antero-lateral angle.

The eyes have moderately long ocular peduncles, with setose scales, striae and a row of fine "lashes".

The basal segment of the antennule (Fig.30D) is with a short acuminated distome-dian spine and two large distolateral ones. The armature of the antennal peduncle is somewhat variable, in having the distomedian angle of the third segment, armed in the male (Fig.30E) and unarmed in the female.

The maxilliped affords an excellent character for quick diagnosis of the species, since the merus is much longer than the ischium. The merus is armed with two strong and developed spines on the distal half of the inner margin, a minute spine on the distolateral angle can be seen in the male specimen (Fig.30F). The ischium is short, broad and with a bifurcated distomedian and small distolateral spines.

A detached cheliped present with the female, is more than three times the length of the carapace (chl, 12mm, cl+r, 4mm). The finger is as long as the palm (fl, 3.7mm, pl, 3.7mm), the inner margins of the fingers are evenly granular. The entire dorsal surface of the cheliped is covered with scales, many of which are tipped with one or two spinules. The only large spines present are on the distal angles of the merus, and near the distomedian angle of the carapace.Six detached walking legs are also present in the same jar. The dactylus of each is produced distally into an unguiculus, its margin has 3-5 teeth, of which the distal one is the largest; further, at the base of each tooth is a movable spine. The outer margin of the propodus is with 3-5 movable spines. Of the six legs four are each with a row of small spines on the inner margin of the carpus and the merus. Like the cheliped the walking legs are also weakly spinose.

Epipods are present on the chelipeds only.

Distribution.-

Atlantic, Indian Ocean: The species is known from the Faeroes and Norwegian fjords and southwards, from the Mediterranean, the Azores, Madeira, the Canary and Cape Verde Islands, from Dakar southwards to the Gold Coast of Africa, South Africa and now from the Indian Ocean.

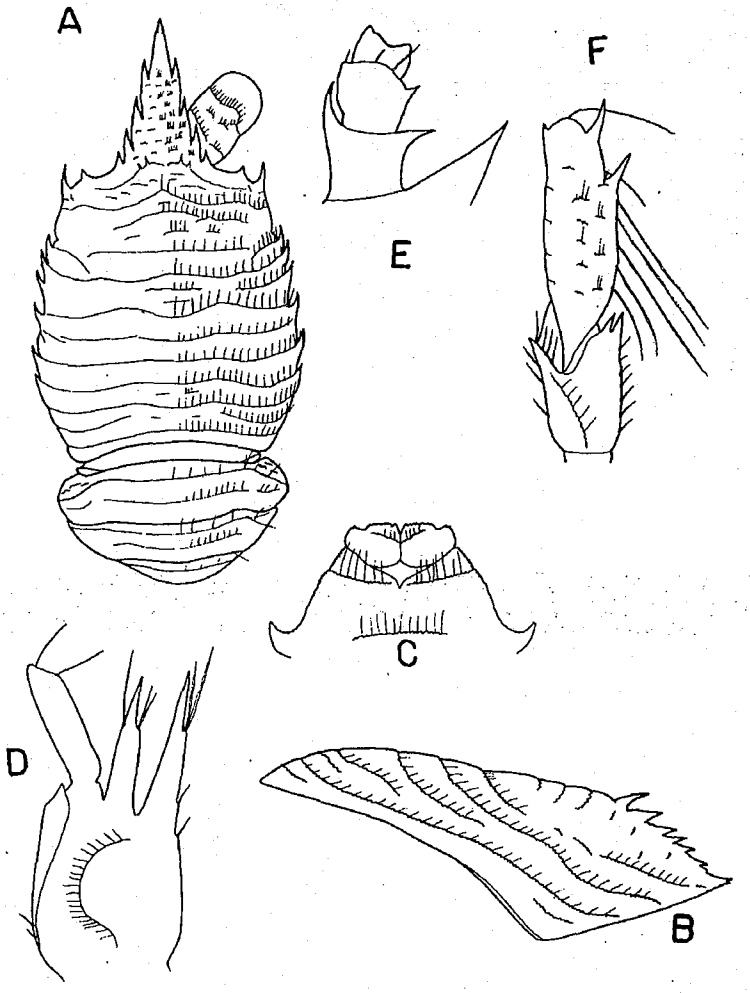

Fig.30. *Galathea intermedia* Lillijeborg, 1851, male, cl+r, 4.7mm, A, carapace and abdomen, dorsal view; B, right pterygostomian flap; C, anterior part of sternal segments; D, basal segment of right antennule, dorsal view; E, right antennal peduncle, ventral view; F, ischium and merus of right third maxilliped, ventral view.

Galathea pubescens Stimpson, 1858
(Fig. 31)

Galathea pubescens Stimpson, 1858:252; 1907:233; Balss, 1913:11, figs.11-12; Yokoya,1933:57; Miyake, 1947:732, fig.2117; 1965:634, fig.1043; 1982:145, pl.49, fig.3.; Tirmizi, 1966: 187; Haig, 1974:447; Baba, 1969c:48, fig.5; 1988:76.

Material and measurements.-

Sta.390S; Cruise 7; 35'S; Long.31°42'E; Depth 138M; Date 9-9-1964; 1 male, cl+r, 5mm; cb, 3mm; rl, 2mm; 1 female, cl+r, 4mm; cb, 3mm; rl, 1.5mm.

Descriptive remarks.-

The rostrum which is more than half the carapace length, is with slender, and rather delicate spines laterally, the dorsal surface of the rostrum is furnished with granular setose scales. The carapace is globular and with prominent transverse striae and scales, several of which are spiny as can be seen in figure 31A. The spines are so delicate that not all are complete in the specimen under study. The second and third abdominal segments are each with three transverse grooves.

The pterygostomian flap (Fig.31B) is acutely pointed anteriorly, it is beset with complete and incomplete distinctly marked setose striae. It may be mentioned that the ventral lobe is also rather narrow and pointed.

The third thoracic sternite (Fig.31C) is bilobed forming a transverse figure of '8', each lobe is rounded and with crenulated free margin.

The eyes are remarkable in being narrow, setose, and covered with very fine long 'lashes'.

The basal segment of the antennule (Fig.31D) is with a strong armature but for the reduced distomedian spine. The basal antennal spine is sharp (Fig.31E), reaching a trifle beyond the distal margin of the following segment, which has a strong distolateral spine and an arcuate median one. The distomedian angle of the third segment is produced into a small spine.

The merus and ischium of the third maxilliped (Fig.31F) are with strong spines. The merus is armed with three large spines on the inner margin and a sharp spine on the distolateral angle, a small spine is also present on the middle of the outer margin. The distal angles of the ischium are with well developed spines, a small spine can be seen near the distomedian spine.

The chelipeds and all the walking legs are missing.

Epipods are absent from all the pereopods.

The first and second pleopods of the male are illustrated in figures.31G & H, respectively, they agree fairly well with the illustrations given by Baba (1969c, Fig.5a-b).

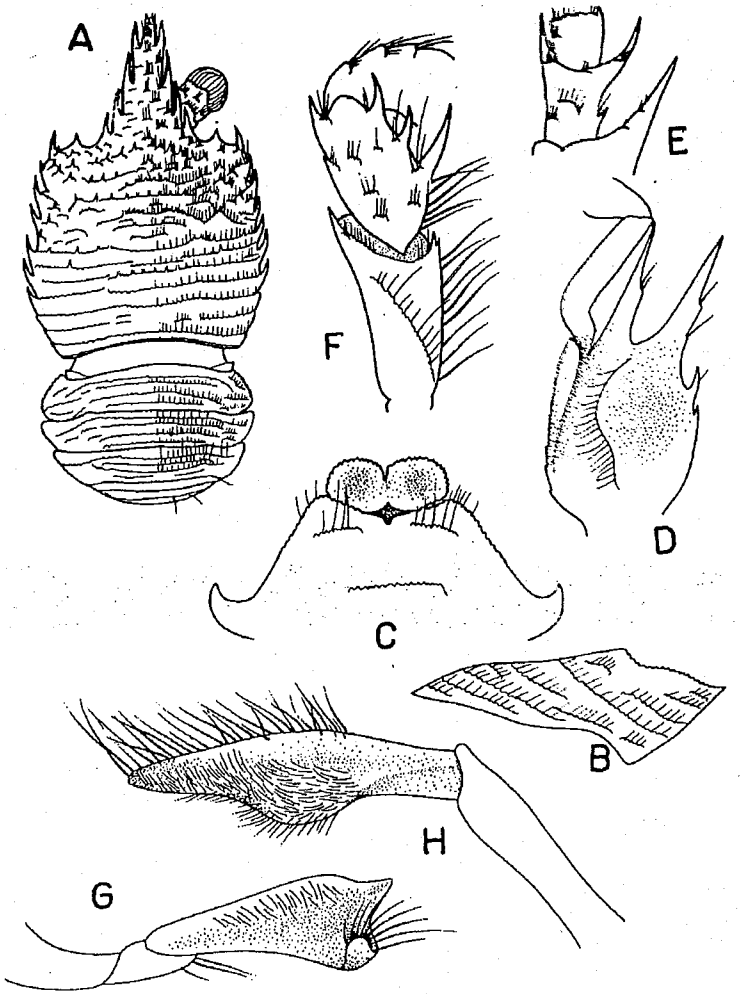

Fig. 31. *Galathea pubescens* Stimpson 1858, male, cl+r, 5mm; A, carapace and abdomen, dorsal view; B, right pterygostomian flap; C, anterior part of sternal segments; D, basal segment of right antennule, dorsal view; E, right antennal peduncle, ventral view; F, ischium and merus of right third maxilliped, ventral view; G, right first pleopod; H, right second pleopod.

Distribution.-

Indo-Pacific: Japanese waters; East China Sea, Philippine waters, western Australia, Zanzibar, Madagascar and southeast African waters.

Galathea omanensis sp.nov.
(Fig.32)

Material and measurements.-

Sta.269C; Cruise 4B; Lat.23°35'N; Long.58°49'E; Depth 121-124M; Dated 2-12-1963; 1 male, cl+r, 5.5mm; cb, 3.5mm; rl, 1mm (tip broken); chl, 18mm; pl, 4mm; fl, 3.6mm.

Measurements of the holotype male.-

cl+r, 5.5mm; cb, 3.5mm; rl, 1mm (tip broken); chl, 18mm pl, 4mm fl, 3.6mm.

Description.-

This interesting species is represented by a single, medium size male, measuring 5.5mm in carapace length. The tip of the rostrum is broken, nevertheless, it can be seen that the rostrum (Fig.32A) is narrow, with almost parallel margins, the rostral teeth are not deeply incised. The surface of the carapace is without any spine and with weak, setose, transverse striae, fringed with a few long setae interspersed with the smaller ones. The outer orbital angle is acute. The anterolateral spines are sharp and well developed, each is followed by five spines, the abdominal segments are smooth but for the second one which bears an illdefined median groove.

The pterygostomian flap (Fig.32B) is quite characteristic, being large and with more or less equidistant, curved, hairless striae.

The third and fourth thoracic sternites form a characteristic feature, which can be helpful in diagnosing the species. As can be seen in figure 32C, the fourth sternite becomes narrow and produced anteriorly, the third sternite is semispherical, with crenulated anterior margin having a median projection and acute anterolateral angle.

The ocular peduncle is with few setae and narrow, cap-like cornea.

The three distal spines of the antennule (Fig.32D) are subequal, long and sharply pointed. The basal antennal spine is with an extra ordinary broad base, which tapers towards sharply pointed tip, extending beyond the distal end of the antennal peduncle. Following two segments are armed as shown in figure 32E.

The inner margin of the merus of the third maxilliped (Fig.32F) is armed with two spines, the basal one being larger, the distolateral angle of this segment is unarmed while a spine is present in the middle of the outer border. The distal angles of the ischium are also armed.

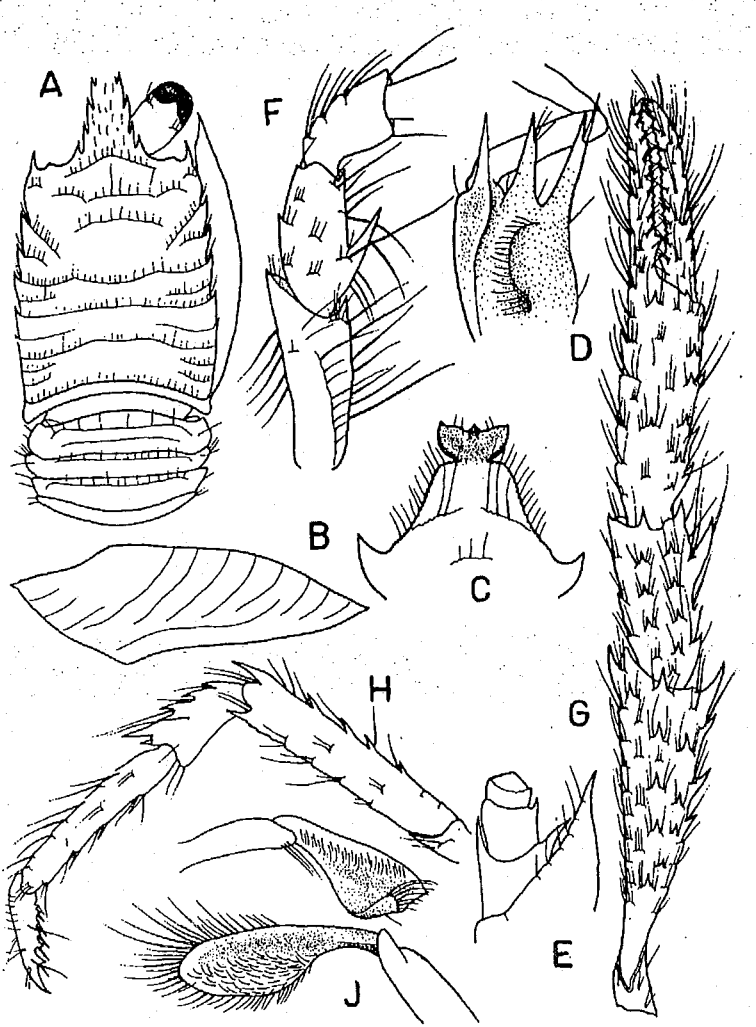

Fig. 32. *Galathea omanensis* sp. nov., holotype male, cl+r, 5.5mm; A, carapace and abdomen, dorsal view; B, left pterygostomian flap; C, anterior part of sternal segments; D, basal segment of right antennule, dorsal view; E, right antennal peduncle, ventral view; F, part of endopod of right third maxilliped, ventral view; G, left cheliped; H, detached walking leg; I, right first pleopod; J, right second pleopod.

The chelipeds are long and hairy, they are three times as long as the carapace. The length of the cheliped is due to the large size of the chela which is nearly as long as the rest of the cheliped. The fingers are slightly shorter than the palm, the inner margins are serrated, each having a tooth near the base. The spinosity of the cheliped is as illustrated in figure 32G. Four detached walking legs are present, one of them is illustrated in figure 32H. The outer margin of the dactylus of each leg is armed with six teeth, each tooth is with a movable spine at the base, that of the propodus is with four movable spines, the outer margins of the carpus and that of the merus are unarmed except one spine on the distal angle of the merus. The inner border of the carpus and merus is provided with a row of spines.

Epipods are absent from all pereopods.

The first and second pleopods are illustrated in figures 32 I and J respectively.

Galathea lenis Baba, 1969
(Fig.33)

Galathea lenis Baba, 1969:13, fig.3.

Material and measurements.-

Sta.AB-22A; Cruise 1; 1 male, cl+r, 3mm; cb, 1.5mm; rl, 1mm.
Sta.202C, Cruise 4B, Lat.18°27'N; Long.71°13'E; Depth 26M; Date 14-11-1963; 1 ovigerous female, cl+r, 4mm; cb, 2.5mm; rl, 1.4mm.
Sta.401B; Cruise 8; Lat.19°51'S; Long.36°21'E; Depth 63M; Dated 4-10-1964. 1 female (infected by some bopyrid species) cl+r, 3mm.
Sta.401 C; Cruise 8; Lat.19°51'S; Long.36°21'E; Depth 62M; Dated 4-10-1964; 1 female, cl+r, 3.5mm; cb, 2mm; rl, 1mm.

Descriptive remarks.-

The present specimens agree rather well with the description and illustrations of the holotype except in some details, which are included in the following description.

The rostrum (Fig.33A) is almost half the carapace length, it is flat and twice as long as wide, being pubescent, whereas in the male which is illustrated few illdefined scales also can be seen. The specimens at hand, differ from the Japanese specimens (Baba, 1969:13) in having the second transverse stria and the hepatic region urarmed. Further, the branchial region is also armed with four spines instead of five, found in the holotype. The second and third abdominal segemnts, second only in the ovigerous females, are with a median groove.

The pterygostomian flap (Fig.33B) is rather smooth, with few, sparsely setose striae.

The third thoracic sternite (Fig.33C) is with bulging lateral margins, in the holotype they are, more or less, straight (Baba, 1969,Fig.3d).

The eyes (Fig.33A) are large, with small scant 'lashes' and a few setae on the peduncle.

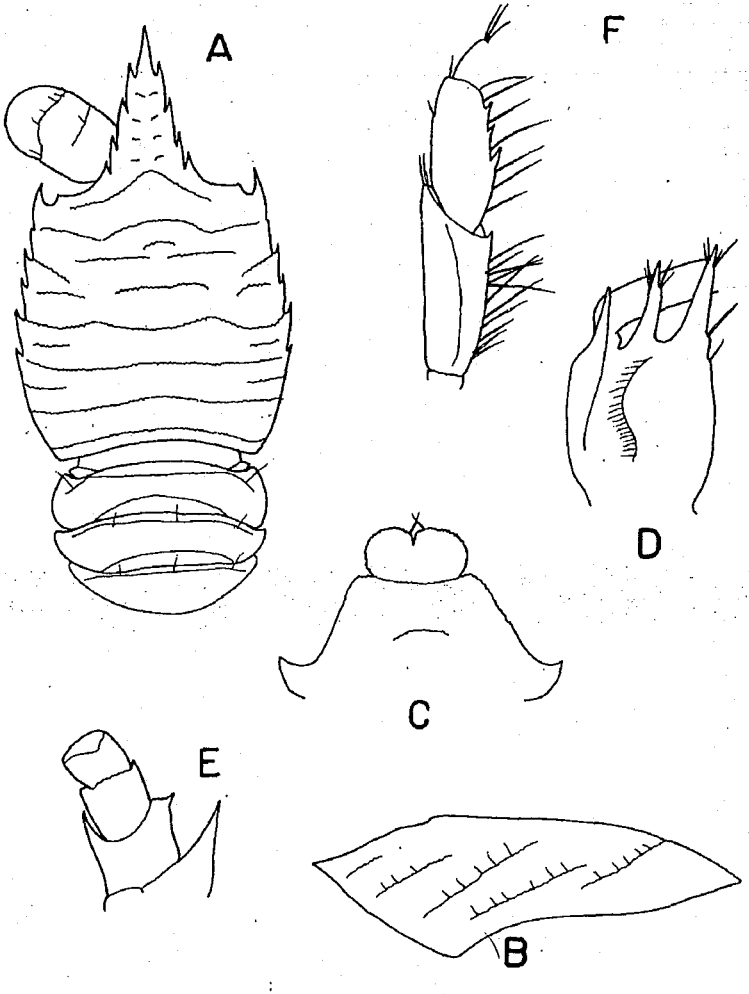

Fig. 33. *Galathea lenis* Baba, 1969, male, cl+r, 3mm; A, carapace and abdomen, dorsal view; B, left pterygostomian flap; C, anterior part of sternal segments; D, basal segment of right antennule, dorsal view; E, right antennal peduncle, ventral view; F, ischium and merus of right third maxilliped, ventral view.

The armature of the basal segment of the antennule (Fig.33D), antennal peduncle (Fig.33E) and that of the third maxilliped (Fig.33F) is very much the same as in the holotype, but for the shorter distomedian spine of the antennule and in the ovigerous female only, the middle spine of the merus is represented by a tubercle.

The chelipeds and walking legs are missing.

Epipods are absent from all the pereopods.

Distribution.-

Indo-Pacific: Off Nishino-omote, Tangega Shima 1, Southern Kyushu and now from the Indian Ocean.

Galathea bengala sp.nov.
(Figs.34-35)

Material and measurements.-

Sta.28A; Cruise 1; Lat.11°52'N; Long.92°49'N; Depth 66M; Date 27-3-1963; 1 female holotype, cl+r, 3mm; cb, 2mm; rl, 1mm.

Measurements of the holotype female.-

cl+r, 3mm; cb, 2mm; rl, 1mm.

Description.-

A small specimen with neatly arranged setose rows, obtained from Bay of Bengal is at hand. As far as we can make out, it is new to science.

The carapace and the left eye is represented in figure 34A. The rostrum is flat furnished with a few scales bearing long setae. The carapace is nearly as long as broad, being widest posterior to the cervical groove. The outer orbital angle is armed, each anterolateral spine is followed by five spines. The transverse striae of the carapace are distinct and with well arranged setae. The abdomen is damaged, however, a single median transverse groove can be seen on each of the second and third segments.

The pterygostomian flap (Fig.34B) is with a few scantly setose striae, the tip is pointed and spiniform.

The third thoracic sternite (Fig.34C) is rather broad with a small notch in the middle of the serrated anterior margin, and rounded anterolateral angles.

