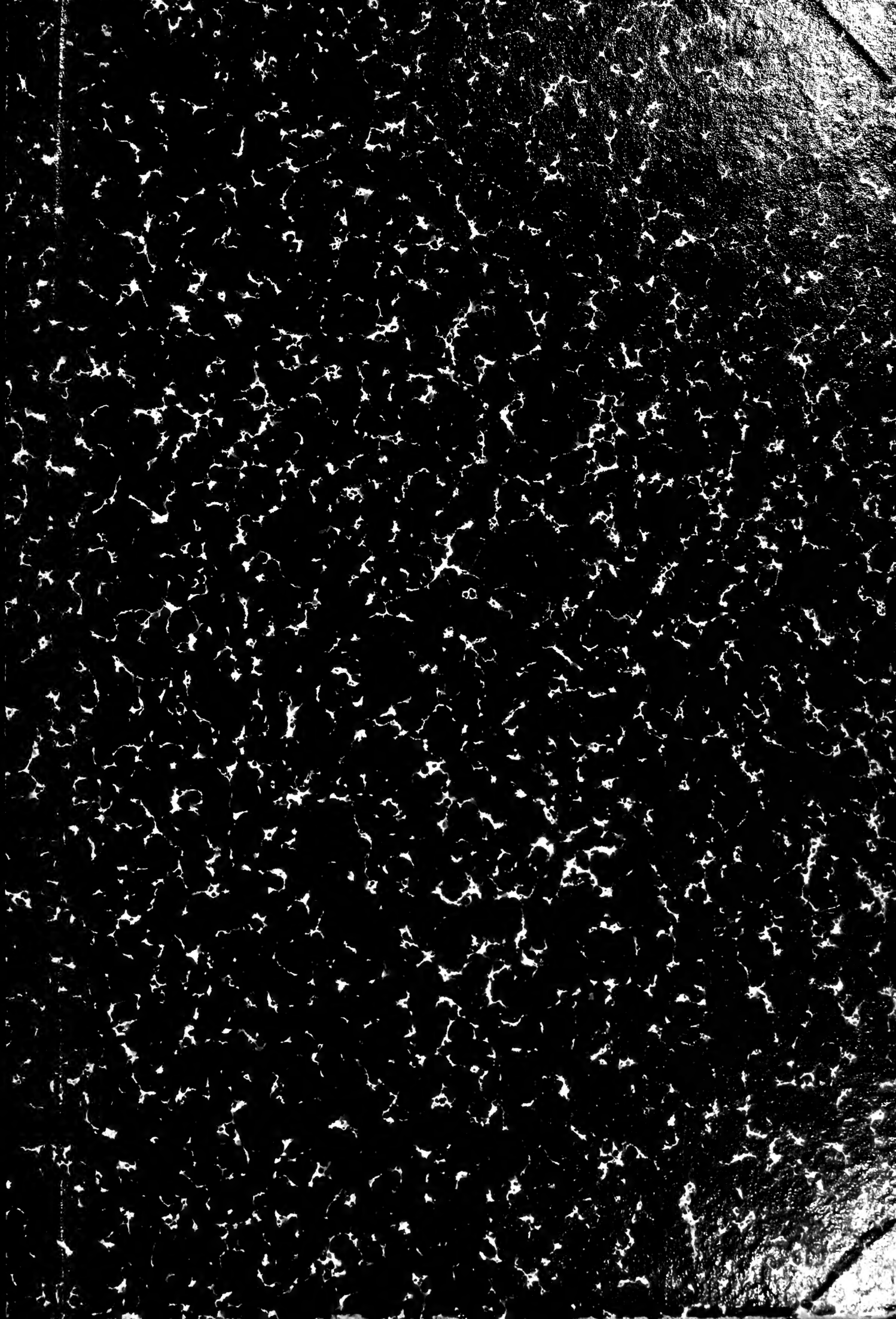

THE

TRANSACTIONS

OF

THE LINNEAN SOCIETY OF LONDON.

SECOND SERIES—VOLUME XIV.

ZOOLOGY.

THE PERCY SLADEN TRUST EXPEDITION

TO

THE INDIAN OCEAN IN 1905,

UNDER THE LEADERSHIP OF

MR J. STANLEY GARDINER, M.A.

VOL. III.

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1910—1912.

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TRANSACTIONS OF THE LINNEAN SOCIETY

THE PERCY SLADEN TRUST EXPEDITION

TO

THE INDIAN OCEAN IN 1905

UNDER THE LEADERSHIP OF

Mr J. STANLEY GARDINER

Volume III.

No. I.—DESCRIPTION OF THE EXPEDITION (CONCLUDED) WITH OBSERVATIONS FOR TERRESTRIAL MAGNETISM AND SOME ACCOUNT OF BIRD AND DENNIS ISLANDS.

By J. Stanley Gardiner, M.A., F.R.S., F.L.S., Commander Boyle T. Somerville, R.N., and J. C. F. Fryer, B.A.

(Plates 1 and 2 and 3 Text-figures.)

Read 2nd December, 1909.

A. DESCRIPTION OF THE EXPEDITION.

By J. Stanley Gardiner, M.A., F.R.S., F.L.S.

While engaged in 1906 and 1907 in working up the collections obtained by the Expedition of 1905 in the Seychelles Archipelago, it became obvious that a further expedition would be necessary to those islands, to trace with a proper degree of accuracy their relationship to the Indian and African Continents as well as to the great island of Madagascar. I was not an entomologist nor was Mr Forster Cooper, my companion in 1905. The weather during our visit was dry until the last fortnight of our stay in the Seychelles. We were engaged on marine and other work, yet in the intervals of these occupations during a visit of seven weeks we obtained a few boxes of insects. These exactly doubled the previously known Hymenopteran fauna of the islands according to Mr P. Cameron's Report (vol. xii., pp. 69–86), while Mr W. L. Distant (vol. xiii., pp. 29–47) found 23 species not previously recorded, six being referred to new genera. It is true no new Dragonflies (see F. F. Laidlaw's Report, pp. 87–89) nor Ants (Prof. A. Forel's Report, pp. 91–94) were obtained. Against these, Mr David Sharp, who examined the beetles, found many apparently new forms, genera and species. He considered it would be a waste of labour to examine them as they consisted of odd forms from many different genera, the variation and identification of many of which might be doubtful and would require revision as soon as fresh collections might

be obtained. His conclusion was that the specimens before him indicated the existence of a large insect fauna which was practically untouched by us or by any previous collector, and he strongly advised sending a properly trained entomologist to the islands. As Prof. Brauer had spent many months in the islands particularly investigating their Cœcilians (Gymnophiona), we naturally expected to find few or no new Vertebrates. Yet Mr G. A. Boulenger (see Report, pp. 491–300) described two new genera.

The botany of the Seychelles had been worked out by J. G. Baker in 1877 (*Flora of Mauritius and the Seychelles*), from collections made by J. Horne in 1871 and 1874, but many new species and genera had subsequently been described by Mr W. Botting Hemsley mainly on collections and individual plants sent home by Mr H. P. Thomasset. It seemed to us essential in considering the relationship of the group to other lands to consider the plants geographically but there seemed to be such considerable uncertainty as to the completeness of Horne's collections that a fresh investigation of the flora seemed essential. A thorough account of the flora too is necessary to the entomologist. For completeness also a further investigation of the geography and rocks of the islands was advisable.

Considering all the above points we decided to undertake the land investigation of the Seychelles as soon as possible. This was the more necessary as the jungle was getting to be more and more constricted year by year owing to the planting of vanilla. For this orchid a stretch of jungle is cleared, though not generally burnt. The vines are placed a few feet apart and stakes, or stick-like cuttings, of various plants stuck into the ground for their support. The plantation lasts for about 12 years when it is either cleared for manioc (cassava) cultivation or more often allowed to go back to jungle. Unfortunately this secondary jungle has a flora largely foreign as the supports grown for the vanillas are mostly introduced trees and shrubs. Cinnamon too, once planted but now wild, always enters, killing every thing under its pungent leaves except the coarsest ferns. In such original jungle, too, as remained all the larger timber trees were cut, or being cut. This produces an enormous change, light being brought in to the smaller trees and herbs which cover the ground. Heat and rain more easily reach the ground, and on steep hillsides this results in the formation of bare patches of rock, "glacis" as they are termed. An island naturally becomes jungle-covered from the shore up to the highest peaks, while man plants from the hills downwards. The lower slopes must be cleared for cultivation, and the salvation of any island is to leave the upper slopes absolutely untouched as long as possible. Their jungle is like a sponge which keeps all below it more or less moist in the tropical heat. The hilltops at much expense may be planted again with other, particularly leguminose, trees, but such artificial jungle is never the same thing and it is questionable whether a fresh sponge-reservoir of water can be formed. It is the destruction of its jungles which has turned St Helena into a desert, and the same process is going on now in the Seychelles. This warning is perhaps the more necessary to-day, as, not only in the Seychelles but in many other islands as well, rubber lianes, cloves and cinnamon are being introduced as mountain plants. The

former squeezes all the naturally occurring or indigenous trees out of existence, and the pungency of the leaves of the latter trees is destructive to all plants and animals around them. In any islands it is inadvisable to allow the destruction of the main jungles on the hilltops, until some method of replanting them has been found to be practically successful.

There were also certain islands requiring investigation which the "Sealark" was unable to visit in 1905. Chief of these were Aldabra, Assumption, Astove and Cosmoledo, lying to the west of Farquhar on almost the same line of latitude. These had been visited by Voeltzkow, and the Hon. Walter Rothschild had had collectors at Aldabra. Beyond birds we practically know little of the fauna of that latter island but that little indicates a number of peculiar species. There may be collections at Thring but they have not so far as we are aware been examined. I also found peculiar sand on produce from Aldabra, and accordingly judging it to be of more than ordinary interest added it to our area for investigation.

We have already referred briefly to our previous work in the Seychelles (pp. 159–162). The second time we were accompanied by Mr H. Scott, B.A., as Entomologist, and Mr J. C. F. Fryer, B.A., as Zoologist, etc., to go to Aldabra. We left England on June 23, 1908, arriving at Victoria, Mahé, on July 12. Unfortunately there was some little smallpox in the native quarters at Aden, and, although all the people have been vaccinated in accordance with the laws of the Colony, and there is, or should hence be, no fear, we were placed for 10 days in quarantine at Long island. This island is an oval granite mass of about 100 acres, 297 feet high. It is covered all over with coconuts having coarse grass beneath, and around its shores a few screw pines, and other of the commoner shore trees such as *Hibiscus tiliaceus, Calophyllum Inophyllum, Terminalia Catappa, Guettarda speciosa, Morinda citrifolia,* and *Hernandia peltata.* It stands on a reef with Cerf, Moyenne and Round islands, all parts of which we visited without at that time going above tide-marks. We collected the insects of the island thoroughly, getting little variety but a representative lot of the ordinary forms which inhabit the areas of cultivation. We also secured a good series of the Nemertean, *Geonemertes arboricola,* described by Punnett (pp. 57–62), which otherwise we only obtained in the mountains of Mahé. The land plants were of course collected as well as the seaweeds. The enforced detention was probably of peculiar value to Fryer in view of his subsequent work on other coral reefs.

On July 23 the Governor, W. E. Davidson, Esq., C.M.G., from whom we received throughout the greatest kindness and hospitality, placed the Government cutter "Wave" at our disposal to take Fryer to Bird island. She then returned to Victoria, a fortnight later visiting Fryer and bringing him to Dennis, whence he returned to Victoria on Messrs Said and Co.'s trading ship on Aug. 17. These two islands had been seen by us in 1905, but we only dredged between them without landing owing to lack of time. They are both of coral formation and lie on the north edge of the whole Seychelles bank, distant 60 miles from Victoria and 27 miles from one another (map, fig. 46). Their particular interest rests on the fact that they are the only land and surface reefs on the edge of the Seychelles bank, which is about 650 square miles in

extent, the other 27 islands, all of which are of granite, lying close together on its centre. Fryer's account of these two islands is appended to this article.

On August 22, Fryer left the Seychelles, after a two days' visit to us in Silhouette, on the brig "Charlotte," Capt. Parcou, for Astove, Cosmoledo, Assumption and Aldabra. A short report on the first three islands, at each of which he had a few days' stay, appeared in *Nature* of Dec. 17, 1908. He reached the Aldabra group on Sept. 13, and remained on those islands until Jan. 24, 1909. M. d'Emmerez de Charmoy, the enlightened owner, had given orders that every facility should be placed at Fryer's disposal and he was provided with a pirogue and six men while houses were built for him in four situations so that he might examine the whole of the group. His work during this, the summer season at Aldabra, must have been, as we know by our own experience elsewhere, arduous in the extreme on an island of jagged coral, covered with hard wooded *Pemphis acidula*, through which all paths had to be cut, and having in the centre a stinking mangrove swamp literally alive with mosquitoes. Even native labour dislikes going to Aldabra, which has an evil reputation second to none in the world. Of course its unhealthiness and unpleasantness can undoubtedly be to some degree cured by cultivation, etc., but to the naturalist the greater wildness has peculiar charms. Mr Fryer's discovery that Aldabra is an elevated coral reef and that it has much phosphatised and peculiar rock with fossil vertebrate remains is of great importance. His description will form a separate report. On his return Fryer revisited Assumption and Cosmoledo, reaching Victoria on Feb. 12 and England on March 28. We would pay a warm mead of praise to Mr Fryer's energy and pluck in carrying on his work in Aldabra in spite of its many unpleasantnesses and his own consequent ill-health.

Meantime Scott and I left in the government tug "Alexandra" on July 24 for Silhouette, a most precipitous island 2,467 feet high, lying 13 miles N.W. of Mahé. It belongs to the Dauban family, of whom M. Edouard Dauban and his wife live on the island; for the kindness and hospitality of this charming family we desire to express our warmest thanks. The island itself is about 12 square miles in size, but within this compass it includes 10 peaks of over 1,500 feet, all of which are still clothed with indigenous jungle, the fauna and flora of which we desired to compare with those of Mahé. Rather more than half the island attains a greater elevation than 1,000 feet. Further, it seemed advisable to select a smaller island, the better to investigate the causes which have been responsible for the cutting up of the granite masses of the Seychelles into mountains and valleys, and to consider how far these could have been responsible for cutting granite land down to sea level.

At first we camped at Mon Plaisir on the west side of Morne Pot-à-eau, the central peak of Silhouette, at about 1,600 feet, absolutely in the indigenous jungle. For days together it was an area of mist, but Scott remained here for a month, every day obtaining new insects. Photography was impossible as well as plant drying so that I moved with a few things to the north and leeward and hence dry side of the same hills. Here is an open space, with a marsh known as the Mare aux Cochons, I had a second house at about 1,300 feet. It was drier but photographic negatives and plants

had to be sent down to the coast to be dried and the daily visits to look after them after rough mountain work were very laborious. However, we visited every peak and the head of every valley in the island, securing a large set of dried plants of all kinds and specimens of the rocks. In this we were greatly assisted by M. Dauban himself and his head forester, who twice took us through an untouched coastal timber reserve, the only one at low level in the whole group, to the south of the island. We were also visited by M. Dupont, Curator of the Botanic Gardens, who gave us the benefit of his knowledge in the higher jungles. We returned to Victoria, Mahé, on Aug. 22, when Mr Scott shifted to Mare aux Cochons, subsequently returning to Mahé on Oct. 2.

In Mahé I remained in Victoria for a week endeavouring to dry the Silhouette collections and visiting the north of the island. In this part all the jungle has been cleared, the hilltops being bare, or partly grass-covered, or sprinkled with introduced filao trees (*Casuarina equisetifolia*). Immediately north of Victoria, it was interesting to see the remains of the old French terrace cultivation of the eighteenth century, built up walls to hold the earth for spice shrubs. On Aug. 28 I left for La Plaine on the west side of the island having borrowed a house from M. Julian Lemarchand. The situation was a coral flat close to the sea with many paths up to the highest ridge of the island, which extends for three miles N.W. of Morne Seychellois at a minimal elevation of 2,200 feet. There was, too, a second nearer ridge about 1,700 feet high, which was also almost untouched in places. The main ridge was traversed for its whole length and most of the other peaks were visited, several hundred sheets of plants being secured. The coast too, was examined from N.W. Bay to Barbaron. We returned to Victoria on Sept. 11, whence after great difficulties in plant drying we went with Mr Thomasset along the coast to Anse Royale and Baie Lazare, spending nine days in the south of the island, where we ascended the four hill masses, securing several new plants, and traversed the coasts. It was not, however, a profitable visit, the hilltops having been cleared of jungle, our new plants being only such as love the glacis. The animal life at all heights was only such as one finds in cultivation, insects mostly introduced with only the more robust indigenous varieties. We secured a large series of Cœcilians from different localities, some having eggs*.

I then returned north to Cascade where I had a week with Mr Thomasset at his place, which is situated some 600 feet above the sea and where he has a drying house, equally good for vanilla and botanical specimens. The jungle on the ridge between and around Mts. Harrison and Capucin was the best and most varied that we found in the Seychelles, while Mt Sebert is the locality whence Mr Thomasset has obtained many of his new plants, its summit being naturally bare glacis. After a week in the jungles here, I returned to Victoria, whence I visited the islands off the same and Mamelle, reaching England finally on Oct. 28.

After I left, Mr Scott remained in the Seychelles until March 1909. He had a house under Morne Blanc at about 800 feet, from which he was able to visit the jungles of Morne Seychellois. He also stayed at Mare aux Cochons, Mahé, at about 1,000 feet,

* We desire to thank Dr Bradley, the Commissioner of the South of Mahé, and M. Cauvin, for their kindness and hospitality.

and did a great deal of collecting at Cascade, where he had the invaluable assistance of Mr Thomasset. He further visited Felicité, Marianne, Praslin and other of the outlying islands, throughout confining his attention for the most part to insects. Many of these had to be pinned out at the time, but the firmer forms were sent home in sifted sawdust and are only now being relaxed and set out into proper boxes. The method is a most valuable one, as it allows large series of beetles, Rhynchota, Hymenoptera, and Orthoptera to be kept, for which otherwise the services of one or two trained attendants would be necessary in the field. Cardboard boxes of different sizes are used. When the day's catch is brought in, the bulk of the insects of the above groups are sorted out into sizes, only a few being set. Then boxes are taken and into the bottom of each are placed a few drops of crude carbolic acid. Then this is covered with sawdust, which has been sifted through fine netting, all dust being thrown away. A layer of insects is placed in and covered with sawdust, and then a second and a third layer until the box is filled. The lid is then placed on and the box is tapped on the table so that the sawdust passes in between the legs, etc., of the insects. Space always appears, and more sawdust is added, a few drops further of carbolic perhaps being placed in the lid. The latter is then pinned on to the box at either end. Different sized sawdust is used for different sized insects, and the boxes should never be packed in tins. The sawdust boxes can be sent home by post, and the setting out of the specimens can proceed at home whilst the collector is still in the field. The results of Mr Scott's work will doubtless be seen in numerous reports in these volumes. I will only say here that his work has revealed an insect fauna richer proportionately to the size of the islands than that of the Hawaiian group, and possibly as interesting. Much, doubtless, still remains to be done, but it appears certain that collections have now been secured sufficiently large to work out the relationships of the Seychelles to other lands.

In conclusion, I have to thank the Sladen Trustees for their continued confidence in me, and the Royal Society, the Managers of the Balfour fund, Cambridge University, and the British Association, for grants in aid of my expedition of 1908. I have also to thank the Governing Body of my College for leave of absence during term time. It is almost invidious to mention any one in the Seychelles, where one and all, English, French and Indian, deemed nothing of too much trouble if it ministered to our efficiency or comfort. I only hope that the public lectures which we delivered on "Coconut and Cassava Cultivation," on "Marine Fisheries" and on "Scale Insects" (Mr H. C. Scott), as well as our discussion with the Chamber of Agriculture on "Reafforestation," may have proved of some aid to the Colony in its economic troubles. Besides those mentioned above I must express my deep obligations to Mr H. A. Pare (Messrs Baty, Bergne and Co.) for managing our banking arrangements, shipping our goods, searching out and securing for us the best house, collecting, reef and jungle boys, and for many other things too numerous to mention. Scientifically, we are under great obligations to Mr R. Dupont and Mr H. P. Thomasset, while the Governor placed every possible facility at our disposal. From M. d'Emmerez de Charmoy, the owner of Aldabra, Assumption, Astove and Cosmoledo we received every kindness, and we only trust that our explorations may assist him in developing the resources of these wonderful islands.

To this Report is appended Capt. Somerville's "Observations for Terrestrial Magnetism." The observations made at Funafuti appeared to us of considerable interest, but we were unable to carry out similar work in any of the atolls we visited, only indeed occasionally swinging the ship and getting a day ashore. It is generally believed of course that there is no connection between the variation and the problems we were investigating, but it is clearer day by day that all the sciences are becoming more and more interrelated and the field worker *must leave no stones unturned.* The available data relating to variation are very small. All that can be said at present is that the ocean depths are relatively permanent as compared with the cyclical, annual and even hourly changes in the variation. One may, we think, be quite certain that so enormous a natural cause as terrestrial magnetism must have some equally large effect—it itself being the result of a still more enormous cause—on the life that inhabits its field of influence, while its effect on earth-movements must have been very great. The peculiar behaviour of the curves of equal magnetic variation to the north of Madagascar, first worked out by Capt. Somerville, is especially to be observed (fig. 1, p. 10), the line from Seychelles to Madagascar being supposed to be that of an ancient land, comparatively recently submerged.

B. OBSERVATIONS FOR TERRESTRIAL MAGNETISM.

By Commander Boyle T. Somerville, *Royal Navy,*
commanding H.M.S. "Sealark."

Among the scientific observations of a practically useful character, made whilst H.M.S. "Sealark" was conveying the Percy Sladen Trust Expedition through part of the Indian Ocean in 1905, were those for Terrestrial Magnetism.

These may be conveniently divided into two headings; namely:

(1) Those taken afloat with the ship's Standard Compass: and
(2) Those taken ashore, with Absolute Instruments.

(1) *Observations Afloat.*

The actual method employed was by swinging the ship both ways and making observations with the ship's head on the points N., N.E., E., S.E., S., S.W., W., and N.W., the eight-point swing as it is termed. It is necessary to keep the ship's head steadily on the point at which the sun's bearing is to be observed for a period of about five minutes; for it is found that a compass needle does not immediately acquire all the effect of local attraction, but has a tendency to lag behind, a peculiarity known as hysterisis. In thirty double swings a difference was found on every occasion between the variation resulting from the swing to starboard and that to port. This difference was invariably in the same direction, the average being 20′, the variation from the swing to starboard being the greater in Westerly Variation. The eight-point swing, both ways, takes at least one hour and forty minutes. For the best results a smooth sea

and a clear sky are essential. The observations should be made in the morning or evening when the sun's altitude is less than 30°, since its motion in azimuth is then less, thus rendering its observation more easy. In the "Sealark" the observations were made at a Kelvin Compass with a card 10 inches in diameter. The ship's speed is of course reduced to as slow a rate as possible to lessen the vibration, and to preserve the geographical position of the ship as nearly as possible.

(2) *Observations Ashore.*

Observations for Horizontal Force and Declination were taken with a Unifilar Magnetometer by Elliot; and for Dip with a Barrow's Dip Circle by Dover.

Those accustomed to make these observations at instruments permanently erected in a Magnetic Observatory will find that many practical difficulties arise when making a travelling Magnetic Survey of the nature of that carried out in the "Sealark." This is perhaps not the proper place to consider these, but the order of the day's Magnetic Observations may be thus enumerated:

(1)	Time,	A.M.	6 to 7.	Theodolite observation for True Bearing, immediately after landing the instruments.
(2)	,,	,,	7 to 8.	Erection of tent, and setting up of Magnetometer.
(3)	,,	,,	,,	Observations for Torsion, Declination, and Torsion.
(4)	,,	,,	9.	A.M. observation for Error of chronometer. (Eq. Alts.).
(5)	,,	,,	10.	Observation of Vibrations.
(6)	,,	,,	11.	Observation of Deflections.
(7)	,,	P.M.	2.	P.M. observation for Error of chronometer. (Eq. Alts.).
(8)	,,	,,	3.	Observations for Torsion, Declination, and Torsion.
(9)	,,	,,	4.	Erection of Dip Circle, and Observation of Dip.
(10)	,,	,,	5 to 6.	Removal of tent and magnetic instruments, and re-erection of theodolite on site. P.M. observation for True Bearing.

In the above list it will be noticed that time is given for two observations, one A.M. and one P.M. for Declination, and only one for Horizontal Force, and for Dip.

In southern magnetic latitude (Mauritius), Declination is at its maximum between 9 and 10 A.M., and again between 2 and 3 P.M.; and at these times is altering most slowly in its daily curve.

The mean, therefore, of observations taken near these hours should give the proper mean declination for the position; disregarding the annual movement.

Horizontal Force is at its maximum in these latitudes at about Noon, and at its minimum at about 10 P.M. Its curve, however, when plotted, shows that it is at its mean values at about 7 A.M. and 2 P.M.; but it is then altering most rapidly.

Vertical Force is, like the Declination, greatest at 9 A.M. and least at 2 P.M.; and is at its mean value at about 11.30 A.M.

The best times for observing each element, if a mean value for the day is desired, derived from observations when it is greatest and least, will be seen, there-

fore, somewhat to overlap: nor, indeed, would it be possible in the hours at disposal, to get two separate observations of each element. It would be necessary, in such a case, to observe on two or more days.

During the course of observations on the "Sealark's" cruise, the declinational element was considered to be of the greatest practical value: and as no more than one day could be given to any set of magnetic observations; and, further, as it established an equality in the value of the whole results, the observations were made after the sequence tabulated above; and at the hours stated, as nearly as could be managed.

It will be noticed that meals had to be interpolated when possible; and had, indeed, to be "moveable feasts"!

Observations for Variation (Declination) Afloat.

The following is a tabulation of the results obtained during the cruise of the Expedition.

Note.—The variation given at Farquhar Island on the appended Chart was deduced from several bearings taken at anchor, and not from a regular observation from double "Swings"; and does not therefore appear in this tabulation.

Date	Latitude	Longitude	Variation (Declination)	Direction	Remarks
May 1905	4° 11′ S.	70° 50′ E.	3° 41′	W.	Mean of double swings
July „	6 17	69 52	3 43	„	„ „
Aug. „	10 19	64 54	4 59	„	„ „
„ „	20 6	57 28	8 34	„	„ „
„ „	16 26	59 30	6 43	„	„ „
Sept. „	8 43	59 52	3 48	„	„ „
„ „	10 58	50 22	8 38	„	„ „
Oct. „	9 14	51 2	4 38	„	„ „
„ „	8 25	51 30	4 16	„	„ „
„ „	7 10	52 53	2 58	„	„ „

Magnetic Observations Ashore.

The following is a general tabulation of the results for Declination, Dip and Horizontal Force, obtained at various positions throughout the cruise of H.M.S. "Sealark." Of the two values given for Horizontal Force, the first is corrected for "*P*"; the second is uncorrected, or "*X′*."

Place	Date	Latitude, S.	Longitude	Variation (Declination)	Dip	Horizontal Force	
						X	*X′*
Salomon I., Chagos Archipelago	May 1905	5° 18′ 19″	72° 15′ 6″	3° 47′ 2″	30° 40′ 20″	·32979	·32839
Diego Garcia, Chagos	June „	7 13 58	72 26 0	4 40 3	34 24 18	·31354	·31268
Coetivy I., Seychelles	Sept. „	7 9 46	56 14 56	3 40 7	35 58 42	·30186	·30103
Mahé, Seychelles	„ „	4 37 13	55 27 35	2 45 1	32 12 32	—	·31144
Cerf I., Providence	Oct. „	9 31 40	50 59 39	4 45 3	41 5 12	·28218	·28142
I. des Roches, Amirante Ids.	„ „	5 41 14	53 40 34	2 59 5	33 34 55	·30375	·30292

The accompanying chart shows the positions, both afloat and ashore, at which observations were made; and the amount of magnetic variation found at each. There are scarcely sufficient observations from which to protract the curves of the magnetic elements which were observed on shore only; but those of equal declination, deduced from the results obtained both at the fixed and floating positions, are shown; and are of interest, pointing as they do, to the fact of considerable divergence from the parallelism usually seen in general charts of these curves;—due, of course, to insufficiency of data.

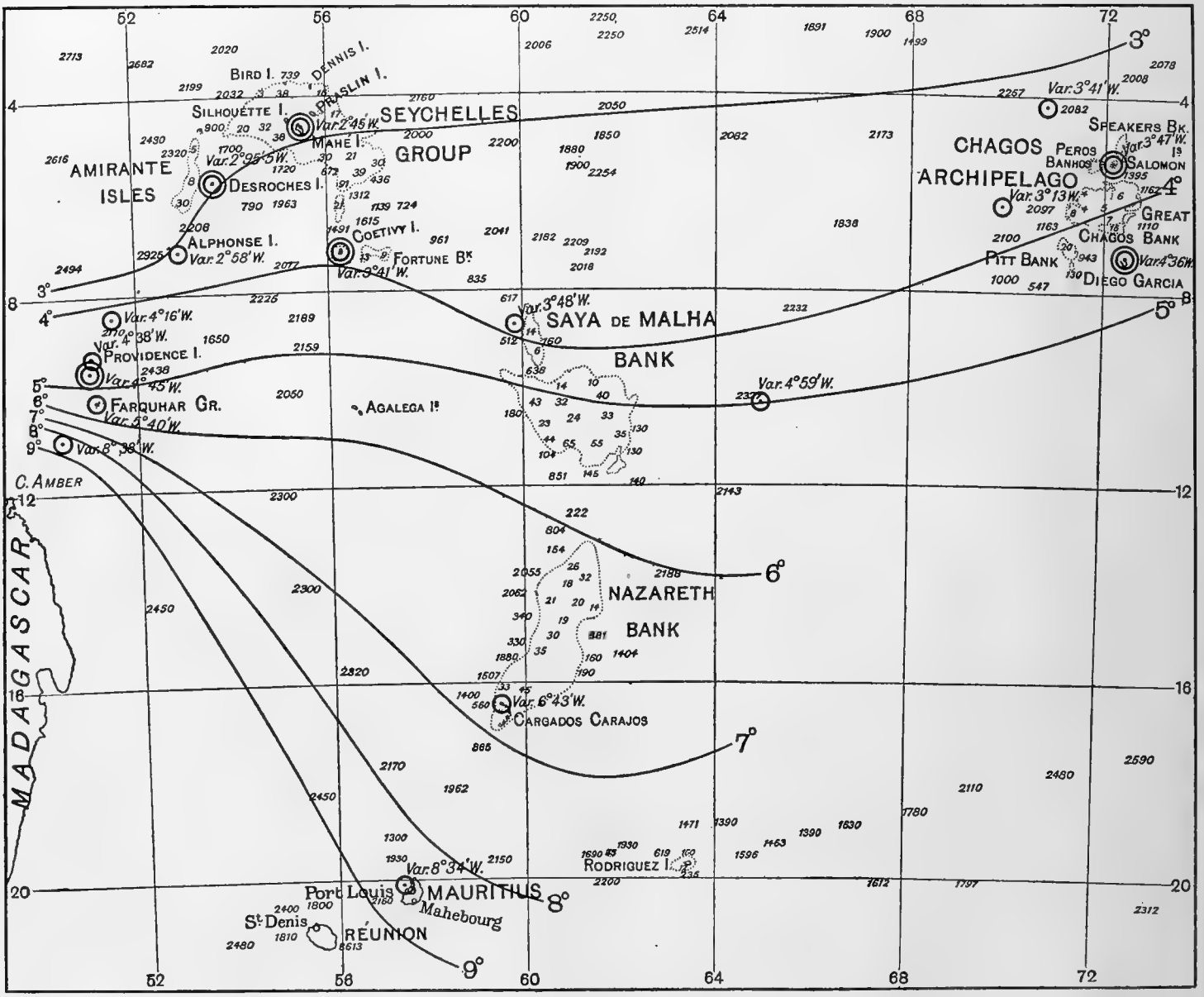


Fig. 1. Chart showing curves of Equal Magnetic Variation (Declination).

There seems little doubt that, as information increases, so will the complexity of the lines of equal variation.

The rapid change in variation in the area north of Madagascar is very noticeable, and of great importance to the navigator. It will be seen that there is a

change of no less than 6° in only 200 miles,—that is to say, in 17 hours' run for a 12 knot ship.

It will be noticed that the variation at sea off Mauritius is 8° 34′ W., while the mean declination for 1905 at the Royal Alfred Observatory, which was distant 5 miles from the position of the "swing," was 9° 11′ 26″ W., and for the time at which the "swing" was made, was 9° 10·1′ W.

This difference is no doubt due to the local magnetic attractions in the grounds of the Observatory, as reported by Mr T. F. Claxton, the Director, in 1905.

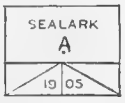
The "Sealark" swing should therefore more nearly indicate the true declination of the locality.

For the benefit of any future expedition that may visit these localities, more particular statements will now be given both of the magnetic elements, and of the exact positions at which the "Sealark" observations were made on the various islands visited.

At each island these particulars were made the subject of a letter to the "Administrateur" of the firm working the plantation on it; with a request that the document might be retained in the Archives kept on each island, for the benefit of future investigators; and were as follows:

Iles Salomon.

The Magnetic Observation Spot is in Latitude 5° 18′ 19″ S., Longitude 72° 26′ 00″ E., namely, on the beach, at the western extreme of the Ile de la Passe (see Admiralty Chart No. 4, Principal groups of the Chagos Archipelago), just above high water mark.

The exact position is marked by a cube of concrete about 15 inches each way, and engraved on the top thus: 

, the central hole being the spot of observation. This cube was buried about 2 feet in the sand; but there were unfortunately no near objects of a permanent nature to which its position could be referred.

On May 27th, 1905, the following magnetic elements were observed at this position:

Declination.

At 11 h. 00 m. A.M. 3° 48′ 59″ W.
,, 4 h. 05 m. P.M. 3° 45′ 20″ W.

Inclination.

From 2 h. 51 m. to 3 h. 30 m. P.M., −30° 45′ 20″.

Horizontal Force.

From 0 h. 37 m. to 1 h. 39 m. P.M. $X' = 0{\cdot}32839$ c.g.s.

Diego Garcia.

The Magnetic Observation Spot, of which the geographical position is Lat. 7° 13′ 58″ S., Long. 72° 26′ 00″ E., is at the beach end of a road leading to the lagoon, 400 yards to the

northward of the trigonometrical station on Observatory Point (see Admiralty Chart No. 920, Diego Garcia), beneath three or four coconut palms.

The position is marked by a flat coral slab, with ⅄ roughly cut in it, buried about one foot deep in the ground, and covered with a small cairn. It is placed at the south side of the path, and at about six feet from the present landward edge of the sand.

From the position, the right extreme of the trees on Eclipse Point (in 1905), bears S. 68° 21′ 05″ W. (True).

On June 12th, 1905, the magnetic elements found at this spot were as follows:

Declination.

At 9 h. 30 m. A.M.	4° 42′ 41″ W.
,, 3 h. 45 m. P.M.	4° 32′ 51″ W.

Inclination.

From 2 h. 00 m. to 2 h. 45 m. P.M., -34° 24′ 18″.

Horizontal Force.

From 11 h. 20 m. A.M. to 0 h. 33 m. P.M. $X' = 0{\cdot}31268$ c.g.s.

Coetivy Island.

The Magnetic Observation Spot, which is in Lat. 7° 09′ 46″ S., Long. 56° 14′ 56″ E., is about 300 yards south of the Settlement Flagstaff, and 20 yards in from the high water line. A *Casuarina* tree (the local name is "Filao"), with three trunks, stands on the end of the slight outward bend of the beach at this point, and upon its southern trunk a mark ⅄ is cut at five feet from the ground.

The exact position of the spot is marked by two large, faced coral blocks, mortared one on top of the other, and buried about eighteen inches under the ground.

⅄ is cut on the top of the upper block; the circular hole representing the precise position; and the words "SEALARK, 1905" are cut on the side.

This stone is S. 48° E. (Magnetic) from the marked *Casuarina* tree, distant 52 ft. 0 in.

The "Fixed Mark" used in the declination experiment was the centre line of the Settlement Flagstaff. Its azimuth is N. 3° 09′ 29″ E.

The following magnetic elements were observed on this position on September 11th, 1905:

Declination.

At 10 h. 14 m. A.M.	3° 40′ 45·6″ W.
,, 4 h. 04 m. P.M.	3° 40′ 37·9″ W.

Inclination.

From 1 h. 28 m. to 2 h. 23 m. P.M., -35° 58′ 42″.

Horizontal Force.

From 11 h. 22 m. A.M. to 0 h. 40 m. P.M. $X' = 0{\cdot}30103$ c.g.s.

Port Victoria, Mahé, Seychelles Islands.

The Magnetic Observation Spot, which is in Lat. 4° 37′ 13″ S., and Long. 55° 27′ 35″ E., is situated near the North-Eastern corner of Coral Island, a small artificial islet, built chiefly of coral blocks lying off the south side of the centre of the pier, and used for storing government coal.

The position is marked by a square block of concrete, raised about six inches above the ground, and inscribed "OBSERVATION SPOT. H.M.S. SEALARK, 1905. VARN. 2° 45′ W."

The exact spot is shown by the head of a copper rod, which is flush with the concrete, and has a small hole in the centre; where the plummet should rest.

There are several old rusted pieces of iron lying in the vicinity, but all are outside the magnetic field of influence.

The "Fixed Mark" employed is the pointed top of the outermost boulder off North-East Point. Its azimuth from the Magnetic Station is N. 12° 02′ 43″ E.

The magnetic elements observed at this spot on September 18th, 1905, were as follows:

Declination.

At 9 h. 26 m. A.M.	2° 49′ 13″ W.
,, 3 h. 34 m. P.M.	2° 40′ 55·5″ W.

Inclination.

From 1 h. 22 m. to 2 h. 24 m. P.M., $-32° 12′ 32″$.

Horizontal Force.

From 10 h. 19 m. A.M. to 0 h. 52 m. P.M. $X' = 0{\cdot}31144$ c.g.s.

Cerf Island.

The Magnetic Observation Spot, which is in Lat. 9° 31′ 40″ S., and Long. 50° 59′ 39″ E., is situated on the westernmost of the four tidal sand islets forming Cerf Island, and is separated by a narrow channel, dry at low water, from the islet with the oldest coconut palms (13 in number) and most bushes (1905).

There are a few bushes of *Scævola* on the observation islet, and a fairly large pool of fresh water. The magnetic position is situated with the centre of this pool bearing N. 15° W. (mag.), distant about 45 yards.

There are no very definite or permanent objects to mark the situation accurately; but the following true bearings may be given:

Southernmost coconut tree on near islet	S. 48° 35′ E.
Northernmost ,, ,, ,,	N. 81° 18′ E.
Distant boulder on outer reef	N. 55° 27′ E.
,, ,, (near above)	N. 54° 57′ E.
Single coconut tree, distant about 1 mile	N. 1° 01′ W.

A large wooden peg, marked ⊼ on the top, and "SEALARK, 1905" on the side, is driven into the sand to mark the exact spot, and is covered with sand to a depth of two feet. The hole in the centre of the bench-mark is the position of observation.

The magnetic elements observed on this spot on October 3rd, 1905, were as follows:

Declination.

At 9 h. 48 m. A.M. 4° 48′ 19·4″ W.
„ 3 h. 52 m. P.M. 4° 42′ 00·2″ W.

Inclination.

From 1 h. 37 m. to 2 h. 23 m. P.M., −41° 05′ 02″.

Horziontal Force.

From 10 h. 56 m. A.M. to 0 h. 20 m. P.M. $X' = 0{\cdot}28142$ c.g.s.

Iles des Roches.

The Magnetic Observation Spot, which is in Latitude 5° 41′ 14″ S., and Longitude 53° 40′ 34″ E., is situated about 800 yards south-westward from the Settlement, and ten yards in from the edge of the beach, on the inside of the track running along the island at this point.

A newly made plantation of coconut trees (1905) extends on both sides of the position.

Two coconut trees, here leaning out over the beach, have each been marked ⊼ on the trunk, at a short distance up from the ground and the magnetic position is 29 ft. 7 ins. from that on the western palm, 44 ft. 5 ins. from that on the eastern.

A log of *Casuarina* wood has been marked ⊼ on one end; and buried upright in the ground to a depth of 18 ins. at the spot, the circle in the centre of the bench-mark being the exact position.

The following magnetic elements were observed at this spot on October 14th, 1905:

Declination.

At 9 h. 10 m. A.M. 3° 01′ 42·7″ W.
„ 4 h. 16 m. P.M. 2° 57′ 15·6″ W.

Inclination.

From 1 h. 44 m. to 2 h. 46 m. P.M., −33° 34′ 55″.

Horizontal Force.

From 10 h. 46 m. A.M. to NOON $X' = 0{\cdot}30292$ c.g.s.

C. BIRD AND DENNIS ISLANDS, SEYCHELLES.

By J. C. F. Fryer, B.A., *Research Student of Gonville and Caius College, Cambridge.*

I. BIRD ISLAND. (Fig. 2.)

Bird island, or Ile aux Vaches, is the most easterly of two small islands, which are unique in being the only islands existing on the edge of the Seychelles bank. At present the name "Bird island" is decidedly the most appropriate; but formerly there is no doubt the island was the haunt of the species of dugong known as Vache Marine, which unfortunately has long ceased to exist.

The island is small, having an extreme length of 1800 yards and width 1000 yards: it is nearly uniform in level, the elevation above low water mark not exceeding 14 feet.

The composition of the island appears to be entirely of calcareous sand, on the top of which there was formerly a layer of guano: the best of this has, however, been removed and the phosphate, which now exists, is all in the form of a surface stratum of soft sandstone. This sandstone, which is very friable, seems to have been largely formed by the agglomeration of the calcareous sand particles by means of the phosphoric acid in the guano. Underneath the surface stratum, which is brown in colour, is a white, calcareous sand, which in most places has been formed into a soft sandstone rock, this having been effected partly perhaps by phosphoric acid but mainly by lime deposited from solution in rain-water. No doubt in the more superficial layers the phosphoric acid is neutralised by the lime, and the carbon dioxide produced, remaining in solution, helps to dissolve more lime, which, redeposited at lower levels, serves to cement the sand particles together. No particular stratification was observed in the sand, but all observations were made from pits or wells, and possibly a long trench would furnish further details. In no part of the island was either any plutonic or true reef rock observed, which might form a basis for the sand to collect on.

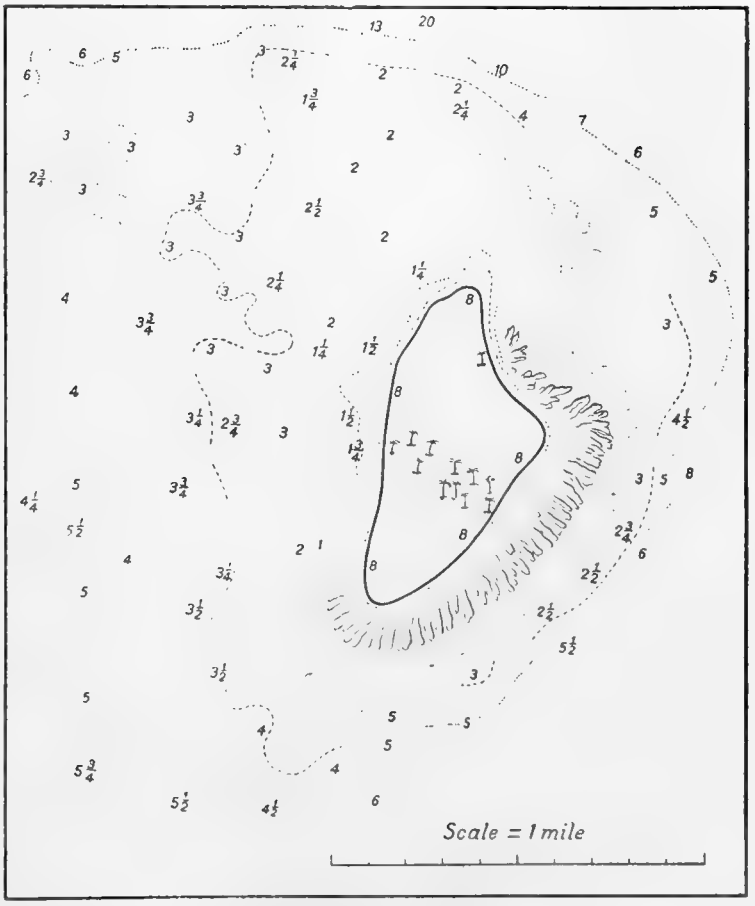


Fig. 2. Bird Island.

The shore is entirely sandy and is apparently in an unstable condition, *i.e.* washing away in some places and extending in others. The erosion seems to be greatest along the northern part of the west coast, where much dead bush is standing on the present beach between tide marks. (Plate **2**, fig. 1.)

To the north (N. by E.) there is a small spit of sand, which is now growing out, but this is only a temporary feature, since its dryer and more landward part is covered with bush killed by the sea. It has evidently been increasing outwards for some seasons and has not been submerged lately, as young *Tournefortia* seedlings are everywhere appearing on its surface.

On the north-east the beach consists of a broad slope of sand, which in places is so piled with dead *Cymodocea*, that it even forms small cliffs, the sand being matted together by the long ribbon-like leaves*. Behind these cliffs is a ridge of sand, sometimes double, and then a narrow sandflat covered with rushes, the depressions between the ridges being piled full with dead *Cymodocea* leaves. The scrub on these ridges is luxuriant and is extending out into the sandflat†. The beach round the rest of the island shows little sign of alteration: the scrub is apparently flourishing, though the sea at spring tides flows to the top of the beach, which is short and steep. In no part was any beach sandstone found, a condition which according to Gardiner indicates the absence of any continuous erosion on such beaches.

Considering the coast formations as a whole it seems reasonable to deduce that the island is undergoing but little permanent change: evidences of quick erosion and quick outgrowth are only found on the north-west and north-east, which coasts are unprotected, as the reef only extends from the north-east round the south of the island to the south-west. Consequently it seems probable that the rapid changes on the north-west and north-east are either seasonal in character or else are due to a succession of storms, and in either case merely transitional.

The curious distribution of the fringing reef is clearly visible in the chart. The reef surface was very disappointing, and after a recent visit to some reefs near Port Victoria, Mahé, seemed very dead and bare. The whole flat was composed either of sand covered with growing *Cymodocea* or of broken coral fragments, usually slightly encrusted with Lithothamnia, and a boulder zone can hardly be said to exist: the buttress zone on the extreme seaward face was well defined but the channels were much filled with loose sand. A little live coral was found in the channels, *Millepora* being most abundant, though *Heliopora*, *Pocillopora* and *Stylopora* were also present. The whole reef was very sandy but the north-east portions most so, and in those regions *Cymodocea* was most abundant.

The vegetation of the island was poor in forms and at the time of my visit (July 25—August 1) very dried up. Completely encircling the island was a zone ten yards wide, of scrub, composed largely of bushes of *Tournefortia argentea* and *Scævola Koenigii*. Inside this was a zone of varying breadth (15—50 yards wide) composed of the same species and tangled weeds, most noticeable among which was a small creeping plant, "pagôte," with yellow flowers and very thorny seeds, the latter always forming an

* Compare "Description of the Expedition," "Coetivy," *Trans. Linn. Soc.* Ser. II. Zool. vol. XII. (1907), p. 138.

† Plate **1**, fig. 1.

obstacle to bare feet. A *Convolvulus* was common climbing up the bushes, and "liane sans fins" (*Cassytha filiformis*) in places bound all the bushes together into a dense mat of vegetation: other plants included various low herbs and the "batatran" (*Ipomœa Pescaprœ*). The interior of the island was a large plain entirely occupied by an enormous colony of wide-awake terns (*Sterna fuliginosa*). Practically no vegetation existed on it at the time of my visit, the birds having destroyed everything. Across the centre of this plain (east to west) a broad belt of coconuts has been induced to grow, while "papaya" trees have been planted round its outskirts and seem to flourish; lastly a few small clearings in the same position produce fair crops of maize and tobacco. The only timber tree on the island is the introduced *Casuarina*, which has been largely planted and is common round the settlement, where also there is a large "bois blanc" (*Hernandia peltata*).

As regards the fauna the birds are dominant, and indeed directly, and also by their guano, govern both the fauna and flora of the island: it is quite impossible to give any idea of the countless thousands which breed upon the island. Wide-awakes exclusively occupy the central bare plain as a breeding ground. The confusion, noise and smell of such a "fair" can only be realised by a visit, as any attempt at description would seem an unpardonable exaggeration. Outside the wide-awakes is a colony of grey-headed noddies (*Anous leucocapillus*): these birds make nests in the scrub, sometimes accumulating quite a large erection of sticks. When all available spaces on the bushes have been occupied, they build on the ground underneath low bushes and masses of herbage. Besides the above, there are a few small colonies of gannets (*Sula piscator*) and one of shearwaters (*Puffinus* sp.?). The former breed in small colonies, laying their pairs of eggs wherever an open space can be found: when approached, they usually vomit their last meal and in every way merit their local name of "fou." The shearwaters nest in holes in the sandstone, coming out at night only. Other birds are not numerous and comprise no species not found on other Seychelles islands. The only true land birds noticed were the small ground dove (*Geopelia striata?*), the cardinal (*Foudia madagascar*), the white egret or heron (*Ardetta* sp.?) and the moorhen (*Gallinula* sp.?).

Land vertebrates, in addition to birds, are limited to two geckos, one bright green and usually found on the trunks of the coconut trees, and the other mottled grey, nocturnal and usually found under lumps of sandstone. The invertebrates contain nothing which calls for special mention here and will be represented in the lists for the Seychelles islands as a whole.

Economically the island is mainly of value on account of its eggs, since the coconuts for some reason do not flourish well. The season for the eggs extends from June to August, and they are then collected and sold in Mahé, where they yield a fair profit. According to the manager (M. George), in 1907 no less than 909,000 eggs were collected. I was also informed that the programme of the wide-awakes is as follows: the birds begin to arrive in the vicinity about March 3, and to sleep regularly on the island about April 25; they commence to lay on May 18 and depart in September. The eggs collected are nearly all those of wide-awakes, though no doubt a few noddies' eggs, which are very similar, are sold as well. As the birds produce a regular and increasing profit it seems a doubtful policy to persist in planting coconuts which do not seem to be suited to the island in its present state.

II. DENNIS ISLAND. (Fig. 3.)

Dennis island lies about 25 miles east of Bird island and like it is situated on the edge of the Seychelles bank. It is slightly larger than Bird, which broadly speaking it resembles in topography and composition. The basis is calcareous sand, over which a layer of guano has been deposited with the result that the sand has been phosphatised in varying degrees. The greater part of the surface is a very soft brown sandstone, but in places the sand has not been affected at all. In comparison with Bird the cementation process has been carried less deeply. The changes of level over the island are not conspicuous, but perhaps the highest portion (12 feet above low water mark) is in the north and west. Wells dug in this latter part penetrate through nine or ten feet of pure sand before reaching water (brackish or fresh). In various parts of the island are small marshes: in some of these the water is almost fresh, but in others, especially those nearer the sea, it is brackish and fluctuates with the tide.

The coast is more varied than the land, and is of interest as showing the various conditions in a calcareous sand island being removed by wave action. These may be outlined as follows:

(1) Sand beach sloping steeply, with a small sandflat on the top, bearing a little vegetation (rushes, *Ipomœa*, etc.). The whole of the beach scrub growing luxuriantly.

(2) Sand beach uniformly gently sloping; beach scrub (*Scœvola*, *Tournefortia*), with the outer bushes killed by the sea.

(3) Beach formed almost entirely of beach sandstone, having to the landward only a few feet of sand and rubble followed by the phosphatic sandstone of the island. Scrub, containing much *Pemphis acidula*, growing right down to the beach sandstone but in process of being killed. (Plate **1**, fig. 2.)

(4) Beach sandy with honeycombed cliffs of phosphatic sandstone; they overhang and are crumbling fast; dead coconuts and other trees can be seen with their roots exposed on the cliff face. (Plate **2**, fig. 2.)

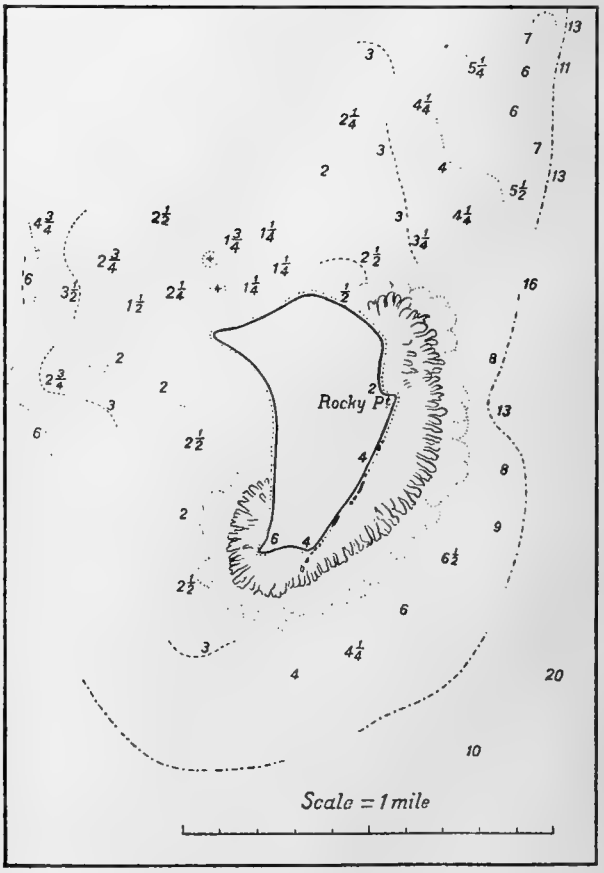


Fig. 3. Dennis Island.

All these formations with the exception of (1) point to rapid erosion. (1) is found on the north-west opposite the settlement and on part of the west coast, (2) occurs just south of west point and all round north point, (3) is found from east point to south-east point; it is worth noting that the beach

FIG. 1. Bird Island, N.E. Coast. Sandy beach with *Scævola, Tournefortia* and other plants.

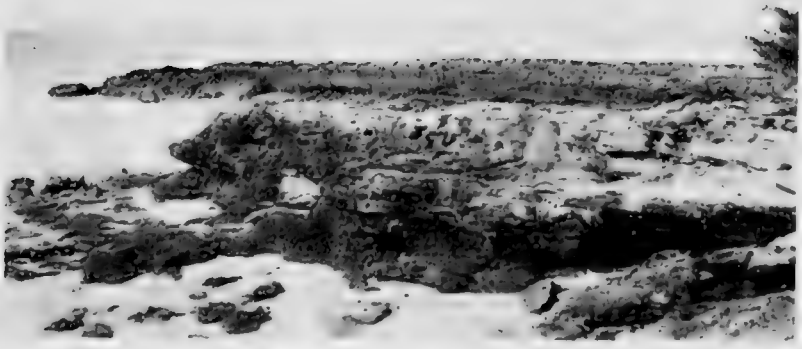


FIG. 2. Dennis Island. Beach sandstone on S.E. point.

Fig. 1. Bird Island, N.N.W. part. Bush killed by erosion of sea.

Fig. 2. Dennis Island, S.W. part. Cliffs formed of guano.

sandstone, at its terminations just round the east and south-east points respectively, forms small spits of rock projecting into the sea, its line pointing out across the two small bays to the north-east and south of the island, thus showing that these bays are undoubtedly of very recent formation.

Small cliffs as in (4) are found all round south-west point and the loss of land must be very considerable. A little beach sandstone occurs at various points under the cliffs.

The reef probably influences the distribution of these coast formations. As at Bird island it only extends from the north-east southwards to the south-west. It is marked by a sandy flat, absence of any considerable boulder zone and ill-defined buttress zone: there is much *Cymodocea* but few colonies of growing coral. Possibly a further search would show that it is not really so negative in character, for, during my visit, the weather was very rough and squally at the only period of spring tides which occurred.

The island was undoubtedly once a breeding ground of birds and the vegetation is of no interest, being all secondary in character and dependent on the coconut cultivation to which its whole surface is devoted. The beach scrub is formed of rather larger bushes than at Bird island and contains *Hibiscus tiliaceus* and *Pemphis acidula*, besides *Scævola* and *Tournefortia*. Large trees are also more numerous: *Casuarina* have been planted over the north-west of the island, two fine avenues of tall trees now existing. "Takamaka" (*Calophyllum inophyllum*), "bois blanc" (*Hernandia peltata*), "la fouche" (*Ficus* sp.?) "mapou" (*Pisonia Calpidia?*), and other trees are scattered about among the coconuts. The herbaceous vegetation is more luxuriant than at Bird island, and contains several other forms such as bulrushes (*Typha angustata*) and a large fern (*Asplenium* sp.?) in the marshes, while *Vinca rosea* gives the dryer ground the appearance of a garden planted with flowers of red and white. All the vegetation under the coconut trees is cut down periodically and the plantation as a whole kept remarkably clean. Bananas and a few vanilla vines have been introduced, but are quite subsidiary to the coconut cultivation.

Formerly it is probable that the guano was worth exploiting but now that the coconut plantation is made and in full bearing it is extremely doubtful whether it would pay to attempt to work it. The fauna calls for little remark: it is recorded that dugongs, giant tortoises, and green turtles abounded: the dugongs are extinct, the tortoises are represented by a few introduced specimens, and the green turtle (*Chelone mydas*) is very scarce.

Land birds are more plentiful than at Bird island and include, in addition, a *Cinnyris* and a turtle-dove (*Turtur picturatus*), the latter apparently being far from common in the other islands of the Seychelles. The lizards are represented by two geckos as at Bird, and in addition a skink. Invertebrates were commoner than at Bird, but were represented by nearly the same forms, with the addition of several species of insects. As in the case of Bird island the description of the various animals will be incorporated with the report on the Seychelles islands as a whole. In conclusion it must be pointed out that Dennis island must have once been in the same condition as Bird island is in at present, all changes being due to the institution of coconut planting and the consequent desertion by the birds.

III. THE FORMATION OF BIRD AND DENNIS ISLANDS.

An examination of the sand of which Bird and Dennis islands are formed, shows that it is composed of broken coral and Lithothamnia in about equal parts, with a small proportion of foraminiferal (*Orbitolites*, etc.) and molluscan shells. The surface of the sand grains is fairly smooth but not so much so as in those of dunes of wind formation: it is also not so rough and jagged as in similarly constituted sand obtained from various depths below low water mark. From these facts it can be reasonably deduced that the sand (1) came from a reef on which Lithothamnia was very prevalent, and (2) was piled up mainly by sea agency, but that wind also assisted after the surface had risen above low water mark.

The ocean currents in this area of the Indian ocean are variable both in direction and force and naturally break up still more irregularly over the shallow Seychelles bank. While these might have been directly or indirectly the cause of the accumulation of the material which formed the foundation of these islands even at some considerable depth, the land can only have been affected by their surface movements and by the wind. From the fact that Dennis island is washing away it appears that these surface currents or the winds must have altered considerably since the piling up occurred.

The topography and surroundings of both islands are similar and suggestive: (1) each island has a fringing reef only from the north-east southwards to the south-west, (2) the unprotected (north-west) side of each island consists of a long slope of sand, (3) the islands are situated on a rather deep (25—44 fathoms) part of the edge of the bank.

The former two facts seem to suggest that the islands have been piled up from the north-west and consist of débris washed up from the edge of the Seychelles bank, together with pelagic foraminifera. On the other hand it is possible that the islands were once larger and that erosion is taking place, chiefly from the south-east, the material washed away forming the long sand slope on the north-west and swamping any reef which formerly existed there. The reef, which, as we have pointed out, is peculiar, possibly then represents the former contour of the land though it may itself be washing away also. There is no evidence, indeed, from present facts, as to whether the islands form part of a land which extended along the northern reefs of the Seychelles bank, or whether they were separate formations. They may have had, in the past, a basis on a reef of coral rock, or on a ledge of granite, and themselves have consisted of a line or area of rock masses against which sand piled up. The rock was eroded away perchance and now the sandy land is itself disappearing. It is idle, however, to speculate; all we really know is that two sandy islands, which are built on sand-covered banks, exist on the northern edge of the Seychelles plateau and that they are the only surface banks which exist on the 650 miles or so of edge possessed by this large shoal.

No. II.—EIGHT MONTHS' ENTOMOLOGICAL COLLECTING IN THE SEYCHELLES ISLANDS, 1908—1909.

By Hugh Scott, M.A., F.L.S., *Curator of Zoology in the University of Cambridge.*

Read 5th May, 1910.

I. INTRODUCTION.

The object of this resumé is to give some account of nearly 8 months' entomological work in the Seychelles Islands, during a period extending from July 12, 1908, till March 10, 1909, the whole of which was devoted to the collecting and investigation of the insects and other terrestrial Arthropoda of the archipelago.

It is not necessary here to enter into a general description of the islands, since Professor Stanley Gardiner will publish such a description in this volume. It will be enough to state that they are entirely of granitic formation and mountainous, rising to heights of 2000—and in places of nearly 3000—feet. Erosion has taken place to an enormous extent, carving out of the face of the land extremely steep slopes, narrow ridges, and sharp peaks. One of the products of destruction of the granite is a hard red earth, which forms a large part of the lower spurs and slopes of the mountains. The islands are clothed from their coasts to their highest summits with verdure, consisting of the most varying forms of vegetation. The lower slopes are covered with plantations of coconut and other trees, and the cultivation of vanilla has been carried in places to heights of 1500 feet or more: but there still remain considerable expanses of the true native forest in the higher parts of the mountains. It is a tropical rain-forest of extreme luxuriance and beauty, and is highly interesting from the fact that it is composed to a very great extent of plants belonging to genera and species which are peculiar to the islands.

During by far the greater part of the time, the scene of my work lay in the forests, at elevations generally over 1000 feet, and often over 2000 feet, above sea-level; since it is in them that the great majority of the truly indigenous forms of insect-life are to be found. Small though the land-area of the islands is—only about 150 square miles altogether—there are well-marked distinctions between the entomological faunas of different parts. That of the shady, moist mountain-jungles is very different from the fauna of the more open and cultivated lands at lower levels. Not only so, but even within the limits of the jungles, differences can be remarked between the insect-life of the highest dampest peaks, and that of the lower forests. Very different, again, is the fauna of the coasts,

where the land is in many places bordered, just above the beach, by a fringe of trees and other plants not peculiar to Seychelles, but characteristic of many a tropic beach in the Western Indian Ocean.

Having passed over two months in the island of Silhouette, I spent the remainder of my time in various parts of Mahé, with the exception of about a fortnight given to visits to the islands of Praslin, Félicité, and Marie Anne. I have divided this account into three sections, devoting the first to Silhouette, the second to Mahé, and the third to the three other islands just mentioned. I have also maintained as far as possible a chronological sequence in dealing with the various phases of the work, discussing the various localities for the most part in the order in which I visited them.

II. SILHOUETTE.

The stay in Silhouette (July 25—September 30, 1908) fell entirely within the season of the south-east wind; that is to say, in the coolest and driest time of year. On the whole the weather was fine, though broken by some wet spells, and often by short rain-storms. In fair weather, lines of white clouds could often be seen passing across the blue sky from the south-east; and on such days there was usually a haze in the distance, rendering invisible the islands of Mahé and Praslin, 20 miles and more away.

Silhouette measures roughly about 4 miles by 3: it is sculptured by erosion into extremely steep-sloping ridges, valleys, and peaks, and it rises at its highest point to over 2400 feet above the sea. During the whole period I had easy access to the high forests, as I was camped at considerable elevations. Huts had been built for Professor Stanley Gardiner in the mountains by the proprietor of the island, Monsieur E. Dauban, to whom and to whose family I am extremely indebted, not for this only, but for their unfailing kindness to me throughout my whole sojourn in Silhouette.

The first of these huts was situated at an elevation of about 1500 feet, at a spot called Mon Plaisir, near a point where three of the principal mountain-ridges meet. The ground on all sides was so rough and steep, that it had been necessary to dig in order to form a level space on which to erect the hut. In every direction lay forest: beyond a steep-sided valley-head rose a great granite precipice—the southern aspect of the highest ridge of the island. The face of this precipice is bare, but its summit, which is a knife-edged ridge only a few feet wide in places, is clothed with dense jungle composed largely of capucin trees (*Northea seychellarum*). Being encamped in such a situation proved to be an experience of great value: for since the loftiest summits and the narrow ridge mentioned above were within easy reach of the hut, I was enabled to devote much time to the fauna of the very highest and dampest forest-zone. However, I shall not deal in detail with the work done during this time, much of which was necessarily spent in learning how to find the insect-fauna. Though collecting in the tropics was entirely new to me, I was so fortunate as to profit by the experience of others who had collected in tropical islands. On first entering the forests, one is often liable to gain the impression that insect-life is extremely scarce. At first sight, the fauna is quite the reverse of evident. In such places as the Seychelles mountain-jungles, insects must be searched for

with persistence and often by peculiar methods: when found they are for the most part small or minute, and obscure in appearance. As soon, however, as the nature of their hiding-places and the necessary particular methods of search have been discovered, there is revealed a number of individuals and a wealth of forms which seem quite out of proportion to the small size of the islands.

On August 21 I moved to a second hut, at a place known as "la Mare aux Cochons," where I remained till September 29. This very beautiful locality proved to be excellent in every way for insect-collecting. Towards the western end of the western and highest range, at an elevation of 1000 feet or more, is a gap in the mountain-ridge. It has a level marshy floor, about 500 yards long by 250 yards wide, which is the "plateau" of the Mare aux Cochons. At either end of the gap a stream flows down the steep slope of the range towards the sea, while on either side the mountains rise abruptly to the highest parts of the ridge. The level floor is covered with a very dense vegetation about 4 feet high, consisting of ferns and bushes, among which latter the bush-groundsel (*Senecio seychellensis* Baker) and the pink-flowered *Melastoma* hold a prominent place. There are rush-grown pools in places: round the edge of the plateau is an earth-track, bordered by a vegetation of tall grasses, bushes, and low trees, the last often sprawled over by a white-flowered bindweed, a species of *Ipomœa*. A few coconut palms are planted at intervals among the wild vegetation of the plateau, which is almost at the upper limit of their cultivation. On one side, dense native forest clothes the mountains down to the edge of the plateau.

This plateau was extremely rich in insect-life. By sweeping the low thick vegetation with a strong net, very numerous minute parasitic Hymenoptera, Homoptera, and Diptera were obtained, as well as certain small Coleoptera. Small black fossorial Hymenoptera were abundant on the paths, incessantly taking short low flights, settling and running swiftly to and fro on the earth. I caused a narrow track to be cut across the plateau through the thickest of the vegetation, and thus discovered several species of Micro-lepidoptera, which appear to be especially characteristic of such localities, low down among the stalks of the dense fern-growth. Several species of Seychelles butterflies frequented this place: the fritillary *Atella philiberti* Joan. often settling on the flowers of a low tree; small Lycænids (*Zizera lysimon* Hb.) flying low over the growth of low weeds at the edges of the paths; and the handsome black and white *Euplœa mitra* often to be seen in copses of low trees at the plateau edge. A Hesperiid (*Eagris sabadius* Gray) dashes swiftly and erratically round the tops of tall bushes and low trees, settling (but rarely) with wide-expanded wings on the broad surfaces of big leaves. *Melanitis leda* L. was found in shady places at the edge of the forest, as it is also in many other localities in the Seychelles, in the lower parts of the mountain-forests. This last species was extremely hard to secure, as it settles continually on the ground among brown dead leaves, where it is very difficult to see, owing to its coloration; and it almost always starts up and flies off before one can come within reach.

