OCCASIONAL PAPER NO. 117

Records of the Zoological Survey of India

Contribution to the study of Xanthidae : Actaeinae (Decapoda : Crustacea) of India.

MAYA DEB

Zoological Survey of India

RECORDS
OF THE
ZOOLOGICAL SURVEY OF INDIA

OCCASIONAL PAPER No. 117

Contribution to the Study of Xanthidae : Actaeinae (Decapoda : Crustacea) of India

BY

Maya Deb

Zoological Survey of India, Calcutta

Edited by the Director, Zoological Survey of India
1989

Published : June 1989

PRICE : Inland : Rs. 50.00

Foreign : £ 5.00 $ 7.00

PRODUCTION : PUBLICATION UNIT
Zoological Survey of India, Calcutta

Printed in India by Saakhhar Mudran, 4, Deshapran Sasmal Road, Calcutta-33
Produced by the Publication Division and Published by the Director,
Zoological Survey of India, Calcutta.

RECORDS
OF THE
ZOOLOGICAL SURVEY OF INDIA

OCCASIONAL PAPER

No. 117 **1989** **Pages 1-59**

CONTENTS

Introduction

The subfamily Actaeniae comprises of four genera and 44 species from India and more than hundred species from the world. The present day carcinologists have grouped the species, erected few more genera, shifted the species and splitted the groups but the problems of identification have remained as difficult as before. Rather the work has become more complicated at present stage for want of suitable generic and specific keys. Literature are mostly in German and French and are very scattered, not easily available for consultation. In most of the cases the reasons and the characters considered for erection of new species and genera are very vague and insignificant. In majority of cases discussions and remarks given for the new genera are very lengthy and without proper justice shown on the major significant characters. While discussions were made, the age, sex, sizes, number of examples studied, locality, their seasonal variations etc. were not taken into consideration.

The present paper deals with the description of 44 species belonging to this subfamily, keeping in view the above consideration. A key for the species dealt with is suggested for conveniences sake, keeping in mind the textural patterns of the carapace of the small coral crabs, a character, which is more prominent than any other.

Systematic Account

The crabs of the subfamily Actaeinae are either hairless or thickly hairy ; surface of carapace lobular, well outlined into regions and these regions are in turn covered with granules which are microscopic, sharp, pearly, uniform or of different sizes, nodules etc.

Nature of hairs is also variable such as white. yellow, long, silky, short, furlike, velvety, mixed, scattered, bristles, dark, grey or black etc.

Variations are numerous. So while grouping the species of the subfamily the nature of ornamental charaeters are given importance.

The genus *Actaea* and its allied genera are large, comprising mostly the small crabs of variously sculptered carapace, inhabitants mostly of coral reefs and are very rare, difficult to collect, study and identify correctly. Besides very meagre descriptions about the sculpteral patterns of carapace are given by Alcock (1898), most of the species except the new ones were not figured by him.

The following twenty species are added and recorded for the first time in the Indian list of Actaeinae viz. *Actaea amoyensis, A. consobrina, A. hellari, A. lata, A. margaratifera, A. michaelseni, A. obesa, A. orientalis, A. scabra, A. tumulosa, A. variolosa, A. cavipes,* sp 2, sp 3, sp 4, *Banareia baneareias, B.* sp 2, *B. krausii ; Calvactaea tumida ; Paractaea indica, P. garretti, P. sulcata, P. nodosa, P. neospeciosa,* n. sp, *P. typica* n. sp. A complete list of species included in the present communication is as follows :

1. *Actaea alcocki* Laurie
*2. *A. amoyensis* (de Man)
3. *A. areolata* Dana
4. *A. bullifera* Alcock
5. *A. cavipes* (Dana) var. 1
6. *A. cavipes* var. 2
7. *A. cavipes* var. 3
8. *A. cavipes* var. 4
9. *A. calculosa* A. M. Edwards
*10. *A. consobrina* A. M. Edwards
11. *A. depressa* (White)
= purvula (De Haan)
12. *A. echinus* Alcock
13. *A. flosculata* Alcock
14. *A. fossulata* A. M. Edwards
*15. *A. helleri* A. M. Edwards
16. *A. hirsutissima* (Ruppell)
*17. *A. lata* Borradaile
*18. *A. margaritifera* Odhner
*19. *A. michaelseni* Odhner
20. *A. nodulosa* White
*21. *A. obesa* A. M. Edwards
22. *A. peronii* (A. M. Edwards)
23. *A. perspinosa* Borradaile
24. *A. pulchella* A. M. Edwards
25. *A. ruppelli* (Krauss)

*26. *A. ruppelli orientalis* Odhner
27. *A. savignyi* (H. M. Edwards)
*28. *A. scabra* Odhner
29. *A. spinosissima* Borradaile
30. *A. tomentosa* (H. M. Edwards)
*31. *A. tumulosa* Odhner
*32. *A. variolosa* Borradaile
*33. *Banareia banareias* Rathbun
34. *B. armata* A. M. Edwards
*35. *B. kraussi* Heller
*36. B. sp.
*37. *Calvactaea tumida* Ward
38. *Paractaea indica* Deb 1985
*39. *P. garretti* (Rathbum) 1906
*40. *P. sulcata* Stimpson 1860
*41. *P. nodosa* Stimpson
42. *P. rufopunctata* (H. M. Edwards)
43. *P. speciosa* (Dana)
*44. *P. neospeciosa* n. sp.
*45. *P. typica* n. sp.

Family XANTHIDAE Macleay, 1838.

Xanthidae Macleay 1838 : 59 ; Alcock, 1898 : 69 ; Rathbun, 1930 : 233 ; Sakai, 1939 ; 440 ; Odhner 1925 : I ; Barnard 1950 : 198. Sakai 1965 : 14

Sub family Actaeinae Alcock 1898 78, 137
Genus—*Actaea* De Haan 1833

Actaea de Haan 1833 : 18 ; A. M. Edwards 1865 : 259 ; Miers 1886 : 118 ; Alcock 1898 : 137 ; Stebbing, 1905 : 29 ; 1910 : 298 ; Odhner 1925 : 35 ; Rathbun 1930 : 250; Sakai 1939 : 481 ; 1965 : 145 ; Barnard 1950 : 227 ; Guinot 1958 : 87, 1971 : 1070
Actaeodes Dana 1852 : 162, 194 *Banaria* A. M. Edwards 1869 : 168 *Glyptoxanthus* A. M. Edwards ; 1873-81 : 253 ; *Cyclolepas* Ortmann 1894 : 683

Diagnosis Usually a small crab with broad oval carapace, mostly convex antero posteriorly, slightly convex or almost flat from side to

side. Regions and subregions of the carapace are well demarcated by both deep and faint grooves into regional lobules. The lobules are convex and granular. Antero lateral sides of carapace usually divided into 4 lobes these are either shallow, indistinct or very distinct and convex. Postero lateral sides usually short and strongly convergent, sometime concave.

Front usually narrow, obliquely bilobed and deflexed. Upper edge of the orbit tumid, usually with two sutures, a third suture present just below the outer orbital corner.

Antennules obliquely or transversely fold and flagellum lodged in the orbital hiatus. Anterior edge of the merus of external maxilliped slightly oblique.

Chelipeds almost equal or so in both the sexes ; fingers blunt pointed, sometime hollowed out at the tips.

Male abdomen five segmented ; 3, 4, 5, joints fused.

Remarks : Usually a small crab with well marked, lobulated convex regions and the lobules are in turn studded with granules ; front bilobed, deeply cleft, rounded and with equal chelipeds.

The genera of the subfamily Actaeinae has more than 17 species known from India, described by Alcock. In the present work 44 species are reported from coasts of India, Andamans, Sri Lanka, Mergui and other localities, 27 species more than Alcock but much less than 75 species of the world record.

The genus *Actaea* is very easy to identify, the most difficult task is to determine the species, as the shape of carapace, disignes and lobulations, shape, size of the well demarcated regions ; nature, colour, softness of hairs, setae, felt ; size, shape, thickness of disposition of milliary or vesciculus granules on the lobules of carapace are so varied that it is almost difficult to confirm them by mere descriptions only, unless the comparison is being made with photographs. For very small crabs of allied species the chance of confusion is much more. However every effort is being made to confirm correctly and in the present work comparison of the male pleopods of the species when available has been done while considering the other diagnostic characters also. The species recorded for the first time from India

have marked with asterix.

Key to the genera of Indian Actinae

1. Surface of carapace divided into regional lobules, which are usually convex and granular, short fur or bristle like hairs present in most of the crabs, the granules and textural pattern of carapace usually visible ... ***Actaea***
2. Very clean appearance of the textural pattern of the carapace ; grooves and lobules covered with short fur; uniform granules are very clearly visible within the short velvety fur. ... ***Paractaea***
3. Carapace and appendages covered with dense coat of long hairs ; lobules granules etc. Fingers of chelipeds thin, compressed, sharp edged ... ***Banareia***
4. Carapace semicircular ; sharp, microscopic granules, short hairs and faint 'Y' shaped grooves present on the surface. ... ***Calvactaea***

Key to the Indian species of genus Actaea

I Carapace covered with uniform granules/ pits or eroded, or worm eaten in appearance.

Upper edges of leg joints viz. propodus and dactylus adorned with one or two crested, trough like cavities—

1. Surface eroded with pits ; 3M, divided ... ***cavipes* 1**
2. Surface not clearly eroded or markedly granular, 3M, divided ; outer surfaces of wrists and hands eroded ... ***cavipes* 2**
3. Surface minutely granular, 3M, divided, outer surfaces of wrists and hands eroded ... ***cavipes* 3**
4. Surface granules minute, indistinct ; outer surfaces of wrists and hands dimpled, not eroded or pitted ... ***cavipes* 4**
5. Surface granular, 3M, not divided ... ***fossulata***

II Carapace covered with hairs and minute granules of almost same size ; regional

lobules not well demarcated by shallow, broad grooves.

a) Broadly oval, convex, carapace. ... *amoyensis*
b). Hexagonal, convex carapace. ... *alcocki*
c). Hexagonal, flat carapace, anterolateral sides parallel ... *obesa*

III Carapace flatish, oval, or pentagonal, in shape, regional lobules well demarcated by narrow, deep, grooves ; surface granules small not uniform in size—

a) Carapace pentagonal, flat ... *depressa*
b) Carapace broadly oval, not quite flat ... *scabra*

IV Carapace covered with isolated tubercles, nodules, or spines or by mixed types; hairs almost absent—

a) Pearly tubercles of various sizes ... *nodulosa*
b) Pearly tubercles of almost uniform sizes ... *bullifera*
c) Spine like tubercles, blunt tipped ... *echinus*
d) Long spines, sharp tipped ... *perspinosa*
e) Petaloid, flat topped, kidney shaped tubercles ... *flosculata*
f) Pin head like, stalked tubercles *peronii*
g) Petaloid tubercles in middle, spines near edges and on les joints. ... *Spinosissima*

4. Carapace closely covered with uniform, confluent, tubercles.

a) Tubercles smooth, legs not spiny ... *Calculosa*
b) Tubercles rough, legs often spiny ... *Savingnyi*

5. Carapace well lobulated and grooves narrow, covered with hairs. Surface of lobules uniformly granular, hairy, Sculptural pattern very distinctly demarcated—

a) Dark brown, valvety crab, granules pearly, only 2 M divided into two. .. *tomentosa*
b) Hairs, stiff, bristle like, dark ; both 2M and 3 M divided. ... *hirsutissima*
c) Hairs stiff, yellowish, granules minute, cardiac region subcircular ... *ruppelli*
d) Like *rupelli* ; granules lesser and larger, clusters of long bristles disposed symmetrically on the surface, cardiac lobe indistinct. ... *orientalis*

e) Lobules many, indistinct, 3M like inverted T ; 2M divided into three lobule. ... *areolata*

f) Small, hairy, thick crab ; lobules distinct only medially, indistinct on branchial regions, 2M divided ; cardiac region subcircular, granules fine, microscopic ... *variolosa*

g) Entire surface clearly demarcated by distinct, hairy, grooves ; cardiac region indistincly heart shaped, otherwise like variolosa ... *lata*

h) Small subcircular crab, lobules many, very convex, covered with pearly granules and scanty hairs. ... *tumulosa*

6. Carapace almost bare in look, lobules distinct, or indistinct posteriorly. Granules small/microscopic and are of different sizes or of uniform sizes—

a) All the lobules convex, distinct, 2M divided ; 3M divided into three lobules. ... *consobrina*

b) Lobules indistinct posteriorly, granules scattered, less in number and prominent in sizes ; anterolateral sides granular only. ... *helleri*

c) Lobules distinct, granules scattered, shape of crab less broader than *michaelseni* ... *pulchella*

d) Lobules very distinct medially, less so on branchial regions ; broad, oval shaped carapace. ... *michaelseni*

Actaea alcocki Laurie
(Pl. I, 1 Text fig.)

Actaea alcocki Laurie 1906 : 403 ; Odhner 1925 : 43, Guinot 1969 : 234 Material not seen, it is not present in Z. S. I. collection ; reported by the author from Gulf of Manaar ;

Male measuring W—24.8 mm. ; L—16.5 mm. Gulf of Manaar.

Medium sized crab, with broad, hexagonal, moderately convex carapace. The body and appendages covered with short fur which does not conceal the lobulation and sharp, crisp, fine granulations. Regional lobules on the anterior two third of carapace are well outlined by shallow grooves. Lobules 1M ; divided 2M, 1L—6L

all are faintly and shallowly outlined. Four lobes on anterolateral edge, bluntly pointed, granular, first one obsolent last one smallest. Front narrow, bilobed, vertically deflexed, outer corner produced vertically downwards to form a tooth. Chelipeds equal, small, narrow, arm smooth, lower edge granular. Upper and lower borders and outer surfaces of hands and wrists crisply granular. The granules on palm are larger and are arranged in longitudinal rows on the lower half. Fingers grooved, tips pointed, base of dactylus rough and the dactylus abruptly curved downward almost at right angle,

Yellowish in colour with a circular brown patch on the gastric region, fingers dark brown in colour.

Remarks : The species can very well be differentiate from its nearest alley *A. amoyensis* and *A. obesa* by its broad, hexagonal shape of carapace and angularly curved antero-lateral sides which are little divergent posteriorly. Lobular pattern of carapace with its fine, sharp nature of granules, presence of fur and by the presence of grooved palms and curved fingers, and by the circular, brown patch on gastric region of carapace, all the above mentioned characters are unusual for other species.

Dist.—Recorded so far from type locality only.

Actaea amoyensis (De Man)
(pl. I, 2 T fig. 1a-b)

Atergatopsis amoyensis De Man, 1879 : 53
Actaea Obesa A. M. Edw. 1865 : 272 ; Alcock 1898 : 145
Carpilodes margaritatus Lanchester 1900 : 731
Actaea amoyensis, Odhner 1925 : 42.

Examined several specimens from Andamans, Bombay, Mergui

Archipelago ; W—22 mm. L—15 mm.

Diagnosis : Carapace broadly oval, front along with antero-lateral edges forms strongly convex arch ; postero-lateral borders strongly convergent ; surface without long hairs. Lobulation on the anterior two thirds of carapace distinguishable, but faint owing to the presence of fine grooves which are seperating them, and absent in posterior third. The entire surface of the carapace, grooves, as well as lobules, covered with minute, sharp and crisp granules, which are larger in the middle of the branchial regions. First of the four antero lateral lobe is shallow. Chelipeds and legs are crisply granular as in carapace, but

the carapal and propodal joints show no dimples. Anterior male pleopod narrow, curved, with actuely pointed apex which is strongly curved outward ; inner sub-apical region adorned with 7-9 long setae followed by three claw like spines, outer side of this region armed with rows of spinules.

Remarks—The specimens which Alcock doubtfully described as *Actaea obesa* are actually *A, amoyensis*. Odhner's (1925) plate 3, fig. 3, of *A. amoyensis* shows it clearly that the surface texture of *A. amoyensis* is different from *A. obesa* in having a distinct, convex, lobular pattern of carapace, the nature of granules ; and very long, strongly convex contour of anterior edge of the crab which are quite distinctive for the species.

Distribution—Andamans, Bombay, Singapore, Mergui, Formosa, Malacca Straits, China, etc.

Actaea areolata Dena

1(pl. VII, 1, T fig. 2a-b)

Actaea areolata Dana 1852 : 73 ; A.M. Edw. 1865 : 264 ; 1880 : 54 ; Miers, 1880 : 209 ; De Man 1887-88 : 25 ; Alcock 1898 : 141 ; Odhner 1925 : 65 ; Sakai 1939 : 487 ;

Actaeodes arelatus, Guinot 1971 : 1072 ; Sakai 1976 : 449. ; Serene 1984 : 133

Material examined, 4 exs are from Mergui Archipelago

W—20 mm, L—13 mm.

Diagnosis—Carapace broadly oval, entire dorsal surface of carapace distictly divided by deep, wide, grooves into numerous, regional lobules ; small uniform granules and thin, short, light coloured fur covered the lobules of carapace, chelipeds and legs.

Regional lobules 1 F, 2 F, 1 M all are very distinct ; 2 M entirely divided longitudinally by one groove and partly by another groove. 3 M is like inverted 'T', divided into three lobules ; 4 M, 1 L—6 L, all the lobules are very distinct. Chelipeds with upper outer surfaces of hands and wrists nodular ; 3—4 lines of granules are very distinct on the lower outer surface of hands. Fingers are long, pointed.

Anterior male pleoped curved near the base, straight apically, apex spooned, inner sub apical region adorned with 12—15 long setae ; followed by spinules all over the process.

Remarks—Less confusing because of its distinct textural pattern

of lobulations and granulations present on the carapace and appendages. Its anterior male pleopod is also dissimilar to other species.

Distribution—Mergui, Singapore, Gulf of Siam, Australia, Queensland and Japan.

Actaea bullifera Alcock

(pl. IV, 1)

Actaea nodulosa var. *bullifera* Alcock, 1898 : 149.
Actaea margaritifera var. *bullifera*, Odhner 1925 : 48 ; Guinot 1958 ; 89.

Seen one female from Andamans, collected by J. Wood Mason, measuring, W—14·5 mm, L—10 mm.

Diagnosis—A small crab of the subcircular carapace, 2/3 as long as wide, moderately convex in both the directions and almost free from surface hairs. Whole of the carapace is subdivided into small, convex, regional lobules by deep, smooth, well cut grooves. These lobules are studded with pearly, isolated, smooth granules of nicely uniform and regular sizes. The lobules 1 M ; divided 2 M, 3 M, 4 M, 1 P, 2L—6 L and two unbroken parallel granular lines on the posterior margin of carapace are very clear cut and distinctive in nature.

The front is deflexed, biolobed, free edge finely beaded and convex near the centre, median notch V shaped. Lower orbital border markedly and evenly beaded ; two sutures present on supra and one sature on infra orbital borders. Antero-lateral sides of carapace four lobed, exclusive of outer orbital angle, each lobe finely beaded. Postero-lateral sides short, distinctly concave.

The exposed surfaces of chelipeds and legs are closely, crisply granular, these granules are either pearl like or tubercular and those on anterior edges of leg joints are being spine like. The granules on lower outer surfaces of hands are arranged in longitudinal lines ; wrists and corresponding joints of legs are lobular or dimpled.

Few, scanty hairs present on inner side of dactylus of legs. Cheliped fingers with lines of tubercles present on proximal ends, their cutting edges are evently dentate, with pointed tips and white colour.

Remarks—The new var. *bullifera* Alcock is represented by a single female, type, specimen from Andaman, and Alcock designated it as a variety, named it as *A. nodulesa* var, *bullifera*. Odhner 1925 designate

the same as *A. margaritifera* var. *bullifera.* I think the subsecific name *bullifera* is distinctive enough to be introduced, and raised into species status. Male absent and its anterior pleopod cannot be studied and compared with the *nodulosa* from Sri Lanka and with Guinot's (1958) fig. 15a—b. As Alcock's *nodulosa* specimens are not same as *margaritifera* of Odhner & Guinot, hence the subspecific name *bullifera* cannot be assigned to the *margaritifera.*

Here the status of variety *bullifera* is raised to specific level as it is very distinct and different from *nodulosa* specimens.

Actaea claculosa A.M. Edw.
(Pl. III, 8 T fig. 4a-b)

Cancer calculosa A. M. Edwards 1869 : 168
Actaea calculosa, A.M. Edw. 1865 : 276 ; Alcock 1898 : 152 ; Laurie 1906 : 404 ; Rathbun 1910 : 351 ; Odhner 1925 : 52 ; Sakai 1939 : 486 ; Stephensen 1947 : 153 ;Guinot 1967 : 555, 559 ; 1971 : 1071 ; Sakai 1976 : 445 ; Serene 1984 : 111

Examined several specimens from Sri Lanka and few from Port Okha ; W – 10 mm. L—8 mm. *Diagnosis*—Medium sized crab with subcircular, convex carapace, the lobules are much distinctly delimited by smooth, wide, shallow grooves. The granules on the carapace and chelipeds are smooth and confluent with each other intimately. Lobulations of carapace is distinct and the lobules 1 M ; partially divided 2 M ; 3 M ; 1 L, 2 L, 3 L, 5 L and 6 L, 1 P and distincly separated 2 P all the lobules outlined and are so well distinguishable that there is no chance for confusion, or mistake.