The eyes are characteristic being short and globular, the ocular peduncle is smooth and without striae or hairs. The cornea is cap-like, a fringe of fine 'lashes' and a thick seta are as illustrated in figure 34A.

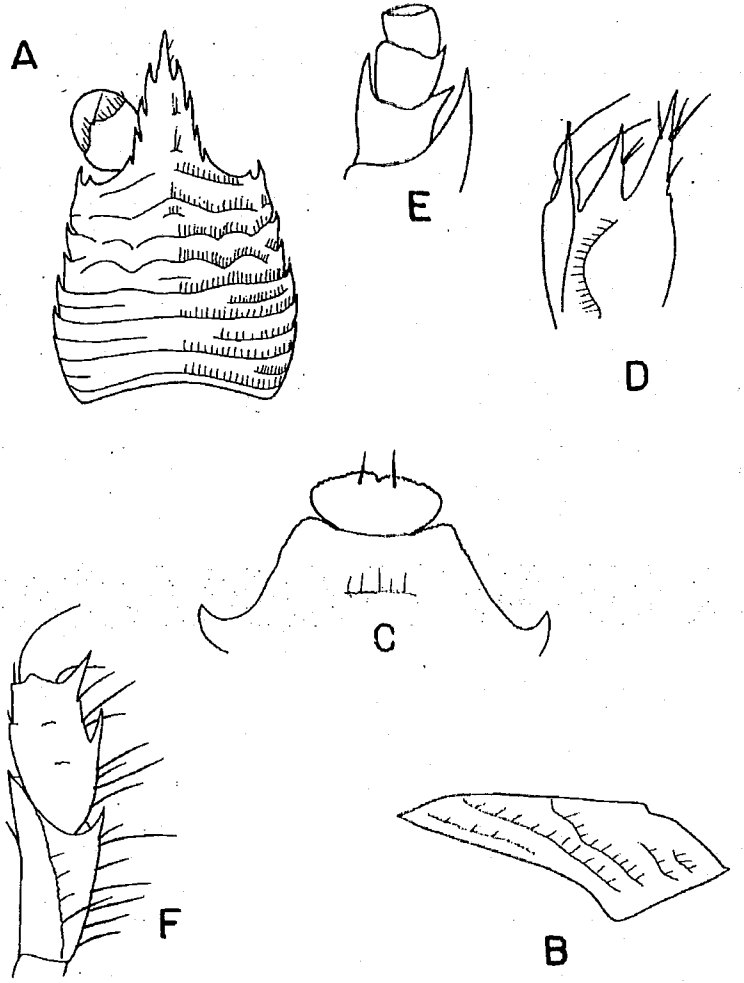

Fig. 34. *Galathea bengala* sp. nov., holotype female, cl+r, 3mm, A, carapace and left eye, dorsal view; B, right pterygostomian flap; C, anterior part of sternal segments; D, basal segment of right antennule, dorsal view; E, right antennal peduncle, ventral view; F, ischium and merus of right third maxilliped, ventral view.

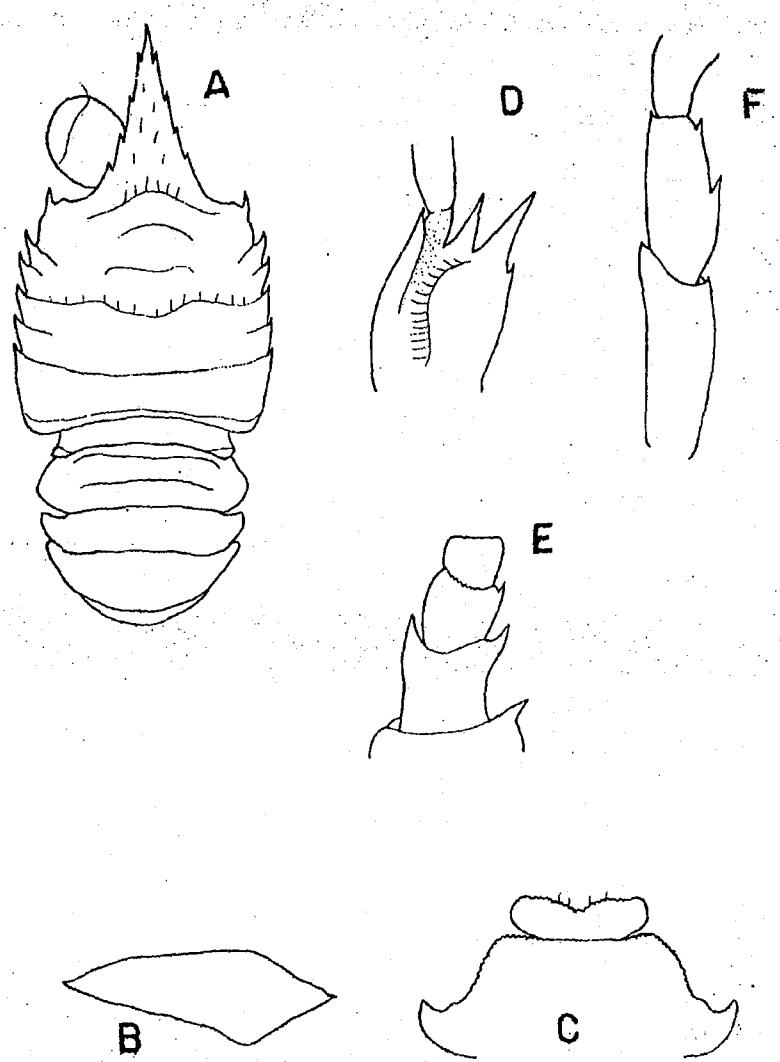

Fig. 35. *Galathea bengala* sp.nov., juvenile female, cl+r, 2mm. A, carapace and abdomen, dorsal view; B, right pterygostomian flap; C, anterior part of sternal segments; D, basal segment of right antennule, dorsal view; E, right antennal peduncle, ventral view; F, ischium and merus of right third maxilliped, ventral view.

The basal segment of the antennule (Fig.34D) is armed with three well developed distal spines, of which the inner lateral spine is the smallest. The basal antennal spine (Fig.34E) is stout, sharply pointed both distal angles of the following segment and the distomedian angle of third segment are armed.

The inner margin of the merus of the third maxilliped (Fig.34F) is armed with two large spines, the distolateral angle of this segment is unarmed, whereas both the distal angles of the ischium are armed.

Three specimens, all females, measuring 1.6-2mm in carapace length are being referred to this species, as representing juvenile stages. A careful examination reveals a good resemblance to the holotype. The specimen illustrated in figure 31A, is from St.AB 21-63, and measures 2mm in carapace length. The rostrum is as yet with only a few setae and no definite scales, the striae on the carapace are few but the shape of the carapace, and the eye shows a close resemblance to the holotype. Only the second abdominal segment is with a median groove, the groove on the third segment could not be seen.

The pterygostomian flap (Fig.35B) has the same general shape as seen in the holotype, but neither striae nor setae are visible.

The third thoracic sternite (Fig.35C) is boat-shaped and with a shallow median notch.

The armature of the antennule, antennal peduncle and the third maxilliped shows some differences. As can be seen in Fig.35D, the distomedian spine of the basal segment of the antennule is small, and the outer lateral spine longer than the inner one, moreover, a spine is also present at the base of the outer spine. The antennal peduncle and the merus of the third maxilliped are with a weak spination.

The specimens are without chelipeds and the walking legs.

Epipods are absent from all the pereopods.

Galathea platycheles Miyake,1953
(Fig.36)

Galathea platycheles Miyake, 1953:205,figs.5,6; Miyake & Baba,1966:65, figs.6,7.

Material and measurements.-

Sta.Arsenal Bay; Cruise 2; Date 16-6-1963; 1 male, cl+r, 2.5mm; cb, 2mm; rl, 0.8mm.

Descriptive remarks.-

A small male, measuring 2.5mm in carapace length agrees well with the earlier descriptions and illustrations by Miyake (1953:295,figs.5,6), and Miyake & Baba (1966:65, figs.6,7), except some few and insignificant variations, given in the following account.

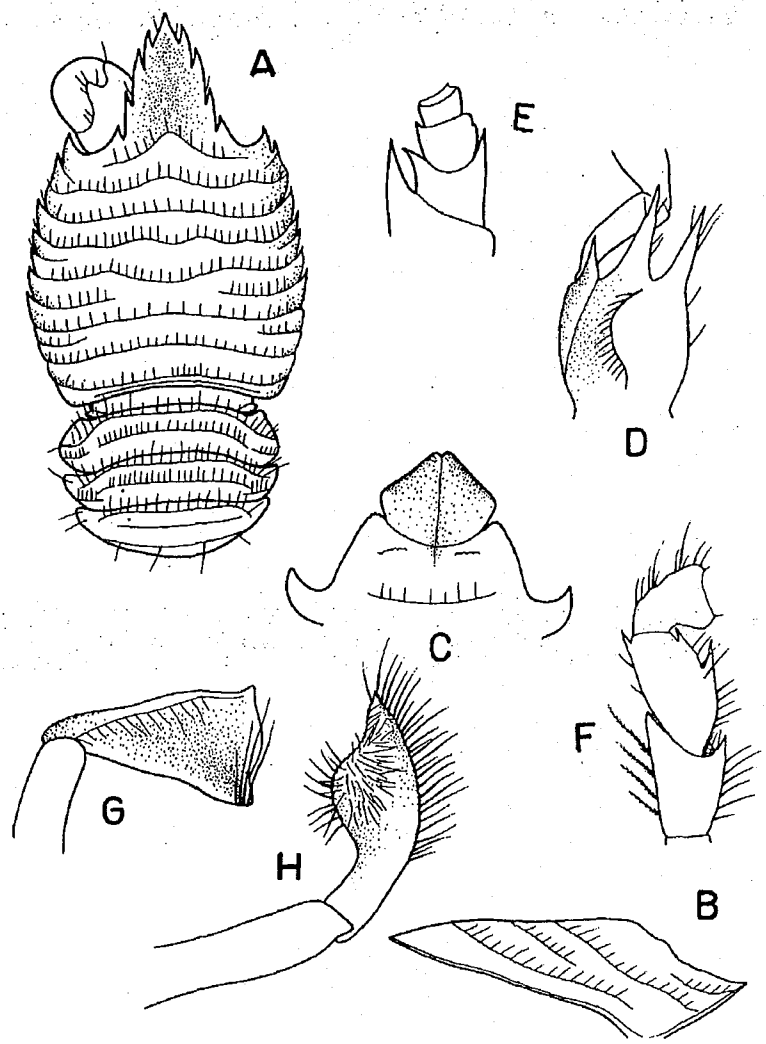

Fig. 36. *Galathea platycheles* Miyake, male, cl+r, 2.5mm; A, carapace and abdomen, dorsal view; B, right pterygostomian flap; C, anterior part of sternal segments; D, basal segment of right antennule, dorsal view; E, left antennal peduncle, ventral view; F, part of endopod of right third maxilliped, ventral view; G, right first pleopod; H, right second pleopod.

The rostrum is less than half the carapace length, slightly concave and pubescent. The carapace (Fig.36A) is slightly wider than long (cb, 2mm, cl, 1.7mm), the striations are characteristic and help in the identification of the species. The outer orbital angle is armed with a strong tooth, which is even larger than the anterolateral spine. The armature of the lateral margin of the carapace agrees with that of the holotype (Miyake,1953,Fig.5) in having five spines, posterior to the anterolateral spine; in the Japanese specimen, however, there are seven lateral spines (Miyake & Baba, 1966,Fig.6). The second and third abdominal segments have each a median transverse groove as described for the holotype.

The pterygostomian flap (Fig.36B) is rather narrow with an acutely pointed tip and ventral lobe, there are only few setose striae.

The third thoracic sternite (Fig.36C) differs from that of the holotype in being narrower, and more produced anteriorly.

The armature of the antennule, antennal peduncle and the third maxilliped (Figs.36D,E & F), agrees quite well with the specimen described and illustrated by Miyake & Baba (1966:65,Fig.7A,B & C).

None of the chelipeds and walking legs are present with the specimen.

Epipods are present on the chelipeds only.

The male pleopods are being illustrated for the first time. As can be seen in figure 32G, the first pleopod shows the same general pattern as seen in other species, the second pleopod has a pronounced lobe and a prolonged and pointed tip.

Distribution.-

Indo-Pacific: Known from Formosa, Ryukuyu Islands and now from the Indian Ocean.

Galathea ternatensis de Man, 1902
(Fig.37)

Galathea orientalis var *ternatensis* de Man, 1902:714.
Galathea providentia Laurie, 1926:125,pl.8, figs.1-4.
Galathea ternatensis: Melin, 1939:67, figs.39-42; Miyake and Baba, 1963:405, figs.1,2; Haig, 1974:447; Baba, 1977a: 245; 1979a: 525; 1988:80.

Material and measurements.-

Sta.AB 43-63; Cruise 1; 1 male, cl+r, 8mm; cb, 5mm; rl, 2.6mm.
Sta.AB-22A; Cruise 1; 1 male, cl+r, 5mm; cb, 3mm; rl, 1.7mm; 1 ovigerous female, cl+r, 9mm; cb, 5mm; rl, 3mm; chl, 21.5mm; pl, 4.5mm; fl, 5mm.
Sta.401B; Cruise 8; Lat. 19°50'S; Long.36°21'E; Depth 65M; Date 4-10-1964; 2 females (1 ovigerous), cl+r, 4-4.7mm; cb, 2.5-3mm; rl, 1.5-1.5mm.
Sta.401 C; Cruise 8; Lat.19°51'S; Long.36°21'E; Depth 62M; Date 4-10-1964; 4 ovigerous females, cl+r, 5-6mm; cb, 3-4mm; rl, 2-2mm.

Descriptive remarks.-

G.ternatensis was so far known from the Atlantic and Pacific Oceans, the IIOE specimens are the first to be recorded from the Indian Ocean. The present nine specimens, agree quite well with the description and illustrations given by Miyake & Baba (1963:405, Figs.1,2), except some variations which are also noticeable in the specimens, at hand. Since these specimens are the first to be recorded from the Indian Ocean, a brief description is given below:

The rostrum (Fig.37) is nearly half the carapace length, its dorsal surface is slightly concave and with setose scales, the tip is rather long and finely serrated, laterally. As in the Japanese material, one spine in each hepatic region is constant but the spines near the lateral ends of the second stria are variable, they may be present, represented by a tubercle or totally wanting. The outer orbital angle is produced into a pyramid-shaped tooth. Each anterolateral spine is followed by 5-7 spines. The second and third abdominal segments are, each with three transverse grooves except in a male (cl+r, 5mm), where the groove on the anterior half is missing from each of there two segments, in other specimen a female (cl+r, 6mm), only two grooves can be seen on the third as illusrated in figure 37A.

The pterygostomian flap (Fig.37B) is acutely pointed at the tip, posterior to which the margin is crenulated and setose for some distance, the surface is beset with several complete and incomplete setose striae.

The third thoracic sternite (Fig.37C) differs from the illustration given by Miyake & Baba (1963, Fig.2 D), in being more produced anteriorly.

The eye is provided with rather long ocular peduncle, having a few setose striae, the cornea is covered with 'lashes' not crossing its distal margin.

The armature of the basal segment of the antennule and the antennal peduncle of a female (cl+r, 6mm), is illustrated in figures 37D,E respectively. In a male (cl+r, 8mm), the spinosity is somewhat reduced; the inner spine of the basal segment of the antennal peduncle is also smaller (Fig.37F) than in the female.

The inner margin of the merus of the third maxilliped is armed with three spines, the outer margin is serrated as shown in figure 37H. The spinosity of the merus and ischium does not show any noticeable variations except that in a few speciemns the distolateral angle of the ischium of the third maxilliped (Fig.37G) is somewhat more acutely pointed. Furthermore, the spines on the inner margin of the merus are all situated on the distal half, and the outer margin is weakly serrated.

The chelipeds are more than twice the carapace length. The spinosity of the cheliped is similar to that of the Japanese specimens except that the fingers have a small hiatus, and the movable finger is provided with a small tooth near the base. A few detached walking legs are present, they differ from the Japanese specimen in having six teeth on the outer margin of the dactylus, instead of three (Miyake & Baba, 1963, Fig.2F-H).

Epipods are present on the chelipeds only.

The first pleopod (Fig.37I) is narrow, with a tongue-like reflected lobe at the base of

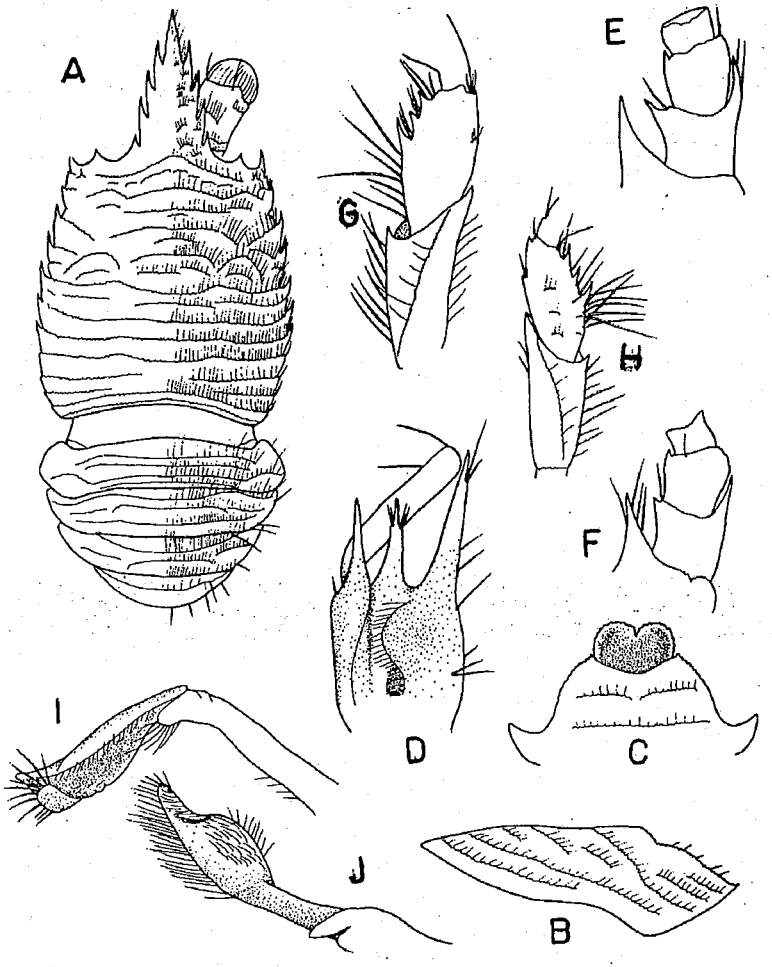

Fig. 37. *Galathea ternatensis* de Man, 1902, A-E,H ovigerous female, cl+r, 6mm, F,G,I,J male, cl+r, 8mm, A, carapace and abdomen dorsal view; B, right pterygostomian flap; C, anterior part of sternal segments; D, basal segment of right antennule, dorsal view; E, left antennal peduncle, ventral view; F, left antennal peduncle, ventral view; G, ischium and merus of left third maxilliped, ventral view; H, ischium and merus of right third axilliped, ventral view; I, left first pleopod; J, left second pleopod.

which the margin is dented. The second pleopod (Fig.37J) has a pronounced bulge and a narrow elongated terminal portion which is rounded apically.

Distribution.-

Atlantic, Indo-Pacific: This species has a wide range of distribution. It is recorded from Providence Island, the Maldives, western Australia, New Caledoria, Ternate, north of New Guinea, the Bonin Islands, Japan and now from the Bay of Bengal and east coast of Africa.

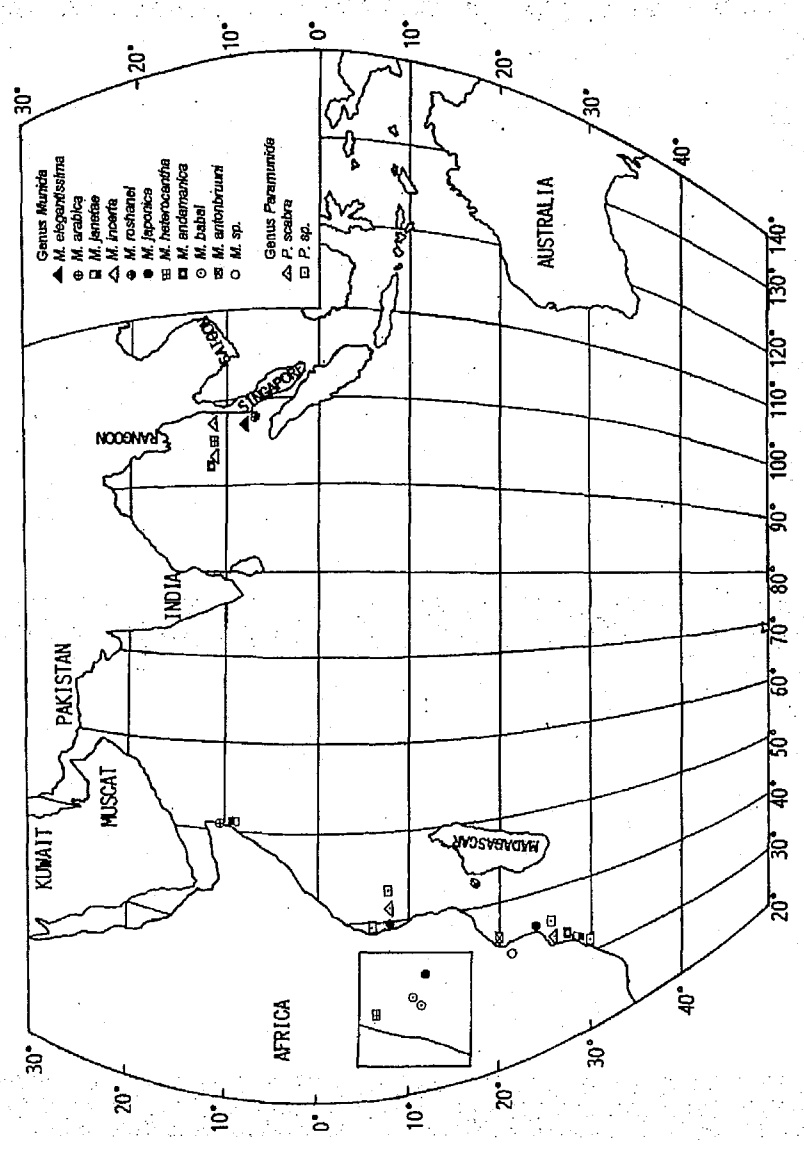

Fig. 38. Station at which species of the genus *Munida* and *Paramunida* were taken.

