

THE EGYPTIAN UNIVERSITY.

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BULLETIN OF THE FACULTY OF SCIENCE, No. 6.

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**Report on a Collection of  
Stomatopoda and Decapoda**

from

**Ghardaga, Red Sea.**

BY

**M.M. RAMADAN, B.Sc. (Cairo).**

ZOOLOGICAL LABORATORY, CAMBRIDGE.

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PUBLISHED BY THE EGYPTIAN UNIVERSITY, GIZA.

## ERRATA

Page 8 line 22, for *in* read *is*

- " 12 " 3, for *Pencaecidae* read *Penaeidae*
- " 12 " 13, for *Burkenroad* read *Burkenrood*
- " 12 " 18, for *Alphaeidae* read *Alpheidae*
- " 13 lines 5, 14 and 19 for *demicircle* read *demi-cercle*
- " 24 line 2, for *Galatheidæ* read *Galattheidea*
- " 28 " 12, for *Miidae* read *Maiidae*
- " 41 " 11, for *aus* read *aux*
- " 42 " 5, for *Noux* read *Nouv.*

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## I. — INTRODUCTION

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### a. General Remarks.

The Crustaceans enumerated in this report were collected in the neighbourhood of the Biological Station of the Egyptian University at Ghardaqa on the Red Sea, where I had been sent from Cairo by the Zoological Department. Some notes on the nature of the localities are added. Nearly all the specimens were obtained in the summer of 1933 by myself, but a few were taken in the succeeding winter by Mr. G. C. L. Bertram. I am under deep obligations to Dr. C. Crossland, the Director of the Station, for his valuable help during collecting.

The collections have been worked out by me as a guest in the Cambridge Laboratory. I wish to express my gratitude to Prof. J. S. Gardiner, F. R. S., for his interest in my work and his encouragement. I am also greatly indebted to Dr. L. A. Borradaile for the supervision of the work and for reading through the text. I would also thank Dr. W. T. Calman, F. R. S., the Keeper of the Zoological Department of the British Museum, for the opportunity of working in his department and Dr. I. Gordon for her help during my work there. Finally, I should like to express my thanks to Dr. A. Naef, Professor of Zoology, Egyptian University, and the authorities of the Faculty of Science, for recommending me for the mission to Cambridge to carry out this work and for various information and assistance in making this paper ready for print.

The collection comprises 6 species of Stomatopoda, 32 of Macrura, 16 of Anomura and 57 of Brachyura, making in all 111 species. Three species are described as new and 3 are new to the Red Sea. The former are *Athanas erythraeus*, *Arete ghardaqensis*, *Aretopsis aegyptiaca*. The latter are *Coralliocaris venusta*, *Athanas minikoensis*, and *Neptunus (Hellenus) tenuipes*.

Whenever possible I have included notes on the habits of the species, particularly of the land and amphibious crabs.

Among *points of systematic interest* raised by the collection are the following:—

- (1) The material of *Gonodactylus demani* and its var. *spinosus* enabled me to discover a new constant character distinguishing the variety from the type of the species. This character added to others suggests that the variety should be regiven specific recognition.
- (2) Three specimens among the material of *Gonodactylus brevissquamatus* Paulson, strongly support the view that *Gonodactylus fimbriatus* Lenz is a synonym.
- (3) The material of *Arete ghardaensis* bridges further the gap between the genera *Athanas* and *Arete*.
- (4) The examination of the specimen of *Synalpheus charon* (Heller) leads me to suggest that *Synalpheus helleri* De Man is not specifically distinct from *Synalpheus charon* (Heller).
- (5) The abundant material of *Dotilla sulcata* leaves no doubt that this species and *Dotilla affinis* are synonymous.
- (6) The examination of 33 animals of *Chlorodopsis pugil* (Dana) [= *C. Spinipes* Alcock] confirms the suggestion that *C. pugil* and *C. wood-masoni* Alcock are one species.

My observations on *Ostracotheres tridacnae* Rüppell and its host, suggest that the male of this species, unlike those of other species of the family *Pinnotheridae*, is not migratory.

#### b. Geographical Distribution.

The distribution of the previously recorded species of the Red Sea has already been dealt with either by Nobili, Klunzinger, Laurie, Tattersall or Balss. The Macrura and Brachyura have been discussed by Tattersall and Laurie. Balss adds further comments. The geographical distribution of the Red Sea Anomura, however, has not yet been surveyed as a whole. Like the Brachyura and Macrura they belong to the fauna of the

Indo-Pacific region. To demonstrate this, as Laurie did for the Brachyura, I give here a complete list of the Anomura known to occur in the Red Sea, associated with statements showing for each of the species where it has been recorded from adjacent parts of the Indo-Pacific region. (The Thalassinidea are not included here, as they had been included by Tattersall with the Macrura).

### LIST OF RED SEA ANOMURA

The numbers in ( ) refer to corresponding numbers in the reference-list at the end of this paper. The numbers in [ ] refer to secondhand records. R = Red Sea, P = Persian Gulf, E = East Coast of Africa, Zanzibar, Madagascar, L = Laccadives and Maldives, I = India, C = Ceylon.

#### ALBUNEIDAE

1. *Albunea symmysta* (Linn.) R. (46) I (34) C. (50).
2. *Albunea thurstoni* Hend. R. (46) I (34) C. (50).

#### HIPPIDAE

3. *Hippa asiatica* Edw. R. (46) P. (47) E. (42) I. (34) C. (50).
4. *Remipes pictus* Heller R. (46).
5. *Remipes testudinarius* Lat R. (10) E. (42) C. (50).

#### GALATHEIDAE

6. *Galathea australiensis* Hend. R. (10, 46) P. (47) C. (150).
7. — *humilis* Nob. R. (46).
8. *Munida japonica* Stimps. R. (10) C. (50).
9. *Bathymunida polae* Balss R. (10).

#### PORCELLANIDAE

10. *Petrolisthes virgatus* Paulson R. (10, 46).
11. — *ornatus* Paulson R. (10, 46).
12. — *leptocheles* (Heller) R. (46).
13. *Petrolisthes bosci* (Aud.) R. (10, 46) P. (47) I. (34) C. (50).
14. — *rufescens* (Heller) R. (10, 46) P. (47) E. (41) C. (50).
15. — *tomentosus* Dana R. (46).
16. — *carinipes* Heller R. (10, 46).
17. *Polyonyx denticulatus* Paulson R. (10, 46).
18. — *biunguiculatus* Dana R. (10) C. [10].

19. *Polyonyx triunguiculatus* Zehn. R. (46) I. (27).
20. — *pugilator* Nob. R. (10, 46) P. (47).
21. — *pedalis* Nob. R. (46).
22. *Porcellana serratifrons* Stimps R. (46) P. (47) C. (50).
23. — *inaequalis* Heller R. (10, 46).
24. *Pachycheles sculptus* (Edw.) R. (10, 46).

COENOBITIDAE

25. *Coenobita rugosus* var. *jousseaumei* Bouv. R. (10, 46) P. (47).

PAGURIDAE

26. *Paguristes jousseaumei* Bouv. R. (10, 46) P. (47).
27. — *calvus* Alc. R. (10) I. (6).
28. *Clibanarius aequalis* var. *merguiensis* Man R. (10) I. (6) C. (50).
29. — *longitarsus* (Man.) R. (46) P. (47) E. (41).
30. — *striolatus* Dana R. (46) E. (42) I. (6).
31. — *infraspinatus* Hilg. R. (46) I. (6).
32. — *caruifex* Heller R. (46) P. (47).
33. — *signatus* Heller R. (10, 46).
34. — *virescens* Krauss. R. (46) P. (47) E. (41).
35. *Calcinus lateus* Rand. R. (10, 46) P. (47) L. (7) I. (6).
36. — *rosaceus* Heller R. (46) P. (47).
37. *Aniculus strigatus* (Herb) R. (46) E. [6] I. (6).
38. *Diogenes senex* Heller R. (46) P. (47) E. [6]. C. (50).
39. — *denticulatus* Chev. Roux. R. (46).
40. — *pugilator* var. *avarus*. Heller R. (46) E. [6].
41. — *pugilator* Roux. R. (10, 46) P. (47).
42. *Troglipagurus jousseaumei* Bouv. R. (46) I. (6) C. (50).
43. *Cestopagurus helleri* Balss. R. (10).
44. — *coutieri* Bouv. R. (46).
45. *Pagurus punctulatus* Oliv. R. (46) E. (41) L. (7) I. (6) C. (50).
46. — *euopsis* Dana. R. (10, 46) P. (47) E. (41) I. (5) C. (50).
47. *Pagurus deformis* Edw. R. (46) E. (41, 42) I. (6) C. (50).
48. — *tinctor* (Forsk.) R. (10, 46) P. (47) E. (10) L. (7) I. (6†).  
C (50).
49. — *arrosor* (Herb.) R. (46 ††).
50. — *wood-masoni* Alc. R. (10, 46) L. (7).
51. *Eupagurus cavicarpus* Paulson R. (46).
52. — *janitor* Alc. R. (10) L. (7).