Lobules on the anterolateral sides of carapace are distinct, rounded and four in number,

Chelipeds massive, its outer surfaces thickly studded with confluent tubercles and three rows of well marked tubercles present on the lower, outer half of palm. The tubercles on the legs are sharper, like spines. Fingers deep brown ; tips white and obtusely pointed, and spooned. A cluster of plumose setae fringed the inner subapical area of male anterior pleopods, outer and lower subapical regions armed with spinules on all sides.

Remarks : Whole of the carapace is well sculptured with smooth, deep, satures and shallow, wide, grooves and the regional lobules are distinctly demarcated. The granules on the carapace and chelipeds are more smooth and confluent with each other. An expert eye will not

confuse to separate A. *calculosa* from A. *savignyi* (M. Edw) an allied species, and their photographs are distinguishable at a glance.

Distribution : Gulf of Manner ; Sri Lanka, Port Okha, Karachi, Persian gulf ; Mergui, Gulf of Siam ; China Sea ; Japan, Tahiti, Sunda Strait, Australia.

Actaea consobrina A.M. Edw.
(pl. III, 7)

Actaea consobrina A.M. Edwards 1873 : 79 ; Odhner 1925 : 67 ; Sakai 1939 : 491 ;
Actaeoides consobrina, Guinot 1971 : 1072 ; Sakai 1976 : 448 ; Serene 1984 : 135,

Seen one male from coral reefs of Laccadives, W—7 mm, L—5 mm.

Diagnosis : Small crab, with almost no hairs present on dorsal surface. Carapace broadly oval, the lobules of the entire carapace are convex, prominent, well separated by deep, smooth grooves, all the lobules including 4M are very clear and the lobule 4M is distinctly isolated. Front broad, median sinus V shaped and deep. The four anterolateral lobes are distinct, last three lobes rounded and convex, first one shallow, continuous with the outer orbital angle. The lobules on the palms and wrists of hands are not very distinctly defined as on the carapace. Fingers are dark brown in colour with pointed, white tips. Leg joints covered with very fine, granules. In freshly preserved specimens carapace adorned with dark, brown, longitudinal bands. The median band is distinctly U shaped in its anterior half and roughly Y shaped in form. The coloured bands on chelipeds and legs are fainter than on the carapace.

Remarks ; The species is very near to A. *tumulosa*, but the carapace is broader, transeversely oval in shape ; lobules of the carapace are not so markedly convex as in *A. tumulosa* species. The median, frontal sinus is more deeper and wider than that of *A. tumulosa*. The textural pattern and their geographical dimentions separates the species very clearly from each other

Distribution : First time from Laccadives (India), Japan, Bonin Isla. Marshal Is, Gilbert Is, Ellice Is, Samoa and Marquesas Is.

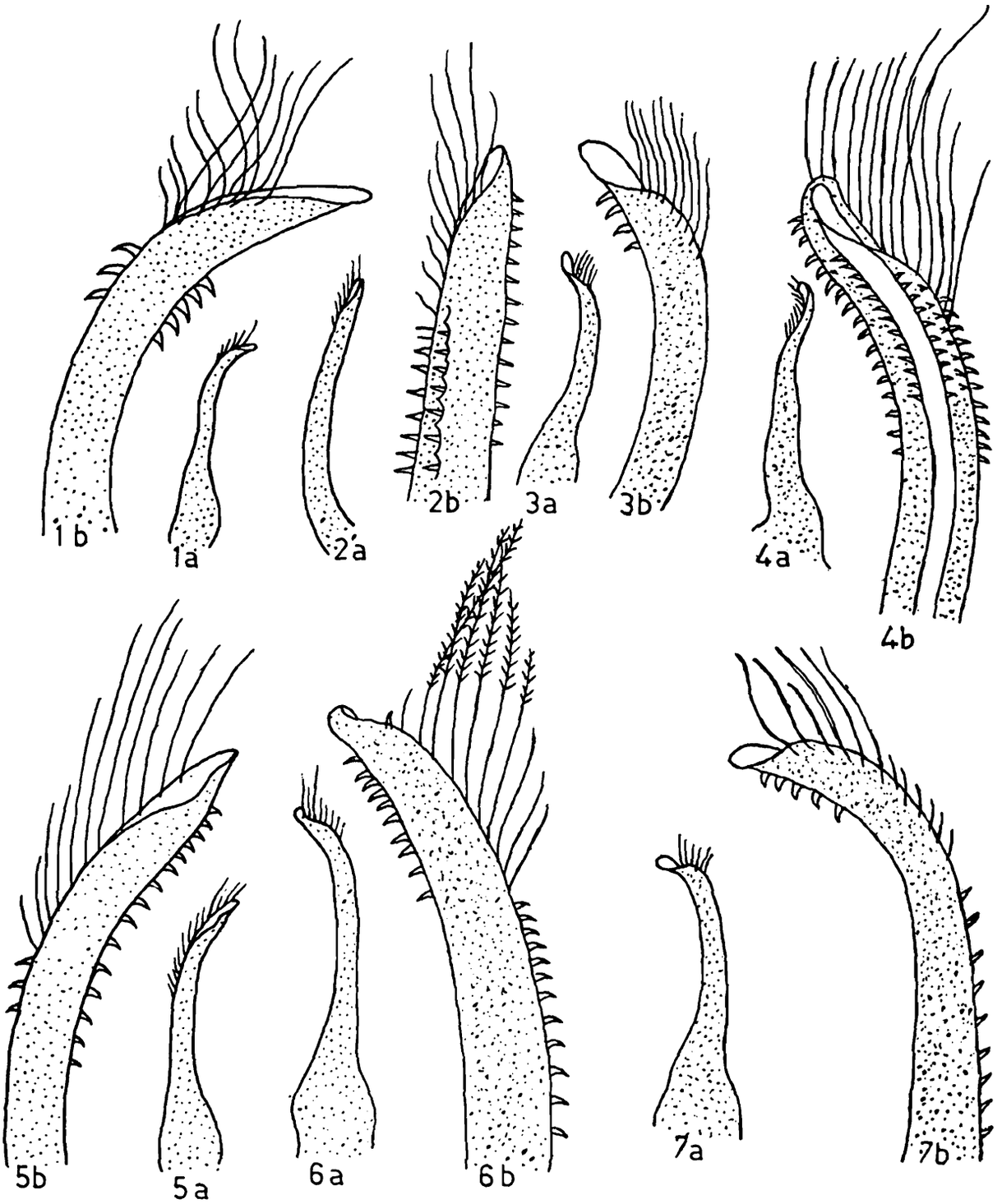
Actaea cavipes (Dana)
(pl. III, 3-5 T fig. 3a-b)

Actaeodes cavipes Dana 1852 : 78 ; Guinot 1971 : 1072
Actaea cavipes, A. M. Edwarda 1865 : 280 ; 1873 : 193 ; Alcock 1898 : 147 ; Odhner 1925 : 68 ; Sakai 1939 : 492 ; Stephensen ; 947 : 151 ; Barnard 1950 : 229; Sankarankutty 1962 : 132 :
Psaremis cavipes Serene 1984 : 129

Lipaestherius cavipes Guinot 1972 : 1072 ; Sakai 1976 : 447 ;

Seen three female specimens from Andamans and one female from Pearl Bank. Width—17 mm ; Length—10·5 mm.

Diagnosis : Carapace broad, three fifth as long as wide, roughly hexagonal in shape. Anterior two thirds of carapace completely lobulated, the regional lobules are separated by distinct, broad, shallow grooves. Lobules 1 M and divided 2 M ; 3 M ; 4 M ; 1L—6 L all



1a. *Actaea amoyensis* (de Man) ; b, same apex enlarged 2a. *A. areolata* (Dana) ; b. same apex enlarged 3a. *A. cavipes* Dana, b. same apex enlarged 4a. *A. calculosa* Edw., b. same enlarged apex 5a. *A. depressa* (White) b. same enlarged apex 6a. *A. echinus* Alcock b. same enlarged apex. 7a. *A. fossulata* Edw. b. same enlarged apex

these are distinctly demarcated. Anterolateral sides four lobed, posterolateral sides concave and shorter than the anterolateral. The lobules of the carapace covered with microscopic granules and pits. This pits are not present in all the specimens preserved in the collections. Chelipeds equal, upper and outer surfaces of wrists and palms covered with craters and pits. Fingers are light brown in colour, long and pointed at tips. Leg joints stout, anterior edges of carpus and propodus of legs adorned with one, crested, distinct, trough like cavity, posterior rim of this trough is most distinctly demarcated as sharp, white rim. Anterior male pleopod is a curved process, apex narrow, cleft in the middle and directed outwards. Outer subterminal region armed with a number of small spinules, the inner side of same region is bushy, with long simple setae.

Remarks : The lobular textural pattern of *A. cavipes* (Dana) is very specis specific and cannot be mistaken for *A. fossulata* a nearest ally of the former. The attached photographs of both the speciea shows clearly the different lobular textural pattern of their carapaces, which are of fine different pattern. These were described designated here as *cavipes* var. 1, *cavipes* var. 2, var. 3, var. 4, and *fossulata* in the plate III, figs. 1—5 for the present.

Distribution : Andamans, Laccadives, Aden, Persian Gulf, Mekran coast, Upolu, Mauritius, Madagascar, Europe, Tor, New Guinea, Florida, New Caledonia, Salmon Island and Japan.

Actaea cavipes var. 1.
(Pl. III, fig. 3)

Seen three females from Port Blair, Andamans, largest one measuring 15 mm in width 10 mm in length, Z.S.I. Regd. No. C5691/1 ; one female from Pearl Bank, 12 miles from Tuticorin, Regd. No. C5697/1

Diagnosis : Carapace is broad, octogonal in shape, almost flat on posterior two thirds and from side to side but convex before backwards on anterior third only. The entire upper surface of carapace is covered with large pits which are very clear in the photograph. The regional lobules are well demarcated anteriorly and medially but indistinct in other areas. Antero lateral sides of carapace is very convex, long tubercular or indistinctly four lobed. Postero lateral sides shorter than the antero lateral and it is horizontal in most of its length and then curved. The mesogastric area ie 3M is very clearly divided into three

lobules. Outer surfaces of wrists and hands are markedly pitted and eroded.

Remarks : Beside the above mentioned characters other details are common in all the four (or six) varieties of *A. cavipes.*

Actaea cavipes var. 2.
(Pl. III fig. 5)

Seen one specimen from Loc. ?

Diagnosis : Shape of carapace roughly octogonal, surface is rough uneven but without pits, craters and granules. Mesogastric area is divided into three lobules. First antero lateral tooth indistinct, low ; last three teeth are in straight line ; postero lateral sides of carapace is like var. 1. Outer surfaces of wrists and hands are eroded with pits and craters of different sizes.

Remarks : Absence of surface pits, craters and granules, its rough unclean appearance separate this var. 2 from others ; rest of the characters are same as in others.

Actaea cavipes var. 3.
(Pl. III fig. 4)

Seen two males from Persian Gulf, Regd. Nos. 3988-89/3 and one female from Port Blair, 1930 collection, measuring 13 mm in width, 8 mm in length : Z.S.I. Regd. No. C5698/1.

Diagnosis : Carapace broadly oval in shape and very convex in both the directions. Regional lobules are distinctly outlined, convex and covered with minute granules which are not very closely and uniformly arranged. The outline of mesogastric area, i.e. 3M is different from the var. 1 and 2. and from *A. fossulata* and 3M is divided indistinctly into 3 lobules. First antero lateral tooth low indistinct and last three teeth are neither uniform nor regular. Postero lateral sides of carapace are not horizontal but convergent. Outer surfaces of wrists and hands are covered with large pits and craters.

Remarks : The shape of carapace, its distinct lobular textural pattern, small surface granules, nature of antero lateral teeth of the carapace etc. are unlike the other allied varieties of *A. carvipes.*

Actaea cavipes var. 4.
(PI. III fig. 2)

Seen 3 males from Rotuma, Cantab Museum ex. measuring 10 mm in with and 6 mm in length.

Diagnosis : Carapace broadly oval to octogonal in shape, Flat on posterior two thirds and slightly convex on anterior one third. Regional lobules are well outlined, surface of these regional, flat lobules are rough not clearly granular. Mesogastric area is not divided and its outline is different from the other varieties of *A. cavipes*. Upper outer surfaces of the wrists and hands are uneven, dimpled but not adorned with pits and craters like the other varieties. Major portion of the lower outer area of chelaepeds of mature males are deep brown in colour and granular. Its anterior male pleopod structure is also slightly different from the other *cavipes*.

Remarks Absence of pits and craters on carapace and appendages the undivided 3M, its shape, indistinct surface texture, presence of large brown, triangular patch on the lower outer sides of palms separate the variety 4 from others.

Actaea fossulata A. M. Edw.

(Pl. III, Text fig. 7a—b)

Cancer fossulatus Giard 1859 : 149

Actaea schmarde Heller 1861 : 6

Actaea fossulata, A. M. Edw., 1865, Alcock 1898 : 148 ; Odhner 1925 : 68 ; seen one male from upole, measuring 8 mm in width 6 mm in length and examined two exs. from Andamans. males only.

Diagnosis : Carapace octagonal, broad, almost same as in *A. cavipes* ; lobules convex, distinctly demarcated, covered thickly with minute granules of equal sizes, in between them, deep cavities present specially on branchial regions and on the grooves.

The lobules 1M, 2M, divided 3M ; 4M, 1P specially the last two are distinctly demarcated by the deep grooves.

The presence of pits and craters gives the carapace a worm eaten appearance. First of the four antero lateral lobe is indistinct, low and shallow.

The upper borders of the hands bluntly crested and the outer sides of hands and wrists are pitted, rather than eroded. Upper borders of the carpus and propodus of legs adorned with two, small, cup like cavities or troughs. Minute granules present on the upper surfaces of leg joints, maxillipeds, sternum and on abdomen. Dark

brown colour of fingers extend upto 2/3 of the lower border of palm and it is like a triangular patch, still exists in the specimens preserved for long time in spirit, anterior male pleopod is slightly different from *A. cavipes.*

Remarks Odhner 1925 and Sakai 1939 have synonymised *A. cavipes* and *A. fossulata* ; they might have not seen the specimens of the later species. My opinion is that Alcock was correct, because a lot of twenty specimens including Alcock's (1898) are before me and I think they can be divided into three-four or five groupes or species rather than only two species retained by Alcock, as the lobular and textural pattern of these specimens are distinctly different from one another and it is clear enough from their attached photographs. A series of specimens were examined by me including the Alcock's (1898) specimens and I feel Odhner (1925) and Sakai (1939) were incorrect in synominising both the species because there are some remarkable differences instead of their apparent similarity of shape of carapace and textural pattern. One group of specimens are small in size with few scattered punctae present on the carapace and only one crested trough present on the anterior edges of carpus and propodus of legs. While the other groups are of medium sized, surface of carapace well marked with deep, scattered pits and craters which are much more in number than in the former group and the trough on carpus and propodus of their legs are only one.

A third group of specimens are there, with their medium sized carapace, thickly pitted and eroded surface which gives it worm eaten appearance. Upper edges of carpus and propodus of legs are adorned with two, small, troughs instead of one in the former.

A fourth variety is also present which is different from the other three types in its surface pattern of their carapace.

Distributon : Great Coco I., Andamans ; Madagascar, Mauritius, Gulf of Aden, Djeddah, New Guinea, New Caledonia.

Actaea depressa (White)
(Pl. II, 3. Text fig. 5a-b)

Xantho depressa White 1847 : 225
Actaea purvula de Man 1887 : 27 ; Alcock 1898 : 146
Actaea depressa, Odhner 1925 : 38 ; Balss 1934 : 136 ; Sakai 1939 : 483 ; 1965 : 147 ; Barnard 1950 : 229 ; Sakai 1976 : 446
Forestia depressa Serene 1984 : 106

Material Examined are one male and three females specimens from Andamans, W-34 mm L-25mm.

Diagnosis : Carapace 2/3 as long as broad, medium in size, somewhat pentagonal in shape, perfectly flat and quite devoid of lobulations on posterior third. The anterior third of carapace is markedly convex and well lobulated, divided by deep, smooth, broad grooves. Whole surface is covered with small vesiculus granules which become very small posteriorly, and with soft, brown, short felt of hairs. Lobule 1 M continuous with partly divided 2M ; 3M ; 1L, 2L, 3L, 5L and 6L distinctly outlined. Antero-lateral sides divided into four, granular lobes, postero-lateral sides straightingly convergent. Chelipeds markedly unequal in large adult male ; upper outer surfaces of wrists and hands covered with pearly granules and felt, fingers pointed at tips. Felt on exposed parts of leg joints conceals the sharply granular sculpture. Last pair of legs rather short.

Anterior male pleopod obtuse and spooned apically. A cluster of long setae present on inner sub-apical area and the adjoining regions armed with thickly set spinules all over.

Remarks The specific name of the crab is quite appropriate and it seems that, de Man 1887 ; Alcock 1898 ; Sakai 1939, 1965 were unaweare about the presence of *Xantho depressa* White. Odhner examined (1925) the Indian specimens of *A. purvula,* studied and designated by Alock and confirmed it as *A. depressa* and separate one specimen of Alcock, from Mergui and labelled it as *A. plana.* But while describing the same *A. plana* specimen, he redesignate it as *A. scabra,* and the species is included into the present paper as *A. scabra.*

Distribution : Andamans, Mergui. Philippine, Bonnin Island, Philippines, Japan.

Actaea echinus Alcock

(pl. IV, 3 Text fig. 6a-b)

Actaea echinus Alcock 1898, 149 ; Sakai 1965 : 40 ; 1976 : 444.
Actaea nodulosa Var, *echinus,* Odhner 1925 : 57.

Material : Examined one male and one female from Malabar coast, West Coast at Karwar Dist. Oyster Rock of India, W-42 mm, L-37mm, Z. S. I. Regd. No. C 1974/2. for Paratype male.

A large male twice the size of Type specimen of Alcock, is the second record from type locality is before me, which helps me to express clearly and firmly that it is not a variety of *A. nodulosa* for the following distinctive chatacters. Carapace of the crab is broadly oval in shape, moderately convex anteriorly and almost flat postriorly. Regional lobules flat, distinctly demarcated by broad, smooth, grooves, each lobule covered with several, long, prominent, blunt pointed nodules. Four, large, spines with few smaller spinules in between them are present on the antero lateral sides of carapace. Three large spines present on upper edge of palm, besides, the usual prominent long nodules present on the leg joints and on the equal chelipeds. Lobule 2M divided ; 1M, 3M, 4M, 6L, all are distinct ; 1P heart shaped and divided. Other lobules are indistinct. Leg joints thin, compressed, upper edges of merus crested, carpus and propodus with nodules on upper edges. Spongy growth of hairs on arm of chelipeds are marked ; in other places it is obscure. Nodules on the anterior part of carapace and chelipeds are more prominent and large. Three large spines present on upper edge of palm ; besides, the usual prominent, long, nodules present on the legs and on both the equal chelipeds. While the under surfaces of crab is granular. Anterior Male pleopod is a process, strong and curved near the base and apex. Rows of sharp spinules present at the base and the outer sub-apical sides of pleopod. A cluster of 12-15 long, plumose, setae present on the innerside of subapical region, the outer side of the same region is armed with strong, scattered spinules.

Remarks : The characters on which Alcock (1898) described the *A. echinus* are so distinctive that it can not be mistaken as *A. nodulosa* and its variety. Size of crab, *A. echinus* is much larger than *A. nodulosa*, the nature of granules present on the *A. echinus* are blunt pointed, 5-6 mm long which are nodule like, smooth and rounded at tips, not exactly short, rounded and tubercular as in *A. nodulosa*, and not sharp, long, spine like as in *A. perspinosa* Borradaile (1902) an allied species from Maldive area.