Depth (M)	*M. elegantissima* *M. andamanica*	*P.* sp. *M. babai*	*P. scabra* *M. arabica*	*M. japonica* *M. roshanei*	*M. heteracantha* *M. species*	*M. janetie* *M. antonbruuni*	*M. incerta*
38 or 86					1		
59-61			174				
59-66							
62						1	1
77	2			1			
78-82						1	
100		9	19	1			
118		2				1	
138				1			
150		1					
165				1			
150-300				6			
293			9		33	33	
347-112		2	7				
384	6						48
600-665	3						

Fig.39. Chart indicating depth of capture and number of individuals of the genera *Munida* and *Paramunida* from four cruises of Anton-Bruun in the Indian Ocean.

Genus *MUNIDA* Leach, 1820

Rostrum generally slender, styliform and with a well developed supraorbital spine on either side of the base, eyes generally large and pigmented, ocular peduncles leaving a few exceptions, markedly dilated distally. Carapace more or less convex, with marked transverse sculpture, having setose ridges, squamae, varying numbers of spines or spinules and tubercles, lateral margins spiny. Abdominal segments with transverse grooves and setose ridges, one or more of them may be armed with different number of spines. Exopod of first maxilliped with flagellum. Epipods on pereopods may be present or absent.

Members of this genus are confined to the continental shelf and upper part of continental slope. Females carry large number of small eggs.

Type-species: *Munida rugosa* (Fabricius)

KEY TO INDO-WEST PACIFIC SPECIES OF *MUNIDA* (After Baba,1988)

1. Pereopods 1-3 with epipods... ... 2
- Pereopods 1-3 without epipods ... 3
2. Carapace and chelipeds with long setae; propodus of first walking leg with 8-9 spines on ventral margin... ... *M.elegantissima*
- Carapace without long setae dorsally; cheliped with plumose setae; propodus of first walking leg with 4 spines on ventral margin... ... *M.bellior*
3. Rostrum with setae dorsally... ... 4
- Rostrum without setae dorsally ... 6
4. Rostrum with setose, granulated scales; basal segment of antennule with 4 spines on the outer margin... ... *M. arabica*
- Rostrum without distinct scales; basal segment of antennule with 5 spines on outer margins... ... 5
5. Rostrum arched; second abdominal segment armed with 8 spines. *M. pilorhyncha*
- Rostrum not arched, second abdominal segment unarmed... ... *M. janetae*
6. Supraorbital spines overreaching tip of rostrum ... ... *M.longispinata*
- Supraorbital spines barely reaching, or, falling far short of end of rostrum ... 7
7. Fourth abdominal segment armed with dorsal spines 8
- Fourth abdominal segment unarmed 20

8. Anterolateral spine of carapace unusually produced; antennal peduncle unarmed ... ... *M.leviantennata*

- Anterolateral spine of carapace normally developed; first and second segments of antennal peduncle armed... 9

9. More than 2 epigastric spines; merus of third maxilliped with at least 2 spines on inner margin 44

- Only two epigastric spines; merus of third maxilliped with single spine on inner margin... 10

10. Fourth abdominal segment lacking spine on posterior ridge 11

- Fourth abdominal segment with spine on posterior ridge 12

11. Two spines on posterior transverse ridge of carapace; lateral protogastric spine present on each side; dorsal margin of merus of third maxilliped unarmed... ... ... *M.pilosimanus*

- No spine on posterior transverse ridge of carapace; lateral protogastric spine absent; dorsal margin of merus of third maxilliped with spine ... ... *M.tenuipes*

12. First segment of antennal peduncle with unusually prolonged process 13

- First segment of antennal peduncle with moderate sized process 16

13. Cardiac spine absent ... ... *M.incerta*

- Cardiac spine present 14

14. Basal segment of antennule with two subequal spines ... ... *M.variabilis*

- Median terminal spine of basal segment of antennule smaller than lateral terminal ... ... .15

15. Two spines behind postcervical spine; distomedian spine of second segment of antennal peduncle reaching end of third segment; walking legs very slender ... ... *M.eminens*

- No spine behind postcervical spine; distomedian spine of second segment of antennal peduncle distinctly overreaching antennal peduncle; walking legs moderately slender ... ... *M.fortiantennata*

16. Pair of protogastric spines directly behind pair of epigastric spines ... ... *M.soelae*

- No protogastric spines ... ... .17

17. Cardiac region with transverse row of spines ... ... *M.normani*

- Cardiac region with prominent median spine 18

18. Postcervical spine absent ... ...*M.spinicordata*

- Postcervical spine present 49

19. Rostrum more slender than supraorbital spines; first segment of antennal peduncle bluntly produced on distomedial margin ... ...*M.similis*

- Rostrum as stout as or slightly stouter than supraorbital spines; first segment of antennal peduncle with distinct, sharp distomedial process ... ... *M.squamosa*

20. Lateral margin of carapace with 4 or less spines behind cervical groove 21

- Lateral margin of carapace with 5 spines behind cervical groove 24

21. Chelipeds strongly depressed dorsoventrally, fingers relatively long, 2.5 times as long as palm... ... ...*M.burcei*

- Chelipeds moderately depressed dorsoventrally, fingers shorter than or as long as or longer than palm, but not exceeding 1.5 times length of palm... 22

22. Carapace with spines in front of cervical groove, in addition to epigastric and lateral protogastric spines ... ... *M.sentai*

- Carapace armed with only epigastric and lateral protogastric spines in front of cervical groove 23

23. Striae on carapace prominently granular; merus of third maxilliped with 4 or 5 subequal spines on ventral margin ... ... *M.tuberculata*

- Striae on carapace not granular; merus of third maxilliped with 2 ventral marginal spines, proximal larger... 24

24. Third abdominal segment with 1-4 spines on anterior ridge... ... .*M.major*

- Third abdominal segment unarmed 25

25. Basal segment of antennule with two well developed, subequal spines... ... ...*M.albiapicula*

- Medial terminal spine of antennular basal segment very small, lateral terminal spine well developed ... ... *M.rufiantennulata*

26. Front margin strongly oblique 27

- Front margin transverse or slightly oblique 30

27. Abdominal segments without spines ... ... *M.roshanei*

- Abdominal segments with spines at least on second segment ... ... .28

28. Third abdominal segment unarmed ... ... *M.exigua*

- Third abdominal segment armed 29

29. Six epigastric spines; third walking leg with dactylus as long as propodus... ... ...*M.kuboi*

- Twelve epigastric spines; walking leg with dactylus distinctly shorter than propodus ... ...*M.spinulifera*

30. Eyes small, cornea scarcely wider than eyestalk... ... ... .31

- Eyes large, cornea wider than eyestalk 34

31. Second abdominal segment unarmed ... ... *M.comorina*

- Second abdominal segment armed ... ... .32

32. Carapace with epigastric spines only ... ...*M.crassa*

- Carapace with epigastric and other spines 33

33. Transverse ridges of carapace granular; postcervical and lateral protogastric spines absent; second abdominal segment with 2 spines; chelipeds and walking legs stout ... ... *M.parvioculata*

- Transverse ridges of carapace not granular; postcervical and lateral protogastric spines present; second abdominal segment with 6-10 spines; chelipeds and walking legs slender ... ...*M.microps*

34. Inner margin of merus of third maxilliped with single median spine ... ... .35

- Inner margin of merus of third maxilliped with 2 or more spines 36

35. Two terminal spines of antennular basal segment antennule with two subequal spines, third abdominal segment with 2 dorsal spines ... ... *M.vigilliarum*

- Lateral spine of basal antennular segment larger than median spine, third abdominal segment unarmed ... ... *M.africana*

36. Third abdominal segment armed... 37

- Third abdominal segment unarmed 38

37. Second segment of antennal peduncle with well developed spine overreaching third segment; chelipeds setose ... ... *M.prominula*

- Second segment of antennal peduncle with stout distomedian spine not overreaching third segment, chelipeds sparsly setose... ... ...*M.armata*

38. Merus of third maxilliped with distodorsal marginal spine... 39

- Merus of third maxilliped unarmed on dorsal margin... 44

39. Transverse row of 6-8 epigastric spines ... ... *M.sanctipauli*

- Transverse row of more than 10 epigastric spines 40

40. Rostrum 3 times as long as supraorbital spine; postcervical and branchial dorsal spines absent; sternite of third thoracic somite wider than anterior margin of following sternite ... ... *M.inornata*

- Rostrum about twice as long as supraorbital spine; postcervical and branchial dorsal spines present; sternite of third thoracic somite barely as wide as anterior margin of following sternite ... ... *M.japonica*

41. Chelipeds relatively long and slender... ... ... *M.heteracantha*

- Chelipeds short and massive 42

42. Rostrum laterally compressed ... ...*M.compressa*

- Rostrum spiniform 43

43. Palm of cheliped without row of spines ventral to median marginal row ... ... *M.andamanica*

- Palm of cheliped with 1 or 2 rows of spines ventral to median marginal row ... .*M.militaris*

44. Rostrum carinated dorsally; supraorbital spines comparatively close to rostrum; abdomen armed... ... ... *M. babai*

- Rostrum not carinated dorsally; supraorbital spines not so close to rosturm; abdomen unarmed... ... ... *M. antonbruuni*

Munida elegantissima De Man, 1902
(Fig.40)

Munida elegantissima De Man, 1902: 726, pl.24, fig.42; Laurie, 1926:138; Tirmizi,1966 :190,fig.12; Baba, 1969 :37, figs.3,4; 1977a: 253; 1988:95; 1989b: 131; Haig,1973:270, 1974:447;
Munida alcocki Southwell, 1906:222, fig.2.

Material and Measurement.-
Sta.AB 18a-63; Cruise 1;Date 31-7-1963; 1 male, cl+r, 14.6mm,ch.1, 35mm; 1 female (ovigerous), cl+r, 15mm.

Descriptive remarks.-
M.elegantissima is a medium sized species (Fig.40A) which has been adequately described and can be readily identified by the shape of the eyes, the armature of the carapace, and the third maxillipeds. The present collection consists of a male and an ovigerous female. It is of interest to note that the carapace is furnished with additional long setae amongst the rows of short setae. There are two pairs of spines in the

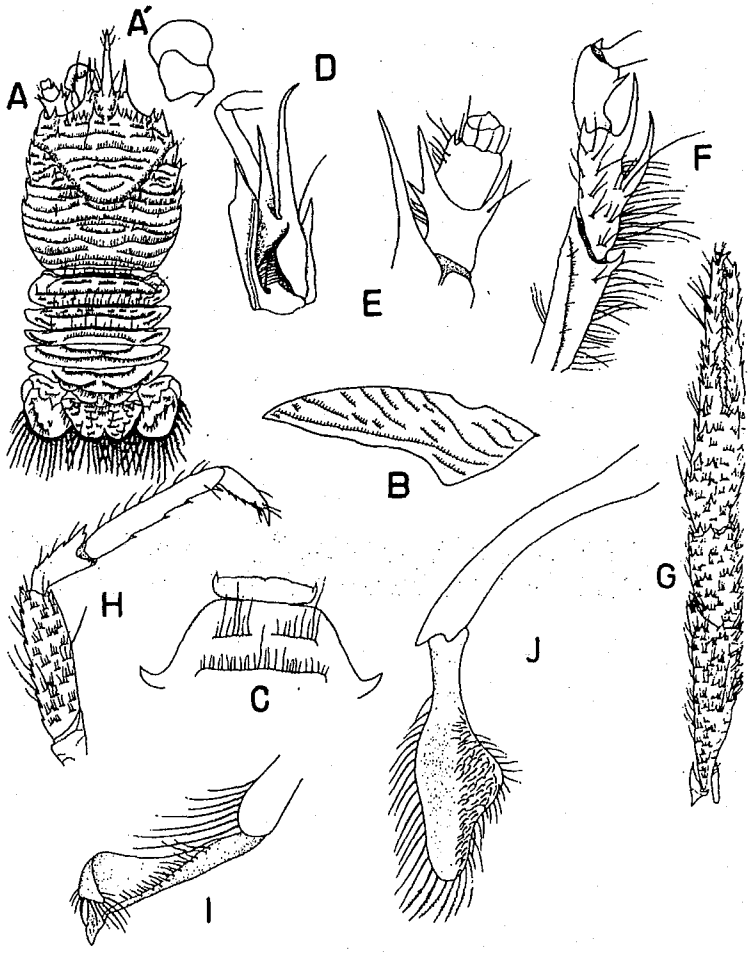

Fig. 40. *Munida elegantissima* de Man, 1902. A-H, female, cl+r, 15mm, I,J male, cl+r, 14.6mm. A, carapace and abdomen, dorsal view; B, right pterygostomian flap; C, anterior part of sternal segments; D, basal segment of right antennule, dorsal view; E, left antennal peduncle; F, part of endopod of right third maxilliped, ventral view; F, part of endopod of right third maxilliped, ventral view; G, left cheliped; H, detached walking leg; I, right first pleopod; J, right second pleopod.

cervical triangles of the female as shown in the figure. In the male however, the anterior pair of spines is missing.

The pterygostomian flap (Fig.40B) is rather narrow, produced into a spine anteriorly and with, more or less, continuous striae bearing short setae.

The third thoracic sternite is a narrow band with a minute median notch, and serrated anterior margin, the anterolateral angles are produced into forwardly directed spines (Fig.40C). As such it differs from the Japanese material in which according to Baba there is a "sharp spine directed inwards at the outer extremity of either side" (1969:39, Fig.4C).

The eyes are characterized by a black spot carrying a single long seta (Fig.40A').

The spination of the antennule, and antenna of the present specimens (Figs. 40 D&E), agree with those described by earlier authors (Tirmizi, 1966:191, Baba,1969:37), except that the spine on the basal segment of the antennule is very large curved and without hairs (Baba,1969,Fig.4a).

The third maxillipeds differs from those of the specimens described previously, in having stronger and curved spines on the inner margin of the merus. The distomedian angle of the ischium and carpus is each produced into a spine (Fig.40F).

The chelipeds are hairy and the fingers are only a little less than twice the length of the palm (Fig.40 G). A detached walking leg (probably the first) is shown in figure 40H. As can be seen, the dactylus is with five spines, in this respect it agrees with the "John Murray" specimens and differs from the Japanese specimen where "the inner margin of the dactylus is strongly serrated with six broad setae" (Baba,1969:39). On the other hand, the number of spines on the remaining segments are much more.

Epipods are present on the first three pairs of pereopods. The first two pleopods of the male are illustrated in figures 40 I&J, as can be seen, the spout-like projection on the tip of the first pleopod is more pronounced than in the "John Murray" specimens (Tirmizi,1966, Fig.12).

Distribution.-

Indo-Pacific: Amirantes and Providence Island, Zanzibar, Gulf of Mannar, Bay of Bengal, Malay Archipelago, Molucca Sea, Celebes Sea, Seram Sea, Japan and Australia.

Munida arabica Tirmizi & Javed, 1992
(Fig.41)

Munida arabica Tirmizi & Javed, 1992: 312, figs.1,2.

Material and measurements.-

Sta.447; Cruise 9;Lat.10°00'N;Long.051°15'E; Depth59-61M; Dated 16-12-1964; 174 specimens; 22 females, smallest male, cl+r, 5mm (rostrum broken); largest male, cl+r, 12mm; 1 male, cl+r, 11.5mm; chl, 22-46mm; 7 females (6 ovigerous), cl+r, 6.5-11mm; chl, 23mm. (85 specimens broken into pieces).

Descriptive remarks.-

The rostrum (Fig.41A) is less than half the length of the carapce, and more than three times as long as the supraorbital spines, all the three are furnished with setose, granular scales, and are at a higher level than the carapace. The transverse gastric row has five pairs of spines; the median gastric row is formed by two spines and one scale. In some specimens there may be twelve or eleven spines in the transverse gastric row, and 2-4 in the median gastric row, some specimens have scales as well as spines in the median gastric row; 1-4 spines are present on each hepatic region. The two anterior striae each having a spine on either end, are continuous, besides this the third striae may have one or two spines on each lateral end. A spine is present in each cervical triangle and one behind each bifurcation of the cervical groove, in some specimens, the cervical triagles may have two spines instead of one. The anterolateral spines are fairly well developed, each is followed by eight spines. The number of lateral spines of the hepatic region may vary from 4-6, whereas there are always five spines behind this region, on the lateral margin of the carapace. The abdomen is unarmed, each of the second and third abdominal segment has a deep median groove, anterior to which there are three, and posteriorly two fine grooves (Fig.41A). The number of these fine grooves is subject to variation. The few setose striae and scales of the last abdominal segment, telson and uropods are as illustrated in figure 41B.

Majority of the setose striae on the pterygostomian flap (Fig.41C) are continuous, and the tip is acutely pointed.

The third thoracic sternite (Fig.41D) shows a marked resemblance to that of *M.roshanei*, but the anterior part of the fourth sternite is very different in the two species, as can be seen by comparing figures 45E and 41D.

The eye (Fig.41A,A') is barrel-shaped with rows of setae and long 'lashes' on both surfaces.

The basal segment of the antennule (Fig.41E) has three long and slender spines on the lateral margin and a rather stout spine on the proximal portion, the distomedian angle is also produced into an acute and slender spine. The proximal spine on the outer border may be missing, and in some the margin behind the last spine is serrated throughout. The basal spine of the antennal peduncle (Fig.41F) is of moderate length. Those of the following segments are long and needle-like, the inner margin of the second segment, in some, has an additional spine. Further, the outer distal angle of the third segment, and both angles of the ultimate segment are produced into spines.

The merus of the third maxilliped (Fig.41G) has a strong armature which shows considerable variations. The distal angles of the ischium are produced into spines. The inner margin of the merus has three spines, in some specimens, there may be four or five spines, the distolateral angle has a sharply pointed spine followed by a strongly serrated margin which may bear one or more spines.

The chelipeds are long and slender being more than three times the length of the carapace, including the rostrum; in some, they may be even four times the length of the carapace. The armature is not very strong nor are the hairs very long, as can be seen in figure 41 A. The chela is more than half the entire length of the cheliped, the figners are shorter than the palm (chl, 41 mm, chela, 22mm, fl, 10.5mm). A large

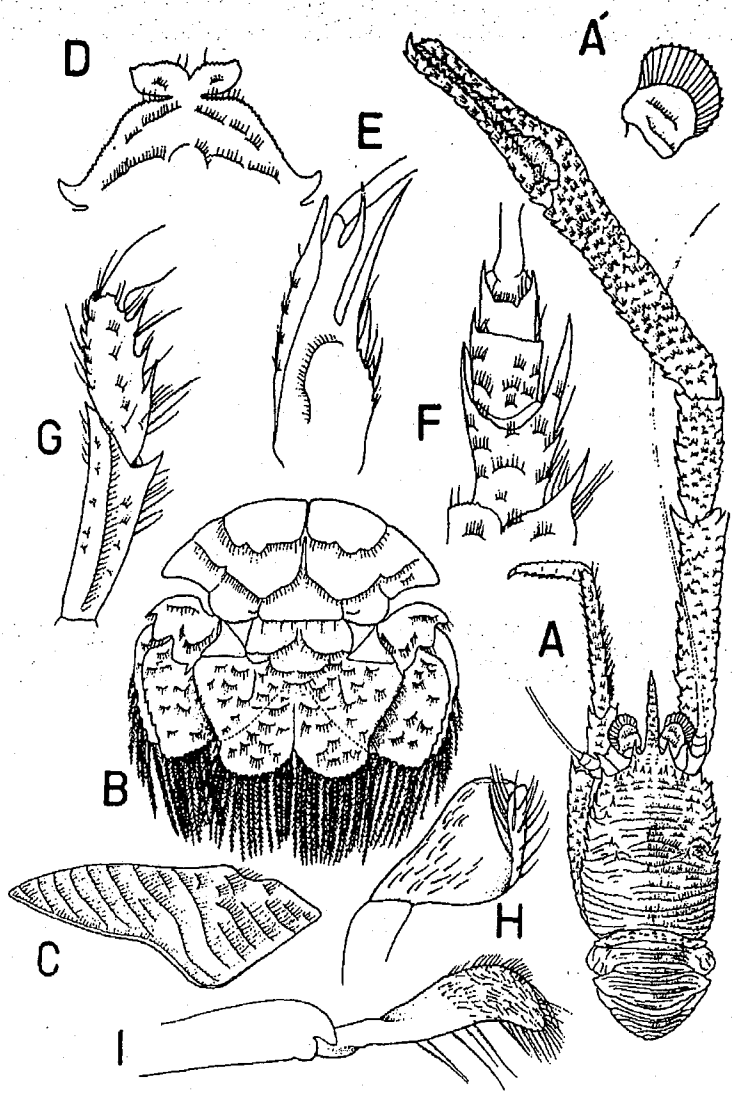

Fig. 41. *Munida arabica* Tirmizi & Javed, 1992, male (holotype), cl+r,11.5mm. A, animal, dorsal view; A', left eye, ventral view; B, last abdominal segment, telson and uropods, dorsal view; C, right pterygostomian flap; D, anterior part of sternal segments; E, basal segment of right antennule, dorsal view; F, right antennal peduncle, ventral view; G, ischium and merus of right third maxilliped, ventral view; H, distal part of right first pleopod; I, distal part of right second pleopod.

hiatus is present in several specimens. The walking legs are long and rather flat. In the specimen under study only the third leg (Fig.41A) was attached. Epipods are lacking on all the pereopods.