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† Recorded as *Pagurus varipes*, See Balss, 1915 (2), p. 10.

†† Recorded from West Coast of Africa.



Although the preceding list shows satisfactorily that the Anomura of the Red Sea form a part of the fauna of the Indo-pacific region, yet it is not as striking as in the case of the Brachyura, which was discussed by Laurie (1914). This is due to the fact, that while the Crustacea of the Red Sea have received much attention, relatively little is known of the Anomura of the Indo-pacific. Other than the monograph of Alcock (1905) on the *Pagurides* of India, there is no comprehensive memoir on this subject.

21 of the 51 species are spreading up to (or from) India and Ceylon, as far as our present knowledge goes.

**c Notes on the grounds from which the collection  
was made.**

The area can be roughly divided into 4 regions:—

- (1) The beach or the area above the high water mark.
- (2) The tidal zone, area between the high and low water mark.
- (3) The reefs including the shore reef.
- (4) The sea bottom either inside or outside the reefs.

(1) The beach: Decapoda found in this part are restricted to *Ocypode aegyptiaca* and *Coenobita rugosa* var. *jousseaumei*, notes on the former are given below.

(2) The tidal zone: This area in some parts is rocky, in others sandy. As a whole and particularly in the flat at the base of the beach, it is characterised by enormous numbers of hermit crabs of different sizes. Under stones in the rocky part, all the material of *Leptodius* and some Alphaeids were found. The latter were usually obtained by raising pieces of the rock. Members of the Grapsidae were collected from the stones of the pier, which extends all along the tidal zone into the water. In the sandy area just below the high water mark, great numbers of small holes are obvious. These are the shelters of *Dotilla sulcata*. The sandy areas are characterised by large numbers

of Holothurians from which *Pinnotheres* were collected. More or less near the low water mark in these areas all the specimens of *Oxystomata* were found. The inner part of the tidal zone in many places is rich in weeds among which spider crabs live.

(3) The reefs: The first of these is the shore reef. All the material of Stomatopoda was collected by breaking into this reef and the harbour reef, except *Squilla massavensis* which was dredged inside the reefs. The Decapod fauna of the reefs is just as that of any other reef. Xanthid crabs, most obvious of which is the brightly coloured *Trapezia* sp., and Alphæids are very common. Members of the Pontoniidae, in association with corals and Echinoderms living on the reefs, are also common. Molluscs (*Tridacna*) from which *Ostracotheres* sp. were collected are also very common on the reefs.

(4) Sea bottom: Swimming crabs (Portunidae), prawns (Penaeidae) and spider crabs were dredged from sandy bottom; the latter with weeds. From a depth of 2-6 metres divers brought up sponges in which commensal Crustaceans, *e.g.* *Upogebia* sp. were found.

## II. — SYSTEMATIC LIST

### and discussion of Ghardaqa species.

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#### A.— Order Stomatopoda.

##### FAMILY SQUILLIDAE.

##### GENUS *Squilla* FABRICIUS.

*Squilla massavensis* Kossmann, 1880.

[Kemp, 1913, p. 76. Balss, 1910, p. 2, text-fig. a, c, d].

A single female specimen, 80 mm.

##### GENUS *Pseudosquilla*, DANA.

*Pseudosquilla ciliata* (Fabricius, 1887).

[Kemp, 1913, p. 96. Hansen, 1926, p. 17. Bigelow, 1929, p. 152.]

A single male specimen, 60 mm.

This specimen belongs to the type variety with no spine at the postero-lateral angle of the fourth abdominal segment. This absence of spine distinguishes the Indo-pacific variety from the Atlantic one.

##### GENUS *Gonodactylus* LATREILLE.

*Gonodactylus glabrus* Brooks, 1886.

[Kemp, 1913, p. 167, pl. 9, fig. 113. Bigelow, 1929, p. 127].

32 males and females, 16-50 mm.

The specimens may be referred to variety *ternatensis*, De Man.

All the specimens agree in the following characters:—

(1) The keels of the sixth abdominal segment and the 3 central ones of the telson terminate in spines.

(2) The median keel between the sub-medians of the sixth abdominal segment, which according to Kemp is occasionally present, is possessed by all the specimens.

(3) The lateral and intermediate keels of the sixth abdominal segment are not as convex as the sub-medians, but have the upper surface depressed, and the lateral ones have the inner margin elevated and distinct as a ridge.

(4) In 20 of the specimens, but not in all, the central keel of the telson is swollen.

(5) Both Kemp and Tattersall record the presence of a pair of black spots close to the anterior margin of the sixth abdominal segment. In all my specimens, besides these two spots, there is a pair of similar but larger spots, one on either side, just inside the two tubercles at the anterior end of the telson.

(6) The uropods of all the specimens agree with the description of Bigelow. Kemp mentions that, among the Ceylon specimens, a spineless form with swollen keels is the commonest. All my specimens have the keels of the sixth abdominal segment and the 3 central ones of the telson terminating in spines, and most of them have swollen keels. This suggests that in the Red Sea a spiny form with swollen keels is the commonest.

As regards colour of the Red Sea form, one can recognise two types, one with keels of the telson all dark blue, the other with the keels with alternating green and colourless bands. I examined all the animals with the purpose of discovering any structural difference between the two types, but I could not find any, only the majority of the type with the dark blue keels are males, while the other is invariably female.

This species is the commonest Stomatopod round the station.

*Gonodactylus demani* Henderson, 1893.

[Kemp, 1913, p. 164, Addendum p. 198. Tattersall, 1921, p. 359].

8 females 20-35 mm. 5 males, 17-28 mm.

All the specimens are without setae on the inner margin of the inner uropod (except for 3-4 on the extreme anterior part).

In this respect they agree with the specimens described by Tattersall. Also the inner margin of the distal segment of the outer uropod is devoid of setae. Kemp was the first to notice the absence of setae from the inner margin of the inner uropod. Tattersall made use of this character as differentiating between the type of the species and its var. *spinosus*. Neither Kemp nor Tattersall made any statement about the inner edge of the distal segment of the outer uropod. In the absence of setae from both inner edges of the inner uropod and distal segment of the outer one my specimens agree with the figures of the type specimen by Henderson. In the distribution as well as the size of the spines on the telson the specimens agree with the figure of Kemp, but not with that of Henderson.

*Gonodactylus demani* var. *spinosus* Bigelow, 1893.

[Kemp, 1913, p. 165, pl. 9, fig. 112. Tattersall, 1921, p. 361.

Bigelow, 1926, p. 579, fig. 1].

14 females, 14-32 mm. 11 males, 20-30 mm.

All the specimens have all the edges of the inner uropod as well as those of the distal segment of the outer uropod invested with setae. On these two characters I have separated the type specimens from the variety. I found that all specimens with setae on all the edges of the uropod have small spinules covering almost all the surface of the telson except the spaces between the ridges and the top part of the central keel, while the specimens with the setae on the outer edges only have large spinules restricted to the posterior region of the telson and these are the specimens identified as the type. Bigelow gives a full history of *G. demani* var. *spinosus* and redescribes one of the type specimens kept in the U. S. Museum. He gives a figure of the telson. He found that the type specimen has the inner edge of the inner uropod invested with setae. This result is in agreement with Tattersall's observations. But although he describes the type, he overlooks the distal segment of the outer uropod. Fortunately his figure shows that it agrees with my observations. Now we have 3 characters which go together: (1) the investment of setae of all the edges of the inner uropod, (2) presence of setae

on all the edges of the distal segment of the outer uropod, (3) presence of small spines on almost all the telson. These three characters may be safely used for separating the variety from the type. Kemp in his monograph, uses, (1) the relative length of the telson to breadth, (2) the development of the lateral and intermediate spines of the telson. The first of these two characters is difficult in practice to make use of. The second character does not agree either with Tattersall's observation or with mine. The examination of my material lends confirmation to Tattersall's observation, that in var. *spinusus*, the lateral and intermediate spines are as well developed as in *G. demani*. In no specimen is the lateral spine absent or not well developed.

Owing to the constancy of the characters referred to above, I am inclined to give specific rank to this variety.

*Gonodactylus brevisquamatus* Paulson, 1875.

= *Gonodactylus fimbriatus* Lenz.

[See Kemp, 1913, p. 174, pl. 10, fig. 110-115 and Tattersall, 1921, p. 362, pl. 27, fig. 5-6.

One male 29 mm. 7 females 20-32 mm.