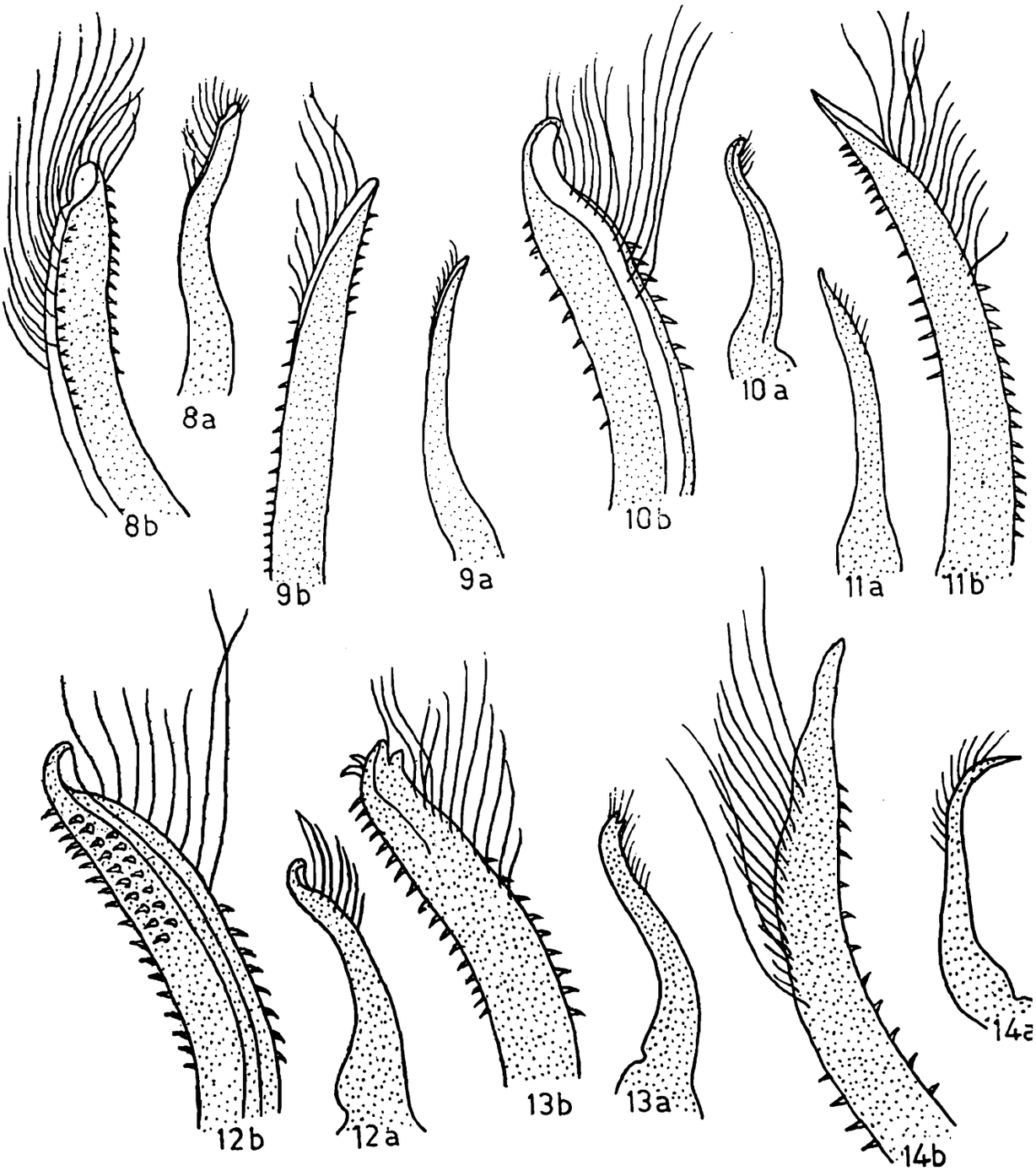
Distribution Malabar coast of India so far from the type locality only.

Actaea flosculata Alcock

(Pl. VI, 2 Text fig. 8a-b)

Actaea flosculata Alcock, 1898 : 151 ; Rathbun 1911 : 222 ; Serene 1984 : 115

Borradaile 1902 : 256 ; Odhner 1923 : 54 ; Guinot 1971 : 1071. Seen three specimens from Maldive Island and Sri Lanka ; W-12 mm. L-8 mm.



8a. *A. flosculata* Alc. b. same enlarged apex 9a. *A. hirsutissima* (Ruppell) same enlarged apex 10a. *A. michaelseni* Odhner b. same enlarged apex 11a. *A. nodulosa* White b. same enlarged apex 12a. *A. peronii* Edw. b. same enlarged apex 13a. *A, pulchella* (Edw.) b. same enlarged apex 14a. *A. rupelli* (Krauss) b. same enlarged apex.

Diagnosis : Carapace sub circular, 3/4 as long as broad, convex, well lobulated and divided by broad, deep, smooth grooves into regional lobules. All these convex lobules of carapace are closely

covered with smooth, elegant tubercles, exactly like pin heads in appearance. The outer sides of the chelipeds and legs are also covered with similar type of tubercles as those on the carapace. Antero lateral sides of carapace with four, petaloid, marginal lobes. Lobules on the surface of carapace viz. 1M, 2M, 3M ; 2L, 3L, 5L, and 6L and 1P, all are distinctly demarcated. Some of the surface tubercles are kidney shaped and the space below the tubercles are quite smooth. Surface is almost devoid of hairs. Chelipeds stout, not lobulated, fingers short tips blunt, slightly hollowed out at the tips. Anterior male pleopod is a grooved, curved, process, apex broad and spoon like, inner subapical area hairy and outer side spinulose.

Remarks : Elegant, smooth, pin head like, petaloid, tubercles of the surface are identical with *A. fragifer* (White) but the shape and lobular textural pattern of carapace ; nature and thick, irregular, arrangements of the granules on the carapace and appendages are quite distinctive enough to separate both the species.

Distribution : Maldive Island, Sri Lanka ; Amieranten.

Actaea savignyi (H. M. Edw.)
(Pl. VI, 1 Text fig. 21a-b)

Cancer granulatus Savignyi & Audoin, 1826 : 77-98.
Cancer (*Actaea*) *savignyi*, H. M. Edwards 1834 : 378.
Actaea granulata, A. M. Edw., 1865 : 275 ; 1873 : 192 ; Miers 1879 : 20 ; Alcock 1898 : 151 ; Laurie 1906 : 405
Actaea savignyi, Rathbun 1911 : 221 ; Sakai 1939 : 485 ; Stephensen 1947 : 151 ; Barnard 1950 : 231 ; Chhapgar 1957 : 432 ; Guinot 1971 : 1070 ; Sakai 1976 : 442 ; Serene 1984 : 113

Material : Seen several specimens of both the sexes from Sri Lanka, Andamans and Madras, W—23 mm ; L—18 mm.

Diagnosis : Very convex, medium sized, crab of sub circular carapace. Surface of the carapace is of mulberry like appearance, owing to the pressure of most closely set, rough tubercles on the regional lobules. Each individual tubercle is formed of a number of facetted, granules, confined by their bases. The lobules of the carapace are distinct but almost lost in the polygonal mosaic of tubercles. Lobules 1M : and incompletely divided 2M ; 3M ; 4M ; 1L 6L are all distinctly separated by fine sutures.

The tubercles on the exposed surfaces of chelipeds are same as on carapace but on the legs these granules are spiny, especially those on dactyli. Fingers short, blunt pointed.

Anterior male pleopod slightly curved ; stout process apex acute, hook like, inner sub apical region fringed with 15-20 plumose setae and the region just below the hairy area, is thickly armed with strong spinules.

Most of the preserved specimens in spirit are ivory white to gray in colour.

Remarks : Mulberry like appearance of the carapace with fine sutures that divides the regional lobules of carapace are the main distinctive appearance along with its typical anterior male pleopod. It does not actually resembles *A. calculosa* ; the lobules of the later species is well separated by deep, broad, smooth grooves.

Distribution : Persian gulf to Mergui, Maldive, Laccadives Sri Lanka, Andamans, Indo-pacific, from Japan to Red Sea, East coast of Africa, Australia, New Caledonia.

Actaea hellerii A. M. Edw.
(Pl. VII, 10 Text fig. 28a-b)

Actaea hellerii A. M. Edwards, 1865 : 79 ; Odhner 1925 : 77
Pseudolimera helleri, Guinot 1971 : 1071 Sakai 1976 : 452 ; Serene 1984 : 100

Examined 2 females from Sri Lanka W-8 mm. ; L-6mm.

Diagnosis : Carapace transversely oval, length is about 3/4 of the width. More strongly convex fore and after than the convexity of side to side. Few lobules are demarcated (by deep, wide, smooth grooves) towards the anterior two thirds of the carapace, which are covered with golden coloured short hairs and bristles.

The lobules are flat and covered by crisp, vesiculus granules all over and pterygostomian region of the body, appendages and on sternum. The granules are larger near the branchial regions. Lobule 2M completely divided into two subequal lobes, the inner lobe is continuous with 1F, 2F and 1M forward. Antero lateral border creast like, finely granular, indistinctly four lobed ; a transverse, deep, broad, groove on carapace separate the branchial region at the incision between the second and third antero-lateral lobes. Lobule 3M, and indication of 4M are well marked, other lobules are faintly marked.

Front much prolonged and produced, deflexed vertically downwards, obliquely rounded into two lobes, free margin beaded ;

outer corner confluent with inner supra-orbital tooth.

Upper orbital margins tumid and granular, sutures indistinct. Anterior border of merus of external maxilliped oblique.

Chelipeds equal, arm smooth, with crested and beaded anterior border. Outer surfaces of wrists and palms convex and covered with various types of granules. Lower border of palm crested and beaded ; granules on upper, inner surface of palm are of gradually increasing in size from upper to lower edges. Hands and legs not lobulated on their outer surfaces but granular ; merii of legs with beaded, creast like, anterior edges. Scattered, stiff, setae present all over the surfaces in fresh specimens. Anterior male pleopod taken from the Guinot's figure of 1962, is as usual a groved, curved, process, hairy and spinulose on inner subapical areas.

Remarks Flat and incomplete lobulations of carapace and its absence on the appendages, absence of lobes on anterior-lateral margins and want of thick felt or fur are the distinctive characters for the species. Its similarity with *A. lata* is just as its similarity with other species of the genus, otherwise both the species are quite different in their geographical dimentions and textural pattern.

Distribution Sri Lanka, Djeddah, Durban, Natal, Salmon Is., Marshall Is. Gilbert Is., Honolulu and Oahu, Maurititus, Red Sea.

Actaea hirsutissima (Rupell)
(Pl. VII, 2 Text fig. 9a-b)

Xantho hirsutissima Ruppell, 1830 : 28
Actaea hirsutissima, Alcock, 1898 : 141 Odhner 1925 : 69 ; Laurie 1906 : 69 Sakai, 1939 : 488 ; Barnard 1950 ; Sankarankutty, 1962 : 131.
Actaeodes hirsutissimus, Guinot : 1971 : 1072 ; Sakai 1976 : 448 ; Serene 1984 : 135

Materials seen from Andamans, W-16mm, L-11mm, F-3.5 mm.

Diagnosis : Broadly oval, medium sized crab, moderately convex in both the directions. The entire carapace is divided into convex regional and sub-regional lobules by deep, smooth, wide grooves. Surface of these lobules are covered with small granules and scattered, short, dark, stiff hairs. The lobule 2M entirely divided into two, the inner one of these is continuous with 1M forward, 3M is divided into three lobules, 4M is narrow ; 1P roughly heart shaped ; lobules 1L—6L all are very distinct. Textural pattern of carapace is very clear in adults. Frontal lobes rounded and deflexed, outer corners of

each lobe prominent. Antero lateral sides long, convex, four lobed, other than outer orbital corner, first lobe low, small, last one smallest, 3rd one broadest. Outer surfaces of wrists of chellipeds dimpled, granular and hairy, of palm dimpled on upper surface, two-three very distinct, granular and hairy ridges present on the middle of palm, lower outer part is sharply granular ; the rows of granules continued upto two thirds of the fingers. Only in very old males the almost entire palms and fingers are dark brown in colour, tips are white and blunt pointed. Base of dactylus is also white, but in youngs these fingers are not brown, but white. Leg joints thickly hairy, all the short, stout, carpal and and propodal joints are rather dimpled ; under surface of carapace is rough and with a thick coat of hairs and furs. Anterior male pleopod is a long, narrow, straight process, apex conical, bluntly ended and directed outwards ; a cluster of long, simple, setae present on inner subapical area, outer sides of this process is armed with scattered spinules all over.

Remarks : Inspite of its resemblences with the other allied species the present species is distinctive, because of its lobular pattern, which is unlike any other known species of *Actaea.* Its surface hairs are also not as thick and dark coat as that of the *A. tomentosa,* rather in young and subadult crabs, the hairs, bristles, fingers, palms are almost yellowish white in colour and may be mistaken as a separate species than the *A. hirsutissima.*

Distribution : Andaman Nicobar Islands ; Samoa, Philippines, Mauritius ; widely ranges in Indo-Pacific regions.

Actaes lata Borradaile
(Pl. V, 1 Text fig. 27a-b)

Actaea lata Borradaile 1902 : 254 ; Odhner 1925 : 62 ; Holthuis, 1953 : 10 ; Guinot 1962 : 236

Pseudoliomera lata, Guinot 1971 : 1070 ; Sakai 1976 : 453 ; Serene 1984 : 102

Width—10 mm. ; Length—7 mm., Seen several specimens from Andamans and Sri lanka.

Small, thick, hairy crab, with broad very convex, distinctly and entirely lobulated carapace. Flatish regional lobules are covered with pearly graules which are smaller towards the posterior third and the lobules are separated by dark grey hairy grooves. Long, golden brown, hairs, and short bristles, interspread among the granules. Front bilobed, emerginate, convex and vertically deflexed. Antero-

lateral sides of carapace with four, low, lobes including outer orbital angle. Pterygostomian region granular, hairy and grooved. Grooves running from the notches present in between the lobes of the antero lateral sides. Postero-lateral sides concave. Lobule 2M divided into two lobes, 3M distinct ; 4M heart shaped; 1P, 2L—6L all the lobules are distinct. Chelipeds stout, subequal, palm tumid, wrists and palms lobulated and granular on their outer surfaces. Both outer and inner sides of palm granular and hairy, granules extended upto the middle of dactylus. Fingers short, specially the fixed one ; dactylus strongly curved, cutting edges dentate, tips pointed. Leg joints stout, covered with granules and hairs with bristles in between. Colour white with red spots, the black colour of the fingers extended upto the palm, finger tips are white. Figure of anterior male pleopod taken from Guinot 1962.

Remarks : It is a small crab, whitish to greyish in colour, very thick and hairy. Its carapace divided into flatish, regional lobules which are very species specific and has some simalarity of size, shape and appearance with *A. variolosa* Borradaile, but the main difference lie in having grooves, hairs and granules present on pterygostomian region. The 3M i.e. mesogastric area is undivided, 4M heart shaped which are unlike *A. variolosa*.

Distribution : Maldives ; Andaman Nicobars, Sri Lanka, Port Llyod, Bonin Island, Paumotu.

Actaea margaritifera Odhner
(Pl. III, 9 Text. fig. 29a-b)

Actaea margaritifera Odhner 1925 : 48
Epiactaea margaritifera Serene 1984 : 117

Seen two males from Pearl Bank, (Sri Lanka), Collected by Southwell in Jan.-Feb. 1911. Width 6 mm., Length 4 mm.

The carapace is broad, more subcircular in shape than oval, it is convex in both the directions. The entire upper surface of crab is divided into convex, regional and subregional lobules which are covered with granules. The carapace is not hairy. Front measures one third of the width, bilobed, convex. Posterior most border of carapace is granular and interrupted in the middle by a gap. Antero lateral sides cut into four, rounded, granular teeth, the first teeth, low, small. The regional lobules of carapace are separated by very narrow suture like fine, grooves and the demarcation is not very clear and well

outlined. Outer surfaces of wrists, palms of chelae and leg joints are covered with short hairs and granules. The granules on the lower outer surface of palms are arranged in rows. The males are without the anterior male pleopods perhaps because of their very young age, hence pleopod cannot be figured.

Remarks : *A. margaritifera* can be mistaken for *A. nodulosa* to the beginner only. Odhner 1925 & Stephensen 1947, synonimised the species by mistake. The shape of carapace, its dimentions, the lobular textural pattern of carapace and lastly the presence of minute, small, surface granules instead of large nodular granules differentiate the former from the latter. *A. bullifera* of Alcock is a medium sized crab, its lobular pattern is very clearly outlined and distinctly differs from the present and other allied species also. The sculptural pattern of carapace agree in all details with the Odhner's specimen.

Distribution : Sri Lanka, Trinocomalee, Aden, Karachi, Gulf of Siam, Singapore, Torres Straite.

Actaea michaelseni Odhnar
(Pl. II, 1 Text fig. 10a-b)

Actaea michaelseni Odhner 1925 : 43;

Material examined are one female from Sri Lanka and one male from Nankauri Harbour, Andamans, collected by R. Hodgart, 14.1.1926. W-19 mm. ; F-3.6 mm.

Diagnosis : The small light brown coloured crab is very much like *A. pulchella* but differs from it in the following respects. (i) Deep brown, short fur intermingled with stiff. light yellowish, long, bristles covered the whole surface quite densely, the bristles that are present on the appendages are more dense and prominent.

(ii) Crisps granules/present on the lobules of carapace and appendages are of different sizes. Under surface of carapace is finely granular and covered with short, brown fur, the same region in *A. pulchella* is quite smooth and glazed. Lobular pattern of carapace is slightly different from *A. pulchella* in the posterior half of the carapace.

(iii) The lobules on the carapace are less distinctly demarcated by the hairy grooves on posterior third of the carapace.

(iv) Anterior male pleopod of *A. michaelseni* is strongly curved

and its apex is obtusely spooned, but narrower from side ; inner sub-apical region adorned with a cluster of 8-10 long setae and outer side of the same region along with the basal part of the process is armed with scattered spinules all over.

Remarks : Odhner (1925) established the species. Afterwards Sakai (1939) had studied lots of specimens of the *A. michaelseni* and of *Actaea pulchella* Edw., which were from different localities but did not designate them newly or separately. I prefer to retain the identity given to the specimen separately by Odhner as I feel the specimens are distinctive enough to deserve a new specific status for them.

Distribution : Andamans and Sri Lanka (New Loc. records), other localities are Japan, Sharks Bay, South West Australia.

Actaea nodulosa White
(Pl. IV, 1 Text fig. 30a-b)

Actaea nodulosa White 1847-48 : 224 ; Henderson 1893 : 356 ; Alcock 1898 : 148
Odhner 1925 : 56, Edmondson 1946 : 294, 1962 : 256 Guinot 1962 : 236 ; 1964 : 40
Epiactaea nodulosa Serene 1984 : 116

Examined 4 males and 1 female from Malabar coast, Andamans, Sri Lanka and Persian Gulf, W-18 mm., L-14 mm. for the largest male.

Diagnosis : Medium sized crab with broadly oval carapace ; 2/3 as long as wide and moderately convex in both the directions. Anterior three fourth of the carapace is divided into convex, regional lobules by deep, smooth, wide grooves. The lobules are studded with pearly tubercles and granules of different sizes. Symmetrically disposed, scattered clusters of long, whitish bristles are present on the regional lobules.

Front deflexed and very convex medially appears deeply four lobed, owing to the outer corner of each lobes standing on orbital angle, The long antero-lateral sides of carapace sharply four lobed, each lobe rasp like composed of one large and 2-3 small tubercles. Postero-lateral sides short and slightly concave. The posterior border of the carapace is bounded by two parallel, rows, formed of beaded granules ; the inner row is broken in the middle. The starnum and under surface of the carapace covered with bubble like granules.

Exposed surfaces of the chelipeds and leg joints are closely and

crisply granular ; these granules are tubercular, pearly and those on the anterior edges of leg joints are spine like ; leg joints specially their upper edges are fringed with long, thick, whitish hairs and bristles.

Fingers short, obtusely pointed, light brown in colour, this brown colour in male extended upto the middle of the lower border of palms. Spirit preserved specimens are white in colour.

Remarks : The specimens of *A. nodulosa* are markedly different from *A. bullifera* Alcock (1898) in the following points. The surface tubercles of the former are irregular in size, some of them are rasp berry like, composite and much larger in size, others are very small ; presence of clusters of symmetrically disposed, whitish bristles on carapace and thickly hairy legs are the main diagnostics for the *A. nodulosa.* In *bullifera*, these surface clusters of hairs and marginal hairs of leg joints are almost absent, surface tubercles are very nicely uniform in size and smooth, polished in appearance, smaller granules present on the grooves only. Odhner 1925 ; Guinot 1958 considered the specimens described by Alcock, as actually of *A. nodulosa* and *A. margaritifera.* Now the plates given by Odhner for both the species and Alcock's specimens are before me and their comparison reveals that the Alcock's specimens are exactly as nodulosa. While in its granular and lobular pattern with symetrically disposed clusters of hairs etc. are considered. So I prefer to retain it as Alcock had decided. The pleopod figures in Guinot (1958 Fig. 15a-b) are also almost similar in appearance with ZSI specimen from Sri Lanka but the carapace (fig. 17) of Guinot is not exact as Z.S.I. specimens. Pelopod fig of Guinot is given here (Fig. 29) and it is more obtuse at the apex than fig. 11 of the Indian *nodulosa.*

Distribution : Malabar coast, Sri Lanka, Andamans, Persian Gulf, Red Sea, Madagascar, Maurititus, China Sea, Hawaii.

Actaea obesa A. M. Edw.
(Pl. I, 3 Text fig.)

Actaea obesa A. M. Edw., 1865 : 272 ; Odhner 1925 : 61
Atergatopsis obesus Serene 1984 : 143

Material seen one female from Sri Lanka, W-18 mm., L-13 mm.

Diagnosis : Crapace broad, hexagonal ; fronto-orbital and lateral borders are almost flat or flatly curved. Postero-lateral sides concave, convergent and shorter than the antero-lateral. First lobe

of antero lateral border shallow, indistinct, last three lobes convex and prominent. Anterior two-third of the carapace flatly lobulated by deep, broad, grooves ; short brown felt covered the grooves and the space between the crisps, miliary, granules which covers the lobules of carapace and its under surface, legs, outer surface of the wrists and hands. Lobule 2M partially and indistinctly divided ; Lobules 3M, 5L, 6L, are only, distinctly demarcated. Anterior margin of merus of external maxilliped oblique.