The pleopods (Fig.41H,I), show a general resemblance to those of *M.japonica* (Tirmizi, Fig. 16 A,B)

Distribution.-
Indian Ocean: Off Somalia

Munida janetae Tirmizi & Javed, 1992
(Fig.42)

Munida janetae Tirmizi & Javed, 1992: 317, fig.2.

Material and measurements.-

Sta.444;Cruise 9; Lat.09°36'N; Long.51°01E;Depth 78-82M; Date 16-12-1964; 1 female (holotype), cl+r, 5mm (rostrum broken); cb, 4.5mm.

Sta.390 p; Cruise 7; Lat.29°34'S; Long. 31°39'E; Depth 118M; 9-9-1964; 1 female (paratype), cl+r, 9.5mm; cb (carapace mutilated posteriorly), 6mm; chl, 18mm.

Descriptive remarks.-

This interesting species is represented by two specimens, both females. The carapace (Fig.42A) is almost as wide as long, it is beset with striae bearing long setae, and is armed with five pairs of gastric spines, forming the transverse gastric row, the median row consists of two spines, in the other specimen there is only one spine, each end of the first continuous stria and the hepatic region bears a spine, a spine is present in each cervical triangle and one behind each bifurcation. These spines are absent or reduced in the paratype. The rostrum is narrow, thickly beset with setae and about three times the length of the supraorbital spines, it is complete in one specimen only, as can be seen in figure 42B; The tip of the rostrum is serrated laterally. The anterolateral spines are followed by eight spines, in both the females, except that the holotype has seven on the left side (hepatic region has three spines instead of four). The abdominal segments are unarmed, second and third abdominal segments, each is with a deep median groove, the anterior half of the second segment bears one fine groove, whereas that of the third segment is with one complete and one broken groove, the posterior half of each segment bears two fine transverse grooves (Fig.42C). The last abdominal segment, telson and uropods are with scant striae and scales as illustrated in figure 42D.

The pterygostomian flap is rather broad, and with continuous striae bearing long hairs, the tip is rounded in one specimen (Fig.42E), and acute in the other.

The posterior margin of the third sternite (Fig.24 F) is almost as wide as the anterior margin of the following sternite. The anterior margin has a 'V'- shaped notch on

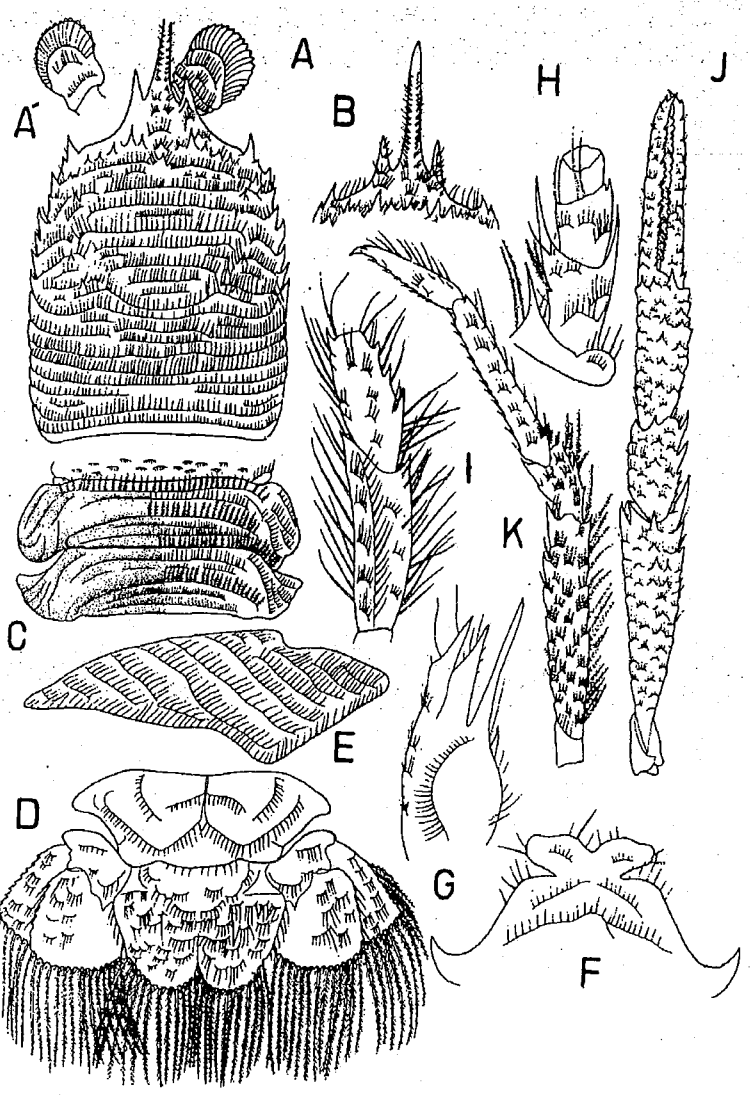

Fig. 42. *Munida janetae* Tirmiz & Javed, 1992. A,A', C. female (holotype), cl+r, 5mm (rostrum broken); B,J,K, paratype female, cl+r, 9.5mm, A, carapace and right eye, dorsal view; A', right eye, ventral view; B, anterior part of carapace and right eye, dorsal view; abdominal segments, dorsal view; D, last abdominal segment, telson and uropods, dorsal view; E, right pterygostomian flap; F, anterior part of sternal segment; G, basal segment of right antennule, dorsal view; H, left antennal peduncle, ventral view; I, ischium and merus of right antennule, dorsal view; H, left antennal peduncle, ventral view; I, ischium and merus of right maxilliped, ventral view; J, left cheliped; K, left detached walking leg.

either side of which there is a slight bulging, laterally it is more or less truncated (Fig.42F).

The eyes are large and with several rows of long setae on both surfaces of the peduncle, the 'lashes' are long and outreaching the cornea (Fig.42A,A').

The distomedian and distolateral spines of the basal segment of the antennule (Fig.42G) are almost of equal size, the second spine on the outer margin is larger than the others, and at its base is a small spine followed by a serrated outer margin. The basal antennal spine is sharp and slender, reaching a little beyond the middle of the next segment. Both the outer and inner spines of the second segment are well developed, the inner spine being larger reaching as far as the middle of the ultimate segment, the distolateral angle of the third segment bears a well developed spine (Fig.42H).

Only one cheliped is present which is nearly twice the length of the carapace (chl, 18mm; cl+r, 9.5mm). It is moderately hairy and spinose, as can be seen in figure 36J. The fingers are longer than the palm (fl, 5mm; pl, 4mm). A detached walking leg is as illustrated in figure 36K. Epipods are wanting on all the pareopods.

The differences as seen among *M. roshanei, M. arabica* and *M. janetei* have already been given (see Tirmizi & Javed, 1992, Table 1).

Distribution.-

Indian Ocean: Off Somalia.

Munida incerta Henderson, 1888
(Figs.43-44)

Munida incerta Henderson,1888:130, pl.23, fig. 4,4a; Estampador, 1937:498; Barnard, 1925 :122;1950:492,fig.92a; Yanagita, 1943:15, figs 1,2; Tirmizi,1966:205,fig.22; Miyake, 1982:146, p.49:fig.5; Baba, in Baba, Hayashi & Toriyama, 1986:290, fig.121; Baba, 1988:106; 1989a: 963.

Material and Measurement.-

Sta.23-63; Cruise, 1; Date 31-7-1963; 48 specimens and 3 molts; 18 males, cl+r, 16.5-32 mm; chl, 83mm (largest male); 30 females (5 ovigerous), cl+r, 19.5-31mm.

Descriptive remarks.-

The large number of specimens taken by the "Anton Brunn" provide a good opportunity to study individual variations. *M.incerta* can be easily recognised by the armature of the carapace and abdomen.

The largest specimen is a male, measuring 32mm in carapace length (including rostrum, which is 4mm long). The smallest specimen is also a male, carapace length 16.5mm. The carapace, eyes and the right antenna of a male are illustrated in figure

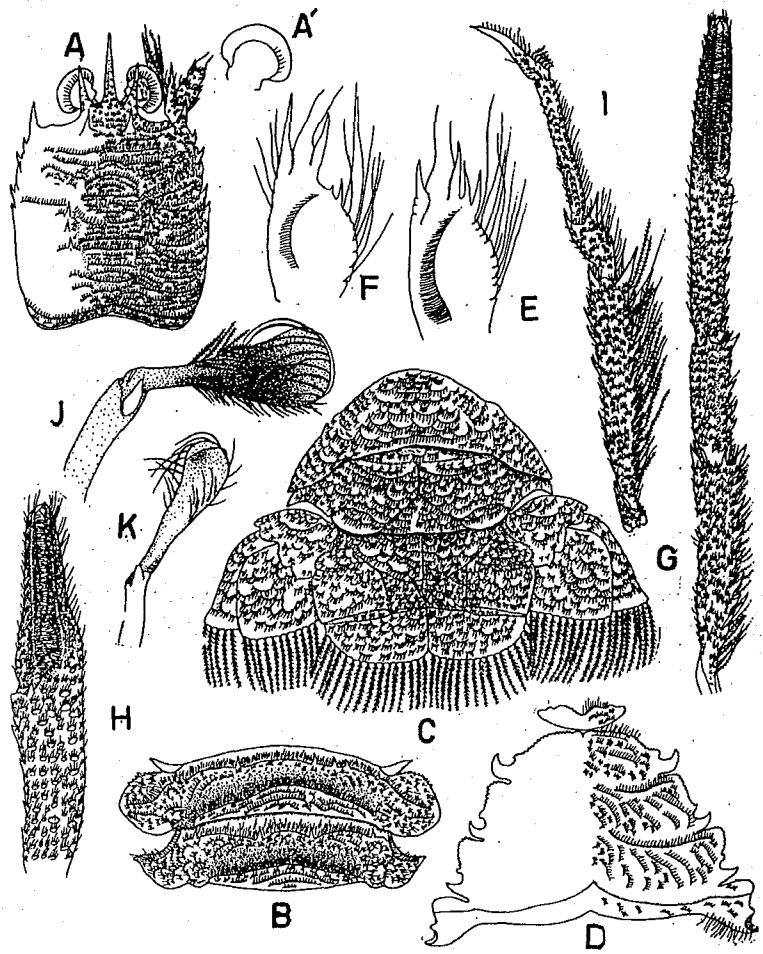

Fig. 43. *Munida incerta* Henderson, 1888, A,A',J, male, cl+r, 30mm; B-D, male, cl+r, 28mm; F-G, female, cl+r, 29.5mm; H,I, male, cl+r, 31mm; A, carapace, dorsal view; A', right eye of the same, ventral view; B, second and third abdominal segments, dorsal view; C, last two abdominal segments, telson and uropods, dorsal view; D, sternal segments; E, basal segment of right antennule, dorsal view (female, cl+r, 29.5mm); F, basal segment of right antennule, doral view (male, cl+r, 32mm); G, left cheliped; H, right chela; I, left fourth walking leg; K, left secnd pleopod of young (male, cl+r, 16.5mm) J, left second pleopod (male, cl+r, 30mm).

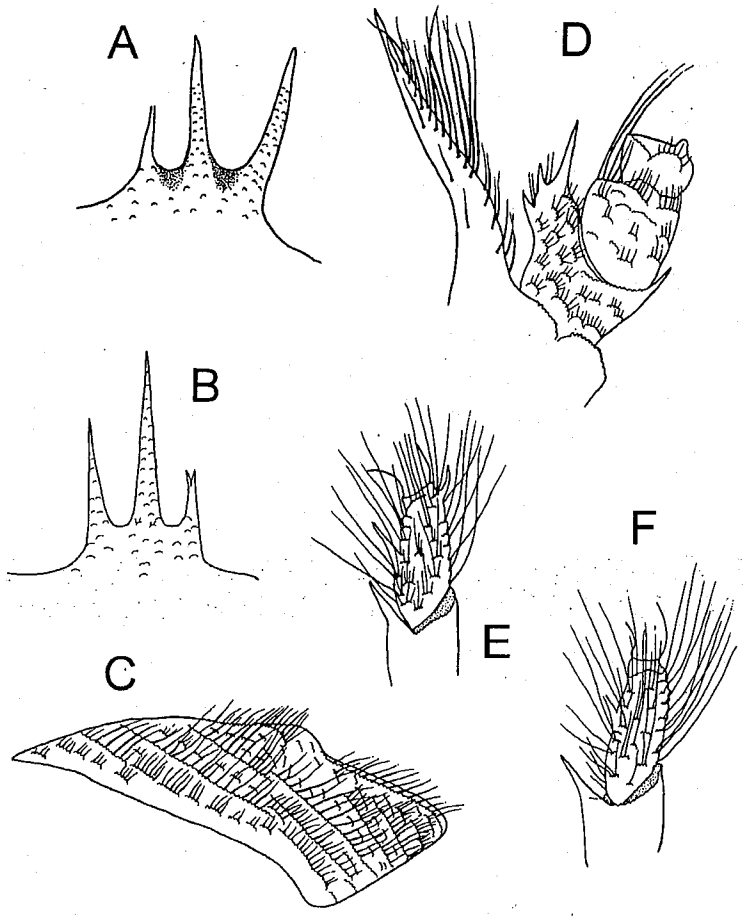

Fig. 44. *Munida incerta* Henderson, 1888, A. male, cl+r, 27mm. B-D, female, cl+r, 26mm. A, anterior part of carapace, dorsal view; B, anterior part of carapace, dorsal view; C, right pterygostomian flap; D, left antennal peduncle, ventral view; E, part of ischium and merus of left third maxilliped, ventral view. Male, cl+r, 29.5mm; F, part of ischium and left merus, ventral view.

43A,A'. As can be seen, the specimen agrees rather well with the previous descriptions however, in some specimens the supraorbital spines are more divergent, resembling the South African material (Barnard, 1950:490,Fig.92a). In a male (cl+r, 27mm) the right supraorbital spine is nearly as long as the rostrum whereas the left one is of normal size and shape except that it is parallel to the rostrum and not divergent which is characteristic of the species (Fig.44A). In a female, measuring 25mm in carapace length the right supraorbital spine is attenuated and bifurcated (Fig.44B). The sculpture of the second and third abdominal segments is illustrated in figure 43B, and that of the last two segments, telson and uropods in figure 43C.

The pterygostomian flap is rather broad with the anterior margin rounded. It is provided with long and short setae which are arranged, more or less, in rows (Fig.44C).

The third thoracic sternite is shorter than the anterior margin of the fourth. It is boat-shaped with crenulated anterior margin, setose surface, and lateral angles rounded (Fig.43D).

The outer border of the antennule is armed with three spines and the distomedian angle is also produced into a strong spine as has been illustrated for "John Murray" specimens (Tirmizi, 1966, Fig.22A). In the present collection, the relative length of these spines is variable. In some specimens, the two distolateral spines are almost equal, the inner spine is also short (Fig. 43E) compared to normal condition, in one male, the second spine on the lateral margin is reduced to a simple projection (Fig.43F). The basal antennal spine is very large, outreaching the distal margin of the basal antennular segment (Fig.43A), the following segment is produced into a median and a lateral spine distally, in a few specimens one or two additional spines may be present on the inner margin (Fig.44D).

The merus of the third maxilliped is armed with a strong spine on the inner margin and a slightly smaller but well developed spine on the distolateral angle (Fig.44E). The distolateral spine is wanting only in the left merus of one female (Fig.44F).

The chelipeds are long and thorny (Fig.43G) being usually twice the length of the carapace except in one male, where they are more than three times the length of the carapace (cl+r, 27mm, chl, 87mm). In larger specimens, the chelipeds are robust and with a hiatus, moreover, there are two projections on the inner margin of each finger (Fig.43H). The legs are thorny and pubescent (Fig.43I).

Epipods are wanting from all the pereopods.

Only the second pair of pleopods of the male is present, it is spoon-shaped and fringed with long setae which curl inwards (Fig.43J). The pleopod of a small male, measuring 16.5mm in carapace length, including rostrum, has already acquired the characteristic shape except it is rather small and with few hairs only (Fig.43K).

Distribution.-

Indo-Pacific: Delagoa Bay off southern Mozambique and Zanzibar, Madagascar, Bay of Bengal, Malaya Archipelago between Moluccas and Luzon, Okinawa Trough and off the Pacific coast of Honshu, Japan (Baba,1988).

Munida roshanei Tirmizi, 1966
(Fig.45-46)

Munida roshanei Tirmizi, 1966:192,fig.13; Lewinsohn, 1969: 127,fig.25; Baba, 1988:126, fig.48.

Material and measurements.-

Sta.408 D; Cruise 8; lat.16°42'S; Long.043°18'E; Depth 150-300M; Date 15-10-1964; 3 males, cl+r, 3.5-6.5mm; 3 females (1 ovigerous), cl+r, 5.5mm-7.4mm.

Sta.447; Cruise 9; 2 females (ovigerous), cl+r, 4.5-5mm; 2 fragmentary specimens.

Sta.AB 21-63; Cruise 1; Dated 31-7-1963; 1 female (ovigerous).

Sta.18A; Cruise 1; Lat.07°34'N; Long.98°00'E; Depth 77M; Date 21-3-1963; only 1 male, cl+r, 12.5mm; chl, 34mm, pl., 10mm, fl, 6mm.

Remarks on material.-

The IIOE specimens of *M.roshanei* are in a very bad condition. Some of them are represented by a few fragments only, which, however, make the identification possible. Most of the specimens are small, the largest being a female measuring 7.4mm in carapace length, including rostrum. Out of the six females three are ovigerous. Carapace of two of these are complete, measuring 4.5 & 5mm. Two specimens from Sta.447 are fragmentary, pieces of cheliped are present in this tube only, all the other specimens are without chelipeds and some or all the walking legs.

Descriptive remarks.-

This species was first described from the Indian Ocean by Tirmizi (1966:192), later (Lewinsohn,1969) from the Red Sea and Philippines (Baba,1988). The condition of available specimens prevents a much needed detailed study of the species, however, a careful examination shows that there are some slight variations. One specimen has the rostrum a little longer than in the type (cl+r, 5mm, rl, 1.6mm), it is also more slender. The number of spines on the transverse gastric row is, more or less, constant having five pairs of spines except one male (Sta.408D) and one female (Sta.447) each having an extra pair of spines rather small, and situated laterally between the fourth and fifth spines. This extra spine, in some, is replaced by a tubercle on both sides. In two females, a small spine on the outer and of the first stria is present, in others they are absent or present on one side only, or may even be bifurcated. The median gastric row may consist of three spines, as in the type; in some cases one or even two spines are replaced by setose scales or acute tubercles. In all the available specimens each anterolateral spine is followed by eight spines. The number of striae on the carapace shows some insignificant variations, the first stria is almost always interrupted (Fig.45A). The second and third abdominal segments are as illustrated in figure 45B, as can be seen, each has a deep groove dividing it into anterior and posterior halves, each half bearing a fine groove. A few setae of the carapace and abdomen are much longer than the others. The last abdominal segment, telson and uropods are as represented in figure 45C.