Dr. Tattersall, after reading a manuscript paper of Mr. Patience on a collection from Mergui, and after comparing his specimens with Patience's description, came to the same conclusion as Mr. Patience that *G. brevisquamatus* and *G. fimbriatus* are synonymous. I have not been able to see the manuscript of Mr. Patience but finding my specimens, on the whole, agreeing with Tattersall's description, I have followed him in the identification. In the following lines I am putting on record some remarks which may be of some value later on.

(1) In none of the specimens does the antennal scale reach the extremity of the eye. Tattersall writes that in the largest of his specimens which is 28 mm., the antennal scale reaches the extremity of the eye. The largest of my specimens is 32 mm., and still the antennal scale does not reach the extremity of the eye, a fact which does not fit in with the suggestion that the antennal scale develops with age.

(2) On the sixth abdominal segment the median carinae are invariably wider than the intermediates. Tattersall writes that in the male the median carinae are parallel and in the female they are divergent. In the only male specimen I have they are not parallel, and in one of the females they are more parallel than in the male. In their shape, they do not agree with Tattersall's figure but agree with that of Paulson, particularly in the fact that they touch each other at their anterior end.

(3) The telson bears in the middle of the dorsal surface an oval smooth elevation, coloured brick red in some specimens, terminating in an obtuse transverse tubercle which can be seen in all the specimens. This tubercle is well developed in 3 female specimens, 20 mm., 23 mm., 27 mm. In those 3 specimens only, on either side of this tubercle and anterior to its level there is a smaller tubercle. In this character they resemble *G. fimbriatus*, Lenz. In other characters the telson agrees with the description of Tattersall. But it may be noted that the sub-median carina and the other small one lateral to it vary in their development in different specimens, but are more developed in the 3 female specimens already referred to. The lateral spines of the telson are absent and the intermediate spines are half as long as the sub-medians. There are two tubercles near the anterior margin of the telson, one on either side of the median elevation. The inner margin of the sub-median spines bears some 10 slender spinules. In all the specimens there is a similar spinule on the outer margin of the sub-medians and inner margin of the intermediates, except in one single specimen where there are two on the inner margin of the intermediates on both sides.

(4) The uropods agree with the description of Tattersall except that the dorsal surface of the endopodite, which according to Tattersall is smooth, is invariably beset with plumose setæ distally.

The discovery of the 3 female specimens already referred to, which possess 3 tubercles at the posterior end of the median elevation, strongly supports the view that *G. brevisquamatus* and *G. fimbriatus* are synonymous. It adds an important character to those given by Tattersall, which brings the two species together.

**B. — Order Decapoda.**

*a. Tribe Penaeides*

FAMILY PENEAEIDAE

GENUS *Penaeus* FABRICIUS.

*Penaeus semisulcatus* De Haan, 1849.

[De Man, 1911 (1), p. 97, pl. 9, fig. 31 a-b. Tattersall, 1921, p. 367].

Many specimens males and females, 15-25 cms.

*Penaeus japonicus* Bate, 1888.

[De Man, 1911 (1), p. 107. Monod, 1930, p. 138.]

3 young specimens 6-8 cm.

GENUS *Penaeopsis* BATE.

(Burkenroad, 1934, p. 7)

*Penaeopsis vaillanti* (Nobili 1904)

[Tattersall, 1921, p. 366, pl. 27, fig. 9.]

2 specimens 7.5-9 cms.

*b. Tribe Carides.*

FAMILY ALPHAEIDAE.

GENUS *Athanas* LEACH.

*Athanas crosslandi* Tattersall, 1921.

[Tattersall, 1921, p. 372, pl. 27, figs. 13-17].

*Athanas djiboutensis* Coutière, 1897, p. 856, fig. 129.

[Tattersall, 1921, p. 368, pl. 28, fig. 25].

Of the 4 specimens referred to this species one is an ovigerous female and 3 are males. The female specimen has lost the small chela and it agrees in all respects with the figures and descriptions of Coutière. The male specimens differ from



each other in the form of the first cheliped and may be noted as follows :—

(1) This specimen which is 9 mm. in length, agrees with the type except that the larger chela has the mobile finger less "courbé en demicircle" than Coutière's type, while the mobile finger of the small chela is as the type.

(2) This specimen which is 7.5 mm. in length may be referred to form (5) of Tattersall. The immobile finger of the larger chela carries the broad high tubercle and the movable finger has the smaller one. The smaller chela was lost in Tattersall's specimens. In this specimen it resembles the type in the merus, carpus, propodus, but the two fingers are different. While in the type the immobile finger is turned downwards and a little inward and the mobile finger is "courbé en demicircle", in this specimen the immobile finger is only turned a little inward, but not downward, with the result that the lower border of the finger does not make an angle with the palm. The mobile finger is curved in a normal way and not "courbé en demicircle".

(3) This specimen is 8 mm. in length. The large chela is of the same type as in specimen (2). The smaller one is different. The fingers are more bent inward than in the preceding form and the immobile finger is bent downward forming a distinct curve. Both chelae in this example are larger than in the preceding one.

*Athanas minikoensis* Coutière, 1905.

[Coutière, 1905, p. 959, fig. 130. De Man, 1911 (2) p. 149, pl. 2, fig. 5]

A single male specimen 7 mm.

This species is new to the Red Sea.

Dist.: Maldive and Laccadive Archipelagoes.

*Athanas erythraeus*, sp. nov. (pl. 1, fig. 1).

One ovigerous female 7 mm. in length.

Definition: An *Athanas* of the *nitescens* sub-group with the dactyli of the 3 posterior legs simple, supra and extra-corneal

spines present and infra-corneal absent and the visible part of the first antennular segment almost as long as the other two segments. In the simplicity of the dactyli, presence of the supra- and extra-corneal spines and absence of the infra-corneal one, this species resembles *A. areteformis*, Coutière (Fauna of the Maldives and Laccadives, p. 860, fig. 132).

The rostrum extends to the end of the second antennular segment. It resembles that of *A. areteformis*, in having the sides parallel for some distance from the proximal end. The supra-corneal spine is not as developed as it is in *A. areteformis*, while the extra-corneal spine is very well developed and almost reaches the end of the visible part of the first antennular segment.

The stylocerite reaches the end of the second antennular segment.

The scaphocerite reaches beyond the antennular peduncle and its lateral spine just passes its end. The carpocerite is much shorter than the scaphocerite.

Coutière does not describe the antenna and antennule of *A. areteformis* but states that they resemble those of *A. naifaroensis* (Fauna of Mald. p. 859, fig. 13). A glance at the dorsal view of *A. naifaroensis* shows at once that *A. erythraeus* differs from *A. areteformis* in the following :—

(1) The visible part of the first antennular segment in this species is approximately of the same length as the other two segments, while in Coutière's species the visible part of this segment is by far longer than either of the two that succeed it.

(2) The lateral spine of the scaphocerite is not well developed in this species as it is in Coutière's species.

The right chela of this specimen has been lost. The left chela exhibits the most important difference between this species and *A. areteformis*. It resembles the chela of the male *A. areteformis* described by Coutière. The meropodite is shorter than the palm and is of triquetrous form, the carpopodite is hemispherical and embraces the basal part of the palm. The fingers are equal and the inner edge of the immobile finger is not entire.

GENUS *Arete* STIMPSON

*Arete ghardaensis*, sp. nov. (pl. 1, figs. 2-8).

One female, 8 mm. 4 males 7-8 mm.

Definition: An *Arete* with the supra-corneal spines present, dactyli of posterior legs simple, and external filament of antennule made of more than 4 segments. This species in its general form recalls *Arete borradailei* Coutière (Fauna of Maldives, p. 852, fig. 133) from which it differs in the following respects:—

(1) The ventral side of the rostrum is not convex as in *A. borradailei* but shows an angular form which is much more pronounced in the female than in the male.

(2) Below the extra-corneal spine the anterior edge of the carapace is not so concave as in *A. borradailei*, but shows a little prominence and then runs downward.

(3) The external filament of the antennule is made of more than 4 segments (fig. 3) and they are much shorter than in *A. borradailei*.

(4) The basicerite is of a different shape and does not carry any lateral spines.

(5) The two median carpal articles of the second leg are not equal as in the other species, the proximal one being rather longer. The fourth segment is larger than the first and quite uniform in breadth, while the first is more slender at its proximal end than at its distal end (fig. 4).

(6) The tooth of the basal segment of the uropod is bifid and not simple as in *A. borradailei*. The first pair of legs is symmetrical and sexually different. The female chelipeds resemble those of *A. borradailei* and those of the male are completely different. No male *A. borradailei* has been recorded.

The ischium is shorter than the merus and carries some spinules on both inner and outer side. The merus is longer than broad and excavate at its inner distal part. The carpus is of a peculiar form. It is completely excavate on its inner side. The propodus is very broad and flattened with both edges crenulated for a little distance. The immobile finger carries two

prominences and the mobile finger carries one which fits between the two on the other side.