My work in the forest above the plateau was representative of many of the kinds of collecting employed in the Seychelles forests. Therefore it is well to attempt some account of it, assuming that one is passing through the various types of jungle from the

level of the plateau (about 1200 feet) to the summit of the highest peak of the island, some 1200 feet above. The forest is entered on the edge of the plateau, and, after first climbing an extremely steep slope, one reaches a fairly level space, the top of a mountain-spur about 150 feet above the starting-point. In the jungles of Silhouette and Mahé, relatively level spaces are worth searching for and making good use of, for there are many places where it is impossible to collect in a satisfactory manner, owing to the precipitous slope of the ground affording no sure foothold, or to the confusion of roots, holes, fallen stems, or great granite boulders, with which the earth is covered. On the level space in question the forest consists of tall trees with very little undergrowth. Owing to its relative dryness, epiphytic mosses and ferns are almost entirely absent, and the workings of termites and ants are much in evidence in dead wood: these insects, particularly the termites, while abounding in the low cultivated country and the lower stretches of forest, become much less abundant in the highest and dampest mountain-jungles. The ground between the tree-trunks is covered with large dead leaves, especially with those of the "bois rouge" (*Wormia ferruginea*), and of *Pandanus Hornei*, of which latter there are several magnificent groups with straight stems 50 feet or more in height. When the dead leaves are disturbed, they are found to be the hiding-place of several species of micro-moths, only discovered in this kind of environment.

Passing on towards the summit of the mountain, a descent is made into a deep gully, on the far side of which the collector pulls himself up a precipitous moss-grown glacis of rock with the aid of the aerial roots of a screw-pine (*Pandanus seychellarum*), and then gradually enters a second and somewhat damper type of forest. Here are occasional patches of undergrowth of grass and fern, the abode of numerous insects—moths, flies, Homoptera and parasitic Hymenoptera. One traverses stretches of jungle composed almost exclusively of endemic palm-trees, particularly *Stevensonia*. This brings me to a most important mode of collecting, the search for those creatures which are only found between the bases of the leaves of palms and *Pandani*. A palm is felled, the head is cut off the stem, and the thick broad leaf-bases are then chopped and pulled off one by one beginning with the outermost and lowest: between them is a certain amount of muddy slimy humus, the dwelling-place of a considerable fauna, some of the members of which appear to inhabit these palm-heads only, not having been found by me anywhere else. In this form of collecting *Stevensonia* gave most abundant booty; the tall *Verschaffeltia* also yielded several species; *Roscheria* on the other hand gave practically nothing, because its leaf-bases are differently formed, wrapping round one another so tightly as to leave no space for humus between them. In that very part of the Silhouette jungle at present under consideration, on Sept. 22 I felled a *Stevensonia* about 15 feet high, and obtained from its leaf-bases 80 or more small Coleoptera (little Lamellicorn beetles, a genus of *Aphodiini*, of a kind scarcely found anywhere but in palm leaf-bases, small Staphylinidæ, and others) and small earwigs. On other occasions numbers of small Forficulidæ with white tegmina were found between the leaf-bases of *Verschaffeltia* palms. Many forms are also found between the bases of the leaves of the *Pandani*. On the same day (Sept. 22) and in the same place I felled a large head of *Pandanus Hornei* and two heads of *P. seychellarum*, and worked through them, cutting off the leaves one by one. Between the bases and on

the blades of the leaves the following were found:—earthworms; leeches; snails; woodlice; Lepidopterous larvæ; rat-tailed Dipterous larvæ (? *Eristalis* sp.); Coleopterous larvæ; Dytiscid beetles (*Copelatus* sp., a form only found in the moisture between *Pandanus* leaves); a peculiar very flattened cockroach, a form apparently only inhabiting *Pandanus*; certain minute Coleoptera between the leaf-bases; lastly, small weevils and a species of scaly-winged Psocid, higher up on the blades of the leaves.

When an elevation of 1500 feet is reached, one enters the dampest type of forest, where undergrowth is abundant in places. Thick moisture-soaked beds of ferns, when swept with a net, are found to contain numbers of small stick-insects (Phasmidæ) and various Hemiptera peculiar to such situations. One or two kinds of Homoptera appear to have a special predilection for the bush-groundsel (*Senecio seychellensis* Baker), the foliage of which they sometimes inhabit in such numbers, that when the bush is shaken, the surrounding air is filled with a little cloud of flying and leaping insects*. Diptera are present, of kinds never seen at lower levels. For the last few hundred feet before the summit is reached, the slope is extremely steep. I often found such slopes to be a help in collecting in the high forests: because, owing to the exceedingly sharp angle of the surface of the ground, one is enabled to survey and reach the upper surface of the foliage, and the tops of small palms and other trees which are rooted some feet below. Various curious forms of Hemiptera, parasitic Hymenoptera, and Coleoptera are then seen, sitting exposed to the light on the top of the green roof of foliage, especially on the leaves of the small *Roscheria* palms so abundant in such places. Especially characteristic are certain small elongated weevils, which appear as little dark linear objects with their long axes parallel to the longitudinal ridges and crinkles of the palm-leaves. Thus I was occasionally able to obviate to some extent that difficulty so often experienced in tropical forests, namely, that so many of the living creatures are out of reach in the tree-tops overhead.

The actual summit of this highest peak of Silhouette is covered with capucin trees (*Northea seychellarum*), whose trunks and branches bear epiphytic ferns and are hidden by a shaggy coat of moss, several inches thick. These highest peaks are very often hidden in mist. Thus on the occasion of my first visit to this one, though the sunlight could be seen blazing on the magnificent expanse of close-packed tree-tops below, yet the peak itself was continually wrapped in cool cloud, its soil was sodden and its vegetation dripping. Altogether it is not surprising to have found certain forms of insects only on the actual summit of this mountain and in one or two precisely similar localities in Mahé. A small black Hydrophilid beetle lives in the layers of moisture between the large, smooth, dead capucin leaves, which were collected in little hollows on the ground. In the damp leaf-mould, too, I found a form of Thysanura never seen elsewhere. It may be mentioned also that there were many *Campodea* in this same humus, though they are found in many places at lower levels. A species of *Nepenthes* grows in profusion on some of the highest peaks, and the water in its pitchers swarms with Culicid larvae.

Before ceasing to speak of these jungles, something may be said of the collecting of Coleoptera, etc. from dead wood: this will refer not to Silhouette only but to other

* Neither this plant nor the accompanying Homoptera are confined to the highest forest-zone; both are also found in the lower forest down to about 1000 feet.

parts of the Seychelles as well. Dead timber of the capucin tree is very abundant in the Seychelles forests. Though this tree lives and flourishes on the tops of the mountains, yet at lower levels very many capucins have been killed in some way, and their great barkless bleached skeletons are a most conspicuous feature of the jungles. However, I never found that this form of dead wood much repayed investigation. It is excessively hard, and appears to be very seldom attacked by boring larvæ, with the exception of those of the ubiquitous *Callirhiphis* (Rhipiceridæ), which reduce parts of it to powder. The cylindrical, hard, polished brown larvæ of this beetle abound in all kinds of dead timber in all localities; in the cultivated low country, where they are met with in the dead stems of the coconut, and at all elevations up to the mountain-tops. The case is different when the dead capucin-wood retains its bark: in a number of small fallen branches gathered from the highest forests (such as the summit described above), were found many small Longicorn larvæ, from which I bred two kinds of beetles apparently quite confined to the highest and dampest forest-zone. Other kinds of softer timber also often contain insects. Numbers of small Coleoptera and Hemiptera (Aradidæ) are found under the bark of various sorts of dead trees, at a certain stage in their decay. Dead "bois rouge" (*Wormia ferruginea*) especially is worth investigating: its bark often comes cleanly away from the wood, leaving a smooth damp surface abounding with small bark-dwelling insects. The stems of the endemic palms in an advanced state of decay become hollow, and are then found to be tenanted by cockroaches, by the larvæ of certain Lamellicornia, and by beetles (*Figulus*, etc.).

Mention must also be made of the method of collecting by beating branches, etc. over a beating-umbrella. This is not often easy in the tropical forest, as the leaves and branches are usually out of reach far overhead. But in certain circumstances many species may be obtained in this manner, some of which are not obtained otherwise. If the dead but still hanging leaves of palms (and other trees) are beaten, or the fallen leaves picked up and shaken hard over an umbrella, numerous insects are often secured, Thysanura (Machilidæ), Blattidæ and Coleoptera (Curculionidæ, Anthribidæ, Anobiidæ, etc.). A quantity of dead vegetable matter, often containing various Coleoptera, can frequently be shaken from big epiphytic ferns (*Asplenium nidus*). Pieces of secondary forest are often good places to visit with a beating-stick and umbrella, since the trees are not tall and the foliage is therefore easily accessible. In such situations I beat many interesting specimens from the green leaves, and by shaking the abundant dry fallen *Stevensonia* leaves obtained numerous insects and Arachnida (Chernetidia, etc.). Interesting forms were sometimes found by beating the thatch of houses. The hut at the Mare aux Cochons (Silhouette) was roofed with a thick thatch of fresh-cut palm-leaves, and by beating the edge of it I obtained large numbers of several small and minute species, Psocidæ, Coleoptera and Hemiptera.

Night collecting in Silhouette during this season of the south-east wind gave very little result. At both camping places in the mountains, there were a few species of Microlepidoptera, which always came to the lamp in the hut: two kinds of beetles (Scolytidæ, *Platypus* sp., and another) also constantly appeared, possibly out of the split palm-laths of which the walls were made. Winged ants and a kind of fig-insect

(Proctotrypidæ) occasionally came to the light: also winged termites, which after settling used vigorously to try and dispose of their wings, and finally to leave these organs scattered near the lamp. A few specimens of other species were obtained at light. At the Mare aux Cochons at about 9 or 10 p.m. I often examined the stems of trees by the light of a lamp, and found various Coleoptera on them. In the same way, I several times found considerable numbers of Coleoptera on the outside of the walls of the hut, especially on rainy nights.

III. MAHÉ.

On September 30 I returned from Silhouette to Mahé, where I at first spent a week in the town of Port Victoria, packing and preparing the material collected in Silhouette for Prof. Stanley Gardiner to take to England. During this time Mr H. A. Pare, head of the firm which owns the lighters used for cargo-lading, etc. in the harbour, called my attention to the workings of a species of termite in the woodwork of some of the lighters. I examined one lighter which was up on the stocks for repairs, and found that there were in its bottom workings swarming with these insects, mostly between the ribs and planks. Salt water to a depth of some inches collects in these lighters, so that the workings had been submerged, as I was informed, for over a week at a stretch: only one very small piece of them was above the level to which the water accumulates. This termite has been determined by Dr Nils Holmgren as *Coptotermes truncatus* Wasmann: he considers the fact of the insects being able to live thus, when the wood in which they are working is submerged for prolonged periods, to be very interesting, and to affect possibly the distribution of the species.

On October 10 I left Port Victoria and, crossing the mountain-backbone of Mahé, took up my abode in an unoccupied planter's house at an elevation of about 800 feet, near Morne Blanc, on the western side of the island. Here I remained till November 25, excepting for a few short visits to Port Victoria, from which Morne Blanc is distant about $6\frac{1}{2}$ miles. During this period the weather was on the whole fine and often calm, though there were some very rainy days. Close to the house lay a considerable expanse of vanilla-plantations, in which various native trees and other plants serve as supports for the vanilla-vines. On either side of the road which leads back towards the central ridge of the island were patches of bush of a mixed character, composed partly of endemic vegetation and partly of introduced trees, among which latter the cinnamon-tree (*Cinnamomum zeylanicum* Nees) predominates. Collecting with a beating-stick and umbrella among this kind of vegetation was well repaid. By beating the trees in the vanilla-plantations various Coleoptera (Coccinellidæ, etc.), Hemiptera, lacewings (Chrysopides), etc. were obtained. Moreover by beating both in the "vanilleries" and mixed jungle mentioned above, a large number of Psocidæ were collected. They were mostly minute scaly-winged forms of great beauty, and of which I found a considerable number in the Seychelles. Some had already been obtained in Silhouette.

There was a marshy hollow near the house, of a kind frequently seen in Mahé. It was filled with a growth of long grass and bushes, among which stood some of the native

Stevensonia-palms and some planted banana-trees. Through the vegetation runs a small mountain-stream forming several pools. Such hollows are excellent collecting-grounds just at sunset, about 6 p.m. In this one might then be seen little groups of a caddis-fly (*Leptodermatopteryx tenuis* Ulmer) dancing in the air a foot or two above the ground, and a small mayfly, the first species of Ephemeridæ ever found in the Seychelles: there were certain Tipulidæ hovering over the pools, and Psychodidæ sitting or running excitedly in gyrations on the broad banana-leaves. The place was frequented also by another species of caddis-fly*, and, needless to say, by dragon-flies.

It may be mentioned here that the very numerous mountain-streams of the Seychelles are not tenanted, so far as I could discover, by a rich insect-fauna. There are a few kinds of those Hemiptera which run on the surface of water, and in places considerable numbers were obtained of a large *Ranatra*-like bug, of a Notonectid bug, and of a Dytiscid beetle. There are also certain insects, including those mentioned in the preceding paragraph, the earlier stages of which are passed in water. But the pools in mountain-streams are almost always crowded with freshwater prawns, which possibly exist there somewhat to the exclusion of aquatic insects.

Beyond Morne Blanc the road which crosses the island in this district zigzags steeply down to the west coast. It passes through a country with many rises and hollows, covered with very varying types of vegetation. There are cultivated clearings, patches of jungle, expanses almost devoid of soil, where the rock bears only a low dry scrub, and great stretches of the fern *Gleichenia dichotoma*. This fern, which grows so densely that large beds of it are penetrable only with considerable exertion, abounds in Mahé and Silhouette, ranging up to great elevations, and covering patches of ground to the complete exclusion of other plants. I often beat and swept in these fern-patches, obtaining various insects from them: notably the only species of Coniopterygid found hitherto in the Seychelles, identified by Dr Günther Enderlein as *Semidalis africana* Enderlein. This little creature abounds in the *Gleichenia*, and appears to be quite confined to the patches of this plant.

Several kinds of butterflies (*Lampides boeticus* and *L. telicanus* among the Lycænidæ, *Parnara* spp. among the Hesperiidæ, and the wide-spread *Danaida chrysippus*) were numerous in waste pieces of ground overgrown with flowering weeds, as was also a carpenter-bee (*Koptorthosoma caffrum* L.). Some of these waste patches were covered with a low pink-and-white flowering plant (*Vinca rosea* L.), among which a little bee (*Halictus mahensis* Cameron) was especially abundant. The sides of the zigzagging road, also, were the habitation of many Hymenoptera. The metallic-blue fossorial wasp *Sceliphron madecassum* Grib., might be seen hovering, often in groups of a dozen or so, round projecting granite rocks in the blazing sun. A leaf-cutter bee, *Megachile seychellensis* Cameron, might be seen entering holes in banks of red earth, and two other species of the genus were found in the same locality. From these same banks I also obtained an occasional *Odynerus*, though nearly all of these wasps which I saw in the Seychelles, were hovering round the outside of houses in the town and other

* Herr Georg Ulmer (Hamburg) has worked out these Trichoptera, of which I obtained six species, all new.

places near the coast. It may be said here too that some other species of Hymenoptera were only seen in and about houses: namely, a species of *Trypoxylon* observed to enter nail-holes, etc. in inner walls, and the brilliant metallic-green *Ampulex compressus* Fabr., which is often seen on verandahs, etc. *Eumenes alluaudi* Pérez also frequently builds its nest in rooms.

A kind of "firefly," *Luciola* sp., appeared near Morne Blanc in some numbers on many evenings. This species seems to be decidedly local in its distribution in Mahé. In walking one Saturday afternoon from Morne Blanc to Port Victoria, I met for the first time with the Melolonthid beetle *Perissosoma ænescens* Waterhouse. A number of specimens were flying to and fro low over the road, swiftly and silently, settling occasionally on the scented lemon-grass (*Andropogon*) which is planted by the wayside to bind the soil together. The afternoon was very dull after much rain; as far as my personal experience goes, this beetle seems to be most in evidence in wet weather.

The mountain-jungles were easily accessible from the house which I occupied. A certain amount of collecting was done in the jungle on the summit of Morne Blanc itself: but a far finer hunting-ground was in the forest covering the highest mountains of the island, where Morne Seychellois, clothed with luxuriant jungles, with woods of sombre capucin and brilliant green patches of fern, rises to almost 3000 feet, hidden as often as not in mists. Several times I visited a summit adjoining Morne Seychellois, which was spoken of as "Morne Pilot." This peak was covered with an extremely humid forest of capucin trees, and was in many respects like the highest peak of Silhouette. On it were again found, between the dead capucin-leaves, numbers of that same genus of small Hydrophilid beetles, which is only seen in very restricted areas on these highest mountain-tops. Several other interesting and uncommon forms were found in this place.

Not far below the actual summit was a comparatively level expanse of fine humid forest, containing some hollows filled with a dense growth of large ferns. This, too, proved to be an excellent collecting-place, and here particularly many species were obtained from dead leaves on the ground. I used to fill the beating-umbrella with this material, shake it sharply, and then, after flinging out the bigger leaves, I examined carefully the débris left in the umbrella. Various Thysanura, Collembola, Coleoptera (Scolytidæ, Scydmænidæ, etc.) and land-shells were found thus. The Coleoptera most numerous among dead leaves were certain forms of weevils, with rather flattened broad bodies: unfortunately it is impossible to say at present with any certainty to what group they belong. Some larger species were found, in many places in the mountain-forests of Mahé and Silhouette, on the concave inner surfaces of the bases of fallen and rotted palm-leaves, and it was practically useless to search for them elsewhere. Occasionally larvæ or pupæ of Coleoptera were discovered in the substance of these thickened leaf-bases, where it is probable that the metamorphosis is gone through. In at least one case an imago emerged in captivity from one of these pupæ, which was thereby found to be that of a weevil. But lack of time prevented the investigation of the habits of these insects in any detail.

A smaller but allied form of weevil is very abundant on large fallen leaves, on

those of the "bois rouge" particularly, and on those of the capucin. On the lower sides of the "bois rouge" leaves the veins are sharply raised above the general surface, and the little rather flattened weevils are frequently found on the sides of the raised midrib and other veins, as well as on the flattened parts of the leaf. They are very similar in colour, etc. to the dead leaf on which they rest, but as soon as one has learnt where to search, they are found in great numbers in suitable patches of leaves: several specimens often occur on a single leaf. Very few of them were obtained from July to September in Silhouette, though this may be due in part to my having then had less experience. They were very numerous in the Mahé forests in November. In the jungles behind Cascade in January and February (1909) they were much scarcer, but some of a quite different form of small weevil were found on the leaves. It is possible that in this case something was seen of the seasonal changes among the insect population. The small flattened weevils were often found *in coitu*, and probably they are connected with the dead leaves throughout their life-cycle. On December 31 (near Cascade), when I was surprised at the scarcity of these weevils, I noticed at the side of the midrib in many leaves little holes each surrounded by a tiny pile of leaf-substance reduced to dust. These had been seen before in several places on dead "bois rouge" and capucin leaves, where the weevils are found. However, on this day I saw a boring-beetle of another family entered into one of these holes head first: so it must remain uncertain whether the holes and burrowing of the midrib have any connection with the weevils or not. At all events it is likely that the thick substance of these large leathery leaves may be the habitat and food of more than one species of Coleoptera in the larval state.

On one occasion (October 24) a number of beetles, including more than one kind of Nitidulidæ and a Hydrophilid, were found in some fallen and decaying fruits of *Pandanus seychellarum*, which smelt very strongly. This was in the forest on the summit of Morne Blanc. Certain kinds of Staphylinidæ, Hydrophilidæ and Nitidulidæ swarm in decaying fruit at many elevations, teeming especially in rotten oranges and "jak" (*Artocarpus integrifolia*).

On November 27 I left Mahé for a few days stay in Praslin, to be spoken of later. On returning on December 3 to Mahé, I spent several days working in the high forest between Morne Seychellois and the Trois Frères mountains, on the north-eastern side of the high mountain-mass which I had previously worked from the south-west. I occupied an empty room in a house near the Trois Frères over 1500 feet above the town of Port Victoria, whence the climb to it is excessively steep. It was close to the high woods, and at such an elevation that the early mornings and evenings felt decidedly chilly. Near the house lay another of the marshy hollows, where groups of the caddis-fly *Leptodermatopteryx* performed their air-dances about sunset. During these days I worked in some of the finest stretches of high damp mountain-forest, obtaining much valuable material of all kinds.

Embiidæ, since described by Dr Enderlein as a new species of *Oligotoma*, were found in this locality twice, and on both occasions in rather curious situations. Their web-tunnels were in patches of moss some way up the stems of small trees. In both cases the trees were felled, but in the second case the branch bearing the Embiids was even

then several feet above the ground. There cannot be much doubt that the creatures had established themselves up on the trees while the latter were still growing. Individuals of this *Oligotoma* had previously been found in another locality, near the summit of Morne Blanc, but in a less remarkable situation, their web-tunnels being on the ground among fallen leaves under a bush. One of the *Oligotoma* from the moss-patches, which showed wing-rudiments, was placed with pieces of the bark and moss in a tightly-closed screw-topped bottle, and left for some weeks, when the wings developed fully.

From December 14—18 I was again absent from Mahé, on a short visit to Félicité island. On returning to Mahé, I went on December 21 as the guest of Mr H. P. Thomasset to Cascade Estate, which was my headquarters till January 25, 1909. It is hard to estimate how very much I am indebted to Mr Thomasset in every way, for his constant kindness, and especially for the very large amount of help given by him in the collecting of the insect-fauna. He worked with untiring energy, not only collecting all kinds of insects in the field, but also at the more trying and much less pleasant task of mounting and preparing great numbers of minute and delicate specimens. A large proportion of the material amassed during this part of my stay in the Seychelles was obtained by him. This statement refers especially to Diptera, on which order we largely concentrated our attention, making a collection of considerable size, and pinning and mounting almost all the specimens on the spot.

Cascade lies over four miles south-east of Port Victoria. To quote the words of Professor Stanley Gardiner*, "it is an amphitheatre opening from a gorge extending up 600 feet from the sea and spreading out into a circlet of hills, each with an almost perpendicular face, but each at some point throwing out an earth-covered buttress." On the circlet of hills are expanses of most luxuriant endemic forest, while the earth-covered spurs and the valleys between them are clothed with many kinds of wild and cultivated vegetation. The locality was so rich in insects and the kinds of collecting so manifold, that it is impossible to describe them in detail. Valuable material of the most varied nature was obtained from the mountain-jungles. Abundance of small insects, parasitic Hymenoptera, Diptera, Coleoptera, etc. were got in the plantations, by sweeping and beating in long grass and patches of mixed vegetation. On some occasions when the foliage of coffee-bushes was shaken, several fresh forms of Microlepidoptera flew out and specimens of them were captured.

In one of the valleys between the earth-buttresses lay a swampy piece of ground, on which much of a wide-ranging tropical plant, *Jussiæa* sp. (Onagraceæ) was growing. By sweeping this marsh-vegetation numbers of certain Diptera and Hemiptera-Heteroptera, characteristic of swampy places, were collected. In another direction were some rocky and relatively dry pieces of land, covered—as such situations very often are in the Seychelles—with a scrub composed of various endemic bushes and small trees such as the "bois dur" (*Plectronia bibracteata* Baker), "bois doux" (*Craterispermum microdon* Baker), and "café marron" (*Randia* sp., and *Erythroxylon laurifolium* Lam.). Certain kinds of insects are especially numerous among vegetation of this sort, even though they

* J. Stanley Gardiner, "The Seychelles Archipelago"; from the *Geographical Journal* for February, 1907, p. 160: see this and the succeeding pages for a description of the Cascade jungle.

may not be absolutely confined to it, so that such places are tenanted by a fairly definite fauna of their own. Another remarkable locality several times visited was the summit of Mount Sebert. This consists in great part of bare granite, but it has patches of a very peculiar stunted forest growth, and it yielded valuable entomological material.

Another excellent and often-visited collecting-ground was a valley in the forest, some way above the Cascade house in the direction of Mount Harrison. It was an exceedingly beautiful place, traversed by a clear mountain-stream, and filled with a thick wood of native palm-trees bearing a luxuriant growth of epiphytes. Here were found many small and minute Coleoptera, certain very minute and curious Hemiptera, etc., among the dead and fallen palm-leaves; Diptera and other insects by sweeping ferns and other undergrowth; while over the stream flew mayflies and another new species of caddis-fly (*Hydromanicus seychellensis* Ulmer).

At this time was experienced the worst spell of weather, and almost the only successful night-collecting, during the whole of my stay in the islands. The season was that in which most rain is expected, and from December 19 to December 30 the sun was scarcely to be seen at all at Cascade. There was also heavy rain at other times, and collecting was frequently rendered very difficult or temporarily impossible. The weather was generally calm: on fine days the sea lay smooth as glass under a blazing sky, and a great mass of white cloud hung motionless over each of the distant islands of Praslin and La Digue. Although a large number of Lepidoptera had already been secured by diurnal collecting, yet the night-flying species had not been obtained hitherto in any satisfactory quantity. This defect was made good to a large extent during the wet weather at Cascade. By placing a bright lamp and a sheet in the front of the verandah on dark cloudy nights, we succeeded in getting a number of the larger moths, including many species new to me. For example, on December 26 about 111 specimens were captured, on December 27 about 40, and others on other nights. On clear and moonlight nights none were obtained.

It has been mentioned that we largely concentrated our attention on Diptera. During the wet weather especially, numerous small flies and other insects came into the house and were caught on the window-panes (Drosophilidæ, Phoridæ, Chironomidæ, Psychodidæ, etc.). Moreover here as elsewhere Diptera were collected in the high forests. Many flies were captured in the plantation, where certain species had the habit of settling, in fine weather, on the leaves of various cultivated trees and bushes. Among these last were certain metallic Dolichopidæ; it could often be remarked that different forms of these flies showed each a distinct predilection for a certain kind of spot on which to settle. Thus, in the high forests there is a particular kind of Dolichopid (*Leptorhethrum* sp.) constantly seen to settle on the broad upper surfaces of the leaves of *Curculigo* or of small palms; while on the plateau of the Mare aux Cochons in Silhouette a brilliant metallic-green form continually settled on the big leaves of the climbing *Ipomœa*, often in the blazing sunlight. It may be well, too, to mention here a phenomenon several times seen in the mountain forests. There are small flies (Limnobiidæ, almost certainly *Thrypticomyia* sp.) which hang in rows to threads of web fastened between bushes. Each fly clings to the thread by its two front tarsi: a dozen

or more may hang thus motionless in a row, close enough to one another for their outstretched legs almost to touch. When disturbed they fly off and disperse, but some generally return soon to the web. Large numbers of them may be sometimes seen thus in a very small area. Their tarsi are white: and as the insects usually hang in rather shady, dark, places, these tarsi catch the eye as a number of isolated white dots.

Leaving Cascade on January 25 for Port Victoria, I went the next day to the district known as the "Mare aux Cochons*," where I stayed till February 3, occupying a room in a house owned by a firm of Chinese merchants in Port Victoria. The Mare aux Cochons is a very elevated and rugged part of the country, some miles north-west of the district in which I had previously worked while staying near Morne Blanc. It has several hill-streams, flowing in part of their course through what might almost be termed gorges, and the mountains bear fine stretches of wild forest. The country is very rough with extremely steep slopes, and highly fatiguing to traverse. It is of a type in some respects unlike anything I had seen before, and well repaid entomological investigation. It is somewhat to be regretted that time allowed only of a short stay there.

A number of trees of the "bois de fer" (*Vateria seychellarum* Dyer) grew near to the house. The species is peculiar to the Seychelles, and I was informed that this is the only locality where it still exists. Many insects were collected among these trees, including a species of Longicorn beetle which, even if not actually confined to the "bois de fer," had at any rate not been found by me in any numbers elsewhere. On two afternoons I worked in a patch of secondary forest, finding interesting Coleoptera and Homoptera on the leaves of the young palms, especially rather late in the afternoon. Several excursions were made into the high forests, including a climb to the summit of a peak standing above Anse Major. This peak is covered with a dense forest of living capucin trees, and from the top of a great tabular rock lying among them one gets a most curious view over the dense foliage of the tree-tops, an expanse of big, dull blue-green leaves: one or two individuals of the butterfly *Euplœa mitra* were flying over them. On this summit the little black Hydrophilid beetles were again found among dead capucin leaves on the ground, and many other interesting specimens were obtained.

In the marsh which is the Mare aux Cochons proper, at an elevation of 1500 feet or more, specimens were obtained (among other things) of another new species of caddis-fly†. In a swampy piece of ground where there were several small pools among fallen leaves of *Pandanus hornei*, were found various flies of the families Tipulidæ, Chironomidæ, Culicidæ and Psychodidæ. At about 4 o'clock on the afternoon of January 26, on coming up the bed of the stream in a gorge a little below the house, I found the place swarming with countless specimens of yet another new caddis-fly, a very small species (*Petrotrichia palpalis* Ulmer): they were running rapidly to and fro on the rocks, or hidden in overhanging bushes, or fluttering over the water. In part of this valley, too, there was a considerable display of the "fireflies" (*Luciola* sp.) on more than one evening.

* Not to be confounded with the similarly-named locality in the island of Silhouette. In several cases the same place-name is used in more than one island.

† *Hughscottiella auricapilla* Ulmer.

Leaving the Mare aux Cochons district on February 3, I descended to the coast at Port Glaud, on the western side of Mahé: then, reascending the hills by the road, lodged again for two nights in the house near Morne Blanc. On the intervening day (February 4) I made an excursion to Morne Seychellois, hoping to reach the actual summit, not hitherto visited by me. Owing however to heavy clouds, which rolled up early in the morning and quite concealed the whereabouts of the Morne, I had to be contented at first with collecting in lower patches of jungle. But in the afternoon the sky quite cleared, enabling me to ascend the precipitous slopes of the peak to within a few hundred feet of the top, and to collect in the dense low vegetation of endemic ferns, bushes, and small trees, with which this part of the slopes is clothed. I returned in the evening to Morne Blanc, passing thence next day (February 5) to Port Victoria, having made since January 26 a circuit of the most mountainous and forest-covered part of Mahé.

Some days were then passed in Port Victoria, during which a certain amount of collecting was done. Mr de Gaye, to whom I am much indebted for several suggestions concerning collecting, had informed me that a beetle, *Adoretus* sp., is to be found in the town at night among rose-bushes, the leaves of which it eats. Accordingly we went on the evening of February 9 with a lantern to the Botanic Gardens, and obtained a fair quantity of these beetles among the rose-bushes. As soon as the lantern is brought near the bush the beetles fly to the light, and Mr de Gaye told me that very great numbers can sometimes be taken in this manner. On another evening, which was rainy, a number of moths and several specimens of a Rutelid beetle (*Parastasia coquerelii* Fairm.) came to a bright lamp placed on the verandah of the house.

On February 15 I returned to Mr Thomasset's house at Cascade, remaining there till March 3, when the mountains were left for the last time a few days previous to departing altogether from the Seychelles. During this second stay at Cascade, much collecting was done, as before. More than once a locality at about 1500 feet elevation on a ridge behind the estate was visited, where a good-sized area of ground is thickly strewn with leaves fallen from a group of great *Pandanus Hornei*. Besides beetles and parasitic Hymenoptera, there were present among these leaves certain flies of the family Chironomidæ, and also numbers of a kind of Culicid, which appears to be confined to such localities. This same mosquito (as well as some Chironomidæ) was obtained at the Mare aux Cochons (Mahé) near small ponds among fallen *Pandanus* leaves. But in that place there were pools of water, whereas in this locality behind Cascade the only standing-water appeared to be that collected in the hollows of the leaves themselves, in which the aquatic larvæ of the flies possibly live. It may be added that there is a large species of Homoptera, which I never found anywhere except among the fallen leaves under certain groups of this *Pandanus*.

Before this section is closed, some reference must be made to entomological work in parts of the low cultivated country of Mahé. Firstly, collecting was done on two little coconut-planted islets lying each about 4 miles from the main island, namely Long Island (July 12—22) and Anonyme Island (January 8 and 9). Among seaweed in both

places were found certain Coleoptera, a minute Histerid (? *Halacritus* sp.) and some Trichopterygidæ. Certain small Diptera swarmed among masses of seaweed at Anonyme Island. Other interesting flies were caught either on the beach itself, or in sandy places overgrown with a creeping littoral *Ipomœa* and other plants just behind the shore. Characteristic insects were also obtained among certain kinds of coast-bushes and trees which are common to many islands in this region.

There are several marshy tracts on the small coastal plains, which lie between the foot of the mountains and the sea in places along the shores of Mahé. By means of a short expedition made (January 19—21) to these plains towards the south of the island, at Anse aux Pins and Anse Royale, I was able to get a sample of their insect-fauna. The plain at Anse aux Pins is for the most part covered with coconut-plantations; but there are some uncultivated swamps, overgrown with long rushes and other marsh-loving plants, and in places with the yellow-flowered *Jussiæa* already mentioned as growing in some swampy places in the mountains. At Anse Royale there are marshy pieces of ground and ditches on the low-lying land, through which a river runs to the sea. At these places several species of water-beetles, not previously taken by me in the islands, were found in large numbers. The rank marsh-growth was found, when swept, to be very rich in Diptera, including brilliant metallic-green Psilopinæ and other Dolichopids, small Chloropidæ with vivid yellow markings, and many more. These flies were obtained not so much from rushes, etc., growing actually in the water, as from grasses and other rank herbage near the water. *Stomoxys* was abundant in some swampy places: in a dense expanse of *Jussiæa* at Anse aux Pins these flies were fairly numerous, while Diptera in general seemed scarce.

In a number of places I swept the long grass and other coarse growth which is often to be found growing among the coconut-palms in plantations. In all cases such vegetation was found to contain very numerous small insects (parasitic Hymenoptera, Homoptera, etc.). Certain kinds of dragon-flies were only seen quite near the sea-level, while others extend their range to elevations of over 1000 feet. Lastly, on some occasions large numbers of small Coleoptera were found under the bark of fallen trees in the low country. The insect-fauna of the low-lying and cultivated country has in general a distinct character of its own, since many of its species do not extend their range up into the mountain-forests, while most of the forms inhabiting the latter do not descend to the cultivated lands.

IV. PRASLIN, FÉLICITÉ, AND MARIE ANNE ISLANDS.

In the nature of their high forests and in several other respects the islands of Mahé and Silhouette are closely alike, so that much that has been said of the entomological work in the one island would apply equally well to the other, and *vice versâ*. This cannot be said with regard to Praslin, in which island the general topography and the vegetation differ in several important points from those of Mahé or Silhouette. The mountains are lower, the highest being only 1260 feet. The scenery appears, especially to one newly arrived in the island, to be of a quite fresh type, which is partly due to the great abundance of the feathery *Casuarina* trees on the hills. The native jungles have been destroyed

to a very large extent: on the mountains exist areas which bear only a low dry scrub, growing out of the hard red subsoil. Such patches of endemic forest as do remain are of a highly peculiar nature, largely composed of the famous "coco de mer" palm (*Lodoicea seychellarum*), which in a wild state is confined to this one island.

Time allowed of only a very short trip to Praslin, which was made between Nov. 27 and Dec. 2 in the company of Mr R. P. Dupont, the Curator of the Botanic Station in Mahé. We stayed in a house near Grande Anse: and were favoured throughout the time with extremely fine weather. The best remaining piece of "coco de mer" forest, namely that in the Vallée de Mai on the Côtes d'Or Estate, was easily accessible, and altogether two days were devoted to collecting there. The route by which we went to it leads at first along a valley, up a sun-baked red-earth path, on which were found numbers of a Cicindelid beetle (almost certainly a form of *Cicindela melancholica* F.): I had not previously met with this insect, which appears to be the only member of the family found in the Seychelles. Having arrived almost at the highest point of the path, beyond which it commences to descend the other side of the hills, we turned to the left along the side of a marshy piece of ground filled with rank vegetation over which were flying several fritillaries (*Atella philiberti* Joan.). Then a fairly open piece of ground, in which "coco de mer" palms stand at intervals, was traversed: here also were numerous young palms, and tufts of grass, which swarmed with insects, parasitic Hymenoptera and Coleoptera. Finally, after a slight descent, one enters the "coco de mer" jungle, one of the most beautiful pieces of forest which I ever saw in the Seychelles. Those forms of vegetation which appear strangest to the eyes of a European are here massed together, almost to the exclusion of more ordinary-looking plants: great "cocos de mer" rear their crowns of leaves aloft, sometimes to heights of 80 feet or more; there are tall slender *Deckenia* palms, *Stevensonia*, and big clumps of *Pandanus*. Among the foliage overhead is heard at intervals the note of a dark brown parrot (*Coracopsis barklyi*). As might be expected, such a place proved to be a rich collecting-ground; though it remains to be seen whether the insects as well as the palm *Lodoicea* are peculiar to this one island. Interesting Coleoptera were found by shaking the dead palm-leaves with which the ground is strewn, and certain beetles and Hemiptera (Aradidæ) were obtained in numbers from decaying logs. A moderately tall male "coco de mer" tree was felled and a number of Coleoptera found between the bases of the leaves, including at least one remarkable form (a Scydmænid) which was quite new to me.

Some Acridiidæ were caught in a dry, sandy, grass-grown place on the low-lying coastal land at Grande Anse: and another member of the family was present in some numbers in a rather similar situation in Félicité Island. These grasshoppers almost certainly belong to species which range over many of the islands in this part of the Indian Ocean, and perhaps even more widely still. They are an example of a certain section of the Seychelles insect-fauna, which is found only near the coasts of the big islands and on small out-lying islets, and never in the endemic mountain-jungles. It is a part of the fauna in no way peculiar to the archipelago, but common to it and to many of the low-lying islands in the same region.

A short visit was made to each of the small islands of Marie Anne and Félicité, which lie relatively near to Praslin. In the former, where I enjoyed the hospitality of

the owners, the Messieurs Choppy, time permitted of a stay only of one night (Dec. 2—3). In Félicité I was enabled to spend four days (Dec. 14—18), through the kindness of Mr H. a'C. Bergne. Both these islands are largely given up to the cultivation of coconuts, but considerable areas remain covered with wild forest, of a type of which hitherto I had had little or no experience. Conspicuous among the trees, some of which are of great size, are the "badamier" (*Terminalia Catappa*), the takamaka (*Calophyllum Inophyllum*), the "bois de natte" (*Imbricaria seychellarum*), and several kinds of *Ficus*. Some of the species (*e.g.* the *Imbricaria*) are peculiar, but there are many which (unlike those of the endemic mountain-jungles in Mahé, etc.) range beyond the confines of the Seychelles. Moreover these forests are very dry compared with the humid mountain-jungles, and their insect-fauna appeared to be relatively scanty. Mosquitoes (*Stegomyia*) were abundant and persistent; and a number of insects of various other kinds were captured. Several species of moths not met with before were found in Félicité. They were taken in one particular spot, where, at the foot of a precipitous rock and in its crevices, lay piles of fallen *Pandanus* leaves among which the creatures hid. On the whole, the quota of material yielded by these two islands is by no means unimportant, including as it does several forms which I did not obtain elsewhere. These may possibly prove not to be peculiar to the archipelago, but to belong to that wider-ranging fauna which is established round the coasts of the Seychelles, and to which allusion has already been made.

The last few days (March 3—10) of my stay were passed in Port Victoria, and I left the Seychelles for England early on March 11, 1909.

V. CONCLUSION.

At this early stage, while most of the material is still only being prepared and sorted, it is not possible with any reliability to draw from it conclusions as to the general nature of the insect-fauna of the Seychelles. That many new forms are contained in the collection is, however, quite certain. Those groups which have already been cursorily examined, or worked out, by specialists, show a considerable proportion of new species and in some cases of new genera. There are some groups, such as the Trichoptera, of which no species had previously been described or recorded from the archipelago. Of some other divisions, such as the Diptera and small parasitic Hymenoptera, extremely few have hitherto been obtained from the Seychelles: during the expedition which is the subject of this paper, large numbers of specimens of these groups were obtained, including many forms new to the islands, and to science. In the case of certain other orders (Orthoptera, Coleoptera) a considerable number of species had already been collected by the well-known French entomologist Monsieur Charles Alluaud, who visited the islands in 1892, and from the results of whose expedition knowledge of the entomology of the Seychelles has been chiefly drawn: but even in these cases, owing to the much longer time spent by me in the islands and the great facilities for reaching the best collecting-grounds, there will doubtless be large additions to the list of the Seychelles fauna.

The total number of specimens collected can be only very roughly guessed at, but is probably somewhere over 50,000. Many species are represented by large series of specimens. It is intended to place a set of specimens, including types of new species, in the British Museum, and to retain as complete a set as possible, with co-types whenever they are present, in the Cambridge University Museum. The majority of the specimens were got in the Seychelles, mostly from the mountain-forests, in the above described expedition of 1908—9 : but the collection includes some thousands of insects obtained by Mr J. C. F. Fryer in the coral-atoll of Aldabra (1908—9), and also a considerable number of specimens collected by the H.M.S. "Sealark" Expedition under Professor J. Stanley Gardiner in 1905, in the Seychelles, Amirantes, and other islands in this region. Even a first glance is enough to show that the insect-fauna of Aldabra presents a decidedly different facies to that of the Seychelles, which might be expected from the very different nature and geographical position of the two places.

The usual difficulties connected with the collecting and preservation of insects in a hot and very damp climate were experienced. Large quantities of crude carbolic acid had to be used, to keep away mould, Psocidæ, ants, etc. Damp proved to be about the worst enemy, mould even once appearing on some moths in a box which had already been heavily carbolised, though not sufficiently for such a climate. Several instalments of specimens were sent to England in advance, to get them sooner out of the climate. While staying at Cascade I more than once placed storeboxes full of specimens for a short time in the house which is used for drying vanilla and other spices grown on the estate : this treatment seemed beneficial in warding off the evil effects of damp. Almost all the Dipterous and Neuropterous insects, and many other specimens besides, were pinned in the islands, pins of solid silver wire being employed in order to avoid the corrosion which sets in very rapidly if ordinary entomological pins are used. The great bulk of specimens, including almost all the Coleoptera, Hymenoptera and many Orthoptera, etc., were packed in sawdust.

The collections made should be thoroughly representative of the insect-fauna of the Seychelles. Many more species, however, doubtless remain to be discovered in this archipelago, which, considering its small size and isolated position, appears to be so rich in insect-life. Owing to the clearing of the lower forests and the great reduction of the areas covered by endemic vegetation generally, many native insects have probably become extremely rare or even extinct. The statement about the representative nature of the material applies particularly to that collected in the endemic mountain-forests of Mahé and Silhouette. They are by far the most important collecting-grounds, and to them I devoted by far the greater part of my time, camping either in or very near to them, going over the ground as thoroughly as possible, and in some cases returning often to the same area and searching it minutely. It may be hoped that the entomological investigation of these forests will be proved to approach somewhere near to completeness. The same cannot be said with regard to the marshes near the coasts of Mahé, nor to the island of Praslin. Time did not permit of my doing more than just touching on these places. Praslin above all would probably repay richly minute investigation, both of the remaining patches of its highly peculiar native forest, and perhaps also of certain marshy areas.

Further search also might well be made in the forest on the islands of Félicité and Marie Anne.

My stay in Seychelles extended through most of the year. From July till the end of September it fell within the season of the south-east wind, the coolest and least wet portion of the year: and it included the calmer, hotter, and often wetter, months from October to March. But I missed April, May, and June, when there is, as I am informed, an extremely hot and calm period preceding the commencement of the south-east wind: it is possible that careful search might reveal the existence of some special forms of insect-life appearing only at that season. The work of collecting allowed me scarcely any leisure for examining into the life-histories and habits of the native insects: therefore it is hardly necessary to add that in this direction a big field of enquiry lies almost untouched.

Lastly, it is a great pleasure to me to express my gratitude for the kindness of the many people in the Seychelles, who have aided me in my task in different ways. I am especially indebted to the Governor of the Colony, His Excellency W. E. Davidson, C.M.G., for many facilities granted to me in my work, particularly in the matter of passing from one island to another. I have already stated, in connection with particular localities visited, how much I owe to Mr H. P. Thomasset, and to Monsieur E. Dauban. My best thanks are also due to Mr R. P. Dupont, Curator of the Botanic Station in Mahé, for acting as my guide and companion on more than one occasion, and for much valuable information about the local flora: and to Mr H. A. Pare, Mr de Gaye, and others who in various ways have contributed to render delightful my whole sojourn in the Seychelles.

No. III.—TRICHOPTERA.

Von Georg Ulmer, Hamburg.
(Mitgeteilt von Prof. J. Stanley Gardiner, M.A., F.R.S., F.L.S.)

(Tafeln 3 und 4.)

Gelesen den 2. Dezember 1909.

Mr Hugh Scott hatte die Freundlichkeit, mir die von ihm auf den Seychellen gesammelten Trichopteren zur Bearbeitung anzubieten. Gleichzeitig gab er mir von seiner Reise und den von ihm besuchten Inseln einen kurzen, interessanten Bericht, von dem das für die Trichopteren Wichtigste hier wiederholt sein mag.

Nachdem schon im Jahre 1905 Mr J. Stanley Gardiner*, Cambridge, die Seychellen besucht hatte, unternahm dieser Herr im Jahre 1908 eine zweite längere Expedition, während welcher er 3 Monate lang auf den Inseln hauptsächlich botanisch und geologisch tätig war; sein Begleiter, Mr Hugh Scott, weilte sogar 8 Monate dort und sammelte während der ganzen Zeit die Insekten jener eigenartigen Insel-Fauna.

Die Seychellen bestehen aus Granit und sind sehr gebirgig; die Abhänge sind sehr steil, und die Berge steigen bis auf 2000 Fuss und mehr über dem Meere auf; der höchste Berg ist 2990 Fuss hoch. Die höheren Bergregionen sind mit prächtigem Tropenwald bedeckt, der fast gänzlich aus solchen Pflanzen besteht, die nur den Seychellen eigen sind, sowohl der Species wie dem Genus nach†; so sind z. B. auf dieser Inselgruppe 5 Arten Palmen gefunden worden, die jede eine besondere Gattung bilden und die nur hier vorkommen. Die Bergwälder sind ausserordentlich feucht, der Regenfall ist sehr gross; die höchsten Spitzen sind oft in Wolken und Nebel gehüllt. Die niedrigeren Regionen bilden cultiviertes Land. So sind rings an den Küsten und ins Gebirge oft mehrere 100 Fuss aufsteigend, Anpflanzungen der Cocospalme vorhanden; noch höher hinauf findet sich z. B. die Vanille in Kultur, und noch viele Kulturpflanzen mehr sind von anderen tropischen Ländern eingeführt worden; einige dieser Pflanzen, wie z. B. der Zimtbaum von Ceylon, sind verwildert und bilden jetzt einen Teil der gemischten Bestände des Bergwaldes in den mittleren Regionen.

Die Trichopteren wurden sämtlich in den gebirgigen Partien der beiden Inseln Mahé und Silhouette gesammelt—und zwar teils an sumpfigen Stellen, teils an Bächen—in Höhen von ca. 1000 bis 1500 Fuss. Genauere Angaben über die Lokalitäten findet man bei den einzelnen Arten.—War ich schon erfreut, überhaupt einmal von jener

* Mr J. Stanley Gardiner hielt über seine Reise vor der Royal Geographical Society einen Vortrag, der in *The Geographical Journal* für Februar 1907 publiziert wurde. Mr Hugh Scott gab mir Gelegenheit, diese Arbeit kennen zu lernen.

† Ich führe diese Tatsache an, weil sich für die Trichopteren etwas Ähnliches herausgestellt hat.

Inselgruppe, die bisher noch gar keine Trichopteren für die Sammlungen geliefert hatte, diese Insekten zu sehen, so war ich sogar überrascht, als ich mit der Bearbeitung begann. Schon Mr Scott hatte das Material in Gruppen zusammengestellt, und bei der näheren Untersuchung ergaben sich 6 Arten, sämtlich unbekannt, ja noch mehr: diese 6 Arten erwiesen sich als zu ebensovielen Gattungen gehörig, von denen 4 vollkommen neu sind und ein ganz eigenartiges Gepräge aufweisen, während nur 2 Genera (*Hydromanicus* und *Ecnomus*) seit langem bekannt sind.

Hinsichtlich der genaueren Beschreibung verweise ich auf die folgenden Seiten, ich möchte aber doch hier einige Bemerkungen, besonders über die neuen Genera vorausschicken.

Wahrscheinlich ziemlich nahe stehen sich die beiden Gattungen *Leptodermatopteryx* (n. g.) und *Hughscottiella* (n. g.); beide hätte man zu den Leptoceridæ im weit. Sinne (McLachlan) zu rechnen; darauf weisen die langen Fühler, die Maxillartaster, die dünnen Beine, der Bau der Genitalorgane des ♂ hin; aber es ist recht schwierig, sie in unser neues System, das die Leptoceridæ (s.l.) ja in 4 Familien (Molannidæ, Leptoceridæ, Odontoceridæ, Calamoceratidæ) trennt, einzuordnen; ohne weiteres scheiden die Molanniden (wegen ihrer unregelmässigen Nervatur etc.) und die Calamoceratiden (die eine Medianzelle im Vorderflügel besitzen) aus. Von den Leptoceriden kommen die zahlreichen Gattungen der Leptocerinæ nicht in Betracht, da sie u. a. nie eine geschlossene Discoidalzelle im Hinterflügel besitzen; entscheiden müsste man sich also zwischen den Triplectidinæ (Unterfamilie der Leptoceridæ) und den Odontoceridæ; ich möchte annehmen, dass die beiden genannten Gattungen den letzteren angehören, und zwar deshalb, weil in allen Flügeln die Endgabel 2 vorhanden ist und weil wenigstens in je einem Flügelpaar (bei *Leptodermatopteryx* im Vorderflügel, bei *Hughscottiella* im Hinterflügel) der Radius in den ersten Apicalsektor mündet; allerdings spricht gegen die Annahme der Zugehörigkeit zu den Odontoceriden die Tatsache, dass bei *Hughscottiella** die Nervatur in den Geschlechtern gleich ist, während die bekannten Odontoceriden-Genera sämtlich sexuelle Differenzen in der Nervatur aufweisen. *Leptodermatopteryx* würde ganz gut in die Nähe von *Marilia* Fr. Müll. gebracht werden können (vgl. besonders die Beziehungen des Radius und des Apicalsector I zueinander und ferner die undeutliche Analader unter der Thyridiumzelle, beides im Vorderflügel); *Hughscottiella* dagegen könnte ich augenblicklich keiner bekannten Gattung an die Seite stellen; der Entwickelung der Nervatur nach müsste sie noch vor *Marilia* zu stehen kommen; gewisse Ähnlichkeiten in der Aderung zeigen sich bei *Psilopsyche* Ulm. und ferner bei einer Trichoptere (*Electropsilotes*, n. g.) aus dem Baltischen Bernstein (K 3076, Coll. Klebs-Königsberg); doch ist in diesen Gattungen die Nervatur viel reicher und teilweise auch in anderem Sinne entwickelt.

Zu den Polycentropidæ gehört ohne Zweifel die neue Gattung *Cyrnodes*, die ich in die Nähe von *Cyrnus* Steph. stelle, die aber noch einfachere Nervatur besitzt und wohl die kleinste bisher bekannte Art der Polycentropinæ darstellt; höchst merkwürdig ist das Fehlen der Gabel 3 im Vorderflügel, die sonst allen Genera der Polycentropiden eigen ist.

* Von *Leptodermatopteryx* ist kein ♀ in dem Material vorhanden.

Und nun die in gewissem Sinne merkwürdigste der 4 neuen Gattungen: *Petrotrichia*; dies Insekt ist dem Habitus nach vollständig eine Hydroptilide (aus der Verwandtschaft von *Mortoniella* Ulm. und *Protoptila* Banks, hat auch wie diese beiden keine verdickten Haare auf den Flügeln), aber die ♂♂ besitzen **drei**gliedrige (!) Maxillartaster, die ♀♀ fünfgliedrige. Trotzdem möchte ich *Petrotrichia* zu den Hydroptiliden stellen—und in diesem Zusammenhange daran erinnern, dass ein Limnophiliden-Genus (*Thamastes* Hag.) in ähnlicher Weise "contra leges naturæ" (wie MacLachlan sagt) handelt; dort hat nämlich das ♀ dreigliedrige Taster, obgleich die Fünfgliedrigkeit hier im weiblichen Geschlechte (wie bei den Hydroptiliden in beiden Geschlechtern) die Norm ist.—Die jetzt noch nicht erwähnten letzten beiden Arten (*Hydromanicus seychellensis*, n. sp. und *Ecnomus insularis*, n. sp.) bieten nichts Besonderes, zeigen aber wenigstens, dass die Seychellen nicht nur endemische Gattungen aufweisen, sondern auch solche, die weite Verbreitung besitzen.

Es wäre nutzlos, nach Beziehungen zu suchen zwischen den Trichopteren der Seychellen und denen näher oder weiter entfernter Gebiete. Die 4 neuen Gattungen stehen, wie erwähnt, ganz isoliert da. Von den beiden anderen Gattungen, die noch durch je eine Art vertreten sind, findet sich *Hydromanicus* mit zahlreichen Arten im indo-malayischen—und mit einer Art im chinesisch-japanischen Gebiete; *Ecnomus* findet sich mit 2 Arten im eurasiatischen Gebiete und mit je einer Art im Kongostaate und auf Java.

Mr Hugh Scott möchte ich auch an dieser Stelle herzlichen Dank aussprechen für die Erlaubnis, einen nicht unbeträchtlichen Teil seines Materials für meine Sammlung zurückbehalten zu dürfen. Die Hauptmasse seiner Collection wird in den Museen von Cambridge und London aufbewahrt werden.

Fam. **Hydroptilidæ.**

PETROTRICHIA, n. g.

Spornzahl 0, 2, 4; Innensporne länger als Aussensporne, besonders an der Mitteltibie; Subapicalsporne der Hintertibie etwa am Ende des zweiten Drittels; Beine kräftig, Hinterbeine am längsten. Kopf mit einer medianen Längsfurche und mit drei nicht sehr grossen Warzen (je eine zwischen den Fühlern und innen neben den Augen). Ocellen fehlend. Fühler so lang oder ganz wenig länger als der Vorderflügel, stark behaart, recht dünn, distal verschmälert, nur das Basalglied, welches mindestens so lang ist wie der Kopf, dicker (Fig. 1); Maxillartaster des ♂ dreigliedrig (Fig. 1a), das erste Glied sehr kurz, das zweite etwa dreimal so lang, das dritte noch beträchtlich länger; Maxillartaster des ♀ (Fig. 1b) fünfgliedrig; das erste Glied kurz, das zweite am längsten, das dritte das kürzeste, das vierte Glied etwas länger als das dritte, das fünfte noch länger; die beiden letzten Glieder, besonders das fünfte, dünner als die übrigen. Labialtaster kurz, die drei Glieder an Länge zunehmend; Behaarung aller Taster dicht, aber nicht lang. Flügel dicht behaart, aber recht glatt, ohne aufgerichtete verdickte Haare; Vorderflügel (Fig. 2, 3) lang und schmal, fast gleichbreit, am Apex stumpf vorgezogen; die Nervatur wird (ebenso wie am Hinterflügel) erst nach Entfernung der Haarbedeckung sichtbar; Subcosta gegenüber der Anastomose in den Costalrand mündend, Radius beträchtlich

länger. Discoidalzelle geschlossen, lang; Thyridiumzelle sehr lang, geschlossen; Anastomose vollständig; nur Endgabel 1 vorhanden; Media nur einfach gegabelt; Cubitus beim ♂ ganz ungeteilt, beim ♀ gegabelt; die erste Analader in der Anastomose-Region mit dem Cubitus vereinigt; keine Apicalzelle gestielt; Zahl der Apicaladern beim ♂ 6, beim ♀ 7. Hinterflügel (Fig. 2) kürzer und noch viel schmäler als der Vorderflügel, etwas spitzer, der Costalrand hinter der schwach vorgezogenen Mitte etwas concav; Subcosta und Radius von der Mitte an miteinander verschmolzen; Discoidalzelle und sämtliche Endgabeln fehlend; Sector radii nur einmal gegabelt, Media und Cubitus gar nicht; Randwimpern des Vorderflügels ungefähr $\frac{3}{4}$ so lang, die des Hinterflügels etwa $1\frac{1}{2}$mal so lang wie die Flügelbreite. Genitalanhänge des ♂ (s.w.u.) mit zwei grossen Klauen.

1. *Petrotrichia palpalis*, n. sp.

Kopf graubraun, auf den Warzen schwarz und lang behaart, zwischen den Fühlern manchmal schneeweiss behaart. Fühler schwarz, mit schwarzen Haaren, die am Basalgliede (Fig. 1) recht lang sind. Taster gelb, manchmal hellgelb oder beim ♀ schwach rötlich, mit gelben Härchen; unter den Augen ein Büschel schwarzer Haare. Brust oben heller oder dunkler braun, mit schwarzen Haaren; Unterfläche der Brust heller, gelbbräunlich, beim ♀ oftmals rötlich; Hinterleib braun oder dunkelbraun mit rötlichem Tone, beim ♀ ganz rot. Hüften aller Beine wie die Brust gefärbt (gelbbräunlich bis rötlich); Schenkel gelb, nur am Apex angedunkelt; Schienen und Tarsen schwarzbraun, schwarz behaart, doch sind am Mittelbein die ersten 2 bis 3 Tarsalglieder rein gelb, und die Tarsalglieder des Hinterbeines sind an den Articulationen manchmal schmal gelb geringelt. Flügel grauschwarz; die Vorderflügel durch die dichtere und längere schwarze Behaarung etwas dunkler als die Hinterflügel, mit drei schneeweissen oder silberweissen Haarflecken* von denen der grösste eine breite Querbinde in der Anastomose-Region bildet, den Hinterrand aber nicht erreichend; die zweite Makel ist die kleinste und liegt am Hinterrande in der Mitte, am Ende der Analader; die dritte Makel ist fast so gross wie die erste, ist rundlich und liegt an der Flügelbasis; Adern und Randwimpern schwarz; nur dort, wo die erste Makel den Costalrand und die zweite den Postcostalrand berührt, sind einige weisse Randwimpern.—Die Genitalorgane des ♂ sind nur nach Behandlung mit Kali- oder Natronlauge und nach Aufhellung in Nelkenöl deutlich erkennbar; ohne diese Manipulation sieht man an den Tieren ein Paar starker hakenförmig ventral gebogener Klauen (Fig. 4a) und ein Paar seitlich davon stehender lappenartiger, stark behaarter Anhänge. Im mikroskopischen Präparate (Fig. 4b) sind diese Teile durch den Druck des Deckglases etwas verschoben; die starken Klauen ragen am weitesten vor; die lappenartigen stark behaarten Anhänge sind distal schwach keulenartig verdickt und lateral gerichtet; an ihrer Basis gehen sie in je einen ziemlich spitz endigenden Fortsatz über, der distal gerichtet ist und am Ende eine Borste trägt; diese beiden Fortsätze sind an der Basis verbreitert und dort miteinander verwachsen. Unter einer am Hinterrande tief spitzwinklich ausgeschnittenen Membran liegt der breite gerade Penis.—Das Hinter-

* 1 Exemplar (No. 104, ♂) zeigt diese weissen Haarflecke nicht; es ist wohl noch nicht ausgefärbt oder aber abgerieben; die Genitalien sind ohne Präparation nicht erkennbar.

leibsende des ♀ ist stumpf und ohne Anhänge. Am V. Segment bei ♂ und ♀ ein ventraler Zahn. Körperlänge des ♂ 2 mm., des ♀ 2½ mm.; Flügelspannung des ♂ 5 bis 6 mm., des ♀ 7½ mm.

Material: 11 ♂♂, 8 ♀♀; davon 4 ♂♂, "Mahé, Cascade Estate about 800 feet, XII. 1908"; 7 ♂♂, 8 ♀♀, "Mahé, Mare aux Cochons district, about 1500 feet, I. 1909." Von diesen letzteren schreibt Mr Hugh Scott mir: Hunderte von Exemplaren liefen mit grosser Schnelligkeit auf den Felsen eines kleinen tief eingeschnittenen Gebirgsbaches; sehr viele Stücke wurden auch mit dem Netz von den Büschen gestreift, die über das Wasser hinragten; die Zeit des Fanges war 4 h. Nachmittags.

Fam. **Polycentropidæ.**

CYRNODES, n. g.

Spornzahl **3**, 4, 4; Innensporne länger als Aussensporne; der Subapicalsporn der Vordertibie steht basal von der Mitte; die Subapicalsporne der Mitteltibie stehen noch weiter basal, etwa am Ende des ersten Drittels, und die der Hintertibie etwas distal von der Mitte; Hinterbeine länger als Mittelbeine; Tibie und Tarsen (diese schwächer) des Mittelbeines beim ♀ deutlich erweitert. Kopf oben sehr dicht behaart; nach Entfernung der Kopfhaare sieht man in der hinteren Partie innen neben den Augen je eine grosse dreieckige (basal verbreiterte) Warze und eine kleine Warze zwischen den Fühlern; die Kopffläche ist gewölbt und durch die etwas vertiefte Mittelnaht geteilt. Ocellen fehlend. Augen normal, klein. Fühler so lang wie der Vorderflügel, ziemlich dünn, innen nicht gekerbt (höchstens am distalen Ende ganz schwach); die einzelnen Glieder der zweiten Hälfte etwa doppelt so lang wie breit; das erste Glied kurz und wenig dicker als die folgenden. Maxillartaster mit zwei sehr kurzen Grundgliedern; das dritte Glied länger als die beiden ersten zusammen, das vierte etwas kürzer, und das fünfte Glied etwas länger als das dritte; fünftes Glied deutlich gegliedert. Labialtaster sehr klein, das dritte Glied am längsten, gegliedert. Flügel (Fig. 5) schmal; Vorderflügel apical kaum verbreitert, am Apex stark rundlich; Costalraum breit (besonders basal von der deutlichen additionellen Querader), Postcostalraum aber sehr schmal; Subcosta etwas geschwungen, Radius ihr sehr nahe, beide Adern durch eine kurze Querader miteinander verbunden (der Basis der Discoidalzelle gegenüber); Discoidalzelle normal, so lang wie ihr Stiel, geschlossen; Medianzelle länger und etwas schmäler, viel weiter apical, aber nicht so weit basal reichend wie die Discoidalzelle; Thyridiumzelle viel länger als die Discoidalzelle, die Basis der Medianzelle erreichend; nur Gabeln 2, 4, 5 vorhanden; 8 Apicaladern; Gabel 2 kurz gestielt, Gabel 4 sitzend, aber spitz, Gabel 5 lang gestielt. Hinterflügel kürzer und schmäler als der Vorderflügel; der Costalrand gerade (sehr schwach concav), der Costalraum sehr schmal; Subcosta und Radius miteinander verschmolzen; Discoidalzelle offen, nur Gabeln 2, 5 vorhanden, beide gestielt; 7 Apicaladern; zwischen Media und Cubitus keine Querader; nur zwei lange Analadern. Genitalfüsse des ♂ (s.w.u.) lang, am Ende verbreitert; ♀ ohne Legeröhre.

Die Gattung ist mit *Cyrnus* Steph. und *Nyctiophylax* Brau. am nächsten verwandt; von diesen und allen andern Polycentropiden unterscheidet sie sich durch das Fehlen der

Endgabel 3 im Vorderflügel und durch nur 2 Analadern im Hinterflügel, der sonst mindestens 3 lange Analadern aufweist.

2. *Cyrnodes scotti*, n. sp.

Kopf graugelb mit graugelben, teilweise etwas dunkleren Haaren. Fühler gelb, schwach dunkler geringelt. Taster dunkelgrau oder graubraun, ebenso behaart. Dorsalfläche der Brust graugelb (etwas dunkler als der Kopf) oder (beim ♀) bräunlich ; Behaarung wie auf dem Kopfe ; Ventralfläche der Brust manchmal reiner gelb. Hinterleib dunkelgrau, in der basalen Hälfte (♂) gelblich ; beim ♀ ganz dunkel, mehr bräunlich. Beine gelblich, die Schienen und Tarsen angedunkelt, besonders beim ♀. Membran der Vorderflügel grau, schwach irisierend, mit nicht sehr dichten grauschwarzen Haaren und ebenso gefärbten Randwimpern ; die Adern kaum dunkler als die Membran ; Hinterflügel etwas heller als die Vorderflügel, etwas stärker irisierend, weniger dicht behaart, die Adern etwas deutlicher ; die Randwimpern grauschwarz, am Innenwinkel länger und heller.—Beim ♂ ist das VIII. Tergit (Fig. 6) in der Mitte des Hinterrandes stark, fast halbkreisförmig, vorgezogen ; die Rückenschuppe des X. Segments (Fig. 6) ist gross ; die distale Hälfte ist durch je einen seitlichen scharfen Einschnitt von der bedeutend breiteren proximalen Hälfte, die in eine scharfe Ecke vorspringt, abgesetzt ; die distale Hälfte ist lappenförmig, stumpfdreieckig ; in Lateralansicht (Fig. 7) ist die Rückenschuppe an der Basis sehr dick, trägt dort einen kleinen ventralen, dorsal gebogenen Haken jederseits und ist am Ende abwärts gebogen ; die Mitte des Ventralrandes ist anscheinend in einen allmählich sich verjüngenden, langen ventral gerichteten Fortsatz ausgezogen. Die Genitalfüsse (Fig. 6, 7) sind lang und schmal, in Dorsalansicht (Fig. 6) am Ende deutlich beilförmig verbreitert und dort an der medianen Analecke mit einem langen Haarbüschel besetzt ; in Lateralansicht (Fig. 7) erscheinen die Genitalfüsse ganz gerade, das Ende ist etwas verbreitert und schwach ventral gebogen. Appendices praeanales fehlen wohl.

Körperlänge : 2 bis 2,3 mm. (♂), 3,8 mm. (♀) ; Länge des Vorderflügels beim ♂ 3—3,8 mm., beim ♀ 4,1 mm. ; Flügelspannung des ♂ also ca. 7—8 mm., des ♀ 9 mm.

Material : 2 ♂♂, 1 ♀ : 1 ♂ und 1 ♀, " Mahé, from a marshy hollow near Morne Blanc, about 800 feet, XI. 1908." 1 ♂, " Mahé Island, Cascade Estate, 800 feet, I.—III. 1909." —Siehe dazu die Fundorts-Bemerkung bei *Hydromanicus* (w.u.).

3. *Ecnomus insularis*, n. sp.