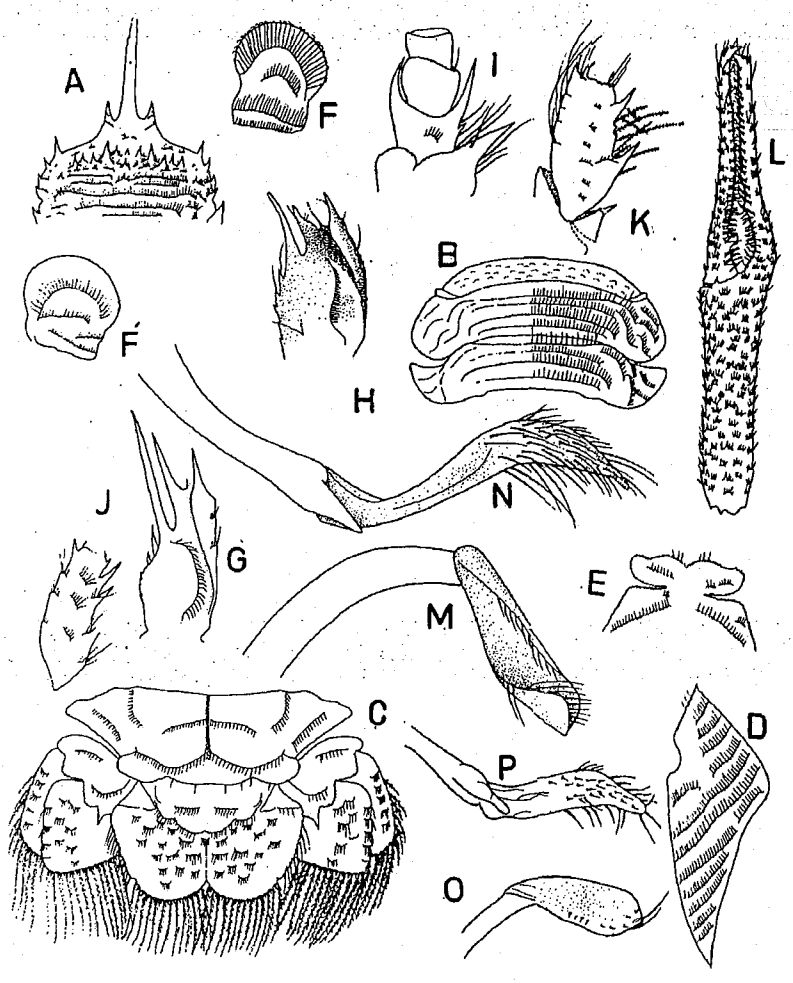

Fig. 45. *Munida roshanei* Tirmizi, 1966. Specimen mutilated. A, anterior part of carapace, dorsal view; B, second and third abdominal segments of female, dorsal view; C, last abdominal segment, telson and uropods, of the same, dorsal view; D, right pterygostomian flap; E, anterior part of sternal segments; F, eye, dorsal view; F', same, ventral view; G, basal segment of left antennule, dorsal view; H, basal segment of left antennule of female, dorsal view; I, righ antennal peduncle, ventral view; J, merus of right third maxilliped, ventral view; K, part of ischium and merus of right third maxilliped, ventral view; L, chela of right cheliped; M, first right pleopod of male; N, second right pleopod of the same, male, cl+r, 3.5mm; O, distal part of first right pleopod; P, distal part of second right pleopod.

The pterygostomian flap (Fig.45D) is furnished with a few setose striae, anteriorly it is produced into a small spine.

The third thoracic sternite (Fig.45E) is strip-like, somewhat elongated from side to side.

The eyes (Fig.45F&F') are with conspicuous 'lashes' on both the surfaces.

The basal segment of the antennule may have an extra spine on the outer margin of both sides or any one side (Fig.45G&H). The second antennal segment (Fig.45I) may have an extra spine on the median margin.

The merus of the third maxilliped (Fig.45J), in most cases, has the usual armature except in a male (Sta.408 D) where the median spine is wanting, its position is, however, indicated by a small notch (Fig.45K), similar condition has been noted in *M.japonica* by Yanagita (1943:25,Fig.7 d) and Miyake & Baba (1967:242, Fig.12).

Unfortunately, only a few fragments of one cheliped are available. The chela (Fig.45L) agrees with the description and illustration given for the 'John Murray' specimen, except that the fingers are as long as the palm (chela, 20mm, fl, 10mm), whereas in the type the fingers are a little shorter. It has been shown by Lewinsohn (1969) that the ratio of palm and fingers is considerably variable.

Epipods are absent from all the pereopods.

The first and second pleopods of the adult male are as illustrated in figure 45M and N, respectively. The tip of the second pleopod is considerably produced. Pleopods of a younger male (cl+r, 3.5mm) show an early stage of development (Figs.45O,P).

A male, though included under this species, differs in several characters some of which are quite significant, it is therefore, being described in considerable details:

The rostrum is longer, more slender and when viewed laterally it is smooth and not serrated as in the other specimens of *M.roshanei*, the supraorbital spines are also rather long and slender, the transverse row of the gastric spines consists of five pairs, and there are no median spines, those on the lateral ends of the first stria are also wanting (Fig.46A). The anterolateral spines are followed by eight spines on each lateral margin, three being in the hepatic, four in the cervical triangle, and one behind the posterior cervical groove. The abdomen (Fig.46B) is unarmed, the second and third abdominal segments have only one fine groove in the anterior and the posterior halves of each segment. The last abdominal segment and telson differ mainly in being a little more setose (Fig.46A).

The pteryogostomian flap is furnished with a few complete and several incomplete hairy striae. A small cicatric-like transulscent depression can also be seen in figure 46C, it is indicated by an arrow, further, the anterior spine is sharp and well developed.

The third thoracic sternite is not as broad as that of *M.roshanei*, illustrated in figure 46E, the anterior margin is here produced into two serrated subtriangular projections separated by a'V' shaped notch (Fig.46D).

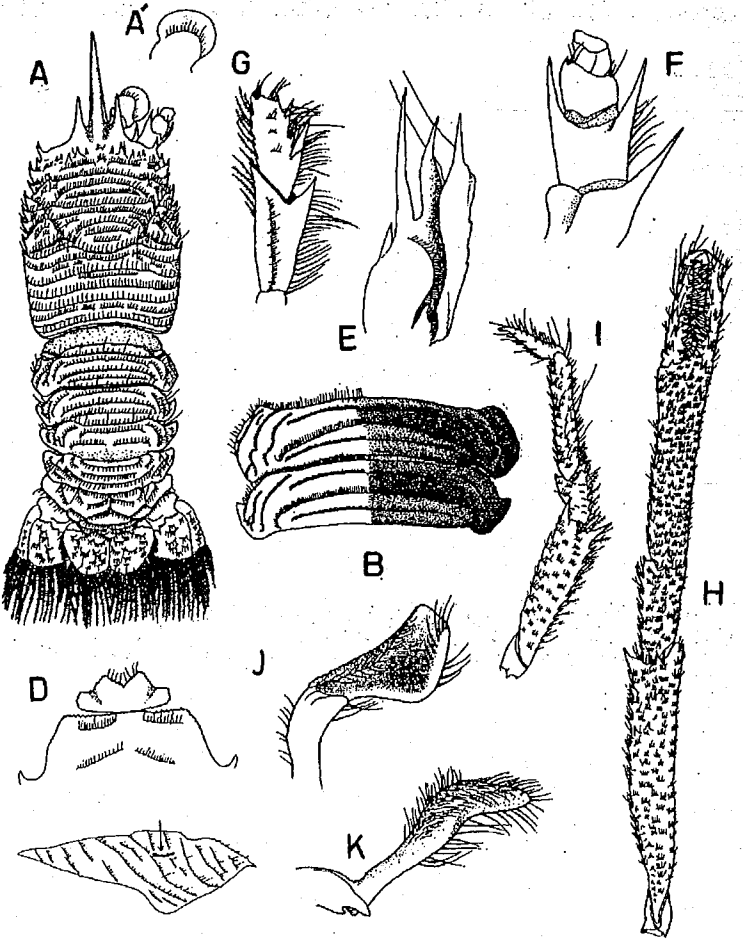

Fig. 46. *Munida roshanei Tirmizi*, 1966, male, cl+r, 12.5mm. A, animal, in dorsal view; A', left eye, ventral view; B, second and third abdominal segments, dorsal view; C, right pterygostomian flap; D, anterior part of sternal segments; E, basal segment of left antennule, dorsal view; F, right antennal peduncle, ventral view; G, ischium and merus of right third maxilliped, ventral view; H, right cheliped; I, left detached walking leg; J, distal part of right first pleopod; K, distal part of right second pleopod.

The ocular peduncle (Fig.46A, A') is smooth and without any setose ridge on either side, the 'lashes' present on both the sides are short, not reaching as far as the anterior margin of the cornea.

The proximal spine on the outer margin of the basal segment of the antennule (Fig.46E) is strong behind which this margin is smooth and not serrated as in the specimens just described. The basal antennal spine (Fig.46F) is longer, both spines of the following segments are strong, an extra spine is present on the distolateral angle of the third segment.

The merus of the third maxilliped (Fig.46G) has three well developed spines, an acuminate projection is, however, present on the inner margin of the right merus only, the distolateral angle has a claw-like spine followed by a strongly serrated outer margin.

Only the right cheliped (Fig.46H) is present, it is more than twice the length of the carapace (including rostrum). Its length is mainly due to the large size of the chela which is nearly as long as the combined length of the remaining cheliped (chl, 34mm, chela, 16mm). The inner margin of all the segments are armed with sharp spines, dorsally a median and a submedian row of spines can also be seen. The fingers are short being much less than the length of the palm (fl, 6mm, pl, 10mm). Upper surface of the outer margin of both, the finger and the thumb, is spinose, a few sharp spines are also present on the proximal half of each, being more conspicuous on the movable finger. A detached leg is illustrated in figure 46I.

Epipods are absent from all the pereopods.

The first pleopod (Fig.46J) of the male is without a reflected portion. The second pleopod (Fig.46K), however, is more like that of the juvenile from Sta.408 D although the present specimen is much larger.

Distribution.-

Indo-Pacific: Red Sea, Gulf of Oman, Gulf of Aden, Mozimbique channel, Bay of Bengal, Malaysia and Philippines.

Munida japonica Stimpson, 1858 (Fig.47)

Munida japonica Stimpson, 1858:252;1907:235; Miers, 1879:51; Ortmann,1892: 254,pl.11, fig.11; Borradaile, 1900:42; de Man,1902:724; Doflein, 1902:644; Southwell, 1906:221; Balss,1913:15,fig.14,1916:3; Laurie,1926:135; Yokoya,1933 :58; Melin, 1939:85,figs.54-57; Miyake,1957: 86; Tirmizi,1966:195,figs.15-16; Miyake & Baba, 1967:240, figs.11,12; Lewinsohn,1969:131, figs 261; Haig,1973: 271 & 275; Baba,1977 a:253, Baba, in Baba, Hayashi & Toriyama, 1986:171,290, fig.122; Baba, 1988: 108; 1990: 964; 1989b: 131.
Munida honshuensis Benedict, 1902:261, fig.11.
Munida japonica typica Balss, 1913:15,fig.14.
Munida militaris variety andamanica: Boone, 1935:42, pl.10.
Munida japonica japonica Yanagita, 1943:24, fig.7.

Material and measurements.-

Sta.371D;Cruise 7; Lat.24°64'S; Long.35°20'E; Depth. 165M; Date 18-8-1964; 1 female, cl+r, 13mm;chl, 23mm.
Sta.9-422; Cruise 9; Lat.06°51'S; Long.39°54'E; Depth. 100M; Date 19-11-1964; 1 male, cl+r, 8mm; chl, 15.5mm.
Sta.390S; Cruise 7; Lat.29°35'S; Long.31°42'E; Depth. 138M; Date 9-9-1964; 1 female, cl+r, 5.5mm; chl, 13.5mm.

Descriptive remarks.-

M.japonica is widely distributed in the Indo-Pacific region, it has been adequately described and illustrated. As already mentioned by some of the earlier authors the species is somewhat variable. This is furhter confirmed by the study of the present specimens, two females and one male. A short description of the available specimens is given below:

The shape and size of the rostrum, and supraorbital spines are, more or less, as described for the "John Murray" specimens except that the supraorbital spines are strong but not sharply pointed (Fig.41A). The transverse gastric row consists of twelve spines of which the second pair is much larger than the others, moreover, a well developed spine is present near each end of the first complete transverse stria, one or two spines may be present in the hepatic regions behind the anterolateral spines. The median gastric row is formed by two spines, and a posterior scale as illustrated in (Fig.47A), except in the younger female where instead of spines, there are three scales. Each anterolateral spine is followed by eight lateral spines, except in the male where only two spines are present between the anterolateral spine, and the anterior margin of the cervical triangle. One fairly strong spine is present, immediately behind the bifurcation of the cervical groove, and another equally strong spine in the cervical triangle. The first abdominal segment is furnished by several broken striae, roughly arranged in transverse rows, each stria is finely serrated and with backwardly directed setae. The number of spines on the second abdominal segment vary, being three in the male, six in the larger female (cl+r, 13mm), as can be seen in Fig.47B, and eight in the younger female (cl+r, 5.5mm). The sculpturing of the second and third segments of the large female is illustrated in Fig.47B, that of the fifth, sixth segments, telson and uropods in Fig.47C.

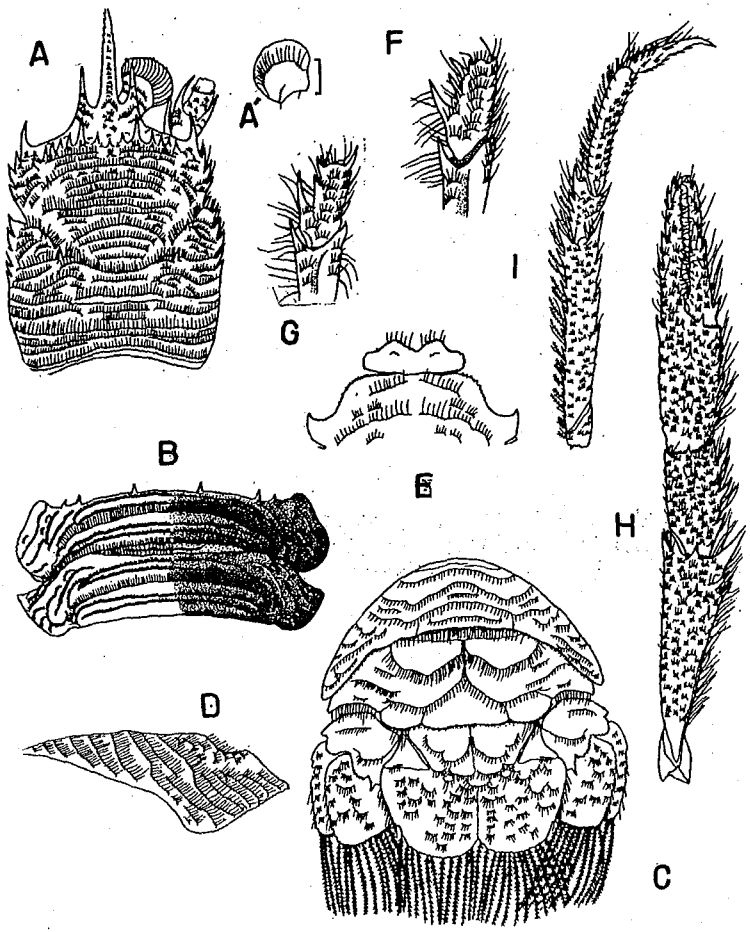

Fig. 47. *Munida japonica* Stimpson, 1858. Female, cl+r, 13mm, A, carapace, right eye and antennal peduncle, dorsal view; A', right eye, ventral view; B, second and third abdominal segments, dorsal view; C, last two abdominal segments telson and uropods, dorsal view; D, right pterygostomian flap; E, anterior part of sternal segments; F, part of ischium and merus of left third maxilliped, ventral view; G, part of ischium and merus of left third maxilliped, ventral view; H, left cheliped; I, right detached walking leg.

The pterygosotmian flap is with a shallow notch, and is acutely pointed anteriorly (Fig.47D).

The anterior margin of the third thoracic sternite is notched medially, each lateral half is somewhat bilobed. The anterior and lateral margins are serrated, a few setae are present on the anterior margin. Laterally, the sternite is broadly rounded, further, the posterior margin in nearly as wide as the anterior margin of the following sternite (Fig.47E). Rest of the sternum is provided with setose striae which are not constant in number. In having striae on the first abdominal segment and sternum, the present specimens resemble those from the East China Sea (Miyake & Baba,1967:242).

The eyes, antennules and antennal peduncle of the large female show a close resemblance to the "John Murray" specimens (Tirmizi, 1966). The antennal peduncle of the other two specimens, however, have an extra spine on the outer margin of the third antennal segment, in this respect these specimens resemble the Japanese specimens (Yanagita, 1943:25) as well as those from the Red Sea described by Lewinsohn (1969: 130, fig.26,d).

As already pointed out by earlier workers (Tirmizi,1966, Miyake & Baba,1967), the spinosity of the merus of the third maxilliped is subject to considerable variations. In the present specimens, the inner margin of the merus is armed with four subequal spines in the large female (Fig.47F) and three in the other two specimens. Furthermore, in the male the spine on the outer margin is very strong and followed by a small acute spine (Fig.47G).

The pereopods are either wanting or detached. The right cheliped of the large female is illustrated in Fig.47H, it agrees rather well with the description given by Tirmizi (1966:197). The remaining walking legs may very in the number of spines on the last two segments, in some there are seven spines on the dectylus, and twelve on the propodus, whereas in several outhers there are nine on the dactylus, and fifteen on the propodus (Fig.47I).

Epipods are absent from all the pereopods.

The pleopods of the available male, are as described and illustrated for the "John Murray" specimens (Tirmizi, 1966:197, Fig.16).

Distribution.-

Indo-Pacific: Ranges from Red sea eastward to Japan, East Indian Archipelago, Philipines, Bismarck Archipelago and Australia (see Baba, 1988)

Munida heteracantha Ortmann, 1892
(Fig. 48-49)

Munida heteracantha Ortmann, 1892,:255, pl.11, fig.12; Doflein, 1902 :644; Baba, 1969:49, 1988:104, fig.38.
Munida semoni Ortmann, 1894:24,p;.1:fig.4.
Munida sagamiensis Doflien,1902:623,pl.3,fig.9.
Munida honshuensis Bendict, 1902,:261, fig.11.
Munida japonica Var. *heteracantha*: Balss, 1913,:15; Melin,1939:89, fig.58.
Munida japonica heteracantha Yanagita, 1943:27, fig.8.

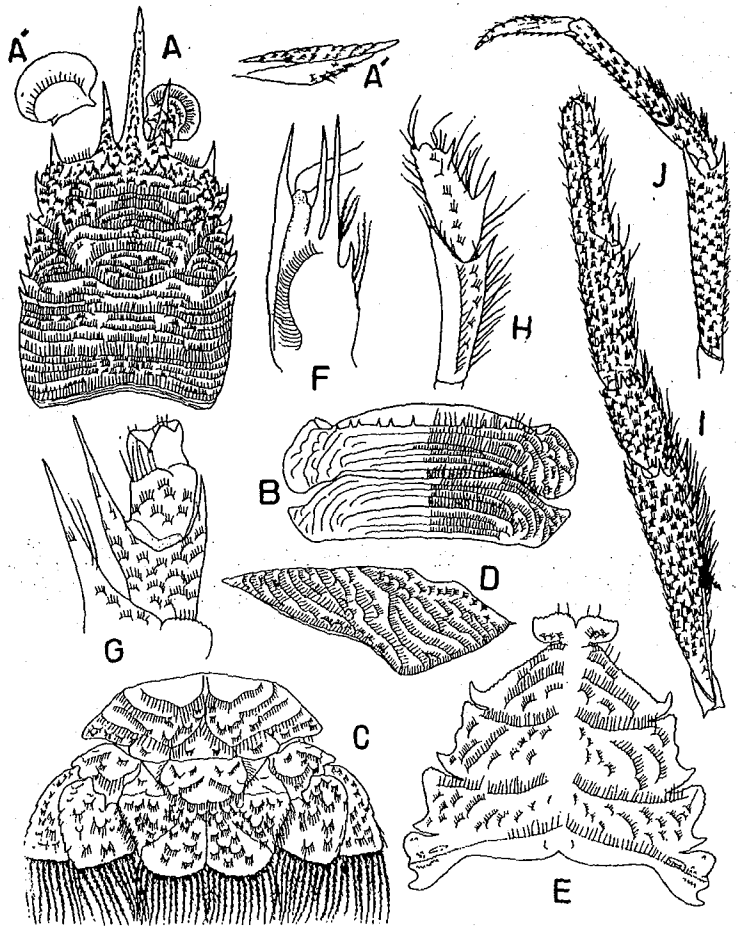

Fig. 48. *Munida heteracantha* Ortmann, 1892, male, cl+r, 18mm, A, carapace dorsal view; A', rostrum, lateral view; A", right eye, ventrla view; B, second and third abdominal segments, dorsal view; C, last abdominal segment, telson and uropods, dorsal view; D, right pterygostomian flap; E, sternal segments; F, basal segment of right antennule, dorsal view; G, left antennal peduncle, ventral view; H, ischium and merus of right third maxilliped, ventral view; I, left cheliped; J, detached walking leg.

Material and measurements.-

Sta. 22(b)-63; Cruise 1; Date 31-7-1963; 33 specimens: 18 males, cl+r, 23-17.5mm; chl, 40.5mm; 15 females (ovigerous), cl+r, 17mm-22mm; chl, 31-38mm.

Sta.392K; Cruise 7; Lat.29°19'S; Long.31°26'E; Depth 38M; Date 9-9-1964.

(Note:"Label for Sta.391C also found in sample" Lat.29°9'S; Long.31°45'E; Depth 86M; Date 10-9-1964) only 1 female cl, 8.5mm (rostrum broken).