The third maxilliped and dactyli of the posterior legs are similar to those of *A. borradailei*. Coutière considers *A. borradailei* as an intermediate form between *Athanas* and *Arete* but more on the *Arete* side. This species, in having more than 4 segments on the external filament of the antennule, shows a further step towards *Arete*.

GENUS *Aretopsis* DE MAN, 1911 (2), p. 170.

*Aretopsis aegyptiaca*, sp. nov. (pl. 1, figs. 9-10; pl. 2, figs. 9-17).

The genus *Aretopsis* was established by De Man for a specimen discovered by the Siboga Expedition. According to De Man the most important differences between *Arete* and *Aretopsis* are :—

(1) The rostrum in *Aretopsis* is laterally compressed with the tip rounded as in *Athanopsis*.

(2) The absence of an extra-corneal spine.

(3) The carpus of the second leg is made of 5 segments instead of 4. My specimen agrees with *Aretopsis* in the state of the rostrum and the absence of the extra-corneal spine. But when we come to consider the carpus of the second leg we are confronted with a difficulty. The carpus of the left leg which is longer than the right is made of 5 segments as in *Aretopsis*, but the right carpus is made of 4 segments as in *Arete*. But under high magnification one can see a notch at the distal end of the first carpal segment, which shows where the formation of the fifth segment would have taken place.

The rostrum extends beyond the first antennular article. Looked at from above, it appears subacute, triangular and wider at the base than it is long, with the lateral margins concave. Its anterior part is obtusely carinate. Laterally viewed, it is compressed with the anterior region slightly rounded.

The eyes are covered by the carapace. There are no teeth in place of the supra and extra-corneal teeth. Below the outer

angle of the orbit the antero-lateral margin of the carapace is directed vertically downward and the pterygostomian angle is rounded. The carapace is slightly compressed, its upper surface is straight.

Apart from the fact that the eyes are covered, the rostral region of this species resembles that of *Aretopsis amabilis*, except that the rostrum is not as high, or much rounded anteriorly as it is in the latter.

The abdomen is laterally compressed. The pleura of the sixth abdominal segment are articulate. The lateral margin of the sixth abdominal somite extends backward in the form of a tooth.

Unfortunately the telson is damaged but the uropods are present. The anal tubercles are very distinct. In *A. amabilis* according to De Man they are probably absent. The tooth of basal segment of the uropod is deeply incised and the outer uropod carries a movable spinule at its outer margin (fig. 11).

Of the 3 segments of the antennular peduncle the third is the longest and the second is longer than the visible part of the first. The stylocerite does not reach the end of the second segment. In this last character it resembles *A. amabilis*.

The antennular flagellum has 7 segments before the bifurcation. The carpocerite is stout and longer than the antennular peduncle. The scaphocerite is longer than the antennular peduncle but shorter than the carpocerite. Its lateral tooth is well developed and extends beyond its end.

The external maxilliped has the antepenultimate segment broad and depressed as in *Athanas* and *Arete*, the terminal segment marked with transverse series of bristles and made of more than 4 segments.

The first pair of legs (figs. 12,13,14) is very asymmetrical, the left being longer than the right. The ischium is small and nearly half as long as the merus. It carries a transverse ridge on the lower half of the inner side. The merus is triangular in cross section, roughly pyramidal in shape, and with a small tooth on the inner side. The anterior surface of the merus is concave and embraces the base of the carpus. The lower part of the anterior edge of the outer surface of the merus has two

grooves, the lower of which is more shallow than the other. The carpus is very peculiar in form. It is longer than the merus. Viewed from the outside it is oblong. The anterior part of the outer surface is concave. The dorsal, anterior, and ventral edges are cristate. Anteriorly it is concave and embraces the articular process of the palm. This form of carpus is very peculiar as it differs from the general form, which is either hemispherical or triquetrous and more or less embraces the base of the palm.

The palm, which is roughly as large as the carapace, articulates with the carpus by a small process, placed more on the inner side. Its outer margin is rounded and its inner margin is cristate with some 3-4 crenulations. The fingers which cross one another are very acuminate. The immobile one carries, at its base, a strong molar process which is placed more on the anterior edge of the palm than at the base of the finger, and midway a large tooth which slopes anteriorly, and on its slope carries 3 small teeth. The mobile finger carries a double-headed large tooth at the base, a small tooth half way, and 3 small ones as long as the merus. The merus is triquetrous and has 3 S-shaped spines on its inner side. The lower part of the anterior margin of the outer surface carries two grooves as in the large chela. The merus is twice as long as broad, the carpus of the same type as in the large chela, the palm longer than high with the two fingers bent inward at their anterior end. The immobile one is entire and the mobile is crenulate all over its inner surface.

The second pair of the legs (figs. 15-16) is also asymmetrical. The left one is longer, with a carpus of 5 segments. The first carpal segment is the longest, the distal next in length and the 3 middle ones are equal. The right leg has the carpus of 4 segments but, as stated above, the first of these shows a notch, where an articulation might have existed.

The 3 posterior legs are stout (fig. 17) with the dactyli biunguiculate and the inner side of the propodus carries some movable spinules. The merus is about 4 times as long as broad and less than propodus and carpus together.

The ischium is more than half as long as the merus.

GENUS *Synalpheus* BATE.

*Synalpheus streptodactylus* Coutière, 1905, p. 870, pl. 70, Fig. 1.

[De Man, 1911 (2), p. 226, pl. 7, fig. 29].

2 males, 11 mm. 2 ovigerous females, 11 mm.-14 mm.

*Synalpheus heroni* Coutière, 1909, p. 24, fig. 24.

[De Man, p. 256, pl. 9, fig. 41].

One ovigerous female, 16 mm.

*Synalpheus hululensis* Coutière, 1908, p. 12.

[Tattersall, 1921, p. 374].

2 ovigerous females and 2 males, 15-20 mm.

*Synalpheus biunguiculatus* (Stimpson, 1860).

[Coutière, 1905, p. 873, pl. 71, fig. 8. De Man, p. 273,  
pl. 11, fig. 51].

2 females, 16 mm.

*Synalpheus triunguiculatus* (Paulson, 1875). Pl. 14, figs. 1-1 g.

[Tattersall, 1921, p. 374].

Many specimens.

*Synalpheus quinquedens* Tattersall, 1921, p. 376, Pl. 28, figs. 1-5.

One male, 9 mm. One ovigerous female, 18 mm.

The figure of the sixth abdominal segment given by Tattersall is not very exact. The teeth in my specimens are very regularly disposed and not as shown by Tattersall.

*Synalpheus charon* (Heller, 1861).

[Paulson, 1875, pl. 13, fig. 4. De Man, 1911 (2), p. 194  
and 245].

One ovigerous female. 22 mm.

The specimen agrees with the description and figures of De Man except in the shape of the rostrum in which it approaches

*S. helleri*, De Man. It is doubtful whether *S. charon* is specifically distinct from *S. helleri*. The characters on which De Man separates the two species are:—

- (1) The excavation of the ventral hook of the dactylus of the 3 posterior legs.
- (2) Fusion of the dorsal hook with a dorsal process of the dactylus.
- (3) Shape of the antennular peduncle.
- (4) Shape of the rostrum.
- (5) Shape of the two lateral spines.
- (6) Scaphocerite and its lateral spine.

Before discussing each of these characters, it may be useful to mention that all the previous writers overlooked the fact that Paulson recorded *S. charon* as *Alpheus charon* from the Red Sea and excellent figures are given by him. When we come to discuss the above mentioned characters we find that (1) and (2) are of doubtful value as De Man knew them only at secondhand. He writes p. 194 under *S. helleri*, "the ventral hook of the dactylus probably not excavate, anterior margin of the dactylus probably without a process".

(3) Shape of the antennular peduncle: my specimen agrees with De Man's figure. Paulson's figure is different.

(4) Rostrum: Paulson's figure according to De Man's description is typical of *S. helleri*. The two lateral margins are parallel for quite a long way and then converging. De Man's description is typical of *S. helleri*. De Man's species has them converging from the base. In my specimens the rostrum is intermediate between the two. The lateral margins are parallel for a short distance and then converge to the tip.

(5) Lateral spines: De Man's species and mine are alike while Paulson's is more or less like *S. helleri*.

(6) Scaphocerite: In this character the three specimens, De Man's, Paulson's and mine are alike. The lateral spine is straight, not curved inward and exceeds the end of the scaphocerite.



From the above it appears that there is no sharp specific distinction between *S. charon* and *S. helleri*. It must be noted that altogether only some 4 or 5 specimens have been examined and further investigations are necessary before the question can be decided.

GENUS *Alpheus* FABRICIUS.

*Alpheus gracilis* Heller, 1861.