In Grösse und Färbung von den bisher bekannten vier Arten der Gattung *Ecnomus* (*E. tenellus* Ramb., *E. deceptor* McLach., *E. tropicus* Ulm., *E. obtusus* Ulm.) nicht verschieden, die Unterschiede liegen in den Genitalien des ♂ (s.w.u.). Körper oben braun oder gelbbraun, unten gelblich ; Hinterleib meist dunkler als Kopf und Brust ; Behaarung weissgelblich. Fühler gelb, braun geringelt, in der basalen Partie sind die Ringe schmal, nach dem Ende hin oft breiter. Taster gelblich oder graugelb, aussen dunkler ; erstes Glied der Maxillartaster sehr kurz, zweites länger, drittes länger als das zweite, viertes Glied noch länger ; das fünfte Glied ist so lang wie die vier ersten Glieder zusammen. Beine hellgelb, aussen manchmal dunkel (braun) ; oft die Tarsen (und manchmal auch die Tibien) auf hellem Grunde dunkel geringelt—oder der helle Grund ist bis auf schmale Ringe an den Artikulationen durch dunkle Färbung fast ganz verdeckt. Vorderflügel mit hellgrauer

Membran, dunkelbraun behaart, dicht mit hellgoldigen Punkten, die zum Teil zusammenfliessen, besät; am Apicalrande und am Costalrande eine Reihe dunkler mit hellen Partien abwechselnder Punkte; Adern nicht dunkler als die Membran; Randwimpern graubraun oder braun, mit helleren Unterbrechungen. Hinterflügel hellgrau (selten dunkler grau, mit heller (oder dunkler) bräunlichen Adern und gelblichgrauen Randwimpern. Flügelform und Nervatur (siehe Fig. 8) wie bei den bekannten Arten; die Thyridiumzelle erreicht nicht ganz die Medianzelle (bei allen 7 Exemplaren).—Beim ♂ ist der Hinterrand des letzten sichtbaren Tergits (IX.?) halbkreisförmig vorgezogen (Fig. 9); die Appendices praeanales sind sehr gross, in Dorsalansicht (Fig. 9) mit längerem Lateralrande, die laterale Analecke also vorgezogen und der Analrand schief; die Mediankante trägt einige stärkere Borsten, die Lateralkante an der Basis einen kleinen stumpfen Höcker; in Lateralansicht (Fig. 10) erscheinen die Appendices etwas schmäler, distal schwach verengt; die Genitalfüsse sind den Appendices meist dicht angelegt (wie in den früher bekannten Arten); in Dorsalansicht werden sie von den Appendices verdeckt, sie sind also nicht länger als diese; sie bestehen aus zwei deutlich voneinander abgesetzten Gliedern (Fig. 10); das Basalglied verschmälert sich distalwärts; das Endglied ist in dorsaler Richtung stark verbreitert, etwa doppelt so lang wie breit, an der Basis aber nur so schmal wie das Basalglied, von dort an mit aufsteigendem Dorsalrande; beide Analecken abgerundet; der Analrand ist verdickt, etwas concav und rinnenartig vertieft; die Innenfläche der Genitalfüsse ist ausgehöhlt, besonders das Endglied; in Lateralansicht erscheint unter dem Genitalfuss das Ende des auch in Dorsalansicht zwischen den Appendices sichtbaren schmalen Penis.—An dem Hinterleibsende des ♀ hängt Laich in Form einer Eierschnur.

Körperlänge: 3,3 bis 3,5 mm. (♂), 4 mm. (♀); Länge des Vorderflügels beim ♂: 4 bis 4,5 mm., beim ♀ 5 mm.; Flügelspannung des ♂: 9 bis 10 mm., des ♀ $10\frac{1}{2}$ mm.

Material: 5 ♂♂, 1 ♀: 3 ♂♂ und 1 ♀, "Silhouette, plateau of Mare aux Cochons, about 1000 feet, IX. 1908"; 2 ♂♂: "Mahé, Cascade Estate, 800 feet, I.—III. 1909." Die Exemplare von Silhouette Island wurden bei Tage von Gras, Farnkräutern und Büschen mit dem Netz abgestreift; die Lokalität ist ein sumpfiges Plateau mit nur niedriger Vegetation.

Fam. **Hydropsychidæ.**

4. *Hydromanicus seychellensis*, n. sp.

Kopf gelblich bis graugelb; Behaarung gelblich, auf den grossen Kopfwarzen aber (eine zwischen den Fühlern und zwei innen neben den Augen) mit längeren schwarzbraunen Haaren. Fühler so lang wie der Vorderflügel, beim ♀ etwas kürzer als dieser; beim ♂ etwas dicker als beim ♀; gelb, an den Artikulationen schwarzbraun geringelt, beim ♂ sehr kräftig ausgeprägte Ringelung, beim ♀ recht unscheinbare. Maxillartaster graugelb, mit dunkelgrauen bis fast schwärzlichen Härchen; nur am Ende des zweiten Gliedes nach innen zu gelbe stärkere Härchen; erstes Glied sehr kurz, versteckt; die folgenden drei Glieder etwa gleichlang, das vierte etwas länger als das dritte; fünftes Glied gegliedert, etwas länger als die vier vorhergehenden zusammen. Labialtaster so gefärbt wie die Maxillartaster, die drei Glieder an Länge zunehmend. Pronotum wie der Kopf gefärbt und behaart. Mesonotum und Metanotum braun, ersteres an den Seiten oft dunkler;

Behaarung des Mesonotum (an den Schultern und auf zwei Längsstreifen neben der Mittelnaht) gelb, mit wenigen schwärzlichen Haaren. Unterfläche der Brust und die Beine gelb oder graugelb; die Schienen, besonders der Mittel- und Hinterbeine des ♂ (beim ♀ weniger), aussen dunkel; Behaarung der Beine sehr kurz, gelb, auf den dunklen Tibien aber schwärzlich; Spornzahl 2, 4, 4; Innensporne länger als Aussensporne; die Subapicalsporne der Mitteltibie stehen am Ende des ersten Drittels, die der Hintertibie weit distal von der Mitte, fast am Ende des zweiten Drittels. Mittelbeine des ♀ nicht erweitert (Tibien und erste Tarsalglieder kaum merkbar verflacht); Krallen des ♂ normal. Flügel (Fig. 11) ziemlich breit und kurz; Vorderflügel apicalwärts deutlich verbreitert, am Apex stumpf; Membran grau bis dunkelgrau, dicht goldiggelb behaart (glatt) und mit mehr oder weniger zahlreichen schwarzbraunen Punkten geziert, die wenn zahlreicher vorhanden, meist in Querreihen angeordnet sind und dann teilweise zusammenfliessen; nahe dem Apicalrande sind diese Punkte, wenn sie im übrigen auch fast alle fehlen, stets vorhanden; die ♀♀ sind im allgemeinen weniger gefleckt als die ♂♂, doch ist ein ♀ (Mahé, 120) genau so gezeichnet wie die ♂♂ desselben Fundortes; die Randwimpern sind kurz, gelb, am Apicalrande schwarzbraun und gelb abwechselnd; die Adern treten nicht hervor. Hinterflügel kürzer und etwas schmäler als der Vorderflügel; mit dunkelgrauer bis schwärzlichgrauer Membran, schwärzlichen Haaren, Randwimpern und Adern; letztere treten deutlich auf der Membran hervor; die Behaarung ist am Apex und am Hinterrande am dichtesten. Im Vorderflügel (Fig. 11) ist keine additionelle Costalquerader vorhanden; zwischen Subcosta und Radius eine kurze Querader; ebenso zwischen Radius und Discoidalzelle, diese geschlossen, die Querader sehr schief; Medianzelle so gross wie die Discoidalzelle, etwas weiter basal liegend, Thyridiumzelle sehr lang, bis fast zur Mitte der Medianzelle reichend; alle fünf Endgabeln vorhanden, Gabel 1, 3, 5 gestielt; im Hinterflügel (Fig. 11) sind Subcosta und Radius vor ihrem Ende (kurz hinter der Discoidalzelle) miteinander verschmolzen; die Subcosta ist dem Costalrande (der Discoidalzelle gegenüber) sehr nahe; Discoidalzelle geschlossen, auch hier die Querader schief; Medianzelle nicht geschlossen; Gabeln 1, 2, 3, 5 vorhanden; Gabel 1 ausserordentlich kurz (sehr lang gestielt), so dass man bei flüchtiger Betrachtung die Gabel sogar übersehen könnte; Stiel der Gabel 3 so lang wie die Gabel selbst; Gabel 5 erreicht fast die Querader, ist also sehr lang.—Hinterleib schwärzlich, mit grauem Schimmer, die postsegmentalen Ränder und die Seitenlinie etwas heller; beim ♀ ist das Abdomen mehr bräunlich, aber auch sehr dunkel. Genitalanhänge des ♂ grösstenteils gelb; die Grenzlinie zwischen dem VIII. (noch schwarzen) und IX. (schon gelben) Tergite verläuft unregelmässig (Fig. 12); in der Mitte zwischen beiden liegt eine querelliptische schüsselförmige flache Vertiefung; der Hinterrand des IX. Tergits verläuft bogenförmig (convex) und ist in der Mitte in einen langen schmalen Fortsatz ausgezogen, der wie ein Kiel auf der Basis des X. Tergits (Rückenschuppe) liegt, womit er fest verwachsen ist (Fig. 12); dieser kielförmige Fortsatz des IX. Tergits ist am Ende gerade (fast senkrecht) abgeschnitten (Fig. 13) und geht mit einer rundlichen Ausbuchtung (die nicht immer so tief ist wie in der Figur gezeichnet) in das X. Tergit über; dieses letztere (Fig. 12, 13) ist sehr breit, hat kurz hinter der Basis je einen grossen rundlichen lateralen Ausschnitt und sein Hinterrand ist winklig eingeschnitten, so dass die beiden Analecken vorragen; die distale Hälfte der Rückenschuppe

ist wiederum schüsselartig ausgehöhlt, fast häutig, während die Seitenränder, besonders in der basalen Partie, dicker bleiben; die ganze Rückenschuppe ist ventral geneigt. Die Genitalfüsse sind sehr lang, zweigliedrig, im ganzen etwa S-förmig gekrümmt; das Basalglied ist kürzer und etwas dicker, dorsal gebogen (Fig. 13); das Endglied ist lateral (Fig. 13) so breit wie das Grundglied, dorsal (Fig. 12) aber sehr schmal; sein Ende ist stumpf abgeschnitten und concav, so dass 2 kleine Zähne entstehen, von denen der ventrale etwas grösser ist als der dorsale; die distale Hälfte des Endgliedes ist geschwärzt und innen mit einer schwarzen Haarbürste versehen (Fig. 12); der Penis ist kräftig und ragt vor; in Dorsalansicht (Fig. 14) ist er vor dem Ende etwas eingeschnürt; am Apex ist er gespalten; in Lateralansicht (Fig. 13) endigt er stumpf, rundlich.

Körperlänge: 4½—5 mm. (♂), 5½—6½ mm. (♀); Länge des Vorderflügels beim ♂: 7—7,8 mm., beim ♀: 8—10 mm.; Flügelspannung des ♂: 15—16 mm., des ♀: 17—21½ mm.

Material: 10 ♂♂, 5 ♀♀; davon 10 ♂♂, 4 ♀♀, "Mahé, Cascade Estate, 800—1500 feet, I.—III. 1909"; 1 ♀, "Mahé, Mare aux Cochons district, about 1500 feet, I. 1909." Die Exemplare von Cascade Estate flogen über einem Gebirgsbache im dichten Walde, während des Tages; doch war die Lokalität schattig infolge des dichten und hohen Pflanzenwuchses.

Fam. **Odontoceridæ.**

LEPTODERMATOPTERYX, n. g.

Spornzahl 0, 2, 2; Innensporne länger als Aussensporne; Beine dünn, Hinterbeine am längsten. Kopf mit einer haarbesetzten Warze oben zwischen den Fühlern und mit zwei langen kielartigen Warzen, die von der Mitte der Augen in schräger Richtung anal verlaufen, sich auf dem Hinterhaupte fast berührend; der Raum zwischen den Kopfwarzen glatt, von der vertieften Medianlinie geteilt. Fühler doppelt so lang wie der Vorderflügel, sehr dünn; nur das erste Glied, das kürzer ist als der Kopf, dick. Ocellen fehlend. Augen klein, aber prominent. Maxillartaster zart, fünfgliedrig; das erste Glied sehr lang, das zweite ebenso lang (oder ganz wenig kürzer), das dritte Glied etwa ⅔ so lang wie das zweite, das vierte Glied kaum länger als das dritte, und das fünfte Glied etwas länger als das vierte, aber kürzer als das zweite; das fünfte Glied ist biegsam, aber nicht gegliedert; die Taster sind ziemlich dicht, kaum zottig, behaart. Labialtaster kurz und zart; das erste Glied sehr kurz, die beiden folgenden länger, unter sich gleich. Prothorax klein; Mesonotum mit drei (einer medianen und zwei mehr lateralen) schwachen Längsfurchen. Flügel (Fig. 15) sehr zart, lang und schmal; beide apicalwärts stark verschmälert; Vorderflügel in der Arculus-Region, die von dem stark vorgezogenen Apex weit entfernt liegt, am breitesten; der Postcostalrand bis zum Arculus concav; der Apicalrand convex, aber sehr schief; der Apex stumpfspitzig; Discoidalzelle geschlossen, länglich, schmal, die erste Apicalzelle sehr kurz, die Discoidalzelle daher mit viel längerer costaler Begrenzung; Stiel der Discoidalzelle fast doppelt so lang; Thyridiumzelle mehr als doppelt so lang und viel breiter als die Discoidalzelle, geschlossen, am distalen Ende fast spitz, in der Mitte am breitesten, Media und Cubitus gebogen; Endgabeln 1, 2,

4, 5 vorhanden; Zahl der Apicaladern 9; Gabel 1 sehr schmal, der erste Sektor nimmt ungefähr in seiner Mitte den Radius auf; die Apicalzelle IV ist gestielt; alle übrigen sind sitzend; basal von der Gabel 5 bildet das Ende der (schon nahe der Basis vereinigten) Analadern eine Gabel; über und nahe dieser Analader läuft eine lange undeutliche Ader (in der Figur punktiert); Flügelbehaarung nicht sehr dicht, Randwimpern nur in der Arculus-Region länger. Hinterflügel viel kürzer und ziemlich viel breiter als der Vorderflügel, mit stumpfspitzigem Apex; Discoidalzelle auch geschlossen, kürzer als im Vorderflügel; nur Endgabeln 2, 5 vorhanden; Zahl der Apicaladern 7; wie im Vorderflügel geht von der ersten Apicalader eine schiefe Querader zum Radius; die Subcosta ist im Hinterflügel mit dem Radius vor der genannten Querader vereinigt; Apicalzelle IV sehr kurz, also lang gestielt; Gabel 5 an der Basis fast spitz; Behaarung des Hinterflügels ziemlich spärlich, Randwimpern länger als im Vorderflügel, besonders am Hinter- und Innenrande.—Hinterleib dünn; Genitalanhänge des ♂ (s.w.u.) kurz, nur die Genitalfüsse ziemlich lang.—♀ unbekannt; wahrscheinlich wird das ♀ (wie das in der Fam. der Odontoceriden immer* ist) eine etwas andere Nervatur (nämlich mehr Apicaladern) besitzen.—Der nächste Verwandte ist vielleicht *Marilia* Fr. Müll.

5. *Leptodermatopteryx tenuis*, n. sp.

Der ganze Körper oben hellbräunlichgrau, das Ende des Hinterleibes dunkler, die postsegmentalen Ränder des Abdomen wieder etwas heller; Unterfläche des Körpers gelb, das Hinterleibsende wie auf der Dorsalfläche. Behaarung auf Kopf und Brust spärlich, grauweiss bis weisslich; auf dem Mesonotum stehen die Härchen in zwei Reihen, zwischen der Mittellinie und den lateralen Furchen. Fühler weisslichgelb, sehr breit dunkelbraun geringelt (bis zum Apex hin); im allgemeinen ist die proximale Hälfte jedes Gliedes hell, die distale dunkel; doch nimmt die Grundfarbe vieler Glieder einen geringeren Raum ein als die dunkle Ringelung. Taster gelblich, weisslich behaart. Beine gelblich, die Hinterbeine etwas mehr grau, die Spitzen der Schienen und Tarsalglieder (aller Beine) schwärzlichbraun, die Tarsen im übrigen weisslich; Hintertibien und die ersten zwei bis drei Tarsalglieder des Hinterbeines mit langen weisslichen Haaren; diese Haare sind auf den Tibien am längsten und stehen an der Basis derselben zweizeilig. Membran aller Flügel sehr zart, hellgrau, irisierend; Vorderflügel mit zerstreuter gelber Behaarung; Adern etwas dunkler als die Membran, schwach bräunlich, die Adern der Anastomose deutlicher; Randwimpern grau, bei gewisser Beleuchtung weisslichgrau, vom Apex bis zur Mitte des Hinterrandes ziemlich lang; Hinterflügel noch weniger behaart, mit mehr grauen Haaren; Adern und Randwimpern wie im Vorderflügel gefärbt; Randwimpern vom Apex nach dem Innenwinkel hin immer länger werdend.—Der Hinterleib des ♂ ist an den letzten Segmenten etwas verschmälert, die Genitalanhänge sind klein. Vom IX. Tergit ist der Dorsalbogen kaum entwickelt, sehr schmal (Fig. 16), die seitlichen Partien aber ragen vor. Die appendices praeanales liegen nahe beieinander und sind schmal dreieckig, lang behaart (Fig. 16, 17); darunter liegt der gerade Penis (Fig. 16, 16a), der vor seiner etwas verschmälerten Mitte ein Paar (dorsal gesehen, Fig. 16a) dünner herabhängender und am Ende median gebogener

* Vgl. aber *Hughscottiella*!

Anhänge besitzt; in Lateralansicht (Fig. 17) scheinen diese Anhänge aus dicker Basis sich zu verschmälern; die Genitalfüsse sind etwas länger als die appendices praeanales, zweigliedrig (Fig. 16, 17); das zweite Glied ist ungefähr ebenso lang wie das erste, aber dünner, schwach median und dorsal gebogen, und zugespitzt; das Basalglied trägt lange Haare.—♀ unbekannt.

Körperlänge: 3½—4 mm.; Länge des Vorderflügels: 7½—9 mm.; Flügelspannung: 15½—18½ mm.

Material: 30 ♂♂, davon 13 ♂♂ "Mahé, Forest near Trois Frères, 1500 feet, XII. 1908; from a marshy hollow containing banana trees"; 11 ♂♂, "Mahé, from a marshy hollow near Morne Blanc, about 800 feet, XI. 1908"; 2 ♂♂, ibidem; 4 ♂♂, "Mahé, Mare aux Cochons district, about 1500 feet, I. 1909." Diese Tiere erschienen bei Sonnenuntergang (um 6^h abends) und tanzten z. T. in kleinen Gruppen in der Luft, etwa 2 bis 3 Fuss über dem sumpfigen, mit langem Gras, Bananenbäumen und einer wilden Palme (*Stevensonia*) besetzten Boden.

HUGHSCOTTIELLA, n. g.

Spornzahl 2, 4, 4; der Aussensporn der Vordertibie ist nur dornförmig (sehr kurz) und an den meisten Exemplaren nicht sichtbar; Innensporne auch der anderen Beine viel länger als Aussensporne; die Subapicalsporne der Mitteltibie stehen dicht hinter der Mitte, die der Hintertibie am Ende des zweiten Drittels; Beine lang und dünn, die Tarsen schwach bedornt; Hinterbeine nur so lang wie die Mittelbeine, da die Schenkel der Hinterbeine kurz sind; Kopf mit einer Warze zwischen den Fühlern, einer kleinen je hinter der Fühlerbasis, zwei grossen rundlichen innen neben den Augen und zwei schmalen hinter den runden Warzen; Medianlinie des Kopfes nicht vertieft. Ocellen fehlend. Augen des ♀ klein, normal, prominent, die des ♂ beträchtlich grösser, so dass die Dorsalfläche des Kopfes beim ♂ kleiner ist als beim ♀. Fühler fast 2½mal so lang wie der Vorderflügel, sehr dünn, nur das Basalglied, das etwa halb so lang ist wie der Kopf, dick. Maxillartaster ziemlich kräftig, die beiden ersten Glieder kurz, das zweite etwas länger als das erste Glied, das dritte noch länger, das vierte Glied am längsten (fast doppelt so lang wie das dritte), das fünfte (etwas biegsame, nicht gegliederte) Glied wenig kürzer als das vierte; Behaarung dicht und zottig, aber nicht lang. Labialtaster klein, das erste Glied kurz, die folgenden an Länge zunehmend. Prothorax klein, Mesonotum schwach gefurcht. Flügel (Fig. 18) länglich; Vorderflügel apicalwärts kaum verbreitert, mit schwach gerundetem Apicalrande und kaum vorgezogenem, stumpfem Apex; Subcosta und Radius beide lang, nicht vereinigt, letzterer nicht mit dem ersten Apicalsektor verbunden; Discoidalzelle kurz, geschlossen; ihr Stiel mehr als dreimal so lang wie sie; die obere Begrenzung an der Stelle, von welcher die Querader zum Radius entspringt, schwach gebrochen; Thyridiumzelle sehr lang, schmal, am distalen Ende am breitesten, Media und Cubitus nicht gebogen; nur Gabeln 1, 2 vorhanden, Zahl der Apicaladern 7; die 4 Analadern sind in Gruppen von je 2 angeordnet, da je zwei der Adern schon nahe der Basis zusammenfliessen; die beiden so entstehenden Hauptäste vereinigen sich kurz vor dem Flügelrande und senden einen kurzen Ast zum letzten

Apicalsektor (gleichsam eine falsche Gabel 5 bildend); Gabel 1 ist entweder sitzend, spitz, oder kurz gestielt. Behaarung dicht und fein; Randwimpern kurz, nur am Apicalrande und am Arculus etwas länger. Hinterflügel kürzer und etwas breiter als der Vorderflügel, mit stumpfem Apex; Subcosta und Radius vereinigen sich kurz vor ihrem Ende und senden einen kurzen Ast zum Costalrande und einen anderen in den ersten Apicalsektor hinein; Discoidalzelle auch geschlossen, etwas kürzer als im Vorderflügel; nur Gabeln 2, 5 vorhanden, Zahl der Apicaladern 6; alle Apicalzellen sitzend; Gabel 5 lang; Behaarung nicht sehr dicht; Randwimpern des Hinterrandes und besonders des Innenrandes recht lang.—Genitalanhänge des ♂ (s.w.u.) kräftig, die Genitalfüsse zweigliedrig; der ziemlich robuste Hinterleib des ♀ mit lappenartigen appendices praeanales.

6. *Hughscottiella auricapilla*, n. sp.

Oberfläche des Kopfes graulichgelb, beim ♀ ganz hell gelb; Ventralfläche des Kopfes gelblich; goldige Härchen bilden zwei Längsstreifen dicht neben der Mittellinie und längere goldige Haare sitzen auf den Kopfwarzen. Fühler gelb, seidenartig schimmernd infolge dichter äusserst feiner und kurzer Behaarung, an den Artikulationen kaum sichtbar dunkler geringelt; das Basalglied goldig behaart. Maxillartaster graubraun, schwarzbraun behaart; Labialtaster gelblich oder graugelblich, braun (kurz) behaart. (Beim ♀ ist die Färbung der Taster und Fühler etwas heller, letztere ziemlich deutlich dunkel geringelt; doch rührt diese Verschiedenheit nur davon her, dass das ♀ stark abgerieben ist, während die vorliegenden ♂♂ sehr gut erhalten sind). Prothorax gelb, Meso- und Metathorax mehr graubraun; Mesonotum an den Seiten noch dunkler; doch ist beim ♀ die ganze Brust gelb; Behaarung von Pro- und Mesonotum goldig. Beine gelb, wie die Fühler seidenartig schimmernd; die Hüften dunkler, auch die Vorderbeine etwas dunkler als die übrigen, ferner die Aussenseite der Schienen (Mittelbein) manchmal schwach dunkler gelb. Membran der Vorderflügel hellgrau (fast farblos) mit schwach gelblichem Tone, dichter goldiggelber Behaarung und grauschwarzen Punkten, deren Färbung teils von Flecken in der Membran, teils von schwärzlichen Haaren herrührt*; diese dunklen Punkte finden sich in folgender Anordnung: ein Punkt an der Flügelbasis an der medioanalen Querader; ein zweiter auf dem Cubitus; zwei weitere (und zwischen ihnen ein undeutlicher dritter) bilden eine Querreihe vom Sector radii zum Cubitus; ein Punkt an der Basis der Discoidalzelle; eine schiefe Querbinde in der Anastomose (von Gabel 1 bis zum Cubitus) und eine etwas kürzere schiefe Querbinde gegenüber dem Arculus im Bereiche der schiefen Querader zwischen Cubitus und Analadern; endlich ein dunkler Schatten, der die Apicalzellen IV und V fast ganz ausfüllt; der Vorderrand des Flügels ist wenigstens an der Basis angedunkelt und mit schwärzlichen Randwimpern besetzt; im übrigen sind die Randwimpern goldig; die Adern sind gelb und treten deshalb nicht hervor. Hinterflügel mit schwärzlichgrauer Membran, irisierend, mit zerstreuten schwarzen Haaren, deutlich hervortretenden dunklen Adern und schwarzen, am Innen-

* Die beiden, wie es scheint, stark abgeriebenen, ♀♀ (und ein ebensolches ♂, No. 105) zeigen keine dunkle Zeichnung, auch nicht in der Membran selbst; 1 ♂ (No. 104, Mahé) hat den apicalen Längsstreif über die Anastomose hinaus bis fast zur Flügelbasis hin (basal sich verschmälernd) verlängert.

winkel etwas purpurn schimmernden Randwimpern. Hinterleib oben braun, unten etwas heller, mit grauen postsegmentalen Rändern. Der Hinterrand des IX. Tergits ist in der Mitte stark stumpfdreieckig vorgezogen (Fig. 19); die appendices praeanales sind gross, dorsal gesehen ziemlich breit, am Ende etwas verschmälert und gerundet (Fig. 19); in Lateralansicht (Fig. 20) erscheinen sie schmäler, und sind in der Mitte gedreht, so dass in der distalen Hälfte die Unterfläche (Innenfläche) zum Vorschein kommt. Darunter erblickt man eine breite flache Rückenschuppe, deren Hinterrand in der Mitte etwas vorgezogen ist (Fig. 19, 20); der Penis ist nicht sichtbar; die Genitalfüsse sind nur so lang wie die appendices præanales, zweigliedrig; das Basalglied ist in Lateralansicht (Fig. 20) länger und dicker als das Endglied, in der Ansicht von oben und hinten her erscheint das Basalglied verkürzt infolge seiner dorsalen Richtung; das Endglied ist lateral ziemlich schmal, zugespitzt, dorsal (Fig. 19) und besonders ventral (Fig. 20a) aber breit, beilförmig, mit vorspringender basaler Innenecke, die besonders bei Betrachtung von unten her scharf hervorspringt; der Innenrand ist mit kleinen Dörnchen und mit Härchen besetzt, im übrigen sind die ganzen Genitalfüsse (und auch die appendices praeanales) lang behaart. Beim ♀ trägt das IX. Tergit 2 grosse warzenartige Auftreibungen und 2 lappenartige, starke appendices praeanales (Fig. 21).

Körperlänge: 5—6 mm.; Länge des Vorderflügels: 8—9 mm.; Flügelspannung: 17—19 mm.; ♂ und ♀ an Grösse etwa gleich.

Material: 6 ♂♂, 2 ♀♀; davon 1 ♂, "Mahé, Cascade Estate, 800 feet"; 1 ♂, 1 ♀, "Mahé, cultivated country, about 1000 feet, XII. 1908"; 4 ♂♂, 1 ♀, "Mahé, Mare aux Cochons district, about 1500 feet, I. 1909."

Diese Art fand sich teils in offenem, halbkultiviertem Gelände, wo die Tiere nahe an Bächen von langem Gras etc. mit dem Netz abgestreift wurden, teils auch in sumpfigem Terrain und wurden dort durch Schlagen aus den Büschen herausgescheucht. Der Fang geschah tagsüber.

ERKLÄRUNG DER ABBILDUNGEN.

Tafel 3.

Fig. 1. *Petrotrichia palpalis*, n. sp., Kopf mit der Basis der Fühler; *a.* Maxillartaster des ♂, *b.* Maxillartaster des ♀.

Fig. 2. *Petrotrichia palpalis*, n. sp., Flügel des ♂.

Fig. 3. *Petrotrichia palpalis*, n. sp., Vorderflügel des ♀.

Fig. 4. *Petrotrichia palpalis*, n. sp., Genitalanhänge des ♂, dorsal; *a.* hakenförmige Klaue, stärker vergrössert, lateral.

Fig. 5. *Cyrnodes scotti*, n. sp., Flügel des ♀.

Fig. 6. *Cyrnodes scotti*, n. sp., Genitalanhänge des ♂, dorsal.

Fig. 7. *Cyrnodes scotti*, n. sp., Genitalanhänge des ♂, lateral.

Fig. 8. *Ecnomus insularis*, n. sp., Flügel des ♂.

Fig. 9. *Ecnomus insularis*, n. sp., Genitalanhänge des ♂, dorsal (Genitalfüsse nicht sichtbar).

Fig. 10. *Ecnomus insularis*, n. sp., Genitalanhänge des ♂, lateral.

Tafel 4.

Fig. 11. *Hydromanicus seychellensis*, n. sp., Flügel des ♂.

Fig. 12. *Hydromanicus seychellensis*, n. sp., Genitalanhänge des ♂, dorsal (Penis nicht sichtbar).

Fig. 13. *Hydromanicus seychellensis*, n. sp., Genitalanhänge des ♂, lateral.

Fig. 14. *Hydromanicus seychellensis*, n. sp., Penis, dorsal.

Fig. 15. *Leptodermatopteryx tenuis*, n. sp., Flügel des ♂.

Fig. 16. *Leptodermatopteryx tenuis*, n. sp., Genitalanhänge des ♂, dorsal; *a*. Penis, dorsal.

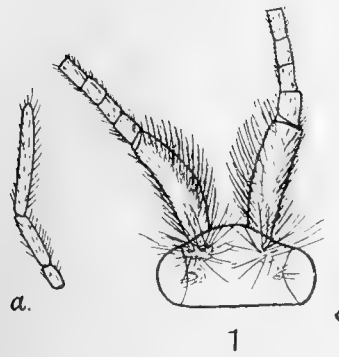
Fig. 17. *Leptodermatopteryx tenuis*, n. sp., Genitalanhänge des ♂, lateral.

Fig. 18. *Hughscottiella auricapilla*, n. sp., Flügel des ♂.

Fig. 19. *Hughscottiella auricapilla*, n. sp., Genitalanhänge des ♂, dorsal (und etwas von hinten).

Fig. 20. *Hughscottiella auricapilla*, n. sp., Genitalanhänge des ♂, lateral; *a*. Distales Ende des Genitalfüsses, ventral.

Fig. 21. *Hughscottiella auricapilla*, n. sp., Genitalanhänge des ♀, dorsal.



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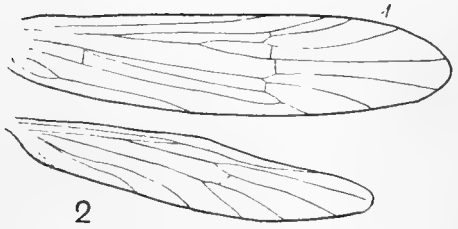

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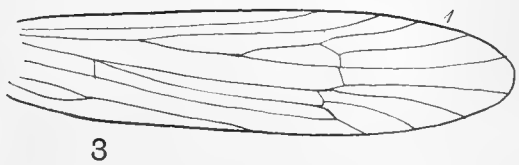

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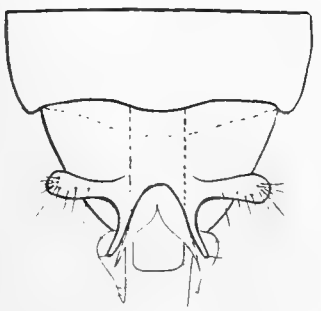

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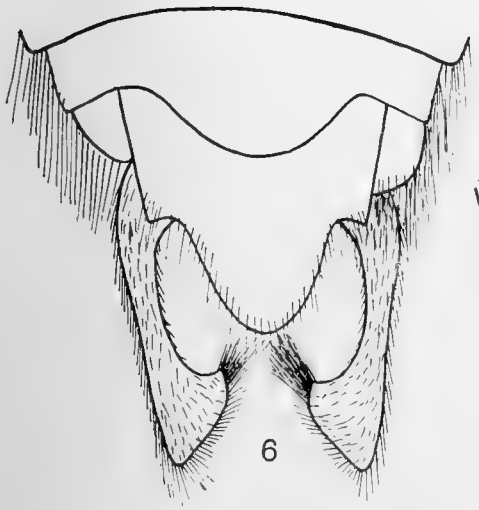

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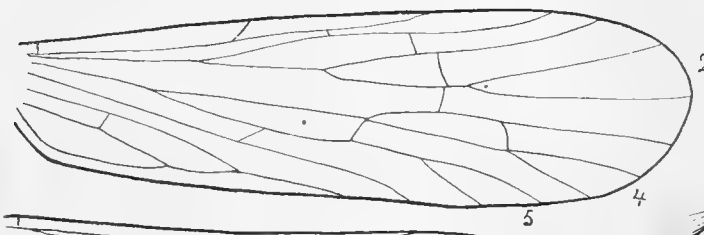

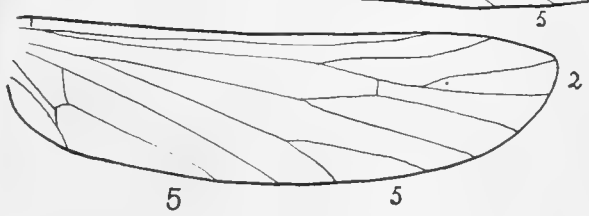

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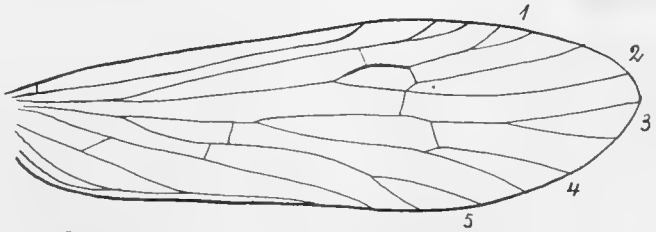

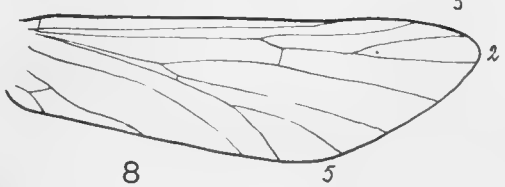

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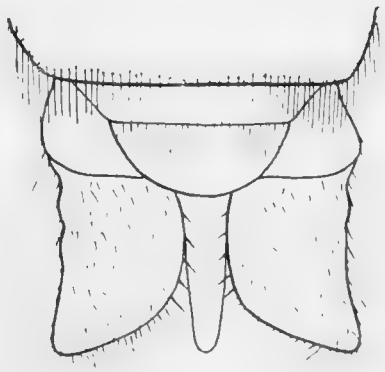

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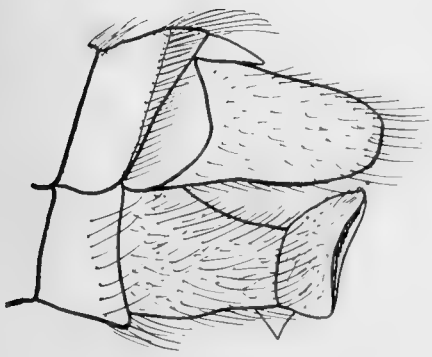

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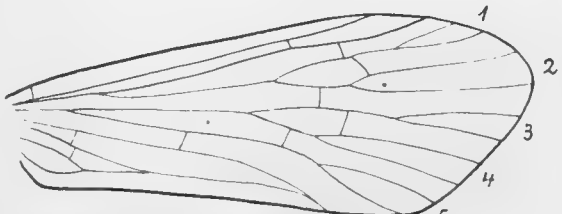

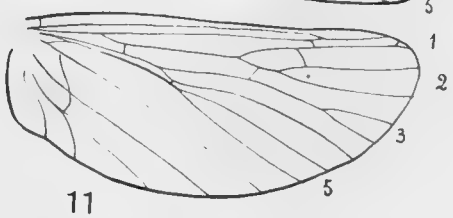

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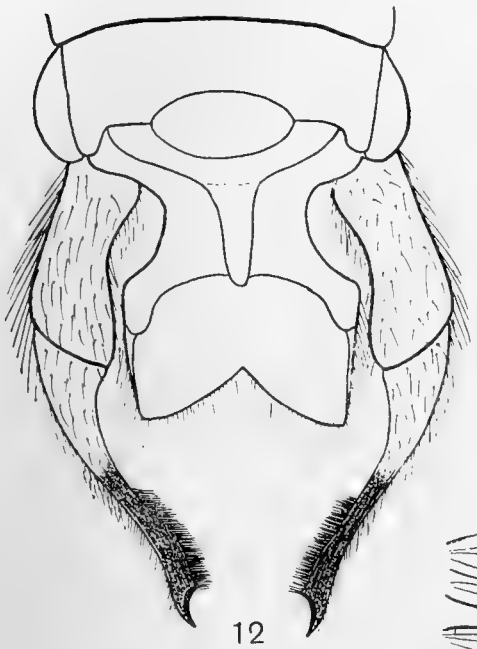
TRICHOPTERA FROM SEYCHELLES



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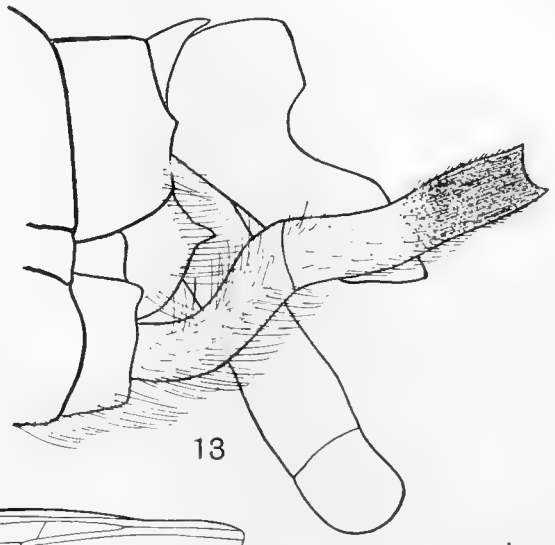

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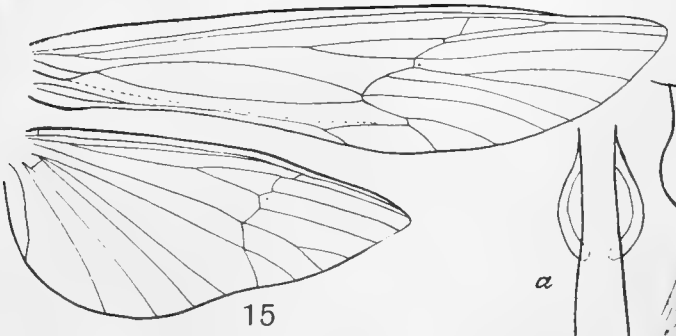

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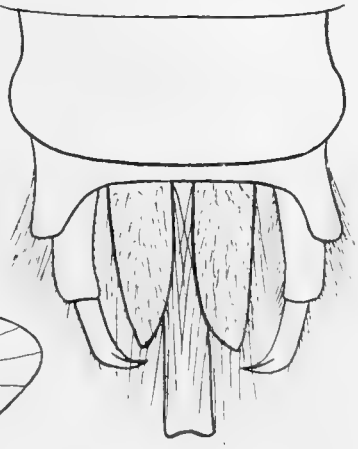

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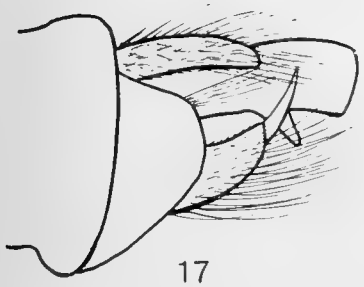

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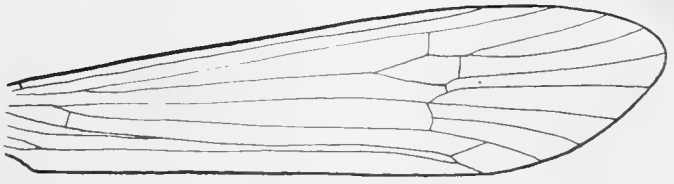

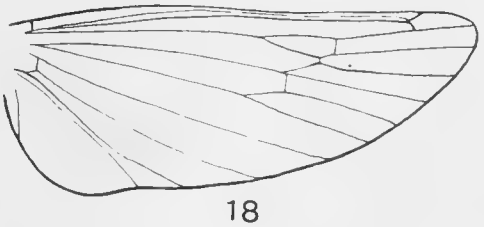

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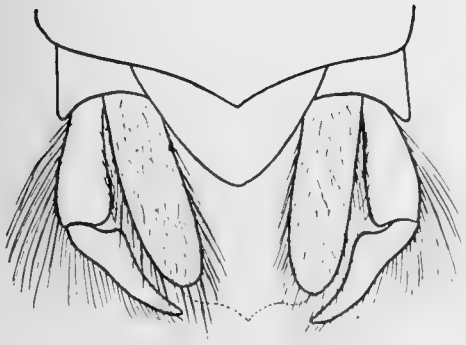

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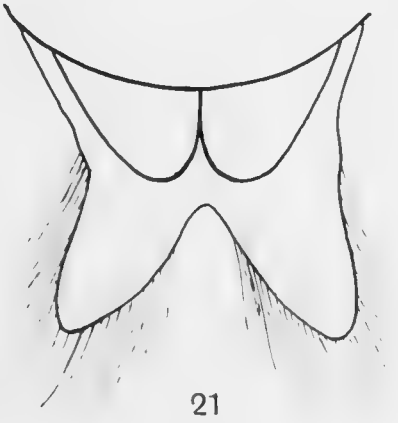

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TRICHOPTERA FROM SEYCHELLES

No. IV.—EMBIIDINA UND NEUROPTERA (CONIOPTERYGIDAE UND HEMEROBIIDAE).

Von Dr Günther Enderlein, Stettin.

(Mitgeteilt von Prof. J. Stanley Gardiner, M.A., F.R.S., F.L.S.)

Gelesen den 17. Februar 1910.

Aus der Ausbeute von Herrn Hugh Scott von den Seychellen gebe ich in folgendem die Embiidinen, die Coniopterygiden und die Hemerobiiden bekannt.

EMBIIDINA.

Fam. **Oligotomidæ.**

1. *Oligotoma scottiana*, nov. spec.

♂. Kopf mässig gross, Seitenrand hinter den Augen fast geradlinig, ziemlich stark nach hinten zu convergierend; Hinterhauptsrand schwach gebogen, Seitenecken ziemlich stark abgerundet. Kopflänge ca. $1\frac{1}{4}$ mm., Kopfbreite dicht hinter den Augen 1 mm. Augen gross, ziemlich stark gewölbt, von oben ungefähr zur Hälfte sichtbar. Fühler lang, mässig dünn (unvollständig), von den 12 vorhandenen Gliedern (die zusammen ca. 4 mm. lang sind) ist das erste etwas dicker als die übrigen und so lang wie dick, das zweite dünn und so lang wie dick, das dritte ca. 3-mal so lang wie am Ende dick, das vierte ca. $1\frac{1}{4}$-mal, das fünfte ca. $1\frac{1}{2}$-mal so lang wie dick, das sechste und siebente doppelt so lang wie dick, die übrigen fast 3mal so lang wie dick. Endglied des Maxillarpalpus schlank, fast 3mal so lang wie dick.

Pronotum schmal, Seiten fast geradlinig und ziemlich stark nach vorn convergierend; Querfurche sehr kräftig am Ende des ersten Viertels, Medianfurche fein aber deutlich. Mesonotum an der breitesten Stelle ca. $1\frac{1}{4}$ mm. breit. Metatarsus der Vorderbeine mässig schlank. Metatarsus der Hinterbeine dick und so lang wie das dünne dritte Glied. Abdomen sehr flach, ein wenig mehr als 1 mm. breit. Körperpubescenz lang und dicht.

Abdominalspitze des ♂: Anhang des linken Teiles des zehnten Tergites in Form einer langen schmalen sehr schwach S-förmig gebogenen Lamelle. Anhang des rechten Teiles des zehnten Tergites sehr lang stilettförmig, Spitze wenig spitz, kurz vor derselben aussen ein kleiner spitzer nach hinten zu gerichteter Zahn. Der Anhang des neunten Sternites (ast9) ist kegelförmig, am Ende abgestutzt und auf der rechten Ecke mit zahnartig zugespitzter Ecke. Der linke Cercusbasipodit so lang wie der linke Anhang und am Ende spitz haakenartig nach aussen umgebogen. Rechter Cercus gedrungen, Verhältnis der Glieder ca. $1 : 1\frac{1}{2}$. Erstes Glied des linken Cercus mässig schlank, nach dem Ende zu allmählich verdickt, die Glieder ungefähr gleichlang.

Flügel schlank, besonders der Vorderflügel, der $4\frac{1}{4}$mal so lang wie breit ist. Radialgabel im Vorderflügel ca. $1\frac{1}{2}$, im Hinterflügel ca. $2\frac{1}{4}$mal so lang wie der Stiel. Radiussaumlinien mässig kräftig. Zwischen c und r, im Vorderflügel ca. 4, im Hinterflügel ca. 2 sehr undeutliche Queradern. r_1 flachbogig in r_{2+3} mündend; zwischen beiden Adern im Vorderflügel ca. 2, im Hinterflügel ca. 4 kräftige Queradern. Unscharf sind r_{4+5} ohne das Basalviertel, m_1 und cu_1.

Tiefschwarz, Körperpubescenz dunkelbraun. Flügel schwärzlich braun, Radiussaumlinien bräunlichrot, Adern dunkelbraun, Intervenallinien mässig fein und farblos. Membran speckig glänzend mit sehr schwach rötlichem Ton.

Körperlänge 8 mm. Abdominallänge ca. $4\frac{1}{4}$ mm. Vorderflügellänge $6\frac{1}{2}$ mm. Hinterflügellänge ca. 5 mm. Vorderflügelbreite ca. $1\frac{2}{3}$ mm. Hinterflügelbreite ca. $1\frac{1}{2}$ mm.

♀. Gross und schlank. Fühler kurz, ca. $2\frac{1}{2}$ mm. lang; ca. 18—19 gliedrig; das erste Glied etwas dicker als die übrigen und ca. $1\frac{1}{4}$mal so lang wie dick; das zweite so lang wie dick, das dritte ca. $1\frac{1}{4}$mal so lang wie dick, das vierte kaum so lang, das fünfte so lang wie dick, die übrigen bis zu ca. $1\frac{1}{2}$mal so lang wie dick. Grösste Thorakalbreite ca. $1\frac{1}{4}$ mm. Abdominalbreite ca. 1 mm. An das Pronotum legt sich beim ♀ meist die grosse Apotom-Platte* des Mesonotum an, so dass es häufig scheint, als gehörte diese noch zum Pronotum. Hinterschenkel relativ sehr breit. Körperfarbe dunkelbraun, Beine mehr dunkelrostbraun. Körperlänge 9—$10\frac{1}{2}$ mm. Abdominallänge 4—5 mm.

Larven. Dunkelbraun mit rostgelben bis rostbraunen Beinen, die jüngeren Larven auch mit rostgelben Kopf (bei einer Körperlänge von ca. $4\frac{1}{2}$ mm.).

Fundorte. Seychellen. Mahé: Hochwald bei den Trois Frères, Dec. 1908, 1 ♂, 1 ♀, 2 Larven, gefunden in gewebten Röhren in Moospolstern auf der Rinde eines gefällten Bilimbi marron Baumes (*Colea pedunculata*); das männliche Individuum wurde noch mit unentwickelten Flügeln gefunden, und in eine Büchse mit Rinde und Moos einige Wochen gebracht und die Flügel entwickelten sich vollständig; Gebirgsböschung nahe vom Gipfel des Morne Blanc, 30 Oktober, 1908, 3 ♀ und 1 Larve aus gewebten Röhren unter dürren Blättern am Boden unter einem Busch; Cascade Estate, ungefähr 800 Fuss hoch und mehr, Oktober, 1908 und Januar, 1909, 2 ♀ gesammelt von H. P. Thomasset und H. Scott; Dichtes Gebüsch zwischen Trois Frères und Morne Seychellois, ungefähr 1500—2000 Fuss hoch, December 1908, 2 Larven; Spitze des Berges Sebert, 1800 Fuss hoch und mehr, dürre Waldvegetation, Januar 1909, 1 Larve; 2 Larven aus gewebten Röhren in Moospolstern an Rinde, einige Fuss über dem Boden am Ast eines gefällten Baumes. Cargados Carajos Gruppe: Siren Insel, 27, 8, 1905, 1 ♀. Typen im Museum von Cambridge, Stettin und im Britischen Museum. Gewidmet wurde diese Species dem Sammler, Herrn Hugh Scott.

2. *Oligotoma latreillei* (Ramb. 1842).

Embia latreillei Rambur, Hist. nat. Neur. 1842, p. 312. (Mauritius, Madagascar, und Indien.)

Embia latreillei Rambur, Lucas, Bull. Soc. ent. France (6) III. 1883, pp. xxvi., cvi.

* vergl. G. Enderlein: "Über die Segmental-Apotome der Insekten und zur Kenntnis der Morphologie der Yapygiden," Zoolog. Anzeiger, Bd. 31, 1907, pag. 629—635, 8 Figuren.

Oligotoma saundersi Westw. p.p. Hagen, Canad. Entomologist, XVIII. 1885, p. 144.

Embia hova Saussure, Bull. Soc. Ent. Suisse, vol. IX., 1896, p. 354, fig. 14 (Madagascar).

Embia hova Saussure, Verhoeff. Nov. Act. Leop. Carol. Akad. Bd. 82, 1904, p. 202.

Embia hova Saussure, Friedrichs, in Voeltzkow, Reise in Ost-Afrika, Stuttgart, 1907, pp. 51—53 (Ost-Africa).

Oligotoma latreillei (Ramb.) m.

Fundort. Aldabra-Insel; 12 ♂, 2 ♀, 1 Larve. Gesammelt von J. C. F. Fryer, Nov. 1908.

Länge, ♂ 7—8 mm. in Alkohol, 6—8 mm. trocken, ♀ 10½ mm. in Alkohol.

Breite des Abdomens, ♂ 1 mm. in Alkohol, 1 mm. trocken, ♀ 1¼ mm. in Alkohol.

Die ♂ kamen besonders in den letzten Wochen des Novembers, Abends an die Lampe, die (flügellosen) Weibchen wurden unter Steinen gefunden.

NEUROPTERA.

Fam. **Coniopterygidæ.**

Subfam. **Coniopteryginæ.**

3. *Semidalis africana* Enderl. 1906.

Semidalis africana Enderlein, Zoolog. Jahrb. Syst. 23 Bd. 1906, p. 214, Fig. 14, 41 und 42.

Diese aus Deutsch Ost-Africa beschriebene Species liegt in zahlreichen Stücken von den Seychellen vor. Die Querader zwischen Media und Cubitus 1 mündet meist in die Basis vom m_2, selten in den Gabelungspunkt (wie l.c. abgebildet) und noch seltener in den Gabelstiel ganz dicht am Gabelungspunkt. Sehr characteristisch ist der hyaline Randsaum des Vorderflügels.

Fundorte. Seychellen. Silhouette: Hochgelegene Gegend nahe Mont Pot-à-eau, ungefähr 1500 Fuss hoch, August 1908, 13 Exemplare (trocken); Wald oberhalb von Mare aux Cochons, 2 September 1908, 2 Exemplare (trocken); über 2000 Fuss, September 1908, 2 Exemplare (trocken); Ebene von Mare aux Cochons, 1000 Fuss, September 1908, 10 Exemplare (trocken). Mahé: Cascade Estate, ungefähr 800—1500 Fuss hoch, Oktober 1908—Januar 1909, 28 Exemplare trocken und 24 Exemplare in Alkohol, gesammelt von H. P. Thomasset et Hugh Scott.

Alle Exemplare wurden immer an dem Farn *Gleichenia dichotoma* gefunden, der in sehr ausgedehnten und dichten Beständen grosse Distrikte bedeckt.

Fam. **Hemerobiidæ.**

4. *Micromus timidus* Hag. 1853.

Micromus timidus Hagen, Hagen, Ber. Königl. Preuss. Akad. Wissensch. Berlin, 1853, p. 481.

Micromus timidus Hagen, in Peters, Reise nach Mozambique, vol. II. 1862, p. 91, Taf. 5, Fig. 2.

Die Stücke von den Seychellen stimmen völlig mit der sehr bezeichnenden Originaldiagnose und mit Exemplaren aus Ost-Afrika im Stettiner Zoologischen Museum überein.

Zwei vorliegende Puppengespinnste bestehen aus einem sehr losen Cocon aus gelblichen ziemlich dicken Fäden, das durch ein weisses ziemlich dichtes und aus etwas feineren Fäden bestehendes Gespinnst auf die Oberseite je eines Blattes befestigt ist; letzteres breitet sich auf dem Blatte in ziemlich grossem Umfange um das Cocon aus, diesem dicht anliegend. Durch das Cocon hindurch ist die Puppe selbst leicht sichtbar, Länge des Cocons 5—6 mm., Breite $2\frac{1}{4}$—$2\frac{1}{2}$ mm.

Hagen, l. c. 1862:

"M. fuscus, antennis flavescentibus, articulis duobus basalibus et apice fuscis, pedibus pallidis; alis anticis subcinereo hyalinis, basi et margine postico cinereo variegatis, octo sectoribus, seriebus venarum gradatarum (11; 7) parallelis fuscis.

Long. c. alis 8 millim.; exp. alar. ant. 15 millim.; long. antennae 5 millim."

Hagen, l. c. 1853:

"Von der Grösse des *Hem. humuli*; Form der Fühler, Taster, Füsse, Flügel durchaus wie bei der Gattung *Micromus* Ramburs, besonders wie bei *M. intricatus* Wesm.

Braun, weiss behaart; Gesicht glänzend, Scheitel geballt. Taster bräunlich, das letzte lang, zugespitzt. Fühler etwa bis zur Mitte der Oberflügel reichend, blassgelb, die beiden Grundglieder und die Spitze (10 Glieder) braun. Füsse blassgelb, genau von der Form und den Verhältnissen, die Rambur für die Gattung angibt. Leib sehr zerstört. Die Form und das Geäder der Flügel zeigt die Abbildung genau. Das Randfeld ist an der Basis eingebuchtet, der Vorderflügel zeigt 8 Sectoren, in der ersten Reihe 7, in der zweiten 11 Stufenadern. Sie sind leicht aschfarbig, die Basis und die Hinterhälfte etwas marmoriert. Die Adern und ihre dünne Behaarung sind blassgelb, die Sectoren sind an ihrem Ursprunge, an ihren Verbindungen, und im ganzen Verlauf braun gefleckt; die Stufenadern und ihre Verbindungen sind ganz dunkelbraun. Die glashellen Hinterflügel führen in der ersten Reihe 6, in der zweiten 5 Stufenadern, die letzteren sind nebst ihren Verbindungen dunkelbraun.

Vaterland. Ein Stück aus Mossambique. Es gehört diese Art unbezweifelt zu *Micromus*, da sie in keiner Hinsicht Abweichungen zeigt. Sie unterscheidet sich leicht von den drei bis jetzt bekannten Arten durch die beträchtliche Zahl der Sektoren, und steht *M. intricatus* näher als *M. paganus* und *variegatus* durch den genäherten und parallelen Verlauf der Stufenadern."

Fundorte. Seychellen. Silhouette: Ebene von Mare aux Cochons, 1000 Fuss, Sept. 1908, 4 Exemplare; nahe Mont Pot-à-eau, 1500 Fuss hoch, August 1908, 3 Exemplare. Mahé: Bebaute Gegend ungefähr 1000 Fuss hoch, November bis December 1908, 1 Exemplar; Wald zwischen Trois Frères und Morne Seychellois, ca. 1500—2000 Fuss hoch, December 1908, 1 Exemplar; Cascade Estate, ca. 100 Fuss und mehr, 2 Exemplare; Gegend des Forêt Noire, Oktober bis November 1908, 1 Exemplar; nahe bei Morne Blanc, Oktober bis November 1908, 1 Exemplar; Umgebung von Mare aux Cochons, ca. 1500 Fuss hoch, 26. Januar bis 2. Februar, 1909, 1 Exemplar; Cascade Estate, ungefähr 800—1500 Fuss, 1909, 5 Exemplare; Port Victoria, Februar 1909, 8 Exemplare und 2 Puppengespinnste.

No. V.—DIPTERA, MYCETOPHILIDÆ.

Von Dr Günther Enderlein, Stettin.

(Mitgeteilt von Prof. J. Stanley Gardiner, M.A., F.R.S., F.L.S.)

(6 Textfiguren.)

Gelesen den 21. April 1910.

Die Mycetophiliden-Ausbeute von Herrn Hugh Scott in Cambridge (England) umfasst 17 neue Species, die sich auf 10 Gattungen verteilen, von denen 4 noch unbekannt waren. Da die Sammlungen vom Juli 1908 bis März 1909 ausgeführt worden sind und zahlreiche von den verschiedensten Lokalitäten stammende Exemplare (168 Ex.) umfassen, so ist, wenn man ganz besonders noch berücksichtigt, mit welch seltener Sorgfalt auch die allerkleinsten Formen gesammelt worden sind, die Mycetophilidenfauna der Seychellen als ganz ungewöhnlich arm zu bezeichnen. Haben wir doch hier in Deutschland eine reiche Fülle von Gattungen und zahllose Arten.

Um eine Erklärung dieser eigenartigen Tatsache zu versuchen, verweise auf meine faunistische Moor- und Dünen-Studien*, aus welcher Publikation ich von pag. 63 folgendes citiere:

"Eine höchst eigenartige, bisher noch gänzlich unbekannte Methode, Pilzmücken (Mycetophiliden) in grosser Menge in bequemster Weise zu fangen, mache ich in folgendem bekannt.

Im Buchenwalde südlich von Werblin (Westpreussen) tummelten sich im Schatten, besonders an den dunkelsten Stellen (vor allem in einer schmalen steilufrigen Bachschlucht unter überhängenden Büschen), relativ grosse Schwärme von Pilzmücken. Da mir aber die äusserst gewandten Tierchen meist fast alle wieder aus dem Netze entwichen, so dass ich froh war, wenn ich von vielen Tieren im Netze ein einziges erwischte, versuchte ich ihre Lebhaftigkeit dadurch etwas zu schmälern, dass ich sie, indem ich den Insekteninhalt durch Schwenken des Netzes in den untersten Zipfel brachte, diesen dann mit einer Hand umhüllte und dann kräftig einige male durch diese hohle Hand den ausgestossenen Atem hindurchtrieb. Der Erfolg war ein völlig unerwarteter. *Sämmtliche Pilzmücken waren tot*, während alles übrige Lebende schleunigst das Weite suchte. Später konnte ich konstatieren, dass nur ein einmaliges kräftiges Hindurch-Hauchen durch die Hand den gleichen überraschenden Erfolg hatte.

Eine Erklärung dieser eigentümlichen Erscheinung wäre auf zweierlei Weise denkbar. Der den Sauerstoff ermangelnde und an Kohlensäure reiche ausgestossene

* G. Enderlein, "Biologisch-faunistische Moor- und Dünen-Studien," 30. Ber. Westpr. Bot.-Zoolog. Vereins, Danzig 1908, pp. 54—238; mit 1 Karte und 6 Abb. im Text.

Atem könnte die zarten Tierchen erstickt oder vergiftet haben. Diese Erklärung halte ich jedoch für wenig wahrscheinlich. Vermutlich werden dagegen die das Licht und die Wärme ängstlich fliehenden Tierchen, die sich nur an kühlen und sehr schattigen und dunklen Stellen aufhalten, durch die Einwirkung der Wärme des Atems getötet."

Über die Zusammensetzung dieser Schwärme citiere ich noch aus gleicher Arbeit von pag. 142:

"Die Schwärme waren aus den verschiedensten Arten und Gattungen zusammengesetzt, grosse und kleine Formen scheinen sich so zu einem gemeinsamen Schwarm zu vereinigen."

Bei dieser Gelegenheit erwähne ich noch eine reiche Sammelausbeute aus subtropischem Gebiete, nämlich aus Santa Catharina in Süd-Brasilien hier im Stettiner Zoologischen Museum, die ebenfalls sehr umfangreich an Minutien ist und die ebenso relativ wenig Arten enthält, die zum Teil in grosser Individuenzahl vertreten sind. Leider sind die tropischen Mycetophiliden noch ausserordentlich wenig bekannt, so dass weitere Daten nicht herangezogen werden können.

Aus dem Vorstehenden ist aber der Schluss berechtigt, dass die Mycetophiliden kältere Zonen bevorzugen und dass sie in den Tropen stark zurücktreten. Aus den genauen Notizen von Herrn H. Scott ist zudem ersichtlich, dass sie auf den Seychellen die höchsten Punkte und hier wieder die dichtesten Wälder und die feuchtesten Stellen bevorzugen.

Die interessanteste Form ist die Gattung *Mesochria*, nov. gen., die allen bisher bekannten Mycetophiliden dadurch gegenübersteht, dass die ausserordentlich vergrösserten runden Augen in der Kopfmitte hinter den Fühlerwurzeln breit zusammenstossen. Bemerkenswert ist ferner die im Geäder ausserordentlich abgeleitete mit Silbenschuppen bedeckte Gattung *Scottella*, nov. gen.

Die Sciariden habe ich in dieser Publikation ausgeschlossen und werde sie später besonders bearbeiten.

Mycetobiinæ.

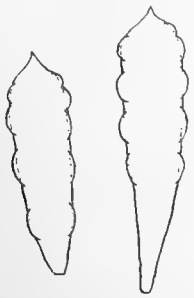
Scottella, nov. gen.

Typus: *Sc. argentosquamosa*, nov. spec.

Kopf klein, so breit wie der Thorax. Augen gross. Gesicht und Scheitel breit. 3 Ocellen, die in einer geraden Linie liegen, die äusseren ziemlich weit vom Augenrand entfernt. Rüssel kurz, Maxillarpalpus lang, vorn mit einzelnen kurzen senkrecht abstehenden Börstchen, 4-gliedrig, das erste lang, das 2. und 3. kürzer, das 4. sehr lang und schlank; das 2. und 3. bilden einen halbkreisförmigen Bogen. Fühler ca. doppelt so lang wie die Kopfhöhe; 2 + 14-gliedrig. Thorax ziemlich lang, nicht sehr stark erhöht. Scutellum als flache Platte die mässig hoch absteht, sehr breit ist, hinten fast gerade abgestutzt und an den Ecken abgerundet; am Hinterrand mit 4 oder 5 kürzeren Borsten. Postscutellum etwas bogig gewölbt, an den Seiten werden sie von den stark bogig gewölbten Metapleuren nach hinten zu etwas überragt. Abdomen etwas dorsoventral zusammengedrückt. Coxen schlank, etwa so lang wie der Thorax. Schienen

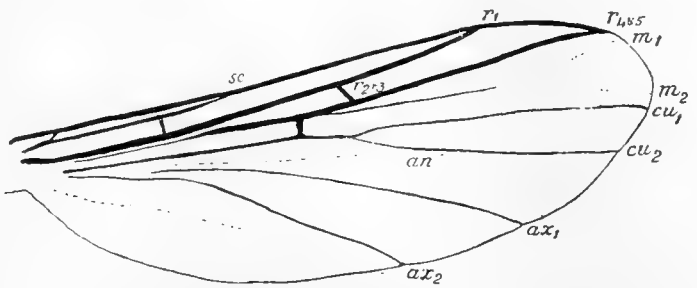
oben mit 2 Reihen Borsten, die beim Vorderbein kürzer als der Schienendurchmesser sind. Auf Thorax und Abdomen finden sich an verschiedenen Stellen Schuppen (Fig. 1), die am Ende zugespitzt sind, und an den Seiten flache blasenartige Beulen tragen.

Fig. 1.



Scottella argentosquamosa Enderl. Schuppen vom Thorax. Vergr. 560 : 1.

Fig. 2.



Scottella argentosquamosa Enderl. ♀. Flügel. Vergr. 20 : 1.

Flügel mässig schlank. Subcosta mündet etwas ausserhalb des ersten Viertels geradlinig in die Costa. Basalquerader fehlt. Die Costa endet an r_{4+5}. Die Media ist von der Basis bis zur Querader deutlich, aber dicht an den Radius gedrängt; ausserhalb der Querader verblasst sie sehr bald und feine Linien deuten m_1 und m_2 an (von letzterer fehlt die Basis) oder die beiden Äste sind spurlos reduciert (*Sc. formosana*). Die Basis des Radialraums ist mit der Media verschmolzen; die Ursprungsstelle auf r scheint reduciert. Cubitusgabel mit kurzem Stiel bis zur Querader nach der Media. r_{2+3} als Querader zwischen r_{4+5}; schräg nach vorn und basalwärts gerichtet. Der Radius und Radialramus sind auffällig dick und mit mässig langen, dicken, in der Mitte fast schuppig verbreiterten, anliegenden Borsten ziemlich dicht mehrreihig besetzt. Die Analis als feine Linie. 2 Axillaradern entwickelt.

Diese Gattung steht innerhalb der Subfamilie Mycetobiinae besonders durch die auffällige Reduction der Media, der auffälligen Verschmälerung der Zelle R bis fast zur völligen Reduction, sowie durch die Mündung der Querader zwischen m und cu in den Stiel der Cubitalgabel sehr isoliert.

Gewidmet wurde diese Gattung dem Sammler, Herrn Hugh Scott in Cambridge, England.

1. *Scottella argentosquamosa*, nov. spec. (Fig. 1 u. 2.)

♂♀. Kopf klein, seitlich gesehen oval, so breit wie der Thorax. Augen gross. Gesicht in der hinteren Hälfte parallelseitig und $1\frac{1}{2}$-mal so lang wie breit; die vordere Hälfte verbreitet sich sehr stark nach vorn. Die 3 Ocellen am Hinterrande des hier steil abfallenden Scheitels in gerader Linie; die seitlichen mässig gross, der mittlere kleiner; Abstand vom mittleren etwas mehr als 1 Ocellendurchmesser, vom Augenrand ca. $1\frac{1}{2}$ Ocellendurchmesser. Vor dem mittleren Ocellus eine scharfe Medianfurche bis zwischen die Fühlerwurzeln. Maxillarpalpus schlank und lang, das erste Glied etwas dicker. Fühler ca. doppelt so lang wie die Kopfhöhe, relativ gedrungen, Enddrittel schwach zugespitzt; die beiden Basalglieder mässig dicht mit langen, kräftigen schwarzen Borsten besetzt, erstes etwas länger, zweites so lang wie dick; Geisselpubescens micro-

scopisch fein, kurz und dicht. Geisselglieder eine Spur breiter wie lang, im Spitzendrittel etwas länger als breit, die beiden letzten Glieder doppelt so lang wie breit. Hinterrand und Seiten des Scheitels, Schläfen und Wangen mit sehr langen kräftigen Borsten besetzt.