Descriptive remarks.-

M. heterocantha is a fairly large species, and several specimens belonging to both sexes are available for study. The carapace (Fig.48A) is covered with setose striae some of the hairs are iredescent. The rostrum (Fig.48A') is laterally compressed and sabreshaped. The supraorbital spines extend up to the distal margin of the cornea, they are, more or less, divergent. The anterolateral spines are strong, and followed by six spines. The transverse gastric row consists of 5-6 pairs of spines, 2-4 granular scales form the median gastric row. On either side of the first continuous stria, a spine may be present. In some cases, a spine is present on one side only. A spine in the cervical triangle, and also behind the bifurcation of the cervical grooves may be present on both sides, or may be absent from one side of the carapace, in some cases, is totally wanting (Fig.48A). Only the anterior margin of the second abdominal segment is armed, there are altogether twelve spines. The grooves and striae of the second and third abdominal segments are, as illustrated in figure 48B. The last abdominal segment and telson are strongly sculptured, in the males the lateral margins of the telson (Fig.48C) are provided with dense rows of thick amber coloured setae, and tooth-like projections distolaterally. This is in common with some other species of *Munida*.

The pterygostomian flap (Fig.48D) has a shallow notch, in front of which is a triangular projection, and anteriorly it is acutely pointed.

The posterior margin of the third thoracic sternite (Fig.48E) is wider than the much narrowed anterior margin of the following sternite. Further, the anterior margin of the third sternite has a median notch on either side of which the sternite bulges out slightly, and the anterolateral angles are acutely rounded.

The ocular peduncle (Fig.48A") is furnished with hairy scales, the 'lashes' are rather short, not reaching as far as the outer margin of the cornea. Ventrally, there is only one row of short hairs.

The spines on the basal segment of antennule (Fig.48F) are long and slender except the third spine on the outer margin which is short and rather stout, behind it the outer margin is strongly serrated. The basal spine of the antennal peduncle (Fig.48G) is rather elongated and acutely pointed, the inner spine of the following segment may be as long as the basal spine or just a trifle longer. A well developed spine is present on the distolateral margin of the second segment, as far as can be seen the next segment is unarmed.

The outer margin of the merus of the third maxilliped (Fig.48H) is strongly serrat-

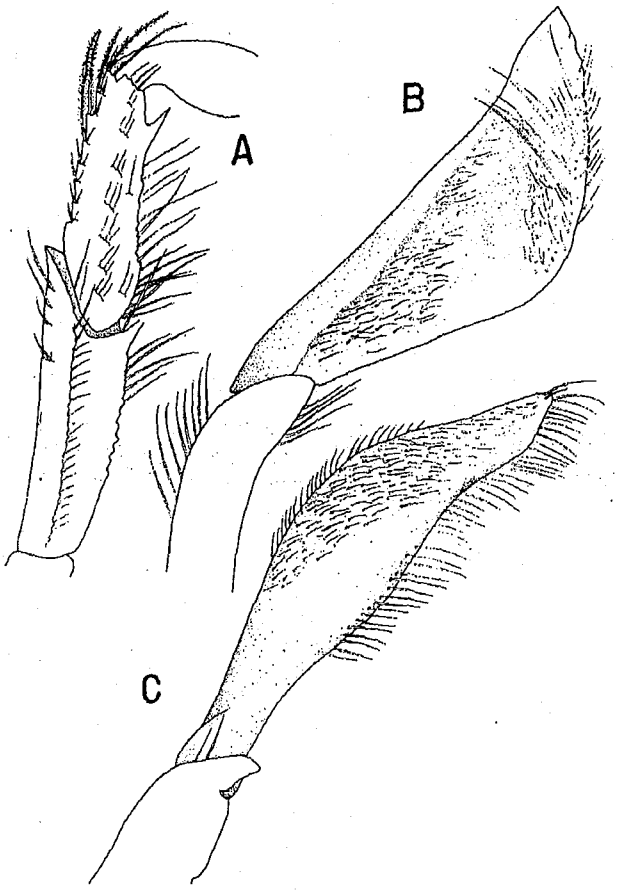

Fig. 49. *Munida heteracantha* Ortmann, 1892. Female, cl+r, 8.5mm, A, carapace and abdomen, dorsal view; A', left eye, ventral view; B, right pterygostomian flap; C, sternal segments; D, basal segment of left antennule, dorsal view; E, left antennal peduncle, ventral view; F, part of ischium and merus of right third maxilliped, ventral view.

ed, whereas the inner one bears a larger proximal and a smaller distal spine. In a male, only the distal spine is present, the proximal being represented by a minute projection (Fig.49A).

The chelipeds vary considerably in size. In females, they are less than twice the length of the carapace, including rostrum, while the males, specially the larger ones, have rather long and stout chelipeds; the right and left chelipeds may also be of different lengths, for example, a male measuring 23mm in carapace length (including rostrum) has the left cheliped 72mm long, and right one 66.5mm long. The cheliped of a male (cl+r, 18mm) is illustrated in figure 48I. As can be seen, it is pubescent and moderately spinose, the fingers are nearly as long as the palm. The walking legs (Fig.48J) are also pubescent and spinose.

Epipods are wanting from the pereopods.

The first male pleopod (Fig.49B) is, more or less, like a spatula, setose, slightly concave, and with a spout-like anterior projection. The second pleopod (Fig.49C) is elongated, setose and slightly swollen near the middle.

Remarks.-

M. heteracantha is a highly variable species. The variabilities in its morphological characters are well discussed by Baba (1988:105). The present material agrees well with species account and illustrations of Baba (1988:104, fig.38) except that the supra-orbital spines are almost half as long as rostrum while in "Albatross" specimens they are less than a half of rostral length.

Distribution.-

Indo-Pacific: Sagami Bay, East China Sea, the Bonin Islands, Philippines and now from the Bay of Bengal and south eastern coast of Africa.

Munida andamanica Alcock, 1894
(Figs. 50-53)

Munida militaris var. *andamanica* Alcock, 1894:321; Alcock & Henderson, 1895:pl.13:fig.3.
Munida adamanica Alcock, 1901:242,pl.xii,fig.2; Kemp & Sewell, 1912:25; Balss, 1913:17; Doflein & Balss, 1913:143; Parisi, 1917:1; Yokoya, 1933:63; Yanagita, 1943:29; Tirmizi,1966 :198, figs.17-19; Baba,1982 b:103; Miyake, 1982:149,pl. 50:fig.1; Baba, in Baba, Hayashi & Toriama, 1986:169-289, fig.119; 1988:85.
Munida curvatura Benedict, 1902: 253, fig.5.

Material and measurements.-

Sta.397 C; Cruise 8; Lat.26°07'S; Long.34°1'E; Depth 600-665M; Date 29-9-1964; 2 males, cl+r, 19.5-25mm (both infected by bopyrid species; chl, 31-36mm; 1 female (ovigerous), cl+r, 25mm; chl, 43mm.
Sta.23-63; Cruise 1; Dated 31-7-1963; 1 male, cl+r, 29mm; chl, 48mm; 5 females (1 ovigerous), cl+r, 20.5- 26mm; chl, 37-39mm.

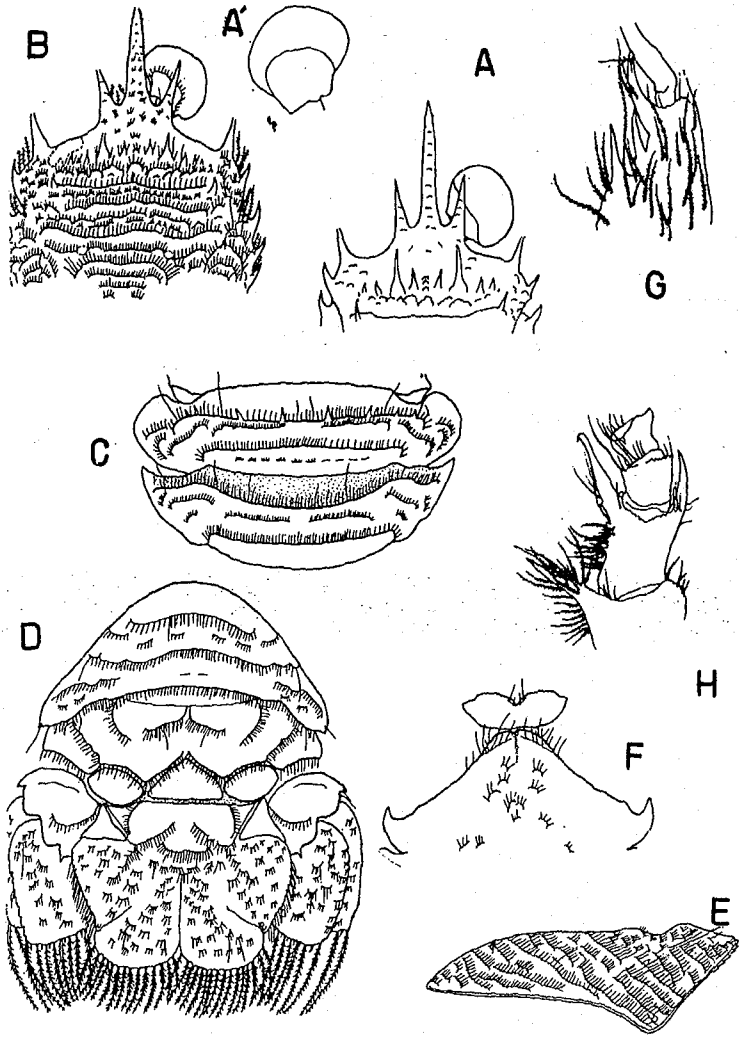

Fig. 50. *Munida andamanica* Alcock, 1894. A,A' male, cl+r, 19.5mm; C-G, male cl+r, 25mm; A, anterior part of carapace and right eye, dorsal view; A', right eye, ventral view; B, anterior part of carapace and right eye, dorsal view (female, cl+r, 25mm); C, second and third abdominal segments, dorsal view; D, last two abdominal segments, telson and uropods, dorsal view; E, right pterygostomian flap; F, anterior part of sternal segments; G, basal segment of right antennule, ventral view; H, left antennal peduncle, ventral view.

Descriptive remarks.-

Three specimens of *M.andamanica* are available in the present collection. All the three specimens, two males and one ovigerous female, show some variations amongst themselves as well as from the existing descriptions of the species.

The supraorbital spines (Fig.50A) may be almost straight or divergent, they are a little less than half the length of the rostrum (Fig.50B). The number and size of the gastric spines vary considerably. The small pair of spines lying immediately behind the large gastric spine is totally wanting in the present specimens. According to Tirmizi (1966:200). "these small spines are present in several specimens and may be totally lacking". The spines behind the bifurcation of the cervical groove are present in the large male, in the other male the spine on the right side, and in the female that on the left side only is present. A spine is present in each cervical triangle of all three specimens. The anterolateral spines are well developed, not curving inwards, and followed by six spines. The anterior margin of the second abdominal segment is armed with eight spines. The sculpture of the second and third abdominal segments is illustrated in figure 50C, that of the last two abdominal somites, telson and uropods in figure 50D.

The pterygosotmian flap (Fig.50E) is covered with long and short striae which are, more or less, straight and with short setae. A small anterior portion is serrated ventrally.

The anterior margin of the third thoracic sternite (Fig.50F) is divided by a small 'V' shaped notch, its anterolateral angles are acute. As far as can be seen, the last thoracic sternite is smooth.

The spines on the basal segment of the antennule vary in size. The small male is with the second distal spine longer than the third, whereas in the other two specimens these spines are subequal. It is interesting to note that the distolateral spine of the right antennule of large male is forked (Fig.50G, indicated by an arrow). The spines on the inner margin of the second segment of the antennal peduncle (Fig.50H) may be present or replaced by tubercles.

The chelipeds (Fig.51A), being about one and half times as long as the carapace except in the female, where they are nearly twice as long and have the characteristic feathery look. The walking legs (Fig.51B,C) are also beset with strong spines and plumose setae.

Epipods are wanting on all the pereopods.

The first pleopod of male (Fig.51D) is somewhat spoon-shaped and heavily setose, the second (Fig.51E) is rather narrow, elongated and with dense setae. The pleopods of younger male (Figs.51F,G) differ in being rather flat and less hairy. Each of the second and third abdominal sternites (Figs.51H,I) has a tubular structure attached by a short stem. These structures probably represent the spermatophores, they got easily dislodged while taking out the pleopods. It may be pointed out that the males are infected with some bopyrid species.

Six specimens from Sta. 23-63 were identified as *M.curvirostris* Henderson. There were, however, some differences for which it seemed necessary to compare them with Henderson's specimens. The authorities of the British Museum very kindly sent on

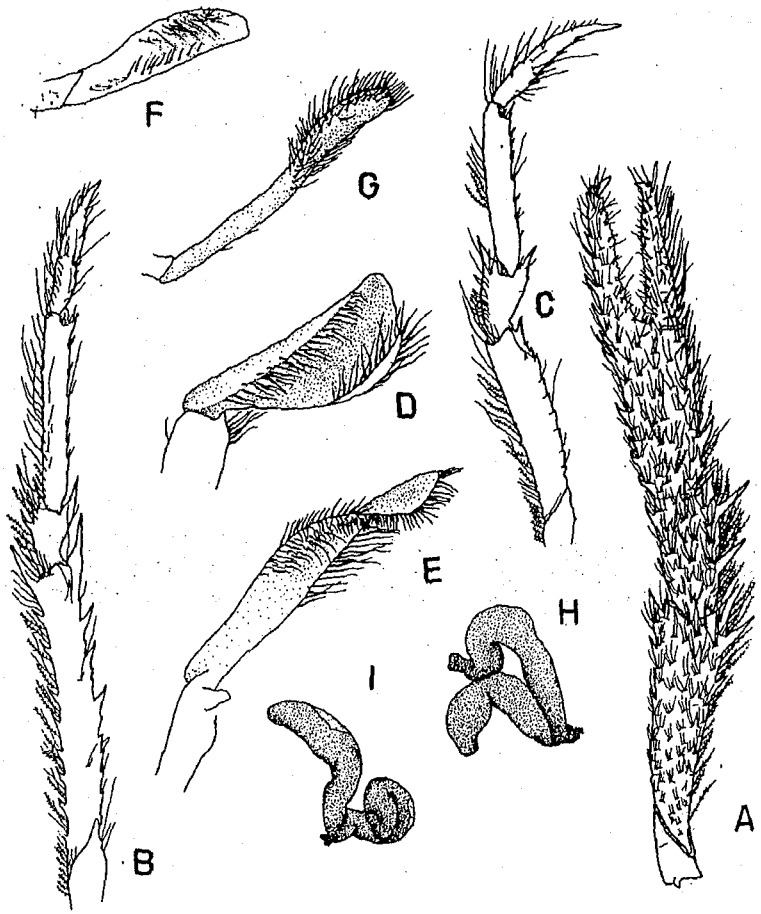

Fig. 51. *Munida andamanica* Alcock, 1894. female, cl+r, 25mm; A, left cheliped; male, cl+r, 19.5mm; B, right first walking leg; C, right third walking leg; male, cl+r, 25mm; D, distal part of right first pleopod; E, distal part of right second pleopod; male, cl+r, 19.5mm; F, distal part of left first pleopod; G, distal part of left second pleopod; H, tubular structure attached to the second abdominal segment; I, tubular structure attached to the third abdominal somite.

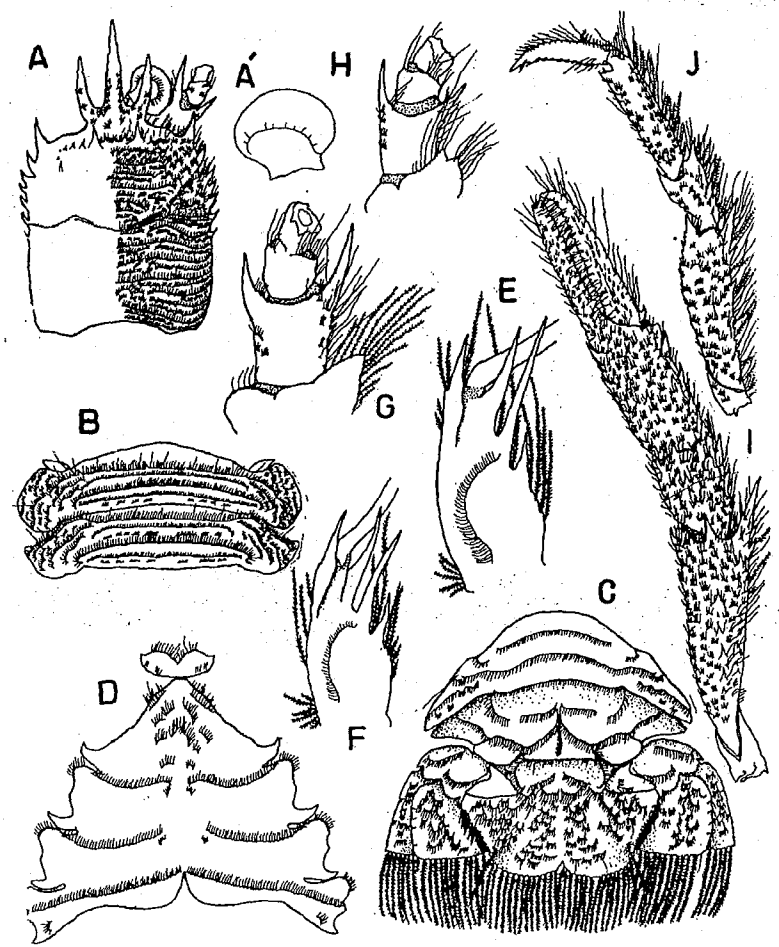

Fig. 52. *Munida andamanica* Alcock, male, cl+r, 29mm; A, carapace, eye and antennal peduncle, dorsal view; A', right eye, ventral view; B, second and third abdominal segments, dorsal view; C, last two abdominal segments, telson and uropods, dorsal view; D, sternal segments; E, basal segment of right antennule, dorsal view (female, cl+r, 23.5mm); F, basal segment of right antennule, dorsal view; G, right antennal peduncle, ventral view; H, right antennal peduncle, ventral view (female, cl+r, 23mm); I, left cheliped; J, a detached leg.

loan one specimen of *M.curvirostris* and two of *M.militaris* (one male and one female, the female does not seem referable to this species). After a detailed examination of the specimens at hand, we consider it appropriate to place them in *andamanica* as a variant and describe them in detail for future references.

As in the specimens described above the rostrum is a little less than half the length of the carapace, but its distal one third is distinctly curved upwards, the supraorbital spines are a little more than half the rostral length, they are strongly arched, slightly diverging and serrated distally. Both the rostrum and supraorbital spines bear setose granulated scales. The transverse gastric row consists of five pairs of spines, the second being the largest and the last one the smallest. In two females, there are only three pairs of gastric spines, the remaining two pairs are represented by tubercles. A well developed spine is present on each lateral end of the first continuous stria. Further, one or two tubercles may be present between this spine and the last gastric spine. The anterolateral spines are well developed and followed by six spines. The entire carapace is covered by finely granulated, setose striae and scales (Fig.52A). The anterior margin of the second abdominal segment is armed with 7-9 spines, eight in the male. The second and third segments each have a deep median transverse groove, and on each half thus formed, are one or two fine grooves or one groove and a few setose scales, arranged more or less, in transverse lines. The pattern on the second and third pleuron is as illustrated in figure.52B, the last two abdominal segments have few setose striae, the telson and the uropods are covered by setose scales. In the male, the lateral margin of the telson (Fig.52C) has a thick fringe of setae which extends as far as the tooth-like projection which is highly developed.

The sternum (Fig.52D) and the pterygostomian flap (Fig.15A) show a general resemblance to the three specimens described earlier, the striae of the pterygostomian flap are, however, more sinuous and with long hairs, anteriorly it is finely dentate (Fig.52D).

The eyes (Fig.52A'). are slightly flattend and with short 'lashes', the ocular peduncle as far as we can see, is smooth. Ventrally, the 'lashes' are short and thin.

The basal segment of the antennule (Fig.52E,F) is armed with four spines, the two distolateral spines are subequal in one female and in the male, in the three females, the second outer spine is longer (Fig.52E). In one female, the basal spine of the right antenna is notched (Fig.52H). The remaining females have a rather long, slender and acutely pointed spines as illustrated in figure 53C. The inner margin of the second segment may have one or two additional spines on one or both sides.

The spinosity of the merus of the third maxilliped varies considerably. The right merus of the male is with a strong proximal and a reduced distal spine (Fig.53D). In a female (cl+r, 20.5mm) the merus is with three spines (Fig.53E). Yet in another female (cl+r, 22.5mm) only the proximal spine is present, it is well developed,sharp and pointed, and more towards the middle of the segment (Fig.53F). The distomedian angle of the ischium may be produced into a large or small spine or it may be represented by a small bidentate projection (Fig.53D).

Chelipeds, from all the specimens, are detached except one, which belongs to the male and is illustrated in figure 52I.