[De Man, 1911 (2), p. 337, pl. 14, fig. 70. Tattersall, 1921, p. 378].

2 ovigerous female, 17-22 mm. 2 males. 16-17 mm.

*Alpheus ventrosus* H. Milne-Edwards, 1837.

[De Man, 1911, p. 339].

Many specimens, males and ovigerous females.

As De Man states, this species exhibits variability in the length of the ovigerous females and in the relative length of the rostrum. As regards the obsolescence of the dactyl of the large chela, all the males have the dactyli sharp pointed and all the females except one have them obsolete.

*Alpheus microstylus* sp. Bate, 1888.

[De Man, 1911 (2), p. 344. Tattersall, 1921, p. 379].

2 males, 20-23 mm.

*Alpheus audouini* Coutière, 1905, p. 911, pl. 87, fig. 52.

[De Man 1911 (2), p. 414, pl. 23, fig. 100].

Many specimens males and females, 17-28 mm.

*Alpheus parvirostris* Dana, 1852.

[Coutière, 1905, p. 906. De Man, 1911 (2), p. 432, pl. 23, fig. 106].

Many specimens, 8-12 mm.

GENUS *Racilius* PAULSON.

*Racilius compressus* Paulson, 1875, pl. 14, fig. 2-2g.

[Coutière, 1899, p. 87, fig. 46, p. 243, fig. 296. Balss, 1927, p. 226].

One ovigerous female, 18 mm.

FAMILY HIPPOLYTIDAE.

GENUS *Saron* THALLWITZ.

*Saron marmoratus* (Olivier 1811).

[Kemp, 1914, p. 84].

5 specimens males and females, 10-20 mm.

FAMILY PONTONIINAE.

GENUS *Periclimenes* COSTA.

*Periclimenes petitthoursii* (Audouin, 1825).

[Borradaile, 1917, p. 369. Kemp, 1922, p. 196].

2 males, 11-16 mm.

*Periclimenes (Ancylocaris) grandis* Stimpson, 1860).

[Kemp, 1922, p. 210, text-fig. 58].

One male, 14 mm.

GENUS *Harpilius* DANA.

*Harpilius beaupresi* (Audouin, 1825).

[Borradaile, 1917, p. 324, pl. 55, fig. 21. Kemp, 1922, p. 229, text-fig. 67-68].

One ovigerous female, 14 mm.

*Harpilius depressus* Stimpson, 1860.

[Borradaile, p. 380, pl. 56, fig. 22. Kemp, 1922, p. 231, text-figs. 69-70].

One male, 13 mm.

*Harpilius gerlachei* Nobili, 1905.

[Kemp, p. 238, text-figs. 74-75].

One male, 10 mm.

GENUS *Coralliocaris* STIMPSON.

*Coralliocaris superba* (Dana 1852).

[Borradaile, 1917, p. 383. Kemp, 1922, p. 272, text-figs. 98-99].

One male and 4 females in association with corals.

Rostral formula of the male  $5/2$  the females  $5/2$ ,  $5/2$ ,  $5/1$ ,  $3/2$ .

In this species the second pair of chelae seems to exhibit a variability in relative size. In one specimen the chelipeds were equal, in another one they were very unequal, while in the other 3 specimens they were intermediate.

*Coralliocaris graminea* (Dana, 1852).

[Borradaile, 1917, pp. 324 and 383. Kemp, 1922, p. 269, text-figs. 96-97].

One ovigerous female, 18 mm.

*Coralliocaris venusta* Kemp, 1922. p. 274, text-figs. 100-101.

One ovigerous female 10 mm.

The specimen agrees with the description of Kemp except in the rostrum, which just reaches the second segment of the antennular peduncle and carries one spine on the dorsal side and none on the ventral side.

This species is new to the Red Sea.

Dist.: Gulf of Manaar.

GENUS *Anchistus* BORRADAILE.

*Anchistus miersi* (De Man, 1888).

[Borradaile, 1917, p. 388, pl. 56, fig. 25. Kemp, 1922, p. 255, text-fig. 85].

One ovigerous female, 20 mm. One male, 12 mm.

GENUS *Conchodytes* PETERS.

*Conchodytes meleagrinae*, Peters 1851.

[Borradaile, 1917, p. 393. Kemp, 1922, p. 285].

2 males, 2 ovigerous females.

c. *Tribe Anomura.*

SUPERFAMILY GALATHEIDAE.

FAMILY GALATHEIDAE.

GENUS *Galathea* FABRICIUS.

*Galathea australiensis* Stimpson, 1858.

[Balss, 1915 (2), p. 2].

Many specimens.

FAMILY PORCELLANIDAE.

All the species of this family in my collection were taken among artificial heaps of stones on the shore behind the shore reef.

GENUS *Petrolisthes* STIMPSON.

*Petrolisthes virgatus* Paulson, 1875, pl. 11, fig. 4.

[Nobili, 1906 (1), p. 134. Balss, 1915 (2), p. 7].

A single female specimen.

*Petrolisthes ornatus* Paulson, 1875, pl. 11, fig. 3.

[Nobili, 1906 (1), p. 133. Balss, 1915 (2), p. 7].

A single female specimen.

*Petrolisthes leptocheles* (Heller, 1861).

[Nobili, 1906 (1), p. 131, pl. 8, fig. 2. Balss, 1915 (2), p. 7].

Many specimens.

*Petrolisthes bosci* (Audouin, 1826).

[Nobili, 1906 (1), p. 130. Balss, 1915 (2), p. 7].

Many specimens.

*Petrolisthes rufescens* (Heller, 1861).

[Nobili, 1906 (1), p. 130. Balss, 1924, p. 7].

Many specimens.

GENUS *Pachycheles* STIMPSON.

*Pachycheles sculptus* (H. M. Edwards, 1834).

[Nobili, 1906 (1), p. 136. Balss, 1915 (2), p. 8].

Many specimens.

GENUS *Porcellana* LAMARCK.

*Porcellana inaequalis* (Heller, 1861).

[Nobili, 1906 (1), p. 141. Balss, 1924, p. 8].

SUPERFAMILY THALASSINIDEA.

FAMILY CALLIANASSIDAE.

GENUS *Upogebia* LEACH.

*Upogebia (Calliadne) savignyi* (Strahl, 1861).

[De Man, 1927, p. 5, fig. 1., de Man, 1928, p. 47].

Many individuals in sponges. In every case a male and a female were found together.

SUPERFAMILY PAGURIDEA.

FAMILY COENOBITIDAE.

GENUS *Coenobita* LATREILLE

*Coenobita rugosus* var. *jousseaumei* Bouvier, 1889.

[Nobili, 1906 (1), p. 124. Balss, 1915 (2), p. 12].

Many specimens.

FAMILY PAGURIDAE.

GENUS *Clibanarius* DANA.

*Clibanarius striolatus* Dana 1852.

[Alcock, 1905, p. 46, pl. 4, fig. 7. Nobili, 1906, p. 115].

Many specimens.

GENUS *Calcinus* DANA.

*Calcinus latens* Randall, 1839.

[Alcock, 1905, p. 58, pl. 5, fig. 5. Nobili, 1906, (1), p. 117. Balss, 1915 (2), p. 9].

Many specimens.

GENUS *Pagurus* FABRICIUS.

*Pagurus euopsis* Dana, 1852.

[Nobili, 1906 (1), p. 121. Alcock, p. 86, pl. 9. fig. 2. Balss 1915 (2), p. 10 = *Dardanus helleri*, Paulson, pl. 12 fig. 4-4c.].

My specimen, which is a female, agrees more exactly with Paulson's figure than with Alcock's. It differs from Alcock's description in the following :—

(1) The antennal acicle reaches beyond the base of the last joint of the antennal peduncle.

(2) The left cheliped in my specimen, which is a female, is distinctly larger than the right.

(3) In size, it is larger than the adult of Alcock, and as large as that of Paulson.

*Pagurus tinctor* (Forskal, 1775).

[Nobili, 1906 (1), p. 122. *Pagurus varipes* (Heller) Alcock, 1905, p. 90, pl. 9, fig. 7].

One male and one female.

GENUS *Eupagurus* BRANDT.

*Eupagurus janitor* Alcock, 1905, p. 132, pl. 11, fig. 6.

[Balss, 1915 (2), p. 10.].

One male, one female.

*Eupagurus cavicarpus* Paulson, 1875, pl. 12, fig. 3-3 a.

[Nobili, 1906 (1), p. 123].

3 males.

d. *Tribe Brachyura.*

a. *Brachyura Dromiacea.*

FAMILY DROMIIDAE.

GENUS *Dromidia* STIMPSON.

*Dromidia unidentata* (Rüppell, 1830).

[Nobili, 1906 (1), p. 145. Laurie, 1914, p. 426].

One female specimen.

GENUS *Cryptodromia* STIMPSON.