Examined only one female specimen without legs and chelipeds and the only detached cheliped present, is prehaps not belong to the specimen.

Remarks : Alcock (1898) doubtfully described one female specimen of *A. amoyensis* de Man as *A. obesa* which is now redesignated as *A. amoyensis* in the present paper. The single female specimen described above is quite identical with the figure and descriptions of *A. obesa* given by Odhner 1925. The shape of *A. obesa's* carapace is hexagonal, lateral sides of carapace are almost parallel ; last three lobes of antero lateral border are rounded, convex and the disposition of lobules on the carapace are different from *A. amoyensis*. The chelipeds, specially the palms of *A. obesa* are less swollen ; upper surfaces of carpus and propodus of legs are dimpled while it is not so in *A. amoyensis*.

Actaea peronii (H. M. Edw.)
(Pl. VI, 3. Text fig. 12a-b)

Xantho peronii. H. M. Edw. 1834 ; A. Mine Edwards 1865 : 133, 171.
Xantho spinosus Hess 1865 : 133 ; DeMan 1887 : 690, 692 ;
Actaea peronii, Haswell 1882 : 46 ; Miers, 1886 : 122 ; De Man 1887 : 690 ; Henderson, 1893 : 357 ; Alcock, 1898 : 150 ; Odhner, 1925 : 58 ; Guinot 1971 : 1071

Seen one female from Andamans, W-8mm., L-6 mm., and three female specimens from Australia are present in ZSI collection, measuring W-14 mm. ; L-9 mm.

Diagnosis : Small crab with broadly oval, moderately convex carapace, covered with smooth, polished, well isolated tubercles, which are largest and stalked on the branchial regions, and smallest and squamiform on posterior border and on lower, outer part of hands. Lobules 1M, 2M-4M, 1P are distinct. Four antero-lateral lobes represented by 4 large, stalked, tubercles.

Exposed surfaces of wrists and hands covered with more prominent, smooth, tubercles, like those on the branchial regions. Carpus and propodus of legs covered with stout spines which are smaller on merus and are still more smaller on dactylus. Fingers brown, short and blunt pointed.

Front bilobed, each lobe with a prominent outer angle, supra-orbital border armed with a series of tubercles.

Anterior male peopod narrow, curved ; apex narrow, obtuse and distinctly spooned. Inner sub apical region adorned with a cluster of 12-15 long setae, outer part of that region is thickly studed with stout spinules which are gradually decreasing in size towards the lower proximal end.

Remarks : Inspite of their apparent similarity, *A. peronii* differs from *A. flosculata* in its broadly oval shape of carapace, covered with smooth tubercles which are not petaloid or kidney shaped as in the *flosculata* and in the presence of stout spines on leg joints are also unlike the later species.

Distribution : Andamans First record. Adelaide, Phillip Isl.. Victoria, Port Jackson, Upolu, Samoa.

Actaea perspinosa Borradaile
(Pl. VII, 3 Text fig.)

Actaea perspinosa Borradaile 1902 : 257 ; Odhner 1925 : 59, Guinot 1971 : 1071 ; Sakai 1976 : 446 ; Serene 1984 : 115

Not present in Z.S.I. collection, not seen, reported by the author from reef at Hulule, Mila dumadulu, Maldives, 25 fms ; Width 5.5 mm. ; Length 4 mm.

Whole of the upper surfaces of carapace and appendages are covered with sharp, stout spines all over, including the frontal sides, posterior margin of carapace and on first and second abdominal turga. Similar type of spines present on the leg joints, cheliped joints including fingers, specially the dactylus. Posterior border of carapace adorned with two continuous rows of spines. Regions and sub-regions of carapace demarcated by distinct, smooth, deep, grooves. Antero-lateral sides of carapace convex, divided into four, spinous lobes, including outer-orbital angle. Regions 2M, 3M, 5L and 6L all are distinctly demarcated. Chelipeds equal or almost so, inner side of palm with few spines.

Remarks : Odhner (1925) reported a specimen of female of *A. perspinosa* from Bonin Ins. which is much larger than the type, measuring W-20 mm. ; L-14 mm. Shape of carapace and thel obular textural surface pattern of carapace ; distribution and arrangements of spines on the crab surface differentiate the crab from other spinous species of *Actaea.*

Distribution : Maldive ; Bonin Ins., Port Lloyd.

Actaea pulchella A. M. Edwards
(Pl. II, 2 Text fig. 13a-b)

Actaea pulchella A. M. Edwards 1865 : 273 ; Alcock 1898 : 146 ;
Lanchester 1900 : 734 ; Borradaile 1902 ; 256 ; Odhner 1925 : 39 ; Sakai 1939 : 484 ;
Guinot 1971 : 1071 ; Sakai 1976 : 445 ;

Examined several specimens from Sri Lanka and Mergui area ; W-16.5 mm. ; L-11 mm.

Diagnosis : A small crab with broadly oval carapace which is moderately convex from side to side but strongly convex before backwards. The lobules on the carapace are less convex but distinctly outlined by broad, deep, grooves, specially on the anterior two thirds only. Upper surfaces of lobules and the other raised portions of carapace, the outer surfaces of chelipeds and legs are covered with crisp granules, intermingled with short, brownish bristles which are not thick enough to conceal the lobules and their pattern. Four lobes on the antero lateral sides of carapace are sharply granular. Following are the lobules viz. 1M, partially divided 2M, 3M, and a row of granules represents the 4M ; 1L—6L and a faint groove present in between 1P and 2P.

Wrists of chelipeds, carpus and propodus of legs are lobulated. Yellowish brown colour in spirit. Male specimens are more distinctly lobulated and the crisp granules are more prominent than on females. Anterior pleopode of male curved, apex notched, obtuse, spooned. Inner subapical region fringed with a cluster of long setae and an armature of rows of strong spinules present both on inner and outer parts of the subapical regions.

Remarks : The textural pattern of carapace of *A. pulchella* is very clean and clearly demarcated for the species and cannot be mistaken for other allied species, when their photographs are compared. Only description of the species is misleading and are not

dependable.

Distribution : Andamans, Sri Lanka, Maldive. Laccadives, Mergui, Singapore, Formosa and Japan.

Actaea rupelli orientalis Odhner
(Pl. V, 2, Text. fig. 17a-b)

Actaea ruppelli orientalis Odhner 1925 : 46 ; Shen 1937 : 291 ; Sakai 1936 : 160 ; 1939 : 492 ; 1965 : 146 ;
Paractaea ruppelli orientalis Guinot 1969 : 224 ; Sakai 1976 : 432

Material seen, one male from Andamans, and 4 females, plus 2 males from Gulf of Mannar, W-36 mm., L-32 mm.

Diagnosis : Four large females. and two large, male specimens represent the variety *orientalis* of typical *ruppelli.* The specimens differs from *ruppelli* by being larger in size of carapace and in having symmetrically disposed bundles of long, stiff hairs. Hairs are also present on the lobules or on the grooves separating them. Lobule 2M completely divided ; other lobules are same as on the *A. ruppelli.* Ambulatory legs are densely fringed with long, stiff, brownish setae along both anterior and posterior edges.

First male pleopod stout, curved, gradually tapers apically, apex spoon shaped, inner subapical border adorned with 17-20 setae of gradually increasing size. The subapical regions armed with scattered spinules.

Remarks : The granules on the carapace are less in number but larger, prominent in size than in *ruppelli.*

The entire crab is more hairy ; hairs are stiff, bristle like, golden yellow to dark in adults and fainter in young ones. Few clusters of very long, bristles, present symmetrically on the surface of carapace and separates the variety *orientalis* from the species *ruppelli.*

Distribution : Gulf of Mannar, Sri Lanka, Andamans (first record) North and South China, Hongkong ; Japan.

Actaea ruppelli (Krauss)
(Pl. V, 3, Text fig. 14a-b, 16a-b, b)

Aegle ruppellii Krauss 1843 : 28
Actaea rupellii, A. H. Edw , 1865 : 270 ; Alcock : 1898 : 144 ; Calman : 1900 : 7 ; Lanchester 1900 : 733 ; Borradaile 1902 : 24 ; DeMan 1902 : 610 ; Laurie 1906 : 403 ; Rathbun 1911 : 219 ; 184 ; Odhner 1925 : 45 ; Sakai 1939 : 491 ;

Stephensen 1947 : 150.
Paractaea ruppelli Sakai 1976 : 451 ;

Syn : *Aegle rugata* White 1848 :

Material : Seen several specimens from Andaman, Mergui Archipelago and Sri Lanka ; W-32 mm., L-24 mm.

Diagnosis Carapace 3/4 as long as wide, very convex, medium in size, well lobulated by deep, broad, smooth, grooves ; all the lobules of carapace and appendages are covered with milliary granules and short, brownish stiff setae. Antero-lateral sides of carapace composed of four, convex, lobules, excluding the external orbital angle. 2M completely divided into two lobules, the outer one of which is broader and very convex. Lobule 1M, 3M distinct, 1P convex and subcircular in shape. Wrists of chelipeds are very swollen and larger than the palm. Upper surface of wrists dimpled and divided into about seven lobules ; upper border of palm with three lobules and lower border adorned with granules ; carpus and propodus of legs distintly lobulated.

Anterior male pleopod narrow, curved ; apex acute angular ; inner subapical area adorned with a cluster of 12-15 gradually increasing setae and with scattered spinules. Text figs. : 14a-b are of *A. rugata*, and 16a-b are perhaps broken, abnormal, 16c, taken from Barnard 1950.

Remarks : Textural lobular pattern of carapace is very distinct and well marked in the large specimens ; in the young ones these lobules and granules are flatish, minute in size and apparently seem to be different.

Distribution : East coast of Africa to Indian coasts, Sri Lanka, Maldives Laccadives, Andamans, Persian Gulf, Singapore, Mergui. Java, Sumatra, Phillipine, Hong Kong, Japan, Central Pacific. Australia.

Actaea spinosissima Borradaile
(Pl. VI, 4 T fig. 22a-b)

Actaea spinosissima Borradaile 1902 : 256 ;
Odhner 1925 : 59 ; Guinot 1971 : 1071 ; Serene 1984 : 114
Syn : *Actaea peronii* Var. *squamosa* Henderson 1893 :
Calman 1900 ; Laurie 1906. 404

Material Examined are four females and three males from Sri

Lanka, W-16.5 mm., L-11 mm.

Diagnosis : Small crab, carapace 2/3 as long as wide. The flat lobules present only on anterior two third of carapace, these regional lobules are well separated by narrow, smooth, grooves and covered by large, scale like, flatish, smooth, oblique, petaloid, tubercles. The similar type of smaller granules present on the posterior third of the carapace arranged in transverse rows ; on antero-lateral sides of carapace these granules are spine like, specially the posterior two or three, antero-lateral borders of carapace not lobulated. The upper edges of legs and cheliped joints are armed with spines, outer surfaces of wrists and palms are adorned with flat scale like tubercles but without convex lobules. 2M divided and continuous forward with 1M ; Lobules 3M and 4M are very distinct.

Male pleopod process is curved, apex obtuse, narrowly spooned apically. A cluster of 20-25 long setae present on inner subapical region, a row of spinules armed the inner and outer borders of subterminal region of the pleopod.

Distribution : Mahlos Atoll, Maldivs ; Sri Lanka, Tores Straits ;

Actaea scabra (Odhner)
(Pl. II, 4 T. fig. 18a-b)

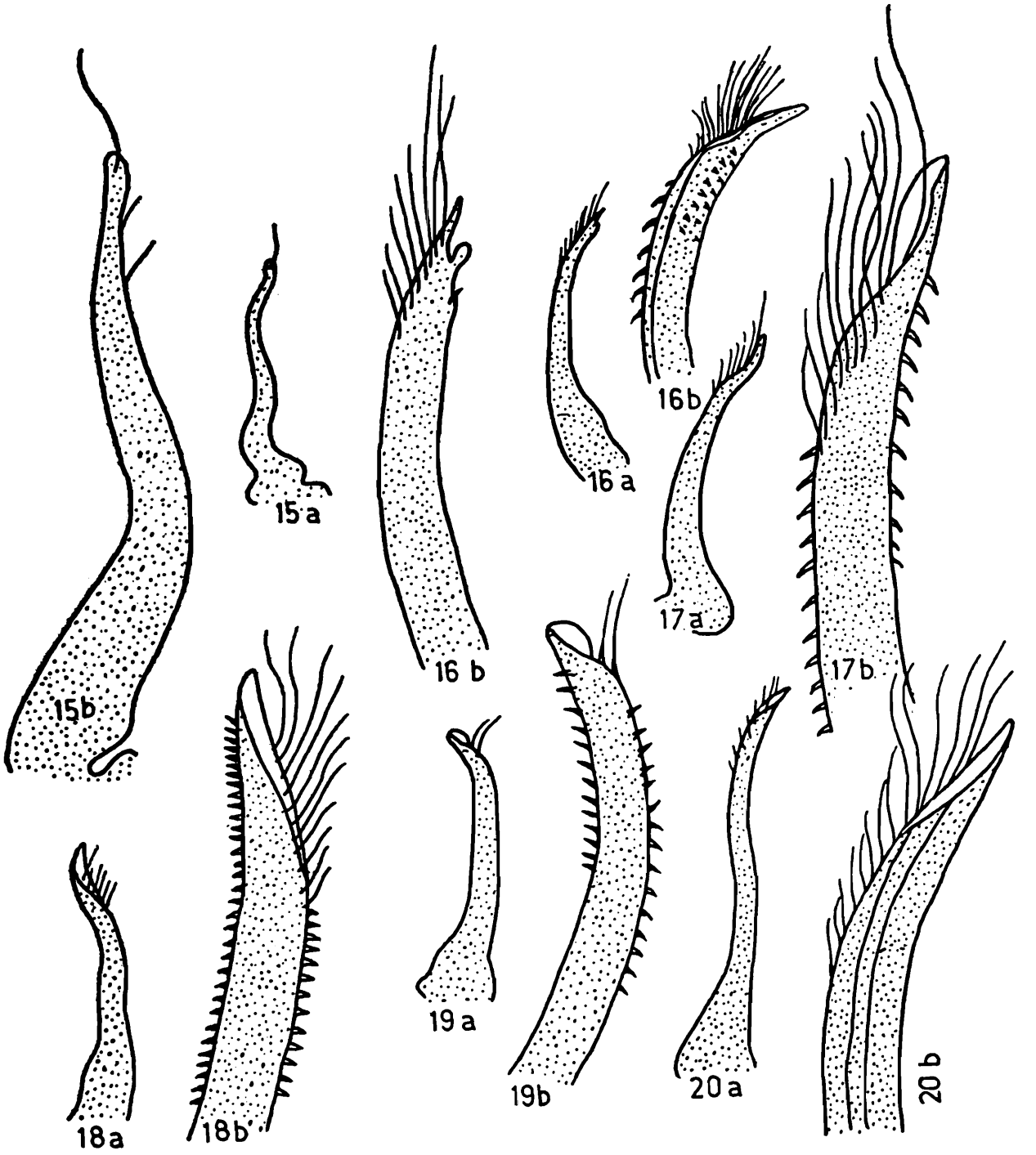
Cancer scaber Fabr. 1787 :
Xantho scaber, H. M. Edw. 1834 ; Haswall 1882 & De Man 1896 : 79.
Actaea purvula Alcock 1898 : 146.
Actaea scabra, Odhner 1925 : 37

Seen one male from Mergui Archipelago, Width-23 mm. ; Length-18 mm.

Diagnosis : A medium sized, moderately convex crab with carapace 7/9 as long as broad and not quite flat on posterior third ; lobules on the anterior two thirds of carapace are separated by wide, deep, grooves, the lobules on posterior third of carapace are more fainter and the exposed surfaces and grooves are covered with soft, brown, valvety pad of fur. The hairy coat could not conceal the minute, small, crisp, granules on legs and on posterior third of the carapace. The granules on chelipeds and on anterior part of carapace, on four antero lateral lobes are sharp, larger than on other parts. Lobule 1M continuous with the partly divided 2M ; 3M ; 2L—6L all are markedly demarcated ; a faint transverse groove parallel to the posterior border of carapace is present.

Chelipeds stout, almost equal, fingers long, obtusely pointed and white to deep brown in colour. Wrists prominent, traversed by one transverse and one long grooves. The legs with markedly grooved carpus ; hairs present, but not so thick enough to conceal the grooves and granules ; last pair of legs rather shorter than the other legs.

Male anterior pleopod slightly curved in the middle, apex obtuse and spooned ; inner sub apical region fringed with a cluster



15a. *A. rufopunctata* (Edw.) b. same enlarged apex 16a. *A. ruelli* (broken ?) b,b',*d* same enlarged apex 17a. *A. orientalis* Odhner b. same enlarged apex 18a. *A. scabra* Odhner b. same enlarged apex 19a. *P. speciosa* (Dana) b. same enlarged apex 20a. *A. variolosa* Borr. b. same enlarged apex

of 20-25 long setae, rows of spinules present on both inner and outer surfaces of the sub apical regions.

Remarks: Carapace moderetely convex in both the directions and not quite flat posteriorly like *A. depressa* and its broadly oval shaped carapace is also unlike the *depressa* which is pentagonal in shape. The specimen from Mergui designated by Alcock as *A. purvula* is quite indentical with the figure of adult male from Queensland and fully tallying with the plate and description of *A. scabra* given by Odhner 1925.

Destribution. Mergui Archipelago, Queensland and Sunda Island.

Actaea tomentosa (H. M. Edw.)
(Pl. III, 11. T. Fig. 23a-b)

Zozymus tomentosus, M. Edw. 1834, 385
Actaeodes tomentosus, Dana 1854 : 197
Actaea tomentosa, A. M. Edw., 1865 : 262 ; Alcock 1898 : 140 ; Laurie 1906 : 70 ; Rathbun 1906 : 852 ; Odhner 1925 : 70 ; Sakai 1939 : 487 ; Barnard 1950 : 233 ; Guinot 1958 : 87 Sankarankutty 1962 : 131
Actaeodes tomentosus, Guinot 1971 : 1072 ; Sakai 1976 : 447 ; Serene 1984 : 134

Examined a lot of specimen from Andamans, Laccadives & other parts of India. W-26 mm., L-17 mm.

Diagnosis: Broadly oval carapace, length 2/3 of width or less. The exposed surfaces of body and appendages covered with very dense, soft, short, blackish, even, felt, through which numerous, large, pearly granules are visible. While the entir ecarapace is distinctly well outlined into convex regional lobules ; the lobules 2M, 3M & 1P, all are divided ; IM, 4M, IL—6L, 2P all the lobules are distinct. Anterolateral borders 4 lobed, strongly convex ; postero-lateral sides short, concave. Exposed surfaces of appendages and under surface of carapace are covered with such a thick felt that it concealed the granulation that exists. Arm of cheliped and upper edges of leg joints fringed with coarse, tuft of hairs. Fingers short, white at tips which are slightly hollowed out.

First male pleopod is long, narrow process, curved both proximally and distally ; apex ended acute angularly. Subterminal inner border fringed with a dozons of long simple setae ; both inner and outer sides of pelopod armed with scattered spinules.

Remarks : Most common and easily recognisable species of India and Andamans which are dark brown in colour because of the presence of very dense short, dark, valvaty felt through which vesiculus pearly granules are visible.

Distribution : Indian coasts including Laccadives, Andaman Nicobars, Indo specific species, records are being made from Maurititus, Australia, South Sea Is., China, Japan etc. etc.

Actaea tumulosa Odhner
(Pl. VIII, 1 T fig.)

Actaea tumulosa, Odhner, 1925 : 61. Sakai 1939 : 490;
Paractaea tumulosa Guinot 1971 : 1072 ; Sakai 1976 : 450
Paractaeopsis tumulosus Serene 1984 : 127

On Male, W-6.5 mm,. L-5 mm. from Sri Lanka, seen, one famale from Andamans ; W-7 mm., L-5 mm.

Diagnosis : A species of small size and rare in availability. Carapace 3/4 as long as wide, rather subcircular in shape, dorsal surface completely well lobulated by deep, distinct, but not quite smooth grooves. The regional lobules on carapace, on antero-lateral sides and on appendeges are very convex and studed with distinct, pearl shaped granules. Scattered soft, fine, scanty hairs present all over the body, but more thicker & longer hairs fringed the upper edges of merii of legs. Lobule 2M completely divided into two lobules, the inner one of which is narrower. First of the four well marked, convex, lobules of antero-lateral sides are fused with the external orbital angle. 1M, 2M completely divided into two, inner one narrower ; 3M, 1P, 1L—5L distinctly demarcated. The anterior half of the 3M is extermely narrow. Outer surfaces of hand and wrist bears about five and five to six lobules. The carpus and propodus of ambulatory legs also bears three, distinct lobules. All these lobules are very convex. Wrists and palms are rather less swollen.

Remarks : Ivory white colour, small size, and very convex lobules of carapace, their arrangements and the shape of carapace are quite distinctive in appearance. Pearly granules on the regional lobules are uniform in size and in arrangement. The distinctive textural pattern of the carapace separates the species from its nearest alley. The crab is not very easy to recognise and determine because of its very small size.