Thorax ziemlich lang, mässig gewölbt; an den Seiten (sehr kurz behaart) Mesonotum hinten mit einer Querreihe von 4 langen Borsten, die beiden mittelsten dicht neben einander. In der Medianlinie eine kaum erhabene, wenig deutliche Linie, jederseits davon nicht weit abgerückt Spuren von je einer weiteren solchen Linie. Scutellum sehr plattgedrückt, mässig lang, breit, nach hinten und oben gerichtet, hinten mässig stark gerundet, in der Mitte an der Spitze schwach abgestutzt und an den Ecken je eine lange Borste. Postscutellum kurz und sehr breit, an den Seiten etwas geschwollen und auf diesen Beulen ein Büschel nach den Seiten gerichteter langer Borsten, sonst unpubesciert. Abdomen walzig, oben abgeplattet; die 6 ersten Segmente nahezu gleich lang; das 7. Segment beim ♀ sehr kurz und wenig behaart, beim ♂ etwas länger als die übrigen Segmente, gewölbt conisch zugespitzt und dicht und lang behaart. Coxen mässig schlank, so lang wie der Thorax. Schenkel ziemlich schlank, besonders der Vorderschenkel. Schienen oben mit 2 Reihen mässig kräftiger und mässig langer Borsten, die beim Vorderbein kürzer als die Schiendicke sind. Schienenendsporne lang und kräftig, unpubesciert, der längere ungefähr $\frac{5}{6}$ des 1. Tarsengliedes; am Vorderfuss nur 1 Sporn.

Vorderdrittel und Hinterrandsaum des Rückenschildes, sowie dreieckige Flecke die Vorderhälften der Seiten des 2.—5. Abdominaltergites einnehmend dicht mit bläulich silberweissen Schuppen besetzt; ebenso ein in der Mitte unterbrochener Querstreifen auf dem 1. Tergite. Die Form der Schuppen ist in Figur 1 abgebildet.

Flügel (Fig. 2) schlank, etwas länger als das Abdomen, Spitze abgerundet. Die Subcosta mündet ausserhalb des Endes des ersten Flügelviertels geradlinig in die Costa; die Querader zwischen *sc* und *r* ziemlich weit von der Mündung abgerückt. Die Costalzelle sehr schmal. Die Subcostalzelle relativ breit. Die Randstrecke der Cubitalgabel $2\frac{1}{2}$-mal so lang wie die der schmalen Mediangabel. Mediangabelstiel ungefähr doppelt so lang wie die Querader zwischen *rr* und *m*. Die Media ist fast im ganzen Verlauf, wenn auch im Apikalteil sehr undeutlich, erkennbar; nur der Basalteil von m_2 fehlt völlig. Halterenknopf breiter wie lang, am Ende breit und gerade abgestutzt, nach dem Stiel zu zugespitzt; Stiel kurz und dick.

Gesicht und Mundteile rostgelb mit silbergrauem Ton. Scheitel und Hinterkopf schwarz, silbergrau bereift. Thorax und Abdomen schwarz, Vorderdrittel und Hinterrandsaum des Rückenschildes mit bläulich silberweissen Schuppen besetzt. Von den ebenso beschuppten dreieckigen Flecken des 2.—5. Tergites sind die des 4. und 5. Tergites gross, die übrigen klein; ein in der Mitte unterbrochener Querstreifen auf dem 1. Tergite ebenso beschuppt. Cerci rostgelb. Coxen blass weisslich gelb, mit weisslich gelber Pubescenz; die Basis und Spitze schmal schwarz. Trochanter und die äusserste Basis der blass weisslich gelben Schenkel blass, Enddrittel letzterer schwarz; Hinterschenkel ganz schwarz. Schienen braun, die Vorderschienen vorn mit ockergelblichem Längsstreif. Tarsen schwarzbraun. Beborstung schwarz. Schienenendsporne

weisslich gelb, die der Vorderbeine braun. Flügel grau hyalin, Spitzendrittel schwärzlich. Adern schwarzbraun, Queradern gelbbraun. Membran sehr lebhaft in allen Farben irisierend. Halteren gelblich weiss.

Körperlänge 3,5—5½ mm. (sowohl beim ♂ als auch beim ♀).

Flügellänge 3, 3—4,7 mm.

Fühlerlänge 1,5—1,6 mm.

Thorakallänge 1,3—1,9 mm.

Abdominallänge 2,7—3,6 mm.

Länge des Hinterschenkels 2,1 mm.
„ der Hinterschiene 1,9 mm.
„ des Hintertarsus 2,7 mm.
} bei einem grösseren Exemplar.

Fundorte: Seychellen. Silhouette: Ebene von Mare aux Cochons, September 1908, 1 ♀; Wald oberhalb von Mare aux Cochons, ungefähr 1400 bis über 2000 Fuss, September 1908, 5 ♀; in Nähe von Pot-à-eau, ungefähr 1500 Fuss, August 1908, 1 ♀. Mahé: in der Nähe von Morne Blanc, Oktober bis November 1908, 1 ♀; Cascade Estate, ungefähr 800—1500 Fuss, Oktober 1908 bis März 1909, 4 ♂, 26 ♀; März 1909, 10 ♂, 3 ♀; davon 1 Pärchen in Copula.

Typen im Zoologischen Museum von London, Stettin und Cambridge (England).

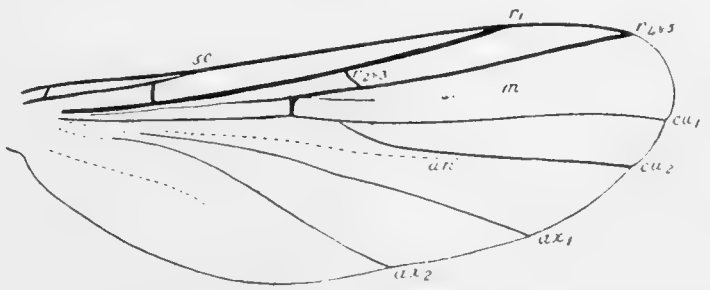
Diese Species findet sich besonders an den feuchtesten Stellen des höchsten Urwaldes.

2. *Scottella formosana*, nov. spec. (Fig. 3.)

Als Einfügung zur Gattung *Scottella* beschreibe ich hier eine 2. Species aus Formosa:

♀. Kopf klein, seitlich gesehen fast oval, so breit wie der Thorax. Augen gross. Gesicht und Scheitel breit; ersteres nach vorn zu ziemlich stark verbreitert, dreimal so

Fig. 3.



Scottella formosana Enderl. ♀. Flügel. Vergr. 20 : 1.

lang wie hinten breit und doppelt so lang wie vorn breit. Ocellen in einer geraden Linie, Abstand von einander ca. 1. Ocellendurchmesser, Abstand vom Augenrand ca. 1½ Ocellendurchmesser; vor dem mittleren Ocellus eine scharfe Medianfurche. Maxillarpalpus fast so lang wie die Kopfhöhe. Fühler doppelt so lang wie die Kopfhöhe, relativ dick, Enddrittel etwas zugespitzt. Die beiden Basalglieder mässig dicht mit langen kräftigen schwarzen Borsten besetzt, erstes etwas länger, zweites so lang wie dick; Geissel microscopisch fein und kurz pubesciert. Geisselglieder so lang wie dick, im Spitzendrittel etwas länger, die 2 letzten doppelt so lang wie dick. Scheitelseiten und -hinterrand, Schläfen und Wangen mit einigen langen dicken Borsten besetzt.

Thorax ziemlich lang, hinten ein wenig erhöht; nur am Rand kurz behaart; etwas glänzend; in der Medianlinie eine kaum erhabene wenig deutliche Linie, jederseits davon vorn nicht weit abgerückt Spuren von je einer weiteren solchen Linie. Abdomen auf der Oberseite stark abgeflacht; lang, vorn und hinten etwas verjüngt, in der Mitte ein wenig breiter als der Thorax. Pubescenz ziemlich dicht, kurz und anliegend. Coxen ziemlich schlank, von Thorakallänge. Schenkel ziemlich schlank, besonders der Vorderschenkel. Schienen oben mit 2 Reihen mässig kräftiger und mässig langer Borsten, die beim Vorderbein kürzer als die Schienendicke sind. Schienenendsporne lang und kräftig, unpubesciert (mit dem Microscop ist eine äusserst kurze und dichte Pubescenz erkennbar), der längere ungefähr $\frac{3}{4}$ des 1. Tarsengliedes, beim Vorderfuss nur 1 Sporn.

Nur auf dem Vorderende des Thorax finden sich einige Schuppen; auf dem Abdomen scheinen sie abgerieben zu sein.

Flügel mässig schlank, etwas länger als das Abdomen, Spitze abgerundet. Die Subcosta mündet etwas ausserhalb des Endes des ersten Viertels geradlinig in die Costa; kurz vor der Spitze die Querader zu r_1. Die Costalzelle sehr schmal. Die Subcostalzelle relativ breit. Die Randstrecke der Cubitalgabel $2\frac{3}{4}$-mal so lang wie die sehr schmale Mediangabel. Mediangabelstiel ungefähr doppelt so lang wie die Querader zwischen rr und m. Die verschwindende m endet in der Mitte der Zelle R_5, Gabeläste völlig verschwunden. Halterenkopf breiter als lang, am Ende breit und gerade abgestutzt, nach dem Stiel zu zugespitzt, Stiel kurz und dick.

Gesicht dunkelrostgelb, Scheitel und Hinterkopf schwarz. Mundteile und Maxillarpalpus blass ockergelblich. Thorax und Abdomen schwarz, auf letzterem nimmt eine ockergelbe Querbinde die Vorderhälfte des 4. Tergites ein, das 3. und 4. Sternit mit Ausnahme je eines schmalen Hinterrandsaumes ganz ockergelb. Cerci ockergelb. Coxen blass ockergelblich, die sehr feine Pubescenz silberweiss, an der Endspitze schwarz behaart. Trochanter schwarz mit schwarzer Behaarung; Schenkel blass ockergelb, Spitzendrittel der Vorderschenkel braun, der Mittelschenkel schwarz, Endhälfte der Hinterschenkel schwarz (ebenso die Pubescenz). Schienen dunkelbraun, die der Vorderbeine vorn ockergelb pubesciert. Tarsen schwärzlich. Beborstung der Schienen und Tarsen schwarz; Schienenendsporne weisslichgelb, der Vorderbeine bräunlich. Flügel grau hyalin, Spitzendrittel schwärzlich. Adern schwarzbraun, Queradern gelbbraun. Membran lebhaft in allen Farben irisierend. Halteren weiss.

Körperlänge ca. 5 mm.
Flügellänge 4,8 mm.
Fühlerlänge 1,5 mm.
Thorakallänge 1,9 mm.
Abdominallänge 3,8 mm.
Länge des Hinterschenkels 2,1 mm.
„ der Hinterschienen 2,2 mm.
„ des Hintertarsus 3 mm.

Fundort: Formosa: Kyukokado, 6. Januar 1908, 1 ♀ gesammelt von H. Sauter. Type im Stettiner Zoologischen Museum.

Diese Species unterscheidet sich von *Sc. argentosquamosa* durch die stärkere

Beschuppung, durch die ockergelbe Abdominalzeichnung und besonders dadurch, dass der Hinterschenkel nicht völlig schwarz, sondern die Basalhälfte blass ockergelb ist.

Mesochria, nov. gen. (Fig. 4.)

Typus: *M. scottiana*, nov. spec.

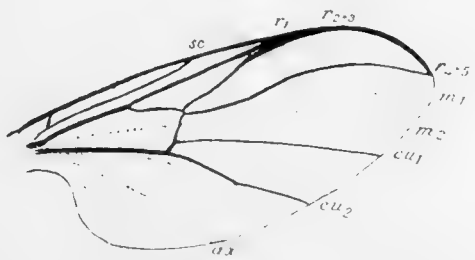
Diese Gattung steht der Gattung *Mycetobia* Meig. 1818 nahe und unterscheidet sich von ihr durch folgendes:

Fühler 2 + 14-gliedrig, die Endhälfte des letzten Gliedes in Form einer langen dünnen Spitze. Die Augen stossen hinter den Fühlern eine lange Strecke zusammen; die 3 Ocellen bilden ein kleines Dreieck in dem entstandenen Augenwinkel. Abdomen dorso-ventral zusammengedrückt. r_1 und r_{2+3} laufen kurz vor dem Ende zusammen und bis zum Ende dicht neben einander und sind auf dieser Strecke stark verdickt. Die Media ist ausserhalb der Anastomose sehr verblasst und ziemlich undeutlich; die Basalhälfte von m_2 fehlt gänzlich; innerhalb der Anastomose ist sie nur als ganz farblose faltenartige Linie angedeutet. cu_2 ist in der Mitte geknickt und trägt hinten eine Spur eines Höckers. Die Randader geht nicht über r_{4+5} hinweg.

3. *Mesochria scottiana*, nov. spec. (Fig. 4.)

♀. Kopf kurz, breit und hoch, kugelcalottenartig; so breit wie der Thorax. Scheitel hinter den Augen sehr kurz. Gesicht wenig breit, doppelt so lang wie breit. Schläfen und Wangen von den Augen völlig verdrängt. Die Augen nehmen fast den ganzen Kopf

Fig. 4.



Mesochria scottiana Enderl. ♀. Flügel. Vergr. $12\frac{1}{2} : 1$.

ein; die Strecke der Verschmelzung fast die Hälfte der Kopflänge; die Fühlerbasis wird von dem Augenrand kreisförmig umschlossen und ist nur nach dem Gesicht zu offen; das hinten zwischen dem hinteren Augeninnenrand entstehende Scheiteldreieck wird von dem kleinen Ocellendreieck gerade ausgefüllt; alle Ocellen berühren also den Augenrand. Gesicht unbehaart, Scheitel und Hinterkopf kurz behaart. Fühler kurz und gedrungen, kürzer als der Thorax, alle Glieder so lang wie dick; Endglied (16.) fast 3-mal so lang wie dick, Endhälfte griffelförmig verdünnt. Rüssel fast $\frac{1}{3}$ der Kopfhöhe. Palpen wenig länger, Endglied in eine haardünne Spitze ausgezogen.

Thorax länger wie hoch, $2\frac{1}{2}$-mal so lang wie breit. Spärlich und mässig lang behaart, Rückenschild hinten mit einigen längeren dünnen Haaren. Scutellum sehr kurz, breit, hinten sehr flach gewölbt, Hinterrand mit einigen langen dünnen Haaren. Postscutellum mässig steil abfallend, mässig hoch und etwas gewölbt. Abdomen stark dorsoventral

plattgedrückt; ein wenig breiter wie der Thorax, Seiten fast parallel, vorn schwach hinten stärker abgerundet. Cerci sehr klein. 1.—7. Tergit fast gleichlang, ziemlich breit und kurz, 8. Tergit sehr kurz; 1. Tergit in der Mitte bis zum Hinterrand breit und tief ausgehöhlt; in diese Höhle wird das Postscutellum eingefügt, wenn das Abdomen gehoben wird. Coxen relativ kurz und gedrungen, halb so lang wie die Schenkel; Vordercoxe lang und sehr schlank, $\frac{3}{4}$ so lang wie der Schenkel. Vordercoxen ziemlich weit von den Mittelcoxen getrennt, zwischen ihnen ist das Sternum stark kugelig gewölbt. Schienen völlig ohne Borsten. Schienenendsporne auffällig klein und zart, ca. $\frac{1}{10}$ der Länge des 1. Tarsengliedes. Fussbörstchen fehlend.

Flügel sehr breit, länger als der ganze Körper. *sc* mündet vor der Flügelmitte in die Costa. Costalzelle schmal. Zwischen *sc* und *r* keine Querader. Ursprung von *rr* stark basalwärts gerückt, wenig ausserhalb des Endes des 1. Flügelviertels. Die Randader sehr dick, sie geht nicht über r_{4+5} hinweg. Randpubescenz kurz und sehr dicht. Halteren schlank spindelförmig; Stiel dünn, so lang wie der Knopf.

Kopf braun, Augen schwarz, Ocellen braun. Rüssel und Palpus hellbraun. Fühler schwarzbraun. Thorax braungelb, besonders an den Seiten mit rötlichem Ton. Abdomen dunkler, Spitze heller. Beine sehr blass bräunlich gelb; Coxen in der Mitte braun; Trochanter am unteren Hinterrand dunkelbraun, Endfünftel der Hinterschienen schwarzbraun, 2.—5. Tarsenglied bräunlich. Hinterschenkel zuweilen schwach angebräunt. Flügel hyalin mit grauem Ton, Adern hell graubraun. Membran sehr lebhaft in allen Farben irisierend. Halteren rostgelb, Stiel blass gelblich.

Körperlänge 3,1—3,8 mm.
Flügellänge 3,7—4,1 mm.
Fühlerlänge 0,8—1,2 mm.
Thorakallänge 1,3—1,4 mm.
Abdominallänge 1,9—2,4 mm.
Länge des Hinterschenkels 1,8 mm.
„ der Hinterschiene 1,8 mm. } beim grösseren Exemplar.
„ des Hintertarsus 2,4 mm.

Fundort. Seychellen. Mahé, Cascade Estate, 800—1500 Fuss hoch, Januar bis März 1909, 2 ♀ gesammelt von H. Scott.

Typen im Museum von London und Stettin. Gewidmet wurde diese sehr interessante Species dem Sammler, Herrn H. Scott.

Ceroplatinæ.

Platyura Meig. 1804.

4. *Platyura axillariger*, nov. spec.

♂♀. Kopf klein und kurz. Augen gross, lang gestreckt, Pubescenz sehr kurz. Ocellen klein. Gesicht schmal, fast doppelt so lang wie breit. Scheitel mässig breit und ziemlich kurz. Behaarung ziemlich kräftig und mässig dicht. Fühler ziemlich rundlich, nach der Spitze zu sehr wenig verdünnt, erst das letzte Glied zugespitzt; die beiden

Basalglieder wenig länger als breit, die Geisselglieder abgesehen von der Fühlerspitze so lang wie breit. Palpus mässig lang.

Thorax ziemlich hochgewölbt, besonders vorn, etwas länger als hoch, doppelt so lang wie breit; mässig dicht mit kräftigen mässig langen Haaren besetzt. Scutellum ziemlich klein, hinten kreisförmig gerundet aber ziemlich kurz; hinten mit einigen borstigen Haaren. Postscutellum sehr schwach gewölbt und flach abfallend. Abdomen stark dorsoventral, beim ♀ etwas weniger, abgeflacht und nach hinten verbreitert, besonders beim ♂; dicht und mässig lang behaart. Die kleinen Haltezangen des ♂ mit kurzen kräftigen Haaren besetzt. Beine schlank, Schienendornen sehr kurz und spärlich, Fussbörstchen kurz und dicht. Längerer Hintertibiensporn $\frac{1}{3}$ des 1. Tarsengliedes.

sc mündet proximal der Basis von *rr* in den Vorderrand. Die Verschmelzung von *rr* und *m* ist sehr kurz, wenig länger als die Dicke dieser Ader. Mediocubitalquerader wenig länger als letztere und doppelt so lang wie der Basalabschnitt von *rr*. r_{2+3} mündet etwas proximal von der Mitte zwischen r_1 und r_{4+5}. Die Costa erreicht fast das Ende des 2. Drittels zwischen r_{4+5} und m_1. r_{2+3} etwa $\frac{1}{4}$ von r_{4+5}. Radialgabelzelle breit. Mediangabelstiel $1\frac{1}{2}$ des Basalabschnittes von *rr*. Mediangabel mässig schmal, Äste fast gerade und allmählich divergierend. Cubitalgabel am Ende stark verbreitert, Basalabschnitt von cu_1 etwas länger als der Basalabschnitt von *rr*. Analis scharf, Endfünftel fehlt. Axillaris scharf, erreicht fast den Hinterrand.

Kopf gelbbraun, Augen schwarz. Palpen bräunlich. Fühler bräunlich rostgelb, beim ♂ meist schwärzlich mit gelblichem Ton. Scheitelbehaarung schwarz. Thorax rostgelb, Behaarung schwarz. Abdomen braungelb, Spitze dunkel gelbbraun, äusserste Spitze ockergelblich, die Zangen des Männchens schwärzlich. Beine hell ockergelb, Schienen gelblich graubraun, Tarsen schwärzlich, Tibienendsporne schwarz. Flügel blass bräunlich gelb, Adern gelbbraun. Halteren dunkelbraun, Stiel blass gelblich. Membran sehr lebhaft in allen Farben irisierend.

Körperlänge 3,1—$3\frac{1}{4}$ mm.
Flügellänge 2,9—3,1 mm.
Fühlerlänge 0,9 mm.
Thorakallänge 1 mm.
Abdominallänge 2,1 mm.
Länge des Hinterschenkels 1,2 mm.
„ der Hinterschiene 1,6 mm.
„ des Hintertarsus 2,5 mm.

Fundorte. Seychellen. Silhouette: Wald oberhalb von Mare aux Cochons. September 1908, 2 ♂. Félicité Insel: 14.—18. Dezember 1908, 1 ♂: Mahé: Cascade Estate, ungefähr 800—1500 Fuss Oktober 1908—März 1909, 1 ♂, 1 ♀; in der Nähe von Morne Blanc, Oktober bis November 1908, 1 ♀.

5. *Platyura lævis*, nov. spec.

♀. Kopf klein, so breit wie der Thorax, kurz; Augen gross, langgestreckt, Pubescenz sehr kurz. Scheitel mässig breit und kurz, Pubescenz sehr fein und kurz, an dem Augenrand einige kräftige Haare. Fühler dünn, nicht zugespitzt, die beiden Basalglieder

so lang wie breit, die Geisselglieder etwas länger als breit, das erste Geisselglied $1\frac{3}{4}$-mal so lang wie breit. Gesicht so lang wie breit. Palpen mässig lang.

Thorax stark gewölbt, doppelt so lang wie breit und so lang wie hoch; Rückenschild poliert glatt, dicht mit feinen und kurzen Haaren besetzt, an den Seiten und hinten sind die Haare ein wenig länger; ohne Borsten. Scutellum klein, hinten gerundet und mit einigen längeren Haaren. Postscutellum mässig gewölbt. Abdomen ziemlich lang, stark dorsoventral plattgedrückt, nach hinten verbreitert, Behaarung dicht und mässig lang. Beine sehr lang und dünn, von den Schienendornen finden sich nur vereinzelt ganz kurze Reste. Längerer Hinterschienensporn $\frac{1}{3}$ des 1. Tarsengliedes. Fussbörstchen vereinzelt und sehr kurz.

sc mündet ein Stück proximal der Basis von *rr* in den Vorderrand. Die Verschmelzung von *rr* und *m* ist lang, etwas länger als der Basalabschnitt von *rr*. Mediocubitalquerader ca. $\frac{1}{4}$ des letzteren. r_{2+3} endet fast am Ende des 2. Drittels zwischen r_1 und r_{4+5}, Radialgabelzelle sehr schmal, r_{2+3} sehr kurz, etwa $\frac{1}{5}$ von r_{4+5}. Mediangabelstiel etwa doppelt so lang wie der Basalabschnitt von *rr*. Cubitalgabelzelle am Ende ziemlich stark verbreitert. Basalabschnitt von cu_1 $1\frac{1}{2}$ der Mediocubitalquerader und $\frac{1}{2}$ des Basalabschnittes von *rr*. Analis scharf, Enddrittel fehlt. Axillaris fehlt völlig.

Kopf und Fühler schwarzbraun, die beiden Basalglieder hellbraun, Augen schwarz. Thorax hell bräunlich gelb, Rückenschild glänzend tiefschwarz, Scutellum bräunlich. Abdomen hell braungelb, Spitzenviertel dunkelbraun, Hinterränder der Tergite schmal schwarzbraun. Beine blass ockergelblich, Schienen grau, Tarsen grauschwarz, Tibiensporne schwarz. Flügel gelblich hyalin, Adern dunkelbraun. Halteren schlank, braun, Stiel hell bräunlich gelb. Membran sehr lebhaft in allen Farben irisierend.

Körperlänge 2,6—2,8 mm.
Flügellänge 2,9—3 mm.
Fühlerlänge 0,8 mm.
Thorakallänge 0,9 mm.
Abdominallänge 2—2,1 mm.
Länge des Hinterschenkels 1,2 mm.
„ der Hinterschiene 2 mm.
„ des Hintertarsus 2,9 mm.

Fundort. Seychellen. Mahé: Cascade Estate, ungefähr 800—1500 Fuss, Oktober 1908—März 1909, 4 ♀.

Aphanizophleps Enderl. 1910.

6. *Aphanizophleps flavipes*, nov. spec.

Diese Species unterscheidet sich von *A. coxata* Enderl. aus Südbrasilien durch folgendes:

Körper grösser und kräftiger. m_2 erstreckt sich weiter basalwärts, und zwar liegt der Anfang hinter der Mündung von r_1. Die schmale Zelle zwischen *c* und *rr* ist länger und noch schmäler.

Der Thorax und das Abdomen sind schwarzbraun. Die Hinterschenkel sind am Spitzendrittel nicht braun, sondern gleichfalls ockergelb; dagegen haben Mittel- und Hinterschenkel an der Basis unten einen schmalen braunen Längswisch.

Körperlänge 2,4—2,5 mm.
Flügellänge 2,2 mm.
Fühlerlänge ca. 1,7 mm.
Thorakallänge 0,8 mm.
Abdominallänge 1,4 mm.
Länge des Hinterschenkels 1,2 mm.
„ der Hinterschiene 1,5 mm.
„ des Hintertarsus 1,9 mm.

Fundorte. Seychellen. Silhouette: Wald oberhalb von Mare aux Cochons, 1400—2000 Fuss hoch, September 1908, 1 ♂. Mahé: Cascade Estate, 800—1500 Fuss hoch, Oktober 1908 bis März 1909, 1 ♂, 1 ♀; in der Nähe von Morne Blanc, Oktober bis November 1908, 1 ♂.

Leia Meig. 1818.

7. *Leia maculicoxa*, nov. spec.

Scheitel matt, mit langen struppig abstehenden Haaren und Borsten. Augen gross, microscopisch fein grau pubesciert. Die seitlichen Ocellen mässig gross und den Augenrand berührend; der mittlere Ocellus verschwindend klein. Gesicht $1\frac{1}{2}$-mal so lang wie breit. Fühler ziemlich dünn, wenig zugespitzt, so lang wie der Thorax, 1. Glied $1\frac{1}{4}$-mal so lang wie breit, 2. zweimal so breit wie lang, beide am Endrande lang behaart, 2. Glied nur mit 1 Reihe rings um den Rand, von diesen die oberste sehr lang und borstenförmig; Geisselglieder $1\frac{1}{4}$-mal so lang wie breit, erstes $1\frac{1}{2}$-mal, letztes doppelt so lang wie breit. Palpus lang.

Thorax $1\frac{1}{4}$-mal so lang wie hoch und $1\frac{3}{4}$-mal so lang wie breit, hoch gewölbt; Rückenschild wenig glatt, mit mässig kurzer und mässig dichter Pubescenz, vorn an den Seiten mit langen und ziemlich dichtgestellten Haaren, ebenso am Hinterrand. Scutellum breit und mässig lang, gleichmässig gerundet, ziemlich dünngedrückt, Hinterrand mit 6 Borsten, die beiden seitlichen kurz und $\frac{1}{4}$ der sehr langen mittleren beiden. Postscutellum fast eben, nur hinten gerundet, sehr flach abfallend, unbehaart. Metapleuren stark gerundet, mit feinen langen Haaren dicht besetzt. Abdomen walzig, oben abgeflacht; 6 Tergite gross, das 7. nur ganz kurz sichtbar. Pubescenz mässig kurz, dicht und etwas anliegend. Längerer Hintertibienendsporn $\frac{4}{5}$ des 1. Tarsengliedes. Fussbörstchen spärlich und sehr kurz. Coxen schlank, nicht ganz so lang wie der Thorax, Vordercoxen etwas kürzer.

rr fast gerade, Zelle R_1 relativ breit. m_1 ziemlich gerade, m_2 von der Mitte aus nach vorn gebogen, so dass die Mediangabelzelle von der Basis bis zur Mitte verbreitert, nach dem Ende zu ziemlich stark verschmälert und am Ende halb so breit wie in der Mitte ist. Mediangabelstiel $1\frac{1}{2}$-mal so lang wie die Breite der Gabel in der Mitte. cu_1 gleichmässig sehr schwach gebogen an der Basis ziemlich breit unterbrochen, cu_2 schwach wellig gebogen.

ax endet wenig distal der Basis von cu_1. cu_2 beginnt wenig proximal von der Basis des Mediangabelstieles.

Kopf bräunlich ockergelb; Fühler hell bräunlich gelb, das Enddrittel jedes Geisselgliedes, bei den 5—6 letzten die Endhälfte, schwarzbraun. Palpen hell gelblich, erstes Glied braungelb. Augen schwarz, Ocellen hellgelblich. Thorax hell bräunlich ockergelb, Scutellum etwas mehr gelblich. Rückenschild vorn mit 1 ganz undeutlichem Mittelstreif, hinten mit 2 ebensolchen seitlichen Streifen, die häufig fehlen. Pubescenz und Beborstung hell braungelb. Postscutellum dunkelbraun. Abdomen hell ockergelb, hintere Hälfte des 1.—6. Tergites schwarzbraun; diese schwarze Zeichnung erweitert sich meist in der Mitte nach vorn, so dass eine winklige Grenzlinie entsteht, die zuweilen den Vorderrand berührt. Auf dem 1—6. Sternit ist an den Seiten von der Hinterecke aus je ein schräggestelltes wenig schmäleres dunkelbraunes Band bis zum Vorderrand. 7. Tergit schwarz. Genitalsegment bräunlichgelb. Beine hell ockergelb, die Enddrittel der Coxen auf der Aussenseite schwarzbraun. Trochanter bräunlich. Schenkel mit brauner äusserster Basis, Mittel- und Hinterschenkel ausserdem im Basal- und Enddrittel unten mit braunem Längsstreifen, die Hinterschenkel ausserdem noch an der äussersten Spitze schwarz und längs des ganzen oberen Randes mit schmalem hellbraunen Längsstreifen. Endachtel der Mittel- und Hinterschienen schwarzbraun. Tarsen sehr schwach gebräunt. Tibienendsporne hell ockergelb, an der Spitze leicht gebräunt.

Halteren gelblichweiss. Flügel hyalin, graugelblich getrübt, Adern gelbbraun. Membran sehr lebhaft in allen Farben irisierend.

Körperlänge 3,3—4,1 mm.
Flügellänge 3,2—3,7 mm.
Fühlerlänge 1,4—1,6 mm.
Thorakallänge 1,4—1,6 mm.
Abdominallänge 2,2—3 mm.
Länge des Hinterschenkels 1,6 mm.
„ der Hinterschiene $2\frac{1}{4}$ mm.
„ des Hintertarsus 2,5 mm.
} beim grösstem Exemplar.

Fundorte. Seychellen. Mahé: Cascade Estate, 800—1500 Fuss, Oktober 1908 bis März 1909, 3 ♂ 17 ♀; Gebiet von Forêt noire, Oktober und November 1908, 2 ♀; in der Nähe von Morne Blanc, Oktober und November 1908, 2 ♀. Anonyme Insel, von Gras und Farnen, Januar 1909, 1 ♀. Praslin, November und Dezember 1908, 1 ♀.

8. *Leia seychellensis*, nov. spec.

♂. Diese Species unterscheidet sich von *Leia maculicoxa* durch folgendes:

Abdominaltergite nur an den Seiten vorn mit dreieckigen ockergelben Flecken. Coxen, Trochanter einfarbig hell ockergelb, nur die äussersten Endspitzen der Coxen und die äussersten Endspitzen des Hinterschenkels schwarz. Grösse viel kleiner.

Körperlänge 2,7—2,8 mm.
Flügellänge 2,6—3 mm.

Fundorte. Seychellen. Silhouette: in der Nähe von Mont Pot-à-eau, ca. 1500 Fuss, August 1908, 1 ♂. Mahé: Cascade Estate, ca. 1000 Fuss und höher, 1 ♂. Félicité Insel: 14.—18. Dezember 1908, 3 ♂.

Phronia Winn. 1863.

9. *Phronia flabellipennis*, nov. spec.

♂♀. Kopf so breit wie der Thorax, Scheitel mässig lang, matt, mässig dicht mit mässig langen nach vorn gekämmten Haaren besetzt, Schläfen mässig lang. Ocellen sehr klein, dicht am Augenrand, der mittlere Ocellus nicht erkennbar. Stirn vorn gerade abgestutzt. Gesicht doppelt so lang wie hinten breit, nach vorn verschmälert. Fühler kurz, etwas kürzer als der Thorax, erst das Endviertel stark verdünnt und grau pubesciert; 1. Glied $1\frac{1}{2}$-mal so lang wie am Ende breit, 2. so lang wie breit, Geisselglieder durchschnittlich so lang wie breit. Augen gross, microscopisch fein pubesciert. Palpen mässig kurz.

Thorax $1\frac{1}{3}$-mal so lang wie hoch und fast doppelt so lang wie breit; fein und ziemlich dicht pubesciert und spärlich mit kurzen Börstchen besetzt, hinten und an den hinteren Seiten mit einigen Borsten. Scutellum halbkreisförmig, kurz behaart, hinten mit 2 langen Borsten. Postscutellum abgerundet stumpf kegelförmig. Abdomen stark lateral zusammengedrückt, kurz pubesciert; das 7. Segment beim ♀ $\frac{1}{3}$ so lang wie das 6. und weniger hoch, beim ♂ so lang wie das 6. und ebenfalls weniger hoch. Hinterrand des 6. Tergites des ♂ mit 8 langen Borsten und in der Mitte mit einer kleinen höckerartigen Verlängerung; beides fehlt beim ♀. Coxen wenig verbreitert, schlank, so lang wie der Thorax, Vordercoxe wenig kürzer. Alle Schenkel schlank. Mittelschiene oben mit sehr kurzen Börstchen; Hinterschiene mit 2 Reihen Borsten die etwas länger als der Schienendurchmesser sind. Längerer Hinterschienenendsporn etwas länger als die Hälfte des 1. Tarsengliedes. Fussbörstchen sehr kurz und spärlich.

Die Costa geht nicht über *rr* hinaus. r_1 gerade. *rr* nur unter der Mündung von r_1 etwas nach hinten umgebogen, sonst gerade. Zelle R_1 sehr schmal, wenig divergierend. Die Querader zwischen *rr* und *m* 4-mal so lang wie der Mediangabelstiel, letzterer ein wenig länger als der Basalabschnitt des Radialramus. Cubitalgabelung ziemlich weit distal der Mediangabelung, Stiel doppelt so lang wie cu_2, Gabel breit, Randstrecke fast $1\frac{1}{2}$ der Randstrecke der schmalen Mediangabel. Die Analis erreicht fast die Cubitalgabelung. 2 Axillaradern; ax_1 etwas kürzer als *an*, ax_2 erreicht fast den Hinterrand. Der über die Basalquerader überstehende Teil der Subcosta ist nicht länger als diese.

Kopf braun, Augen schwarz, Ocellen dunkelbraun, Fühler schwärzlich, grau pubesciert, die beiden Basalglieder ockergelb, Kopfpubescenz hell ockergelb. Thorax hell gelbbraun, Pubescenz und Beborstung schwarz. Abdomen schwarz, ockergelb ist die Unterseite, und ein sich nach den Seiten verbreiternder Vorderrandsaum auf jedem Segment; das 1. Tergit ganz ockergelb, ebenso die hinter dem 7. Segment gelegenen Sexualorgane. Coxen, Trochanter und Schenkel blass weisslich gelb. Alle Schenkel oben mit braunem Längsstreifen, Hinterschenkel an der Spitze braun. Schienen grau, Tarsen schwarz, Tibienendsporne schwarz. Halteren braun mit gelbem Stiel. Flügel bräunlich hyalin, Adern braun. Membran sehr lebhaft in allen Farben irisierend.

Körperlänge ♂ 3,5 mm. ♀ 4,3 mm.
Flügellänge ♂ 3 mm. ♀ 3 mm.

Fühlerlänge ♀ 1,2 mm.
Thorakallänge ♂ 1,3 mm. ♀ 1,4 mm.
Abdominallänge ♂ 2,6 mm. ♀ 3,2 mm.
Länge des Hinterschenkels ♂ 1,5 mm. ♀ 1,6 mm.
„ der Hinterschiene ♂ 1,9 mm. ♀ 2,2 mm.
„ des Hintertarsus ♂ 2,6 mm. ♀ 2,9 mm.

Fundorte. Seychellen. Mahé: Gegend von Mare aux Cochons, 1500 Fuss hoch, 26. Januar bis 2. Februar 1909, 1 ♂; Cascade Estate, 800—1500 Fuss hoch, Januar bis März 1909, 1 ♀.

Typen im Museum von London und Stettin.

10. *Phronia silhouettensis*, nov. spec.

♀. Kopf so breit wie der Thorax, Scheitel ziemlich kurz, Schläfen kurz. Scheitel mit kurzer nach vorn gekämmter Pubescenz. Augen sehr gross, microscopisch fein pubesciert. Ocellen gross, dicht am Augenrand, mittlerer Ocellus winzig klein. Stirn vorn gerade abgestutzt. Gesicht doppelt so lang wie breit, in der Mitte etwas verengt. Fühler mässig kurz, ein wenig länger als der Thorax; gleichmässig nach der Spitze zugespitzt; die beiden Basalglieder $1\frac{1}{2}$-mal so lang wie breit; Geisselglieder $1\frac{1}{2}$-mal so lang wie breit, Endglied länger; Geisselpubescenz äusserst kurz und erscheint nur als grauer Reif. Palpen lang und schlank.

Thorax $1\frac{1}{3}$-mal so lang wie hoch und $2\frac{1}{4}$-mal so lang wie breit, mässig gewölbt. Pubescenz kurz und gleichmässig, an den Seiten und hinten mit einigen Borsten. Scutellum lang, überhalbkreisförmig, in der Mitte des Hinterrandes 2 lange Borsten. Postscutellum breit gewölbt. 7. Segment des Abdomens so lang wie das 6. aber schmäler. Coxen schmal, schlank, so lang wie der Thorax, Vordercoxe ein wenig kürzer. Alle Schenkel schlank und schmal. Mittelschiene oben mit einigen verschwindenden Borstenstummeln, Hinterschiene oben mit 2 Reihen kurzer Borsten, die nicht viel länger sind als der Schienendurchmesser. Längerer Hinterschienensporn halb so lang wie das 1. Tarsenglied, das fast so lang ist wie die übrigen 4 Tarsenglieder zusammen, Fussbörstchen fast fehlend.

Die Costa geht nicht über *rr* hinweg. r_1 gerade, *rr* am Ende des 1. Viertels etwas nach vorn, am Ende des 3. Viertels etwas nach hinten umgebogen. Zelle R_1 nur im Basalsechstel sehr schmal; bis dorthin stark verbreitert. Die Querader zwischen *rr* und *m* $1\frac{1}{2}$-mal so lang wie der Mediangabelstiel, dieser mindestens 3-mal so lang wie der sehr kurze Basalabschnitt des Radialramus. Cubitalgabel ziemlich weit distal der Mediangabelung, Stiel $2\frac{1}{2}$-mal so lang wie cu_2; cu_2 gerade, cu_1 schwach gebogen; Gabel breit und so breit wie die nicht schmale Mediangabel, die kurz vor dem Ende etwas erweitert ist. Die Analis geht noch ein Stück über die Cubitalgabelung hinweg; 2 Axillaradern; die vordere (ax_1) sehr blass, $\frac{2}{3}$ der Analislänge; ax_2 ebenso lang und erreicht fast den Hinterrand. Der über die Basalquerader reichende Teil von *sc* ist doppelt so lang wie diese und berührt fast den Radius.

Kopf hell rostgelb, Augen schwarz, Ocellen dunkelbraun, fein schwarz gesäumt, Fühler grau, weisslich grau bereift, die 3 ersten Glieder ockergelb. Kopfpubescenz

schwarz. Thorax rostgelb, an den Seiten des Rückenschildes ein silberweisser mässig breiter Längsstreifen, der an beiden Seiten schwarz gesäumt ist; Medianlinie des Rückenschildes mit einem schmalen braunen Längsstreifen, der im vorderen Drittel eine schmale Gabel bildet. Scutellum braun, Hinterrand und Medianlinie ockergelb. Abdomen hell ockergelb, der obere Rand (ein schmaler Medianstreif in der Mitte des Tergits), ein schmaler Vorderrandsaum auf dem 3.—6. Tergit und das 7. Tergit schwarzbraun. Beine mit den Coxen hell ockergelb, Schienen grau bräunlich gelb. Tarsen und Tibienendsporne schwarz. Halteren rostgelb. Flügel bräunlichgelb hyalin; Adern gelbbraun. Membran intensiv in allen Farben irisierend.

Körperlänge 4 mm.
Flügellänge 2,5 mm.
Fühlerlänge 1,4 mm.
Thorakallänge 1 mm.
Abdominallänge 3,2 mm.
Länge des Hinterschenkels 1,3 mm.
,, der Hinterschiene 2 mm.
,, des Hintertarsus 2,3 mm.

Fundort. Seychellen. Silhouette: Mare aux Cochons, September 1908, 1 ♀.
Type in Museum von London.

11. *Phronia areolata*, nov. spec.

♀. Kopf sehr breit und gross, ein wenig breiter als der Thorax. Augen sehr gross, Pubescenz kurz und ziemlich kräftig. Ocellen klein, dicht am Augenrand, der mittlere Ocellus sehr klein. Stirn vorn gerade abgestutzt. Scheitel kurz, Pubescenz kurz, an den Seiten einige Borsten. Schläfen kurz. Fühler kurz, gedrungen, so lang wie der Thorax, nicht zugespitzt. 1. Fühlerglied $1\frac{1}{2}$-mal so lang wie breit, 2. eine Spur breiter als lang, am Ende mit einigen längeren Haaren; 1. Geisselglied $1\frac{3}{4}$-mal so lang wie am Ende breit, die übrigen so lang wie breit. Palpen schlank.

Thorax so lang wie hoch, sehr stark gewölbt, $1\frac{2}{3}$ mal so lang wie breit; sehr dicht und sehr fein grau pubesciert, vorn an den Seiten und hinten einige schwarze Borsten. Scutellum breit fast halbkreisförmig, fein pubesciert, hinten mit 2 langen Borsten; es liegt dem Postscutellum bis zum Ende dicht auf, das dann fast rechtwinklig und ziemlich hoch senkrecht abfällt. Abdomen stark lateral zusammengedrückt; das 2. Segment am längsten, das 7. 1/3 so lang wie das 6.; Legerohr und Cerci sehr zart und klein. Coxen sehr lang, wenig verbreitert, Vordercoxen so lang wie der Thorax, die übrigen etwas länger. Schenkel sehr schlank, Hinterschenkel mässig verbreitert. Die Borsten auf der Oberseite der Mittelschiene sind sehr kurz, die der Hinterschiene fast so lang wie der Schienendurchmesser. Längerer Hinterschienensporn 2/3 des 1. Tarsengliedes. Fussbörstchen spärlich und kurz.

c geht nicht über *rr* hinweg. r_1 ist sehr schwach gebogen. *rr* vor dem Ende des 2. Drittels etwas nach hinten gebogen. Zelle R_1 ziemlich breit, an der Basis schmal, ziemlich stark divergierend. Der Mediangabelstiel 2/3 der schräggestellten Querader zwischen *rr* und *m* und 3-mal so lang wie der Basalabschnitt von *rr*. Mediangabelzelle ziemlich breit,

im ersten und dritten Drittel divergierend, im zweiten parallel. Cubitalgabel kurz und mässig breit, Stiel 3-mal so lang wie cu_2; cu_2 gerade, cu_1 nahe der Basis gebogen. Die Enden von m_1, m_2, cu_1 und cu_2 verblasst. Der über die Basalquerader überstehende Teil von *sc* ist kaum länger als diese und berührt fast *r*. Nur eine Axillarader und zwar die hintere.

Kopf braun, Gesicht bräunlichgelb. Augen schwarz, Ocellen gelblich. Fühler schwarz, grau pubesciert, die 2 ersten Glieder und die Basis des 3. ockergelb, das 3. und 4. Glied braun. Kopfpubescenz graugelblich, Borsten schwarz. Thorax gelbbraun, Pubescenz gelblich, Borsten schwarz. Abdomen schwarzbraun, die beiden ersten Sternite und die Hinterhälften der zwei folgenden hell ockergelb, hinten zieht sich bei diesen 4 Segmenten die gelbe Farbe etwas auf die Seiten der Tergite hinauf. Coxen blass ockergelb, Spitze bräunlich. Trochanter und Schenkel braungelb, die dichte Pubescenz schwärzlich. Schienen etwas dunkler, Tarsen und Tibienendsporne schwarz. Halteren schwarzbraun, Stiel hell bräunlich gelb. Flügel grau hyalin, Adern braun. Membran sehr stark in allen Farben, am Aussenrand intensiv blau irisierend.

Körperlänge 3 mm.
Flügellänge $2\frac{1}{4}$ mm.
Fühlerlänge 0,9 mm.
Thorakallänge 0,9 mm.
Abdominallänge 2,2 mm.
Länge des Hinterschenkels 1,3 mm.
„ der Hinterschiene 1,5 mm.
„ des Hintertarsus 2,3 mm.

Fundort. Seychellen. Mahé: Cascade Estate, 800—1500 Fuss, Januar bis März 1909, 1 ♀.

Type im Museum von London.

12. *Phronia subvenosa*, nov. spec.

♂♀. Diese Species hat Ähnlichkeit mit der *Phr. areolata* und unterscheidet sich von ihr durch Folgendes:

Scheitel und Schläfen dunkelbraun, Pubescenz silberweisslich. Thorax rostbraun. Schildchen schmäler und länger, ungewöhnlich schmal. Thorax hell bis dunkel rostbraun, Scutellum ziemlich dunkelbraun. Abdomen schwarz, die 5 ersten Sternite hell ockergelb, selten dunkler; bei einigen Stücken (5 ♀) sind die Vorderdrittel des 3.—5. Tergites hell ockergelb. Abdominalspitze hinter dem 7. Segment rostgelb bis bräunlich. Coxen einfarbig blass ockergelb. Spitzenachtel der Hinterschenkel schwarz. Halteren weisslich bis hell ockergelb.

c geht nicht über *rr* hinweg. r_1 gerade, *rr* am Ende des 3. Viertels sehr schwach gebogen. Zelle R_1 sehr schmal, sehr schwach divergierend. Mediangabelstiel kurz, $\frac{1}{3}$ oder noch weniger von der Querader zwischen *rr* und *m*. Der Basalabschnitt von *rr* sehr kurz, kaum länger als dick. Mediangabel ziemlich schmal und ziemlich parallel. Cubitalgabel kurz, etwas schmäler als die Mediangabel. Die Enden von m_1, m_2, cu_1 und cu_2 fehlen völlig. *an* sehr blass. Nur die hintere Axillarader vorhanden.

Körperlänge 2,9—3,1 mm.
Flügellänge 2,4 mm.
Fühlerlänge 0,9 mm.
Thorakallänge 1,1 mm.
Abdominallänge $2\frac{1}{4}$ mm.
Länge des Hinterschenkels 1,2 mm.
„ der Hinterschiene $1\frac{3}{4}$ mm.
„ des Hintertarsus 2 mm.

Fundorte. Seychellen, 5 ♂, 8 ♀. Silhouette: Ebene und Sumpf nahe bei Mare aux Cochons, August 1908, 1 ♀; Mare aux cochons, September 1908, 1 ♀; Wald oberhalb von Mare aux cochons, September 1908, 1 ♂; Hochwald, 2000 Fuss, September 1908, 1 ♀. Mahé: Cascade Estate, 800—1500 Fuss, Januar bis März 1909, 3 ♂ 2 ♀. Anonyme Insel, von Gras und Farn abgekätschert, Januar 1909, 1 ♂; moorige Gegend in der Nähe der Seeküste, Cascade, 20. Februar 1909, 1 ♀. Félicité Insel, 14.—18. Dezember 1908, 1 ♀.

Typen im zoologischen Museum von Cambridge, Stettin und London.

var. *tricincta*, nov.

5 ♀ unterscheiden sich von der Stammform dadurch, dass das Vorderdrittel des 3.—5. Abdominaltergites hell ockergelb ist.

Fundorte. Seychellen. Mahé: Wald von ziemlich verkrüppelten Capucin-Bäumen (*Northea*), auf dem Gipfel von "Montagne Anse Major," 2000 Fuss, Februar 1909, 1 ♀; Umgebung von Mare aux cochons, 1500 Fuss, 26. Januar bis 2. Februar 1909, 1 ♀. Cascade Estate, 800—1500 Fuss, Januar bis März 1909, 1 ♀. Silhouette: Hochwald oberhalb Mare aux cochons, September 1908, 2 ♀.

Macrobrachius Dziedzicki 1889.

13. *Macrobrachius brevifurcatus*, nov. spec.

♂. Kopf so breit wie der Thorax. Scheitel mässig kurz. Schläfen kurz. Scheitelpubescenz kurz und dicht, an den Seiten und vorn einige Borsten. Ocellen sehr klein, dicht am Augenrand, mittlerer Ocellus nicht zu bemerken. Stirn vorn mit einem langen keilförmigen Fortsatz, der zwischen der Basis der beiden Fühler endet und in der Mitte eine tiefe Längsfurche besitzt. Gesicht ungefähr so lang wie breit. Augen gross, microscopisch kurz pubesciert. Fühler etwas länger als der Thorax, 1. Glied $1\frac{1}{2}$, 2. Glied so lang wie breit, 2. oben mit einem langen Haar. Geisselglieder etwas länger als breit, 1. Glied $1\frac{3}{4}$-mal so lang wie breit. Palpen mässig schlank.

Thorax fast so hoch wie lang, stark gewölbt; fast doppelt so lang wie breit; dicht und kurz pubesciert, ausserdem zerstreute kurze Borsten, an den Seiten ziemlich viel hinten einige lange Borsten. Scutellum ziemlich gross, halbkreisförmig, mit 4 langen Borsten. Postscutellum flach gewölbt und ziemlich steil. Abdomen stark lateral zusammengedrückt, Pubescenz dicht und mässig lang; 1. Segment sehr kurz. Coxen mässig schlank, fast so lang wie der Thorax, Vordercoxe etwas kürzer. Schenkel ziemlich schlank und schmal. Borsten der Oberseite der Mittel- und Hinterschienen so lang wie der Schienendurchmesser. Fussbörstchen dicht aber sehr kurz.

Die Costa geht $\frac{1}{4}$ der Entfernung zwischen *rr* und m_1 über *rr* hinweg. r_1 kräftig und gerade. *rr* gerade, nur hinter dem Ende von r_1 etwas nach hinten gebogen. Zelle R_1 breit und parallelseitig, erst hinter dem Ende von r_1 etwas verbreitert. Stiel der Mediangabel ein wenig länger als die Querader zwischen *rr* und *m*, diese doppelt so lang wie der Basalabschnitt von *rr*. Mediangabel gleichmässig und ziemlich breit divergierend. Cubitalgabel kurz und ziemlich breit, der Stiel 4-mal so lang wie cu_2. Randstrecke der Mediangabel fast doppelt so lang wie die der Cubitalgabel. Die Analis reicht bis zur Cubitalgabelung. Nur die hintere Axillarader vorhanden, diese kurz und erreicht nur die Hälfte der Entfernung bis zum Rand. Radialzelle *R* ziemlich breit.

Kopf und Palpen gelbbraun, Gesicht bräunlichgelb. Augen schwarz, Ocellen gelblich. Vorderer Stirnkeil ockergelblich. Kopfbehaarung schwarz. Thorax hell ockergelb, ein schmaler vorn sich sehr schmal gabelnder Medianstreif und nahe seitlich davon je ein breiterer Längsstreif schwarzbraun. Behaarung (Pubescenz und Borsten) schwarz. Scutellum braun, in der Mitte ockergelb. Postscutellum in der Mitte bräunlich. Abdomen schwarz, die 4 ersten Sternite hell ockergelb, diese Färbung zieht sich an der Vorderseite des 2.—4. Tergites ein Stück in die Höhe und bildet 3-eckige Keilflecke. Beine mit Coxen hell ockergelb, Schienen braungelb, Schienenendsporne und Tarsen schwarzbraun. Schienenendspitzen der Mittel- und Hinterbeine schwarz. Enddrittel des Hinterschenkels schwarzbraun. Basaldrittel des 1. Hintertarsengliedes hell ockergelb. Halteren braun, Stiel hell ockergelb. Flügel hyalin, ziemlich dunkel rauchbraun. Adern dunkelbraun. Membran sehr lebhaft in allen Farben irisierend.

Körperlänge 2,8 mm.
Flügellänge 2,7 mm.
Fühlerlänge ca. $1\frac{1}{4}$ mm.
Thorakallänge 1,2 mm.
Abdominallänge 1,8 mm.
Länge des Hinterschenkels 1,5 mm.
„ der Hinterschiene 1,8 mm.
„ des Hintertarsus 2 mm.

Fundort. Seychellen. Mahé: Cascade Estate, 800—1500 Fuss, Januar bis März 1909, 1 ♂.

Type im Museum zu London.

Platurocypta, nov. gen. (Fig. 5.)

Typus: *Pl. limbatifemur*, nov. spec. (Seychellen).

Dieses Genus unterscheidet sich von *Epicypta* Winn. 1863 durch den stark dorsoventral abgeplatteten Hinterleib (bei dieser lateral zusammengedrückt).

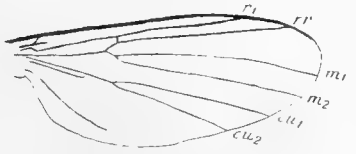
Nur 2 sehr kleine Ocellen sind erkennbar, die dicht am Augenrand liegen.

14. *Platurocypta limbatifemur*, nov. spec. (Fig. 5.)

♂♀ Kopf gross, unten abgeplattet, so breit wie der Thorax, dicht dem Thorax anliegend. Scheitel lang und breit, Schläfen lang; beide poliert glatt und ziemlich dicht

mit sehr feiner und kurzer Pubescenz besetzt, die nach vorn zu gekämmt ist; am Augenrand einige Borsten. Die beiden Ocellen sehr klein, dicht am Augenrand, ziemlich gewölbt. Augen nicht gross, rundlich, mit sehr feiner Pubescenz. Fühler länger als Kopf und Thorax zusammen, 1. Glied fast 3-mal so lang, 2. $1\frac{1}{4}$-mal so lang wie dick, beide oben am Ende mit einem Büschel längerer Haare, besonders das 1.; Geissel gleichmässig dick, erst an der Spitze schwach zugespitzt, die 14 Geisselglieder schliessen dicht aneinander, so dass sie ziemlich schwer einzeln erkennbar sind; jedes Geisselglied ca. $1\frac{1}{4}$-mal so lang wie breit. Palpus lang und ziemlich schlank.

Fig. 5.



Platurocypta limbatifemur Enderl. Flügel. Vergr. 20 : 1.

Thorax $2\frac{1}{4}$-mal so lang wie hoch und $2\frac{1}{2}$-mal so lang wie breit; poliert glatt, ziemlich dicht, sehr fein und kurz pubesciert. Scutellum breit und mässig lang, Hinterrand gleichmässig gerundet und mit 4 langen Borsten; flach auf dem am Ende des Scutellum steil abfallenden Postscutellum liegend. Abdomen flach, besonders oben, mässig breit, poliert glatt, ziemlich dicht und ziemlich kurz pubesciert; nach hinten und vorn zu etwas verschmälert, besonders nach hinten zu. Sexualorgane im relativ grossen letzten (6.) Segment verborgen, die Cerci des ♀ sehr dünn und schlank (gelblich) und ragen ein wenig hervor. Coxen mässig breit, die vorderen etwas schmäler und kürzer, die hinteren etwas länger als die mittleren. Hinterschenkel gross und breit, Vorderschiene oben mit einer sehr kurzen Borste, Mittel- und Hinterschenkel oben mit 2 Reihen langer kräftiger Borsten, Mittelschenkel unten ausserdem mit 3 Borsten längs des mittleren Drittels, die 2 vordersten sehr lang, etwa $\frac{3}{4}$ der Länge des Tibienspornes. Längerer Hintertibiensporn $1\frac{1}{4}$ der Länge des 1. Tarsengliedes. Fussbörstchen dicht und lang.

Flügel mässig breit. r_1 und rr völlig gerade und sehr schwach divergierend; Zelle R_1 mässig schmal. Radialgabelstiel $\frac{2}{3}$ der Querader zwischen rr und m. Cubitalgabelung genau unter der Mediangabelung. Die Costa reicht bis zum Ende des 2. Fünftels der Entfernung zwischen rr und m_1.

Kopf und Augen schwarz, Ocellen gelb, Pubescenz grau, Gesicht rostbraun. Fühler hell graubraun, die 4—6 ersten Glieder ockergelb. Thorax schwarz, Pubescenz braun, Borsten schwarz. Abdomen schwarz, Pubescenz dunkelbraun. Beine mit den Coxen hell ockergelb, Borsten schwarz; der ziemlich stark gebogene obere Rand der Hinterschenkel schmal schwarz gesäumt. Tarsen braun, Behaarung schwarz. Tibienendsporne schwarzbraun. Halteren gelblich weiss. Flügel grau hyalin, Vorderrandsaum etwas dunkler grauschwärzlich. Adern dunkelbraun, c, r_1 und rr schwärzlich. Flügel intensiv besonders blau bis rotviolett irisierend.

Körperlänge 2,4—3 mm.
Flügellänge 2,1—2,7 mm.
Fühlerlänge 1,1 mm.

Thorakallänge 1,2—1,3 mm.
Abdominallänge 1,6—1,8 mm.
Länge des Hinterschenkels 1 mm.
„ der Hinterschiene 1,2 mm.
„ des Hintertarsus 1,6 mm.

Fundorte. Seychellen. Silhouette: Mare aux cochons und Sumpf in der Nähe davon, August 1908, 1 ♀; Ebene von Mare aux cochons, ca. 1000 Fuss hoch, September 1908, 1 ♂. Mahé: Hochwald von Morne Blanc und Pilot, Oktober bis November 1908, 1 ♂; Cascade Estate, 800—1500 Fuss hoch, Oktober 1908 bis März 1909, 3 ♂, 2 ♀, gesammelt von H. P. Thomasset und H. Scott.

Platyprosthiogyne, nov. gen. (Fig. 6.)

Typus: *Pl. metameromelina,* nov. spec. Seychellen.

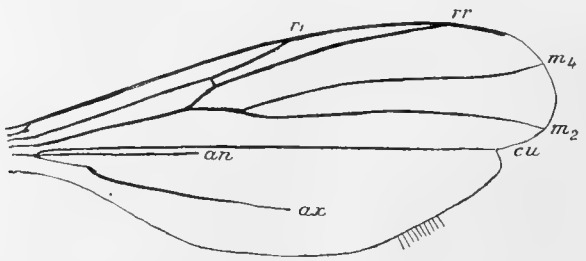
Geäder ähnlich wie bei *Zygomyia* Winn. 1863, nur geht die Costa weit über den Radialramus (*rr*) hinweg, der Flügelrand ist am Ende von *cu* stark ausgeschnitten und r_1 ist etwas kürzer.

Fühler 2 + 14-gliedrig. Palpen lang und schlank. Nur 2 Ocellen dicht am Augenrand. Kopf nach unten gedrückt. Abdomen stark dorsoventral zusammengedrückt. Das 3., 4. und 5. Glied des Vordertarsus beim ♀ mässig stark seitlich zusammengedrückt und etwas verbreitert.

Eine sehr kleine Species.

Sceptonia Winn. 1863 unterscheidet sich von dieser Gattung durch folgendes. Radialramus (*rr*) gebogen, die Zelle R_1 schmal, Flügelrand unausgeschnitten, 3 Ocellen. Abdomen lateral zusammengedrückt. Vordertarsus des ♀ nicht verbreitert.

Fig. 6.



Platyprosthiogyne metameromelina Enderl. Flügel. Vergr. 40 : 1.

15. *Platyprosthiogyne metameromelina,* nov. spec. (Fig. 6).

♂♀. Kopf etwas länger als breit, und so breit wie der Thorax, etwas flach gedrückt; er kann nach unten herumgeklappt werden und legt sich dann dicht dem Thorax an. Die beiden Ocellen klein und flach, nicht sehr deutlich, dicht am Augenrand. Augen nicht gross, rundlich, microscopisch kurz pubesciert. Scheitel lang und breit, poliert glatt, mit ganz vereinzelten kurzen Härchen. Schläfen sehr lang, poliert glatt, spärlich behaart. Wangen fehlen; die Unterseite des Kopfes eben, mit scharfen Seitenrändern, die an den Schläfen eine scharfe Kante bilden und den Augenunterrand tangieren. Gesicht sehr kurz und ziemlich breit. Fühler so lang wie das Abdomen, lang, mässig

dünn, Geissel gleichmässig dick, nicht zugespitzt. 1. Basalglied fast doppelt so lang wie breit, 2. so lang wie breit und am Ende oben mit einigen längeren Haaren; Geisselglieder im Basaldrittel ca. $2\frac{1}{2}$, in der Mitte ca. 2, im Enddrittel ca. $1\frac{1}{2}$-mal so lang wie breit, 16. Glied (Endglied) $2\frac{1}{2}$-mal so lang wie breit. Palpen lang und schlank.

Thorax doppelt so lang wie hoch und $2\frac{1}{4}$-mal so lang wie in der Mitte breit; poliert glatt und mit sehr dünner und kurzer Pubescenz mässig dicht bedeckt. Scutellum mässig gross, halbkreisförmig, Hinterrand mit 2 langen Borsten; dicht auf dem Postscutellum liegend und dieses verdeckend. Abdomen poliert glatt, beim ♀ stark dorsoventral zusammengedrückt und etwas verbreitert, beim ♂ wenig stark und nicht verbreitert. Die männlichen Genitalien verborgen, das weibliche Legerohr aus dem kräftigen letzten (6.) Segment hervorragend und sehr zart mit winzigen Cercis. Coxen sehr gross und breit, Vordercoxen sehr schmal und schlank, kaum kürzer als die übrigen. Schenkel zart und schlank, Hinterschenkel lang, kräftig und etwas verbreitert. Mittelschiene oben mit einigen sehr kurzen Borsten, die nicht länger sind als der Schienendurchmesser, Hinterschiene oben mit 2 Reihen langer kräftiger Borsten, die innere mit 3 die äussere mit 6 Borsten. Längerer Hintertibienendsporn so lang wie das 1. Tarsenglied. 2.—4. Vordertarsenglied beim ♀ seitlich zusammengedrückt und etwas verbreitert. Fussbörstchen dicht und lang.

Flügel schlank. Zelle *R* sehr schmal und schlank. Zelle R_1 relativ breit. *rr* fast 3-mal so lang wie r_1. Mediangabelstiel $1\frac{2}{3}$ der Querader zwischen *m* und *rr*; letztere fast 3-mal so lang wie der Basalabschnitt von *rr*. Mediangabel am Ende stark verbreitert. *cu* völlig gerade. Randeinschnitt am Ende von *cu* kräftig. *an* kurz, *ax* ziemlich lang. Randbehaarung relativ lang. Die Costa geht über die Mitte der Entfernung zwischen *rr* und m_1 ein Stück hinweg. Adern ziemlich gleichmässig dick, m_1, m_2 und *cu* am Ende etwas verdünnt. Kopf, Augen und Ocellen tief schwarz, Pubescenz grau. Fühler braun, die 6 ersten Glieder hell ockergelb, Pubescenz dicht und grau. Thorax und Abdomen tief schwarz, Pubescenz graubraun. Coxen hell ockergelb, Basalviertel der Mittelcoxen und Basaldrittel der Hintercoxen schwarz. Trochanter und Schenkel hell ockergelb, Hinterschenkel mit Ausnahme des Basaldrittels schwarz. Schienen bräunlich gelb, Tarsen und Tibienendsporne braun. Halteren lebhaft gelblich weiss. Flügel grauhyalin, Vorderrandsaum in $\frac{1}{3}$ der Flügelbreite mit Ausnahme des Spitzenviertels dunkelbraun (Grenze nicht sehr bestimmt), ein schmaler Saum an der Vorderseite von *ax* braun. Membran ausserordentlich lebhaft in allen Farben, an der Flügelspitze blau bis violett irisierend.

Körperlänge 2,1—2,2 mm.
Flügellänge 1,7 mm.
Fühlerlänge 1,4 mm.
Thorakallänge 0,9 mm.
Abdominallänge 1,3 mm.
Länge des Hinterschenkels 0,9 mm.
„ der Hinterschiene 0,9 mm.
„ des Hintertarsus 1,3 mm.

Fundorte. Seychellen. Mahé: Cascade Estate, 800 Fuss hoch und mehr, Oktober 1908 bis März 1909, 2 ♂ und 3 ♀, gesammelt von H. P. Thomasset und H. Scott.

Mycetophila Meig. 1804.

16. *Mycetophila seychellensis*, nov. spec.

♂♀. Kopf so breit wie die Thoraxmitte ; lang. Scheitel lang, poliert glatt, Pubescenz fast fehlend. Schläfen sehr breit. Kopfunterrand scharf und stutzt den Augenunterrand breit ab. Gesicht so lang wie vorn breit, nach vorn schwach verbreitert. Ocellen sehr klein, dicht am Augenrand. Erstes Fühlerglied doppelt so lang wie breit, 2. $1\frac{1}{4}$-mal so lang wie breit, beide oben am Ende behaart, 2. mit einer längeren Borste ; Geissel im Enddrittel allmählich zugespitzt ; 1. und 2. Glied $1\frac{1}{3}$ so lang wie breit, die übrigen doppelt, das letzte 3-mal so lang wie breit. Palpus mässig schlank.

Thorax 2-mal so lang wie hoch, $2\frac{1}{4}$-mal so lang wie breit, stark gewölbt, poliert glatt, sehr kurz und dicht pubesciert, hinten mit 6 Borsten. Scutellum breit halbkreisförmig, Hinterrand mit 4 sehr langen Borsten. Die Unterseite liegt dicht auf der oberen Seite des kegelförmig zugespitzten Postscutellums, das unter dem Hinterende des Scutellums spitz endet und dann hoch überhängend abfällt. Metapleure wenig erhaben. Abdomen dicht und kurz behaart. Anhänge des ♂ lang und sehr dünn, meist zum Teil herausragend, die Cerci des ♀ sehr gedrungen und meist verborgen. Coxen lang und sehr breit, Vordercoxe etwas kürzer. Hinterschenkel stark verbreitert. Vorderschiene oben mit einigen kurzen Borsten, Mittel- und Hinterschiene oben mit 2 Reihen langer Borsten ; Mittelschiene unten in der Mitte mit 2 sehr langen Borsten, davor eine kürzere. Längerer Hinterschienenendsporn so lang wie das 1. Tarsenglied. Fussbörstchen lang und dicht.