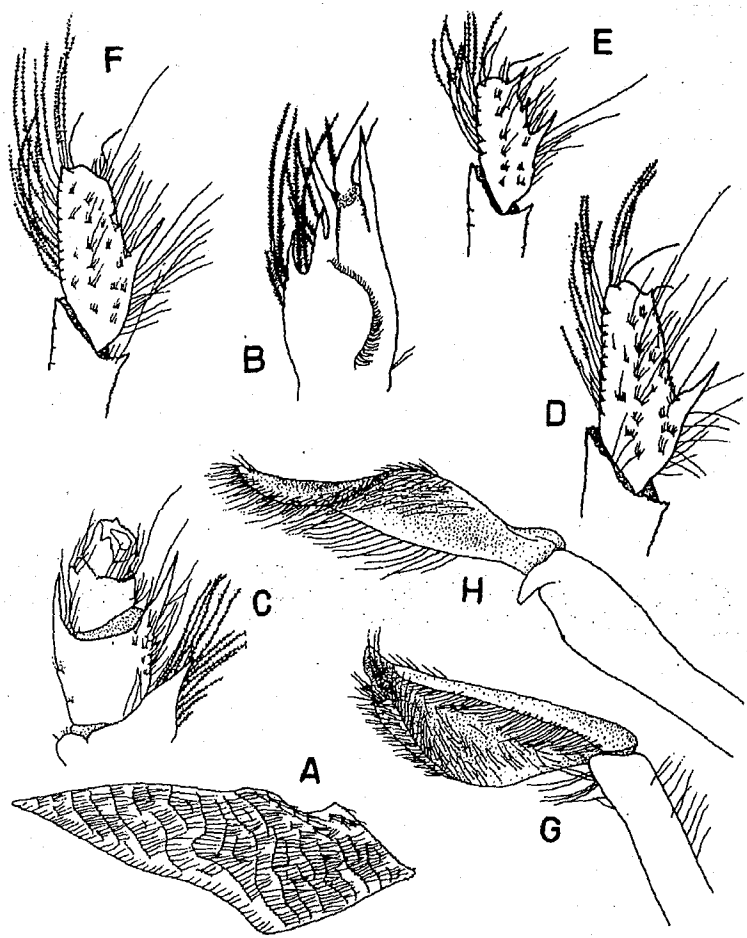

Fig. 53. *Munida andamanica* Alcock, A,D,G & H, male, cl+r, 29mm, A, right pterygostomian flap; B, basal segment of left antennule, dorsal view (female, cl+r, 24mm); C, right antennal peduncle, ventral view (female, cl+r, 23.5mm); D, part of ischium and merus of right third maxilliped, ventral view; E, part of ischium and merus of right third maxilliped, ventral view (female, cl+r, 26mm); F, part of ischium and merus of right third maxilliped, ventral view (female, cl+r, 23mm); G, distal part of left first pleopod; H, distal part of left second pleopod.

The chelipeds are less hairy and with fewer spines, the fingers are longer than the palm (fl, 12.5mm, pl, 10mm). The small spine at the base of the movable finger is missing from a few chelipeds. A detached leg is illustrated in figure 52J. As can be seen it is beset with long plumose hairs and is armed with sharp spines. The spines on the dactylus vary from 11-13 whereas the propodus has only 2-4 spines.

The pleopods (Figs.53G,H) of the male vary in having a well developed spout-like projection at the tip of the first pleopod.

Distribution.-

Indo-Pacific: East coast of Africa, Arabian Sea, Maldives, Andaman Sea, Java Sea, Sulawesi, Moluccas, Phillipines and Japan.

Munida babai Tirmizi & Javed,1976
(Figs. 54-55)

Munida babai, Tirmizi & Javed, 1976:81, Figs.1-3; Baba, 1988: 89, fig.2; 1990: 962.

Material and measurements.-

Sta.390L; Cruise 7; Lat.29°35'S; Long.31°38'E; Depth 150M; Date 9-9-1964; 1 male, cl+r, 6mm; chl, 16mm.

Sta.390P; Cruise 7; Lat.29°34'S; Long.31°39'E; Depth 118M; Date.9-9-1964; 2 fe males, cl+r, 2.5-3mm.

Descriptive remarks.-

The rostrum of the male is rather long, being nearly half as long as the carapace (cl+r, 6mm, rl, 2mm). The rostrum is styliform, arcuate and with a strong ridge, bearing a row of scale-like setose granules. The supraorbital spines (Fig.54A) are somewhat characteristic, with a broad, arched base and a slender pointed tip; like the rostrum they are also setose. Moreover, these spines are situated at a higher level than the rostrum. The transverse row of the gastric spines consists of twelve slender subequal spines. An acuminate scale lies between the first (median) pair of gastric spines, and in line with the scales on the rostrum, behind it, a granulated scale can be seen interrupting the first stria. The only other spines on the carapace are a pair, situated behind the bifurcation of the carvical groove (Fig.54A). The anterolateral spines are acutely pointed and well developed followed by seven spines. The anterior margins of each of the 2-4 abdominal segment is armed. The anterior margin of the second segment has six spines, whereas each of the two posterior segments bears a pair of submedian spines. Each segment bears on its dorsal surface a distinct median, one anterior and two posterior grooves as illustrated (Fig.54B). The last abdominal segment, telson and uropods (Fig.54C) are covered by striae and scales.

The pterygostomian flap (Fig.54D) becomes abruptly narrow posteriorly. The notch on the dorsal margin is fairly deep and wide, anteriorly the tip is rounded, setose and with a distinct spine.

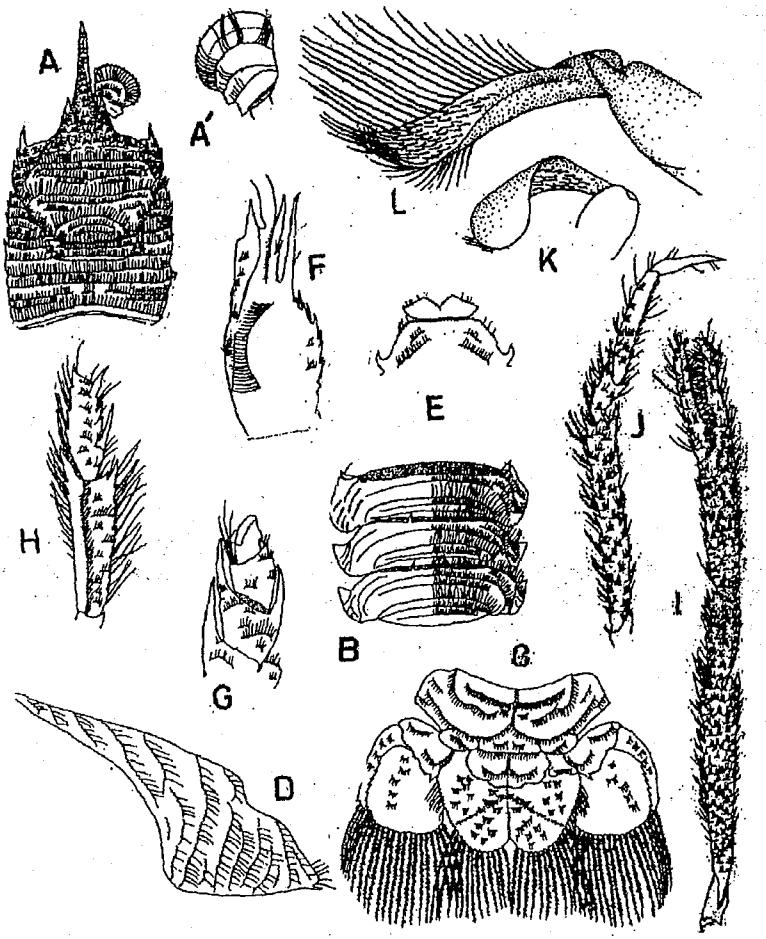

Fig. 54. *Munida babai* Tirmizi & Javed, 1976. A, carapace, dorsal view; A', right eye, ventral view; B, second to fourth abdominal somites, dorsal view; C, last abdominal somite, telson and uropods, dorsal view; D, right pterygostomian flap; E, anteiror part of sternal segments; F, basal segment of right antennule, dorsal view; G, left antennal peduncle, ventral view; H, ischium and merus of right third maxilliped, ventral view; I, right cheliped; J, detached right walking leg; K, distal part of right first pleopod; L, distal part of right second pleopod.

The third thoracic sternite (Fig.54E) is nearly as wide as the anterior margin of the following sternite. Anteriorly it is subdivided by a deep 'V'-shaped notch. On either side of which the anterior crenulated margin is produced forwards so that each half becomes more or less triangular.

The basal segment of the antennule (Fig.54F) bears a short, stout, distomedian spine, and two long and somewhat slender distolateral spines. The outer border proximal to the second spine is spinose throughout the length. It may also be pointed out that a row of submarginal spines is present on the proximal part of the lateral border and some of these spines can be seen from the dorsal side also. On the ventral surface of the distolateral spine is another small spine, concealed in dorsal view. The basal antennal spine is considerably long and directed anteriorly; it extends just beyond the distal margin of the following segment. Both the distomedian and distolateral spines of the second segment are strongly developed, the distomedian being longer and reaching almost as far as the distal margin of the ultimate segment (Fig.54G).

The armature of third maxilliped (Fig.54H) is strong. The distolateral and distomedian angles of the ischium are produced into spines, the entire median margin and part of the lateral one is strongly serrated. A small spine can be seen lateral to the distomedian spine on the ischium of the right maxilliped only. The outer margin of the merus is strongly serrated, distally it is produced into a small spine. On the inner margin are four spines of which the proximal one is the longest, in front of it are two rather short spines, the distomedian spine is strong and rather stout, but shorter than the proximal one.

The cheliped (measuring 16mm) is more than twice the length of the carapace (including rostrum). It is pubescent and thorny as shown in figure 54I. The fingers are nearly as long as the palm (pl, 3.5mm;fl, 3mm).

A detached walking leg is illustrated in figure 54J. The inner and outer margins of the merus, inner margin of the carpus and outer margin of the propodus are spinose. There are ten small movable spines on the outer margin of the propodus. A few setae can be seen on the dactylus which is otherwise smooth. The dactylus is less than half the length of the propodus (dactylus, 1mm; propodus, 2.5mm).

Epipods are wanting on all the pereopods.

The first pleopod (Fig.54K) is somewhat club-shaped and reflected in natural position. As far as can be seen, the marginal setae are small and present only near the tip. The second pleopod (Fig.54L) is long, narrow and setose. The setae on the inner margin are very long.

The two females referred to this species are small and rather fragmentary, chelipeds and all the walking legs are wanting. The carapace of the larger female is illustrated in figure.55A. The rostrum has a broad base tapering gradually to a sharply pointed tip. The supraorbital spines are separated by a greater distance than in the male. The strong anterolateral spines are followed by seven spines. The transverse gastric row consists of five pairs of spines of which the second pair of spines is compound. The median row consists of granular scales one of which is tipped with a spinule. Only a few setae can still be seen on the striae of the carapace. Further, the spine behind the bifurcation of the cervical groove is present on the left side only. In the younger

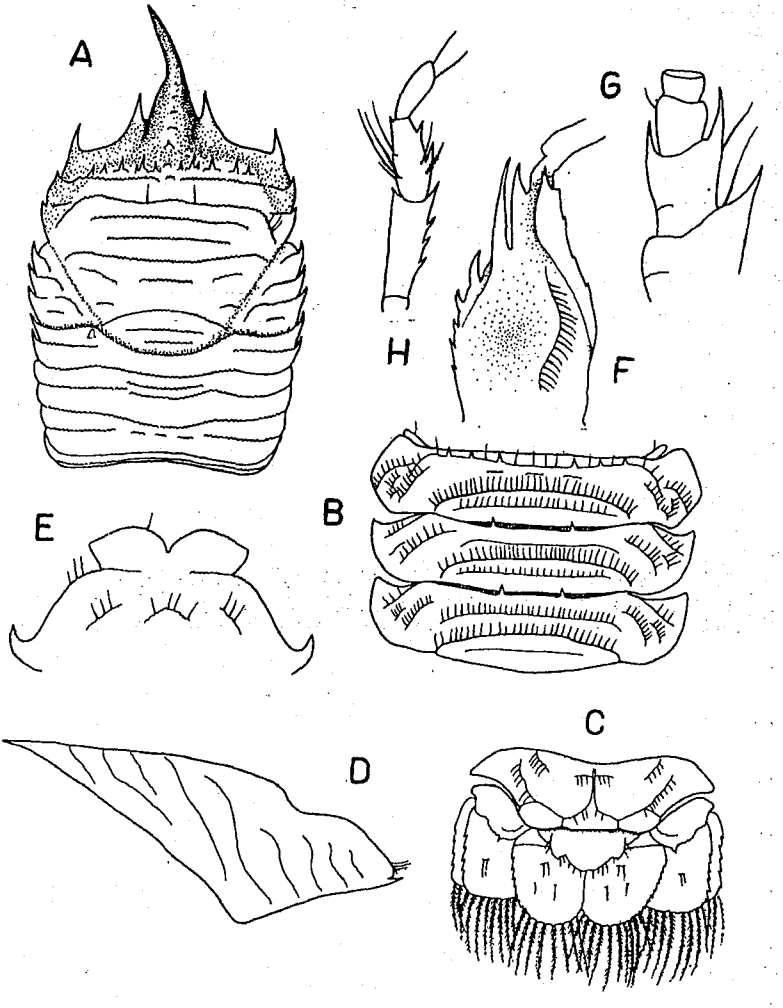

Fig. 55. *Munida babai* Tirmizi & Javed, 1976. A, carapace, dorsal view; B, second to fourth abdominal somites; C, last abdominal somite, telson and uropods, dorsal view; D, right pterygostomian flap; E, anterior part of sternal segments; F, basal segment of left antennule, dorsal view; G, right antennal peduncle, ventral view; H, part of endopod of right third maxilliped, ventral view.

female these spines are wanting. The spinosity of the 2-4 abdominal segments is the same as in the male (holotype). In the small female however, a pair of submedian spines can be seen on the second and third segments only, the fourth one being unarmed. The striae on the abdominal segments are illustrated in figure 55B. The last abdominal somite, telson and uropods (Fig.55C) are lightly sculptured and sparsely setose.

The pterygostomian flap (Fig.55D) differs from that of the male (holotype) in being less hairy.

The third thoracic sternite (Fig.55E) is partially divided by a deep notch, the anterior margin of each half is convex and not triangular as in the male.

The basal segment of the antennule differs only in having fewer spines on the outer margin. The spine on the ventral side, of the distolateral spine (not visible in Fig.55F) can be clearly seen in both the females. The spines on the antennal peduncle (Fig.55G) have not acquired the full size as seen in the adult.

The inner margin of the ischium of the third maxillipied (Fig.55H) is armed with four strong spines whereas the inner margin of the merus is with only two spines, and a small spine distolaterally (Fig. 55H).

Munida babai, differs from all the known species and can easily be identified by the shape of the supraorbital spines, the setation of the eyes and the armature of the antennules and the third maxillipeds. For differences between *Munida babai* and *M.spinulifera* see Tirmizi & Javed 1976, table 3.

Distribution.-

Indo-Pacific: Red Sea, Madagascar, southeast Africa off Natal, south China Sea off Hong Kong, Philippines.

Munida antonbruuni (Tirmizi & Javed, 1980)
(Fig.56)

Phylladiorhynchus antonbruuni Tirmizi & Javed, 1980: 256, fig.1.

Material and Measurements.-

Sta.401C; Cruise 8; Lat.19°51'S; Long.36°21'E; Depth 62M; Date 4-10-1964; 1 female (holotype), cl+r, 2mm; cb, 1.5mm; rl, 0.7mm; chl, 7mm; pl, 1.5mm; fl, 1.5mm.

Descriptive remarks.-

The rostrum is rather broad, long, with distal notch and the basal spines which are not very strong; outer orbital angle is unarmed, the anterolateral spines are fairly well developed, each is followed by six spines. The gastric region is armed with three pairs of small spines, a spine is also present just behind each bifurcation of the cervical triangle. The striation of the carapace is weak, broken and with a few setae here and there. As can be seen (Fig.56A), the carapace is broadest posteriorly. The abdomen is unarmed.

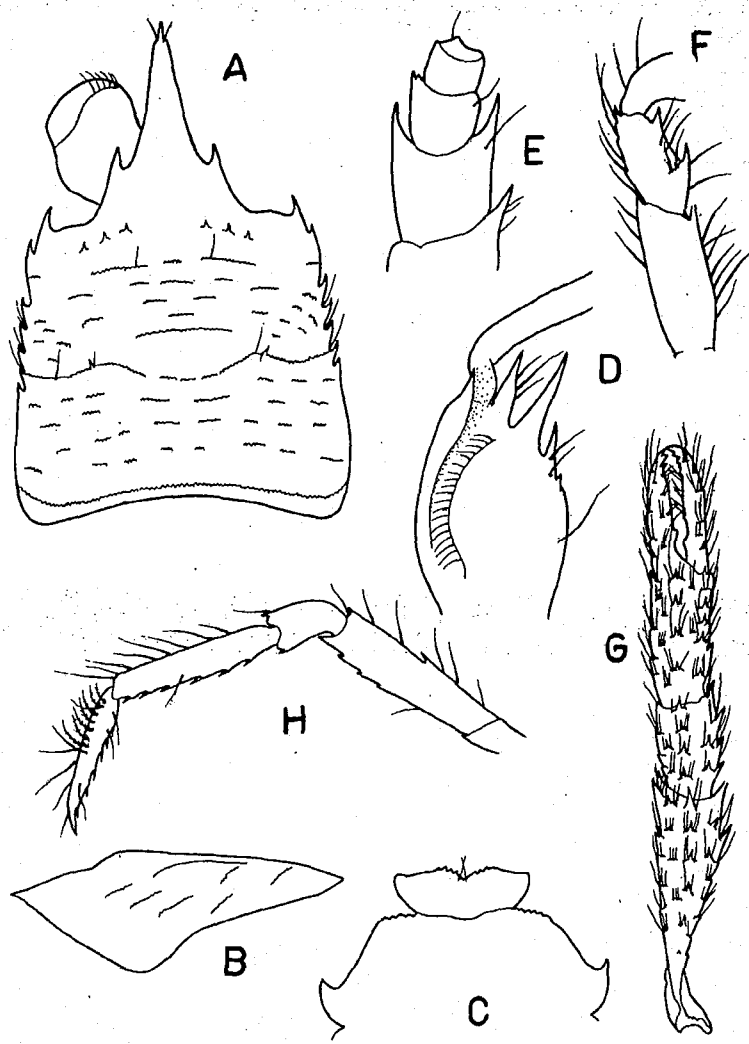

Fig. 56. *Munida antonbruuni* (Tirmizi & Javed, 1980), female (holotype), cl+r, 2mm. A, carapace and left eye, dorsal view; B, left pterygostomian flap; C. anterior part of sternal segments; D, basal segment of right antennule, dorsal view; E, right antennal peduncle, ventral view; F, ischium and merus of right third maxilliped, ventral view; G, left cheliped; H, left detached walking leg.

The pterygostomian flap is wing-shaped and with a few broken striae (Fig.56B).

The third thoracic sternite is somewhat boat-shaped, its anterior margin is notched in the middle and crenulated, the anterolateral angles are acutely rounded (Fig.56C).

The ocular peduncles are stout, the cornea is strip-like and with a few 'lashes' (Fig.56A).

The antennule is armed with a short, sharp, distomedian spine and four spines laterally, of which the proximal one is exceedingly small (Fig.56D). The basal spine of the antennal peduncle is sharply pointed, the distolateral and distomedian angles of the second segment are produced into strong spines directed forwards, of the third segment only the outer distal angle is armed (Fig.56E).

The ischium of the third maxilliped is armed with spines on both the distal angles, the merus is armed with two spines on the inner margin, and the distolateral angle is produced into a small spine, posterior to which the outer margin is serrated (Fig.56F).

The chelipeds (Fig.56G) are more than three times the length of carapace, including the rostrum. They are thorny and setose, the chela is nearly half the length of the entire cheliped (chl, 7mm, chela, 3mm) the palm and fingers are of equal length (pl, 1.5mm, fl, 1.5mm). The walking legs are detached, one of them is illustrated in figure 56H, as can be seen, the outer margin of the dactylus and propodus is armed with movable spines, the distolateral and distomedian angles of the carpus are armed, spines are present on both margins of the merus as illustrated.

Epipods are absent from all the pereopods.

Distribution.-

Indian Ocean: Known only from the Mozambique channel.

Munida sp.
(Fig.57)

Material and Measurements.-

Sta.400C; Cruise 8; Lat.20°30'S; Long.35°43'E; Depth 62M; Date 3-10-1964; 1 female (mutilated).

Remarks on material.-

Single specimen, a female taken from Sta.400C is rather small, and in a very poor condition, it could not stand a detailed study, even a careful handling has left it in a fragmentary condition. Several appendages are missing those which could be studied are illustrated and described below. It is probably a juvenile of one of the several species of *Munida* collected during the expedition.