Distribution : Andaman, Sri Lanka, recorded for the first time from Indian region. Other distributional records from Dar-es-Salam, East Africa, New Guinea, Java, Gilbert Island, Fiji, Tahiti, Japan, Indo-Pacafic.

Actaea variolosa Borradaile
(Pl. III, 6 T fig. 20a-b)

Actaea variolosa Borradaile 1902 :
Pseudoliomera variolosa, Guinot 1971 : 1071 ; Serene 1984 : 102

Material examined are one male W-9·5 mm., L-7mm., from Madras Harbour, collected by S. W. Kemp on 4·5 1918. Z.S.I. Regd. No. C1786/2 ; One male, W-9·50 mm., L-7 mm, One female W-10mm., L-7mm., from Cheval paar, Sri Lanka, collected by T. Southwell on Jan.-Feb. 1911. Z.S.I. Regd. No. C2071/2. One male from Nankauri Harbour, W-11mm., L-8 mm., Collected by H. S. Rao, on 14·1-1926, C2204/2 and one male W-11mm., L-7mm., received from G.E. Dobson, Netty Mus. Exchange, Z.S.I. Regd. No. 3961/3.

Diagnosis : Carapace thick, not very broad, strongly convex, well lobulated, covered all over with short, white, thick fur and long, silky, yellowish hairs. The thick valvet of hairs almost conceal the grooves and tubercles present on the carapace. The grooves are smooth when denuded. The lobules 2M entirely divided longitudinally into two divisions, the inner division is continuous anteriorly with 1M, 2F and 1F. Lobule 3M is indistinctly divided into three lobules, 4M indistinct, lobules 1P, 1L—6L all are distinctly marked by wide grooves and covered with small, pearly granules. Front convex, extend much beyond the orbital edge, deflexed vertically downwards. Eyes small, antennules folds transversely. Anterolateral sides thick crest like, indistinctly four lobed and the edges of these four, flat, lobes are minutely beaded. Posterolateral sides short, concave and convergent. The pterygostomian region smooth, not marked by grooves from the gap in between the anterolateral lobes. Palms enlarged, swoollen, almost equal, lobulations on the outer surfaces of wrists and palms ill defined, fingers short, blunt pointed, light brown to white in colour, dentry edge of fixed finger armed with a large-tooth. Dactylus very short, markedly curved and reach at the middle of propodus. Outer surface of chelliped granular, lower edge of palm beaded, crest like. Leg joints covered with thick coat of hairs and bristles. Anterior male pleopod is grooved, curved process, inner subapical area hairy as usual. Ivory white in colour all over

including the fingers.

Remarks The lobular textural pattern on the adult male carapace is very distinct on anterior two thirds and less prominent on the posterior third. In female these lobulations are less prominent and more indistinct than in male.

Though the *A. variolosa* Borradaile specimens are like *A. lata* Borradaile, yet the lobular pattern of the carapace of both the species are not alike. The inner lobe of 2M is narrow and continuous with 1M, 2F, and 1F anteriorly, the 3M is three lobed, 4M somewhat elongated and undivided, all these are unlike the corrosponding lobes of *A. lata.* The colour of the body and finger is ivory white, not brown and black as in *A. lata.* The under side, of carapace including pterygostomian region is smooth, ungrooved and hairless in *A. variolosa* while it is reverse in *lata.* The dactylus of chelaeped is much shorter than propodal, fixed finger, and it is strongly cruved and touching the fixed finger near the middle.

Distribution Madras coast, Sri Lanka, Laccadive, Maldives, Nankauri Harbour.

GENUS *Banareia* A. M. Edwards.

Banareia A. Milme Edwards 1869 : 168 ; 1873 : 193 ; Alcock 1898 : 153 ; Klunzinger 1913 : 198 ; Sakai 1939 ; 493 Serene 1984 : 36
Banareiopsis Ward 1936 :

The genus *Banareia* differs from the typical *Actaea* only in having the fingers of chelipeds which are very thin, compressed and like knife blade. The fingers are very smooth, glazed, polished and white in colour. Cutting edge of fixed finger has three incisiform teeth at the base.

Remarks Surface of crabs are thickly hairy and only after denudation the granular, well outlined lobules of the carapace are visible.

Key to the species of Banaraia

1.	Lower border of palm tuberculate ...	*Krausii*
2.	„ „ „ smooth ...	*armata*
3.	Both upper and lower edges of palm granular ...	*banareias*
4.	Only the upper edge of palm fringed with a row of long thick hairs ...	*Sp. ? Juvinile*

Banareia armata A. M. Edw.
(pl. VIII, 2 fig. 25a-b)

Banareia armata A. M. Edwards 1869 : 168 ; 1873 : 193 ; Ortmann 1893 : 456 ; De Man 1896 : 75 ; Alcock 1998 : 153 ; ; Serene 1984 : 43
Actaea armata Odhner 1925 : 72

Seen 3 females and one male from Andamans-16 ; Investigator collection. W-17 mm., L-12 mm.

Diagnosis : Broadly oval, medium sized crab, with well lobulated and well covered carapace, with dense, short, fur and with numerous long, stiff, dark brown, setae present all over, except on fingers and lower part of palms. When denuded the convex lobules of the carapace are seen to be covered with small, closely set, pearly granules and the grooves are smooth and wide. Lobule 2M divided by two longitudinal grooves into one inner, narrower and other two, incompletely divided lobules. Lobules 3M divided ; 1M and 4M are distinct ; 5L heart shaped ; 1P ; 1L--6L and 1R—3R all are very distinct. Front bilobed, free edges of lobes are concave and well separated from the inner, supra orbital edges. Antero lateral sides of carapace divided into four, granular, unequal lobes. Postero-lateral sides markedly concave and convergent.

Outer surface of wrists lobulated as on the carapace ; upper, outer part of hands, when denuded shows six, longitudinal, rows of granules ; lower part of palm and fingers are smooth and polished.

The fingers are thin, compressed and sharp, like the blade of a knife ; cutting edge of dactylus entire, of propodus it is armed with three, unequal teeth at the basal end. Fingers are glazed, polished, white in colour. Anterior male pleopod strongly curved at the middle' and with rounded, spooned apex, subapical region of outer side armed with a group of strong, curved, scattered spinules and the inner side adorned with a cluster of 15-20 long setae.

Remarks : Sakai (1939) described *Banareia* as a sub genus of *Actaea*, as the former genus differs from the later only in having compressed, sharp, thin, knife blade like, curved fingers and the ischium of the external maxilliped leaves a narrow hiatus in between them. I think Sakai has named the crab most properly at that time, but for the sake of convenience the sub genenus is raised into a separate genus now.

Distribution : Maldive Laccadives, Andamans, New Caledonia, Fiji and Viti Island.

Banareia kraussi Heller
(Pl. VIII, 3)

Actaea kraussi Heller 1861 : 317 ; Odhner 1925 : 73
Banareia inconspicua Miers 1884 :
Banareiopsis australiensis Ward 1936 :
Actaea (Banareia) kraussi, Sakai 1939 : 495
Banareia Odhneri Sakai 1974 : 92 ; 1976 : 517
Banareia Kraussi Serene, 1984 : 43

Seen 3 females from Chaval paar, Sri Lanka Coll. T Southwell, 1911. W-43 mm., L-30 mm.

Diagnosis : Large, very convex crab, with broadly oval carapace. Covered all over, except the finger tips, with thick, dense, brown fur and long, stiff, numerous setae. On denudation the well outlined lobules of carapace are very convex, covered with pearly granules and separated by deep, smooth, narrow grooves. Four antero lateral lobes are deeply separated and the notches are ventrally connected on pterygostomian region by grooves which separates the lobes. Lobule 2M partially divided ; 1M, 3M, 4M, 5M, and 1L—6L all are distinct ; 1P divided, other small lobules are also present, the lobulations of the carapace are quite identical with Odhner's (1923) and Sakai's (1939) figures of the specimens from China and Japan.

Front narrow, with four, subequal lobes. The ischia of the external maxillipeds are narrower at the base and leaves a tringular hiatus between them.

Outer side of wrists lobulated, and of palm tuberculated below and upper part traversed by six, longitudinal rows of tubercles. Fingers are compressed, thin, long and like the blade of knife, cutting edge of propodus armed at its base with three teeth, and of dactylus almost smooth.

Remarks : Nice, distinctive, lobulations of carapace are sufficient to prove its separate identity. The species is recorded from Indian coasts for the first time. Male pleopod cannot be studied and figured because of its absence in Z.S.I. collection.

Distribution : First time from Sri Lanka, China, Japan, Red Sea, and Queensland.

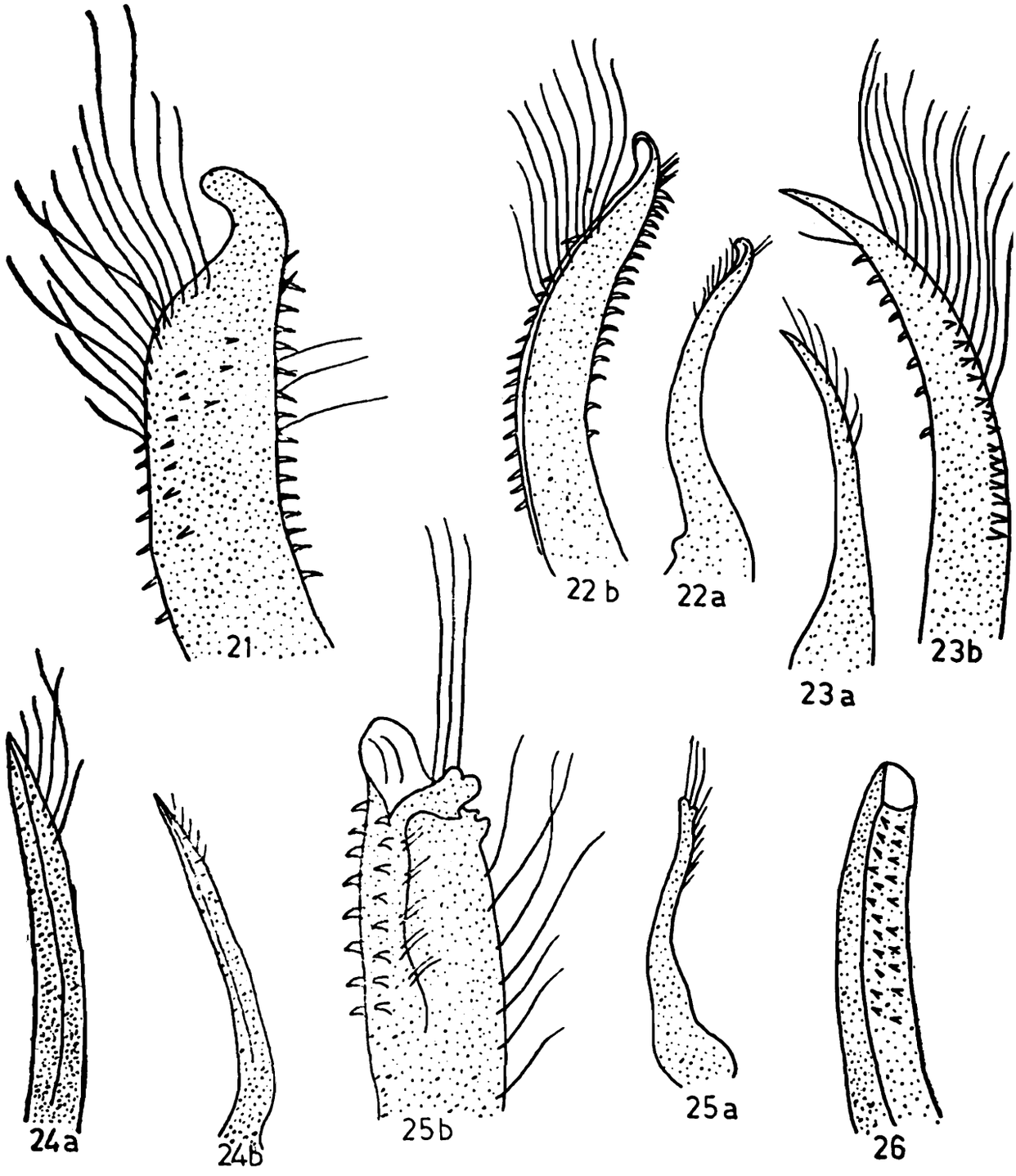
Banareia banareias (Rathbun)

(Pl. Text fig. 34)

Actaea banareias Rathbun, 1911 : 223 ; Edmondson 1962 : 263

Banareia banareias Guinot, 1971 : 1070 ; Serene 1984 : 44

Examined one male from Bay of Bengal, Waltair coast. The specimen belong to the Waltair University collection, brought to me for identification on by a research scholar, Mrs. K. Nirmala and the collection made on 19.2.1979. Width-47.5 mm. ; Length-33.5 mm. ; Front-8 mm. ; Fronto-orbital length-18mm. ; Posterior border-16 mm.



21a. *A. savignyi* Edw. 22a. *A. spinosissima* Borr. b. same enlarged apex 23a. *A. tomentosa* (Edw.) b. same enlarged apex 24a. *P. indica* Deb b. same enlarged apex 25a. *Banareia armata* Edw. b. same enlarged apex. 26a. *Calvactaea tumida* Ward b. same enlarged apex

Description : A large, strongly convex crab, entire dorsal surface and appendages covered and concealed by a thick, shaggy, dark, coat of soft, fine, long hairs. Under the hair the regions and subregions on the carapace are distinctly demarcated. Conical, scattered, irregularly placed granules present all over the surface. Areole 1F, 2F and 1M not distinct ; 2M i.e. protogastric area divided longitudinally by two grooves into inner lobe and the middle and the outer lobe partly divided towards the anterior end. Regions 3M, 2L to 6L distinctly marked. Cardiac region heart shaped and divided longitudinally into two lobes. Anterolateral side longer than postero-lateral, strongly arched, divided into five, low teeth separated by a prominent tubereles, including the outer orbital corner, few smaller tubereles also present near the outer orbital corner. The 4th tooth of anterolateral side is more prominent. Posteroleteral sides shorter, concave and armed with tubercles, two most prominent. Orbits rounded, edge granulate, three granules on outer corner most prominent, a thick subacute tooth on lower inner corner present. Front narrow, median notch deep, V shaped ; outer corner or tooth, blunt, prominent and appear as four tubercular. Antennules transversely fold. Chelipeds almost equal, massive, thickly adorned with hairs and bristles ; three edges of arm beaded, with a subdistal, prominent tubercle on upper edge. Inner corner of wrist flat, straight. Entire outer surfaces of wrist and palm granulate thickly. Edges of carapace and appendages granulate. Upper and lower edges of palm and fingers granular, thickly adorned with bristles ; fingers thin, compressed, black, hooked and pointed at tips, not much gaping when apposed. Edges of leg joints thickly adorned with bristles, upper edges of merus of first three pairs of legs beaded.

Male abdomen seven jointed, sternal plates markedly granular. Anterior male pleopod of above described specimen is curved, stout, tubular process, apex obtusely rounded and spooned at tip, edges of apex fringed with long, plumose setae, outer subapical region thickly spinulose.

Remarks : The specimen described above are very much like the specimens described by Rathbun 1911, and Edmondson 1962 though their specimens are much smaller in size than the Indian specimen. Indian specimen is a very large, mature male, hence its hairs and granules are much more, thicker and it is very convex in appearance.

This unique large specimen is tentatively placed under the subfamily and genus Actaeinae : *Banareia*, with considerable doubt as to its proper taxonomic position. I saw and examined the specimen for a short while, and noted the above mentioned characters. After that I made repeated request to Prof. Hanumanth Rao, of Walttair University, for loaning the specimen for study but he declined. Seeing my great interest for the said crab he thought it would definately be a new, Species. After that also, I advised him to describe the crab as he thought it might be and then deposit the type in Z.S.I. as per the existing rule, so that it can be synonimised later on, but he refused.

Distribution : Bay of Bengal (First record) ; Egmont, Loaoon, Salamon in Indian Ocean ; Hawaii, Tonga.

Banareia Sp.
(Pl. IX, 1, 2)

Seen one male from Trinket, Nicobar Is., Sta. 707 Coll. R. Hodgart ; dt. 8,2.1926. W-7 mm, L-5 mm. ; and 3 small crabs from Andamans 15.

Carapace subcircular in shape, slightly convex in both the directions though the crab look as flatish type. The entire crab, except the outer surface of palms and fingers, are covered thickly with soft, fine, long, hairs. Regional lobules and surface of curb is not smooth, and regions seem to be well outlined. Antero lateral sides armed with 3-4 unseen, concealed, tubercles ; postero lateral sides concave and convergent. Front bilaminar, slightly produced medially ; outer corner of each lamina prominent. Chelipeds slightly unequal, very compressed ; fingers are also very compressed, sharp edged ; white in colour. Upper edge of palm fringed with a row of long hairs, outer and lower surfaces of both the palms are glazed. Leg joints stout, but thickly hairy.

Remarks : The small crabs described above are very young stages hence their correct generic and specific identification is not possible.

But their photographs shows clearly the lobular textural pattern which is almost like Actaeinae Crabs ; the thin, compressed fingers of the chelipeds are also indicates its affinity with the genus *Banareia*, so I included them as a doubtful species under the present genus.

Genus **Calvactaea** Ward

Calvactaea M. Ward 1933 : 384 ; Sakai 1939 : 496 ; 1976 : 520 ; Serene 1984 : 36

Diagnosis : The carapace is very convex, like half of a small pingpong ball. Regional lobules are lacking on carapace, except faint, bifid, grooves which delimits the mesogastric area.

Antero lateral sides of carapace are entire, no indications of lobes present. Postero lateral sides deeply concave. Front in between one fourth to one fifth as wide as the carapace. Upper orbital margin is not tumid as in *Actaea*, but faint traces of sutures present.

The chelipeds are unequal. Leg joints narrow, fringed with hairs. Surface of carapace and outer surface of chelipeds fine, crisply, granular.

Remarks : Like *Actaea*, the *Calvactaea* species occurs associated with corals and it lives in a cavity within the body wall of the coral in adult stage. Young ones are found clinging to the outside of corals.

Distribution : Tropical Indo Pacific, Pearl Bank (First record) Sri Lanka to Australia, Japan.

Calvactaea tumida Ward

(Pl. IX, 3 Text fig. 26)

Calvactaea tumida Ward 1933 : 384 ; Sakai 1938 : 55 ; 1939 : 497 ; 1965 : 148 ; 1976 : 520

Atergatopsis ? *gloobosa* Balss 1935 : 137.

Material : Two females from pearl Bank, Sri Lanka Coll. By T. Southwell. in Jan -Feb., 1911 ; W-22 mm., L-19 mm.

Diagnosis : A species of medium size crab with slightly broader or nearly circular carapace which is very convex like half of a small pingpong ball. Regions and subregions are well outlined, but the surface lobulations, grooves and minute crisp granules on the surface of carapace are visible under lense only. A thin coat of short, fine, surface pubescens covered the carapace evenly. Regional lobules only on frontal and antero-lateral sides and a H-like groove, marked on the gastric region only. Antero-lateral borders creast like, sharp, beaded with crisps granules only, no indication of lobes present. The two frontal lobes oblique, well produced near the median notch and markedly separated from the inner supra-orbital angle. Orbit

small, oval, marginal creast granular. Postero-lateral sides of carapace convergent and deeply concave.

Antenal flagella lodged in the chamber obliquely. Palm of chelipeds rather short, its upper outer surface finely granular, lower surface smooth and polished. Fingers blade like compressed as in *Banareia.* Inner angle of wrist blunt, outer surface minutely granular. Leg joints slender and fringed with hairs. Preserved specimens in alcohol are dark, grayish in colour. Anterior male pleopod is a tubular process, ciliary groove opens apically in wide, almost round aperture, outer sides of the subapical region spinulate all over.

Distribution : Sri Lanka, recorded first time ; Port Jackson (type loc.) and Kii Peninsula in Australia, South West Australia ; Japan.

Remarks : Sakai 1939 remarked that the present genus is apperantly related to the subgenus *Banareia* ; I think except for its blade like, sharp, compressed fingers, both the genera are well distinguished from one another, though its nearness to *Actaea* cannot be denied.

Genus **Paractaea** Guinot

Paractaea Guinot 1969 : 241 ; 1971 : 1071 ; Sakai 1976 : 449 ; Serene 1984 : 95

The carapace of the crabs are broadly oval in shape, moderately convex in both the directions. The entire dorsal surface is divided by broad, deep, grooves into convex, regional and subregional lobules. All these lobules are in turn covered with small, uniform, pearly granules, imbeded in between the short, thick, light coloured fur. The grooves that separating the regional lobules are also covered with similar fur. Outer surfaces of the chelipeds and the leg joints are granular and may or may not be adorned with granular lobules, sometimes these lobules on appendages are obsolate. Front may be prolonged and vertically deflexed (in *rufopunctata* group) or only slightly convex (in *retusa* group). Outer corner of frontal lobes separated from the inner supra orbital angle. The antero lateral sides of carapace cut into five lobes (in *rufopunctata* group) or into four lobes (in *retusa* group). In *Paractaea* the basal antenna segment is more robust and wider than in *Actaea.*

Chelipeds equal or subequal, wrists are very swollen and more prominent than the palms, outer surfaces of both these segments

and leg joints may or may not be nodular.