Stiel der Mediangabel sehr kurz, so lang wie die Querader und wie der Basalabschnitt von *rr*. Cubitalgabelung ziemlich weit proximal von der Mediangabelung. r_1 und *rr* schwach gebogen. Zelle R_1 sehr schmal und sehr wenig divergierend. Medianäste fast parallel.

Kopf und Augen schwarz, Ocellen gelblich braun. Fühler hell ockergelb, Spitzenhälfte braun. Gesicht matt braun. Thorax schwarz, Pubescenz gelblich grau, Borsten dunkelbraun. Abdomen schwarz, Pubescenz gelbbraun, männliche Genitalanhänge hell ockergelb, die weiblichen hell bräunlich gelb. Beine mit den Coxen hell ockergelb, Schienen bräunlich ockergelb, Tarsen gelbbraun, Tibienendsporne braun ; Borsten schwarz. Halteren hell ockergelb. Flügel bräunlich hyalin, Vorderrandsaum ein wenig dunkler, Flügelwurzel hell ockergelb. Adern dunkelbraun. Membran sehr lebhaft in allen Farben irisierend.

Körperlänge 2,5—2,9 mm.
Flügellänge 2,3—2,4 mm.
Fühlerlänge 1,2 mm.
Thorakallänge 1,1 mm.
Abdominallänge 1,9—2,1 mm.
Länge des Hinterschenkels 0,9 mm.
„ der Hinterschiene 1,2 mm.
„ des Hintertarsus 1,7 mm.

Fundorte. Seychellen, 8 ♂, 3 ♀. Silhouette: Wald oberhalb von Mare aux Cochons, 1400—2000 Fuss, September 1908, 3 ♂, 1 ♀. Mahé: Hochwald in der Nähe von Morne Blanc, Oktober bis November 1908, 1 ♂; Wald von ziemlich verkrüppelten Capucin-Bäume (*Northea*), Gipfel von Montagne Anse Major, 2000 Fuss hoch, 1. Februar 1909, 1 ♀; Cascade Estate, 800—1500 Fuss hoch, Januar bis März 1909, 4 ♂, 1 ♀.

17. *Mycetophila collaris*, nov. spec.

♂♀. Diese Species ist der *M. seychellensis* ähnlich und unterscheidet sich von ihr durch einen mässig breiten ockergelben Vorderrandsaum am Rückenschilde und durch die ockergelbe Unterseite des Abdomen. Der längere Hintertibiensporn ist eine Spur länger als das 1. Tarsenglied. Körpergrösse durchschnittlich grösser.

Körperlänge bis 3,2 mm.
Flügellänge bis 2,7 mm.

Fundorte. Seychellen, 15 ♂, 1 ♀. Silhouette: Mare aux Cochons, September 1908, 1 ♂; Wald oberhalb von Mare aux Cochons, 1400—2000 Fuss, September 1908, 2 ♂. Mahé: Cascade Estate, 800 Fuss und höher, Oktober 1908 bis März 1909, 5 ♂, 1 ♀. Umgebung von Mare aux Cochons, ungefähr 1500 Fuss, 26. Januar bis 2. Februar 1909, 3 ♂; Moor an der Küstenebene bei Anse aux Pins und Anse Royale, 12.—21. Januar 1909, 3 ♂.

18. *Mycetophila luridiceps*, nov. spec.

♂♀. Diese Species unterscheidet sich von *M. seychellensis* durch folgendes: Fast das ganze vordere Viertel des Rückenschildes ockergelb. Der ganze Kopf ockergelb. Die Unterseite des Hinterleibes, dreieckige Flecke vorn an den Seiten der Tergite und zuweilen auch diese verbindende schmale Vorderrandsäume auf allen Tergiten ockergelb. Wesentlich grösser.

Körperlänge 3,2—3,5 mm.
Flügellänge 2,7—2,8 mm.
Fühlerlänge $1\frac{1}{4}$ mm.
Thorakallänge 1,3 mm.
Abdominallänge 2,2—2,3 mm.
Länge des Hinterschenkels 1,2 mm.
„ der Hinterschiene 1,2 mm.
„ des Hintertarsus 1,9 mm.

Fundorte. Seychellen, 1 ♂, 6 ♀. Silhouette: Wald oberhalb von Mare aux Cochons, ungefähr 1400—2000 Fuss, September 1908, 3 ♀. Mahé: Cascade Estate, 800—1500 Fuss, Januar bis März 1909, 1 ♂, 3 ♀.

No. VI.—ISOPODA FROM THE INDIAN OCEAN AND BRITISH EAST AFRICA.

By the Rev. Thomas R. R. Stebbing, M.A., F.R.S., F.L.S., F.Z.S., *Hon. Fellow of Worcester College, Oxford, and Hon. Memb. New Zealand Institute.*

(Plates **5—11.**)

Read 16 December, 1909.

In two of the earlier reports specimens collected by Mr Cyril Crossland in British East Africa have been discussed in combination with those obtained by Mr Stanley Gardiner from the Indian Ocean in 1905. This procedure, in itself by no means unsatisfactory, I am following not quite by intention. The report on Mr Crossland's Isopoda from the Red Sea was already out of my hands before I became aware that specimens which he had collected on a previous expedition at Zanzibar and Wasin in 1901—2 were included with those due to the voyage of the "Sealark." Though the distances are considerable between some of the collecting stations of the three expeditions, there is probably little to interfere with the wide distribution either of the free-swimming Isopoda or of those partially parasitic on fishes. It is reasonable, therefore, when circumstances permit it, to group together in a single survey the gatherings from the extensive area with which these exploring agencies have been concerned.

Only four out of the thirty-four species here under discussion are of relatively important size. Many of them are rather perplexingly small. Several are represented in the collections by single specimens.

The diversity, however, is not only specific, seeing that they are spread over five tribes, thirteen families, and no fewer than twenty-nine genera. Four of the genera and fourteen of the species are set forth as new. Among these *Kalliapseudes makrothrix* from Wasin, *Pontogelos aselgokeros* from Mauritius, representatives of new genera, and the new species *Apanthura xenocheir* from Egmont Reef, have rather striking peculiarities which will repay attention.

Besides the Isopoda Mr Crossland's collection included one gathering of Leptostraca. At Wasin from a depth of ten fathoms he obtained six specimens of *Paranebalia longipes* (v. Willemoes Suhm). By Professor Sars in the "Challenger" Reports, vol. xix., 1887, and by Dr J. Thiele in the "Valdivia" Reports, vol. viii., 1904, this member of the family Nebaliidæ has been treated with admirable fullness of description and illustration. As the Wasin specimens comprised none of the rare males, there is no need here to add anything further to the literature of the subject.

ISOPODA ANOMALA.

Tribe *CHELIFERA.*

Family **Apseudidæ.**

	Collected at	By
Apseudes sp. ? juv., p. 85.	Wasin.	Crossland.
Kalliapseudes, n. g., p. 86.		
Kalliapseudes makrothrix, n. sp., p. 86, pl. **5**.	Wasin.	Crossland.
Parapseudes hirsutus, n. sp., p. 89, pl. **6** B.	Egmont Reef.	Gardiner.

Family **Tanaidæ.**

Heterotanais anomalus (?) Sars, p. 90.	Zanzibar.	Crossland.

ISOPODA GENUINA.

Tribe *FLABELLIFERA.*

Family **Anthuridæ.**

Cyathura pusilla juv. (?) Stebbing, p. 91.	Wasin.	Crossland.
Calathura sladeni, n. sp., p. 91, pl. **7** A.	Cargados Carajos and Saya de Malha.	Gardiner.
Apanthura xenocheir, n. sp., p. 94, pl. **7** B.	Egmont Reef.	Gardiner.

Family **Eurydicidæ.**

Eurydice truncata (Norman), p. 95.	S. of Saya de Malha Bank.	Gardiner.
Eurydice humilis, n. sp., p. 96, pl. **8** A.	Off Salomon Atoll.	Gardiner.
Pontogelos, n. g., p. 97.		
Pontogelos aselgokeros, n. sp., p. 97, pl. **8** B.	Mauritius.	Gardiner.
Cirolana minuta, Hansen, p. 98.	Praslin Reef, Coetivy, Diego Garcia.	Gardiner.

Family **Corallanidæ.**

Alcirona maldivensis, Stebbing, p. 99.	Cargados Carajos.	Gardiner.

Family **Argathonidæ.**

Argathona reidi, n. sp., p. 100, pl. **9** A.	Zanzibar.	Crossland.

Family **Ægidæ.**

Æga ommatophylax, Stebbing, p. 101, pl. **9** B.	Mauritius.	Gardiner.
Rocinela orientalis, Schiödte and Meinert, p. 101.	Zanzibar.	Crossland

Family **Cymothoidæ.**

Nerocila trichiura (Miers), p. 102.	Great Chagos.	Gardiner.
Cymothoa eremita (Brünnich), p. 102.	Zanzibar.	Crossland.
Meinertia carinata (Bianconi), p. 103.	Seychelles.	Gardiner.

Family **Sphæromidæ.**

Cymodoce pubescens (Milne-Edwards), p. 104.	Zanzibar, Wasin.	Crossland.
Cymodoce zanzibarensis, n. sp., p. 105, pl. **9** D.	Zanzibar, Wasin.	Crossland.
Cymodoce bicarinata, Stebbing, p. 106.	Zanzibar.	Crossland.
Cilicœa latreillii, Leach, p. 106.	Wasin.	Crossland.
Paracilicœa, n. g., p. 106.		
Paracilicœa hanseni, n. sp., p. 107, pl. **9** C.	Zanzibar.	Crossland.

Tribe *VALVIFERA*.

Family **Idoteidæ**.

	Collected at	By
Idotea metallica, Bosc, p. 108.	Between Saya de Malha and Coetivy.	Gardiner.

Tribe *ASELLOTA*.

Family **Jæridæ**.

Janira crosslandi, Stebbing, p. 108, pl. **6** A.	Egmont.	Gardiner.

Family **Stenetriidæ**.

Stenetrium chiltoni, Stebbing, p. 110.	Amirante.	Gardiner.

Tribe *EPICARIDEA*.

Family **Bopyridæ**.

Kepon halimi, n. sp., p. 112, pl. **10** C.	Cargados Carajos.	Gardiner.
Dactylokepon, n. g., p. 113.		
Dactylokepon richardsonæ, n. sp., p. 113, pl. **11** C.	Seychelles.	Gardiner.
Dactylokepon catoptri, n. sp., p. 113, pl. **10** B.	Amirante.	Gardiner.
Trapezicepon amicorum (Giard and Bonnier) with parasite, p. 114, pl. **11** B.	Amirante.	Gardiner.
Ergyne savignyi, n. sp., p. 115, pl. **10** A.	Cargados Carajos.	Gardiner.
Cancricepon sp., p. 116.	Amirante.	Gardiner.
Gigantione rathbunæ, n. sp., p. 117, pl. **11** A.	Salomon Atoll.	Gardiner.
Cryptoniscian larvæ, pp. 97, 115.	Off Salomon Atoll and Amirante.	Gardiner.

LEPTOSTRACA.

Family **Nebaliidæ**.

Paranebalia longipes (v. Willemoes Suhm) Preface.	Wasin.	Crossland.

Tribe *CHELIFERA*.

Family **Apseudidæ**.

1880. Apseudidæ, Sars, Arch. Naturv. Christian., vol. vii., p. 6.

1886. Apseudidæ, Sars, Arch. Naturv. Christian., vol. xi., p. 265.

1886. Apseudidæ, Norman and Stebbing, Trans. Zool. Soc. London, vol. xii., pt. 4, p. 77.

1895. Apseudidæ, Hansen, Plankton Exp., Tanaidacea, vol. ii., G. c., p. 49.

1896. Apseudidæ, Sars, Crustacea of Norway, vol. ii., p. 5.

1901. Apseudidæ, Whitelegge, Mem. Australian Mus., vol. iv., pt. 3, p. 204.

1905. Apseudidæ, H. Richardson, Bull. U.S. Nat. Mus., No. 54, p. 37.

Gen. *APSEUDES*, Leach.

1814. *Apseudes*, Leach, Edinb. Encycl., vol. vii., p. 404.

1. *Apseudes* sp. ?juv.

At Wasin from a depth of ten fathoms Mr Crossland obtained a specimen of this genus only 2 mm. in length. The important first gnathopods were unfortunately missing

and the uropods imperfect. The outer branch of the latter in being four-jointed agrees with Hansen's description of his *Apseudes intermedius*, though his figure represents this branch as five-jointed. The Wasin species has the telsonic segment parallel-sided, without the two blunt processes on each side that occur in Hansen's species. Our specimen has a six-jointed flagellum to the second antennæ, and respectively one, three, and four spines on the fourth, fifth, and sixth joints of the second gnathopods. Hansen founded his species on two female specimens with half developed marsupium, their length being 2·3 mm., flagellum of second antennæ four-jointed, spines one, two, and four on the above-named joints of the second gnathopods. Though the very small size suggests specific identity between the Cape Verde specimens and the present form from East Africa, details of structure do not warrant their union.

KALLIAPSEUDES, n. g.

Plumose setæ extensively developed on large fourth joint of second antennæ, on fifth joint of first gnathopods, and on palps of mandibles and maxillipeds. Maxillipeds with the terminal sixth joint the longest. Finger of second gnathopods not apically narrowed, its round end encircled by setæ. Fingers of first and second peræopods very elongate, curved, acute, of third and fourth short, straight, apically blunt, of fifth like those of the first and second pairs, but much shorter. Pleopods with inner ramus much longer and broader than the outer.

The generic name is compounded of κάλλος, beauty, and *Apseudes*, the designation of the closely allied genus, from which it is however strikingly distinguished by the group of characters above given. It is possible that others may be added, whenever opportunity offers for a more satisfactory examination of the mouth-organs, but the palps of the maxillipeds are of themselves sufficient to mark a new genus.

2. *Kalliapseudes makrothrix*, n. sp. (Plate **5**.)

Cephalic segment areolated, front obtuse, lateral angles without eyes or separated eye-lobes. Penultimate and antepenultimate segments of peræon the longest, pleon not much narrower than peræon, its first five segments with rounded setiferous lateral margins, these and the peræon segments furnished each with a medio-ventral spine. The telsonic segment broader than long, the lateral margins convex to the insertion of the uropods, then narrowing to a bluntly triangular area, a little more than a third of the total length.

First antennæ. The large first joint more than twice as long as the two successively smaller following joints combined; flagellum not more than half as long as peduncle, its first joint common to the two flagella, but more produced on the inner than the outer side, the outer flagellum with six, the inner with three, additional joints.

Second antennæ. These just reach the flagella of the first pair, by the broad bases of which their peduncles are almost completely concealed. The first joint is produced on the inner side to a setiferous process, possibly an epipod in coalescence. A corresponding process is found in some species of *Apseudes*, but apparently less developed than here. The second joint, broader than long, has on the outer side a narrow exopod bearing four

setæ. The third joint is extremely short, while the fourth is exceptionally long and provided with a fringe of very long plumose setæ, the fifth joint is short, and might pass for a member of the five-jointed flagellum, which by its help would just equal the length of the fourth joint of the peduncle.

The mandibles proved to be exceedingly brittle, but most of their characters could be made out. They have the long narrow trunk and strongly projecting molar as in *Apseudes*. Each has a pellucid curved strap-like plate, strongly projecting and carrying apically four to five spines, representing the spine-row. Between this and the stout dentate cutting edge one mandible has a delicate slightly denticulate accessory plate, which is not represented on the other mandible, where the cutting edge is surmounted by a rather conspicuous tooth on the upper margin. The palp, which is a very distinctive feature, was unfortunately in each case broken, so that the jointing remained obscure. Possibly there is a coalescence of the first and second joints, with a third joint about half the length of these two combined. In any case the palp is very large and closely fringed on the inner margin with very long plumose setæ, a feature not found in other members of the family.

The first and second maxillæ were not very clearly made out, except as regards the outer plate, which in each is distally widened, in the first maxillæ carrying some eleven short apical spines, in the second short apical setæ.

The maxillipeds are six-jointed, with a large epipod, the plate of the second joint fringed on the inner and distal margin with short spines, the third joint short, the three following rather long, successively longer and all three closely fringed with long plumose setæ, the longest at the apex of the last joint. The latter characters make these appendages apparently unique in this family, so far as at present known.

The first gnathopods are of the usual pattern, the second joint carrying a very small two-jointed setiferous exopod, the third and fourth joints coalesced, short, the fifth very long, fringed with closely set plumose setæ of great length, an exceptional feature, the two following joints forming a chela, with the thumb broader than the movable finger, their acute apices crossing when their straight denticulate inner margins are closed together. The front margin of hand and finger is convex, and near to that of the hand there is an open fringe of plumose setæ. Hind margin of hand sinuous.

Second gnathopods stouter than first; exopod of the stout second joint apparently a single-jointed rudiment, third joint short, fourth nearly as long and stout as the second, fifth short, with two stout spines on hind margin, sixth joint shorter than fifth, broader than long, with four stout spines on hind margin and one on apex of front, these spines being minutely pectinate on both edges; the finger nearly as long as the hand, slightly curved, broader at the rounded apex than at the pellucid base, and apically surrounded by a bush of setiform spines or spiniform setæ, presenting as a whole a very singular character.

First and second peræopods closely alike, distinguished from the others by the great length of the slender, curved finger, which is twice as long as the sixth joint, that and the bulkier fifth having each four conspicuous but slender spines on the hind margin.

Third and fourth peræopods closely alike, the finger narrow, straight, blunt-ended,

less than half as long as the sixth joint, tipped with a spine and setæ; the sixth joint as long as the fifth, carrying various spines chiefly on the distal half, and having on the outer margin near the base the plumose cilium spoken of by Professor Sars as an auditory appendage characteristic of these limbs; high up on the outer margin of the second joint there are two similar but much smaller cilia.

Fifth peræopods. These have the finger shaped as in the first and second pairs, but very much shorter, with a little distinct nail preceded by a setule; the sixth joint, scarcely so long as the finger and shorter than the preceding joint, has four conspicuous curved spines on the inner margin, which is fringed with a row of spinules.

The five pairs of pleopods are uniform in character, the second joint of the peduncle having its inner margin and the branches of their free margins, except the broad base of the inner one, fringed with plumose setæ; the outer branch not longer than the peduncle, but the inner much longer and broader than either, with a long plumose spine, bent at the base and tipped with two setules, issuing from the top of the inner margin.

The uropods have a peduncle reaching the end of the telsonic segment, supporting a short slender three-jointed ramus, of which the first two joints are very small, and a long inner ramus of twenty-two joints varying in length and all together about equal to the length of the pleon.

The specimen, not including antennæ or uropods, measured 5·25 mm. in length.

Locality. Wasin, E. Africa, 10 fathoms, mud.

The specific name, from the Greek μακρόθριξ, long-haired, alludes to the luxuriant development of setæ on several of the appendages.

Along with this specimen there was an *Apseudes*, 2 mm. long, and a *Cyathura*, 3 mm. long, both probably not adult.

Gen. *PARAPSEUDES*, Sars.

1880. *Parapseudes*, Sars, Arch. Naturv. Christiania, vol. vii., p. 16.
1886. *Parapseudes*, Sars, Arch. Naturv. Christiania, vol. xi., p. 303.
1905. *Parapseudes*, H. Richardson, Bull. U.S. Nat. Mus., No. 54, p. 47.

The earlier forms assigned to this genus are the little *P. latifrons* (Grube), scarcely more than 3 mm. long, from the Mediterranean, and *P. goodei*, Richardson, of which the length is not mentioned, from Bermudas. It is said to have a close resemblance to Grube's species.

In the amended definition of 1886 Sars gives the following characters:—Body short, depressed, broadest anteriorly. Carapace without definite sculpture; rostral lamina not delimited at the base. Eye-lobes definitely separated, with well developed visual elements. First antennæ with the two flagella subequal in length; the second with the lamellar appendage very small. Mandibular palp very small and sparingly furnished with setæ. Chelipeds about as in *Apseudes*, but scarcely differing in the two sexes. Fossorial feet [second gnathopods] with coxal joint simple, lamellar, without process. Peræopods comparatively very strongly developed, not very different from the fossorial feet, and, like these, armed with numerous strong spines on the inner margin. Pleon with only four

pairs of pleopods, these having the outer branch two-jointed; the fifth segment without appendages. The uropods as in *Apseudes*.

The principal change consists in the omission of the statement that the first and second gnathopods were devoid of a rudimentary epipod, Sars having found on renewed investigation that these rudiments were in fact present in the new genus as in the old.

The specimen now to be described is unfortunately devoid of the first gnathopods, and the presence of a rudimentary epipod on the second could not be definitely determined. The solitary specimen at command was still smaller than *P. latifrons*, which Sars speaks of as the least member of the present family, and this minuteness has left me uncertain whether the characters of the pleopods suit the requirements of the genus. I think that they do so, at least in regard to the fifth pair being absent. The agreement of the armature of the first and second peraeopods with that of the second gnathopods is well marked.

3. *Parapseudes hirsutus*, n. sp. (Plate **6** B.)

Head with rostral lamina produced into an apical point and slightly delimited at the base. General shape strongly tapering from broad head to narrow pleon. First five segments of pleon very short, first overlapped by lateral corners of last peræon segment, second and fifth horizontally produced into small lateral processes, the telsonic segment widened near the base, below the tuberculiform widening descending squarely to the insertion of the uropods, the remainder forming an equilateral triangle which reaches the end of the peduncle of the uropods. Three pairs of plumose setæ are arranged on the back of this segment, the whole animal being dorsally decorated with such setæ in a very conspicuous manner.

The first antennæ have a long setose first joint, followed by two short ones; the principal flagellum of seven joints and the not much shorter accessory of five joints are not nearly so long as the peduncle. The first joint of the principal flagellum is apparently in coalescence with that of the accessory, which in turn is not very distinctly marked off from the next following joint. The much shorter second antennæ are wide apart, being inserted just under the first pair. They have a small narrow scale or exopod on the second joint; the three-jointed flagellum is much shorter than the peduncle. The eyes are dark, the lobes ending in a pointed apex.

The mouth-organs, as will be seen by the figures, are in substantial agreement with those known for the genus *Apseudes*. The mandibular palp shows no falling off in setose armature, and the second joint is unusually broad. Between the palp and the cutting edge of the mandible the upper or outer margin shows a fine denticulation. On one member of the pair the cutting edge and the accessory plate are equal.

The second gnathopods have four stout spines on the inner margin of the fifth joint and six on that of the sixth joint; upon the apex of this joint there are some microscopically serrate spines.

The first two peræopods are very similar in their armature to the second gnathopods. In the three following pairs the strength of the marginal spines is less conspicuous, but

about the apex of the sixth joint in the third peræopods the serrate spines are more numerous. The third and fourth pairs have a minute character bringing the species into accord with *P. latifrons*. In that species Professor Sars notices, in speaking of the third and fourth peræopods, that "the auditory cilium characteristic of these feet is inserted in advance of the middle of the sixth joint's outer margin and less strongly developed than in the genus *Apseudes*." His figures of the third peræopod of *Apseudes robustus* show that the cilium in question is there very near the base of the joint. In our *Parapseudes* it will be seen that, though varying in position on the different limbs, it is always at a considerable distance from the base of the sixth joint.

The presence of the pleopods could not be made out.

Both branches of the uropods appear to begin with an ill-defined minute joint, perhaps only a cuticular fold, followed in the inner branch by eight unequal but fairly long joints, and in the outer by three such joints, most of the joints carrying long setæ.

Length, in bent position, 2 mm. Hansen's *Apseudes intermedius* measured 2·3 mm., for females with half-developed marsupium, therefore perhaps not full-grown. Our specimen contained eight large eggs in the marsupium, and was probably fully adult. It resisted efforts to straighten it out for exact measurement.

Locality. Egmont, breakers on reef edge.

The specific name alludes to the prominence of its setose furniture.

Fam. **Tanaidæ.**

Gen. *HETEROTANAIS*, Sars.

1880. *Heterotanais*, Sars, Arch. Naturv. Christian., vol. vii., p. 28.

4. (?) *Heterotanais anomalus*, Sars.

1880. *Heterotanais anomalus*, Sars, Arch. Naturv. Christian., vol. vii., p. 30.

An ovigerous specimen, a little under 2 mm. in length, was taken at Zanzibar by Crossland. As no male accompanied it, the identification with the Mediterranean species can only be regarded as conjectural.

Tribe *FLABELLIFERA*.

Fam. **Anthuridæ.**

1814. Anthuridæ, Leach, Edinb. Encycl., vol. vii., p. 433.

1900. Anthuridæ, Stebbing, Willey's Zoological Results, pt. 5, p. 618.

1901. Anthuridæ, Whitelegge, Mem. Australian Mus., vol. iv., pt. 3, p. 216.

1904. Anthuridæ, Stebbing, Gardiner's Maldive and Laccadive Arch., vol. ii., pt. 3, p. 699.

1904. Anthuridæ, Stebbing, Spolia Zeylanica, vol. ii., pt. 5, p. 8.

1905. Anthuridæ, Stebbing, Herdman's Ceylon Pearl Fish., pt. 4, Rep. 23, p. 8.

1905. Anthuridæ, H. Richardson, Bull. U.S. Nat. Mus., No. 54, p. 62.

Under the last reference and that for 1900 a sufficiently full account will be found of the bibliography of this family.

Gen. *CYATHURA*, Norman and Stebbing.

1886. *Cyathura*, Norman and Stebbing, Trans. Zool. Soc. London, vol. xii., pt. 4, p. 121.

1904. *Cyathura*, Stebbing, Spolia Zeylanica, vol. ii., pt. 5, p. 9.

5. *Cyathura pusilla* ? juv. Stebbing.

1904. *Cyathura pusilla*, Stebbing, Spolia Zeylanica, vol. ii., pt. 5, p. 9, pl. 6 B.

A specimen, measuring only 3 mm. in length, obtained by Mr Crossland at Wasin from ten fathoms depth, fairly agrees with the Ceylon species, except that it has evident dark eyes. It exhibits the organs near the base of the telson described by Thienemann as statocysts (Zool. Anzeig., vol. xxvi., p. 406, figs. 1, 2, 1903). It has, I think, been already pointed out that the species to which they are attributed is not really *Anthura gracilis* (Montagu). In re-examining *Cyathura pusilla* from Ceylon, I find that the dissected specimen now shows them very conspicuously, in full agreement with Thienemann's illustration.

Gen. *CALATHURA*, Norman and Stebbing.

1886. *Calathura*, Norman and Stebbing, Trans. Zool. Soc. London, vol. xii., pt. 4, p. 122.

1887. *Calathura*, H. J. Hansen, Vidensk. Meddel., p. 181.

1897. *Calathura*, Sars, Crustacea of Norway, vol. ii., pt. 3, p. 44.

1900. *Calathura*, Stebbing, Ann. Nat. Hist., ser. 7, vol. v., p. 13.

1901. *Calathura*, Whitelegge, Mem. Australian Mus., vol. iv., pt. 3, p. 225.

1901. *Calathura*, H. Richardson, Proc. U.S. Nat. Mus., vol. xxiii., p. 509.

1901. *Calathura*, Ohlin, Bihang till K. Svenska Vet. Akad. Handl., vol. xxvi., No. 12, p. 17.

1904. *Calathura*, Stebbing, Gardiner's Maldive and Laccadive Arch., vol. iv., pt. 3, p. 700.

1905. *Calathura*, H. Richardson, Bull. U.S. Nat. Mus., No. 54, p. 71.

To the four species of this genus which I distinguished in 1904 should have been added the Australian *C. gigas*, Whitelegge, nearly the largest of all, since it attains a length of 42 mm., while for its northern rival, *C. brachiata* (Stimpson), next to it in size, the greatest length recorded by Hansen in 1887 was 40·5 mm., but in 1901 Ohlin met with a specimen 43 mm. in length. Ohlin regards *C. brachiata* as quite blind, and Whitelegge says of *C. gigas*, "eyes undistinguishable, destitute of pigment." The new species about to be described will not compete with either of these giants in size, and its eyes are beyond dispute. By the shape and much greater length of the masculine appendix in the second pleopods it is well separated from *C. borradailei*, and by the acutely ending telson from *C. crenulata*, Richardson, in which the telson is round-ended.

6. *Calathura sladeni*, n. sp. (Plate **7** A.)

The antero-lateral corners of the head are well rounded, the head itself about two-thirds as long as the first segment of the peræon. The second segment of the peræon is elongate urn-shaped, with a tuft of setæ at each front corner. The fourth, fifth and

sixth segments have setæ at or near the hind corners, the seventh segment is much the shortest. Following upon six distinct, moderately short, pleon segments, the telson is of long narrowly oval form, ending acutely, with serrate distal margins, set with setæ of various lengths, the largest pair not actually at the apex, though near it.

The eyes are dark, round, near the front corners of the head.

The first antennæ form a leading feature, the first joint longer than second and third combined, the third rather longer than the second; the flagellum is composed of nineteen joints, ten of them stout and furnished with a great bush of long hair-like setæ, from which emerges the slender remainder of the lash, carrying short setæ. The second antennæ have a very stout second joint, the next longest being the fifth, which is only half as broad; the moderately setose flagellum of nineteen joints is rather shorter than the peduncle.

The mandibles end in a long simple tooth; the three joints of the palp are nearly equal in length, rather stout, the curved third being bordered with a neat row of about 13 short spines with a long one at the apex.

The lower lip appears to agree very nearly with the description which Whitelegge gives for that organ in the large *Calathura gigas*, where no doubt the details would be more easy to make out. He says, "The lower lip is keeled externally on the proximal half and exhibits a tuft of hairs on either side internally which arise from near the base and reach almost to the apex." In our species the hairs or setæ appear to arise at some distance from the base.

The first maxillæ have the normal character, the lancet-like head widening a little just below the apex and the inner margin forming a dozen teeth to the backward-directed serrature. The second maxillæ were not clearly made out. The maxillipeds have a small epipod adjacent to a slight concavity in the outer margin of the long second joint at its base, this joint being outdrawn on the inner side so as to overlap the first and part of the second joint of the palp. The triangular plate thus formed carries one seta near its apex; the first joint of the palp has four very unequal setæ on its inner margin, and the longer second ten such on its apex.

The first gnathopods have the third joint rather longer than the second but less broad, the fourth almost semicircular, by its transverse position helping the fifth joint to form a wrist, the long massive hand resting upon them, the basal process of its inner margin strongly projecting, and the whole inner margin being closely beset with little spines and longer setæ, the former chiefly planted on the convex border, the latter projecting from lines of origin on the surface. The finger, distally much curved, fits over the convex border into the hollow between this and the basal process.

The second gnathopods have the third joint rather shorter than the second, both slender, the fourth not longer than broad, wrist like, the fifth very small, triangular, under-riding the sixth, which is two and a half times as long as its greatest breadth, fringed on inner margin with long setæ and six well-defined spines, the finger slightly curved, not nearly so long as the hand, ending in a very small nail.

The first peræopods resemble the second gnathopods, but have the fourth joint rather longer, the sixth more slender.

The second to the fifth peræopods agree together in general structure, though the relative lengths of the joints vary a little. The second and fifth pairs are subequal in length, the third and fourth pairs longer than these. All the joints are slender, the fifth longer than the fourth, and neither overlapped by that nor under-riding the sixth; the finger rather short and a little curved. The second pleopods have both branches narrow, equal in length, both distally fringed with plumose setæ, and the inner having the masculine appendix (its second joint) attached at some little distance from the base, but far above the middle, and descending far below the distal border of the first joint, a narrow straight bar as far as the apex which curves slightly inward.

The uropods reach a little beyond the telson, the upper ramus very long, reaching slightly beyond the long peduncular part which supports the inner ramus at its end, a plate about half the length of the peduncle, fringed with plumose setæ.

Length 10 mm.

Localities. Cargados Carajos, from 28 fathoms, and Saya de Malha, from 26 fathoms. At the latter station the specimen obtained is also about 10 mm. long; the eyes larger; the first antennæ without the thickening and hairy furniture of the flagellum, which is eighteen-jointed; second antennæ with flagellum twenty-two-jointed; fifth peræopods notably shorter than the preceding pairs; second pleopods showing no masculine appendix.

The specific name is given out of respect to the memory of the late Percy Sladen.

Gen. *APANTHURA*, Stebbing.

1900. *Apanthura*, Stebbing, Willey's Zoological Results, pt. 5, p. 621.

This genus was defined as follows:

"Pleon with segments distinct. Mouth-organs as in *Anthura*, except maxillipeds, which have a three-jointed palp, of which the middle joint is much the largest. The last four pairs of peræopods, as well as the preceding pairs of peræon appendages, have the fifth joint under-riding the sixth."

From the character of the peræopods, it seems desirable that *Anthelura abyssorum*, Norman and Stebbing, should be transferred, along with *Anthelura affinis*, Richardson, to the present genus. With the original species *Apanthura sandalensis* and the new one about to be described, there will then be four species, distinguishable as follows:

1 { First gnathopods with small finger closing within apical tooth of the sixth joint, 1. *A. xenocheir*, n. sp.
{ First gnathopods without apical tooth to sixth joint, finger conspicuous. 2.

2 { Eyes absent; telson apically subacute. 2. *A. abyssorum* (Norman and Stebbing).
{ Eyes present; telson apically rounded. 3.

3 { First gnathopods with strong hand and finger; upper branch of uropods apically emarginate. 3. *A. sandalensis*, Stebbing.
{ First gnathopods with small hand and short finger; upper branch of uropods not apically emarginate. 4. *A. affinis* (Richardson).

It is possible that the New Zealand species *Anthura affinis*, Chilton, 1882, may be properly referable to this genus, in which case Miss Richardson's species would require to be renamed, but Dr Chilton's species makes a still nearer approach perhaps to *Cyathura carinata* (Kröyer).

7. *Apanthura xenocheir*, n. sp. (Plate **7** B.)

The lateral corners of the head are well rounded; its rostral point is acute. The segments of the peræon are not very elongate, the third, fourth, and fifth longer than the others. The first six segments of the pleon are short, with their lines of separation not by any means conspicuous, partly owing to the pattern of irregular dark brown spots, with which the whole of the back is diversified; the corners of the fifth segment exhibit each an outstanding tuft of five plumose setæ. Eyes round, dark, close to rounded corners of the head.

First antennæ short, first joint the largest, third a little longer but narrower than the second, flagellum shorter than the third joint of peduncle, three-jointed, the last two joints minute. Second antennæ a little longer than the first, second joint of peduncle the largest, the small flagellum setulose, perhaps three-jointed.

The mandibles ending bluntly in two transparent teeth or lobes, the palp with a stout middle-joint, the third joint much smaller, fringed with five spines. First maxilla with serrature of three denticles at the apex. Other mouth-parts not well made out, but maxillipeds seemingly in agreement with those of *A. sandalensis*.

The first gnathopods are the distinctive feature of this species. The second joint is as usual distally widened, the third nearly as long as the second, the fourth in coalescence with the fifth forming a small cup-like wrist, the sixth joint or hand massive, the hind margin produced into a strong tooth fringed on its inner side with four spinules, a little cavity being left between it and the circular lobe which covers the base of the finger. Into this cavity the strongly curved but very small finger closes down. In Chilton's *Anthura affinis* the hand has a small apical tooth, but the finger closes over the tooth to meet a setiferous process of the fifth joint produced along the inner margin of the sixth joint. This is also the case in *Cyathura carinata* (Kröyer).

The second gnathopods and the five pairs of peræopods are all almost exactly alike, the second gnathopods and first peræopods confronting the others and having a little advantage in robustness, but this is chiefly over the fifth peræopods. In the second gnathopods the fourth joint with its outer apex actually reaches the sixth joint, in the following limbs there is a small but successively increasing interval. In all these limbs, however, the small fifth joint has the quality of under-riding the sixth joint at its base. The four pairs of marsupial membranes enclosed in this specimen thirty-three large eggs.

The first pleopods have a large distally widened outer branch, rather longer than the narrow inner branch which has plumose setæ on its rounded apex; the plumose setæ of the outer branch begin at its greatest breadth on the outer margin and are carried a very short distance up the inner.

The uropods have serrate margins, carrying plumose setæ, to the large upper branch which is partially unfolded on the outer side, and a little exceeds the peduncular part

of the inner branch. The terminal joint of the latter is also strongly plumose except on the straight proximal part of its inner margin; it widens a little from the base, and is more than half as long as the peduncle.

The oval telson is broadly rounded at the end, which carries centrally two pairs of rather long setæ beset with some short ones.

Length about 5 mm.

Locality. Egmont, breakers on reef edge.

Specific name from ξένος, strange, and χείρ, hand, in allusion to the unique character of the hand and finger in the first gnathopods.

Fam. **Eurydicidæ.**

1905. Eurydicidæ, Stebbing, in Herdman's Rep. Ceylon Pearl Fish., pt. 4, Rep. 23, p. 10.

Gen. *EURYDICE,* Leach.

1815. *Eurydice,* Leach, Trans. Linn. Soc. London, vol. xi., p. 370.

8. *Eurydice truncata* (Norman).

1868. *Cirolana truncata,* Norman, Ann. Nat. Hist., ser. 4, vol. ii., p. 421, pl. 23, figs. 12—15.

1869. *Cirolana truncata,* Norman, Brit. Assoc. Report for 1868, pp. 255, 288.

1882. *Eurydice truncata,* Norman, Proc. R. Soc. Edinburgh, 1881–2, p. 683.

1890. *Eurydice truncata,* H. J. Hansen, Vid. Selsk. Skr., ser. 6, vol. v., pl. 3, pp. 366, 375.

1895. *Eurydice truncata,* H. J. Hansen, Isopoden, Cum. u. Stomat. der Plankton Exp., p. 13, pl. 1, fig. 5—5 h.

1905. *Eurydice truncata,* Tattersall, Fisheries, Ireland, Sci. Invest., 1904, II. [1905], p. 45, pl. 11, figs. 5—8.

The broad telsonic segment has the lateral margins finely crenulate and the truncate distal margin cut into twelve teeth, of which the outermost but one at each end is conspicuously the largest. This character apparently distinguishes the species from all others of the genus hitherto described. The segment is quite pellucid, except for a band of colour at the base. Under high magnification it is seen to be covered with scale-like markings. The truncate uropods are likewise pellucid, the outer plate much smaller than the inner, this latter in our specimens being considerably larger than shown in the figure of Norman's North-Atlantic specimen. The first antennæ have also a longer first joint to the flagellum than in his figure, but this feature is doubtless variable within the lifetime of the individual*. The flagellum of the second antennæ may have as many as twenty-seven joints, and is sometimes as long as the whole animal. The first gnathopods in the Eastern specimens are in exact agreement with Norman's figure. In the second pleopods the masculine appendage is attached a little above the middle of the inner plate's inner margin, and extends beyond both plates. It is thickest at each extremity, but the

* See on this subject Tattersall's observations, which corroborate my supposition and give further information.

apex forms a little tooth, which, however, may not be invariably present, as it is not shown in Hansen's figure of this appendage; the hairy inner margin is slightly concave.

The mouth-organs are almost exactly as figured by Hansen for *E. elegantula*. The horn of the clypeus is narrow, a little emarginate at the tip. The colour dorsally is brown, with stellate markings on the peræon, only the telsonic segment being colourless except at its base.

The length of the specimen measured was 4·5 mm.

Locality. S. of Saya de Malha Bank, in surface net (*m*).

9. *Eurydice humilis*, n. sp. (Plate 8 A.)

This species, founded on a single specimen, an adult male, is distinguished by its small size, its poorly furnished limbs, the shape of the telsonic segment, and the form of the male appendix in the second pleopods. The species to which it makes the nearest approach are *E. achata* (Slabber), *E. inermis*, Hansen, and *E. convexa*, Richardson. The first two, like most species of this genus, have the telsonic segment more or less truncate, in the third it is denticulately rounded at the apex, but on each side there is a tooth separated by an interval from the apical dentation. In the present species there are five apical teeth on the narrowly rounded apex, preceded on each side by a short space of faintly perceptible serration.

The eyes are large and dark. The first antennæ reach about to the end of the third joint of the second pair, in which the fourth joint is not twice as long as the third, supporting a flagellum of twenty-one joints with a long apical seta.

The upper lip is furnished with six little dark spinules fringing the emargination of its distal border.

The mandibles have the cutting-edge divided into three teeth on one member and four on the other, there are six spines in the spine-row, and about fourteen teeth on the blade which represents the molar. The second joint of the palp is much the longest, and carries a single seta; the third joint is tipped with five setæ. The other mouth-organs, so far as could be seen, did not depart from the usual type.

As will be seen from the figures the gnathopods and peræopods are content with few spines and setæ. The first and second gnathopods and first peræopods are nearly alike in size and structure. The last four peræopods agree in structure, but the second pair is much the smallest, and the fourth notably larger than the third or fifth. The male appendages on the ventral part of the seventh peræon segment are short and cylindrical.

The second pleopods have three spines on the inner margin of the peduncle. The male appendix or second joint of the inner ramus is attached a little above the middle of the first joint, descending considerably below it as a straight narrow rod, with a little point turned outward at the apex, without any deep incision such as is noted for *E. achata* (commonly called *E. pulchra*). The uropods have the outer branch much shorter than the inner, and do not nearly reach the apex of the telsonic segment.

Length 3 mm., apparently smaller than any other record for an adult male in this genus.

Locality. At anchor off Salomon Atoll, in surface net (*Q*). Several cryptoniscian larvæ were obtained on the same occasion.

PONTOGELOS, n. g.

Only the male known. Flagellum of first antennæ of extraordinary length; mandibles as in other Eurydicidæ with the molar part elongate-triangular, laminar, serrate on the front margin, but with second joint of palp unusually long; second maxillæ with the middle lobe much narrower than either of the others and carrying a single seta; maxillipeds with hooks on the plate of the second joint; uropods with peduncle very moderately produced on the inner margin, the outer of the membranaceous rami much the smaller.

The generic name is formed from πόντος, sea, and γέλως, laughter, a joke, or, colloquially, a lark, in allusion to the name of the exploring vessel.

10. *Pontogelos aselgokeros*, n. sp. (Plate 8 B.)

To the generic characters above given might possibly be added the comparative size of the pleon which equals in length the anterior part of the animal, but nearly the same proportion is attained in *Eurydice elegantula*, Hansen. As will be seen from the figure I have given of the lower lip, that part differs greatly from the form generally found in this family. My dissection, however, did not afford an entirely satisfactory view of it, so that I cannot lay much stress on the representation.

The head is rather strongly produced, with the rostral point bent over towards the frontal lamina which is spatulate with flattened distal margin. The peræon and pleon are nearly parallel-sided. The first peræon segment has the produced front corners rounded. The side-plates of the six following segments are neither deep nor acute. The large telsonic segment has a length equal to its breadth at the base, from which it presently widens, then curves to a subrotund ending. For rather more than its distal third its finely serrulate margin is fringed with setæ of moderate length, the central point having a couple of setules, and about midway of the fringing a scarcely perceptible angle is formed. The segment itself, except at the base, like the uropods, is pellucid.

The eyes are large, roughly rounded, in spirit light orange-brown.

The first antennæ have a stout, almost round, first joint, followed by a much smaller joint which is probably the true third, unless that is represented by what looks like the first joint of the slender, monstrously elongated, flagellum. This with its ninety joints extends considerably beyond the telsonic segment. It is true that Hansen in his conspectus of this family speaks of some genera having numerous joints in the first antennæ, but what has hitherto been considered as long is a flagellum of fifteen joints reaching the hind margin of the third peræon segment, as in *Cirolana chiltoni*, H. Richardson, 1905.

The second antennæ are here contrary to custom much shorter than the first, yet absolutely they are of unusual length, having a flagellum of fifty joints. The fifth joint of the peduncle is about once and a half as long as the fourth.

The mandibles have the cutting edge strongly tridentate, the spine row consisting of seven or more short spines, the teeth of the molar saw twelve to fourteen, the palp set much further back than usual in this family, its first joint a little more than a quarter as long as the second, shorter but much stouter than the third, which is fringed with graduated spines, increasing in size towards the apex. The distal two-fifths of the second joint are spiniferous.

The first maxillæ have three plumose setæ on the inner plate and eleven unequal spines, of which two are obscurely denticulate, on the outer.

The second maxillæ have five setæ on the inner, four on the outer, and a single seta on the little median lobe.

The maxillipeds have a broad second joint, not much longer than broad apart from its produced plate, which is tipped with two setæ and carries certainly one hook and apparently three others. The sixth and seventh joints are not very large, the fourth and fifth are broad.

The limbs of the peræon are of the usual pattern, but not powerful, the first three pairs short, the last four very slender, and of these only the two hinder pairs elongate. The ventral male appendages of the seventh peræon segment are short, parallel-sided.

The pleopods have setose fringes on the rami, excepting the inner ramus of the fifth pair. In the second pair the peduncle is broader than long, furnished with three hooked spines and a plumose seta on its inner border. The second joint of its inner ramus, constituting the masculine appendix, is affixed nearly at the base of the ramus. The structure is rather peculiar. The inner margin for about two-thirds of the length is setuliferous and sinuous, widest at the top, rather abruptly narrowing below, the last third being quite narrow, ending in a little slightly inward turned point, beyond which the body of the ramus is prolonged for a short distance. In at least the first four pairs of pleopods the inner upper corner of the inner ramus is overhung by a lappet which curves first inward and then a little outward.

The outer ramus of the uropods is much narrower and shorter than the inner, both are round ended, and setiferous on both margins.

Length of specimen in slightly curved position 7 mm.

Locality. Mauritius, 5 miles W. of Black River, in surface net (*d*).

The specific name, from the Greek ἀσελγοκέρως, signifying a creature with outrageous horns or antennæ, is applied to this species as one which by its antennæ is in violent conflict with the custom of its family.

Gen. *CIROLANA*, Leach.

1818. *Cirolana*, Leach, Dict. Sci. Nat., vol. xii., p. 347.

11. *Cirolana minuta*, H. J. Hansen.

1890. *Cirolana minuta*, Hansen, Vid. Selsk. Skr., ser 6, vol. v., p. 347, pl. 3, fig. 5, pl. 4, fig. 1.

1900. *Cirolana minuta*, Stebbing, Willey's Zoological Results, pt. 5, p. 634.

Hansen distinguishes this species from his *Cirolana parva* principally by its smaller

size, its rather more slender legs, its differently shaped masculine appendix to the second pleopods of the male, and above all by the possession of an acuminate horn on the base of the frontal lamina.

The specimens from the Seychelles agree closely in size with Hansen's measurements, which are 4·3 mm. for the male, and 4·8 mm. for the female, though I cannot pretend to the same nicety in determining the fractions of a millimetre. Also, they have the masculine appendix, not incurved as in *C. parva*, but quite straight, ending acutely much (in one case very much) beyond the other part of the ramus. But the hinder peræopods do not show the special slenderness of the second joint which Hansen figures, and I cannot perceive the required horn on the frontal lamina of either of the two males dissected.

Localities. Praslin Reef and Coetivy. A female specimen, 5 mm. long, from Diego Garcia, carried numerous young ones in an advanced stage of development. Its first antennæ have a nine-jointed flagellum, and its second one of twenty-two joints.

Fam. **Corallanidæ**.

1904. Corallanidæ, Stebbing, Gardiner's Fauna Maldive and Laccadive Arch., vol. ii., pt. 3, p. 703.

Gen. *ALCIRONA*, Hansen.

1890. *Alcirona*, Hansen, Vid. Selsk. Skr., ser. 6, vol. v., p. 285.

12. *Alcirona maldivensis*, Stebbing.

1904. *Alcirona maldivensis*, Stebbing, Gardiner's Fauna Maldive and Laccadive Arch., vol. ii., pt. 3, p. 708, pl. 51 B.

The present specimen is larger but proportionally narrower than that originally described. It is likewise a female with young, which, as in the other case, are far advanced.

Length 7·5 mm. Breadth 3 mm.

Locality. Cargados Carajos, where the "Sealark" obtained it from a depth of 30 fathoms.

Fam. **Argathonidæ**.

1905. Argathonidæ, Stebbing, Herdman's Pearl Fish., Suppl. Rep. 23, p. 16.

In the single species for which this family was founded the fourth and fifth joints of the maxillipeds are fused into one. Another species has now come to light, in which the distinctness of these two joints is clearly manifest. This might be regarded as an important generic difference, were it supported by any other character of equal weight. But that is not the case. In all other respects features than can fairly be allowed generic value appear to be the same for both species.

Gen. *ARGATHONA*, Stebbing.

1905. *Argathona*, Stebbing, Herdman's Pearl Fish., Suppl. Rep. 23, p. 17.

The statement that the maxillipeds are six-jointed through fusion of the fourth and fifth joints must be excluded from the definition alike of the family and the genus, as

inapplicable to the new species, which is well separated from its predecessor by the absence of this fusion. The two are separated further by more easily observable characters as follows:

Without upturned rostral process; dorsal surface strongly spinulose. 1. *A. normani*, Stebbing.

With strongly upturned rostral process; dorsal surface smooth. 2. *A. reidi*, n. sp.

13. *Argathona reidi*, n. sp. (Plate **9** A.)

The rather small head is scarcely half as long as broad. The rostral process is upturned so as to present in profile a flat top, its curvature over-arching a shaded hollow, behind which the distal part of the head forms a raised triangle, with a faintly-marked tubercular swelling at each end of its base. The eyes are wide apart, tending to reniform, diverging to touch the lower margin outside each tubercle. The width of the peræon increases from the first segment, which is slightly the longest, to the fourth. The three following segments are shorter. The side-plates are diagonally furrowed. The first pleon segment is completely hidden. The four following are short. The telsonic segment is wider at the base than its length and forms a broadly round-ended triangle, not reaching quite so far back as the inner ramus of the uropods. Like them it has a close fringe of not over-long plumose setæ, interspersed with little horny spines.

The first antennæ reach the middle of the last joint of the peduncle of the second. Both pairs are in close agreement with those of *A. normani*. The flagellum of the first pair has twelve joints, most of them carrying filaments. In the second pair the flagellum is composed of twenty-nine to thirty joints.

The frontal lamina is pentagonal, not very large. The epistome, emarginate at the top, has widely divergent arms, embracing a rather small area for the upper lip. The latter and also the lower lip were not clearly made out.

The mandibles are very massive at the base, near to which the palp is implanted, having its second joint much the longest, this and the third being armed with serrate spines. That which I have spoken of as a feeble blade, of quasi molar homology, in the other species, appears to be present here also, but so entangled in a transparent membrane, that I feel little confidence in its interpretation for either species.

The first maxillæ agree with those already described, except that the inner plate is apically more squarely truncate.

In the maxillipeds the sixth joint is more robust than in the other species.

The limbs of the peræon are also very near to those of *A. normani*, the superior robustness of the peræopods being no doubt related to the superior size of the new form.

The second pleopods have the male appendix of the same shape as in the other species, but not reaching the end of either ramus instead of extending a little beyond both.

The peduncle of the uropods is much produced. The inner ramus is much broader than the outer, and produced considerably beyond it, though in actual length it does not greatly exceed it. Both are round-ended.

Length 22 mm. Breadth about 10·5 mm.

Locality. The single specimen, a male, was taken by Mr Crossland at Zanzibar in 1901.

The specific name is given out of respect to Mr J. T. Rennie Reid, the Edinburgh lithographer, who during the past five and twenty years or more has faithfully reproduced on stone the majority of my drawings of Crustacea.

Fam. **Ægidæ.**

Gen. *ÆGA*, Leach.

1815. *Æga*, Leach, Trans. Linn. Soc. London, vol. xi., p. 369.

14. *Æga ommatophylax*, Stebbing. (Plate **9** B.)

1905. *Æga ommatophylax*, Stebbing, Herdman's Pearl Fisheries, Suppl. Rep. 23, p. 21, pls. 4, 5 A.

To this species I refer a specimen from Mauritius, which agrees in all essential particulars with that which I have described and figured (*loc. cit.*, p. 23, pl. 5 A) as the female or a younger form. The two pairs of antennæ and the shape of the telsonic segment perfectly agree, and the great black eyes in like manner stretch all across the head and fold under. But the size of the specimen is considerably smaller. Its greatest breadth is at the fifth peræon segment, with the two following segments shorter than the others, the seventh being completely concealed in dorsal view and furnished with a pair of legs devoid of spines and much smaller than the fourth peræopods. It is interesting to notice that this youthful characteristic is retained in a specimen otherwise so fully developed. But in the pleon also only four segments are conspicuous in advance of the telsonic segment, instead of five as in the adults.

Length 7·5 mm. Breadth at widest part 3 mm.

Locality. Mauritius, station A 2, from a depth of 100 fathoms.

Gen. *ROCINELA*, Leach.

1818. *Rocinela*, Leach, Dict. Sci. Naturelles, vol. xii., p. 349.

15. *Rocinela orientalis*, Schiödte and Meinert.

1879. *Rocinela orientalis*, Schiödte and Meinert, Naturhist. Tidsskr., ser. 3, vol. xii., p. 395, pl. 13, figs. 1, 2.

1905. *Rocinela orientalis*, Stebbing, Herdman's Pearl Fisheries, Suppl. Rep. 23, p. 24, pl. 6 C.

A single specimen, of the female sex, obtained by Mr Crossland in 1901 at Zanzibar, measures 17 mm. in length by 8 mm. in breadth. There is a longitudinal dorsal depression between the rather large dark eyes. The telsonic segment is well rounded distally.

Fam. **Cymothoidæ.**

1881. Anilocridæ + Saophridæ + Cymothoidæ, Schiödte and Meinert, Naturh. Tidsskr., ser. 3, vol. xiii., pp. 1, 281, 286.

1890. Cymothoidæ, Hansen, Vid. Selsk. Skr., ser. 6, Naturv. Afd. v., n. 3, pp. 316, 406.

1900. Cymothoidæ, Stebbing, South African Crustacea, pt. 1, p. 55.

1905. Cymothoidæ, H. Richardson, Bull. U.S. Nat. Mus., No. 54, p. 215.

Gen. *NEROCILA*, Leach.

1818. *Nerocila*, Leach, Dict. Sci. Nat., vol. xii., p. 351.

1829. *Ichthyophilus*, Latreille, La Règne Animal, vol. iv., p. 133.

1902. *Nerocila*, Stebbing, South African Crustacea, pt. 2, p. 55.

1905. *Nerocila*, H. Richardson, Bull. U.S. Nat. Mus., No. 54, p. 219.

The species which Koelbel in 1878 separated from *Nerocila* as *Emphylia ctenophora* was united to the earlier genus by Schiödte and Meinert.

16. *Nerocila trichiura* (Miers).

1847. *Anilocra trichiura*, White, List of Crustacea in Brit. Mus., p. 108 (nomen nudum).

1877. *Anilocra trichiura*, Miers, Proc. Zool. Soc. London, p. 677, pl. 69, figs. 6, 6 a.

1881. *Nerocila trichiura*, Schiödte and Meinert, Naturh. Tidsskr., ser. 3, vol. xiii., p. 83, pl. 7, figs. 1, 2.

In this species the outer ramus of the uropods greatly exceeds the inner in length. The side-plates of the hinder peræon segments end obtusely, contrary to what is usual in the genus.

Locality. A single specimen was obtained at Great Chagos. It is attached by the mouth and front claws at an angle to the underside at the base of the wing fin of a flying-fish, *Exocœtus evolans*.

Gen. *CYMOTHOA*, Fabricius.

1793. *Cymothoa* (part) Fabricius, Ent. Syst., vol. ii., p. 503.

1883. *Cymothoa*, Schiödte and Meinert, Naturh. Tidsskr., ser. 3, vol. xiv., p. 223.

1905. *Cymothoa*, H. Richardson, Bull. U.S. Nat. Mus., No. 54, p. 247.

17. *Cymothoa eremita* (Brünnich).

1775. *Oniscus œstrum*, Spengler, Besch. Berl. Ges. Naturf. Fr. i., p. 312, pl. 7, figs. I—K.

1783. *Oniscus eremita*, Brünnich, Vid. Selsk. Skrift. Nye Saml., vol. ii., p. 319.

1857. *Cymothoa stromatei*, Bleeker, Crust. Ind. Archip., p. 35, pl. 2, fig. 13.

1883. *Cymothoa eremita*, Schiödte and Meinert, Naturh. Tidsskr., ser. 3, vol. xiv., p. 259, pl. 7, figs. 3—13.

The references, but not the dates, are borrowed from Schiödte and Meinert. The first two dates are due to Sherborn's "Index Animalium," which, however, does not mention Spengler's *Oniscus œstrum*, perhaps from the opinion that it was identical with the species so named by Linnæus. The western species is now named *Cymothoa œstrum* (Linn.), distinguished by no very strongly divergent characters from Brünnich's, which inhabits the Pacific and Indian Oceans. Spengler's statement that his species was found attached to whales on the coast of Greenland is regarded by Schiödte and Meinert as

quite untrustworthy. The specimen roughly figured by Brünnich, fig. 5 on the plate illustrating his "Entomologia," 1764, as a typical *Oniscus*, is probably intended for the present species. It attains a large size, sometimes making a near approach to two inches, with great breadth. The head is very deeply sunk within the verrucose first segment of the peræon.

The specimens were obtained by Mr Crossland at Zanzibar in 1901.

Gen. *MEINERTIA*, Stebbing.

1893. *Meinertia*, Stebbing, History of Crustacea, p. 354.

18. *Meinertia carinata* (Bianconi).

1869. *Cymothœ carinata*, Bianconi, Memorie della Accademia delle Scienze dell' Istituto di Bologna, fasciculus xvii., p. 210, pl. 2, figs. 2 a, b.

1869. *Cymothoa* (*Ceratothoa*) *carinata*, Hilgendorf, Von der Decken's Reisen in Ost-Afrika, vol. iii., p. 846.

1883. *Ceratothoa carinata*, Schiödte and Meinert, Naturh. Tidsskr., ser. 3, vol. xiii., p. 327, pl. 13, figs. 1, 2.

In cataloguing this species Hilgendorf mentions that Bianconi's memoir appeared in two forms with different pagination. Thus Hilgendorf's reference to p. 344 answers to p. 210 in the "Memorie" above cited. Bianconi's *Cymothœ* may be intended for a correction of *Cymothoa* Fabricius, or it may be an error caused by Milne-Edward's use of the French form along with the Latin. As I have elsewhere explained, Schiödte and Meinert in instituting the genus *Glossobius* allotted to it precisely the two species for which Dana had established *Ceratothoa*, of which *Glossobius* consequently became a synonym, the name *Meinertia* being then substituted as generic name for the species which the two authors had assigned to *Ceratothoa*. Between the latter in the true sense and *Meinertia* the distinction drawn is that *Ceratothoa* has the fingers unequal, those of the third pair largest of all, while in *Meinertia* the fingers are all equal or subequal.

As Bianconi's Latin description of this rare species is excellent and not easily accessible, it may be convenient here to translate it.

"A Cymothœ with the peræon anteriorly and the pleon carinate. Telsonic segment very broad, with curved sides, distal margin deeply excavate. Head of moderate size, subtriangular, obtuse in front, on either side very sloping. First antennæ bent back, their second joint large. Margin of seventh peræon segment without any tubercle. Head broad at the base, but narrowed towards the obtuse apex; at the sides it is so much depressed that the head also itself appears carinate in the middle. The first antennæ, short and thick, strongly flattened, are bent back laterally, at their third joint, over the head. First segment of the peræon of moderate size, strongly carinate in the middle, narrowing anteriorly, and there extending forward on each side, to reach the insertion of the second antennæ; these processes end in a fairly sharp point directed forward, from a swollen base. The second and third segments are in like manner carinate. Hind margin of fifth pleon segment sinuate; it shows two shallow concavities, which divide the margin itself into three sections. Sixth segment large, very broad; its marginal lines

at the sides rather convex. Its hind margin deeply excavate in the middle, not extending further back than the rami of the uropods.

"This species is very near in some characters to *Cym. gaudichaudii*, but in others to *Cy. trigonocephalam*.

"Length 38 mm. Greatest breadth 14 mm."

The specimen described by Schiödte and Meinert in the "virgo" stage differs apparently from the ovigerous female as described by Bianconi and as seen in our specimen by having the whole length carinate, the first peræon segment much the longest, and especially by having the uropods much longer than and extending much beyond the telsonic segment. In our specimen the uropods scarcely reach the distal margin of the telson, which is 12 mm. broad by 4 mm. long at the centre and nearly 6 mm. at the longest part of the lateral surfaces. It should be noticed that the carination besides being partial, is nowhere sharp.

Length of specimen to centre of telsonic segment 28·5 mm. Breadth at sixth peræon segment, where it is widest, 13·5 mm.

Locality. Seychelles, 34 fathoms.

Fam. **Sphæromidæ.**

1905. Sphæromidæ, Stebbing, Herdman's Pearl Fisheries, Suppl. Rep. 23, p. 29.

1905. Sphæromidæ, Hansen, Quarterly J. Microsc. Sci., vol. xlix., pt. 1, p. 69.

Gen. *CYMODOCE*, Leach.

1814. *Cymodoce*, Leach, Edinb. Encycl., vol. vii., p. 433.

1905. *Cymodoce*, Hansen, Quarterly J. Microsc. Sci., vol. xlix., pt. 1, p. 120.

19. *Cymodoce pubescens* (Milne-Edwards).

1840. *Spheroma pubescens*, Milne-Edwards, Hist. Nat. Crust., vol. iii., p. 209.

1881. *Cymodocea pubescens*, Haswell, Proc. Linn. Soc. N. S. Wales, vol. v., p. 473, pl. 17, figs. 1, 1 x.

1905. *Cymodoce pubescens*, Hansen, Quarterly J. Microsc. Sci., vol. xlix., pt. 1, p. 122.

Mr Crossland's specimens warrant the specific name by being covered dorsally with a kind of velvet pile, consisting of pellucid, short, club-shaped setæ, much like those which I have described on the South African Dromiid crab *Dynomene platyarthrodes*. The remarkable metamorphosis of the mouth-parts in the female of this genus, to which Hansen has called attention, is exhibited in the present species, and its pleopods also satisfy the requirements of the Cymodicini, one of Hansen's sections of his group Sphærominæ hemibranchiatæ. An easily observed character of the species is the strongly marked notch on the outer margin of the outer ramus of the uropods. In the specimen dissected the first antennæ have a flagellum of seventeen joints, the first being much the longest; the second antennæ have an eighteen-jointed flagellum. As in *C. pilosa*, figured by Hansen, the first joint of the mandibular palp is the longest, but in the maxillipeds the plate of the second joint differs a little, being obliquely truncate on the distal margin which is beset with a few spinules. The first gnathopods

have six sharp serrate spines on hind margin of the fourth joint, five on the fifth, and five on the sixth, the fourth in the last set being longer than its successor. The finger has a strong spine at apex of hind margin and a strong unguis.

Length about 11 mm. One specimen is slightly longer, but not approaching an inch, the measurement of Haswell's longest specimen. Milne-Edwards gives the length as ten lines*.

Localities. Zanzibar channel, from 10 fathoms depth, taken by Mr Crossland in 1901, and at Wasin in 1902.

20. *Cymodoce zanzibarensis*, n. sp. (Plate **9** D.)

This species is nearly allied to *Cymodoce pilosa*, Milne-Edwards, first described from the Mediterranean, to the Australian *C. aculeata*, Haswell, and to *C. longistylis*, Miers, from Thursday Island and Singapore. It agrees with the disposition of the hairiness and granulation of the body and with the characters of the uropods assigned by Milne-Edwards to his species. It would be almost superfluous here to describe the mouth-organs because they correspond so thoroughly with the figures which Hansen has given for those parts in the male of *C. pilosa* (Quarterly J. Microsc. Sci., vol. xlix., pt. 1, pl. 7, figs. 1 a—f). But the ornamentation of the pleon is as follows,—at the base on either side is a large flat lobe fringed with setæ; between these lobes runs a curved row of teeth, of which the submedian are the largest; flanking this pair to the rear is a much more conspicuous pair, behind which again is a pair of deeply bifid well separated processes, of length about equal to the breadth; the ends of their teeth reach a circular rose-coloured boss, fringed with setules but almost smooth at the top. It is interesting to note that in all our three specimens which have been in preservative liquid for seven or eight years the colouring of this boss has remained constant, but whether it was the same in the living animal I have no means of knowing. Behind the boss what may be described as a quadrate emargination is occupied by a broad setose apical piece, which narrows near the end to a feebly bifid or in one specimen a feebly trilobed termination, reaching a little beyond the bluntly pointed setose lateral apices. The uropods agree nearly, not only with those of *C. pilosa*, but also with Haswell's description of those in *C. aculeata*, at least as modified by Whitelegge (Mem. Australian Mus., vol. iv., pt. 4, p. 262, 1902), though in each case there are small differences, such as might be explained away, were there no other divergences between the species. In *C. longistylis* Miers records that "the rami of the uropoda are narrow, entire, nearly straight, and rather densely hairy; the outer rather shorter than the inner ramus, and more acute at its distal extremity; the inner long, projecting by about half its length beyond the terminal segment" (Zoological Collections of the "Alert," p. 306, pl. 33, fig. c, 1884). The figure of the inner ramus represents it as much curved, but both figure and description agree in giving it a relative prolongation which will not agree with our species.

With regard to the masculine appendix in the second pleopods of *C. aculeata*, Whitelegge describes it as "a slender stylet about one third longer than the ramus; in its basal two-thirds the stylet is fusiform, and the terminal third is cylindrical, and

* Twelve lines equal one inch in the old measurement.

bears numerous hairs, which become more evident as the acute apex is approached." In the present species it will be seen that this appendix is not nearly a third longer than the ramus, and that its terminal part is free from hairs.

In all the above remarks the comparison is instituted between male specimens.

Length of specimen figured 11 mm. *C. pilosa* described by Milne-Edwards was about 6 lines long, *C. aculeata*, Haswell, 9/16ths of an inch, *C. longistylis*, Miers, 9 mm.

Localities. Taken by Mr Crossland at Zanzibar in 1901 and at Wasin in 1902.

21. *Cymodoce bicarinata*, Stebbing.

1904. *Cymodoce bicarinata*, Stebbing, Gardiner's Fauna, Maldive and Laccad. Archip., vol. ii., p. 713, pl. 52 B.

1905. *Cymodoce bicarinata*, Stebbing, Herdman's Pearl Fisheries, Suppl. Rep. 23, p. 42, pl. 10 C.

Locality. Zanzibar, obtained by Crossland in 1901.

Gen. *CILICÆA*, Leach.

1818. *Cilicæa*, Leach, Dict. Sci. Naturelles, vol. xii., p. 342.

1905. *Cilicæa*, Hansen, Quarterly J. Microsc. Sci., vol. xlix., pt. 1, p. 122.

1905. *Cilicæa*, Stebbing, Herdman's Ceylon Pearl Fisheries, Suppl. Rep. 23, p. 33.

22. *Cilicæa latreillii*, Leach.

1818. *Cilicæa latreillii*, Leach, Dict. Sci. Naturelles, vol. xii., p. 342.

1905. *Cilicæa latreillei*, Hansen, Quarterly J. Microsc. Sci., vol. xlix., pt. 1, p. 122.

1905. *Cilicæa latreillii*, Stebbing, Herdman's Ceylon Pearl Fisheries, Suppl. Rep. 23, p. 36, pls. 3 B, 8.

This genus and this species have been so fully discussed recently by H. J. Hansen and contemporaneously by myself that I refrain from adding further comment, except to note that in minute points of detail specimens show some variation, which may or may not be due to the age or local circumstances or personality of the individual.