*Cryptodromia granulata* (Kossmann, 1877).

[Nobili, 1906 (1), p. 147].

One male. 2 females.

b. *Brachyura Oxystomata.*

FAMILY CALAPPIDAE.

GENUS *Calappa* FABRICIUS.

*Calappa hepatica* (Linnaeus, 1764).

[Alcock, 1896, p. 142. Nobili, 1906 (1), p. 148.

Laurie, 1914, p. 427].

One male. One female.

GENUS *Matuta* FABRICIUS.

*Matuta banksii* Leach, 1817.

[Alcock, 1896, p. 158].

3 male specimens.

FAMILY LEUCOSIIDAE.

GENUS *Ixa* LEACH.

*Ixa inermis* Leach, 1817.

[Alcock, 1896, p. 272. Nobili, 1906 (1), p. 171].

One female specimen.

GENUS *Leucosia* FABRICIUS.

*Leucosia signata* Paulson, 1872, pl 10, figs. 1-1c.

[Nobili, 1906, p. 166. Laurie, 1914, p. 428].

One female specimen.

GENUS *Philyra* LEACH.

*Philyra variegata* (Rüppel, 1830).

[Nobili, 1906 (1), p. 169].

The fingers are denticulated beyond the line of hair

One male, one female.

c. *Brachyura Brachygnatha*.

SUPER-FAMILY OXYRHYNCHA.

FAMILY MUIDAE.

GENUS *Stilbognathus* V. MARTENS.

*Stilbognathus erythraeus* V. Martens, 1866.

[Nobili, 1906 (1). p. 176. Balss, 1929, p. 8].

Many specimens males and females.

GENUS *Menaethius* A. M. EDWARDS.

*Menaethius monoceros* (Latreille 1829).

[Alcock, 1895, p. 197. Balss, 1929, p. 11].

Many specimens males and females.

GENUS *Simocarcinus* MIERS.

*Simocarcinus pyramidatus* (Heller, 1861).

[Alcock, 1895, p. 196. Nobili, 1906 (1), p. 133. Balss, 1929, p. 11].

One female specimen.

GENUS *Micippa* LEACH.

*Micippa tholia* (Herbst, 1803).

[Nobili, 1906 (1), p. 178. Balss, 1929, p. 20].

Many specimens males and females.



*Micippa philyra* (Herbst, 1903).

[Nobili, 1906 (1), p. 178. Balss, 1929, p. 20].

Many specimens males and females.

GENUS *Cyphocarcinus* A. M. EDWARDS.

*Cyphocarcinus minutus* A. M. Edwards, 1863, p. 73, pl. 19, figs. 7-12.

[Nobili, 1906 (1), p. 177. Rathbun, 1911, p. 255. Laurie, 1914, p. 433, pl. 44, fig. 3. Balss, 1929, p. 23. *Ixion capreolus*, Paulson, 1875, pl. 2, fig. 1].

One male, one female.

From descriptions by Laurie, Nobili, Milne-Edwards, it appears there is great variation among individuals of this species. Balss records the species from the Red Sea without any comment. My specimens agree with Laurie's figure in that the pre-gastric region slopes forward more than is shown in Milne-Edwards figure. This sloping is more pronounced in the male than in the female. Again the rostral horns agree with Laurie's description. They are not pressed against each other as in Milne-Edwards' figure but stand apart.

FAMILY HYMENOSOMIDAE

GENUS *Elamena* H. M. EDWARDS.

*Elamena mathei* (Desmarest, 1845).

[Tesch, 1918 (1), p. 21. Balss, 1929, p. 23].

4 ovigerous females.

SUPERFAMILY BRACHYRHYNCHA.

FAMILY PORTUNIDAE.

GENUS *Neptunus* DE HAAN.

*Neptunus (Hellenus) tenuipes* De Haan, 1841.

[Alcock, 1899, p. 42].

3 males, 4 females.

This species is new to the Red Sea.

Dist.: India.

*Neptunus pelagicus* (Linnaeus, 1758).

[Alcock, 1899, p. 34. Klunzinger, 1913, p. 336, pl. 7, fig. 17.  
Balss, 1924, p. 3].

Many specimens males and females.

GENUS *Thalamita* LATREILLE.

*Thalamita poissonii* (Aud. et Savigny, 1826).

[Alcock, 1899, p. 81. Laurie, 1914, p. 438. Balss, 1934 p. 4].

Many specimens males and females.

All the specimens agree with the description of Laurie. The red colouration of the mero-carpal point of articulation is seen in all the specimens. It seems that the species reaches maturity at an early stage, as females of only 11 mm. in length are carrying eggs.

*Thalamita admete* var. *intermedia* Borradaile, 1902 (1), p. 203.

[Balss, 1924. p. 4].

One female specimen.

*Thalamita admete* var. *savignyi* A. M. Edwards, 1861.

[Alcock, 1899, p. 84. Laurie, 1914, p. 440. Balss, 1924, p. 4].

3 males, one ovigerous female.

GENUS *Thalamitoides* A. M. EDWARDS.

*Thalamitoides tridens* var. *spinigera* Nobili, 1905.

[Nobili, 1906 (1), p. 213. Laurie, 1914, p. 441. Balss, 1924, p. 5].

4 males, one female.

FAMILY XANTHIDAE.

GENUS *Carpilius* DESMAREST.

*Carpilius convexus* (Forsk., 1775).

[Alcock, 1898. p. 80. Klunzinger, 1913, p. 125, pl. 1, figs 1 a-b].

2 male specimens.

GENUS *Carpilodes*, DANA.

*Carpilodes rugatus* (H. M. Edwards 1834).

[Nobili, 1906 (1), p. 387. Klunzinger, 1913, p. 139, pl. 1, fig. 2.  
Ohdner, 1925, pl. 1, fig. 16].

2 males, one female.

*Carpilodes rugipes* (Heller, 1861).

[Klunzinger, 1913, p. 137, pl. 5, fig. 4. Ohdner, 1925, pl. 2, fig. 3].  
One male, 3 females.

GENUS *Platypodia* BELL, 1835.

*Lophactaea* A. M. EDWARDS, 1865.

*Platypodia anaglypta* (Heller, 1861).

[*Lophactaea anaglypta*, Alcock, 1898, p. 107].  
[*Platypodia anaglypta*, Balss, 1924, p. 6. Rathbun, 1911,  
p. 214, pl. 17, fig. 3].  
One male, one female.

GENUS *Xanthias* RATHBUN, 1897.

*Lioxantho*, Alcock, 1898.

See Ohdner, 1925, p. 84.

*Xanthias punctatus* (H. M. Edwards, 1834).

[*Lioxantho punctatus*, Alcock, 1898, p. 91. Borradaile, 1902  
(2), p. 253].  
[*Lioxantho punctatus*, Klunzinger, 1913, p. 143, pl. 5, fig. 7,  
Balss, 1924, p. 5].  
One male, one female.

GENUS *Lachnopus* STIMPSON.

*Lachnopus subacutus* (Stimpson, 1858).

[*Liomera subacuta*, Stimpson, 1907, p. 39, pl. 5, fig. 1.  
See Ohdner, 1925, p. 82. See Balss, 1934, p. 509].  
[*Lioxantho tumidus* Alcock, 1898, p. 90. Illus. Investigator,  
pl. 36, fig. 3].  
[*Lioxantho tumidus*, Nobili, 1906, p. 227].  
One female specimen.

GENUS *Actaea* DE HAAN.

*Actaea hirsutissima* (Rüppel, 1830)

[Alcock, 1898, p. 141. Balss, 1924, p. 8].

Many specimens, male and female.

This species is very common in artificial piles of stones in the tidal zone just behind the shore reef. Roughly one third of the specimens are infected with *Sacculina*.

*Actaea garretti* Rathbun, 1906, p. 852, pl. 9, fig. 8.

[Rathbun, 1911, p. 218. Balss, 1924, p. 8].

2 males, 2 ovigerous females.

*Actaea cavipes* (Dana, 1852).

[*Actaea fossulata*, Alcock, 1898, p. 148. Borradaile, 1902 (2), p. 257].

[*Actaea fossulata*, Balss, p. 8. See Ohdner, 1925, p. 68].  
2 males, one female.

GENUS *Leptodius* A. M. EDWARDS.

*Leptodius exarratus* (A. M. Edwards, 1873).

[Alcock, 1898, p. 188. Klunzinger, 1913, p. 209, pl. 3, fig. 6.  
Balss, 1924, p. 10].

Many specimens, males and females.

This species is very common in the district. It is found under stones above the high-water mark and all over the tidal zone. It can be said that it is the commonest crab in the place.

GENUS *Chlorodiella* RATHBUN.

*Chlorodiella nigra* (Forsk., 1775).