Male abdomen five jointed, 3-5 joints fused.

Remarks : A group of species of the genus *Actaea* is very clean and clear in appearance and were redesignated as *Paractaea* by Guinot because of their very clean and clearly visible lobular carapace sculpture. Outer surfaces of these lobules and appendages are covered closely with small, uniform, pearly granules, which are very clearly imbeded into the thick, short, brown fur. These carapace sculptures are very species spacific and it is very easy to distinguish even the most juvinile stages and smallest specimans by this character.

Key to the species of Paractaea

1. Five anterolateral lobes :—
   Lobules of the carapace markedly isolated by broad, deep, hairy grooves, 5 L heart shaped or not.
   (a) Lobules convex, pearly granular, grooves wide, thickly hairy, 5 L heart shaped ... *rufopunctata*
   (b) Lobules and the carapace very convex, grooves not very deep, but wide and thickly hairy, 5L heart shaped. ... *nodosa*
   (c) Lobules convex, grooves distinct, hairy, granules pearly, very close, uniform ; 5L not distinctly heart shaped, lobular pattern is very clean and clear. ... *typica*
2. Four antero lateral lobes :—
   Lobules isolated by grooves, 5L roughly triangular or so—
   (a) Median lobule of 3M short, small ... *indica*
   (b) ,, ,, ,, 3M long, narrow ... *garretti*
   (c) (i) Lobules flatish, very distinct, clean pattern ... *sulcata*
   (ii) Lobules flatish, medially very clean and distinct ...
   (A) Median lobule of 3M not separated ... *neospeciosa*
   (B) Median lobule of 3M separated ... *speciosa*

Paractaea rufopunctata (M. Edw).
(Pl. IX, 6 T fig. 15a-b)

Xantho rufopunctatus H. Milne Edw. 1834, 389

Actaea rufopunctata, A. M. Edw., 1865 : 268 ; Alcock 1898 : 142 ; Borradaile 1900: 584 ; Odhner 1925 : 60 ; Sakai 1939 : 488 ; Edmondson 1946 : 294, 1962 : 252
Paractaea rufopunctata rufopunctata, Guinot 1969 : 245 ; 1971 : 1071 ; Sakai 1976: 449 ; Serene 1984 : 122

Seen three females from Andamans, W-17mm, L-12 mm.

Carapace thick, subcircular to transerverse in shape. All the lobules on the carapace are convex, separated clearly by deep, broad, smooth grooves, which are covered by brown fur, mixed with long setae. The entire carapace is deeply lobulated, the granules on the lobules and appendages are thickly set, smooth and vesiculus. Lobule IM distinct, 2M completely divided into two subequal lobes ; 3 M into two, broad, lower and one narrow upper median, somewhat indistinct lobes ; 4 M completely divided into two ; 5L broadly heart shaped ; IL, 3L-6L all the lobules are distinct. The lobules on the outer side of chelipeds and leg joints are of same type as on the carapace.

Anterior male pleopod stout, curved in young male, no adult male specimen with pleopod is present or examined uptil now, so the pleopod structure of adult can not be compared and studied. But in the subadult it is narrow and obtusely rounded apically and adorned with a long setae followed by few short hairs.

Remarks : In *P. rufopunctata* the entire dorsal surface of carapace is so well lobulated that its textural pattern is very well outlined and distinctive and it is difficult to be mistaken for the other allied species.

Distribution : Andamans, Indian Ocean, Tahiti, Fiji Islands, Japan, Hawaii, East coast of Africa and Madagascar etc.

Paraactaea rufopunctata nodosa Stimpson.
(Pl. IX, 7.)

Actaea nodosa Stimpson, 1860 : 203 ; A. M. Edwards, 1879 : 245
Actaea rufopunctata var. *nodosa*, Miers, 1886 : 122 ; A. M. Edw. 1923 : 316 ; Rathbun, 1901 : 33 ; 1930 : 257 ; Guinot 1969 : 252

Seen one female from Pearl Bank, Sri Lanka· W-11 mm· L-7 5 mm.

Diagnosis : Carapace very convex, nodulous or lobulus. Regional lobules are high and covered with very small, uniform granules in between short brown fur. Inter lobular grooves deep, broad, filled

with dense, short felt, scattered clusters of long, silky, lank hairs present on the carapace, just one cluster on the top of each, regional lobule. Front vertically deflexed, prominent, convex medially, and sharply bilobed as in other *Actaea* species. The tumid supra orbital edge broken by two upper and one lower fissures. Antero lateral sides cut into four, rounded lobules or teeth of almost equal size.

Exposed surface of carpal and propodal joints of chelipeds and legs lobulated in the same style as in Carapace. Lower outer surface of hand adorned with granules arranged in lines. Fingers short, tips white, blunt pointed. Leg joints fringed with long silky hairs on their upper edges and short fur as in other species.

Remarks : The subspecies nodosa is distinguished from the typical *rufopunctata* by being very convex, thick, and slight differences of its lobular pattern ; shape of carapace is also less broader than the typical form. At a glance the crab seem to be different from the typical form but the textural pattern of the carapace in photograph are coinciding with the variety exactly.

Distribution : Pearl Bank, Sri Lanka (First record), Florida reefs, Bahamas, West Indies to Bahia, Brazil, south Atlantic.

Paractaea typica n. Sp.
(Pl. IX, 10 T fig. 33a-b)

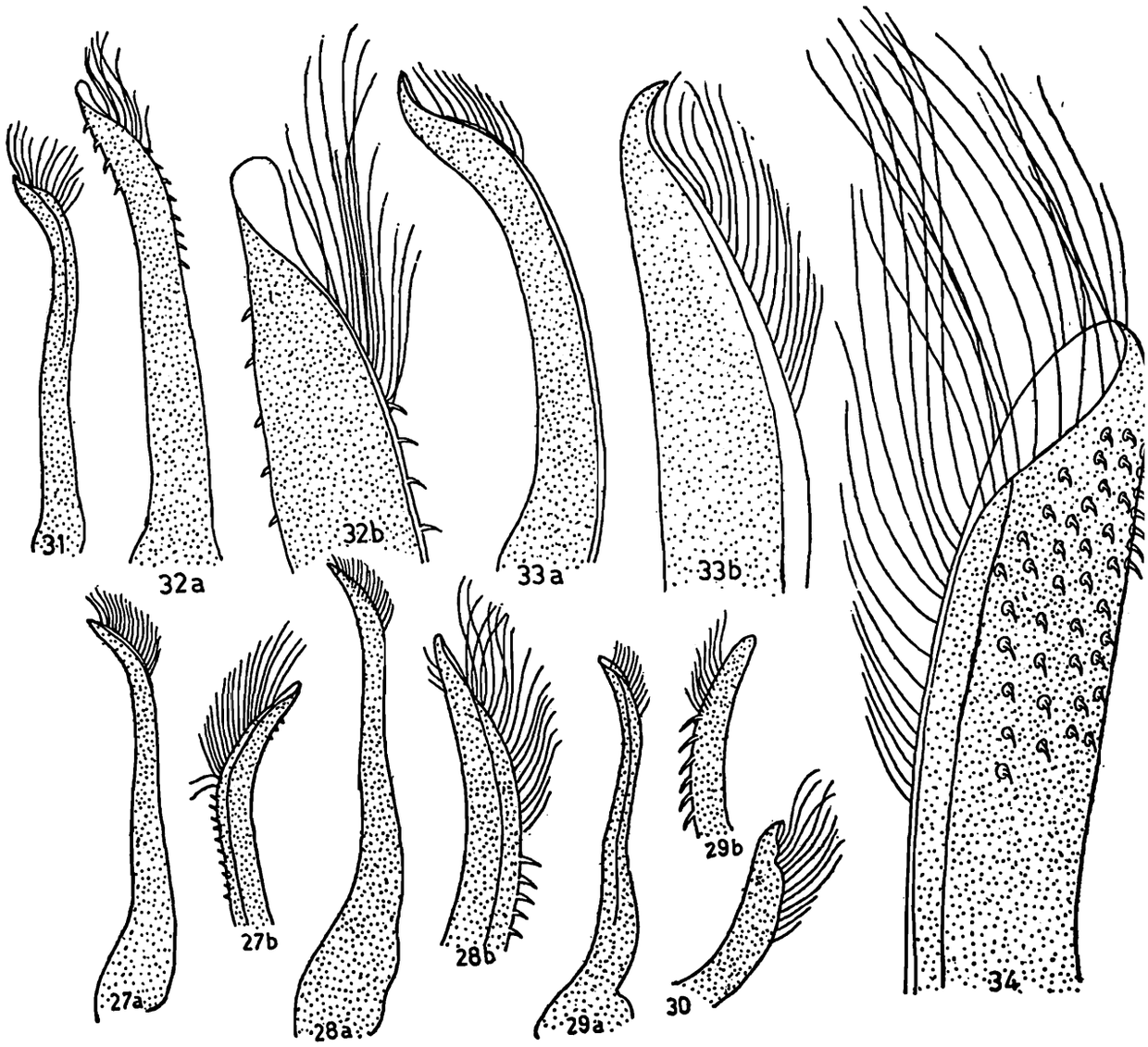
Holotype : Female, Z.S.I. Reg. No. 5282/9 paratype one female Z.S.I. Reg. No. 5383/9, Allo type one male, Z.S.I. Reg. No. 8612/6. The above two females are from South of Sri Lanka, Lat 6.01 'N, long 81 16'E. ; W-12mm, L-8mm. F-2.5mm and one male from Andamans, W-8 mm, L-6 mm, F-2 mm.

Diagnosis : Carapace broadly oval in shape, very convex in both the directions. Regional lobules are well demarcated by broad, deep, hairy grooves and these convex lobules are covered thickly with small uniform granules. The appearance of the crab is very clean and clear. Lobular textural pattern is slightly different from the other allied crabs. 1M square in shape ; 2M divided into two lobules ; inner lobe narrower and shorter than the outer one. 3M is divided into 3 well marked lobules, the median lobule is narrow, long extend upto 1M, lower two lobules are very clean and like petals of flower. Other lobules are all very clear and clean cut. 1P heart shaped ; posterior margin of crab bounded by a broad band like, granular lobule. Four rounded

anterolateral teeth ; front, orbit etc. are like other species. Lobulation and granulations of chelipeds and leg joints are also like the *P. garratti* and *sulcata.* Fingers are short, dark brown in basal half and white apically, tips hollowed out.

Remarks : Very clean, clear and well demarcated lobules of the carapace forms a distinct pattern which is very much species specific and cannot be mistaken for any other allied species.

Distribution : Andamans ; Indian ocean beyond India and South of Sri Lanka (First record).



27a. *A. lata* Borradaile b, same enlarged apex 28a. *A. helleri* Edw. B. same enlarged apex 29a. *A. margari- tifera* Odh b. same enlarged apex 30. *A. nodulosa* White (From Guinot 1958) 31. *A. pulchella* (Edw.) 32a. *Paractaea sulcata* Stimp. b. same enlarged apex 33a. *P. typica* n. sp. b. same enlarged apex 34. *Banareia baneiras* Rathbun of Indian specimen

Paractaea indica Deb.

(pl. IX, 8 T fig. 24a b)

Paractaea indica Deb 1985 : 212

Material examined are two males, the largest one measuring width-11 mm. Length 9 mm. Front 2 mm. from sta. 625 Andamans. Date of coll. March 1914.

Description of male : Carapace broad, transversely oval in shape, thick more strongly convex antero-posteriorly than from side to side. The entire dorsal surface of carapace divided into convex, regional lobules which are closely covered with pearly granules which are visible to the naked eye. The grooves that diveded the carapace, are covered by thick, short, brown hairs. Lobules 2M distinct, separated from the inner lobe of divided 2M. Mesogastric area, i.e. 3M is very distinctly three lobed. Other lobules such as 4M, 1P, 2P, 2L-6L all these lobules are very clear. Front bilobed, deflexed downwards, free edge rounded and entire, separated from the inner, supra orbital, corner by a notch. Outer corner of frontal lobes not recognisable ; Orbits small, rounded and surrounded by granular lobules, dorsally.

Long, convex, anterolateral sides cut into four, broad, low, shallow, granular lobes, exeluding the outer orbital corner. Posterolateral sides short, concave and convergent.

Chelipeds are equal in male, thickly covered with short, brown, soft, fur and granules, which continues upto the 2/3 of the base of both the fingers. Outer surface of the very swollen wrists and rather compressed palms are not at all dimpled or lobular.

Fingers short, curved and light brown in colour, tips of fingers are broad, fluted, bare and white in colour. Leg joints are rather short, compressed, covered with sharp granules and thick brown hairs, below the hairs granules are concealed. No indications of nodules present on leg joints. Under surface of the crab is also scantily hairy but not as valvety as the upper surfaces and appendages.

Anterior male pleopod is straight, tubular process, apex not very acute in shape. Inner subapical area adorned with a cluster of long setae.

Remarks : *Paractaea indica* Deb, is a smooth, clean appearing species. Its lobular textural pattern of carapace are very nicely visible and distinctness of this design is not same or similar with the other known species of the genus. The lobular pettern of carapace of *P. indica* Deb, has got some similarity with the *A. remota* Rathbun 1907, but the former does not fully corresponds with the later because of the shape of mesogastric area i.e. 3M, which is distinctly separated into 3 lobules in *P. indica* and its anterior lobe is very small and narrow, unlike the *A remota*.

In *P. indica* Deb, the inner lobule of protogastric areolae i.e. 2M is continuous with the 1M, anteriorly, like *P. monodi* Guinot 1969, P. 259, but the lobular textural pattern of the rest of the carapace and cheliped are very specific which do not correspond with the *P. monodi.*

Dr. Guinot comments that "It is an unique new specimen, it is neither present in Odhner's 1925 nor in my revision of this genus"

Paractaea garretti (Rathbun)
(pl. IX, 9)

Actaea garretti Rathbun, 1906 : 852
Paractaea retusa (Nobili) forme *garretti*, Guinot 1959 : 255

Seen one female from Port Blair, collected by Capt. Booley, W-17·5 mm, L-11 mm, F- 4 mm. Also one female from Samoa and Viti Island W-14 mm. L-9 mm, F-3 mm.

Diagnosis : Carapace broadly oval in shape, convex in both the directions. Entire upper surface of carapace divided into convex, uniformly granular, regional lobules, separated by deep, wide, thickly hairy grooves. Lobule 2M divided and separated from the 1M. Lobule 3M also divided into 3 lobules ; 4M low, indistinct, rudimentory, 1 P distinct and divided. 1L-6L all the lobules are clear. Posterior margin is also very clearly defined, little concave, uniformly granular ridge. Antero lateral side four lobed. Front one fourth of the width of carapace, bilobed, convex medially. Upper orbital edge tumid and lobed. Chelipeds lobular and granular like carapace. Upper outer surface of wrists and only upper surface of palms are nodulose very clearly. Lower half of palms traversed by longitudinal rows of granules. Base of fingers grannlate. Fingers short and white, cutting edges uniformly dentate, tips hollowed out. Upper edges of leg joints nodular, dimpled, and uniformly granular, covered with hairs. Absence of male specimen prevent the study of anterior pleopod.

Remarks : *P. garretti* (Rath.) is a very clean looking small crab, its similarity with *A. sulcata* Stimpson, is also striking, but these two are not synonymus. I have not seen the specimen of the *retusa* but its photograph is different from *P. garretti.*

Distribution : Andamans (First record), Samoa, viti, Kingsmill Ids.

Paractaea sulcata Stimpson
(pl. IX, 11, T text fig. 32a-b)

Actaea sulcata Stimpson, 1860 : 203 ; A. M. Edw., 1866 : 267 ; Odhner 1925 : 78 ; Rathbun 1930 : 269

Seen one male from Andamans, W-7 mm. L-5 mm. F-2 mm.

Diagnosis : Carapace broad, elliptical in shape and moderately convex in both the directions. Upper surface of carapace divided into flattened, finely granular regional lobules, separated by deep, broad, hairy grooves, these hairs are very long and fine. Surface granules are very fine, not visible to the naked eye.

Posterior lobules less prominent and concealed by long pubescence. Lobular textural pattern of carapace is very much like the *P. garretti,* outer surface of chelipeds and legs joints are also similar as in *garretti.*

Remarks : *Paractaea sulcata* can be distinguished from the *P. garretti* in having the almost flat topped regional lobules, surface granules are minute ; inter lobular grooves wider, hairs on grooves are long, yellow, silky and sometime conceal the textural pattern of carapace. They seem to be different at a glance though their lobular pattern is almost same in photographs.

Distribution : Andamans (first records) ; Mexico, Lower California ; Bay of Panama.

Paractaea speciosa (Dana)
(Pl. IX, 4 T fig. 19a-b)

Actaeodes speciosa Dana. 1852 : 198 ; Stimpson 1898 : 32 ;
Actaea speciosa, A. M. Edw., 1865 : 143 ; Alcock 1898 : 143 ; Rathbun 1906 : 852 ; Laurie 1906 : 402 ; Odhner 1925 : 62 ; Sakai 1939 : 389 ; Barnard 1950 : 232 ; Sankarankutty 1962 : 132 ;
Pseudoliomera speciosa, Guinot 1969 : 230 ; 1971 : 1071 ; Sakai 1976 : 453 ; Serene 1984 : 101

Seen several specimens from Andamans, Sri Lanka, Mergui, Maurititus, W-11·5 mm. L-9 mm.

Diagnosis : Carapace somewhat flattended, roughly pentagenal to subcircular in outline and devoid of long hairs except on the grooves. Lobules less convex, flatish but distinctly demarcated by shallow hairy grooves into series of lobules that appear to radiate from mid-cardiac region. Lobulation on posterior third of the carapace

incomplete. 2M incompletely divided into two unequal lobes, 1M, 1L-6L ; 4M all are distinct ; 1P rhomboidal in shape, 2P rectangular, all the lobules of carapace and appendages are closely covered with milliary granules, which are less distinct postero-dorsally and almost indistinct on lower surfaces. Fine, even, soft and short, yellow felt covered the surface between the granules and the grooves between the lobules. Four shallow subequal lobes present on the anterolateral sides and the postero lateral sides are concave, shorter than the former.

The flat lobes covered the carpus, propodus of legs and chelipeds are of same sculpture and texture as that of the anterolateral part of carapace. Fingers pointed with slight indication of hollowness at tips.

Anterior male pleopod stout, slightly curved, gradually tapers apically ; apex thin, doubled edged ; inner subterminal side fringed with a group of few gradually increasing long setae. Outer and inner sides of subapical region armed with scattered spinules. Basal region of the process is thickly fringed with long, plumose setae.

Remarks : Arrangement of lobules from mid cardiac region is same as that of petals of a flower which made diagnosis of the species easy and correct.

Distribution : Indian and Afriean coasts, Andamans, Sri Lanka, Maldives, Laccadives, China, Japan, Australia, Red sea, widely Indo-pacific in origin.

Paractaea neospeciosa Sp. Nov.
(Pl. IX, 5)

Holotype one female from Palk Strait, Gulf of Mannar, Marine Survey Collection, Z.S.I. Regd. No. 4521/7 ; measurements— Width-12 mm, Length-8 mm, Front-2·5 mm.

Diagnosis : Carapace broadly oval in shape, strongly convex antero-posteriorly and moderately so from side to side. The entire carapace is divided very cleanly into regional and subregional convex lobules. The deep distinct grooves that separates the lobules are covered with short brown fur. Surface of these lobules are covered with uniform, pearly granules, which are very distinct and evenly disposed. Radial arrangements of the lobules on the mid cardiac region is very much like the *P. speciosa*. The lobulations on the posterior third of the carapace is very distinctly defined. Lobule 2M

distinctly divided into two subequal lobules, inner lobule is narrower and continuous with the 1F and 2F forward. Lobule 3M not at all divided, 4M narrow, distinct, 1P is distinctly heart shaped. All the other lobules on the carapace and appendages are very distinctly defined. Antero lateral sides four lobed, which are low, rounded and granular. Front vertically deflexed downwards, little emerginate in the middle, free edge of both the lobes oblique, outer corner of each lobe distinct. In female chelipeds are equal, stout, the lobules on outer surfaces of wrists and on upper edge of hands are distinctly outlined and one granular longitudinal line present on the middle of outer surface of palms. Lower half of palms are granular : base of dactylus is also granular. Dactylus is very short, strongly curved like the beak of bird, one tubercular tooth present on the cutting edges of both the fingers near the base. Fixed finger is also very short, its base adorned with clusters of long bristles. Tips of the fingers are pointed. Leg joints short, stout upper surface granular, lobules present only on upper edges of carpus and propodus.