Locality. At Wasin Mr Crossland in 1902 obtained specimens of both sexes from a depth of 10 fathoms and between 6 and 9 fathoms, and one male between 7 and 10 fathoms.

PARACILICÆA, n. gen.

This genus belongs by its pleopods to Hansen's Sphærominæ hemibranchiatæ, even the narrowly triangular endopod of the first pleopods by their breadth at the base conforming to his measurement, "Endopod of plp. 1 at least rather broad, scarcely ever half again as long as broad." It agrees also with his section Cymodicini, but cannot be assigned to any of the genera (or in his view sub-genera) which he distinguishes in that section. The uropods in agreement with *Cilicæa* exclude it from *Cymodoce*. The want of any medio-dorsal process on the anterior part of the pleon excludes it from *Cilicæa*. The presence of a median lobe in the terminal notch of the pleon excludes it from

Cilicæopsis. The median prolongations in front and rear which distinguish *Ceratocephalus** are wanting here, and in *Cassidinella* the outer ramus of the uropods is very short, whereas here it is very long.

23. *Paracilicæa hanseni*, n. sp. (Plate 9 c.)

The single specimen, a male, has the sides of the peræon setose, and the hind borders of its segments raised, the granular ornamentation of these ridges with a sub-median pair of denticles becoming successively more distinct. The very setose pleon is strongly depressed below the very convex peræon, giving it in perspective an appearance differing from that which it has when detached. Near the base of the telsonic segment are a pair of widely separated teeth. Below these are a pair of large obliquely truncated processes, which while the specimen is somewhat bent hide from view the short inner rami of the uropods. The latter in fact extend a little beyond the three level points afforded by the apices of the segment, the strong, slightly curved, outer rami being in almost their whole length clear of these apices.

The eyes are dark, wide apart, not very large.

The first antennæ have the usual stout basal joint which appears to be composite, followed by a joint not longer than broad, presumably the third. In the fourteen-jointed flagellum the first joint is much the longest, the last two are very small, the ten joints preceding the last are furnished with filaments. In the second antennæ the fifth joint is a little longer than the fourth, the flagellum sixteen-jointed.

The mouth-organs agree very closely with those of *Cymodoce pilosa* and *Cymodoce bicarinata*.

In the first gnathopods the fourth, fifth, and sixth joints are margined respectively with five, four, and four spines. The elongate third joint of the fifth peræopods is without spines, but carries some minute spinules, on its front margin. There the three following joints have several slender spines, in pairs on the fourth and fifth joints, but in single file on the sixth.

The inner ramus of the first pleopods has a breadth at the base compared with the length in the proportion 6 : 8. Apically it is almost acute. In the second pleopods the masculine appendix is somewhat fusiform in the proximal half, the distal half narrow, reaching some way beyond the supporting plate, to the base of which it is attached. At the end it abruptly narrows to a slender terminal setulose on both margins.

Length of specimen about 5 mm., or including the uropods 6·5 mm., with a breadth of about 3·5 mm.

Locality. Zanzibar, obtained by Mr Crossland in 1901.

The specific name is designed to call attention to Dr H. J. Hansen's important treatise on the Sphæromidæ, referred to in the generic definition given above.

* *Ceratocephalus grayanus*, Woodward, was published in the *Encyclopædia Britannica* in 1877. Its synonym *Bregmocerella tricornis*, Haswell, in 1885.

Tribe *VALVIFERA.*

Fam. **Idoteidæ.**

Gen. *IDOTEA*, Fabricius.

1798. *Idotea*, Fabricius, Supplementum Ent. Syst., p. 302.

24. *Idotea metallica*, Bosc.

1802. *Idotea metallica*, Bosc, Hist. Nat. des Crustacés, vol. ii., p. 179, pl. 15, fig. 6.

1881. *Idotea metallica*, Miers, J. Linn. Soc., vol. xvi., p. 35.

1895. *Idothea metallica*, Hansen, Plankton-Exp., Isop., p. 10, pl. 1, fig. 3.

1905. *Idothea metallica*, H. Richardson, Bull. U.S. Nat. Mus., No. 84, p. 362, figs. 392, 393.

1905. *Idotea metallica*, Tattersall, Fisheries, Ireland, Sci. Invest., 1904, II. [1905], p. 50.

In her valuable above-cited "Monograph on the Isopods of North America" Miss Richardson quotes Miers under the date 1883, the date given on the title-page of the Linnean Journal, Zool., vol. xvi., but the following page explains that the several numbers were issued during the years 1881, 1882, 1883. The important paper by Miers belongs to the first of those years.

A specimen of this species only 6 mm. long was taken at the surface on the 9th of September, 1905, between Saya de Malha and Coetivy. The head is wide, the telsonic segment almost straight truncate with rounded corners, the colour dorsally as usual very dark with a light border. Tattersall remarks that "*I. metallica* may be distinguished from *I. emarginata* very readily by the presence of a small supplementary segment between the cephalon and the first segment of the thorax." Miers says, "near the posterior margin of the head is a deeply impressed arcuated transverse furrow." It is likely that this furrow marks off the coalesced segment which carries the maxillipeds, but it would be rather confusing to regard it as an independent segment.

Tribe *ASELLOTA.*

Fam. **Jæridæ.**

1897. Ianiridæ, Sars, Crustacea of Norway, vol. ii., pt. 5, p. 98.

1905. Janiridæ, Stebbing, Herdman's Pearl Fish. Rep., pt. 4, No. 23, p. 48.

1905. Parasellidæ (part), Hansen, Proc. Zool. Soc. London, 1904, pt. 2, p. 315.

1905. Janiridæ, H. Richardson, Bull. U.S. Nat. Mus., No. 54, p. 448.

1910. Jæridæ, Stebbing, J. Linn. Soc. London, Zool., vol. xxxi., No. 207, p. 224.

Gen. *JANIRA*, Leach.

1814. *Janira*, Leach, Edinb. Encycl., vol. vii., p. 434.

1905. *Janira*, Stebbing, Herdman's Pearl Fish. Rep., pt. 4, No. 23, p. 49.

1905. *Janira*, H. Richardson, Bull. U.S. Nat. Mus., No. 54, p. 468.

25. *Janira crosslandi*, Stebbing. (Plate 6 A.)

1910. *Janira crosslandi*, Stebbing, J. Linn. Soc. London, Zool., vol. xxxi., No. 207, p. 225, pl. 22 A.

It is not without anxiety that I distinguish this species from that which in Professor Herdman's Pearl Fishery Report I named *Janira? nana*, from the Gulf of Manaar. On re-examining the details of that minute form I find some inaccuracies in my former account. The right mandible has no accessory cutting plate, the bidentate appearance spoken of being due to two closely approximate spines. The first pleopods of the male were said to end in two pairs of overlapping shortly lanceolate lobes, and these are figured as of equal length. The fact, however, is that the outer lobe is produced beyond the inner, this inner one having on its sharp apex and outer margin several setæ, some of which gave the impression of a prolongation of the lobe itself. The first correction brings the two species into harmony, the second is concerned with a feature by which the two forms seem sharply distinguished. A third form, *Janira minuta*, H. Richardson, from Bermudas, is evidently in close relationship to the other two. The new species has the following characters.

In the male the head is without conspicuous rostrum, the fourth and fifth segments of the peræon are the shortest and the sixth is the widest. The pleon is almost smooth-rimmed.

The eyes are prominent, lateral. The first antennæ have the first joint stout, followed by two successively much smaller, with a flagellum of nine joints, each of the last five carrying a filament. The first four joints of the second antennæ are short, the third the longest, with a small cylindrical exopod. The two following joints of the peduncle are missing from all the adult specimens, but that these are at least moderately long and carry a many-jointed flagellum may be inferred from the condition of these appendages in the marsupial young, where the flagellum is already eight-jointed.

The upper lip is longer in proportion to its breadth than in *J. nana*. The cutting plate of the mandibles is divided into five teeth on the left and seven on the right member, the accessory plate on the left has seven teeth; there are six spines in the spine-row. The first maxillæ have four fine setæ on the inner plate. The second maxillæ and maxillipeds are in practical agreement with those of *J. nana*.

The first gnathopods have the fifth joint in the male with its hind margin produced into a strong tooth, the interval between this and the finger hinge being occupied by a shorter tooth, which is however produced a little beyond the outer one. In *J. nana* the structure is nearly the same, but the two teeth are much less conspicuous. In *J. minuta* there is a much longer outer tooth produced much beyond two shorter intermediate teeth. In all the three species the narrow sixth joint is capable of folding down along the whole length of the fifth, and ends in a minute finger or nail-tipped seventh joint. The first gnathopod of the female is not known for *J. nana*, but, from the analogy of *J. minuta*, it may be supposed that it has the fifth joint fusiform, not distally dentate, and this is the case in the female of *J. crosslandi*. The other limbs of the peræon follow the custom of the genus. In the present species the fifth peræopods appear to be decidedly the longest.

The first pleopods of the male show marks of separation so decided between the upper part and the part below the constriction that I think this lower part should be regarded as constituted by one or both of the rami; its convex outer margins are produced

to a sharp apical tooth, while the inner margin is rounded off distally in each division to meet the base of the tooth, not obliquely truncate as in the specimens originally described, nor produced to the end of the tooth as in *Janira maculosa*, Leach, the general appearance both here and in *J. nana* being suggestive of a coalescence of two long rami. As will be seen, the inner setiferous terminals in the two species are strikingly different. The second pleopods of the male have the characteristic sharply pointed masculine appendix, but the outer plate is here squared below, not narrowly rounded as in *J. nana*, nor somewhat acute-angled as in *J. maculosa*.

The almost circular opercular plate constituted by the first pleopods of the female, instead of being distally truncate as in *J. maculosa*, is here emarginate.

The uropods were missing from all the seven adult specimens, but one of the two females had young ones in an advanced stage of development in her marsupium. These indicated the general character of the second antennæ and of the uropods, the latter having as might be expected a fairly long peduncle supporting two setiferous rami, of which the inner is the longer.

The colour of all the specimens was claret red.

Length 2 mm. *J. nana*, also described from an adult male, measured 1·5 mm. The length of *J. minuta* is not stated, but the specific name implies that it is very small.

Locality. Egmont. Along with two males and an ovigerous female in the same tube there was an antenna, consisting of a long penultimate peduncular joint, followed by another joint rather longer, and a flagellum of nearly a hundred very small joints. It is not improbable that this appendage had become detached from one of the male specimens. The female specimen, carrying large eggs, had one of the first gnathopods still attached.

Fam. **Stenetriidæ.**

1905. Stenetriidæ, H. J. Hansen, Proc. Zool. Soc. London, 1904, pt. 2, p. 315.

Gen. *STENETRIUM*, Haswell.

1881. *Stenetrium*, Haswell, Pr. Linn. Soc. N. S. Wales, vol. v., p. 478.

26. *Stenetrium chiltoni*, Stebbing.

1905. *Stenetrium chiltoni*, Stebbing, Herdman's Ceylon Pearl Fish., Rep. 23, p. 54, pl. 12 A.

A specimen only 2 mm. long, with antennæ broken, and uropods missing, which seemingly belongs to this species, was taken at Amirante, station E 9, from a depth of 34 fathoms.

Tribe *EPICARIDEA.*

1825. Epicarides, Latreille, Fam. Nat. du Règne Animal, p. 291.
1882. Epicarida, G. O. Sars, Forh. Selsk. Christian., No. 18, p. 18.
1893. Epicaridea, Stebbing, History of Crustacea, p. 392.
1898. Epicarida, Sars, Crustacea of Norway, vol. ii., pt. 11, p. 193.

1905. Epicaridea, H. Richardson, Bull. U. S. Nat. Mus., No. 54, p. 497.

1909. Epicarides, Gilson, Bull. Sci. France-Belgique, vol. xliii., p. 78.

The bibliography of this tribe given by Dr Gilson extends from 1722 to 1909 and contains 279 references.

Miss Richardson gives *Bopyroidea* as an alternative name for the tribe, less significant than that proposed by Latreille, which alludes to the circumstance that the members of it are parasitic on other crustaceans, though with the disadvantage that eventually fresh members may be found on non-crustacean hosts, and that actually many crustaceans parasitic on other crustaceans do not belong to the Epicaridea.

Fam. **Bopyridæ**.

1853. Bopyridæ, Dana, U. S. Expl. Exp., vol. xiii., pt. 2, p. 793.

1867. Bopyridæ, Bate and Westwood, Brit. Sessile-eyed Crust., vol. ii., pt. 16, p. 209.

1887. 'Bopyriens,' Giard and Bonnier, Travaux Lab. Zool. de Wimereux, vol. v.

1893. Bopyridæ, Stebbing, History of Crustacea, p. 408.

1895. Bopyridæ, Hansen, Plankton Exp., Isop., p. 18.

1898. Bopyridæ, Sars, Crustacea of Norway, vol. ii., pt. 11, p. 195.

1900. Bopyridæ, Bonnier, Travaux Lab. Zool. de Wimereux, vol. viii.

1904. Bopyridæ, Stebbing, Gardiner's Maldive and Laccadive Arch., vol. ii., pt. 3, p. 715.

1905. Bopyridæ, H. Richardson, Bull. U. S. Nat. Mus., No. 54, p. 497.

1906. 'Bopiridi,' Nobili, Atti R. Accad. Sci. Torino, vol. xli. (extract).

1908. Bopyridæ, Stebbing, S. A. Crust., pt. 4, p. 56, in Annals S. African Mus., vol. 6.

To this family, in which the genera are already rather perplexingly numerous, I have felt it necessary to add a new one, containing two new species. Three species are added to older genera. Some notes are offered on *Trapezicepon amicorum* (Giard and Bonnier), the specimen being derived from a different host from that on which the typical example occurred. The new specimen is further worthy of note for containing, in place of eggs, an obscure but remarkable parasite apparently of the same tribe. A very small species of the genus *Cancricepon* is left unnamed for reasons assigned further on.

In 1906 the late Professor Giard was able to announce that after prolonged efforts M. Edm. Bordage at Réunion had discovered the host of *Kepon typus*, Duvernoy, in the agile crab *Grapsus strigosus* (Herbst). For some reason unexplained in place of Duvernoy's generic name *Kepon* Giard adopts the name *Grapsicepon*, previously regarded as distinct. He promises a much needed revision of Duvernoy's statements, but this promise his lamented death has prevented him from keeping, thus leaving this particular branch of the subject for the moment in some confusion.

Gen. *KEPON*, Duvernoy.

1841. *Kepon*, Duvernoy, Ann. Sci. Nat., vol. xv., p. 10.

1855. *Cepon*, Leidy, J. Ac. Sci. Philad., p. 51.

1893. *Kepon*, Stebbing, History of Crustacea, Internat. Sci. Ser., vol. lxxiv., p. 412.

1900. *Cepon*, Bonnier, The Bopyridæ, p. 250.

1906. *Grapsicepon*, Giard, Comptes rendus Soc. de Biologie, vol. lxi., p. 704. Dec. 22, 1906.

Several other references will be found in the late M. Bonnier's great work above cited.

The species which I venture to assign to this genus agrees with *Kepon typus*, Duvernoy, but not with *Cepon? naxiæ*, Bonnier, in having no medio-dorsal protuberances on the peræon. In the pleon the first five segments have prolonged side-plates and carry double-branched pleopods, all of tuberculate foliaceous character, and the single-branched uropods have a similar appearance, all these points showing agreement with the type-species. On the limbs Duvernoy could not perceive any finger, but rightly surmised that it was not really absent.

27. *Kepon halimi*, n. sp. (Plate **10** c.)

The typical species, derived from an unknown crab of Mauritius, since identified as *Grapsus strigosus* (Herbst), offers scarcely any points for exact comparison with the present form. The size, however, differs very considerably. The adult female of *Kepon typus* attains a length of 12 mm., whereas the specimen here dealt with measured only about 3 mm., or at full stretch might have been 4 mm. long. The head, however, was forced towards the pleon by the enormous globe of eggs in the marsupium, in such a way that the earlier peræon segments were not dorsally visible. This condition of affairs, while introducing a difficulty into the measurement, made it fairly certain that the female was fully adult. The lateral bosses of the early peræon segments, though large, do not show that peculiar verrucosity described by Duvernoy, on which Bonnier lays stress as an exceptional character of much importance, and the existence of which has been recently endorsed by Giard.

In the present species the limbs of the peræon are all provided with a small apical seventh joint or finger as usual. The fifth peræopod is rather remarkable from the shape of the second joint, the front margin of which is produced into a large oval excrescence above and a small circular one below. This limb on the left side (right of ventral view) was lying closely adpressed to the pleopods, bearing a puzzling resemblance to one of their branches. In *Ergyne hendersoni* (Giard and Bonnier) the fifth peræopod has an oval excrescence on the lower part of the front margin. The maxillipeds have the narrow apical lobe common to all the neighbouring genera. It showed no setules. The secondary lamellæ of the cephalic lamina are small, sub-equal, almost simple.

The male, which according to Bonnier has not hitherto been recognised for this genus, was enclosed along with the eggs in the last marsupial plate of the female of this species. In shape it agrees with that figured for *Cancricepon elegans* (Giard and Bonnier) except that I could not see any medio-ventral bosses. The eyes are dark and reniform, much longer than wide. I could not make out more than two joints in the first antennæ and four in the second, but a minute apical joint might in each case be present.

Locality. This species was taken from the left branchial cavity of *Halimus* sp. nov. ♂, as identified by Miss M. J. Rathbun, at Cargados Carajos, 30 fathoms.

DACTYLOKEPON, n. g.

This genus agrees with *Trapezicepon*, Bonnier, in having no medio-dorsal bosses on the peræon, but the inner branches of the pleopods in the adult female are long and irregular. Also it differs from that genus in having the lateral bosses of the peræon small and discontinuous, and in regard to the hind lamina of the head, which, instead of two simple pointed secondary lamellæ at each corner, here has those lamellæ more or less digitate.

The generic name compounded of δάκτυλος, finger, and *kepon*, alludes in the first part to the digitate processes of the head, which find a parallel in the species *Orbione penei*, Bonnier. The second portion of the name, based on *Kepon*, Duvernoy, refers to its close alliance with that genus and with those which have been named with a similar termination by Giard and Bonnier.

28. *Dactylokepon richardsonæ*, n. sp. (Plate **11** C.)

The single specimen for which this species is instituted contained a vast multitude of eggs in the earliest epicaridian stage, but no male could be found. Miss Rathbun's notification that it was found in the left branchial cavity of *Trapezia cymodoce* (Herbst) suggested an expectation that it would prove to be *Trapezicepon amicorum* (Giard and Bonnier), but this was negatived by the characters mentioned for the genus. The present species is much larger than that just named, having a length of 6 mm. instead of 3 mm., and it was taken, not at the Friendly Isles, but the Seychelles.

The anterior lamina of the head is unusually narrowed forward, but as this part of the organism is very soft, its shape might easily be altered by accidental circumstances of pressure in the branchial cavity of the host. The leading characteristic of the species is the strongly digitate form of the outer lamella in the hind lamina of the head. The inner lamella is also somewhat digitate. The maxilliped has the narrow curved extremity following an emargination, in agreement with Bonnier's description and figure of the maxilliped in *T. amicorum*. The side-plates of the pleon, the outer branches of the pleopods and the uropods are all long and digitate as in that species, but the uropods are decidedly narrower. The inner branches of the pleopods could not be at all clearly made out in the confusing mass of digitations to which they lie closely adpressed.

The species is named out of respect to Miss Harriet Richardson, who has done so much valuable work in this and other groups of the Isopoda.

29. *Dactylokepon catoptri*, n. sp. (Plate **10** B.)

The present small species agrees with the preceding species in the generic characters, but the outer lamella of the cephalic lamina is poorly instead of strongly digitate. The maxillipeds have the palp-like apical process more produced and narrower than in the preceding species. It has three minute setules on the apex. The second joint of the fifth peræopod is without excrescences of the front margin.

Length of specimen about 3 mm.

Locality. Extracted from the left branchial cavity of *Catoptrus nitidus*, A. Milne-Edwards, ♂, as identified by Miss M. J. Rathbun. Taken at Amirante, from a depth of

30 fathoms. The young were all in the epicaridian stage, in which the fifth pair of peræopods is still undeveloped.

Gen. *TRAPEZICEPON*, Bonnier.

1900. *Trapezicepon*, Bonnier, Les Bopyridæ, p. 269.

This genus is distinguished by its author from *Cancricepon* and *Grapsicepon* by the absence of the medio-dorsal bosses on the hinder peræon segments, and from *Portunicepon* by the rudimentary condition of the inner branches of the pleopods, in the adult female.

All the three genera were instituted by Giard and Bonnier in 1887, *Portunicepon* being evidently a synonym of *Ergyne*, Risso, 1816. This last has the medio-dorsal bosses, and the other two genera have the rudimentary inner branches of the pleopods, so that the differential characters of *Trapezicepon* might well have been considered as of specific rather than generic value. The four genera may be tabulated as follows:

1 { Without medio-dorsal bosses on the peræon. *Trapezicepon.*
  { With medio-dorsal bosses on the peræon. 2.

2 { Inner branches of pleopods not rudimentary. *Ergyne.*
  { Inner branches of pleopods rudimentary.

3 { Last four segments of peræon with medio-dorsal bosses. *Cancricepon.*
  { Only last two segments of peræon with medio-dorsal bosses. *Grapsicepon.*

It may be added that in *Ergyne* one species has the last three, and a second the last two peræon segments raised into median processes.

30. *Trapezicepon amicorum* (Giard and Bonnier). (Plate **11** B.)

1888. *Grapsicepon amicorum*, Giard and Bonnier, Compt. Rend. Acad. Sciences, July 2, p. 2.

1900. *Trapezicepon amicorum*, Bonnier, Les Bopyridæ, p. 269, pl. 10.

The present specimen agrees in general appearance with that figured and described by Bonnier, but differs in some details. The inner branch of the pleopods is not apically pointed but obtuse in the female, and the uropods are less elongate and with little approach to digitation. In the male the medio-ventral tubercle could only be distinguished on the first three peræon segments, instead of occurring plainly on each segment of the peræon and the first of the pleon.

The length of the female was only a little over 2 mm., instead of 3 mm.

The host was not *Trapezia cymodoce* (Herbst), but *Actumnus tomentosus*, Dana, ♂, as identified by Miss M. J. Rathbun. Position of parasite in left branchial cavity of host.

Locality. Amirante, 34 fathoms.

As I was withdrawing the specimen from the tube, there fell from its well-developed marsupium what I supposed to be a mass of eggs, but it proved to be a bladder-like organism, showing no actual segmentation and no appendages unless a minute process might pass for one. It was of a size to fairly well fill the marsupium of its host. It is reminiscent of the species *Cyproniscus cypridinæ*, Sars, and the genus *Asconiscus*,

Sars. His species, *A. simplex*, is parasitic on *Boreomysis arctica* (Kröyer), and he remarks that in all instances of its capture "the marsupial pouch of the host was fully developed, and it thus seems that the parasite must have entered the pouch immediately after the young of the host had escaped; several male specimens were found with the female, and in one instance two or three females of different development were found in the same host" (Crustacea of Norway, vol. ii., pp. 233, 238, 1899). It seems possible that in these cases the marsupial plates develop round the parasite which usurps the place of eggs. In the tube with the *Trapezicepon* there were no eggs, but a *Bopyrus*-form which I have regarded as the male of *T. amicorum*, and, in addition to this, four specimens of a cryptoniscian larva, slightly larger than the *Bopyrus*-form, not very greatly differing from the male of *Asconiscus simplex* as figured by Sars. There was also present a very much smaller cryptoniscian larva, and a very small duplicate of the bladder-like organism. The relative sizes of these creatures may be judged from the plate, wherein they are drawn to the same scale. If I am right in supposing that the specimens which have lost all clear traces of segmentation belong to *Asconiscus* or some closely allied genus, it will be, I believe, a novelty to find one of the Epicaridea parasitic on one of its own tribe, though there are well-known instances of Epicaridea parasitic on other parasites. *Zeuxo longicollis*, described by Kossmann in his Zool. Ergebnisse einer Reise in die Küstengebiete des rothen Meeres, first part of second half, p. 124 (1880), as figured in his pl. 11, fig. 8, is very like in shape to the occupant of our *Trapezicepon's* marsupium, but with a comparatively long "tap-root" instead of a short one.

Gen. *ERGYNE*, Risso.

1816. *Ergyne*, Risso, Crustacés des environs de Nice, p. 150.

1887. *Portunicepon*, Giard and Bonnier, Travaux Lab. Zool. Wimereux, vol. v., p. 73.

1893. *Ergyne*, Stebbing, History of Crustacea, Internat. Sci. Ser., vol. lxxiv., p. 413.

1900. *Portunicepon*, Bonnier, Les Bopyridæ, p. 276.

The hind lamina of the head has at the outer corners two simple lappets. The peræon carries medio-dorsal bosses. The inner branches of the pleopods are more or less lobed, like the outer branches and the lateral extensions of the segments.

Risso's original species, *E. cervicornis*, was transferred to *Cepon* by Kossmann in 1881. The species of the genus may be distinguished as follows:

Sixth and seventh segments of peræon raised into median bosses. 1. *E. hendersoni* (Giard and Bonnier).

Fifth, sixth and seventh segments so raised. 2. *E. cervicornis*, Risso.

A slight carina rising from the first segment to strongly developed bosses on the last three. 3. *E. savignyi*, n. sp.

31. *Ergyne savignyi*, n. sp. (Plate **10** A.)

Female. Head very broad; in the hind lamina the outer lappet is much longer than the inner, both are microscopically beset with minute setules. The centre of the peræon is slightly angled on the first three segments, more decidedly on the fourth, while each of

the three following segments rises into a very decided prominence, which is a little tip-tilted on the seventh segment.

The maxillipeds have the narrow anterior lobe bordered with eight well separated setæ. Between the lobes a fine membrane projects ending in an emargination between two blunt, not widely separated, apices. This is apparently the lower lip, firmly attached to the maxillipeds.

The outer branches of the five pairs of pleopods are strongly tuberculate on both margins and at least some of them on the surface, the first pair long and broad, and all tending to conceal the inner branches from a dorsal view, and the lateral prolongations of the segments from a ventral view. These prolongations and the inner branches except in size agree much in character with the outer branches. The uropods are single-branched, with the edges moderately incised.

Male. The first antennæ are three-jointed, with four short filaments on the little apical joint. The second antennæ have a setule on the second joint and five short filaments on the fourth, which is the apical joint. In the ventral view of the pleon processes will be seen which appear to represent single-jointed pleopods. Judging by the figures which Bonnier gives of the young male (*Bopyrus* stage), which shows such processes, and of the adult male without them, in *Cancricepon elegans*, it may be supposed that the male in our specimen is not fully adult.

Length of female about 4 mm.

The host was identified by Miss M. J. Rathbun as *Actæa savignyi* (A. Milne-Edwards) in which the parasite occupied the left branchial cavity.

Locality. Cargados Carajos, 30 fathoms.

Gen. *CANCRICEPON*, Giard and Bonnier.

1887. *Cancricepon*, Giard and Bonnier, Travaux Lab. Zool. Wimereux, vol. v., p. 172.

1900. *Cancricepon*, Bonnier, Les Bopyridæ, p. 257.

32. *Cancricepon* sp.

To this genus I refer two specimens, one from the right, the other from the left branchial cavity of a crab identified by Miss M. J. Rathbun as *Pilumnus longicornis*? Hilg., taken on the 18th of October, 1905, in a depth between 22 and 24 fathoms at Amirante. The specimens were alike, both loaded with eggs. The one that was measured only attained a length of 1·5 mm. The medio-dorsal upheaval is faint on the fourth segment of the peræon, but well expressed on the three following segments. The apical lobe of the maxillipeds is rather strongly emarginate and furnished with four or five setules on the concave margin. The secondary lamellæ at the corners of the cephalic lamina are simple, the outer the larger. The uropods are smooth.

The preparation of these small specimens was not sufficiently successful to enable me to give satisfactory figures. I have therefore abstained from giving a specific name.

As compared with *Cancricepon elegans* (Giard and Bonnier), which attains a length of over 9 mm., the small size of the present form adds to the probability that it is specifically distinct.

Gen. *GIGANTIONE*, Kossmann.

1881. *Gigantione*, Kossmann, Zeitschr. wiss. Zool., vol. xxxv., p. 655.

1887. *Gigantione*, Giard and Bonnier, Travaux Lab. Zool. Wimereux, vol. v., pp. 13, 74, etc.

1900. *Gigantione*, Bonnier, Les Bopyridæ, p. 276.

In the female all the segments of peræon and first five of pleon are laterally produced, the extensions on the right side being very considerable. First antennæ of female having the first joint developed into a large pad, against which the two following joints appear to be flattened about at the middle, the third joint very small. The second antennæ five-jointed in the female, six-jointed in the male. Maxillipeds of the female with principal lobe nearly circular, fringed with setules, showing no palp-like prominence. Limbs of the peræon with finger well developed in the male but almost obsolete in the female. Pleopods of the female two-branched, diminishing in size successively from the first to the fifth, with varying development of fringing lobules. Pleopods of the male simple, ovoid, diminishing in size from first to fifth. Uropods in the female very small, but with distinct peduncle and two branches, in the male each consisting of a single piece larger than the preceding pleopod.

Gigantione moebii, Kossmann, for which the genus was founded, measured in the female 15 mm. It was taken at Mauritius from the branchial cavity of *Rüppellia impressa*, de Haan. The pleopods of the male are figured more than twice as long as broad.

Gigantione bouvieri, Bonnier, measures in the female scarcely 3 or 4 mm. It was taken off the Azores from the branchial cavity of *Pilumnus hirtellus* (Linn.), var. *inermis*, A. Milne-Edwards and Bouvier. The branches of the uropods in the female are described as cylindrical, slender at the free extremity.

33. *Gigantione rathbunæ*, n. sp. (Plate **11** A.)

This species agrees very closely with the preliminary description of *G. bouvieri*, which is unfortunately not accompanied by illustrative drawings. Its size, in the female not quite 4 mm., agrees with that of Bonnier's species. Both differ in one respect from Kossmann's generic account, in that the last pleon segment is not produced into lateral lobes, but on that point Kossmann's own figures do not appear to be in accord with his statement.

In the new species eyes are visible, not only in the male, but also in the female. In *Pseudione hoylei*, the visibility of the eyes in a female 12 mm. long is regarded by Bonnier (Op. cit., p. 309) as an indication that the specimen was not yet quite adult. In the present case that inference can scarcely be drawn, since a multitude of young ripe for discharge were in the Epicaridean stage.

The characters of the antennæ, mouth-organs, and other appendages, so far as they could be made out, will be best understood by the figures. With one or two exceptions they do not appear to offer any solid specific characters. Concerning the uropods of the female Bonnier says that in his species they are in accord with the generic character,

having a broad, perfectly distinct peduncle, which carries two little cylindric branches, slenderly drawn out (effilées) at their free extremity, and almost equal. In the new species these branches are of equal breadth all along. The uropods of the male are a broad oval, closely adjacent, extending beyond the sixth pleon segment, each nearly equalling it in size.

Locality. The species was obtained from the left branchial cavity of *Actæa polyacantha* (Heller), at the Salomon Isles, and forwarded to me, with subsequent determination of the host, by the distinguished carcinologist, Miss Mary J. Rathbun, after whom I have the pleasure of naming it. The male was lying transversely across the end of the pleon.

EXPLANATION OF THE PLATES.

Plate 5.

Kalliapseudes makrothrix, n. g. and sp.

n.s. Line indicating length of specimen figured below.

C.V., a.s. Ventral view of head (distal margin) supporting the first antennæ and one of the second antennæ.

a.i. Second antenna.

Per. s. 7., *prp.* 5., *Pl., urp.* Dorsal view of fifth peræon segment and the pleon, with fifth peræopod and the uropods in position.

m., m., mx. 1., *mx.* 2., *mxp., mxp.* The mandibles (much broken), the first and second maxillæ (not very distinctly seen), the maxillipeds (detached one from the other).

gn. 1., *gn.* 2., *prps.* 2, 3, 4, 5. First and second gnathopods, second, third, fourth, and fifth peræopods. The fingers of all but the first gnathopods and some spines and setæ are separately given on the same scale of enlargement as the mouth-organs, which is higher than that of the other detail figures.

plp. 1. First pleopod.

Plate 6.

A. *Janira crosslandi*, Stebbing.

n.s. ♂. Line indicating actual length of male specimen figured below in lateral view (*L*), and in dorsal view, minus the head (*D*).

a.s., a.i., a.i. juv. First and second antennæ with higher magnification, only the first four joints of second antennæ from the adult, but this appendage complete from the marsupial young.

l.s., l.i. Upper and lower lips.

m., m., mx. 1., *mx.* 2, *mxp.* The mandibles, first and second maxillæ, and maxillipeds (in part).

gn. 1., *gn.* 2., *prp.* 5. First and second gnathopods and fifth peræopods, to the same scale as the antennæ.

plps. 1, 2, 3. First, second, and third pleopods of the male, on the same scale of magnification as the mouth-organs, higher than that of the gnathopods.

operc. ♀. Opercular plate (first pleopods) of female, to the same scale as dorsal view of the male.

urp. Uropod of marsupial young, to the same scale as separate gnathopods of male.

B. *Parapseudes hirsutus*, n. sp.

n.s. Line indicating length of specimen in curvature as in the lateral view below.

C.V., a.s., a.i. Ventral view of head with first peræon segment, the eyes and one each of the first and second antennæ in position.

Pl., urp. Dorsal view of pleon and part of seventh peræon segment; uropods in position, outer branch on right imperfect.

m., *m.*, *l.i.*, *mx.* 1, *mxp.* Mandibles, lower lip (in part), first maxilla, and maxillipeds.

gn. 2., *prps.* 1, 2, 3, 4, 5. Second gnathopod and the five peræopods, but only terminal part of the third peræopod drawn, and that on a higher scale of magnification, agreeing with the mouth-organs and the higher enlargement of the distal parts of the second gnathopod and the second peræopod.

Plate 7.

A. *Calathura sladeni*, n. sp.

n.s. Line indicating actual length of the specimen figured below in dorsal and lateral view.

a.s., *a.i.* First and second antennæ.

l.i., *m.*, *mx.* 1., *mxp.* Lower lip, mandible, first maxilla, and maxillipeds, these parts magnified on a higher scale than the other details.

gn. 1., *gn.* 2., *prps.* 1, 5. First and second gnathopods, first and fifth peræopods.

plp. 2, *urp.*, *T.* Second pleopod, uropod and telson.

B. *Apanthura xenocheir*, n. sp.

n.s. Line indicating actual length of the specimen figured below in dorsal and lateral view.

C., *a.s.* Head, with first antenna on the right in position.

a.i. Second antenna.

m., *m.*, *mx.* 1. The mandibles and first maxilla, magnified on a higher scale than the other details except the distal portion of the first gnathopod.

gn. 1., *gn.* 2., *prp.* 5. First and second gnathopods and fifth peræopod.

Pl., *urp.*, *urp.* Dorsal view of pleon with the uropods.

Plate 8.

A. *Eurydice humilis*, n. sp.

n.s. Line indicating length of male specimen figured below in three-quarter view.

C., *a.s.*, *a.i.* The head, with first and second antennæ much more enlarged.

Pl. Part of pleon, enlarged to the same scale as the preceding and other detail figures, with the exceptions subsequently mentioned.

l.s. Upper lip.

m., *m.* The mandibles.

gn. 1., *gn.* 2., *prps.* 1, 2, 3, 4, 5. The two gnathopods and five peræopods in order.

plp. 2. The second pleopod, with higher magnification of the male appendix, to the same scale as the mouth-organs.

urp. One of the uropods.

B. *Pontogelos aselgokeros*, n. g. and sp.

n.s. Line indicating real length of specimen in lateral view on left of plate.

C.D., *C.V.* Dorsal view of head more enlarged with basal parts of first and second antennæ; and ventral view of head with frontal lamina and first peræon segment.

Pl.D., *urp.* Dorsal view of pleon (in part) with the uropods.

a.s., *a.i.* First and second antennæ.

m., *m.* The mandibles. The third joint of palp missing in one and its apex broken in the other.

l.i., *mx.* 1., *mx.* 2., *mxp.* Lower lip, first and second maxillæ and maxillipeds, all the mouth-organs magnified on a uniform scale.

gn. 1., *gn.* 2., *prps.* 1, 2, 3, 4, 5. First and second gnathopods and first to fifth peræopods.

plps. 1, 2, 3. First to third pleopods, the masculine appendix of the second pair more enlarged, on the same scale as the mouth-organs, which is much higher than that of the other details.

Plate 9.

A. *Argathona reidi*, n. sp.

n.s. Dorsal view of specimen, natural size.

C., Per. s. 1., *a.i.* Dorsal view of head and first peræon segment magnified, with first and second antennæ of left side *in situ*. Profile view of detached head on the right.

T., urp. Telsonic segment and uropod of left side to the same scale as the preceding figure and as the detail figures of antennæ, limbs, and pleopod.

a.s., a.i. First and second antennæ.

ep. Epistome, with frontal lamina. This and the mouth-organs are magnified to a higher scale than the preceding figures.

m., m., mx. 1, *mx.* 2., *mxp.* The mandibles, first and second maxillæ, and maxillipeds.

gn. 1., *prp.* 5., *plp.* 2. First gnathopod, fifth peræopod, and second pleopod. The spines besetting the distal margin of the peræopod's fifth joint are separately shown on a higher scale than any of the other figures.

B. *Æga ommatophylax*, Stebbing.

n.s. Line indicating natural size of the juvenile specimen figured above in dorsal aspect.

prp. 4, *prp.* 5. Fourth and fifth peræopods.

C. *Paracilicæa hanseni*, n. sp.

n.s. Lines indicating natural size of specimen figured in dorsal aspect.

l.s. Epistome and upper lip.

a.s. First antenna.

plp. 2., *m.a.* Second pleopod, with much higher magnification of the separated masculine appendix.

T., urp. Telsonic segment in dorsal view, with the uropods *in situ*. All the details are drawn to the same scale, except the separated appendix.

D. *Cymodoce zanzibarensis*, n. sp.

n.s. Lines indicating natural size of specimen figured in dorsal aspect.

plp. 2., *m.a.* Second pleopod, with much higher magnification of the separated masculine appendix.

T., urp. Telsonic segment with right uropod *in situ*. The details, except the separated appendix, are drawn to the same scale.

Plate 10.

A. *Ergyne savignyi*, n. sp.

n.s. Lines indicating natural size of female specimen figured in dorsal, lateral, and ventral positions, marked respectively *D*, *L*, and *V*.

l.C., mxp. Maxillipeds in conjunction with hind lamina of the head.

Pl.V. Ventral view of pleon, showing on the left only the inner branch of the last three pleopods and the uropod, this and the preceding figure more highly magnified than the figures of the complete specimen.

n.s. ♂. Line indicating actual length of male specimen in dorsal view below.

♂. *V.* Ventral view of male more highly magnified, limbs of peræon omitted, except first gnathopod.

a.s. ♂, *a.i.* ♂, *gn.* 1. ♂. First and second antennæ and first gnathopod of male more enlarged, on the same scale as the tip of the head's lateral lappet and the front lobe of the maxilliped of the female.

B. *Dactylokepon catoptri*, n. sp.

n.s. ♀. Line indicating length of female specimen figured below.
Pl.V. Ventral view of pleon much more highly magnified.
l.C. Part of hind lamina of the head.
mxp. A maxilliped.
prp. 5. Fifth peræopod.

C. *Kepon halimi*, n. sp.

n.s. ♀. Line indicating length of female specimen figured below in dorsal view.
Pl.V. Ventral view of pleon, more enlarged, with higher magnification of some inner branches of the pleopods, those on left of the figure being closely curled.
l.C., *mxp.*, *gn.* 1. A figure showing together *in situ* the hind lamina of the head, the maxillipeds, and one of the first gnathopods with part of its marsupial plate. Also *gn.* 1 more enlarged.
prp. 5. Fifth peræopod of female, this and the preceding figure on the same scale as the ventral view of the pleon.
♂. The male magnified to the same scale as dorsal view of female, and above much more enlarged ventral view of male, without limbs of the peræon, except one first gnathopod.
C.D. ♂., *C.V.* ♂. Dorsal and ventral views of head of male, more enlarged.
gn. 1. ♂. First gnathopod of male more enlarged.

PLATE 11.

A. *Gigantione rathbunæ*, n. sp.

n.s. ♀. Lines indicating natural size of female in dorsal view, not including in the width the marsupial plates.
n.s. ♂. Line showing real length of male specimen figured below on the same scale as figure of female. A much more enlarged figure of the male on the left.
a.s., *a.i.* First and second antennæ of the female.
os., *m.m.* Mouth, showing the mandibles, not covered by the first antennæ or maxillipeds.
prp. One of the hinder peræopods of the female, with lateral lobe of segment.
Pl.V. Ventral view of pleon of female, with its five pairs of pleopods, and the uropods; part of first pleon segment not shown.
C.V. ♂. Ventral view of head of male, showing between the eyes the maxillipeds, flanked by the rudimentary second maxillæ, and, above, the mandibles projecting between the first antennæ, which are placed between the second antennæ.
gn. 1. ♂, *prp.* 5, ♂. First gnathopod and fifth peræopod of male.
plps. 2, 3, 4, 5, ♂. Second to fifth pleopods of male.

The ventral view of the female pleon is less highly magnified than the other details, which are on the same scale for male and female.

B. *Trapezicepon amicorum* (Giard and Bonnier).

n.s. ♀. Lines indicating natural size of female figured below.
Pl.V. Ventral view of pleon, more enlarged.
Pl.D. Dorsal view of pleon (part).
urp. Uropod.
n.s. ♂. Line showing length of male specimen figured below.
a.i. ♂., *gn.* 1. ♂. Greatly enlarged figure of male in ventral view, second gnathopod and five peræopods omitted from right hand of the figure, the first and second antennæ and first gnathopod separately more enlarged.
x. *x'*. Supposed females of unknown species, drawn to the same scale as the figures above them.

cr. Cryptoniscian form, of which the ventral view is shown in much higher magnification, the last four pairs of peræopods being omitted except one member of the last pair, and all five pairs of pleopods except one member of the first pair.

prp. 5., *plp.* 1. The fifth peræopod and first pleopod of the last-mentioned figure shown separately more enlarged.

cr'. Smaller cryptoniscian form, magnified on the same scale as the upper one, the separate figure of the uropod being enlarged to the same scale as the uropod in the figure below.

The six figures of complete specimens in the upper part of the plate are all of uniform enlargement.

C. *Dactylokepon richardsonæ*, n. sp.

n.s. Line showing actual length of specimen figured, from which the pleon is detached.

Pl.V., urp. Ventral view of pleon more highly magnified than the figure showing dorsal view of head and peræon.

l.C., mxp. The maxilliped in conjunction with hind lamina of the head, of which the digitate lateral lobes are shown separately in higher magnification.

PERCY SLADEN TRUST EXPEDITION

STEBBING

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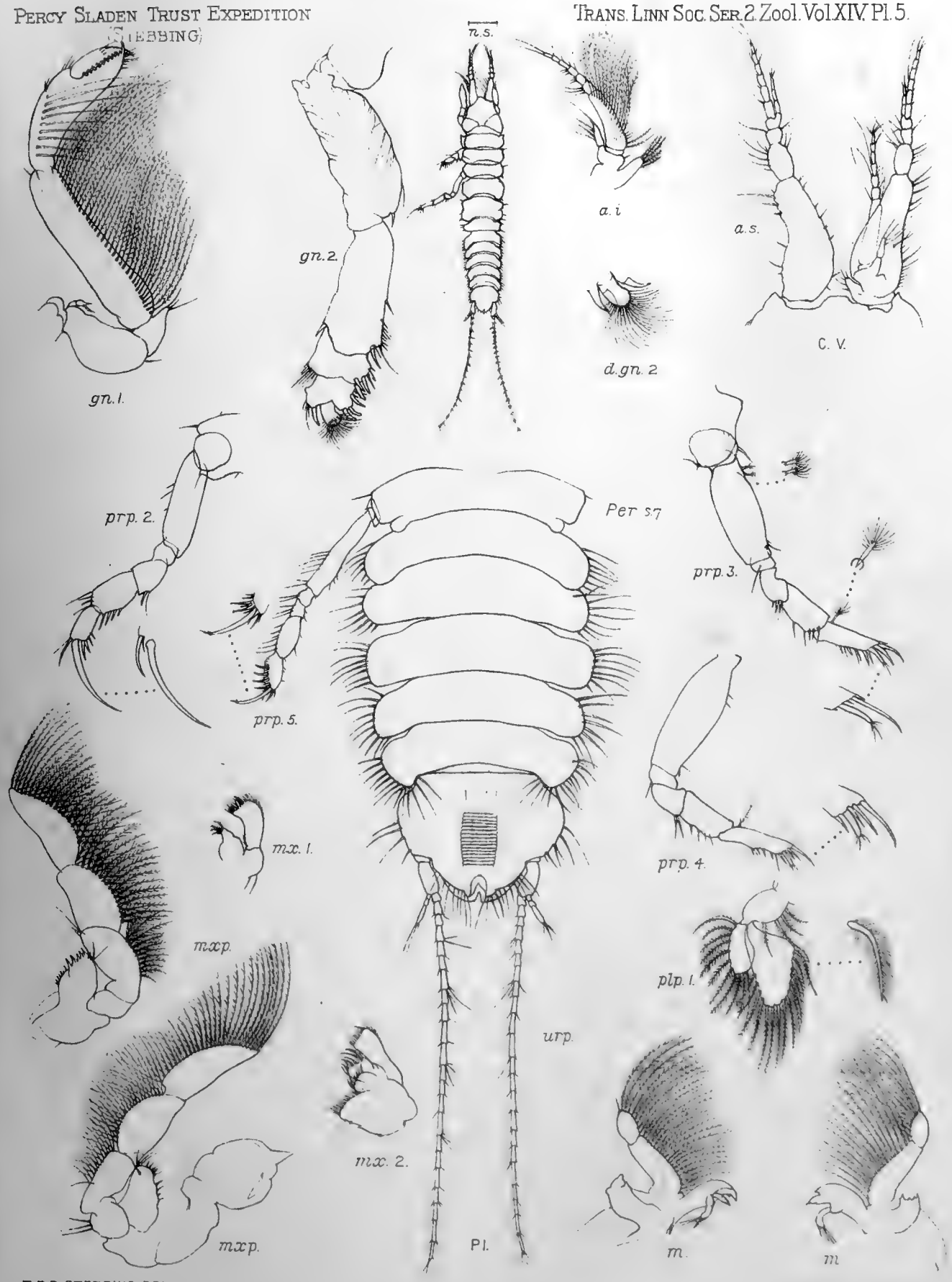
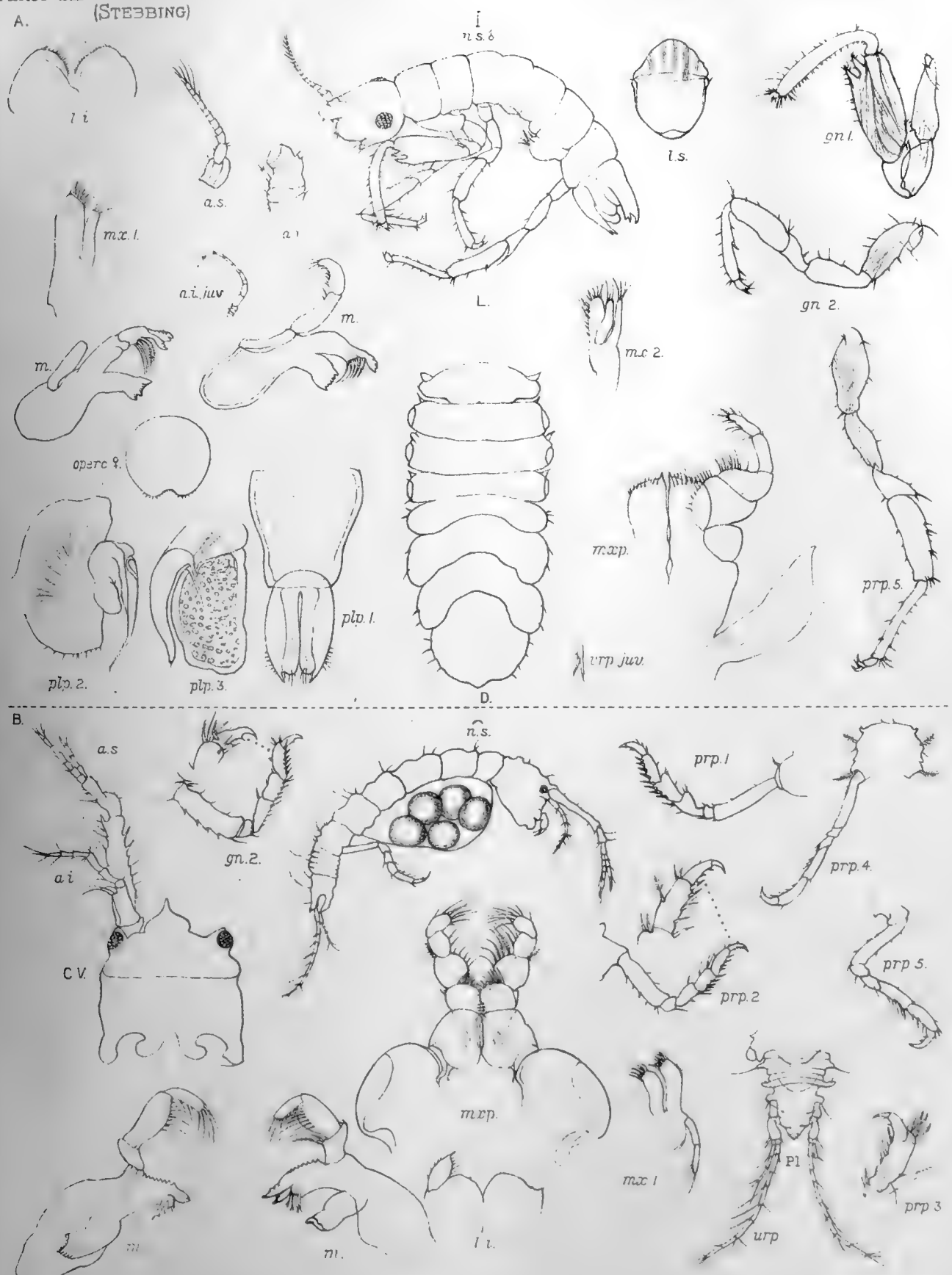


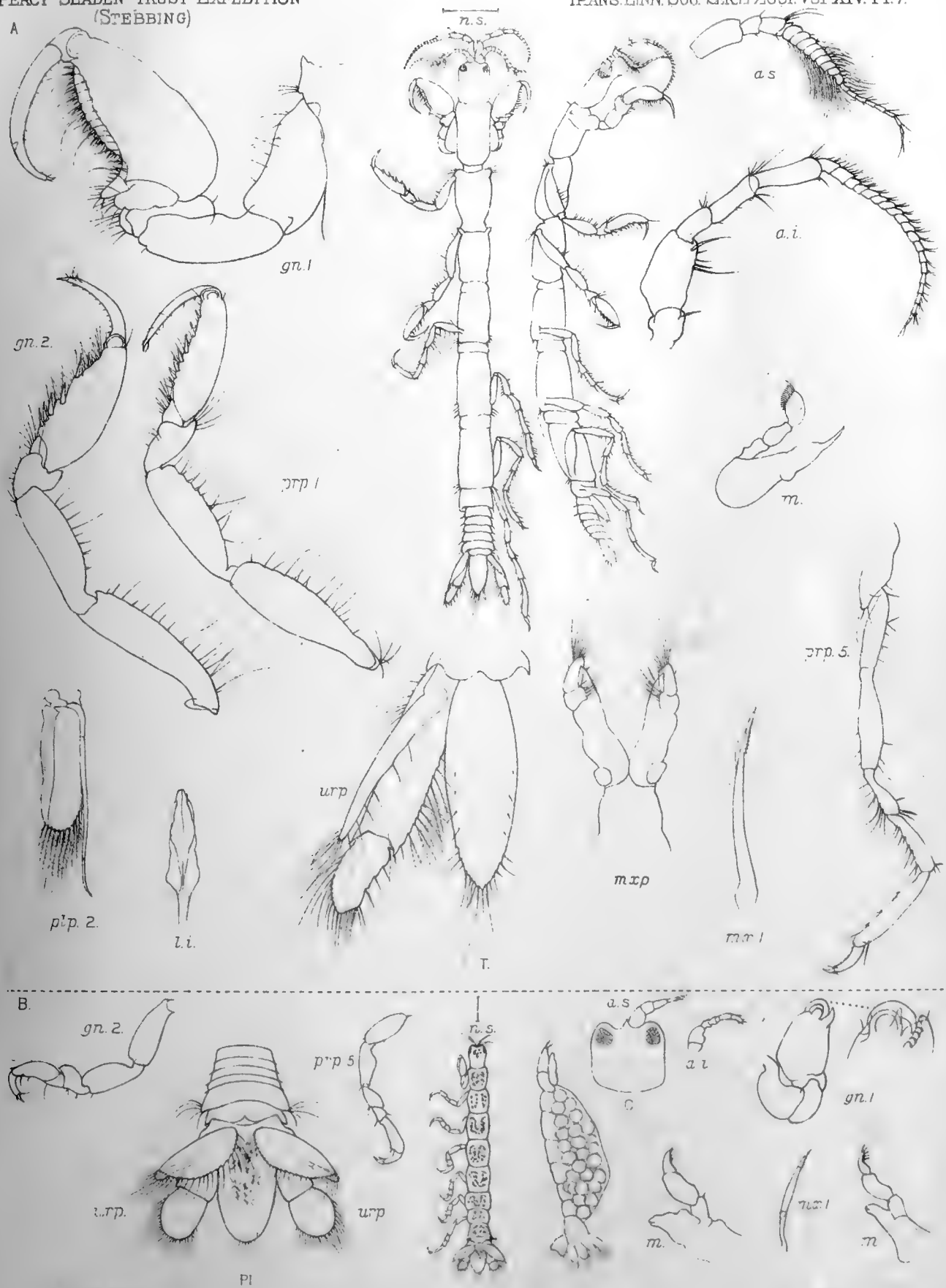
T. R. R. STEBBING, DEL.

J. T. RENNIE REID LITH EDIN.

KALLIAPSEUDES MAKROTHRIX n. g. et. sp.



A. JANIRA CROSSLANDI. Stebbing B. PARAPSEUDES HIRSUTUS n. sp.



T R R STEBBING DEL.

J.T. HENNIE REIDLITH EDIN.

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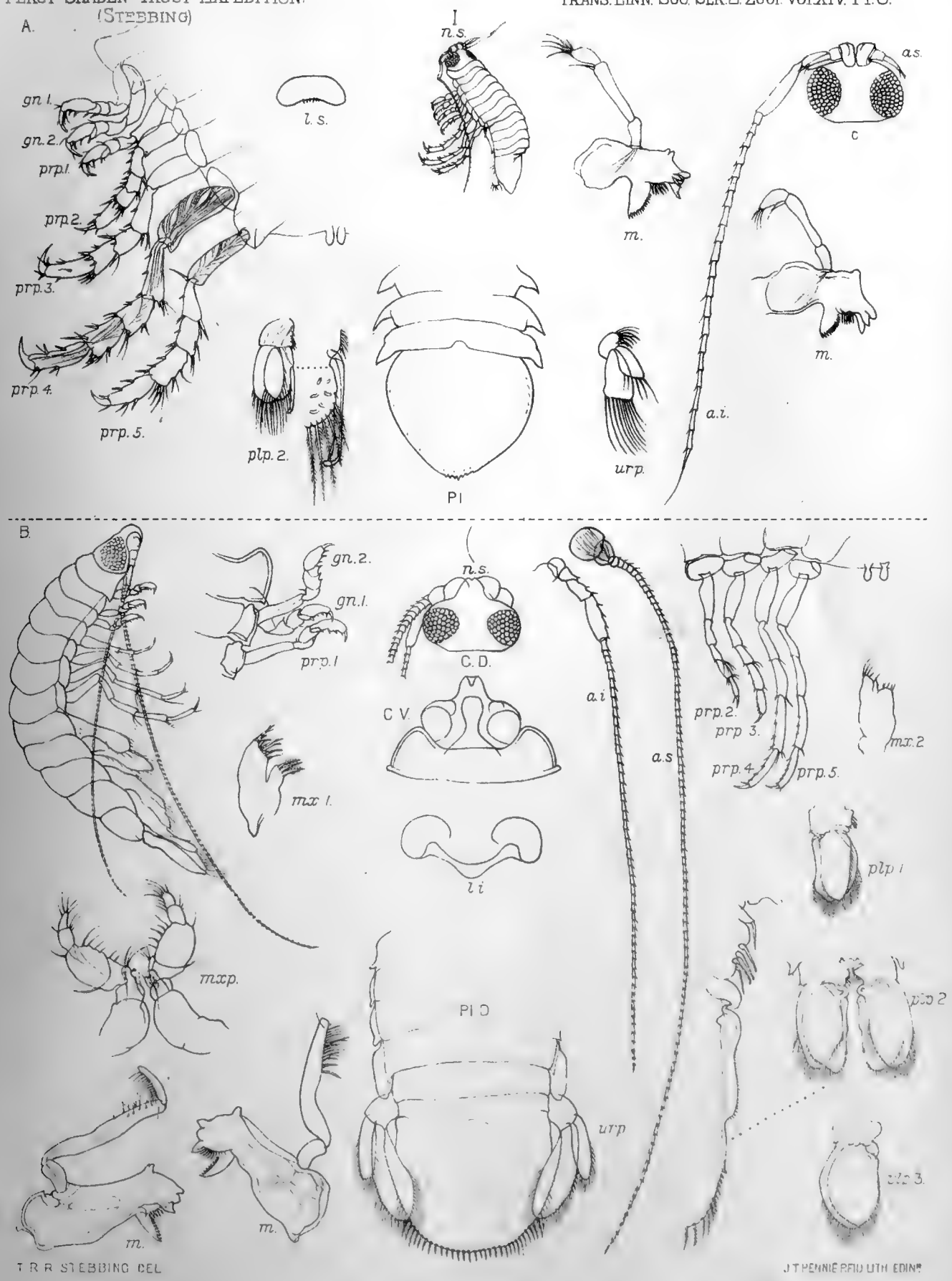
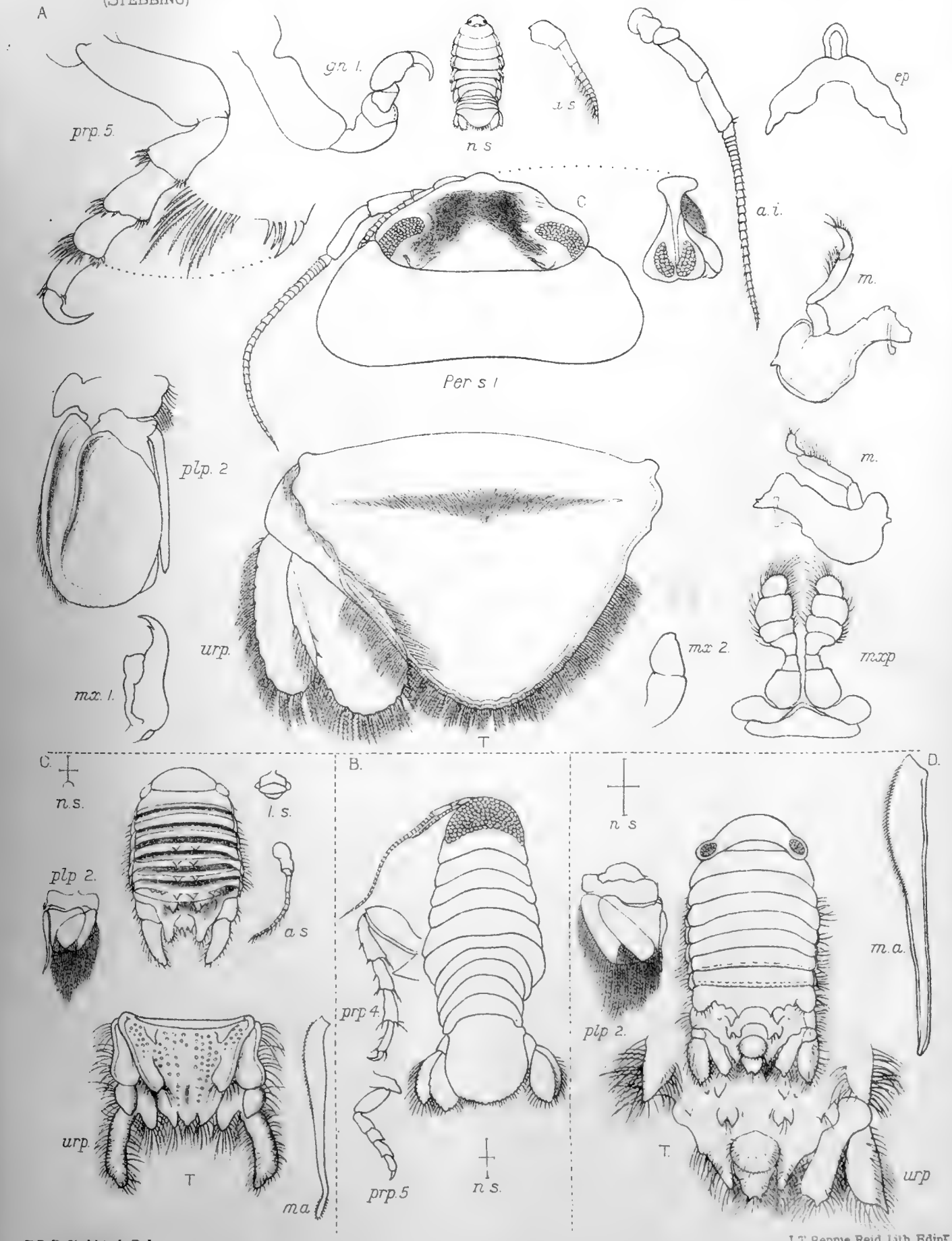


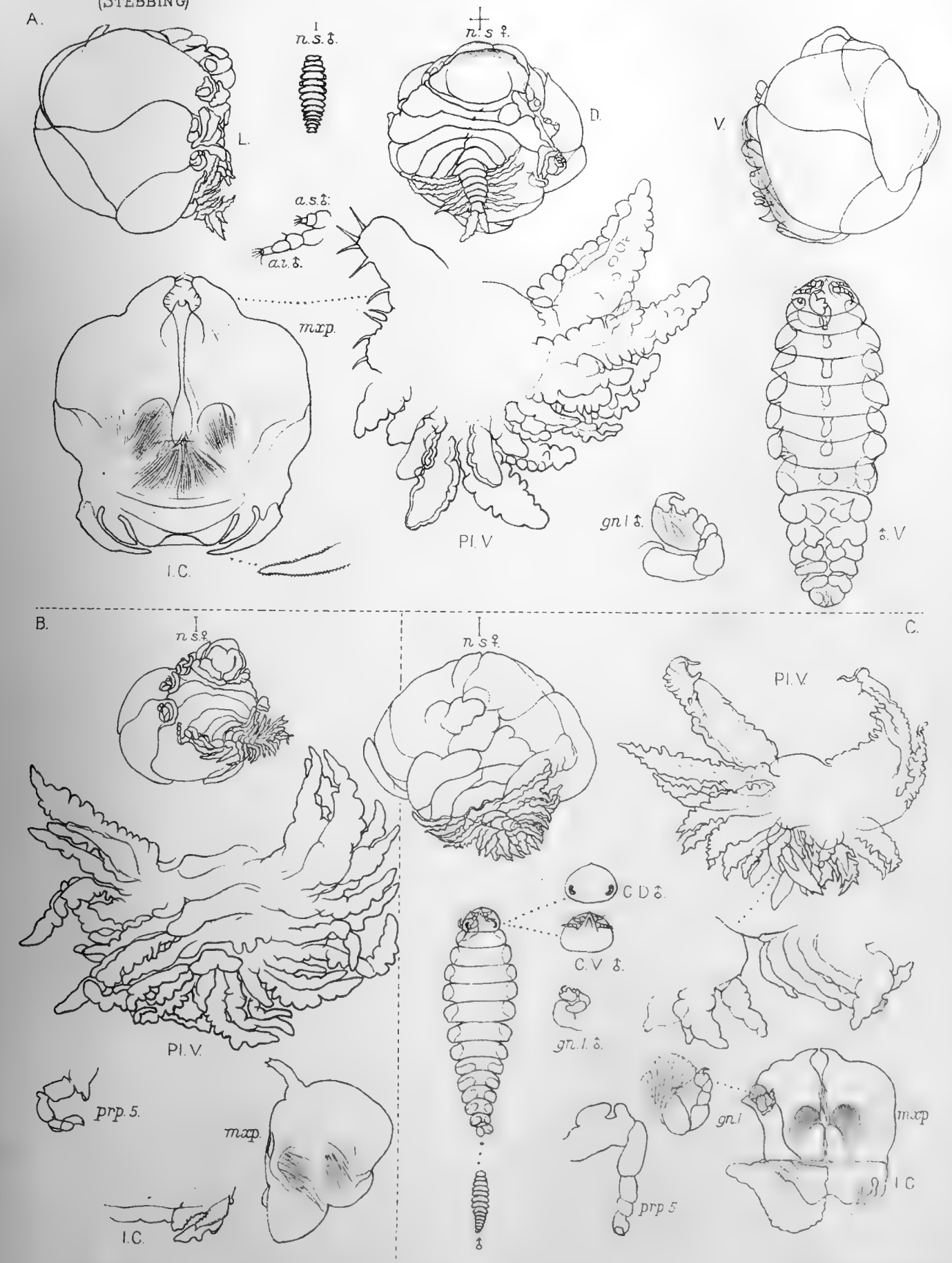
A. EURYDICE HUMILIS n. sp. B. PONTOGELOS ASELGOKEROS, n. sp.



T R R Stebbing, Del.