[*Chlorodius niger*, Alcock, 1898, p. 159. Klunzinger, 1913, p. 225, pl. 1, fig. 8. Balss, 1924, p. 10].

Many specimens, males and females.

GENUS *Phymodius* A. M. EDWARDS.

*Phymodius sculptus* (A. M. Edwards, 1873).

[Alcock, 1898, p. 164. Klunzinger, 1913, p. 225, pl. 6, fig. 11. Balss, 1924, p. 10].

One male, 2 females.

The chelipeds are not as smooth as described by Alcock. They bear some granules as shown by Klunzinger's figure.

*Phymodius granulatus* (Targ.-Tozz., 1877).

[Nobili, 1906, p. 265. Klunzinger, 1813, p. 227, pl. 3, fig. 3. Balss, 1924, p. 10. Gordon, 1934, p. 41].

[*Chlorodopsis arabica*, Laurie, 1914, p. 450, pl. 42, fig. 1-1 b, pl. 43, figs. 2, 4a-4d].

Many specimens males and females.

GENUS *Chlorodopsis* A. M. EDWARDS.

*Chlorodopsis pugil* (Dana, 1852).

[*Chlorodopsis spinipes*, Alcock, 1898, p. 169. Nobili, 1906, p. 270. Laurie, 1914, p. 455. Balss, 1924, p. 11].

[*Chlorodopsis wood-masoni*, Alcock, p. 170].

33 specimens.

Remarks: (1) All the specimens had the front denticulated but there is a great variability in the number of denticles and their size.

(2) The first tooth of the antero-lateral border is very variable. In some cases it is obsolescent while in others it is quite distinct and not much smaller than those following it. But in no case is it as big as the latter.

(3) In 3 animals the second tooth of the antero-lateral border and not the third has a small tooth at its base.

(4) The spines of the legs are pronounced and the armature of the hand and wrist is acicular.

From Nobili's and Laurie's discussions, and from the above facts it appears that *C. wood-masoni* is not distinct from *C. spinipes*.

GENUS *Etisus* H. M. EDWARDS ET DANA.

See Klunzinger, 1913, p. 234. Ohdner, 1925, p. 83.

*Etisus laevimanus* Randall, 1840.

[Alcock, 1898, p. 131. Klunzinger, 1913, p. 237. Laurie,  
1914, p. 445. Balss, 1924, p. 11].

Many specimens.

*Etisus electra* (Herbst, 1801).

[*Etisus electra*, Klunzinger, p. 243, pl. 1, fig. 11. pl. 6, fig. 15].

[*Etisus electra*, Balss, 1924, p. 11].

[*Chlorodius dentifrons*, Stimpson, p. 51, pl. 6, fig. 5].

Many specimens

GENUS *Cymo* DE HAAN.

*Cymo andreossyi* (Audouin et Savigny, 1826)

[Alcock, p. 173. Nobili, p. 129. Laurie, p. 457].

2 males, one female.

GENUS *Lybia* A. M. EDWARDS.

*Lybia caestifera* (Alcock, 1898).

[*Melia caestifera*, Alcock, 1898, p. 231. Illust. Investigator,  
pl. 38. fig. 4].

[*Lybia caestifera*, Klunzinger, 1913, p. 278, pl. 7, fig. 7].

[*Lybia caestifera*, Rathbun, 1906, p. 866].

One male.

GENUS *Pilumnus* LEACH.

*Pilumnus vespertilio* (Fabricius, 1798).

[Alcock, 1898, p. 192. Balss, 1924, p. 8].

Many specimens.

GENUS *Actumnus* DANA.

*Actumnus asper* (Rüppell).

[Balss, 1933, p. 36].

[*Actumnus bonnierii*, Nobili, 1906 (1), p. 132. pl. 6, Laurie,  
1914, p. 459].

Many specimens.

GENUS *Domecia* EYDOUX AND SOULVET.

*Domecia hispida* Eyd. Soul., 1841.

[Alcock, 1898, p. 51. Klunzinger, 1913, p. 303. Balss, 1924, p. 12].

One male, 2 females.

GENUS *Trapezia* LATREILLE.

All the species of this genus and particularly *Trapezia cymodoce* are very common on the reefs. Their bright colour makes them very conspicuous among corals.

*Trapezia cymodoce* (Herbst, 1801).

[Alcock, 1898, p. 219. Laurie, p. 460].

Many specimens.

The transverse line of rounded spots on the carapace described by Laurie is clearly seen in all the specimens.

*Trapezia maculata* (Macleay, 1838).

[Alcock, 1898, p. 221. Laurie, 1914, p. 462. Balss, 1914, p. 13].

3 males, one female.

*Trapezia ferruginea* Latreille, 1825.

[Alcock, 1898, p. 220. Klunzinger, 1913, p. 307].

Many specimens.

*Trapezia digitalis* (Latreille, 1825).

[Alcock, 1898, p. 222. Klunzinger, 1913, p. 312, pl. 8, fig. 14].

One male, 2 females.

*Trapezia ferruginea* var. *guttata* Rüppell, 1830.

[Alcock, 1898, p. 220].

GENUS *Tetralia* DANA.

*Tetralia glaberrima* (Herbst, 1790).

[Alcock, 1898, p. 223. Klunzinger, 1913, p. 314].

Many specimens, males and females.

*Tetralia pubescens* Klunzinger, 1913, p. 316, pl. 7, fig. 15.

Many specimens, males and females.

This species is easily distinguished from *T. glaberrima* by the absence of the rounded pit at the base of the larger hand which is present in the latter species.

FAMILY PINNOTHERIDAE.

GENUS *Pinnotheres*, LATREILLE.

*Pinnotheres pilumnoides* Nobili, 1905.

[Nobili, 1906, p. 307, fig. 12. Laurie, 1913, p. 467].

23 ovigerous females from Holothurians.

GENUS *Ostracotheres* H. M. EDWARDS.

*Ostracotheres tridacnae* Rüppell, 1830.

[Nobili, 1906, p. 299. Balss, 1924, p. 14].

Many individuals from *Tridacna*.

Orton (Nature, CVI, p. 533, 1920) in a note on sex phenomena in *Pinnotheres*, points out that female crabs are frequently found alone in a mollusc and that males are scarce, and that male crabs wander freely and visit the molluscs from time to time in search of females. Dr. S. Kemp, in his monograph on the Pontoniinae, 1922, p. 17, compares the commensalism in the latter family with that found in *Pinnotheridae*. He points out that in the Pontoniinae, contrary to the *Pinnotheridae*, a male and a female are usually found together. He says that Orton's note corresponds with his own observations on the genus *Pinnotheres* and other genera of the family in India. It seems that this is not the case with *Ostracotheres tridacnae*. During my short stay in the Red Sea, I dissected some 17 of these Molluscs (*Tridacna*) and found that in all of them except one a male and a female were present; in this exception only a female was found. The striking phenomenon is that all the *Tridacna* contain crabs, and in every case a male and a female are found. It is quite possible that in the exceptional *Tridacna* a male and a female were present and the male escaped my notice, as I was not attending to this point at the time. It would appear that in



this particular species commensalism is as in the Pontoniinae and in some species of *Upogebia*. I find support to this view in the fact that there are in this species no secondary sexual characters such as one finds in other Pinnotherid species in which the male being migratory must have sense organs more developed than in the female.

FAMILY OCYPODIDAE.

GENUS *Ocypode* FABRICIUS.

*Ocypode aegyptiaca* Gerstäcker, 1856.

[Nobili, 1906, p. 310. Laurie, 1914, p. 467].

This species is found in great numbers. It goes into the sea when disturbed and comes out as soon as the cause of fear disappears. It searches the reef for food at low tide. Some of the individuals are pink, others greyish, but the majority are yellow. I did not stay long enough to record anything about their breeding or hibernation. But Dr. Crossland, the director of the station, says that they hibernate from August to April (roughly). This species is not nocturnal! in the proper sense of the word as it comes out whenever it is quiet.

GENUS *Dotilla* STIMPSON.

*Dotilla sulcata* (Forsk., 1775).

[Alcock, 1900, p. 365. Nobili, 1906, p. 315. Laurie, 1914, p. 467].

[*Dotilla affinis*, Alcock, 1900, p. 365]

130 specimens were examined. I share Nobili's and Laurie's view that *D. sulcata* and *D. affinis* are identical. As Laurie pointed out it is the usual condition for the tympanum to be present on the merus of the last leg and for the meral spine to be absent. The tympanum exhibits a great variability in size and depth, quite independently of sex or size. The males can be easily distinguished from the females by the size of the palm. In males it is thicker and higher than in females where it is considerably thinner and shorter with the result that owing to the highness of the palm in the male, there is a gap at the base of the fingers which does not exist in females.

GENUS *Macrophthalmus* LATREILLE.

*Macrophthalmus depressus* Rüppell, 1830.