Remarks : *Paractaea neospeciosa* Deb and *P. speciosa* (Dana) are very close alley and at a glance the former can be mistaken for the later. But in detail comparison of their photographs shows the main differences clearly as follows :—

P. neospeciosa :	*P. speciosa* :
1. Broadly oval in shape	1. Less broad, roughly pantagonal shape.
2. Inner lobe of 2M continuous forward with 2F and 1F.	2. Inner lobe of 2M not continuous forward with 2F and 1F.
3. 3M not divided at all	3. 3M divided into 3 separate lobules
4. 1P heart shaped	4. 1P not heart shaped but diamond shaped.
5. Lobule 5L not divided or notched.	5. Lobule 5L indistinctly divided or notched.
6. Lobule 2P very distinct, board band like.	6. Lobule 2P not very clearly band like.

SUMMARY

The present communication includes a record number of forty four species of the subfamily Actaeinae comprising of four Indian genera are reported from the coasts of India, Andamans, Sri Lanka and Laccadives Maldives coral colony and stone crevices. Two species *Paractaea typica* and *P. neospeciosa* described here, are new to science and 18 species are reported for the first time from India. *Actaea fossulata* A. M. Edwards is considered a valid species and not a synonym of *A. cavipes*. All 44 species are fully illustrated as an aid to identification.

Thus the present paper gives a complete account of the subfamily Actaeinae so far recorded from Indian region which was earlier limited to 17 species only.

ACKNOWLEDGEMENT

The author is grateful to Dr. B. S. Lamba, Joint Director-in-Charge, Zoological Survey of India, Calcutta for the facilities provided for this work, to Dr. O. B. Chhotani, Scientist-D and Dr. Kuldip Rai, Scientist-C for their valuable guidance, suggestions and encouragements. She is also thankful to the photographers and typist for their help and co-operation.

REFERENCES

ALCOCK, A. 1898 : Materials for the carcinological fauna of India, *J. Asiatic Soc. Bengal*, **67** (1) : 67-233.

AUDOUIN, J. V 1826 : In J. C. Savingy, Description de l'Egypte, Histoire naturelle, Paris **1** (4) : 77-98.

BALSS, H. 1935 : Brachyura of the Hamburg Museum Expedition to South Western Australia 1905. *J. Roy, Soc. Western Australia*, **21** : 113-151.

BARNARD, K. 1950 : Descriptive catalogue of South African Decapod Crustacea (Crabs and Shrimps). *Ann. S. Afr. Museum* **38** : 1-837.

BORRADAILE, L. A. 1902-03 : Fauna and Geography of Maldive and Laccadive Archipelago. London, **1** : 191-208.

DANA, J. D., 1852 : Crustacea, Part-I. United States Exploring Expedition .. .. Charles Wilkes, U.S.N. **13** : 1-685.

DEB, M. 1985. A new species of the genus *Paractaea* Guinot 1969, (Crustacea : Decapoda Xanthidae) from Andamans. *Bull. zool. Surv. India,* **7** (2-3) : 211-213.

EDMONSON, C. H., 1946 : Reef and shore fauna of Hawai. *B. P. Bishop Mus., Spe. Pub.*, **22** : 1-381.

EDMONSON, C. H., 1962 : Xanthidae of Hawai. *Occ. Pap. B. P. Bishop Mus.*, **22** : 215-309.

EDWARDS, A. M., 1865 : Studes zoologiques sur les crustaces recents de la family des Cancerrions. *Nouv. Arch. Mus. D'Hist. Nat.* Paris, **1** : 177-308.

EDWARDS, A. M., 1873 : Description de quelques Crustaces nouveaux ou peu connus *J. Mus. Godeffroy*, **4** : 79-88.

EDWARDS, H. M., 1834-37 : Histoire Naturelle des Crustaces Paris, I (1834), **2** (1837).

FABRICIUS, J. C. 1787 : Mantissa insectorum sistens ... ... Observationibus, I : XX-348 pages.

GIARD, 1859 : Note monographique sur cancer et Platycarcinus. *Ann. Soc. Entom.* France, (3), VII : 149.

GUINOT, D. 1958 : Sur une collection de Decapodes Bracyyoures (Portunidae et Xanthidae) de l'ile Mayolte. II. Xanthidae. *Bull. Mus. Hist. nat.*, **30**, no. I : 84-93.

GUINOT, D. 1962. Sur une collection de Crustaces Decapodes Brachyoures desiles Maldives et de Mer Rouge (Expedition "Xarifa" 1957-1958) *Kieler Meeresforsch.*, **18**, (2) : 231-244.

GUINOT, D. 1969. Sur Divers Xanthidae Notamment sur *Actaea* De haan Et *Paractaea* Gen. Nov. (Crustaces : Decapoda : Brachyura). *Extrait des Cahiers du pacifique*, No. 13 : 223-267, fig. 18-36.

GUINOT, D. 1971. Recherches Preliminares sur Les Groupements Naturels chez Les Crustaces Decapodes Brachyoures VIII. Synthese bibliographie. *Bull. Mus. nat. Hist. Nat.* Paris, **42** (5) : 1063-1090.

HASWELL, W A. 1882 : Catalogue of the Australian stalk and sessile-eyed Crustacea, Sydney : 1-323.

HELLER, C. 1862 : Beitrage zur Crustanfauna des Rothen Meeres. I. S. B. Akad. Wiss. Wien : **43** (I) : 297-374.

HENDERSON, J. R. 1893 : A contribution to Indian Carcinology. *Trans. Linn. Soc. Zool.*, (2) **5** : 325-458.

LANCHESTER, F. W., 1900 : On the Crustacea from Singapore and Malacca. I. Brachyura. *Proc. Zool. Soc.*, London, : 719-770.

LAURIE, R. D., 1906 : Report on the Brachyura collected by Prof. Herdman at Ceylon (1902). *Ceylon Pearl Oyster Fisheries Report*, London, **5** : 349-432.

MAN, J. G. de. 1879 : New or imperfectly known Podophthalmus Crustacea of the Leyden Museum *Notes fr. Leyden Mus., 1.*

MAN, J. G. de. 1888 : Bericht uber die in Indischen Archipel von. und Stomatopodon, *Archiv. f. Naturg.* **53** : 215-600.

MAN, J. G. de. 1896 Brachyuren des Hamb. U. Paris Mus. *Jahrb. Hamb. Wiss. Aust.*, **13** : 75.

MIERS, E. J. 1881 : On a collection of Crustacea ... ... at Goree Island, Senegambia. *Ann. Mag. Nat. Hist.*, Ser. (5), **8** 204-220.

MIERS, E. J. 1884 : Crustacea. Report of the zool. coll. H.N.S. "Alert", London : 513-575.

MIERS, E. J. 1886 : Report on the Brachyura collected by H.M.S. Challenger during the years 1873-1876. Report on Sci. Results Voyage of H.M.S. Challenger during the year 1873-76, Zoology, **17** : 1-362.

NOBILI, M. G. 1905 : Diagnosis prelinaris ... ... de Decapodes dela Mes. Rouge. *Mus. Nat. Hist.* Paris, Bull. **11** : 393-411.

ODHNER, T. 1925 : Monographierte Gattungen der Krabben familie Xanthidae *I. K. Vet. o. Vilter. Samh., Handl.* **29** (1) ser., 4 : 1-92.

ORTMANN, A. 1897 : Carcinologische Studien. *Zool. Jahrb. Syst.*, **10** : 258-372.

ORTMANN, A, 1893 : Abtheilung : Brachyura (Brachyura genuine Boss) aufbewahrten G. Formen, Vii. Theil. *Zool. Jahrb. Syst.* **7** : 411-495.

RATHBUN, M. J. 1906 : The Brachyura and Macrura of the Hawaiian Island. *Bull. U. S. Fish Comm.*, **23** (1903). Washington : 827-930.

RATHBUN, M. J. 1910 : Brachyura : The Danish Expedition to Siam 1899-1900, *V.*-Kal, Dansk Vid. Selsk. Skr. 7., Raekke, Naturvid. math. Afd., Kobenhavn : 301-367.

RATHBUN, M. J. 1911 : Marine Brachyura No. 11 ... ... Stanley Gardiner. *Trans. Linn. Soc.*, London, Ser. 2 (Zoology) **14** (2) : 191-261.

RATHBUN, M. J. 1930 : The Cancroid Crabs of America. *Bull, U.S. Nat. Mus.*, **152** : 1-593.

RUPPELL, ED. 1830 : Beschreibung and Abbildung von 24 Arten Kurzschwang Krabben, als Beitrag zur Naturgenschiahte des Rothen Meeres Frankfurt : 1-28.

SAKAI, T 1939 : Studies on the crabs of Japan IV Brachygnatha, Brachyrhyncha. Yokendo, Tokyo : 365-741.

SAKAI, T 1965 : Crabs of Sagami Bay : 1-206. Tokyo.

SAKAI, T 1976 : Crabs of Japan and the adjacent seas. Kodansha, Tokyo, i - xxix - pp. 773.

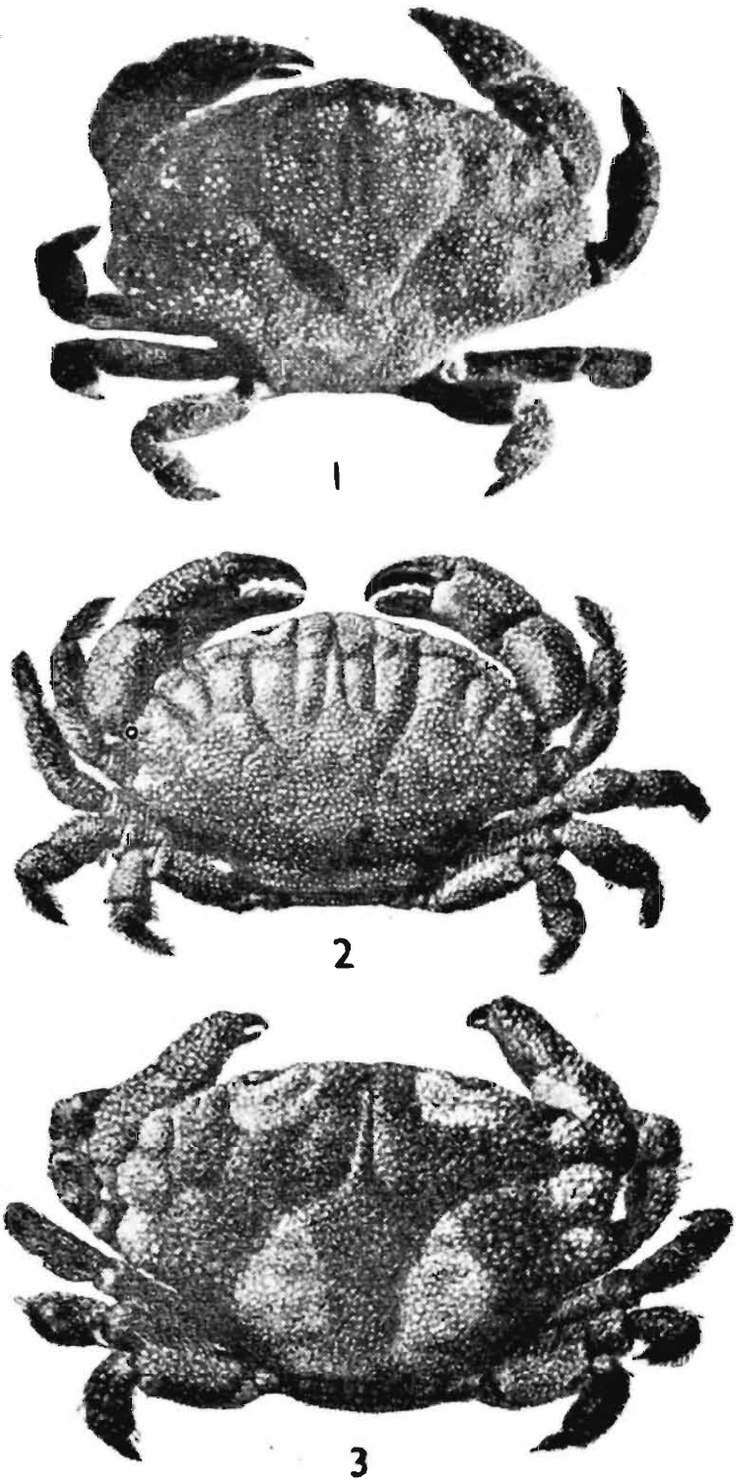
SERENE, R, 1984. Crustaces Decapodes Brachyoures de l' Ocean Indian occidental et de la Mer Rouge Xanthoidea : Xanthidae et Trapeziidae. *Fauna Tropicale, XXIV* : 5-348. Pl-1-48, T fig. 1-243.

WARD, M. 1933 : New genera and species of marine Decapoda Brachyura ; *Australian Zoologist*, 7 (5) : 377-394.

WARD, M. 1941 : New Brachyura from the Gulf of Devao, Mindanao, Phillippine Island, *Am. Mus. Novitates.* (1104) : 1-15.

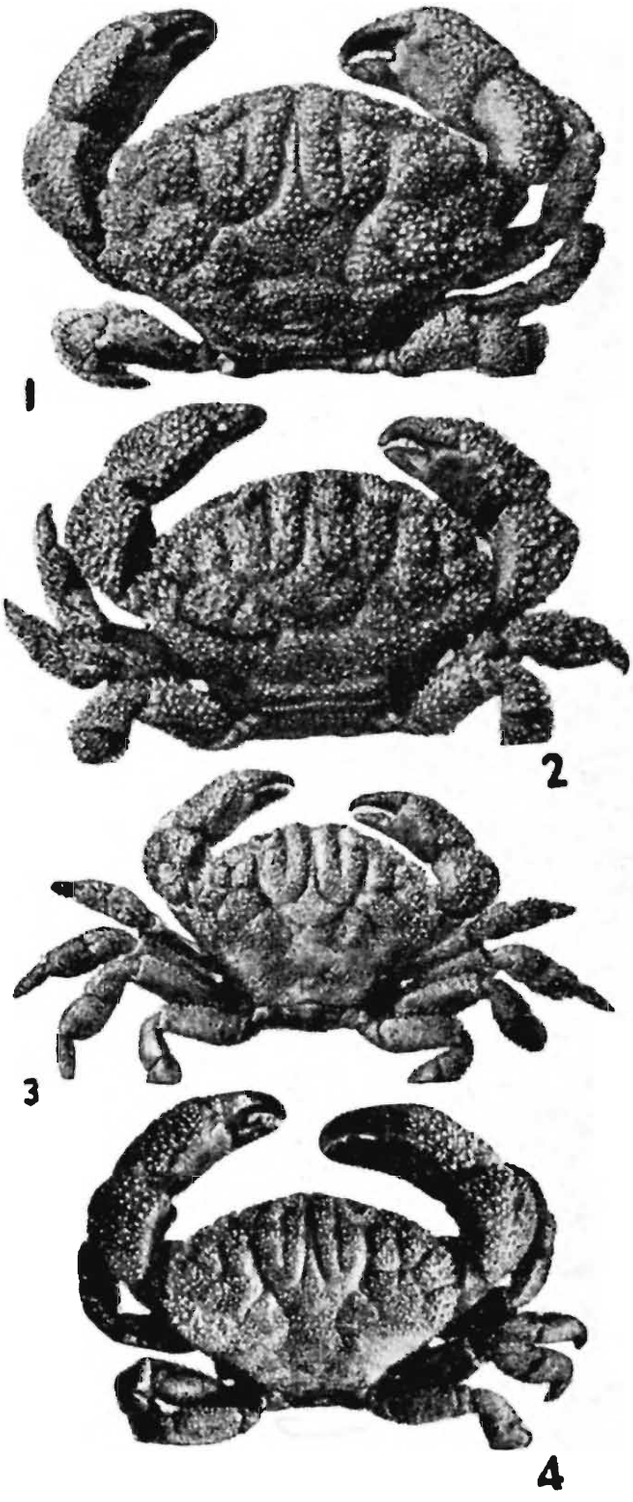
WHITE, A. 1847 : Description of new crustacea from eastern Sea. *Prac. zool. Soc.* London, **15** : 56-58.

PLATES



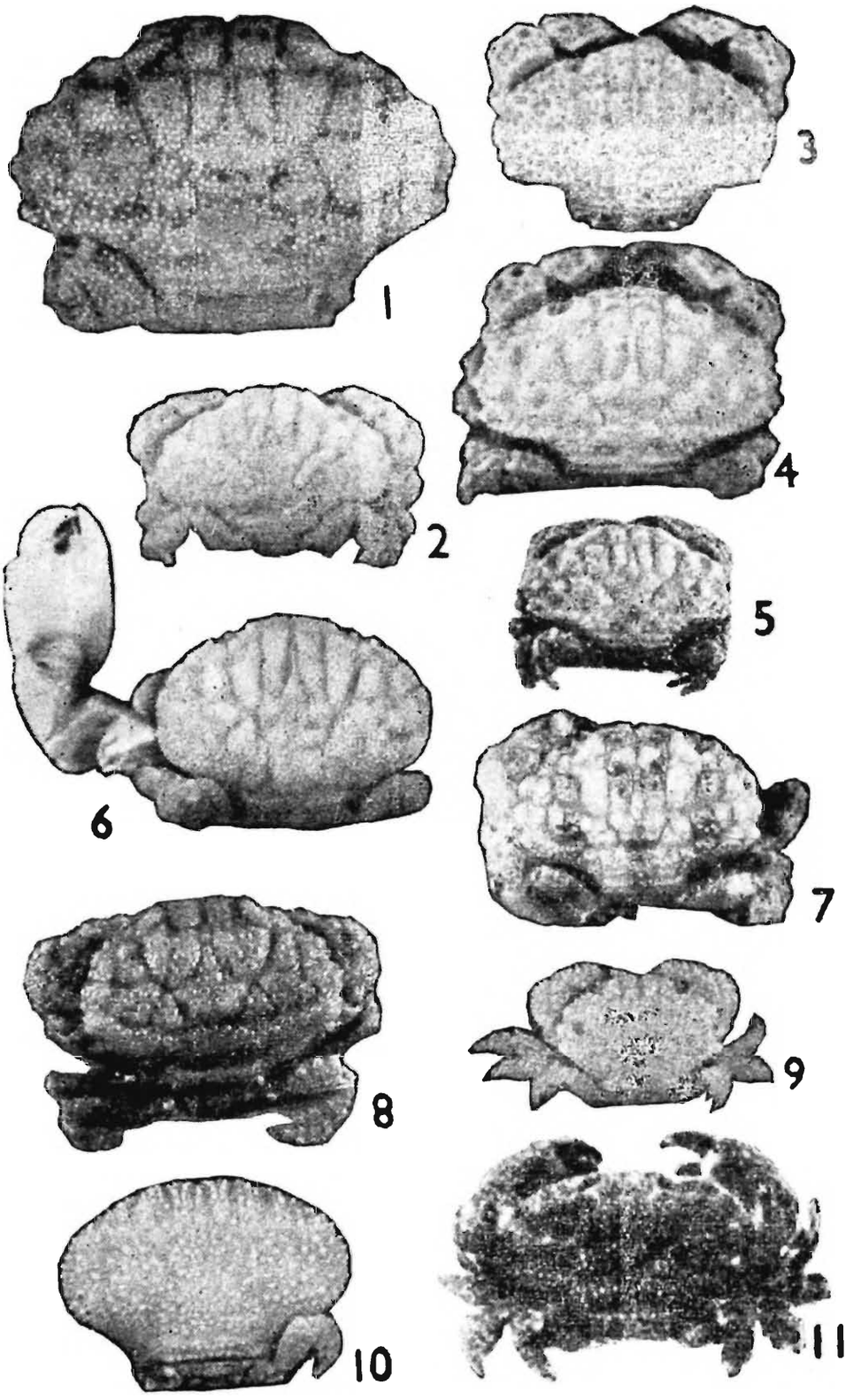
PLATE—I

1. *Actaea alcocki* Laurie 2. *A. amoyensis* (de Man) 3. *A. obesa* Edw.