J T Renme Reid, Lith. Edinr

A. ARGATHONA REIDI n. sp. B. ÆGA OMMATOPHYLAX, Stebbing
C. PARACILICÆA HANSENI n. sp. D. CYMODOCE ZANZIBARENSIS, n. sp.

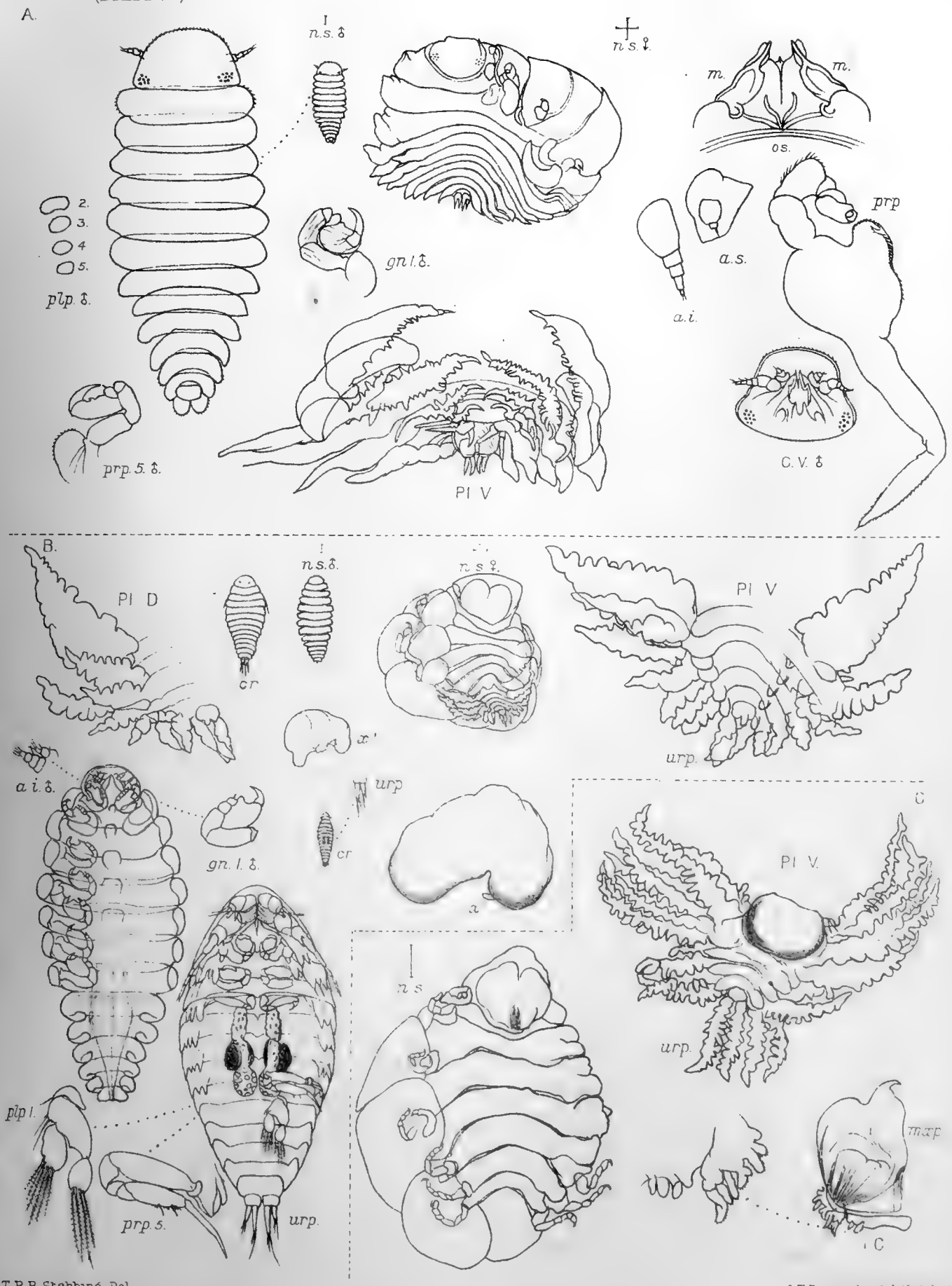


T R R. Stebbing, Del.

J. T. Rennie Reid, Lith. Edin.

A. ERGYNE SAVIGNYI, n. sp.

B. DACTYLOKEPON CATOPTRI, n. sp. C. KEPON HALIMI, n. sp.



T.R.R. Stebbing, Del

J.T. Rennie Reid, Lith. Edinr.

A. GIGANTIONE RATHBUNÆ, n. sp.

B. TRAPEZICEPON AMICORUM (G. & B) C. DACTYLOKEPON RICHARDSONÆ, n. sp

No. VII.—DERMAPTERA.

By Malcolm Burr, D.Sc., F.L.S., F.E.S.

(Text-figures 1—6.)

Read 21*st* April, 1910.

Our knowledge of the Dermaptera of the Seychelles has hitherto been confined to a brief paper by de Bormans (Ann. Soc. ent. Fr., 1895, pp. 387, 388) upon the material obtained there by M. Charles Alluaud. Only four species are recorded, which must be reduced to three, since we now sink one of them as a synonym of another, and that is a cosmopolitan species. On this meagre material, the author was able to state that the Seychelles Dermaptera-fauna has more in common with Ceylon than with that of Africa. This conclusion is not vitiated by the incorrect determination of one of the three remaining species, since de Bormans mistook one Singalese species for another inhabiting the same island. His fourth species is also probably incorrectly determined, but is certainly purely Oriental.

The Gardiner-Scott collection consists of twelve species. From a zoogeographical point of view, we may omit three of these, namely *Labidura riparia* Pall, which is cosmopolitan, *Labia curvicauda* Motsch., which is nearly so, and *Chelisoches morio* Fabr., of which a single specimen was brought from the Farquhar Atoll; it is moreover abundant throughout the Oriental Region, and the Pacific islands; it is still artificially extending its distribution, since it appears to have obtained foothold on the coast of East Africa, and has been transported by shipping even to England.

Another species, *Borellia ståli* Dohrn, is distributed throughout the Oriental Region from Java to India, is common in Madagascar, and has also obtained a foothold on the East Coast of Africa.

The three new species may be, I think, safely regarded as peculiar to the Seychelles, as they appear to occur under purely natural conditions, and one at least, *Brachylabis scotti*, is a member of an archaic apterous group which is represented throughout the tropical world by isolated species.

Of the remaining species, *Labia alluaudi* and *Echinosoma bolivari* are known only from the Madagascar group of islands; *Platylabia thoracica* Dohrn is a truly Oriental species. There remain two, *Psalis dohrni* Kirby, and *Labia pilicornis* Motsch.: of these the former is only known from Ceylon and Travancore and the latter is supposed to be peculiar to Ceylon.

So we see that de Bormans' conclusions, though based on totally insufficient evidence, are not far wrong.

LABIDURIDÆ. ECHINOSOMATINÆ.

Gen. *ECHINOSOMA*, Serville.

1839. Orth. p. 34.

1. *Echinosoma bolivari*, Rodz., var.

Echinosoma bolivari, Rodz., 1897, Wien, Ent. Zeit. xvi. p. 154.

The true *E. bolivari*, from Madagascar, is a large species, with plain black pronotum, elytra and femora, and plain orange wings. The specimens from the Seychelles are of the same size, but the pronotum is dusky brown, the wings have a large, central dusky spot, and the femora are dirty yellow.

These features are quite as good as any which have yet been used to separate the various species of *Echinosoma*, but as I am at present endeavouring to arrange the genus on structural grounds, I refrain from describing this as new, although it is every bit as distinct as are the several so-called African and Oriental species from each other. Very probably it will be necessary to sink as mere colour-varieties several of these so-called species, and I have not hesitated to fuse two Oriental ones in a recent work.

These specimens from the Seychelles differ in the structure of the antennæ and in size from the Singalese *E. parvulum* Dohrn: they differ totally in pattern, coloration and stature from *E. congolense* Bor. (W. Africa), and *E. sekalavum* Borm. (Madagascar); also from *E. forbesi* Kirby (New Guinea) in the structure of the abdomen; also from the abundant Oriental *E. sumatranum* Haan (=*E. westermanni* Dohrn) in size, coloration and distribution: they differ from *E. concolor* Bor., and *E. fuscum* Bor., and *E. afrum* Beauv. (W. Africa), in the spotted wings; from *E. yorkense* Dohrn (N. Australia) in the brown elytra and other features; they differ entirely in coloration, and in the entire penultimate ventral segment of the male, from *E. occidentale* Borm. (W. Africa); from *E. wahlbergi* Dohrn (E. Africa) in the uniform dull brown pronotum and narrow pygidium of the female, and from *E. insulanum* Karsch (Madagascar) in the all brown pronotum and yellow legs.

Possibly *E. insulanum*, *E. bolivari* and this species must be united.

Locality. Seychelles. Silhouette: near Mt Pot-à-eau, VIII. 1908, 1 ♂; Mare aux Cochons, forest and plateau above, 2 ♂, 1 ♀, IX. 1908.

PSALINÆ.

Gen. *PSALIS*, Serville.

1831. Ann. Soc. Nat. xxii. p. 34.

2. *Psalis dohrni*, Kirby.

Nannopygia dohrni, Kirby, 1891, Linn. Soc. Journ. Zool. xxiii. p. 508.

Nannopygia dohrni, Borm., 1900, Forf. p. 11.

Labidura femoralis, Dubr., 1879, Ann. Mus. Civ. Gen. xiv. p. 353 (err., non Dohrn).

Psalis femoralis, Borm., 1895, Ann. Soc. Ent. Fr. p. 387 (err., nec Burr).
Carcinophora cæruleipennis, Borm., 1900, Forf. p. 40.
Carcinophora dohrni, Burr, 1901, Journ. Bombay N. H. Soc. p. 328, pl. B, fig. 8.
Carcinophora dohrni, Kirby, 1904, Cat. Orth. i. p. 15.
Psalis dohrni, Burr, 1910, Derm. Ind. p. 76, fig. 19.

Since de Bormans confused this species with the true *P. femoralis* of Dohrn, writing under the name of Dubrony in 1879, I feel convinced that he made the same error in 1895, in his paper on Seychelles Earwigs, when he reports *P. femoralis* from Mahé, and I accordingly add this reference to the synonyms of *P. dohrni*. Corroborative evidence is afforded by a female from Coetivy which I cannot distinguish from undoubted Singalese specimens of *P. dohrni*.

Locality. Coetivy, 1 ♀, 1 larva; and probably referable here 1 young larva from Mahé, Cascade Estate, about 1000 ft., II. 1909.

Gen. *BORELLIA*, Burr.

1909. Deutsch. Ent. Zeit. p. 325.

3. *Borellia ståli*, Dohrn.

Forcinella ståli, Dohrn, 1864, Stett. Ent. Zeit. xxv. p. 286.
Anisolabis ståli, Borm., 1900, Forf. p. 45.
Anisolabis ståli, Burr, 1907, Voeltzkow, Reise in Ostafrika, p. 56.
Borellia ståli, Burr, 1909, op. et loc. cit., id. Derm. Ind. p. 88.

This species is widely distributed from the Malay Archipelago to East Africa. It was taken by Voeltzkow in Madagascar and the Comoro Islands.

Localities. Seychelles, Mahé: low country, 1 ♀; near Morne Blanc, 1 ♂, 1 ♀, X. 1908; Port Victoria, 1 ♂, 2 ♀, XII. 1908; Cascade, 1500 ft., 1 ♂, 1 ♀, I. 1906; marshes on coastal plain at Anse aux Pins and Anse Royale, 19—21. I. 1909, 1 larva; Long Island, 4 larvæ, 12—22. VII. 1908. Bird Island, VII. 1908, 1 larva (J. C. F. Fryer). Dennis Island, VIII. 1908, 2 larvæ (J. C. F. Fryer). Cosmoledo, 4 ♂, 2 ♀, 2 larvæ, 1907 (H. P. Thomasset). Aldabra: Takamaka, 1 ♂, 1907 (H. P. Thomasset). Amirante Islands: Eagle Island, 2 ♂, 1 ♀, 4 larvæ, X—XII. 1905; d'Arros Island, 1 ♂, 1 ♀, 1 larva, 12. X. 1905; Desroches Island, 1 larva, V—XII. 1905. Farquhar Atoll, 3 ♂, 3 ♀, 7 larvæ, V—XII. 1905. Cargados Carajos Islands, 9 ♂, 5 ♀, 4 larvæ, 1905. Chagos Islands: Egmont Island, 1 ♀, 2 larvæ, 1905.

Immature specimens of the above species are practically indistinguishable from those of the cosmopolitan and abundant *Anisolabis annulipes* Luc.; but as all the adult specimens quoted above are of *Borellia ståli*, I have referred the larvæ to them also.

LABIDURINÆ.

Gen. *LABIDURA*, Leach.

1815. Edinb. Enc. ix. p. 118.

4. *Labidura riparia*, Pall.

Forficula riparia, Pallas, 1773, Reise Russ. ii. Anhang. N. 727.

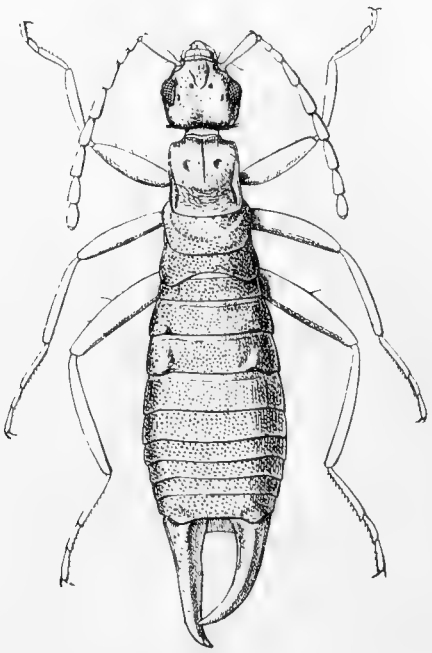
All the specimens are rather small, and the two points of the last dorsal segment of the male are missing, so that they approach the var. *inermis* Br., abundant in India. In most instances the wings are very small, and scarcely protrude beyond the elytra. The species is excessively variable and absolutely cosmopolitan.

Localities. Assumption, 1 ♀, IX. 1908 (J. C. F. Fryer). Cargados Carajos Islands, 16 ♂, 11 ♀, 9 larvæ, 1905. Chagos Islands, 1 ♂, 1 larva, 1905.

BRACHYLABINÆ.

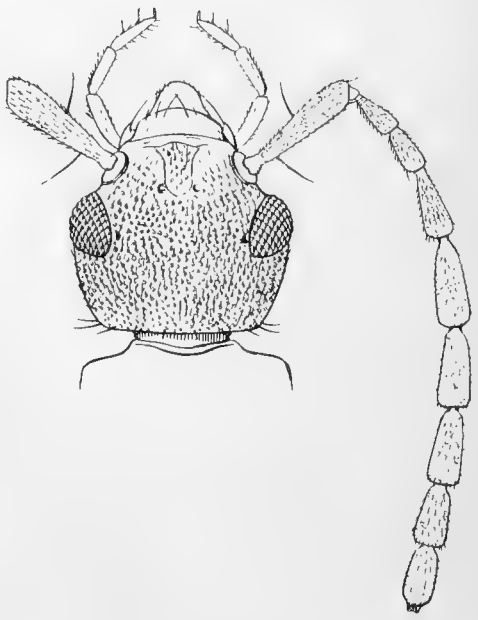
Gen. *BRACHYLABIS*, Dohrn.

Fig. 1.



Brachylabis scotti. ♂. ×10.

Fig. 2.



Brachylabis scotti. ×30.

1864. Stett. Ent. Zeit. xxv. p. 297.

5. *Brachylabis scotti*, sp. n.

Statura minore, sat robusta; oculi parvi, anteriores; antennæ segmentis 10, elongatis conicis; mesonotum obtuse carinatum; abdomen dilatatum; forceps paullo arcuatus.

	♂
Long. corporis	6 mm.
Long. forcipis	1·5 mm.

Small, black ; head and thorax reddish ; the whole body finely punctulate.

Head smooth, tumid, globose ; eyes small, anterior.

Antennæ with 10 segments ; first not strongly clubbed ; third and fourth about equally long, conical ; the rest longer and stouter, all conical.

Pronotum slightly longer than broad, parallel-sided, the sides reflexed, with a distinct median suture and an impression on each side of the prozona.

Mesonotum ample, with a distinct, but not very sharp keel which dies out before reaching the posterior margin.

Legs long and slender ; the femora blackish, passing to yellowish at the knees ; the slender tibiæ compressed ; tarsi yellowish.

Abdomen narrow at the base and gently dilated to about the sixth segment and then gently narrowed again ; lateral tubercles on the fourth segment distinct.

Last dorsal segment transverse, short with a faint median sulcus.

Forceps with the branches remote, cylindrical, tapering, feebly arcuate.

♀ unknown.

This species is more nearly related to *Nannisolabis willeyi* Burr, and *D. philetas* Burr, from Ceylon, than to *Metisolabis malgacha* Burr, from Madagascar, which has large and lateral eyes. The keel, however, of the mesonotum, though neither long nor sharp, is quite distinct, so we cannot place the species in *Nannisolabis*. The presence of this keel, at the same time as the normally situated small eyes make it necessary for us to place it in the genus *Brachylabis*, which should be retained for the typical Chilian species, *B. chilensis* Blanch. This arrangement is unnatural, and must be regarded as provisional, for the system will probably be modified considerably when more material has been accumulated and more species known of this curious and interesting group.

I take pleasure in dedicating this species to Mr Hugh Scott.

Locality. Seychelles. Silhouette: from high forest near Mt Pot-à-eau, 1 ♂, VIII. 1908. Praslin: Coco-de-Mer forest in the Vallée de Mai, 1 larva, 28. XI. 1908.

LABIIDÆ. LABIINÆ.

Gen. *LABIA*, Leach.

1815. Edinb. Enc. ix. p. 118.

6. *Labia alluaudi*, Burr.

Labia alluaudi, Burr, 1904, Tr. ent. Soc. p. 297.

This handsome species was discovered by M. Charles Alluaud in Madagascar at Diego Suarez ; it is also recorded from Nossibé.

Locality. Seychelles. Silhouette: marshy plateau of Mare aux Cochons, about 1000 ft., 1 ♂, 27. VIII. 1908; Mare aux Cochons, on or quite near the plateau, 1 ♂, IX. 1908.

7. *Labia curvicauda*, Motsch.

Forfiscelia curvicauda, Motsch., 1863, Bull. Soc. Moscou, xxxvi. p. 2, pl. II. fig. 1 (♂).

Labia curvicauda, Dohrn, 1864, Stett. Ent. Zeit. xxv. p. 428.

Labia curvicauda, Borm., 1895, Ann. Soc. Ent. Fr. p. 388 ; 1900, Forf. p. 70.

Labia curvicauda, Burr, 1909, Derm. Ind. p. 118, fig. 38.
Platylabia dimidiata, Dohrn, 1867, Stett. Ent. Zeit. xxviii. p. 348.
Platylabia dimidiata, Borm., 1895, Ann. Soc. Ent. Tr. p. 387 ; 1900, Forf. p. 74.
Platylabia dimidiata, Borelli, 1907, Ann. Mus. Civ. Gen. (3), iii. p. 382.
Platylabia guineensis, Dohrn, 1867, Stett. Ent. Zeit. xxviii. p. 348.
Platylabia guineensis, Borm., 1900, Forf. p. 75.
Platylabia dimidiata, Dohrn, var. *guineensis*, Dohrn, Borelli, 1907, l. c.
Platylabia camerunensis, Borg, 1904, Ark. f. Zool. i. p. 570, Fab. 26, fig. 4 (♂).
Platylabia dimidiata, Dohrn, var. *camerunensis*, Borg, Borelli, 1907, l. c.

De Bormans treated *P. guineensis* as a synonym of *P. dimidiata* in his paper on the Dermaptera of the Seychelles in 1895, noting that some of his specimens had the pronotum and legs yellow, that the larger specimens approached the *P. dimidiata* form, the smaller ones *P. guineensis*, while others formed the transition: he adds that only the distance between the originally quoted localities led Dohrn to separate them, the intermediate localities not yet having been discovered. But he separated them again in his monograph in 1900, noting that the former only differed in the stronger pubescence and slightly different forceps of the male. Borg in 1904 described as new, under the name *P. camerunensis*, a form having the forceps of the male more feebly arcuate, with an obtuse tooth rather than a rectangular dilatation, and the almost equally long third and fourth antennal segments. In 1907 Borelli reduced *P. guineensis* Dohrn and *P. camerunensis* Borg to the rank of varieties.

In a recent work on the Dermaptera of India (1910), I have sunk all these names as synonyms of *Labia curvicauda* Motsch., as I can find no characters which satisfy me as to their specific rank, although I admit that I have not examined the types of any of these species.

But I have examined a great many specimens from various localities, and continually find all extremes together from one place. Thus, in this collection, there are fourteen males, in some of which the forceps are almost straight, but feebly dilated at the base, whereas in others, these organs are strongly dilated to form an almost rectangular lobe at the base, and then abruptly bowed inwards almost at a right angle; in others, again, they are strongly arcuate. There are gradations between every form.

Most of the specimens are more or less pubescent, and in some the pronotum is yellow, whereas in most it is blackish brown.

This confirms my previously formed opinion that all these forms are mere variations of one and the same species, and I shall continue to regard them as mere varieties of *Labia curvicauda*.

It is a small species which might be easily transported artificially, and I see in its extremely wide distribution no objection to my opinion in favour of their identity; it appears to be as abundant in West Africa as in Ceylon, Burma, Madagascar, Java and in my own collection I possess specimens from Brazil and the West Indies.

Localities. Seychelles. Mahé: near Morne Blanc, from leaf-bases of growing *Stevensonia* palm, 1 ♂, IX—X. 1908. Long Island, 2 ♂, 1 ♀, 12—22. VII. 1908. Silhouette: Pointe Étienne, low coconut-planted country near the coast, 3 ♀, 17. IX. 1908; near

Mt. Pot-à-Eau, 1 ♂, 2 ♀, VIII. 1908; Mare aux Cochons, 1 ♂, 1 ♀, 1 larva, IX. 1908; the forest above, 7 ♂, 5 ♀, 3 larvæ, IX. 1908; the plateau and jungle near by, 2 ♂, 2. VIII. 1908; under the bark of stem of *Dracæna*, 2 ♂, IX. 1908. Praslin: Coco-de-Mer forest in the Vallée de Mai, 1 ♂, 28—29. XI. 1908. Obtained by Alluaud on Mahé and La Digue Islands.

8. *Labia pilicornis*, Motsch.

Forfiscelia pilicornis, Motsch., 1863, Bull. Soc. Moscou, xxxvi. p. 2 (♀).
Labia pilicornis, Borm., 1900, Forf. p. 72 (♀).
Labia pilicornis, Burr, 1909, Derm. Ind. p. 120, fig. 40 (♂ and ♀).

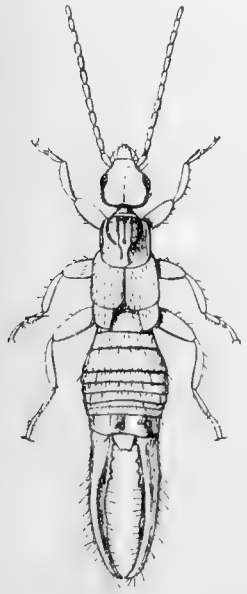
This is a small, rather obscure species, strongly resembling *L. minor* L. It is common in Ceylon, and has not hitherto been recorded from any other locality. It is possibly widely distributed through the Oriental Region.

Localities. Seychelles. Mahé: Cascade Estate, about 1000 ft., 1 ♂, II. and III. 1909.

9. *Labia fryeri*, sp. n.

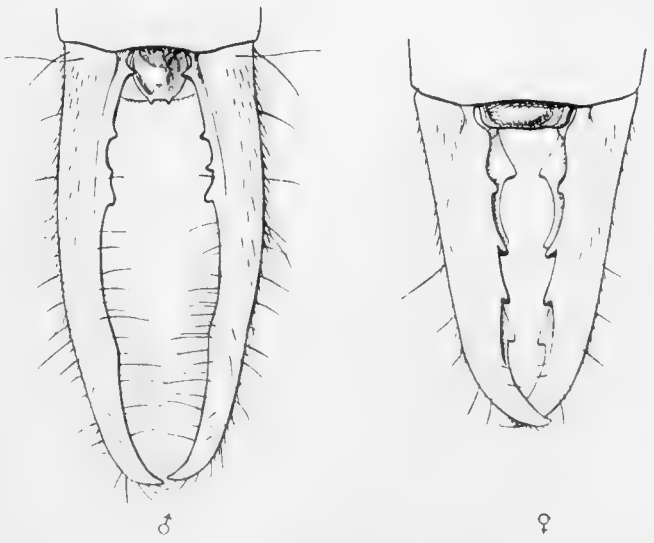
Statura minore; colore fusco-castaneo, forcipe rubrescenti; caput globosum; pronotum parallelum; pygidium ♂ depressum, dilatatum, apicem versus sensim angustatum, apice ipso leviter emarginato; forcipis bracchia ♂ elongata, sensim arcuata, prope basin intus denticulata.

Fig 3.



Labia fryeri. ♂. × 10.

Fig. 4.



♂ ♀

Labia fryeri. × 30.

	♂	♀
Long. corporis	3·5—4 mm.	3·75—4 mm.
„ forcipis	1·5—1.75 mm.	1—1·75 mm.

Size small; general colour dark blackish brown, the forceps and legs reddish; more or less pubescent.

Antennæ with 13—14 segments, blackish, the apical segments paler; third and fourth short, almost cylindrical and equal in length, the remainder a little longer and stouter, passing from cylindrical to ovate.

Head globose, smooth, shining black.

Pronotum about as wide as the head or a trifle narrower, almost square, shining black.

Elytra rather short, truncate apically, dull black, with a fine greyish pubescence.

Wings long, of the same colour and texture as the elytra (in the three females examined the wings scarcely protrude; in the two males they are almost as long as the elytra).

Legs yellowish; the femora dusky and rather thick.

Abdomen parallel-sided in the ♂, slightly dilated about the middle in the ♀, black, shaded with yellowish towards the apex.

Last dorsal segment ♂ transverse, shining black, smooth with a median depression, rectangular; in the ♀ gently narrowed.

Pygidium ♂ depressed and dilated, nearly as broad as long, gradually narrowed towards the apex, which is emarginate; in ♀ the pygidium is very short, scarcely discernible, obtuse and truncate.

Forceps with the branches in the ♂ remote at the base and elongate, feebly arcuate, relatively stout and rather depressed in the basal quarter, yellowish in colour, and clothed with many long fine hairs, with a few denticulations on inner margin in the basal quarter; in the ♀ less remote, stouter and straighter, the inner margins sharply serrate.

This species is characterised by the pygidium of the male, which has the form of a broad spear-head, with the point itself emarginate; in general structure it resembles *L. minor* and *L. pilicornis*.

The description is based on two males and one female. It is dedicated to Mr J. C. F. Fryer.

Localities. Seychelles. Silhouette: 1 ♂, Type, 2 ♀, from high forest, VIII—IX. 1908; Mare aux Cochons and forest above, 1 ♀, IX. 1908. Praslin: Coco-de-Mer Forest in the Vallée de Mai, 1 ♂, 28—29. XI. 1908.

SPARATTINÆ.

Gen. *PLATYLABIA*, Dohrn.

1867. Stett. Ent. Zeit. xxxviii. p. 347.

10. *Platylabia thoracica*, Dohrn, 1867, Stett. Ent. Zeit. xxviii. p. 348.

This is a widely distributed Oriental species, recorded from Burma, Ceylon, and the Malay archipelago. De Bormans records, in his paper in 1895, *P. major* from the Seychelles; this only differs from *P. thoracica* in the non-protruding pygidium. But all the specimens brought back by the Expedition have the very distinct prominent pygidium of *P. thoracica*. I am inclined to believe that de Bormans made a mistake, and that the specimens from Mahé should be referred to *P. thoracica*.

I think it is quite possible that it was a specimen of *P. thoracica* that Karsch described, under the name of *Chætospania inornata*, from Madagascar (1886, Berl. Ent. Zeit. xxx. pp. 87 and 88), as the description and figures agree, save only that the pygidium is not referred to in the text and the drawing may well be faulty.

Localities. Seychelles. Silhouette: from the high forest, over 1500 ft., 2 ♂, 2 ♀, 1 larva, VIII. 1908; from leaf-bases of felled and decayed *Verschaffeltia* palm, 4 ♂, 1 ♀, VIII. 1908; Mare aux Cochons, 3 ♂, 2 ♀, 1 larva, IX. 1908; same locality, under bark of stem of *Dracæna*, 2 ♀, 1 larva, IX. 1908. Mahé: high, damp forest between Trois Frères and Morne Seychellois, about 1500—2000 ft., 1 ♂, 9—10. XII. 1908.

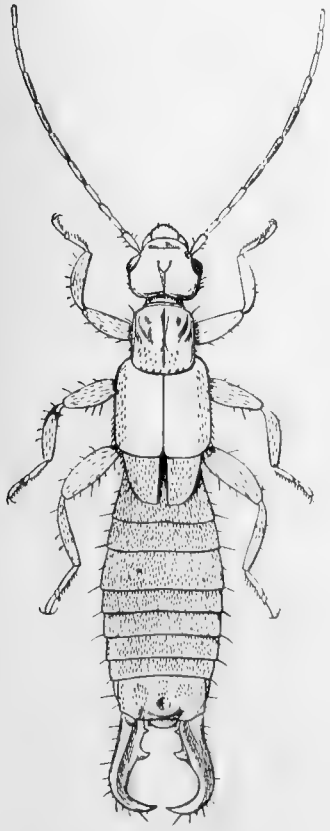
Gen. *SPARATTA*, Serville.

1839. Orth. p. 51.

11. *Sparatta gardineri*, sp. n.

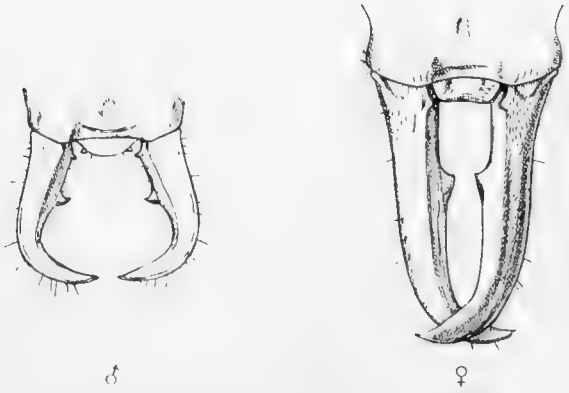
Colore rufo-castaneo, elytris pallidis; pronotum quadratum; abdomen ♂ subdilatatum; pygidium breve, depressum, lateribus excavatis, margine postico truncato, angulis ipsis acutis; forcipis bracchia ♂ basi remota, recta, ante apicem fortiter incurva, margine interno dente acuto armata.

Fig. 5.



Sparatta gardineri. ♂. × 10.

Fig. 6.



♂ ♀

Sparatta gardineri. × 16.

	♂	♀
Long. corporis	5—7 mm.	5·5—8 mm.
„ forcipis	1·25—1·75 mm.	1·5—2 mm.

Small and depressed; general colour dark chestnut, or red and black, the elytra always pale; covered with long, fine, pale hairs.

Antennæ with 12 segments, all slender and cylindrical, third and fourth about equally long, the apical segments longer; basal segment black, 2—5 yellowish, 6—9 black, 10—12 whitish.

Head shining dark chestnut or black, smooth and depressed.

Pronotum rectangular, a little longer than broad, shining black, shading to yellowish at the sides.

Elytra pale straw-coloured, with a narrow dusky border.

Wings prominent, black.

Legs not very long; femora dusky, pale at the knees; tibiæ and tarsi yellowish; the latter rather short, the third segment a little shorter than the first.

Abdomen depressed, brick-red or dark chestnut, very finely punctulate, slightly dilated about the middle in the ♂, as well as in the ♀; lateral tubercles on third and fourth segments feeble.

Last dorsal segment ♂, rectangular, smooth and transverse with a median depression and feebly tumid elevation over the roots of the forceps; similar in the ♀, but a little narrower.

Pygidium ♂ depressed, short and broad, the posterior margin truncate, the angles themselves forming sharp points as the sides are concave; in the ♀ very short and tumid.

Forceps with the branches in the ♂ remote at the base and quite straight, with a sharp tooth in the middle of the inner margin, then, before the apex, abruptly bowed inwards almost at a right angle. By variety, the tooth is sub-obsolete and the curvature very weak. In the ♀ the branches are stouter, trigonal, less remote, stronger, scarcely arcuate, except at the tips themselves, with a depressed obtuse tooth just before the middle.

This is a very distinct species; the form of the forceps recalls *Palex sparattoides* but the pygidium is free and the antennæ have a different structure; the forceps in their strong curvature approach those of *S. brunneri* Borm. from Australia.

I know of no other species in this group of genera having the forceps quite of this form, and the pygidium is also characteristic. In most specimens it is scarcely discernible, being but feebly protruding, the upper surface being nearly vertical, so that the posterior margin is inferior. In one specimen, however, it is projecting and the outline perfectly distinct.

The contrasted coloration is also unusual in this group; the variegated antennæ, pale elytra, black pronotum and wings, red abdomen, must give it a handsome and very distinct appearance when alive, and even in dried specimens the contrast is quite noticeable. In life, the elytra are conspicuously white. There seems to be a certain amount of permanence in the diverse coloration of the antennal segments, but it is improbable that the colour of each individual segment is stable.

The rectangular pronotum really forbids its inclusion in the genus *Sparatta*, but until the confusion that reigns in this group is cleared up, it may as well be placed

here together with the allied *S. brunneri* and some other species for which at least one new genus must be formed.

It is a handsome little species, and I have pleasure in dedicating it to Professor J. Stanley Gardiner, originator of the Seychelles Expeditions of 1905 and 1908.

It appears to be common in the Seychelles, and it is surprising that it was unknown to de Bormans. Being found only in native mountain forests, it is probably peculiar to the islands.

There is a certain amount of variation in the curvature and armature of the forceps in both sexes.

Localities. Seychelles. Silhouette: highest forest, over 1500 ft., 2 ♂, 2 ♀, VIII. 1908; about 1500 ft., from leaf-bases of felled and decayed *Verschaffeltia* palm, 2 ♂, 3 ♀, VIII. 1908; forest near Mare aux Cochons, 2 ♀, IX. 1908. Mahé: high damp forest between Trois Frères and Morne Seychellois, about 1500—2000 ft., 2 ♂, 1 ♀, 9—10. XII. 1908; forest above Cascade Estate, 1 ♀, I. 1909; near Morne Blanc, from leaf-bases of growing *Verschaffeltia* and of *Stevensonia* palms, 13 ♂, 12 ♀, 1908; Cascade Estate, forest, 1000—2000 ft., 1 ♂, II. 1909, and from leaf-base of growing *Stevensonia* palm about 1000 ft., 5 ♂ (Type), 1 ♀, XII. 1908.

FORFICULIDÆ. CHELISOCHINÆ.

Gen. *CHELISOCHES*, Scudder.

1876. Proc. Boston Soc. N. H. xviii. p. 292.

12. *Chelisoches morio*, Fabr.

Forficula morio, Fabr., 1775, Syst. Ent. p. 270.

This species is abundant in the islands of the Pacific Ocean and is spreading artificially to the East coast of Africa and even to England.

Locality. Farquhar Atoll: 1 ♀, 1905.

No. VIII.—ISOPTERA.

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(Mittgeteilt von Prof. J. Stanley Gardiner, M.A., F.R.S., F.L.S.)

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Die Kenntnis des madagassischen Faunengebietes hat immer und mit Recht grosses Interesse beansprucht und man kann wohl sagen dass es faunistisch recht wohl bekannt geworden ist. Auch die Termitenfauna dieses Gebietes ist einigermassen studiert worden, ist aber jedoch verhältnismässig wenig erforscht geblieben. Die ersten ausführlichen Mitteilungen über die Termiten Madagaskars verdanken wir dem unermüdlichen Ameisen- und Termitenforscher Pater E. Wasmann, der von diesem Gebiet zehn Arten beschrieben hat. Später hat Sjöstedt die Faunakunde mit sieben neuen Arten vermehrt. Dazu kommen dann noch zwei von mir beschriebene Arten und der wohl nicht mehr identificierbare *Calotermes pallidus* (Ramb.). Ausserdem können hierzu *Termes bellicosus* Smeath. und *Termes natalensis* Hav. gerechnet werden, welche jedoch wohl von Afrika eingeschleppt sind. Die Mehrzahl der echt madagassischen Arten ist auf der madagassischen Haupt-Insel gefunden. An den kleineren Inselgruppen in der madagassischen Region sind nur folgende Arten angetroffen. Auf Aldabra: *Eutermes salebri thorax* Sjöst. und *Microcerotermes subtilis* Wasm. Auf Mauritius: *Calotermes hova* Wasm., *Calotermes pallidus* (Ramb.) und *Eutermes mauricianus* Sjöst. Von diesen letzterwähnten Arten kommen folgende ausserdem auf Madagaskar vor: *Calotermes hova, Microcerotermes subtilis* und *Eutermes salebrithorax.*

Aus dieser Übersicht geht also zweifellos hervor wie erwünscht eine Erweiterung unsrer Kenntnis des fraglichen Faunengebietes ist. Besonders die kleineren madagassischen Inselgruppen waren bis jetzt in termitologischer Hinsicht wenig untersucht worden. Die von Mr Hugh Scott auf den Seychellen und von Mr J. C. F. Fryer auf Aldabra zusammengebrachte Sammlung muss deshalb von grossem Interesse sein, besonders weil sie von den nördlichsten der Inselgruppen, den Seychellen und den Admiranten grösstenteils stammt, von denen noch keine Termiten bekannt waren.

Die Sammlung enthält 9 Arten und Unterarten, von denen 5 neu sind. Von den früher bekannten, wird die Kenntnis von 3 durch Entdeckung von den früher unbekannten Geschlechtsindividuen komplettiert.

1. *Calotermes laticollis*, n. sp. Imagines, Soldaten.
2. „ (*Procryptotermes*) *fryeri*, n. sp. Imagines, Soldaten, Larven.
3. „ (*Glyptotermes*) *scotti*, n. sp. Imagines, Soldaten, Larven.
4. „ (s. lat.) *longus*, n. sp. 2 Soldaten.
5. *Arrhinotermes canalifrons* (Sjöst.) Neotenen, Soldaten, Arbeiter.

6. *Coptotermes truncatus* Wasm. Nymphen, Soldaten, Arbeiter.
7. *Microcerotermes subtilis* Wasm. Imagines, Soldaten, Arbeiter.
8. *Eutermes nigrita* Wasm. Imagines, Nymphen, Soldaten, Arbeiter.
9. *Eutermes nigrita* subsp. *mahéensis*, n. subsp. Nymphen, Soldaten, Arbeiter.

Hinsichtlich des Verhältnisses des madagassischen Faunengebietes zu dem kontinentalafrikanischen scheinen die Termiten kein bestimmtes auszusagen. Die meisten madagassischen Gattungen sind auch in Afrika vorhanden, aber gemeinsame Arten fehlen in grosser Ausdehnung, und wenn solche Arten vorhanden sind, so sind sie wahrscheinlich eingeschleppt. Interessant ist jedoch dass die *Calotermes*-Untergattungen *Procryptotermes* und *Glyptotermes* noch nicht in Afrika angetroffen sind, ebenso dass die Gattung *Arrhinotermes* da noch nicht endeckt ist.

Das Subgenus *Procryptotermes* kommt aber in Ost-Indien mit der Art *P. domesticus* (Hav.) vor. Das damit nahe verwandte Subgenus *Cryptotermes* gehört Amerika zu, wo Banks ein *Cryptotermes cavifrons* von Florida beschrieben hat. Ausserdem befinden sich in meiner Sammlung und im Berliner Museum zwei noch unbeschriebene Arten aus Brasilien, gesammelt von W. Müller. Vielleicht ist auch *Calotermes brevis* Hagen aus Brasilien ein *Procryptotermes*. *Calotermes braueri* Frogg. aus Australien gehört auch vielleicht diesem Verwandtschaftskreis an.

Das Subgenus *Glyptotermes* kommt ausser in dem madagassischen Gebiet auch in Indien mit einigen Arten, z. B. *G. borneensis* Hav. vor. Aus Australien sind vier Arten von Froggatt beschrieben worden, und in Süd-Amerika habe ich eine noch unbeschriebene Art entdeckt.

Die Verbreitung dieser beiden Subgenera scheint somit ungefähr dieselbe zu sein.

Arrhinotermes, die von Wasmann aufgestellt wurde, kommt ausserhalb Madagascar auch in Vorderindien mit *A. heimi* Wasm., auf die Jaluit-Atolle (eine noch unbeschriebene Art), auf den Cocos-Inseln zwischen den Galapagos Inseln und Costa Rica mit *A. oceanicus* Wasm., und in Costa Rica (eine noch unbeschriebene Art) vor*.

Arrhinotermes besitzt also wahrscheinlich eine ähnliche Verbreitung wie die beiden obigen Subgenera.

Bemerkenswert ist es, dass die madagassischen Gattungen, welche in kontinentalen Afrika vertreten sind, auch in Indien vorkommen wie: *Calotermes*, *Capritermes*, *Microcerotermes*, *Mirotermes*, *Coptotermes* und *Eutermes* (und *Microtermes*?).

Hingegen scheinen die in sowohl Afrika wie Indien vertretenen Gattungen *Hodotermes*, *Rhinotermes*, *Leucotermes*, *Synacanthotermes*, *Acanthotermes*, *Termes*, *Hamitermes*, *Eurytermes*, auf Madagascar zu fehlen.

Noch ist es zu früh irgend welche positive Schlussfolgerungen aus den oben erwähnten Verhältnissen zu ziehen. Die Tatsachen scheinen aber darauf hinzudeuten, dass die madagassische Termitenwelt mehr mit dem indischen übereinstimmt als mit dem afrikanischen. Dass Afrika und Madagascar gemeinsame Gattungen besitzen lässt sich so erklären, dass eine Einwanderung vom Norden (Indien) aus sowohl nach Afrika wie nach Madagascar einst stattgefunden hat, und dass diese nicht ganz gleichzeitig gewesen. Aber

* Hierzu kommt eine als *Prorhinotermes*, n.g., bezeichnete Art, welche Silvestri neuerdings aus Samoa beschrieben hat.

auf dem heutigen Standpunkt unsrer Kenntnis bleiben diese Erwägungen nur vage Hypotesen.

Jedoch trägt Scott's Sammlung ohne Zweifel dazu bei, die tiergeographischen Verhältnisse des madagassischen Faunengebietes zu klären.

Die hier unten benutzte systematische Aufstellung ist aus einem noch nicht publicierten, neuen Termitensystem, dass ich später veröffentlichen werde, herausgegriffen.

Bei Identificieren der Arten habe ich ausser meiner eigenen Sammlung auch die Sammlungen des hiesigen Reichsmuseums benutzt. Für das diesbezügliche Entgegenkommen des Museum-Präfekts, Herr Professor Y. Sjöstedt, spreche ich hier meinen besten Dank aus. Ebenso ist es mir eine angenehme Pflicht, dem Herrn Professor J. Stanley Gardiner (Cambridge), deshalb herzlich zu danken, weil er mir in der Lage versetzt hat, diese interessante Seychellen-sammlung zu bearbeiten. Ebenso danke ich Herrn Hugh Scott hier auch für Mitteilung von zahlreichen indischen Termiten-Arten, welche als werthvolles Vergleichmaterial bei den vorliegenden Studien gedient haben.

Fam. **Protermitidæ,** nov. fam.

Vorläufige Diagnose: Fontanell mit Fontanelldrüse fehlt immer. Praefrons kurz, dreieckig, Antennale bandförmig sich quer über dem Kopf streckend. Malpighische Gefässe 8. Hinterdarmsabteilung I.–II. kurz.

Diese neue Familie umfasst folgende Subfamilien: Mastotermitinæ Desn., Hodotermitinæ, n. subfam., Stolotermitinæ, n. subfam., und Calotermitinæ, n. subfam.

Subfam. **Calotermitinæ,** n. subfam.

Gattung Calotermes Hagen.

Untergattung: *Calotermes* (s. str.) Holmgr., nov. subgen.

1. *Calotermes laticollis,* n. sp.

Imago: Gelb-rotbraun. Hinterleib hell geringt, Unterseite weissgelb. Letzte Sternite braun. Flügel graubraun mit dunkleren Randrippen.

Kopf, Pronotum und Beine sehr dünn behaart. Abdominaltergite und Sternite mit Behaarung besonders auf ihrer hinteren Hälfte.

Kopf ziemlich dick, breit eiförmig, hinter den Augen beinahe halbcirkelförmig abgerundet, vor den Augen ein wenig verschmälert. Facettaugen mittelgross, ein wenig dorsal gelagert. Ozellen ziemlich gross, unmittelbar an den Augen gelegen. Kopfnähte deutlich, fein. Vorderrand des Transversalbandes schwach konkav. Basalteil des Clypeus kurz, Apicalteil länger. Oberlippe stark geneigt, schalenförmig. Antennen 20—21-gliedrig. 2. Glied so lang wie 3.; 4. bedeutend kürzer. 5. ein wenig länger als 4.

Pronotum bedeutend breiter als der Kopf zwischen den Augenspitzen, nicht so lang wie die halbe Breite. Vorderrand breit konkav; Hinterrand konvex, in der Mitte schwach ausgerandet. Meso- und Metanotum mit beinahe geradem Hinterrand.

Die Subcosta der Vorderflügel streckt sich über den inneren Drittel des Flügels und besitzt einen kurzen, basalen Ast. Radius einfach, streckt sich ein wenig über die Mitte des Flügels. Radius sector erstreckt sich zu der Flügelspitze, parallel mit und dem Radius ziemlich genähert. Er besitzt 6 Zweige zu dem Vorderrand des Flügels. Von diesen sind die 4 inneren lang (der 1. der längste und die übrigen von abnehmender Länge). Die Mediana läuft, stark markiert, parallel mit dem rad. sector bis zu der Spitze des Flügels und ist mit diesen vermittelst 12—14 kurzen Querrippen vereint. Die Flügelmembran ist zwischen der Mediana und dem Cubitus reticuliert. Cubitus mit ungef. 12 Ästen zu dem Hinterrande des Flügels, von denen jedoch nur die 6 à 7 inneren deutlich markiert sind.

Die Mediana der Hinterflügel entspringt vom rad. sector, ein wenig von seiner Basis. Die Distanz zwischen den parallelverlaufenden Rippen ist länger als gewöhnlich bei *Calotermes*. Tarsen je mit einem wohl entwickelten Onychium.

Länge mit Flügeln 19mm.
„ ohne Flügeln 12—13mm.
„ des Kopfes mit Oberlippe 2·4mm.
„ des Kopfes zu dem Vorderrande des Transversalbandes 1·7mm.
Breite des Kopfes 2·1mm.

Soldat. Kopf gelbbraun, vorn ein wenig dunkler. Mandibelbasis braun; Mandibeln im übrigen schwarz. Körper strohgelb.

Kopf, Thorax (und Beine) dünn behaart. Abdominaltergite und Sternite mit zwei transversalen Borstenreihen, eine mittlere und eine hintere.

Kopf gross, Kopfseiten schwach abgerundet. Augen klein, rudimentär. Antennleisten mit einer schwachen ohrförmigen Verbreitung. Mandibelkondylen gross. Clypeus zieml. schmal, kurz; Spitzteil unbedeutend. Oberlippe kurz. Antennen 16-gliedrig; 3. Glied ein wenig länger als 2., dunkler als die übrigen Glieder. 4. Glied unbedeutend kürzer als 2. Mandibeln kräftig, gleichförmig gekrümmt. Die linke mit 5 kleineren Zähnen innerhalb der Spitze; die rechte mit einem grossen dreieckigen Zahn an der Mitte und mit einem kräftigen Basalzahn.

Pronotum (bedeutend) breiter als der Kopf, viel kürzer als die halbe Breite. Vorderrand winkelig konkav; Hinterrand beinahe gerade. Mesonotum und Metanotum bedeutend schmäler als Pronotum. Cerci kurz; Styli wohl entwickelt. Klauen und Tibialdornen braun.

Körperlänge 12—13mm.
Länge des Kopfes mit Mandibeln 6mm.
Breite des Kopfes 3mm.
Länge der Mandibeln 2mm.

Nymphe: Länge des Körpers 11mm.
„ der Flügelscheiden 4mm.

Larve mit kleinsten Flügelscheiden (arbeiterähnlich):
Länge des Körpes 8mm.
Flügelscheiden kaum mehr als angedeutet.

Larve mit mittelgrossen Flügelscheiden:

Länge des Körpers 10·5 mm.
„ der Flügelscheiden 1·5 mm.

Larve mit grossen Flügelscheiden (Nymphenähnlich):

Länge des Körpers 8 mm.
„ der Flügelscheiden 3 mm.

"*Arbeiter.*"

Länge des Körpers 11 mm.
Ohne Flügelscheiden.

Bemerkungen: Diese Art ist durch ihren breiten Prothorax und vielgliedrigen Antennen sehr charakteristisch. Keine der bereits bekannten *Calotermes*arten besitzen so viel wie 21-gliedrige Antennen.

Fundorte. Seychellen. Mahé; nahe Morne Blanc, ungef. 800 Fuss Höhe, von einem Nest in einem gefallenen Baumstamm, X. 1908 (alle Stände); Long Island, VII. 1908 (alle Stände). Silhouette: Wald oberhalb Mare aux Cochons, mehr als 1000 Fuss o. M., aus einem gefallenen Ast, IX. 1908 (Soldaten und Larven).

Untergattung Procryptotermes Holmgr., nov. subgen.

2. *Calotermes* (*Procryptotermes*) *fryeri*, n. sp.

Imago: Hell graubraun.

Sehr kurze Haare an der Stirn, am Vorder- und Hinterrande des Pronotums, an den Hinterrändern der Abdominalplatten. Abdominalsterniten hinten mit einer Reihe von längeren Borsten.

Kopf ziemlich breit, oval, hinter den Augen halbcirkelförmig abgerundet. Augen ziemlich gross, wenig ausstehend. Ozellen mittelgross, unmittelbar an den Augen gelegen. Vorderrand des Transversalbandes ziemlich gerade. Clypeus mit wenig entwickeltem Basalteil; Spitzteil deutlich, hyalin. Oberlippe stark geneigt und gewölbt. Antennen 16-gliedrig. 2. und 3. Glied ungef. gleich lang. 4. Glied kürzer und so lang wie 5.; 6. so lang wie 3.

Pronotum so breit wie der Kopf zwischen den Augenspitzen. Vorderrand schwach konkav; Seitenränder schwach bogenförmig; Hinterecken stark abgerundet; Hinterrand in der Mitte schwach eingebuchtet. Meso- und Metanotum hinten beinahe gerade.

Flügel dünn, hyalin. Costa und subcosta, radius und radius sector stark markiert, bräunlich. Radius sector ist mit dem Radius mittelst 4 ziemlich langen, schiefgestellten Ästen verbunden. Die Mediana vereint sich, bogenförmig, mit dem radius sector in dessen äusserer Hälfte. Der Cubitus ist äusserst schwach markiert, kaum sichtbar. Tibien mit drei Spitzdornen.

Körperlänge mit Flügeln 9—10 mm.
„ ohne Flügel 5—6 mm.
Länge des Kopfes, mit Oberlippe 1·16 mm.
„ „ „ vom Vorderrande des Transversalbandes 1·05 mm.
Breite des Kopfes 1·05 mm.

Soldat. Kopf gelbbraun, vorn dunkler; Oberkiefer pechschwarz. Körper strohgelb mit rostgelblichem Farbenton.

Behaarung in der Hauptsache wie bei der Imago. Kopf- und Hinterleibseiten jedoch dichter und länger behaart.

Kopf rectangulär mit abgerundeten Hinterecken und geradem Hinterrand. Augen rudimentär. Von den Augen aus verschmälert sich der Kopf ein wenig. Von der Seite gesehen ist der Kopf wie schief abgeschnitten. Vorderteil der Scheitel ist deutlich rinnenförmig vertieft. Die Rinne erweitert sich nach vorn. Stirnteil (Transversalband) des Kopfes flasch vertieft.

Vorderecken der Antennleisten sind ausserhalb der medialen Mandibelkondylen processenartig stark hervorgezogen. Die Kopfseiten ausserhalb der lateralen Mandibelkondylen sind auch processenartig. Clypeus bandförmig mit schwachem Spitzteil. Oberlippe ganz kurz. Mandibeln basal auf der äusseren Seite deutlich aufgetrieben, lang, ziemlich gerade, mit eingebogenen Spitzen. Nur basal giebt es schwach angedeutete Zähne. Antennen sehr kurz, 10-gliedrig. 3. Glied mehr als doppelt so lang wie 2., basal schmal, apical stark aufgetrieben, mehr als doppelt so dick wie basal. 4.—10. Glieder ganz kurz, schmäler als die vorhergehenden. 10. Glied eiförmig, schmäler als die vorhergehenden.

Pronotum sehr unbedeutend breiter als der Kopf. Vorderrand stumpfwinkelig konkav; Seitenränder beinahe parallel; Hinterrand schwach abgerundet, in der Mitte undeutlich eingebuchtet.

Länge des Körpers 6mm.
„ „ Kopfes mit Mandibeln 3mm.
„ „ „ ohne Mandibeln 1·8mm.
Breite des Kopfes 1·24mm.

Nymphe. Körperlänge 6mm. Länge der Flügelscheiden 3mm.

Larve mit kleinsten Flügelscheiden. L. 5mm. Flügelscheiden kaum mehr als angedeutet.

„*Arbeiter.*" Körperlänge 4,5mm. Ohne Flügelscheiden.

Bemerkung. Wie ich schon in der Einleitung bemerkt habe, kommen die nächsten Verwandte dieser Art in Indien und zwar bei Singapore und Sarawak (Haviland) vor. Die indische Art (*C. domesticus*) ist aber viel mehr specializiert als *C. fryeri* und nähert sich sehr beträchtlich der amerikanischen Untergattung *Cryptotermes* (Banks).

Fundort. Aldabra: Takamaka, Fryer 6. X. 1908 (alle Stände).

Untergattung Glyptotermes (Frogg.).

Syn. Gattung *Glyptotermes* Froggatt.
Calotermes part, Desneux, Haviland.

3. *Calotermes* (*Glyptotermes*) *scotti*, n. sp.

Imago. Dunkelbraun mit hellerer Unterseite. Oberlippe gelblich. Beine graubraun. Flügel braun mit beinahe schwarzen Randrippen, narbig, irisierend. Antennen braun, mit helleren Basalgliedern.

Mit äusserst schwacher Behaarung. Kopf und Thorax mit sehr dünnem Haarkleid. Abdomen besonders an den Hinterrändern der Segmentplatten mit Haaren oder Borsten.

Kopf dick, von oben gesehen rectangulär mit abgerundeten Ecken. Vorderrand des Transversalbandes gerade. Kopfnähte nicht sichtbar. Facettaugen ziemlich klein, flach. Punktaugen klein, nahe zu den Facettaugen gelegen. Clypeus kurz, beinahe gänzlich hyalin. Oberlippe gewölbt, stark geneigt. Antennen 12-gliedrig, nach aussen verdickt, von den Seiten ein wenig zusammengedrückt. 2. Glied ein wenig unbedeutend länger als 3.; 3. ungefähr so lang wie 4. 12. Glied am längsten; 11. am dicksten. Palpen kurz. Oberkiefer verhältnismässig schwach.

Pronotum so breit wie der Kopf, vorn breit konkav; Seitenränder nach hinten schwach konvergierend, abgerundet. Hinterrand schwach abgerundet, in der Mitte höchst unbedeutend eingeschnitten. Hinterrand des Mesonotums gerade, des Metanotums schwach eingebuchtet.

Flügel relativ kurz; Membran dicht mit ziemlich grossen braunen Warzen oder Stacheln besetzt. Radius sector und mediana parallel ohne Seiten-ästen. Cubitus äusserst schwach hervortretend, mit zahlreichen Ästen sowohl zu dem Hinterrande des Flügels wie zu dem radius sector. Letztere besonders undeutlich. Die Äste sind nur durch die Lage der Stacheln angedeutet. Cerci kurz; Styli nur bei dem ♂ vorhanden.

Länge mit Flügeln 8—8·2mm.
„ ohne Flügel 5mm.
„ des Kopfes vom Vorderrande des Transversalbandes 1mm.
Breite „ „ 0·9mm.

Soldat. Kopf gelbbraun, vorn ein wenig dunkler. Kiefer rotbraun, mit schwarzer Spitze. Körper strohgelb.

Behaarung wie bei der Imago. Abdominaltergite mit einer mittleren Borstenreihe, und einem hinteren Härchensaum. Sternite reichlicher aber unregelmässiger behaart.

Kopf rectangulär, beinahe cylindrisch, mit schwach abgerundeten Seiten und stark abgerundeten Hinterecken. Stirn ziemlich stark geneigt. Kopfnähte deutlich. Die Transversalnähte bilden medial einen deutlichen Winkel. Augen sehr klein, rudimentär. Mandibelkondylen deutlich, ein wenig von den Vorderecken der Antennleisten entfernt. Basalteil des Clypeus ziemlich schmal, sehr kurz. Spitzteil hyalin, wohlentwickelt. Oberlippe stark abgerundet, in der Mitte am breitesten. Antennen 11(?)-gliedrig. 1. Glied so lang wie die drei folgenden zusammengenommen; 2. so lang wie 4.; 3. kürzer. Mandibeln kurz, kräftig. Die linke mit zwei sehr schwachen, stumpfen Zähnen ein wenig vor der Mitte und mit einem kräftigen Basalzahn. Die rechte mit einem ziemlich kleinen, stumpfen Zahn an der Mitte und unmittelbar dahinten mit einem äusserst schwachen Zahn.

Pronotum von der Breite des Kopfes, so lang wie seine halbe Breite; vorn breit ausgerandet; Seitenränder abgerundet, nach hinten ein wenig konvergierend; Hinterecken stark abgerundet; Hinterrand in der Mitte schwach eingebuchtet. Meso- und Metanotum in der Mitte eingeschnitten, Mesonotum mit schwachen Flügelansätzen. Hinterleib schmal. Beine kurz.

Länge des Körpers 7 mm.
„ „ Kopfes mit Mandibeln 2·6 mm.
Breite des Kopfes 1 mm.

Nymphe: nicht vorhanden.

Junge Larve: Ohne Flügelanlagen. Körperlänge 2·5—3 mm.

Larve mit Flügelscheiden: Flügelscheiden seitwärts ausstehend. Körperlänge 3·5 mm.

Larve mit Flügelscheiden: Flügelscheiden schief nach hinten gerichtet. Körperlänge 4·5 mm.

Larve mit Flügelscheiden: Flügelscheiden kaum mehr als angedeutet. Körperlänge 5 mm.

Larve mit Flügelscheiden: Flügelscheiden ziemlich lang (mehr als 1 mm.). Körperlänge 6·5 mm.

"*Arbeiter.*" Ohne Flügelscheiden. Körperlänge 6 mm.

Bemerkungen. Die nächsten Verwandte dieser Art kommen in Indien, Australien und Süd-Amerika vor. Die Australischen Arten wurden von Froggatt zu einer eigenen Gattung *Glyptotermes* geführt. Diese Gattung zusammen mit *Heterotermes** führte er zu einer eigenen Subfamilie *Glyptotermitinae*. Immerhin ist *Glyptotermes* morphologisch mit *Calotermes* so nahe verwandt, dass eine Trennung von dieser Gattung künstlich sein muss. Hingegen ist es auch kaum motiviert die *Glyptotermes*-Gruppe ganz einfach mit den übrigen *Calotermes* einzumischen, wie Desneux es gemacht hat.

Fundort. Seychellen. Silhouette: im Walde oberhalb Mare aux Cochons, mehr als 1000 Fuss oberhalb des Meeres, aus einem vermodernden gefallenen Palmenstamm, IX. 1908 (alle Stände).

4. *Calotermes* (*Glyptotermes*?) *longus*, n. sp.

Soldat. Kopf gelbbraun, vorn unbedeutend dunkler. Mandibeln schwarz, basal kaum heller. Körper strohgelb.

Kopf und Thorax dünn behaart. Hinterleib mit zwei transversalen jedoch nicht scharf ausgeprägten Reihen von Borsten und Haaren an jeder Platte.

Kopf lang, parallelseitig, mit den Mandibeln beinahe dreimal länger als breit, beinahe so hoch wie breit. Stirn ziemlich stark geneigt. Vorderecken rechteckig. Facettaugen sehr klein. Kopfnähte deutlich. Die Transversalnaht ist hinten bogenförmig konvex. Clypeus trapezförmig, mit grossem, vorn geraden Spitzteil. Oberlippe breit zungenförmig, stumpf. Antennenleisten ziemlich stark divergierend, mit einer schwach entwickelten, hinteren, ohrenförmigen Verbreitung. Antennen ?-gliedrig. 2. Glied unbedeutend länger als 3. und dicker als dieses; 3. Glied kurz, basal verschmälert; 4. ungefähr so lang wie 3. aber ein wenig breiter; 5. ein wenig länger. Mandibeln relativ kurz, aber kräftig. Die linke mit zwei deutlichen Zähnen vor der Mitte. Von diesen ist der hintere absatzförmig ausgezogen. Basalzahn gross, schneideförmig. Die rechte mit einem sehr kräftigen Zahn ungefähr in der Mitte oder unbedeutend hinter der Mitte. Basalzahn kräftig.

* Später wurde für *Heterotermes* die Subfamilie *Heterotermitinæ* aufgestellt. Ich glaube jedoch dass *Heterotermes* ganz einfach ein *Leucotermes* mit fehlenden Ozellen ist. (Bei *L. tenuis* fehlen Ozellen oft!)

Pronotum einwenig breiter als der Kopf, transversal gewölbt, ein wenig länger als die halbe Breite, Vorderrand stumpfwinkelig konkav; Hinterrand unbedeutend eingebuchtet, Meso- und Metanotum schmäler als das Pronotum. Hinterleib lang, ziemlich schmal, gleich breit. Cerci klein. Styli wohl entwickelt. Beine ziemlich kurz.

Länge des Körpers 8 mm.
„ „ Kopfes 3·7 mm.
Breite des Kopfes 1·4 mm.
Höhe des Kopfes 1·2 mm.

Bemerkungen. Ein relativ unbeschädigtes und ein sehr beschädigtes Exemplar vorhanden. Die Stellung dieser Art is sehr unsicher. Auf Grund der kurzen Oberkiefer habe ich sie zu *Glyptotermes* provisorisch geführt.

Fundort. Aldabra: Takamaka, 6. X. 1908, zusammen mit *Procryptotermes fryeri* von Fryer gefunden.

Fam. **Mesotermitidæ,** nov. fam.

Vorläufige Diagnose: Fontanell mit Fontanelldrüse bei Imagines und Soldaten vorhanden. Arbeiter mit Fontanell und Fontanellplatte. Praefrons dreieckig, Antennale in zwei Lateralhälften geteilt. Malpighische Gefässe 8. Hinterdarmabteilung I.—II., kurz.

Diese neue Familie umfasst folgende Subfamilien: Serritermitinæ, Termitogetoninæ, Coptotermitinæ, Leucotermitinæ und Rhinotermitinæ, alle mit Ausnahme der Rhinotermitinæ neu.

Subfam. **Coptotermitinæ,** n. subfam.

Gattung Arrhinotermes Wasm.

5. *Arrhinotermes canalifrons* (Sjöst.).

Syn. *Termes? canalifrons* Sjöst. Monograph. Nachtrag p. 47, 1904.

Procoptotermes canalifrons Holmgr. Termitenstudien, 1909.

Neotenisches Geschlechtsindividuum. Gelb, glänzend.

Beinahe vollständig unbehaart.

Kopf von oben beinahe cirkelrund. Fontanell gross, breit eiförmig. Kopfnähte als feine, weisse Linien sichtbar. Clypeus wohl entwickelt, ziemlich aufgetrieben; Hinterrand ziemlich stark konvex; Vorderrand schwach konvex. Basalteil längsgefurcht. Spitzteil schwach. Oberlippe stark geneigt, schalenförmig. Mandibeln wie bei *Rhinotermes* und *Coptotermes.* Antennen wahrscheinlich 22-gliedrig*. 2. Glied so lang wie 3. und 4. zusammengenommen. 3.—7. Glieder sämmtlich kürzer als 2., quer; 8. beinahe kugelrund. Vom 5 an werden die Glieder allmählich länger.

Pronotum vorn schwach konkav, halbcirkelförmig, ein wenig schmäler als der Kopf. Mesonotum bedeutend breiter als Pronotum, mit sichelförmigen, ziemlich grossen Flügelansätzen. Metanotum ein wenig schmäler. Hinterleib wenig breiter als Mesonotum, von normaler Grösse.

* Auf einem Exemplar waren 21 Glieder vorhanden, ohne dass die Antenne jedoch vollständig war.

Länge des Körpers 6 mm.
„ „ Kopfes 1,5 mm.
Breite des Kopfes 1,24 mm.
„ „ Pronotums 1,1 mm.
Länge des Pronotums 0,6 mm.

Soldaten und *Arbeiter* stimmen gut mit den Beschreibungen *Sjöstedt's* überein. Sie besitzen jedoch beide Facettaugen, oft mit deutlichen Facetten.

Bemerkungen. Durch die Entdeckung der Neotenen dieser Art wurde ihre systematische Stellung bestimmt. Die Gattung *Arrhinotermes* wurde von *Wasmann* auf nur geflügelten Individuen gegründet. Die Soldaten wurden von *Sjöstedt* als *Termes? canalifrons* beschrieben, dessen Imagines unbekannt blieben. Für diesen Soldaten, welche unmöglich als *Termes* gelten könnten, schuf ich vorläufig die Gattung *Procoptotermes.* Durch *Scott's* Entdeckung dieser Neotenen wurde die Synonymie nachgewiesen, so dass *Termes? canalifrons* Sjöst. = *Procoptotermes canalifrons* (Sjöst.) Holmgr. = *Arrhinotermes canalifrons* (Sjöst.) Holmgr. Die Gattung *Arrhinotermes* steht *Coptotermes* nahe, wie schon Desneux gegen Wasmann hervorgehoben hat, aber besitzt auch deutliche Verwandtschaftsbeziehungen zu *Rhinotermes*, wie es Wasmann ausgesprochen hat. Am besten kann man sich die Beziehungen dieser drei Gattungen vorstellen, wenn man annimmt, dass *Arrhinotermes* der gemeinsamen Stammform der beiden Sub-Familien Rhinotermitinæ und Coptotermitinæ nahe steht. *Arrhinotermes* gehört aber deutlich der Subfam. Coptotermitinæ, nimmt aber innerhalb dieser eine niedere Stufe ein.

Fundorte. Seychellen. Mahé: VII. 1908, Long Island (mit Neotenen). Praslin, XI. 1908 (Scott). Amiranten: Poivre, 10. X. 1905. Aldabra, 1908 (Fryer). Früher aus Tamatave, Madagascar bekannt (*Mathiaux*)*.

Gattung Coptotermes Wasm.

6. *Coptotermes truncatus* Wasm.

Syn. *Termes* (*Coptotermes*) *truncatus* Wasmann, 1897; Desneux, 1904.
Eutermes truncatus (Wasm.) Sjöstedt, 1900, 1904.
Coptotermes truncatus Wasm., Holmgren, 1909.

Nymphen, Soldaten und Arbeiter liegen vor.

Bemerkungen. Mit dem *Coptotermes*individuen liegt folgende Angabe vor: "From the bottom of a lighter (barge) in the harbour at Port Victoria (Mahé): the workings of the Termites were mostly between the cross-beams and planks at the bottom of the lighter, and they had been submerged under several inches of salt water (which collects in the lighters) sometimes for more than a week at a time. Only one small part of the workings was above the level of the salt water." Dieser Bericht ist interessant aus dem Gesichtspunkt der Verbreitungsbiologie der Art. Wenn so kräftige Kolonien, wie die fragliche (in der Kollektion giebt es Massen von Tieren von verschiedenen Kasten) in einer

* Nach Sjöstedt: Monographie, Nachtrag, 1907.