Descriptive remarks.-

The tip of the rostrum is broken, its surface is concave, the supraorbital spines are pointed. The transverse gastric row consists of three pairs of spines arranged in a somewhat covex row. A spine is present behind each bifurcation of the cervical

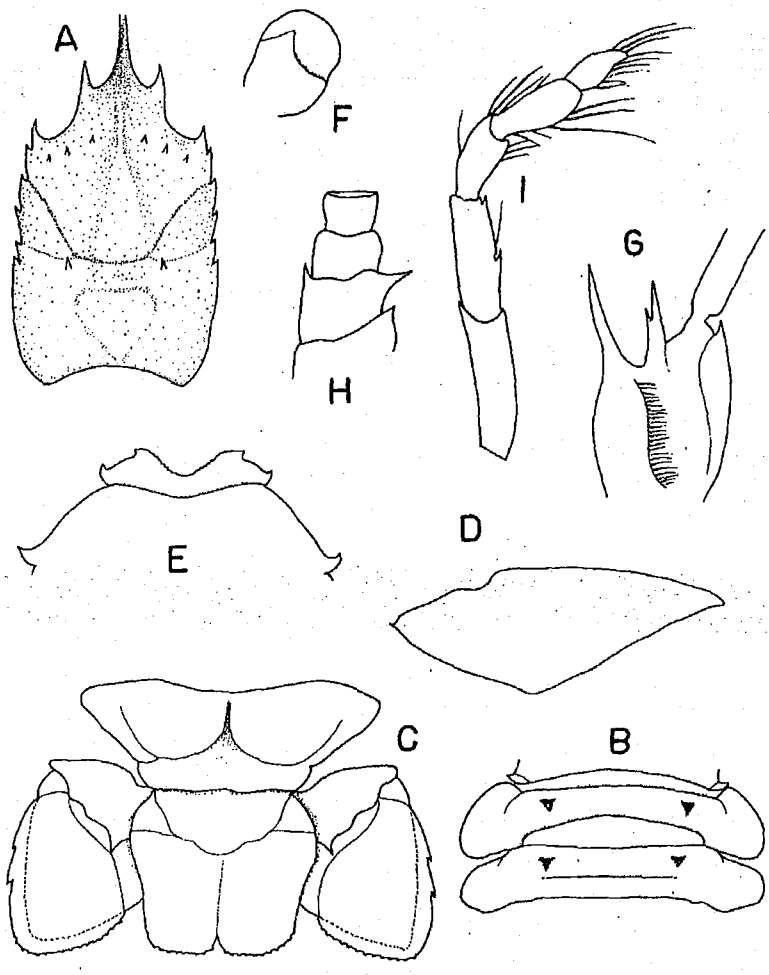

Fig. 57. *Munida* sp., female juvenile, A, carapace, dorsal view; B, second and third abdominal segments, dorsal view; C, last abdominal segment, telson and uropods, dorsal view; D, left pterygostomian flap; E, anterior part of sternal segments; F, right eye, dorsal view; G, absal segment of left antennule, dorsal view; H, right antennal peduncle, ventral view; I, endopod of right third maxilliped, ventral view.

groove (Fig.57A). As far as can be seen, the carapace is destitute of striae and hairs. Each, sharply pointed anterolateral spine is followed by five smaller spines. The second and third abdominal segments are illustrated in figure 57B. There are two grooves on the second, and one on the third abdominal segment. No setae can be seen. A pair of triangular patch of brown colour is present on each of the 2-5 abdominal segments. There is hardly any sculpturing on the last abdominal segment, telson or uropods. The posterior fringe of setae on the telson and uropods is also missing (Fig.57C).

The pterygostomian flap (Fig.57D) is rather broad and with a wide and shallow notch, anteriorly there is a minute spinule (Fig.57D).

The sternite bearing the third maxilliped is narrow and strip-like. As can be seen in figure 57E, the median notch is deep and wide, both the anterolateral and posterolateral angles are produced as short, sharp and slightly curved spines.

The cornea of the eye is as wide as the stalk, the stalk appears to be smooth being without any scales or setae (Fig.57F).

The right antennule is missing that of the left side is illustrated in figure 57G. The distomedian spine is minute, the distolateral one is bifurcated followed by a spine, which is strong and outreaches the others. The distomedian angle of the basal segment of the antennal peduncle is produced as a small acutely pointed process. On the following segment the distolateral spine is small, whereas the distomedian spine is well developed and directed medially (Fig.57H).

The merus of third maxilliped has two very fine spines which can be seen with some difficulty (Fig.57I).

Genus *PARAMUNIDA* Baba, 1988

Rostrum short, triangular, tip spiniform, usually upturned. Carapace covered with spinules or granules, transverse ridges not distinct. Supraocular spines stout and short. Abdominal segment usually with two transverse ridges, spinose. Basal segment of antennal peduncle with greatly produced distomedian spine. Chelipeds and walking legs 'squamate'. Male gonopods only on second abdominal segment (see Baba, 1988).

Type species: *Paramunida setigera* Baba, 1988

KEY TO THE SPECIES OF THE GENUS *PARAMUNIDA* BABA, 1988 (After Baba, 1988)

1. Carapace tricarinate longitudinally with rows of distinct spines ... ...*P.tricarinata*
- Carapace not tricarinate longitudinally... 2

2. Carapace granular and sparsely spinulose... ... ...*P.granulata*
- Carapace densely spinulose dorsally... 3

3. Rostral spine smaller than supraocular spine... 4
- Rostral spine larger than supraocular spine 5

4. Base of rostrum strongly excavated; basal segment of antennule gradually narrowed distally, with 2 more or less reduced terminal spines; without setae at base of carpus of cheliped... ... ...*P.hawaiiensis*
- Base of rostrum moderately excavated; basal segment of antennule narrowed in distal 1/3 of length, with 2 terminal spines; a tuft of setae at base of carpus of cheliped... ... ... *P.setigera*

5. Propodi of walking legs particularly slender, about 20 times as long as wide ... ...*P.longior*
- Propodi of walking legs about 8.5 to 11 times as long as wide 6

6. Carapace with 3 longitudinal rows of spines on posterior half; propodi and dactyli of walking legs relatively thick; distomesial spine of second segment of antennal peduncle not reaching midlength of anterior prolongation of first segment ... ... *P.scabra*
- Carapace with indistinct rows of spines on posterior half of carapace; propodi and dactyli of walking legs relatively slender; distomesial spine of second segment of antennal peduncle overreaching midlength of anterior prolongation of first segment ... ...*P.proxima*

Paramunida scabra (Henderson,1885) (Figs.58-59)

Munida scabra Henderson, 1885,:409; 1888:134,pl.15, figs.4a,b; Yokoya, 1933:63; Yanagita, 1943:30, figs.9,10 a-c; Miyake & Baba, 1967:242, fig.13; Baba, in Baba, Hayashi & Toriyama, 1986:175, 292, fig.125; Miyake, 1982:149, pl.50:fig.2.
Paramunida scabra: Baba, 1988:180.

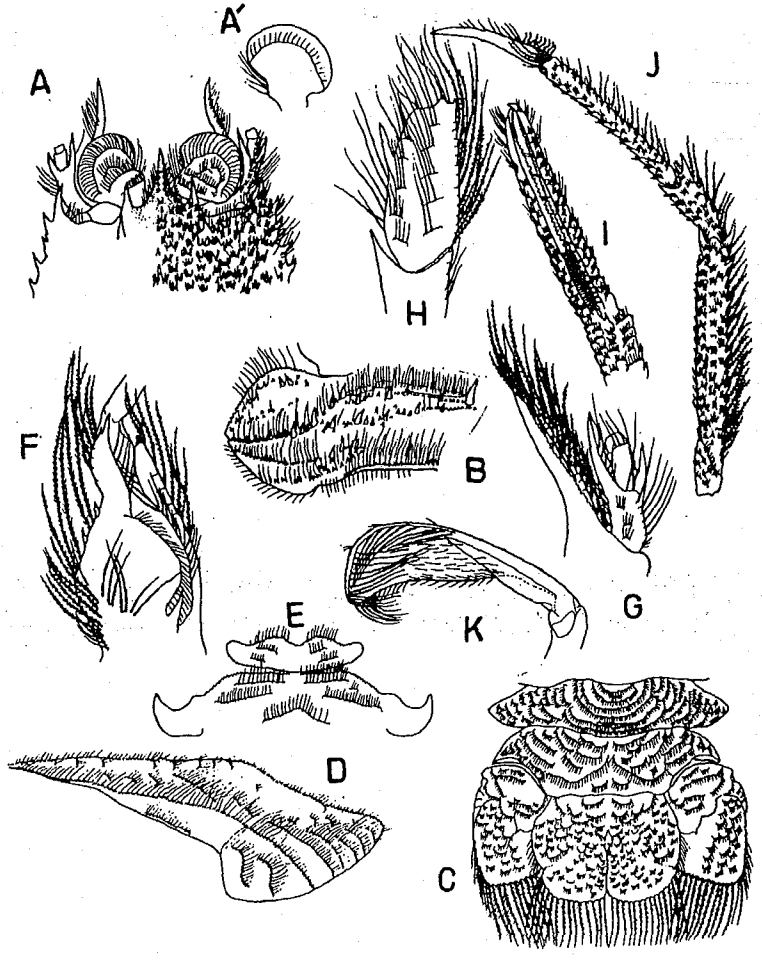

Fig. 58. *Paramunida scabra* (Henderson, 1885) A-D, F-K, male, cl+r, 12.5mm; A, anterior part of carapace, dorsal view; A', left eye, ventral view; B, left half of second abdominal segment, dorsal view; C, last two abdominal segments, telson and uropods, dorsal view; D, right pterygostomian flap; E, anteior part of sternal segments (female, cl+r, 12.5mm); F, basal segment of left antennule, dorsal view; G, left antennal peduncle, ventral view; H, part of ischium and merus of left third maxilliped, ventral view; I, part of left chela; J, detached walking leg; K, right second pleopod.

Material and measurements.-

Sta.9-422; Cruise 9; Lat.06°51'S; Long.39°54'E; Depth 100M; Data 19-11-1964; 18 ovigerous females, cl+r, 11-13.5mm; 1 female, cl+r, 10.5mm (described as a variant).

Sta.370G or 372L; Cruise 7; Lat.24°40'S; Long.35°28'E; or Lat.25°07'S; Long. 34°34'E; Depth 347M or 112M; Date 18-8-1964 or 19-8-1964, 2 females, cl+r, 6.5-7.5mm; 2 females (1 ovigerous), 3 females without carapace.

Sta.22(b)-3; Cruise 1; Date 31-7-1963; 1 male, cl+r, 12.5mm; 8 specimens (4 females) mutilated.

Descriptive remarks.-

A large series of specimens from the Indian Ocean were taken by the "Anton Bruun" for the first time. But for one female, they can be easily diagnosed. As shown in figure 58A, the rostrum is characteristic being short and more or less triangular. The carapace is covered by simple and a few compound, rather slender spines. The adornment of the second abdominal segment is as illustrated in figure 58B. The arrangement of these setigerous striae on the last two abdominal segments has been used as a diagnostic feature (Henderson, 1888:135). It is with some difficulty and after a very careful examination that a 'concentric' arrangement of these striae can be seen (Fig.58C).

The pterygostomian flap (Fig.58D) is long, with granular and heavily setose striae and scales.

The sternum (Fig.58E) is narrow, band-like, its anterior margin has a shallow notch in the middle, on either side of which it is slightly bulging and crenulated, the antero-lateral angles are broadly rounded.

The setation of the ocular peduncle of the dorsal and ventral sides is as illustrated in figures 58A, A'.

The basal segment of the antennule (Fig.58F) has only a few spines on the outer marginwhere as a row of fine submarginal spines (not visible in the figure) are present on the ventral surface of the inner margin, the spine on the distolateral angle is bifurcated. The basal spine of the antennal peduncle (Fig.58G) is twice the combined length of the following segments, the distomedian spine of the second segment extends far beyond the distal margin of the ultimate segment, the lateral spine is nearly as long as the following segment.

The merus of the third maxilliped (Fig.58H) is armed with a strong spine on its inner margin and a minute one distolaterally.

The chelipeds are slender, thorny and covered with setose scales, they measure more than three times the length of the carapace, including rostrum. The fingers (Fig.58I) are slender with inner dentate margins, and are shorter than the palm (fl, 8.5mm, pl, 10.5mm). The walking legs (Fig.58J) are flattened, thorny, furnished with setigerous scales except the dactylus which is long, smooth, pointed and nearly two-third the length of the propodus (dactylus, 6mm; propodus, 9.5mm).

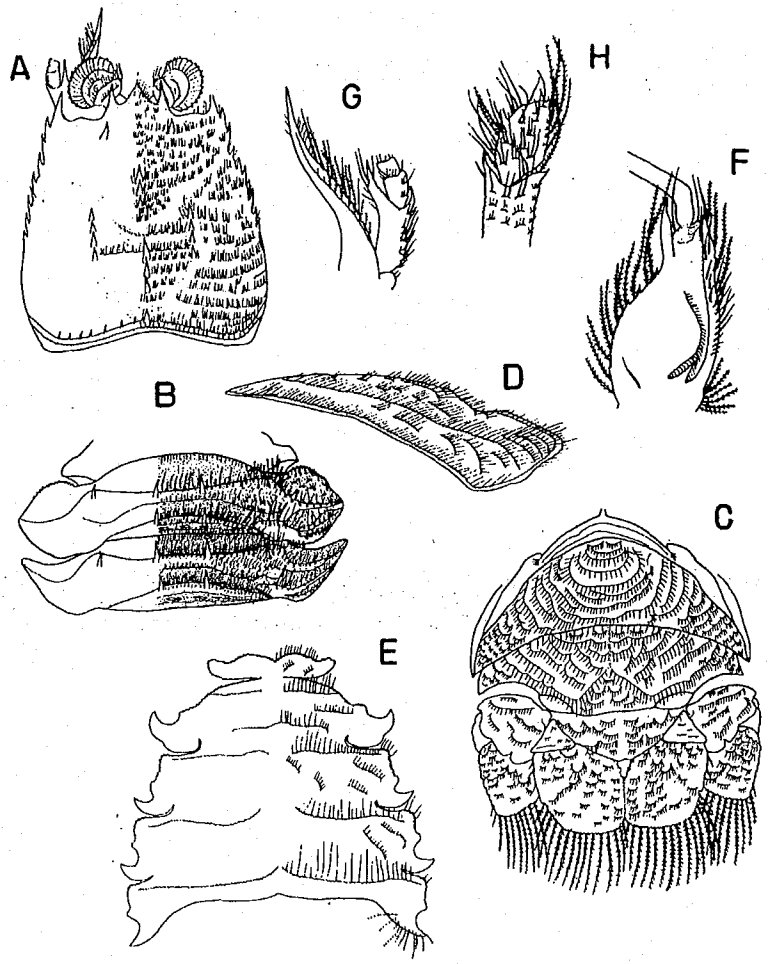

Fig.59. *Paramunida scabra* (Henderson, 1885) female, cl+r, 10.5mm; A, carapace, dorsal view; B, second and third abdominal segments, dorsal view; C, last two abdominal segments, telson and uropods, dorsal view; D, right pterygostomian flap; E, sternal segments; F, basal segment of left antennule, dorsal view; G, left antennal peduncle, ventral view; H, part of ischium and merus of left third maxilliped, ventral view.

Epipods are absent from all the pareopods.

The first pleopod is absent, The second pleopod (Fig.58K) is oar-shaped and setose.

One female (cl+r, 10.5mm) from Sta.9-422, shows several differences and due to a very short rostrum it was first considered as belonging to *P.proxima* (Henderson). Through the kindness of the authorities of the British Museum (Natural History) two specimens of *Munida proxima* have been sent on loan. One of them after selection as lectotype was described by Tirmizi, (1992).

A comparison with *M.proxima* showed that the present specimen does not belong to it. It seems desirable to describe the specimen as a variant of *M.scabra* rather than giving it a new name.

As can be seen (Fig.59A) the rostrum is short, triangular and carinated, it reaches, at most, as far as the tips of the supraorbital spines; the carapace is pubescent and covered with simple and slender spines. The spines on the pleura of second and third abdominal segments are fewer and smaller, it is of interest to note that some of the spines are compound (Fig.59B).

The pterygostomian flap (Fig.59D) is narrower than those of the other specimens of *P. scabra*.

The third thoracic sternite (Fig.59E) is also narrow, the median notch is 'V'-shaped and anterolateral margins are not smoothly rounded.

The basal segment of the antennule (Fig.59F) differs in having a simple distomedian spine, The armature of the antennal peduncle is essentially the same as in the other specimens, however, the spines are slender (Fig.59G).

The third maxilliped (Fig.59H) differs in having a somewhat subquadrate merus and armed distolateral angle of the ischium.

Unfortunately, both the chelipeds and all the walking legs are missing.

Remarks.-

It is clear from the foregoing description that the present specimen differs from the typical *P.scabra* in some characters which are quite significant, but at present, it is described as a variant, because only one specimen is present; furthermore, it is without chelipeds and walking legs. However, it is hoped that in future with more material the correct systematic position will be given to the specimen at hand.

Distribution.-

Indo-Pacific: Kai Islands, the Pacific coasts of Japan from Inubo-Zaki southwards to Miyazaki prefecture, east coast of China Sea, South China Sea, off north-eastern Borneo Philippines Islands and now found in the Indian Ocean.

Paramunida sp.
(Fig.60)

Material and measurements.-

Sta.9-425; Cruise 9; Lat.060°48'S-06°50'S; long 0.39°51'E-039°50'E; Depth; Date 20-11-1964; 1 female, cl+r, 11mm.

Sta.9-422; Cruise 9; Lat.06°51'S; Long 39°54'E; Depth 100M; Date 19-11-1964; 9 ovigerous females, cl+r, 11-13.5mm.

Sta.370G, or 372L; Cruise 7; Lat.24°40'S; Long.35°28'E; or Lat.25°07'S; Long.34°'E; Depth 347M; Date 18-8-1964 or 19-8-1964; 1 male, cl+r, 8.5mm; 1 female, cl+r, 5.5 mm.

Remarks on material.-

The material consists of a single male and eleven females. All the females from Sta.9-422 are ovigerous.

Descriptive remarks.-

This species is readily distinguishable due to the presence of compound spines on its carapace. The specimen illustrated in Fig.60A, is a female from Sta.9-425, measuring 11mm in carapace length, including rostrum. The rostrum is just a little more than one fourth of the carapace and twice the supraorbital spines. Further, the rostrum is acutely pointed and bears a sharp median carina. The armature and sculpturing of the abdominal segments, telson and the uropods are as shown in figure 60A,B. It may however, be pointed out that the spines on the second pleuron are small and numerous. The setose scales on the last two abdominal segments are somewhat differently arranged, not forming concentric rows.

The pterygostomian flap (Fig.60C) shows almost the same pattern of striae as in the previous species.

The third thoracic sternite (Fig.60D) also resembles that of *M.scabra*.

As far as we can see, the setation of the ocular peduncle (Fig.60A & A') is quite similar in both the species (*scabra* & sp.), under consideration.

The basal segment of the antennule is as illustrated in figure 60E. The basal spine of the antennal peduncle (Fig.60F) is strong and more than twice the combined length of the last three segments. The distomedian angle of the second segment is produced into a stout spine which just outreaches the ultimate segment, the outer spine of the same segment extends almost as far as the distal margin of the following segment.

The merus of the third maxilliped (Fig.60G) shows no noticeable differences from that of the species just described.

There are several chelipeds and walking legs in the jars, from which specimens of this species were picked out, along with *P.* sp. were specimens of *M.scabra* and

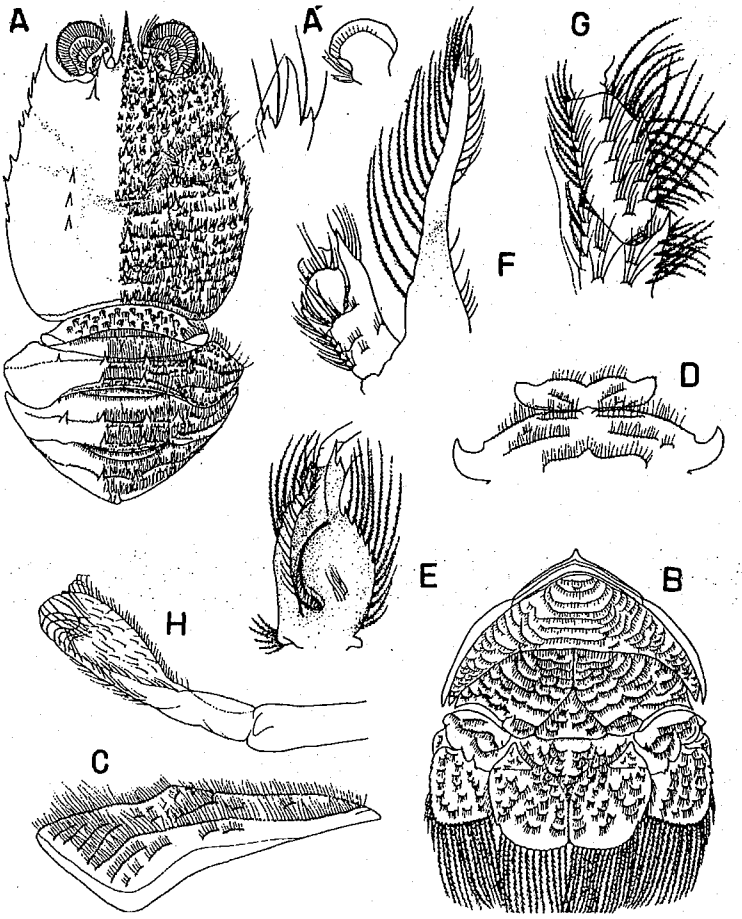

Fig.60. *Paramunida* sp. A-G, female, cl+r, 11mm H, Male, cl+r, 8.8mm, A, carapace and abdomen, dorsal view; A', left eye, ventral view; B, last two abdominal segments, telson and uropods, ventral view; C, left pterygostomian flap; D, anterior part of sternal segments; E, basal segment of right antennule, dorsal view; F, right antennal peduncle, ventral view; G, part of ischium and merus of right third maxilliped, ventral view; H, left second pleopod.

M.japonica as such it is difficult to attribute any one of them to the present species.

Epipods are wanting on all the pereopods.

The single male specimen, is rather small (cl+r, 8.5mm). The pleopod (Fig.60H) shows a close resemblance to that of *P. scabra* except that the setae on the margin are rather short.

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