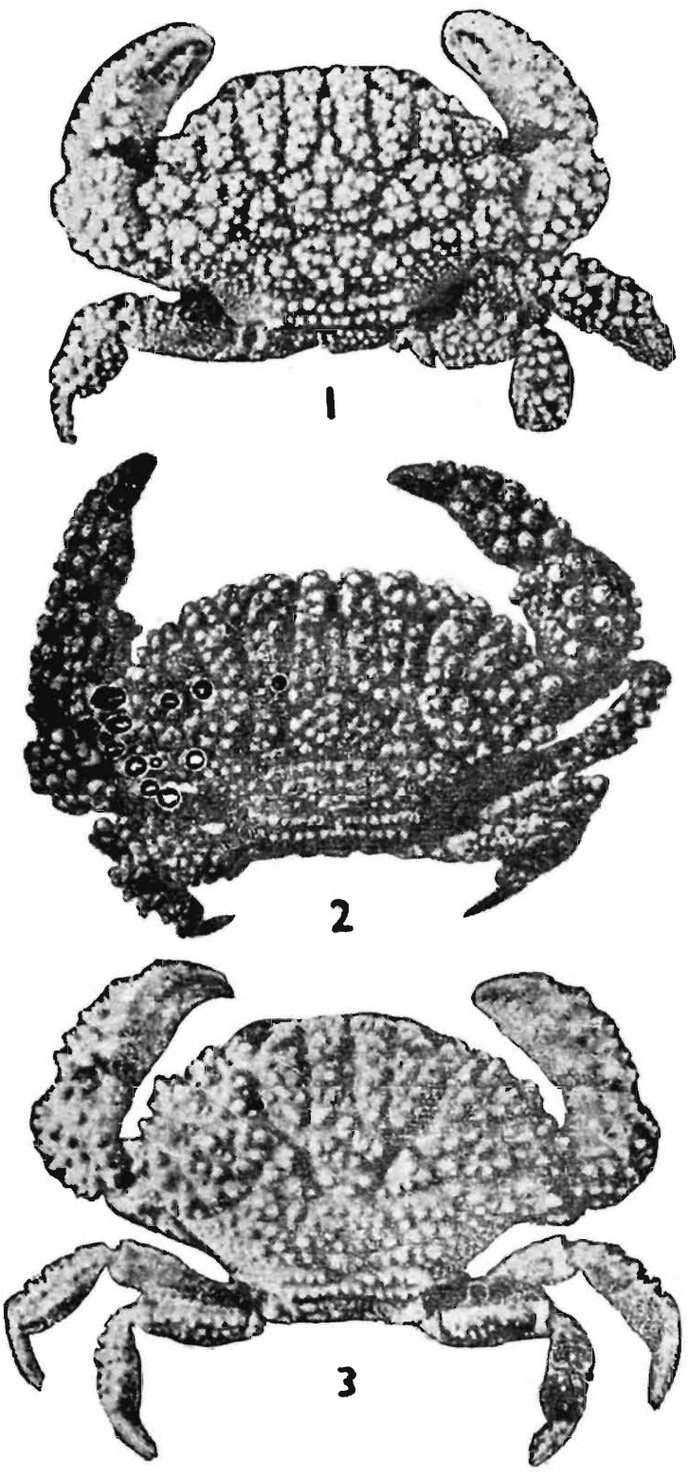
PLATE—II

1. *Actaea michaelseni* Odhner 2. *A. pulchella* (Edw.) 3. *A. depressa* (White) 4. *A. scabra* Odhner



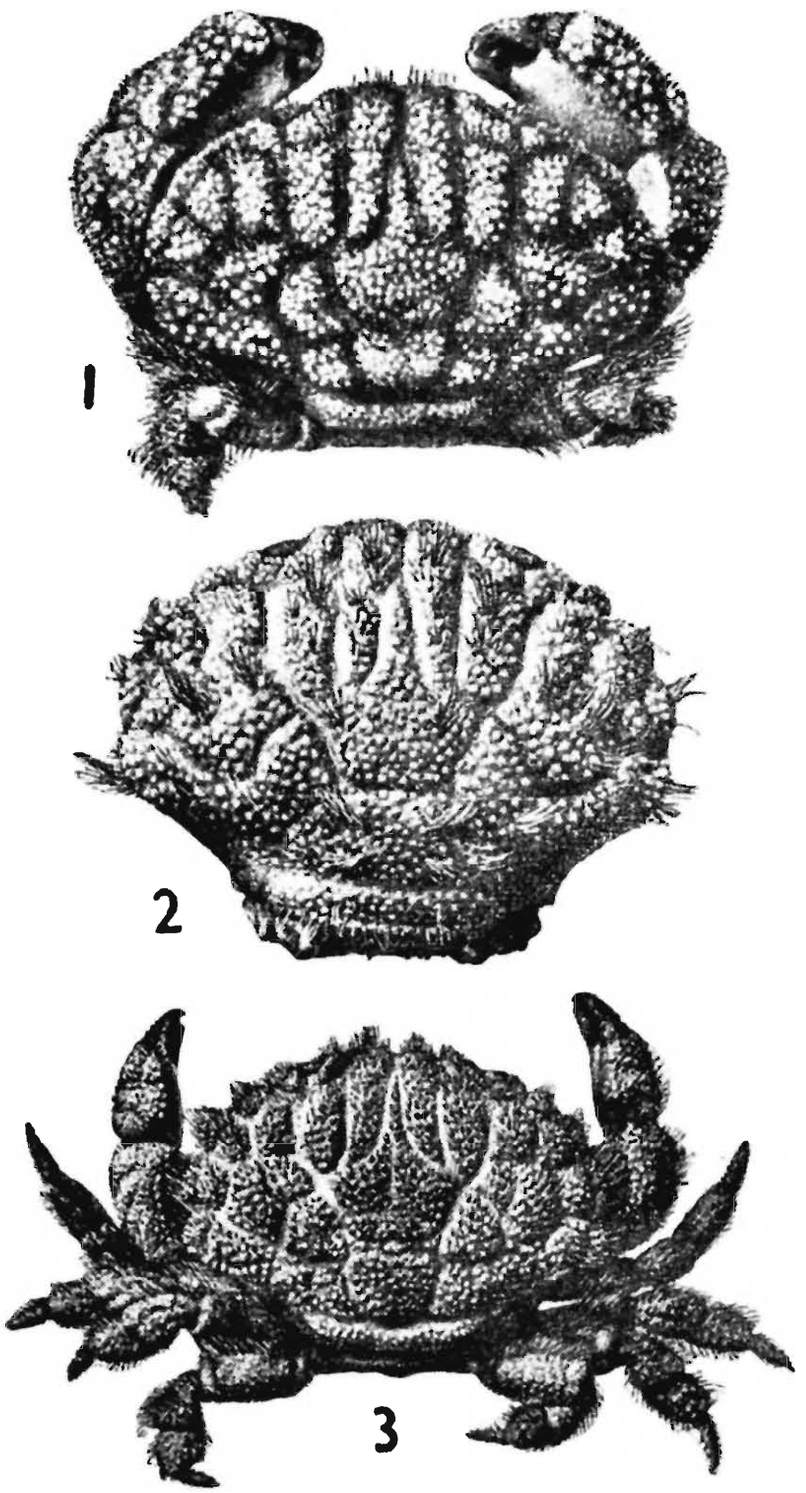
PLATE—III

1. *Actaea fossulata* Edw. 2. Same 3.—5. *A. cavipes* Dana 6. *A. variolosa* Borr. 7. *A. consobrina* Edw. 8. *A. calculosa* Edw. 9. *A. margaritifera* Odhner 10. *A. helleri* Edw. 11. *A. tomentosa* (Edw.)



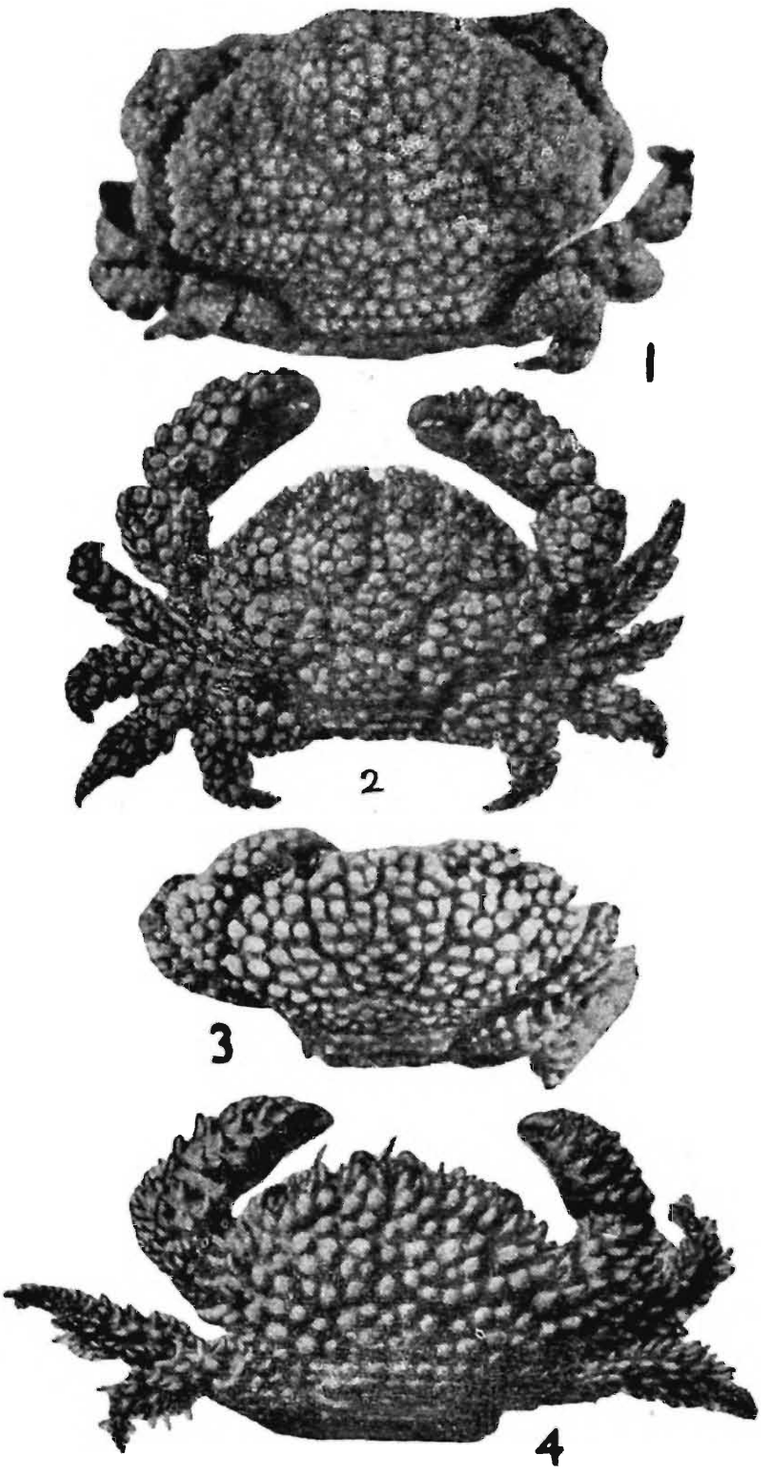
PLATE—IV

1. *Actaea bullifera* Alcock 2. *A. nodulosa* White 3. *A. echinus* Alcock



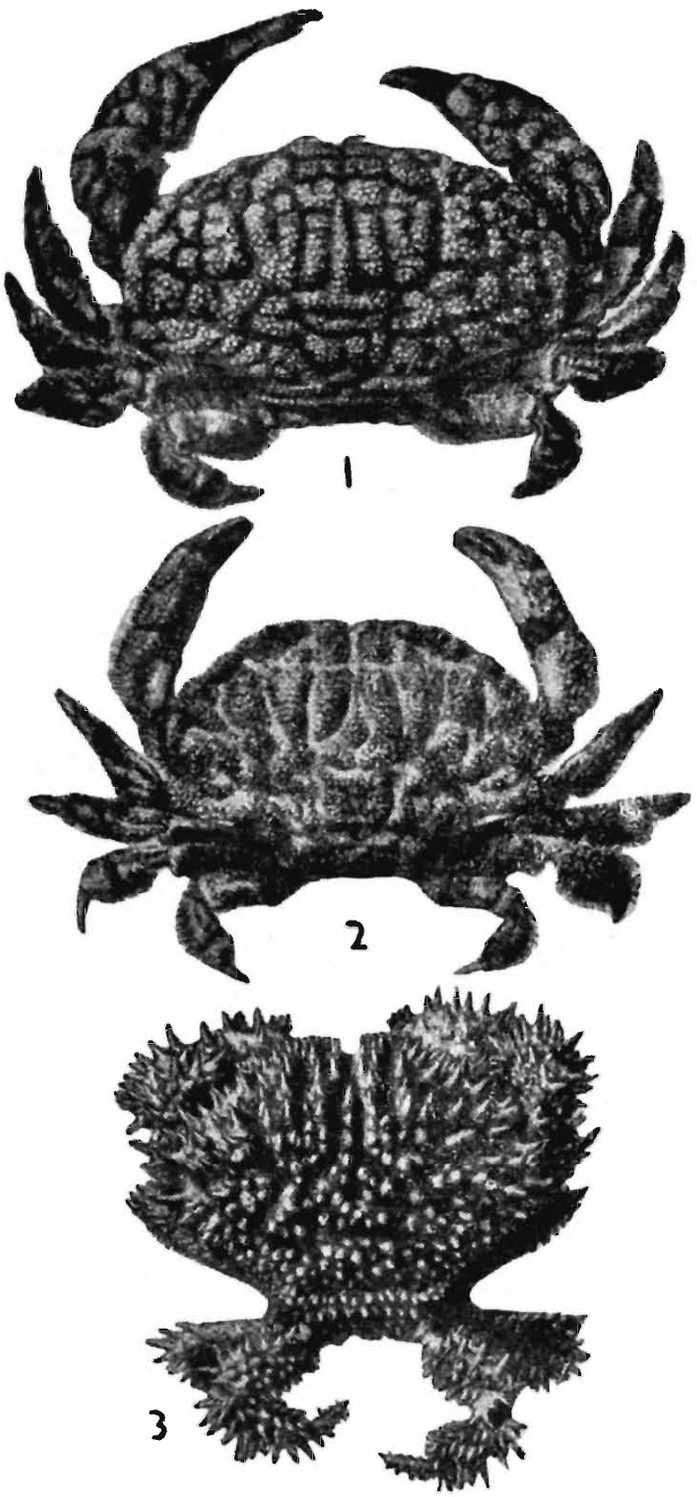
PLATE—V

1. ***Actaea lata*** Borr. 2. *A. orientalis* Odhner 3. *A. ruppelli* (Krauss)



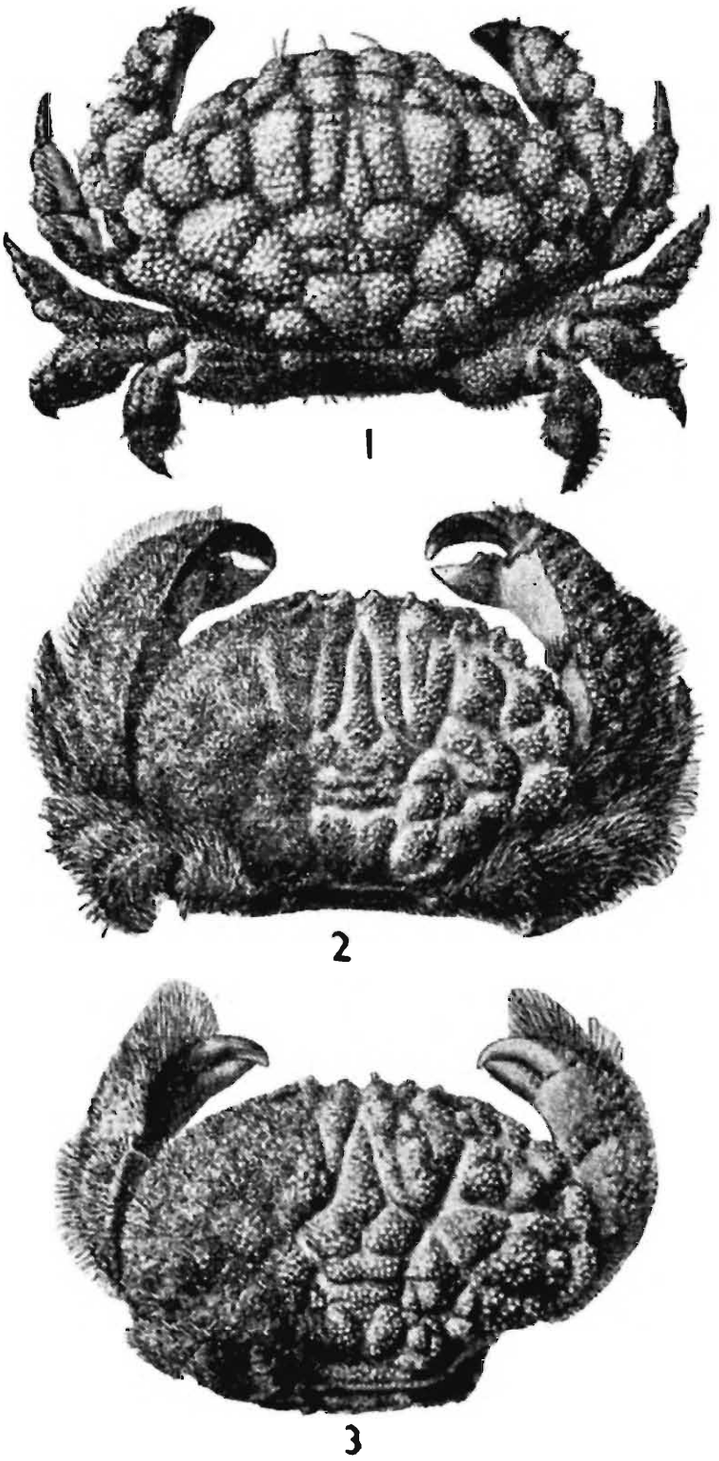
PLATE—VI

1. *Actaea savignyi* Edw. 2. *A. flosculata* Alcock 3. *A. peronii* Edw. 4. *A. spinosissima* Borr.



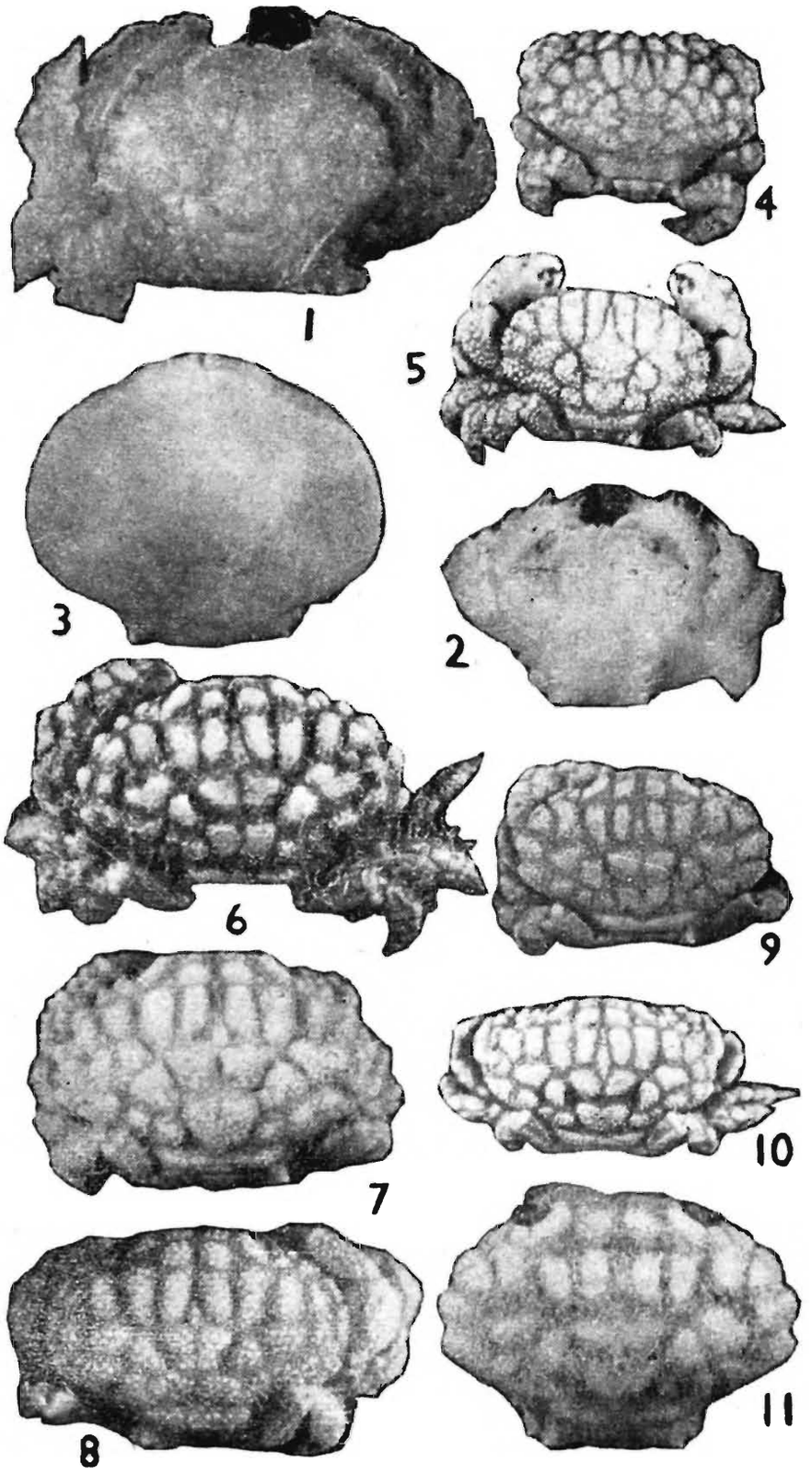
PLATE—VII

1. *Actaea areolata* (Dana) 2. *A. hirsutissima* (Ruppell) 3. *A. perspinosa* Borr.



PLATE—VIII

1. *Actaea tumulosa* Odhner 2. *Banareia armata* Edw. 3. *B. kraussi* Heller



PLATE—IX

1—2. *Banareia* sp. 3. *Calvactaea tumida* Ward 4. *Paractaea speciosa* (Dana) 5. *P. neospeciosa* n. sp. 6. *P. rufopunctata* (Edw.) 7. *P. nodosa* Stimpson 8. *P. indica* Deb. 9. *P. garretti* Rathbun 10. *P. typica* n. sp. 11. *P. sulcata* Stimpson