[Tesch, 1915, p. 196, pl. 53, 54. Balss. p. 15].

A single male specimen.

FAMILY GRAPSIDAE.

Members of this family are never found on sandy shores. They live by snatching at floating debris. They live on nearly vertical rocky faces such as the pier. Dr. Crossland informs me that when he was at Dongonab, there were none within 5 miles across the bay, but as soon as piers and piles for houses in the sea were built, they appeared.

GENUS *Grapsus* LAMARCK.

*Grapsus strigosus* Herbst, 1801.

[Tesch, 1918 (1), p. 71].

Many specimens.

*Grapsus intermedius* De Man.

[Tesch, 1918 (1), p. 71].

One female, 2 males.

GENUS *Metopograpsus* H. M. EDWARDS.

*Metopograpsus messor* (Forsk., 1775).

[Tesch, 1918 (1), p. 79].

Many specimens.

GENUS *Pachygrapsus* RANDALL.

*Pachygrapsus minutus* A. M. Edwards, 1873.

[Tesch, 1918 (1), p. 77].

2 males, 3 females.

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#### IV. — EXPLANATION OF PLATES.

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Fig. 1. — *Athanas erythraeus*, left chela  $\times$  13.

Figs. 2-8. — *Arete ghardagensis*.

Fig. 2. — Lateral view of the carapace, female  $\times$  13.

„ 3. — Dorsal view of the antennule  $\times$  28.

„ 4. — Second chela.  $\times$  13.

„ 5. — Telson and uropod.  $\times$  15.

„ 6. — First chela, male.  $\times$  13.

„ 7. — Third thoracic leg.  $\times$  13.

„ 8. — Terminal joints of third leg.  $\times$  124.

Figs. 9-17. — *Aretopsis aegyptiaca*.

Fig. 9. — Dorsal view of carapace  $\times$  13.

„ 10. — Lateral view of carapace  $\times$  13.

„ 11. — Uropods.  $\times$  13.

„ 12. — Dorsal view of left chela.  $\times$  6.

„ 13. — Dorsal view of right chela.  $\times$  6.

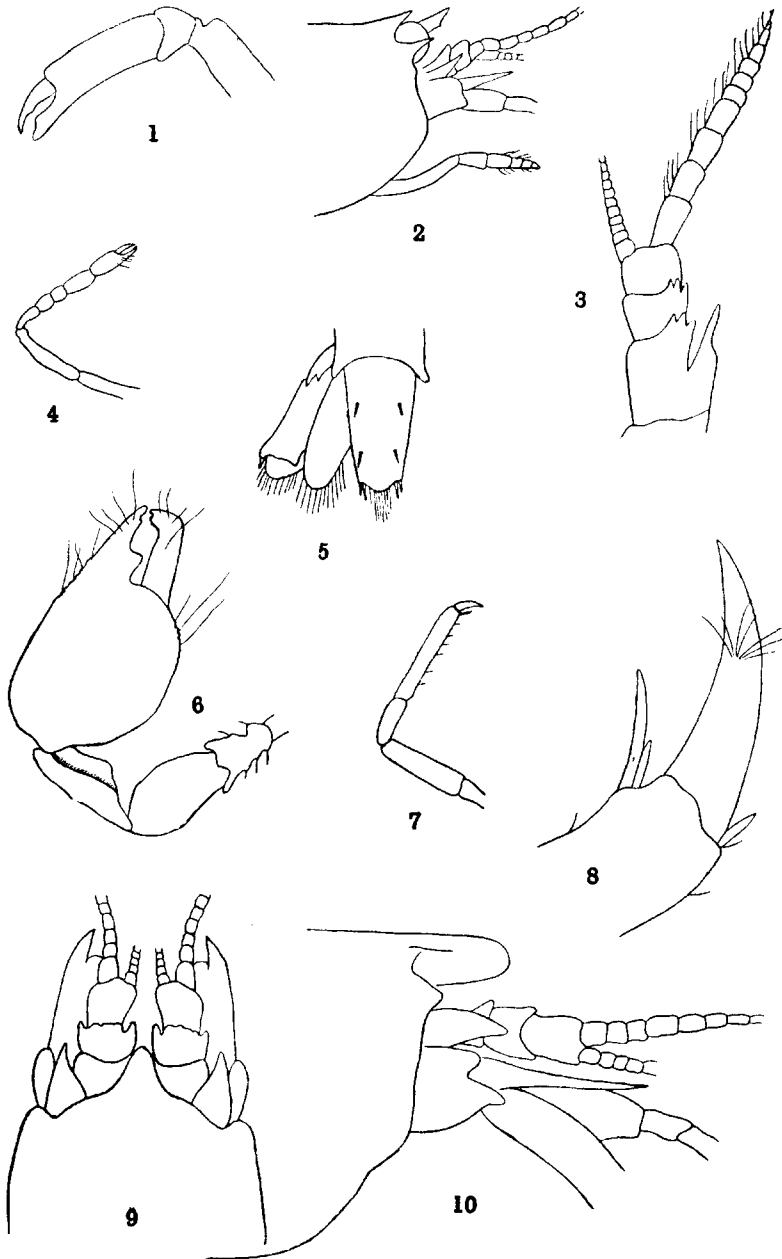
„ 14. — Ventral view of right chela.  $\times$  6.

„ 15. — Second left chela.  $\times$  13.

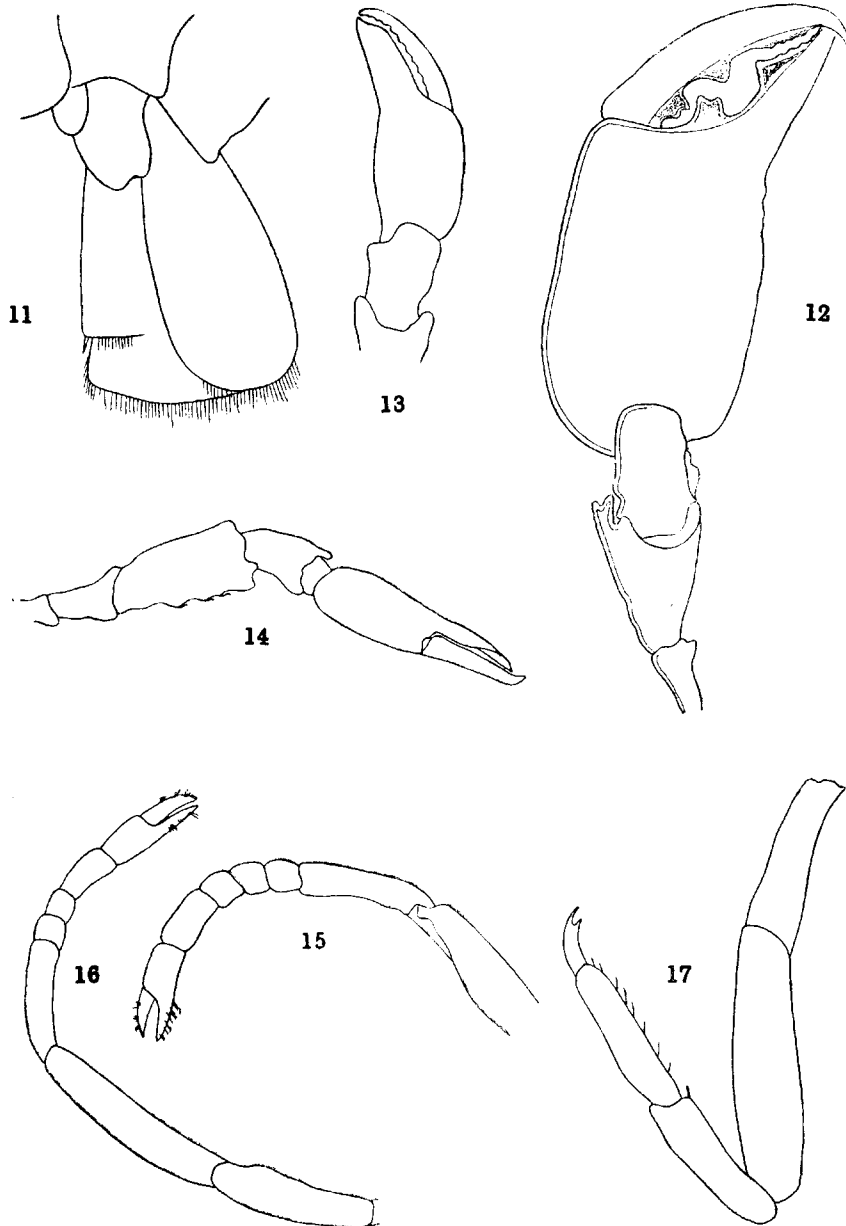
„ 16. — Second right chela.  $\times$  13.

„ 17. — Third leg.  $\times$  13.

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