Barke vorkommen kann, so ist natürlich eine Verbreitung durch Menschen von einer Lande zu einer anderen mit der Schiffsfahrt nicht ausgeschlossen Wenn diese Möglichkeit schon vom Beginn der Schiffsfahrt vorhanden war und eine Verbreitung mit Treibholz auch möglich sein muss, so muss es verwundern, dass thatsächlich so wenige Termitenarten zu den resp. Ländern eingeschleppt sind. Dies kann, glaube ich, nur dadurch erklärt werden, dass die Termiten in der Regel für plötzlich veränderte äussere Lebensbedingungen wenig widerstandsfähig sind. In diesem Verhältnis findet man vielleicht die Erklärung, dass Madagaskar und der naheliegende afrikanische Kontinent im Ganzen keine gemeinsame Termitenarten besitzen, obschon es wohl vorausgesetzt werden muss, dass Termitenaustausch während langen Zeiten zwischen den beiden Ländern vorkam. Und jedoch sind bisjetzt nur drei gemeinsame Arten bekannt: *Termes bellicosus* und *natalensis* und *Calotermes madagascariensis*. Bemerkt muss jedoch werden, dass die Termitenfauna von den nächst liegenden Teilen Afrikas nur sehr wenig bekannt ist.

Fundort. Seychellen. Mahé: X. 1908.

Fam. **Metatermitidæ,** nov. fam.

Vorläufige Diagnose: Fontanell mit Fontanellplatte bei Imagines und Arbeitern vorhanden. Soldaten mit Fontanell und Fontanelldrüse (mit wenigen Ausnahmen). Præfrons hinten gewöhnlich verbreitet. Antennale in zwei Lateralhälfte geteilt. Malpighische Gefässe 4—2. Hinterdarmabteilung I.—II. lang.

Diese Familie umfasst allen übrigen Termitengattungen, und kann in drei Serien oder Subfamilien *vorläufig* eingeteilt werden: Microcerotermitinæ, Termitinæ, und Eutermitinæ.

[Subfam. **Microcerotermitinæ,** n. subfam.]

Gattung Microcerotermes Silvestri.

7. *Microcerotermes subtilis* Wasm.

Syn. *Termes subtilis* Wasmann, 1897.
Eutermes subtilis (Wasm.) Sjöstedt, 1900, 1909, Desneux, 1904.
Microcerotermes subtilis Wasmann, 1903.

Imago: Die von Wasmann gegebene Beschreibung ist etwas unvollständig. Ich teile deshalb eine neue Beschreibung mit.

Kleine Art. Schwarzbraun, braun behaart. Clypeus gelbbraun. Mund und Körperunterseite sowie die zwei basalen Glieder der Antennen rostgelb. Tibien in der Mitte graubraun. Flügel schwarzbraun.

Kopf und Thorax sowie Abdominaltergite und Sternite ziemlich dicht behaart. Sternite ausserdem mit einer hinteren Borstenreihe.

Kopf breit oval, länger als breit. Facettaugen ziemlich klein, ein wenig ausstehend. Ozellen klein, von den Augen um einem Diameter entfernt. Fontanell sehr undeutlich. Clypeus hinten stark konvex. Basalteil gross, ziemlich aufgetrieben, vorn gerade, gerandet, an den Seiten abgerundet. Spitzteil deutlich, hyalin. Oberlippe zungenförmig.

Antennen 14-gliedrig. 3. Glied äusserst kurz; 4. kürzer als 2.; 5. ein wenig länger als 4. beinahe so lang wie 2., breiter als dieses.

Pronotum deutlich schmäler als der Kopf ohne den Augen, so lang wie $\frac{2}{3}$ der Breite. Vorderrand gerade; Hinterrand ziemlich stark ausgeschnitten. Meso- und Metanotum hinten bogenförmig, schwach, ausgerandet.

Vordere Flügelschuppen ein wenig grösser als die hinteren. Flügel dreimal länger als breit, dicht mit kleinsten braunen Stacheln besetzt. Radius sector kräftig markiert. An den Vorderflügeln entspringt die mediana von der Schuppe, an den Hinterflügeln von dem radius sector. Sie ist an den Vorderflügeln einfach, an den Hinterflügeln gewöhnlich zweigeteilt. Cubitus mit 10—12 langen Zweigen.

Länge mit Flügeln 9 mm.
„ ohne Flügel 5—6 mm.
„ des Kopfes 1 mm.
Breite des Kopfes mit Augen 0,9 mm.
„ „ „ ohne Augen 0,8 mm.
„ „ Prothorax 0,66 mm.
Länge des Prothorax 0,4 mm.

Königin. Länge des Körpers 17 mm.
Breite des Körpers 5 mm.

Soldaten und *Arbeiter* sind früher gut beschrieben. Vergl. Wasmann (1897) und Sjöstedt (1900, 1904).

Bemerkungen. Microcerotermes gehört zu den am weitesten verbreiteten Termitengattungen. Sie kommt in Afrika mit 3 (—4) Arten, von denen eine *M. palæarcticus* (Sjöst.) sogar in Algier vorkommt, vor. Die übrigen *M. parvus* und *fuscotibialis* (Sjöst.) scheinen eine grosse Verbreitung zu haben. Auf Madagascar giebt es 2 Arten: *M. subtilis* und *sicoræ*. In Indien treffen wir *M. cylindriceps*, und *heimi* Wasm., *distans*, *dubius* und *serratus* Havil. Australisch sind *M. serratus* und *turneri* Froggatt. Aus Neu-Guinea stammt *M. birói* Desn., aus Süd-Amerika *M. struncki* Sör und *Bouvieri* Desn. Nur die beiden Gattungen *Calotermes* und *Eutermes* können eine so weite Verbreitung aufweisen.

Fundort. Seychellen. Mahé: VII. 1908, Long Island, Königin und andere Stände in einem vermoderndem (gefallenen) Kokostamm VII. 1908.

[Subfam. **Eutermitinæ,** n. subfam.]

Gattung Eutermes (Hag) Fr. Müller.

8. *Eutermes nigrita* Wasm.

Nymphen, Soldaten und Arbeiter sowie Larven liegen vor.

Fundort. Seychellen. Silhouette, 1908, von einem Baumnest, ungefähr 2 Fuss oberhalb des Bodens (Scott). Praslin, XI. 1905, 5 getrocknete Soldaten. Früher aus Tanerive, *Madagascar* bekannt.

Mit wenig Reservation führe ich die folgende Imago zu dieser Art: *Imago*: Kopf und Hinterleib dunkel pechschwarz. Thorax viel heller braun. Clypeus und Basalglieder der

Antennen sowie die Mandibeln heller. Oberlippe, Rest der Antennen und Beine graubraun. Flügel schwarzbraun.

Kopf ziemlich dicht behaart; Nacken ohne Haaren. Pronotum besonders an den Vorderecken und Seitenrändern ziemlich dicht behaart. Flügelschuppen und Randrippen dicht mit ziemlich langen Haaren besetzt. Behaarung des Hinterleibes ziemlich dicht.

Kopf ziemlich gross, flach gewölbt, breit oval mit grossen ziemlich ausstehenden Facettaugen. Ozellen mittelgross, mit ein wenig ausstehenden Rändern, um ihren halben Durchmesser von den Augen entfernt; zwischen den Ozellen läuft ein niedriger Wall. Kopfnähte nicht sichtbar. Fontanell sehr undeutlich, spaltförmig. Transversalband verhältnismässig lang. Basalteil des Clypeus kurz und breit, erreicht jedoch nicht den Seitenecken des Transversalbandes; Hinterrand ziemlich stark konvex; Vorderrand gerade; Seitenränder abgerundet; mit medialer Furche; Spitzteil wohl entwickelt. Oberlippe zungenförmig. Antennen 15-gliedrig. Basalglied dick. 2. Glied so lang wie 3.; 4. unbedeutend kürzer; 5. ein wenig unbedeutend kürzer als 4.; 6. so lang wie 4. Vom 5. nehmen die Glieder schwach in Länge zu.

Pronotum so breit wie der Kopf ohne Augen, so breit wie die doppelte Länge. Vorderrand gerade; Vorderecken stark niedergedrückt, abgerundet; Seitenränder stark nach hinten divergierend: Hinterrand ziemlich tief ausgeschnitten. Hinterrand des Mesonotums ein wenig tiefer und breiter ausgeschnitten als Metanotum.

Flügel ziemlich lang, dicht mit kleinsten Stacheln besetzt. Die mediana verläuft viel näher dem cubitus als dem radius sector und besitzt in der Spitze ein paar kurze Zweige. Cubitus mit 10—12 schief gestellten Ästen, von denen die 7—8 inneren kräftiger sind als die übrigen. Der dritte Zweig ist oft gabelig gespalten.

Länge mit Flügeln 15—16 mm.
„ ohne Flügel 9 mm. (getrocknet 7,5 mm.).
„ des Kopfes 1,9 mm.
Breite des Kopfes 1,73 mm.
Länge der Vorderflügeln 12—13 mm.

Bemerkungen: In der Sammlung kommen 4 getrocknete Individuen vor, welche derselben Art angehören. Von diesen sind 2 von Gardiner auf Praslin, Seychellen 1905 gesammelt und 2 von der Seychellen Expedition auf Silhouette gefunden. Ferner kommen in der Sammlung 5 getrocknete Soldaten von *Eutermes nigrita* vor, welche von Gardiner 1905 auf Praslin gesammelt wurden, während auch von *Eutermes nigrita* Soldaten, Arbeiter und Nymphen aus Silhouette vorliegen. Dies macht es nun sehr wahrscheinlich, dass die Praslin-Imagines zu den Praslin-Soldaten und die Silhouette-Imagines zu den Silhouette Individuen gehören. Diese Wahrscheinlichkeit wird nun zu beinahe vollständiger Gewissheit gesteigert, wenn wir den Körperbau der Imagines mit demjenigen der Nymphen vergleichen. Die Form des Kopfes, Lage der Ocellarflecke, Form des Prothorax ist dieselbe. Die Augen der Nymphen sind schon so gross, dass sie, wenn ausgewachsen, zu der Grösse derselben der Imagines gelangen müssen. Die unvollständige Färbung der Nymphen mit schon relatif dunklem Kopf, dunklen Flügelscheiden und beginnender Ausfärbung des Hinterleibes obschon das Thorax noch beinahe

ungefärbt ist, deutet an, dass die Imagines, welche aus diesen Nymphen hervorgehen, die Färbung der fraglichen Imagines annehmen müssen.

Fundorte. Seychellen. Silhouette, 1908, Scott (2 Ex.). Praslin, XI. 1905 (2 Ex.).

9. *Eutermes nigrita*, subsp. *mahéensis*, n. subsp.

Soldat : unterscheidet sich von *E. nigrita* hauptsächlich in der Färbung, indem der Kopf rotbraun mit heller Nase und der Körper rostgelb-rostbraun ist. Der Kopf ist auch oft ein wenig grösser als bei *nigrata* und auch verhältnismässig breiter. Das Pronotum ist vorn in der Mitte nicht eingeschnitten. (Bei *nigrita* kommen aber nach Sjöstedt (1904) Exemplare vor, die ganzrandiges Pronotum besitzen.)

Arbeiter : Färbung im Ganzen wie bei den Soldaten. Kopf röthlich braun ; Körper rostgelb-rostbraun. Der Kopf ist möglicherweise ein wenig breiter als bei *E. nigrita*. Die Antennen sind ähnlich gebaut, möglicherweise ein wenig kürzer.

Bemerkungen. Ich habe diese Individuen zufolge ihrer Färbung als selbständiger Subspecies aufgefasst. Über die Stellung von *Eutermes nigrita* nebst subsp. *mahéensis* unter den Eutermes-Arten will ich mich hier nicht näher äussern, obschon es mir scheint, als hätte die Art Anknüpfungspunkte zu der *matangensis*-Gruppe unter den indischen Termiten.

Fundort. Seychellen. Mahé, Long Island, VII. 1908.

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No. IX.—DIPTERA, ANTHOMYIDÆ, MIT DEN GATTUNGEN *RHINIA* UND *IDIELLA*.

Von Prof. P. Stein in Treptow a/R. (Preussen).

(Mitgeteilt von Prof. J. Stanley Gardiner, M.A., F.R.S., F.L.S.)

Gelesen den 21. April 1910.

Musca, Linn., Fauna suecica, 439 (1763).

1. *Musca niveisquama* Thoms, Eugenies Resa, Dipt. 547. 175 (1868).

Mehrere Pärchen.

Fundorte. Seychelles: Mahé, Cascade Estate 800–1000 feet, 1908–9; Silhouette, near Coast, 1908; Dennis Island, VIII. 1908. Coetivy, I. 1905. Amirantes Is.: D'Arros and Poivre Is., 1905. Cargados Carajos Is., 1905. China, Manila, Malacca.

2. *Musca fasciata*, sp. nov. ♂ ♀.

Oculis intime cohærentibus, antennis et palpis nigris; thorace nigro, leviter cinereo-pollinoso, vittis 4, intermediis postice abbreviatis, lateralibus fere confluentibus, nigris nitidis: abdomine ovato, dilute cinereo-pollinoso, vitta dorsali lata versus apicem attenuata, segmento primo et marginibus posterioribus segmentorum 2 et 3 anguste nigris; pedibus nigris; alis hyalinis, squamis albis, halteribus albido-flavis.—Femina fronte lata, thoracis lineis 4 distinctis, abdominis segmentis 1 et 2 fere totis nigris differt. Long. 3—4,5 mm.

Augen fast den ganzen Kopf einnehmend, oben aufs engste zusammenstossend, Stirn und Wangen nur in feiner Linie vorragend, Backen schmal, sämtliche Teile fast silbergrau bestäubt, Stirn über den Fühlern mit schmaler schwarzer Strieme, so dass die Orbiten auch hier beinahe zusammenstossen, Fühler und die fadenförmigen Taster schwarz, Borste lang behaart. Thorax grau bestäubt mit 4 glänzendschwarzen Längsstriemen, von denen die mittleren hinter der Naht abgebrochen sind, während die seitlichen nur durch eine feine graue Linie von ihnen getrennt, bisweilen ganz mit ihnen zusammengeflossen sind; Dorsocentralborsten (dc) hinter der Naht 4, nach vorn an Grösse abnehmend; Schildchen glänzend schwarz, nur sehr dünn graulich bereift. Hinterleib länglich eiförmig, ziemlich hellgrau bestäubt, der 1. Ring, eine breite nach der Spitze zu schmäler werdende Rückenstrieme und schmale Hinterrandsbinden auf Ring 2 und 3 schwarz; bisweilen greift die schwarze Färbung der Hinterränder etwas auf die Vorderränder der folgenden Ringe über. Beine schwarz, Pulvillen und Klauen kurz; Mittelschienen hinten mit 3

kurzen Borsten, Hinterschienen aussen dem Körper abgewandt der ganzen Länge nach mit kurzen, ziemlich locker stehenden Börstchen. Flügel glashell, Spitzenquerader nach der Beugung etwas mehr nach innen gebogen als bei unsern bekannten *Musca*arten, hintere Querader deutlich geschwungen, Schüppchen weiss, Schwinger kaum etwas gelblich.—Die Stirn des Weibchens ist breit, die Thoraxstriemen schmäler, weniger intensiv schwarz und alle vier deutlich getrennt und die beiden ersten Hinterleibsringe fast ganz schwarz, indem nur der zweite an den Seiten einen grauen Fleck trägt, während bisweilen die schwarze Färbung auch noch auf den Vorderrand des 3. Ringes übergeht.

Fundorte. Seychelles: Mahé, near Morne Blanc about 800 feet, Cascade Estate, about 800—1500 feet, marshy ground near sea-level at Cascade, marshes on coastal plain at Anse aux Pins and Anse Royale, I. 1909.

Stomoxys, Geoffroy, Hist. des Insectes, ii. 538 (1764).

3. *Stomoxys glauca* Grünb. Zool., Anzeiger xxx. 88 (1906).

Auf die vorliegenden zahlreichen Stücke, die auf Mahé (Cascade Estate) Ende 08 und Anfang 09 erbeutet sind, passt die Grünberg'sche Beschreibung so gut, dass ich vorläufig den Namen für die Art beibehalte. Die Färbung der Fühlerborste, die Grünberg regelmässig in seinen Beschreibungen angibt, ist ohne jede Bedeutung, da dieselbe bei derselben Art sehr wechselt. Der Thorax ist hell schiefergrau, meist aber hell gelblichgrau bestäubt und die seitlichen Thoraxstriemen fliessen auch hinter der Naht nicht zusammen, sondern sind bei reinen Stücken bis hinten hin, wenn auch nur sehr schmal, deutlich getrennt. Der Hinterleib ist wie der Thorax gefärbt und trägt beim Männchen eine schmale braune Rückenlinie, die nur ganz schräg von hinten gesehen einigermassen deutlich ist und sich selten auch auf den letzten Ring erstreckt; der 1. Ring ist hinten schmal braun gerandet, während die beiden folgenden Ringe hinten eine etwas breitere Binde tragen, die aber höchstens halb so breit ist als der Ring lang und die aus 2 flachen, zu beiden Seiten der Mittellinie liegenden Kreissegmenten zusammengesetzt ist. Die Hinterleibszeichnung des Weibchens wechselt mehr. Entweder ist sie ebenso wie beim Männchen, nur die Binden etwas breiter, oder die Segmente sind zu grossen, fast kreisrunden Flecken umgewandelt, die dem Hinterrand anliegen, während zugleich die Rückenstrieme auffallend breit und am Hinterrand der Ringe abgekürzt ist und auch am Vorderrand deutliche, zu einer Querbinde sich vereinigende Flecken auftreten; der letzte Ring trägt, wenn man ihn senkrecht von oben betrachtet, oft auch noch 2 dunkle Flecken, die unter der Bestäubung verschwinden, wenn man ihn ganz von hinten ansieht. Die Beine sind in beiden Geschlechtern schwarzbraun, die Basis sämtlicher Schienen gelblich.

Fundorte. Seychelles: Mahé, near Morne Blanc, about 800 feet, forest behind Trois Frères, about 2000 feet; Cascade Estate, about 1000 feet, marshes on coastal plain at Anse aux Pins and Anse Royale. Kamerun und Togo.

ALLUAUDINELLA, Giglio-Tos, Ann. Soc. Ent. France, lxiv. 363, (1895).

4. *Alluaudinella bivittata* Mcq., Dipt. exot. II. (3e part.), p. 162, tab. 22, fig. 1 (1843, *Aricia*): Giglio-Tos, l.c.

Ich habe von dieser Art in der Berl. Ent. Zeitschr. li. 42. 8 (1906) eine nach dem in der Bigot'schen Sammlung befindlichen Stück angefertigte genaue Beschreibung gegeben und will hier nur erwähnen, dass es ungemein schwierig ist, die beiden Geschlechter zu unterscheiden. Die Stirn ist bei beiden vollständig gleichbreit, der Hinterleib hat dieselbe breite, ziemlich flach gedrückte Form und die Pulvillen scheinen auch beim Männchen nicht verlängert zu sein. Unter den 14 mir vorliegenden Stücken zeigen die, welche ich für Männchen halte, eine etwas weiter ausgedehnte durchscheinende Färbung des Hinterleibs und der letzte Hinterleibsring ist am Hinterrand breiter abgestutzt, während er beim Weibchen, das bei einigen Stücken an der vorragenden Legeröhre sicher als solches zu erkennen ist, mehr zugespitzt ist. Giglio-Tos hat in den Ann. Soc. ent. France lxiv. 363 (1895) auf die vorliegende Art die Gattung *Alluaudinella* errichtet, die ich gern annehme. Die Bildung des Kopfes, der in beiden Geschlechtern breite, etwas flach gedrückte Hinterleib und die auffallend breiten Flügel unterscheiden die Gattung von allen andern. Die von mir beschriebenen *Spilogaster phasiaeformis, gigas, arguta* Karsch, *evanescens, lativentris* u. *albivitta* (Berl. Ent. Zeitschr. li. 36—41, 1906) gehören zur selben Gattung.

Fundorte. Seychelles: zahlreiche Stücke, die auf Praslin XI. 1908 und Mahé (Cascade Estate und Forêt noire district X., XI. 1908) gefangen sind. Mauritius.

MYDÆA, Robineau-Desvoidy, Essai sur les Myodaires, 479. 2 (1830).

5. *Mydæa compressipalpis*, sp. nov. ♂ ♀.

Oculis fere cohærentibus, in femina late disjunctis, nudis, antennis nigris, articulo 2 cinereo, seta longe plumata, palpis nigris, in mare apice paullo, in femina distincte dilatatis et compressis; thorace flavido-cinereo pollinoso, quadrilineato; abdomine oblongo, flavido-cinereo pollinoso, binis maculis rotundis segmentorum 2—4 apicem versus magnitudine decrescentibus, distinctis, nigro-fuscis; pedibus nigris, pulvillis et unguibus in mare paullo elongatis; alis subflavidis, spinula fere nulla, squamis albis, halteribus flavidis. Long. 7 mm.

Augen hoch und schmal, den ganzen Kopf einnehmend, so dass Stirn und Wangen gar nicht vorragen, oben so wenig getrennt, dass die schmalen, silberweiss bestäubten Orbiten sich berühren oder nur durch eine haarfeine schwarze Linie getrennt sind; Frontoorbitalborsten bis zum Scheitel verlaufend, in der ersten Hälfte stark und lang, in der zweiten kurz und fein. Fühler wenig kürzer als das Untergesicht, schwarz, 2. Glied dicht grau bestäubt, Borste lang gefiedert, Taster an der Spitze kräftig, aber nur wenig erweitert. Thorax und Schildchen dicht graugelb bestäubt, 2 feine Mittellinien auf dem ersteren, die in der Mitte zwischen Naht und Schildchen aufhören, recht deutlich, während die Seitenstriemen nur durch einen Fleck vor der Naht angedeutet sind und hinter der Naht kaum wahrgenommen werden können; (dc) hinter der Naht 3 starke und fast gleichlange, zwischen der vordersten und der Naht noch ein kurzes, aber

deutliches und für die Art characteristisches Börstchen, Præalarborste (pra) sehr kurz, Sternopleuralborsten (st) 1, 2, im übrigen der Thorax mit zahlreichen sehr kurzen, anliegenden Börstchen besetzt. Schildchen wie der Thorax bestäubt, an der Basis mit deutlichem braunen Fleck; es ist auf der ganzen Fläche etwas länger, aber zerstreuter behaart als der Thorax. Hinterleib länglich, ebenfalls dicht graugelb bestäubt, die 3 letzten Ringe mit je einem Paar fast kreisrunder, nach dem Ende zu schnell kleiner werdender schwarzbrauner, scharf begrenzter Flecke, während der 1. Ring nur eine schwache Andeutung davon zeigt. Der ganze Hinterleib ist gleichfalls mit anliegenden Börstchen besetzt und erst vom Hinterrand des 3. Rings an abstehend beborstet; Hypopyg vollständig im letzten Ring versteckt. Beine schwarz, die äusserste Basis der Vorderschienen schwach geblich, Pulvillen und Klauen etwas verlängert; Vorderschienen borstenlos, Mittelschienen hinten mit 2, Hinterschienen aussen und aussen abgewandt mit je 1 ziemlich kurzen Borste, Hinterschenkel unterseits abgewandt nur vor der Spitze mit 2—3 längeren Borsten. Flügel fast glashell, Randdorn sehr klein, 3. und 4. Längsader parallel, aber die 1. Hinterrandzelle an der Spitze etwas schmäler als davor, hintere Querader schief und etwas geschwungen, Schüppchen weisslich, Schwinger gelblich.—Das Weibchen hat eine breite Stirn und die Taster sind an der Spitze deutlich verbreitert und zusammengedrückt; im übrigen gleicht es vollständig dem Männchen.

Fundorte. Seychelles: mehrere Pärchen, die auf Mahé (Long Island, VII. 1908, Forêt noire district, X.—XI. 1908, Cascade Estate, III. 1909) gefangen sind; einige Stücke stammen aus Silhouette VIII. 1908.

6. *Mydæa mediana*, sp. nov. ♂ ♀.

Oculis vitta frontali nigra et angustissimis orbitis paullo, sed distincte separatis, antennis nigris, seta longe plumata, palpis filiformibus nigris; thorace flavido-cinereo pollinoso, lineis duabus mediis, inter setas dorsocentrales sitis et saepe fere confluentibus, distinctis et macula laterali utrinque post suturam posita fuscis, scutello immaculato; abdomine subconico, flavido-cinereo pollinoso, binis maculis segmentorum 1—3 et macula media satis magna segmenti 4 fuscis; pedibus nigris, pulvillis et unguibus paullo elongatis; alis subhyalinis, spinula distincta, squamis albidis, halteribus flavidis.—Femina oculis late disjunctis et maculis abdominis paullo fasciformibus differt. Long. 5—6 mm.

Augen nicht so hoch wie bei der vorigen Art, oben durch eine deutliche schwarze Strieme getrennt, die an der schmalsten Stelle fast halb so breit ist als die Fühler lang sind, und von ganz feinen, fast linienartigen, grau schimmernden Orbiten eingefasst wird; Frontoorbitalborsten gewöhnlich 4, sich von der Fühlerbasis nur bis zur Mitte der Entfernung zwischen Fühler und Scheitel erstreckend. Stirn und Wangen etwas vorragend, letztere neben der Fühlerbasis mit schwarz schillerndem Fleck, Backen $\frac{1}{2}$—$\frac{2}{3}$ so breit, als die Fühler lang sind, letztere in der Mitte der Augenhöhe eingelenkt, etwas kürzer als das Untergesicht, scharz, 2. Glied grau schimmernd, Borste lang gefiedert, Taster fadenförmig, schwarz. Thorax gelbgrau bestäubt, 2 ziemlich breite, innerhalb der Dorsocentralborsten liegende, bisweilen fast zusammenfliessende und nach hinten bis

zur letzten Dorsocentralborste sich erstreckende Mittelstriemen scharf begrenzt braun, ein hinter der Naht liegender, unmittelbar an die Flügelbasis stossender Seitenfleck von derselben Färbung; dc 3, pra ganz fehlend, st 1,2, die Grundbeborstung im übrigen wie bei der vorigen Art; Schildchen gelbgrau bestäubt, ohne Basalfleck. Hinterleib fast kegelförmig, vom Hinterrand des 2. Ringes an mit allmählich länger werdenden abstehenden Borsten besetzt; auch an der Basis des 2. Ringes finden sich schon einige kurze abstehende Börstchen. Er ist wie der Thorax bestäubt und trägt auf den 3 ersten Ringen scharf begrenzte, rundlich dreieckige, braune Flecken, von denen die des 1. Ringes etwas kleiner und heller sind, während der 4. Ring einen nach hinten sich verbreiternden, braunen Mittelfleck trägt; Hypopyg nicht vorragend. Beine schwarz, die Basis der Schienen bisweilen bräunlich durchscheinend, Pulvillen und Klauen etwas verlängert; Vorderschienen borstenlos, Mittelschienen hinten mit 2, Hinterschienen aussen abgewandt mit 2, innen abgewandt mit 1 Borste. Flügel fast glashell, mit deutlichem, doppeltem Randdorn, 3. und 4. Längsader parallel, hintere Querader ziemlich steil und kaum geschwungen, Schüppchen weisslich, Schwinger gelblich.—Das Weibchen hat eine breite Stirn und die Hinterleibsflecke erweitern sich hinten oft bindenartig, sonst gleicht es dem Männchen.

Fundorte. Seychelles: Mahé, die Art scheint häufig und weit verbreitet zu sein, da sie sich in der Sammlung in zahlreichen Stücken findet, die an den verschiedensten Stellen die ganze Zeit über gefangen sind, Mare aux Cochons district, over 1000 feet, Long Island, etc.; Silhouette (near coast); Praslin, XI. 1908.

7. *Mydæa fasciculifera*, sp. nov. ♂ ♀.

Oculis intime cohærentibus, antennis et palpis nigris, seta longe plumata; thorace et scutello sordide flavis, nitidis, subpellucidis; abdomine ovato, subdepresso, nigro-piceo nitido, segmento primo, basi segmenti secundi, ventre flavis pellucidis; pedibus flavis, tibiis fuscis, tarsis nigris, femoribus posticis subtus in latere versus corpus directo ante apicem setis 5—6 dense confertis instructis; alis subflavidis, squamis sordide albidis, anguste nigro-marginatis, halteribus flavis.—Femina fronte lata et femoribus posticis subtus nudis differt. Long. ca. 7 mm.

Augen hoch und schmal, den ganzen Kopf einnehmend und oben aufs engste zusammenstossend, die vordern und obern Facetten grösser als die hintern und untern; Fühler wenig kürzer als das Untergesicht, schwarz oder schmutzig braun, Borste lang gefiedert, Taster an der Spitze ganz schwach verbreitert, schwarzbraun. Thorax und Schildchen schmutzig gelb, glänzend, schwach durchscheinend, Brustseiten ein wenig heller, ohne jede Striemung; dc 3, Acrostichalborsten (a) vor dem Schildchen gewöhnlich 2 Paar, pra fast halb so lang als die folgende Supraalarborste (sa), st 1,2, im übrigen der Thorax mit ziemlich dichten, abstehenden, kurzen Härchen besetzt. Hinterleib breit eiförmig, kaum so lang wie Thorax und Schildchen zusammen, glänzend gelb, durchscheinend, die 3 letzten Ringe mit so ausgebreiteten pechschwarzen Querbinden, dass sie fast ganz pechschwarz erscheinen, während ein linienartiger Vorderrandsaum des dritten und ein etwas breiterer des zweiten Ringes durchscheinend gelb ist; bisweilen ist auch der 2. Ring mit Ausnahme eines feinen Hinterrandsaumes und der Vorderrand des 3. Ringes zu beiden

Seiten durchscheinend gelb. Durch die äusserst kurzen, anliegenden Börstchen erscheint der Hinterleib fast nackt und ist nur vom Hinterrand des 3. Ringes an mit längeren abstehenden Borsten besetzt. Beine gelb, sämtliche Schienen verdunkelt, Tarsen schwarz, Pulvillen und Klauen kurz; Vorderschienen borstenlos, Mittelschienen hinten mit 2, Hinterschienen aussen abgewandt mit 1 stärkeren und langen, innen abgewandt mit 2—3 kürzeren und feineren Borsten, Mittelschenkel unterseits fast ganz nackt, Hinterschenkel unterseits zugekehrt unmittelbar vor der Spitze mit etwa 5 dicht gedrängt stehenden, ziemlich langen und an der Spitze etwas gekräuselten Borsten, abgewandt vor der Spitze mit 3—4 längeren Borsten, die aber weitläufig stehen. Flügel blassgelb, 3. und 4. Längsader divergierend, so dass die 1. Hinterrandzelle an der Spitze sehr breit offen ist, hintere Querader schief und kaum geschwungen, Schüppchen schmutzig weiss mit feinem, schwärzlichem Saum, Schwinger gelb.—Die Augen des Weibchens sind durch eine Strieme getrennt, die über den Fühlern gemessen etwas schmäler ist als ein Auge, die pechschwarze Färbung des Hinterleibs ist ausgebreiteter als beim Männchen, während der Bauch wie bei diesem ganz durchscheinend gelb ist, und die Hinterschenkel sind unterseits zugekehrt ganz nackt. Alles übrige wie beim Männchen.

Fundorte. Seychelles: Mahé, mehrere Männchen und zahlreiche Weibchen an verschiedenen Stellen der Insel, Cascade Estate, about 1000 feet, Morne Seychellois, over 1500 feet, etc.; Silhouette, forest over 1000 feet; Félicité I. XII. 1908.

Ophyra, Robineau-Desvoidy, Essai sur les Myodaires, 516, 16 (1830).

8. *Ophyra nigrisquama*, sp. nov. ♂.

Tota cæruleo-viridis, nitida; oculis intime cohærentibus, antennis et palpis nigris; pedibus nigris, femoribus intermediis subtus prope basim setis rigidis duabus instructis, tibiis posticis intus biseriatim pilosis; alis fere hyalinis, squamarum superiore sordide albida, inferiore nigrescente, halteribus nigris. Long. 5,5 mm.

Die Art gleicht im ganzen Bau vollständig der *O. leucostoma* Wied., *ænescens* Wied., *chalcogaster* Wied. und den übrigen echten *Ophyra*arten. Die Färbung des ganzen Körpers ist schwarzblau mit deutlichem, grünem Schimmer, stark glänzend. Die Augen stossen oben aufs engste zusammen und nehmen den ganzen Kopf ein, die schmalen Wangen sind wie bei den übrigen Arten neben der Fühlerbasis mit glänzendem, tiefschwarzem Fleck versehen, Fühler und Taster schwarz; (dc) 4, die beiden vorderen etwas kleiner, a zweireihig, kurz, dazwischen noch kürzere Börstchen; Hinterleib mit sehr kurzer, nach hinten zu etwas längerer, abstehender Behaarung. Beine schwarz, Pulvillen und Klauen kurz; Vorderschienen borstenlos, Mittelschenkel unterseits in der Nähe der Basis mit 2 nicht sehr langen, aber kräftigen, senkrecht nach unten gerichteten, fast dornartigen Borsten, Mittelschienen hinten mit 2 Borsten, Hinterschenkel unterseits abgewandt vor der Spitze mit 5 anfangs langen, dann schnell an Grösse abnehmenden Borsten, Hinterschienen aussen abgewandt kurz gewimpert mit 1 etwas längeren Borste dazwischen, innen abgewandt wie zugekehrt vom Beginn des 2. Drittels bis zur Spitze mit 5—6 feinen und ziemlich langen Borstenhaaren. Flügel glashell, 4. Längsader von der

hintern Querader an sich ganz allmählich, aber nicht stark der 3. nähernd, hintere Querader etwas schief und geschwungen, länger als ihre Entfernung von der kleinen Querader, das obere Schüppchen schmutzigweiss, das untere geschwärzt, Schwinger schwarz.

Fundort. Seychelles: Mahé, Cascade Estate, 1 Männchen.

9. *Ophyra chalcogaster* Wied., Zweifl. Ins. ii. 427. 11 (1830, *Anthomyia*).

Fundorte. Seychelles: Mahé, Cascade Estate, 1909, 2 Pärchen. Java, Neu-Guinea, Singapore.

Fannia, Robineau-Desvoidy, Essai sur les Myodaires, 567, 9 (1830).

10. *Fannia leucosticta* Mg. ?

♂ *Anthonymia leucosticta* Mg., Syst. Beschr. vii. 328. 31 (1826).

Leider finden sich nur einige auf Mahé gefangene Weibchen in der Sammlung, von denen ich nur mit Sicherheit sagen kann, dass es *Fannia*arten sind, die in die allernächste Verwandtschaft von *leucosticta* Mg. gehören. Sie weichen nur insofern von den *leucosticta*-Weibchen meiner Sammlung ab, als die Hinterschienen innen abgewandt gegen die Spitze zu mit 3 Börstchen versehen sind, während sich bei *leucosticta* an dieser Stelle nur eine befindet; ob sie trotzdem mit letzterer identisch sind, lässt sich nur nach Kenntniss des zugehörigen Männchens entscheiden.

Fundort. Seychelles: Mahé, Cascade Estate.

Limnophora, Robineau-Desvoidy, Essai sur les Myodaires, 517, 18 (1830).

11. *Limnophora fasciolata*, sp. nov. ♂ ♀.

Affinis *L. notatæ* Fall. Oculis vitta frontali nigra et orbitis angustissimis distincte separatis, antennis sat longis et palpis filiformibus nigris, seta brevissime pilosa; thorace albido-cano, duabus maculis anticis et fascia transversa post suturam posita nigris, scutello nigro, apice cano; abdomine oblongo, apice acuto, cano, basi segmenti primi, binis maculis triangularibus, postice fasciformibus segmentorum 2 et 3, et macula media triangulari segmenti 4 atris; pedibus nigris, pulvillis et unguibus brevissimis; alis hyalinis, spinula nulla, venis long. 3 et 4 paullo convergentibus, squamis albis, halteribus flavidis.—Femina fronte latiore et segmento primo abdominis toto nigro differt. Long. 4 mm.

Augen hoch und schmal, durch eine Strieme getrennt, die an der Fühlerbasis gut halb so breit ist wie ein Auge an derselben Stelle, Orbiten linienförmig, weissgrau bestäubt, Stirn an der Fühlerbasis nur wenig und in sehr stumpfem Winkel vorragend, Wangen linienförmig, Backen schmal. Fühler ganz wenig über der Augenmitte eingelenkt, den untern Augenrand erreichend, schwarz, 2. Glied grau schimmernd, Borste bei starker Vergrösserung kurz behaart, Taster fadenförmig, schwarz. Thorax weissgrau, 2 rundliche Vorderrandflecke, die sich ganz vorn berühren und hinten bis zur 2. Dorsocentralborste erstrecken, eine Querbinde unmittelbar hinter der Naht, die genau halb so breit ist wie die Entfernung der Naht vom Schildchen, und dieses selbst mit Ausnahme des Spitzendrittels tiefschwarz; dc 3, a kurz, annähernd vierreihig. Hinterleib fast kegelförmig, weissgrau, der 1. Ring mit Ausnahme des Hinterrandes

schwärzlich, je 2 dreieckige Flecke auf Ring 2 und 3, die sich nach hinten zu Querbinden erweitern und hier fast bis auf den Bauch übergehen, während sie vorn an den vorhergehenden Ring anstossen, und ein dreieckiger, die ganze Länge des Ringes einnehmender Mittelfleck des letzten Ringes tiefschwarz; vom Hinterrand des 3. Ringes an ist der Hinterleib mit ziemlich kräftigen abstehenden Borsten besetzt; Hypopyg im letzten Ring versteckt, mit deutlicher Längsfurche. Beine schwarz, Pulvillen und Klauen sehr kurz; Vorderschienen borstenlos, Mittelschienen hinten mit 2, Hinterschenkel unterseits abgewandt vor der Spitze mit 2 Borsten, Hinterschienen aussen abgewandt und innen abgewandt mit je 1 Borste. Flügel glashell, ohne Randdorn, 3. und 4. Längsader ganz schwach convergierend, hintere Querader steil und etwas geschwungen, Schüppchen weiss, Schwinger gelblich.—Die Augen des Weibchens sind breiter getrennt, die Orbiten nicht so schmal wie beim Männchen und in ihrer obern Hälfte verdunkelt, die Vorderrandflecke des Thorax etwas grösser und schärfer begrenzt, und der 1. Hinterleibsring ganz schwarz. Alles übrige wie beim Männchen.

Fundorte. Seychelles: zahlreiche Stücke, beiderlei Geschlechts aus Silhouette (Plateau of Mare aux Cochons IX. 1908) und Mahé (Long Island VII. 1908 und Cascade Estate 1909).

Anm. Die Art ist der *L. notata* Fall. nahe verwandt. Um sie von dieser und einer Anzahl ähnlicher zu unterscheiden, gebe ich bei dieser Gelegenheit eine kurze Bestimmungstabelle für beide Geschlechter.

Männchen.

1. Dorsocentralborsten hinter der Naht 3 2
   Dorsocentralborsten hinter der Naht 4 3

2. Borste deutlich gefiedert, Flecken des Hinterleibs rundlich, Pulvillen deutlich. *L. notabilis* Stein.
   Borste ganz kurz behaart, Flecke des Hinterleibs bindenartig bis auf den Bauch übergehend, Pulvillen sehr kurz. *L. fasciolata*, sp. nov.

3. Die 2 Flecken am Vorderrand des Thorax kaum angedeutet, Hinterschienen innen abgewandt mit 2—3 Borsten *L. procellaris* Wlk.
   Die 2 Flecken am Vorderrand deutlich, Hinterschienen innen abgewandt mit 1 Borste 4

4. Stirn an der schmalsten Stelle über doppelt so breit, als die Breite eines Fühlers beträgt, Hinterschenkel unterseits abgewandt vor der Spitze mit 4—5 Borsten. *L. Osten-Sackenii* Jaenn.
   Stirn an der schmalsten Stelle kaum breiter als ein Fühler, Hinterschenkel unterseits vor der Spitze mit 2, selten 3 Borsten 5

5. Die schwarze Thoraxbinde durch eine braune Mittelstrieme mit dem Schildchen verbunden. *L. notata* Fall.
   Zwischen Thoraxbinde und Schildchen keine Mittelstrieme. *L. obsignata* Rond.

Weibchen.

1. Dorsocentralborsten hinter der Naht 3 2
   Dorsocentralborsten hinter der Naht 4 3

2. Thorax ohne schwarze Querbinde hinter der Naht. *L. notabilis* Stein.
   Thorax hinter der Naht mit schwarzer Querbinde. *L. fasciolata*, sp. nov.

3. Thoraxbinde hinter der Naht in Flecke aufgelöst. *L. notata* Fall.
   Thoraxbinde hinter der Naht vollständig 4

4. Hinterschienen innen abgewandt mit 2—3 Borsten. *L. procellaris* Wlk.
   Hinterschienen innen abgewandt mit 1 Borste 5

5. Orbiten in der Hinterhälfte schocoladenbraun gefärbt, Vorderrandflecke des Thorax gross, vorn zusammenhängend, hinten durch eine ziemlich schmale graue Linie getrennt, Hinterschenkel unterseits vor der Spitze mit 2 Borsten. *L. obsignata* Rond.

   Orbiten rein weissgrau, Vorderrandflecke des Thorax kleiner und durch eine ziemlich breite, bis vorn reichende Strieme getrennt, Hinterschenkel unterseits vor der Spitze mit 3 Borsten. *L. Osten-Sackenii* Jaenn.

ATHERIGONA, Rondani, Prodrom. dipt. ital., i. 97, 18 (1856).

12. *Atherigona bimaculata*, sp. nov. ♂ ♀.

Vitta frontali atra opaca, orbitis angustis nigris nitidis, antennis longis atris, seta fere ad apicem incrassata, nigra, basi flavida, articulo secundo elongato, palpis nigris ; thorace et scutello nigris subnitidis, levissime cinereo-pollinosis, lineis tribus angustis aegre distinguendis nigris, humeris et thoracis lateribus flavis ; abdomine brevi, subovato, apice acuto, flavo pellucido, nitido, binis maculis rotundis, magnitudine decrescentibus, segmentorum 2—4 atris ; pedibus flavis, dimidio apicali femorum anticorum, tibiis anticis extrema basi excepta, tarsis atris, tibiis posticis plus minusve obscuratis ; alis hyalinis, extrema basi alarum et apice cellulae subcostalis leviter fuscomaculatis, squamis albidis, halteribus flavidis.—Femina differt a mare antennarum seta tenui, basi paullo incrassata, femoribus anticis fere totis et tibiis posticis distinctius nigris et alis immaculatis. Long. ca. 3,5 mm.

Stirnmittelstrieme tief schwarz, Orbiten vorn nebst den schmalen Wangen weissgrau bestäubt, hinten glänzend schwarz, Fühler lang, wenig kürzer als das Untergesicht, schwarz, Borste bis fast zur Spitze verdickt, wahrscheinlich durch äusserst dichte, anliegende kurze Pubescenz, schwarz, an der Basis gelblich, 2. Glied verlängert, Taster wie bei allen *Atherigona*arten schwach sichelförmig gebogen, kaum etwas verdickt, schwarz. Thoraxrücken und Schildchen glänzend schwarz, mehr oder weniger graulich bereift, so dass man auf ersterem deutlicher oder undeutlicher 3 schmale dunkle Längslinien erkennt, von denen die mittlere über die Acrostichal-, die seitlichen über die Dorsocentralborsten laufen, Schulterbeulen und Brustseiten gelb, letztere ganz schwach seidenartig weiss bestäubt. Hinterleib von der gewöhnlichen Form der *Atherigona*männchen, glänzend honiggelb, zum grössten Teil durchscheinend, der verlängerte 1. Ring ungefleckt, die 3 letzten Ringe mit

je einem Paar runder, tiefschwarzer Flecken, die anfangs recht gross sind, aber schnell an Grösse abnehmen; gegen die Spitze zu ist das Gelb des Hinterleibs etwas verdunkelt. Beine gelb, die Spitzenhälfte der Vorderschenkel, die Vorderschienen mit Ausnahme der äussersten Basis und die Tarsen schwarz, Hinterschienen mehr oder weniger gebräunt. Flügel glashell, durch die gelblichen Adern schwach gelblich erscheinend, die äusserste Wurzel der Flügel und die Spitze der Subcostalzelle mit durchsichtig bräunlichgelbem Fleck, Schüppchen weisslich, Schwinger gelblich.—Das Weibchen hat eine dünne, nur an der Wurzel schwach verdickte Fühlerborste, die Brustseiten sind dicht weisslich- bis graulichgelb bestäubt, so dass die gelbe Grundfarbe fast verdrängt wird, die Hinterleibsflecke sind grösser und dadurch, dass die Grundfarbe des Hinterleibs ein mehr dunkles Honiggelb ist, weniger scharf begrenzt, die Flecke des letzten Ringes zu einem zusammengeflossen, die Vorderschenkel ganz schwarz, die Hinterschienen deutlicher geschwärzt und die Flügel ungefleckt.

Fundorte. Seychelles: Ziemlich zahlreich auf Silhouette VIII. 1908 und Mahé (Morne Blanc, X., XI. 1908, Cascade Estate, I. 1909).

13. *Atherigona scutellaris* Stein, Mitt. Zool. Mus. Berlin ii. 110, 155 (1903).

Fundorte. Seychelles: 1 ♀ auf Mahé (Cascade auf sumpfigem Boden nahe am Meere, 20. II. 1909). Egypt.

ACRITOCHÆTA, Grimshaw, Fauna Hawaiiensis, iii. 41 (1901).

14. *Acritochæta maculipennis*, sp. nov. ♂ ♀.

Vitta frontali nigra, plus minusve rufescente, orbitis, genis, toto capite flavis, fere aureis, antennis nigris, articulo tertio lato, seta flava, basi paullo incrassata, articulo secundo vix elongato, palpis flavis; thorace et scutello flavis, fere aureis, tribus vittis longitudinalibus, intermedia angustiore, nigris, sat distinctis; abdomine melleo, subpellucido, subnitido, binis maculis rotundis segmentorum 2—4 atris, maculis duabus segmenti 1 et vitta media paullo obscurius flava aegre distinguendis; pedibus flavis, tarsis vix obscuratis, femoribus anticis supra ante apicem paullo incisis et brevissime nigrobarbatis, tarsis anticis subtus pilosis; alis hyalinis, apice macula parva nigra instructis, venis long. 3 et 4 valde convergentibus, squamis flavidis, superiore sordide flavo, halteribus flavis.—Femina palpis apice plus minusve obscuratis, abdominis maculis 8 et vitta media distinctis, omnibus femoribus, tibiis anticis et posticis basi excepta, tarsis anticis et posticis nigris et alarum extremo tantum margine apicis leviter infuscato differt. Long. ♂ 4,5, ♀ 5,5 mm.

Orbiten, Wangen, das Untergesicht, kurz der ganze Kopf dicht goldgelb bestäubt, Stirnmittelstrieme schwarz, mehr oder weniger rötlich, Fühler fast so lang wie das Untergesicht, schwarz, 3. Glied sehr breit, Borste gelb, bis zur Mitte ganz allmählich etwas verdickt, äusserst kurz pubescent, Taster fadenförmig, gelb, an der Spitze schwach verdunkelt. Thorax und Schildchen ebenfalls goldgelb bestäubt, 3 Striemen auf dem ersteren, von denen die mittlere etwas schmäler ist und die seitlichen über die Dorsocentral-

borsten laufen, schwarz und recht scharf begrenzt. Hinterleib gelb, gegen die Spitze zu etwas gesättigter, gegen das Licht gehalten nur an der Basis schwach durchscheinend, mit geringem Glanz, die 3 letzten Ringe mit je einem Paar scharf begrenzter runder, schwarzer Flecke, welche dem Hinterrand fast anliegen und allmählich an Grösse abnehmen, von denen der erste aber längst nicht so gross ist als bei der vorigen Art. Betrachtet man den Hinterleib ganz schräg von hinten, so sieht man auf dem ersten Ring ein Paar noch grösserer Flecke, die sich aber dadurch, dass sie nur etwas dunkler gelb sind als die Grundfarbe, nur ganz schwach von derselben abheben; von gleicher Färbung ist eine Rückenlinie, die gewöhnlich nur auf Ring 2 und 3 etwas deutlicher ist. Beine gelb, Hinterschienen kaum etwas dunkler, Tarsen mehr oder weniger gebräunt; Vorderschenkel oberseits vor der Spitze, etwas dem Körper zugekehrt, mit einem seichten Ausschnitt und im vordern Teil desselben mit zahlreichen, dicht stehenden Härchen kurz bewimpert, Vordertarsen unterseits mit einer Reihe feiner und ziemlich langer, aber nicht sehr dicht stehender Härchen. Flügel glashell, Adern gelblich, die äusserste Spitze mit einem kleinen schwarzen Fleck, 3. und 4. Längsader stark convergierend, hintere Querader etwas schief und deutlich geschwungen, Schüppchen gelblich, das obere etwas schmutziger, Schwinger gelb.—Der Hinterleib des Weibchens trägt auf allen 4 Ringen paarige Flecke, die aber mehr eckig sind und grösser als beim Männchen, während auch eine Rückenlinie auf allen Ringen deutlich zu bemerken ist; sämtliche Schenkel und Vorder- und Hinterschienen mit Ausnahme der Basis sind schwarz, Vorder- und Hintertarsen gebräunt, an der Flügelspitze ist nur der äusserste Saum schwach gebräunt, und die 3. und 4. Längsader convergieren nicht so stark. Alles übrige wie beim Männchen.

Fundorte. Seychelles: zwei Pärchen auf Mahé (Long Island VI. 1908 und Cascade Estate, 1909).

Anm. Die von Grimshaw in seiner Fauna Hawaiiensis iii. 41 (1901) aufgestellte Gattung *Acritochæta* ist eine echte *Atherigona* und unterscheidet sich von ihr im männlichen Geschlecht nur durch die in der obigen Beschreibung erwähnte Bildung und Beborstung der Vorderschenkel, die Grimshaw in seiner Diagnose ganz unberücksichtigt lässt. Zu derselben Gattung oder Untergattung gehört auch die von mir in den Termesz. Füzet. xxiii. 157. 4 (1900) beschriebene *A. trilineata*, deren Männchen ich erst vor kurzem aus Java kennen lernte und die wahrscheinlich mit der Grimshaw'schen *pulvinata* identisch ist.

15. *Acritochæta trilineata* Stein.

Atherigona trilineata Stein: ♀, Termesz. Füz. xxiii. 157. 4. 1900: ♂, Tijdschr. v. Ent. lii. 253, 3 (1909).

Fundorte. Seychelles: Mahé, Cascade Estate 1909 (1 Männchen). Neu-Guinea, Java, Krakatau I.

Lispa, Latr., Préc. d. Caract. gén. Ins., 169 (1796).

16. *Lispa pectinipes* Becker, Mitt. Zool. Mus. Berlin ii. 113, 161 (1903).

L. lateralis Stein, Berlin Ent. Zeitschr. li. 70. 3 (1906).

Fundorte. Aldabra, 1 ♂ (J. C. F. Fryer, 1908).

Die Art ist weit verbreitet. Becker hat sie auf den Canarischen Inseln und in Egypten gesammelt; ich kenne ein Weibchen von der Delagoa-Bai (Südafrika), und ein Pärchen aus Semarang (Java).

ANTHOMYIA, Meigen, Illiger's Magazine, ii. 281 (1803).

17. *Anthomyia amœna* Msq., Dipt. exot. Suppl. iv. 261. 4 (*Spilogaster*).

Ich habe von dieser Art, die mit *A. pluvialis* L. nahe verwandt ist, in der Berliner Ent. Zeitschrift li. 74. 1 (1906) eine kurze Beschreibung gegeben und dabei erwähnt, dass sie wahrscheinlich mit *A. oculifera* Big. zusammenfällt. Obwohl ich augenblicklich beide Arten vor mir habe, wage ich doch nicht mit Sicherheit zu entscheiden, ob sie wirklich verschieden sind oder nur Abänderungen. Die geringen Unterschiede, die ich bemerken kann, sind folgende. Die mir vorliegenden, aus Ithaca (N.Y., U.S.A.) stammenden Stücke von *oculifera* sind grösser, etwas schmutziger grau, die Augen stossen aufs engste zusammen, die Vorderrandflecke des Thorax sind bis vorn hin deutlich getrennt und die Flügel sind gelblichgrau. *Amœna* Mcq. ist kleiner, weissgrau, die Augen sind oben durch die sich berührenden, silberweiss bestäubten Orbiten ganz wenig getrennt, die Vorderrandflecke des Thorax hängen vorn ziemlich breit zusammen, und die Flügel sind fast glashell. Die Behaarung der Fühlerborste scheint bei *amœna* ein klein wenig länger zu sein als bei *oculifera*. Aus Ostafrica liegen mir noch 2 weitere Arten vor, die sich ebenfalls nur in geringer Weise von den vorhergehenden unterscheiden.

Fundorte. Seychelles: Mehrere Pärchen auf Mahé (Cascade Estate 800′, X. 1908—I. 1909). Aldabra (1908—9, J. C. F. Fryer). Antananarivo, Madagascar.

CŒNOSIA, Meigen, Syst. Beschr. v. 210, 761 (1826).

18. *Cœnosia pallipalpis*, sp. nov. ♂ ♀.

Oculis vitta frontali flava separatis, antennis longis flavis, seta longe plumata, dimidio apicali nuda, palpis apice paullo dilatatis, fere albis; thorace et scutello flavido-griseis, lineis duabus angustis obscurioribus; abdomine elongato, sat robusto, fere cylindrico, flavido-griseo, linea dorsali angusta cinerea, binis maculis rotundis segmentorum 1—4 et segmenti basalis hypopygii nigris, hypopygio distincte prominente; pedibus flavis, pulvillis et unguibus elongatis; alis, squamis, halteribus vix subflavidis, venis long. 3 et 4 parallelis.—Femina abdomine apice acuto et pulvillis brevibus differt. Long. 5,5—6,5 mm.

Augen hoch, oberhalb der Mitte breiter als unterhalb, so dass der Hinterkopf unten gepolstert ist, oben durch eine Strieme getrennt, die an der Fühlerbasis fast so breit ist als ein Auge; Stirnmittelstrieme blass rötlich, nach oben sich etwas verschmälernd, schwach leierförmig, hinten nur wenig ausgeschnitten, Stirn etwas vorragend, Wangen linienförmig, Backen sehr schmal, Fühler etwa in der Augenmitte eingelenkt, bis zum untern Augenrand reichend, blassgelb, Borste lang gefiedert, in der Endhälfte nackt, Taster schwach keulenförmig, fast weiss, an der Spitze kurzborstig. Thorax und Schildchen hell gelblichgrau,

ersterer mit 2 feinen über die Dorsocentralborsten laufenden dunkleren Längslinien, a kurz zweireihig. Hinterleib länger als Thorax und Schildchen zusammen, ziemlich kräftig, fast walzenförmig, von der Farbe des Thorax, eine feine, auch auf den ersten Abschnitt des Hypopygs sich erstreckende Mittellinie grau, je 2 runde Flecke auf allen Ringen, die anfangs kleiner sind und allmählich grösser werden, und ein Paar Flecke auf dem ersten Abschnitt des Hypopygs schwarz und namentlich von hinten gesehen scharf begrenzt; die paarigen Flecke sind ziemlich weit von der Mittellinie entfernt und der 3. Ring trägt ausserdem noch jederseits einen kleinern und nicht so dunkeln Fleck; Hypopyg von der Seite gesehen deutlich vorragend, beide Abschnitte über einander liegend, der Hinterrand des 4. Ringes und der Basalabschnitt des Hypopygs abstehend beborstet, im übrigen der Hinterleib nur mit anliegenden Börstchen besetzt. Beine gelb, auch die Tarsen, die Hüften an der Basis graulich, Pulvillen und Klauen kräftig und verlängert; Vorderschienen mit 1 langen Borste, Mittelschienen hinten mit 2, Hinterschenkel unterseits abgewandt mit etwa 3, zugekehrt auf der Mitte mit meist 2, Hinterschienen aussen und aussen abgewandt mit je 2, innen abgewandt mit 1 Borste. Flügel nur sehr schwach gelblich, ohne Randdorn, 3. und 4. Längsader vollständig parallel, hintere Querader steil und grade, die ungleichen Schüppchen und Schwinger weisslichgelb.—Die Stirn des Weibchens ist genau so breit wie beim Männchen. Es unterscheidet sich nur dadurch von demselben, dass der Thorax jederseits nach aussen von den beiden Mittellinien dunkler gefärbt ist, so dass er scheinbar 2 sehr breite Längsstriemen trägt, dass die 3 letzten Hinterleibsringe ausser den gewöhnlichen Flecken noch jederseits davon einen Fleck tragen und dass die Pulvillen und Klauen kurz sind.

Fundorte. Seychelles: 2 ♂ und mehrere ♀ auf Mahé (Forêt Noire district, X.—XI. 1908, Cascade Estate, und Anonyme Island, I. 1909).

19. *Cœnosia exigua*, sp. nov. ♂ ♀.

Flavido-grisea; antennis epistomate brevioribus, mox flavidis, mox obscuratis, articulo secundo albido-pollinoso, seta tenuissima, nuda aut brevissime pubescente, palpis tenuibus, flavis; thorace flavido-griseo, linea media obscuriore satis distincta; abdomine oblongo, subcylindrico, flavido-griseo, vitta media, maculis duabus minimis segmenti 1 et binis maculis rotundis sat magnis segmentorum 2—4 obscure cinereis; pedibus tenuibus, elongatis, pallide flavis, longe setosis; alis levissime flavidis, spinula nulla, squamis albis, halteribus flavidis.—Femina antennis cinereis, abdomine acuto, maculis abdominis minoribus differt. Long. 2,5 mm.

Augen oberhalb der Mitte breiter als unterhalb, Stirn über den Fühlern $\frac{2}{3}$—$\frac{3}{4}$ so breit als ein Auge, bis zum Scheitel gleichbreit bleibend, Mittelstrieme aschgrau, ebenfalls bis zum Scheitel gleichbreit, hinten tief und schmal ausgeschnitten, die schmalen Orbiten und die übrigen Teile des Kopfes hellgrau bestäubt; Stirn über den Fühlern nur wenig vorragend, Wangen kaum sichtbar, Backen fast ganz fehlend, Mundecke nur wenig vor den Augen sichtbar, Fühler in der Mitte der Augenhöhe eingelenkt, etwas über halb so lang als das Untergesicht, 3. Glied entweder gelb oder aschgrau, 2. Glied weisslich bestäubt, Borste haarförmig, an der Basis ganz schwach verdickt, nur mit starker Lupe kurz pubescent, Taster ziemlich kurz, sehr dünn, gelb. Thorax und Schildchen gelblich-

grau, ersterer mit ziemlich deutlicher, bis zum Ende verlaufender, dunkelgrauer Mittelstrieme, a kurz zweireihig. Hinterleib etwas länger wie Thorax und Schildchen zusammen länglich, bisweilen fast walzenförmig, die 3 letzten Ringe mit einer oft nicht ganz vollständigen Reihe von Discalborsten; er ist wie der Thorax gefärbt und trägt eine fast ununterbrochene dunkelgraue Mittellinie und auf Ring 1 ein Paar sehr kleiner, auf Ring 2 und 3 je ein Paar ziemlich grosser, runder, schwarzer Flecke; Hypopyg deutlich entwickelt, aber von der Seite gesehen nur ganz wenig aus dem letzten Ring vorragend. Beine ziemlich lang und dünn, blassgelb, Pulvillen und Klauen sehr kurz; Vorderschienen mit 1 recht langen Borste, Mittelschienen aussen vorn und aussen hinten mit je 1 ebenfalls ziemlich langen Borste, von denen die letztere etwas kürzer ist, Hinterschienen aussen $\frac{1}{4}$ vor der Spitze, aussen abgewandt auf der Mitte und innen abgewandt ebenfalls auf der Mitte mit je 1 Borste, von denen die zweite recht auffallend lang ist, Hinterschenkel unterseits abgewandt wie zugekehrt mit je einigen längern Borsten. Flügel ganz schwach gelblich, ohne Randdorn, 3. und 4. Längsader etwas divergierend, hintere Querader steil und grade, 6. Längsader kurz, Schüppchen weisslich, Schwinger gelblich.—Das Weibchen hat wohl stets dunkle Fühler, der Hinterleib ist zugespitzt, seine Flecke kleiner und die Rückenlinie dünner; alles übrige wie beim Männchen.

Fundorte. Seychelles: 3 ♂ und 1 ♀ auf Mahé, Cascade Estate, 800 ft., und auf sumpfigem Boden nahe am Meere.

PYGOPHORA, Schiner, Novarareise, Zool. Theil, ii. 1. 295 (1868).

20. *Pygophora lobata* Stein, Termesz. Füzet. xxiii. 147. 3. (1900).

Fundorte. Seychelles: 1 ♀ auf Mahé (Cascade Estate, 1909). Singapore, Neu-Guinea.

RHINIA, Robineau-Desvoidy, Essai sur les Myodaires, 422, 24 (1830).

21. *Rhinia apicalis* Wied., Aussereurop. zweifl. Ins. ii. 354. 10 (1830, *Idia*).

6 Stücke, die vollständig mit den von Becker auf den Canarischen Inseln gefangenen Stücken übereinstimmen.

Fundorte. Chagos Islands, 1 ♀ (1905). Amirantes Islands, 1 ♂ (1905). Seychelles: Mahé 4 ♀ (1908—9, Cascade Estate, 800 ft.).

22. *Rhinia scotti*, sp. nov. ♂ ♀.

Simillima *Rh. apicali* Wied., differt antennarum articulo tertio longiore et nigro, thorace et scutello nigro-viridibus, tibiis omnibus prorsus nigris, alis obscurius flavis, apice distinctius infuscatis.

Die Art hat in Grösse und allgemeiner Zeichnung die grösste Ähnlichkeit mit *Rh. apicalis* Wied., ist aber durch eine Reihe constanter Merkmale leicht und sicher von ihr zu unterscheiden. Die Fühler sind in beiden Geschlechtern ganz schwarz und das 3. Glied mindestens dreimal so lang als das 2., während sie bei *apicalis* namentlich im weiblichen Geschlecht schmutzig gelbbraun gefärbt sind und das 3. Glied nur wenig über doppelt so lang ist als das zweite. Thorax und Schildchen sind bei Männchen und Weibchen tief schwarzgrün, bei *apicalis* ziemlich hell erzfarben, im übrigen in derselben

Weise mit zahlreichen schwarzen Pünktchen besetzt, auf denen kleine Börstchen stehen. Die Färbung der hintern Backenhälfte, der breiten Längsstrieme auf den Brustseiten und des Hinterleibs ist bei *scotti* ein reines Goldgelb, bei *apicalis* mehr messinggelb; die Schüppchen und Flügel, letztere namentlich an der Basis, sind mehr angeräuchert gelb und die schwärzliche Färbung an der Flügelspitze viel intensiver. Ein sicheres Unterscheidungsmerkmal bieten aber die Schienen, die bei der neuen Art ganz schwarz sind, während bei *apicalis* höchstens die äusserste Spitze etwas gebräunt ist.

Fundorte. Seychelles: Silhouette (Mare aux Cochons, 1000 feet, IX. 1908); Mahé (near Morne Blanc, 800 feet, Cascade Estate, 800 feet); "hovers in shade under large trees, etc." (Scott). Aldabra: Takamaka, XI. 1908, "hovering in jungle" (Fryer).

IDIELLA, Brauer und Bergenstamm, Denkschr. Akad. Wien, lvi. 154 (1889) und lx. 177 (1893).

23. *Idiella cyanea* sp. nov.

Endlich findet sich in der Sammlung noch ein Pärchen einer *Idiella*, die vielleicht identisch ist mit der von Rob. Desv. in den Myod. 421. 5 (1830) beschriebenen *Idia rostrata*. Da Wiedermann bereits eine *rostrata* beschrieben hat, nenne ich die Art *cyanea*. Bau des Kopfes und Farbe und Länge der Fühler wie bei der vorigen Art. Vordere Hälfte der Backen glänzend schwarz, hintere grau bestäubt. Thorax und Schildchen tief schwarz, mit einem schwachen Stich ins Bläuliche, ersterer äusserst dünn graulich bereift, so dass man 3 breite, dunklere Längsstriemen nur sehr undeutlich wahrnimmt, die Brustseiten mit einer nur schmalen, hellgrau behaarten Längsstrieme. Hinterleib einfarbig schwarz mit bläulichem Stich, der letzte Ring, soweit sich erkennen lässt, weisslich bestäubt. Beine schwarz. Die Flügel sind ziemlich intensiv angeräuchert.—Das Weibchen gleicht dem Männchen, die Längsstrieme auf den Brustseiten ist etwas breiter, die Striemung auf dem Thorax noch undeutlicher und der Hinterleib einfarbig dunkel veilchenblau, mit schwachem Glanz, letzter Ring nicht bestäubt, die Hinterschienen etwas bräunlich.

Fundort. Seychelles: Mahé, 1 Stück von Cascade Estate, 1 Stück von Forêt Noire District, XI. 1908.

No. X.—PTEROPODA AND HETEROPODA.

By Dr. J. J. Tesch, Helder, Holland.

(Plates **12—14**.)

(Communicated by Prof. J. Stanley Gardiner, M.A., F.R.S., F.L.S.)

Read 21st April, 1910.

I. PTEROPODA.

The Pteropoda, collected by the Percy Sladen Trust Expedition in the Indian Ocean, were few in species. The Gymnosomata indeed were not represented. This may be attributed to two principal causes, viz. (1) the region explored lay wholly in warm tropical waters, and did not extend to areas of cooler temperatures, so that a great diversity of forms, as Meisenheimer* has particularly pointed out, could not be expected; and (2) only few hauls were made in the open sea, the characteristic dwelling-place of the Pteropoda, as the members of the expedition devoted themselves chiefly to exploration in the neighbourhood of reefs.

The area of the Indian ocean, in which the Sealark worked, was also explored to some degree by the Valdivia Expedition. We are thus enabled to compare the results of the two expeditions. It is a remarkable fact that not only the Gymnosomata *Clionopsis grandis*, *Notobranchæa valdiviæ* and *Halopsyche gaudichaudi* were not caught by the Sealark, but also that *Peraclis moluccensis*, which was repeatedly found by the German naturalists, did not occur among the spoils, submitted to me, from the same regions. On the other hand I feel justified in describing a species of *Desmopterus* as new.

1. ENUMERATION OF THE SPECIES.

A. EUTHECOSOMATA.

Limacinidæ.

Limacina Cuvier.

1. *Limacina inflata* (d'Orbigny).

Stat. P (124†), Q (2), Chagos Archipelago; u (3), v (1), Farquhar.

* *Wissenschaftliche Ergebnisse der deutschen Tiefsee-Expedition auf dem Dampfer "Valdivia,"* 1898—1899, *Pteropoda*, 1905.

† The figures in brackets indicate the number of specimens. A full list of the stations will be found in *Trans. Linn. Soc.* Ser. 2. Zool. vol. xii. pp. 170–4; they are indicated by letters.

2. *Limacina trochiformis* (d'Orbigny).

Stat. P. (3), Chagos Archipelago; n (1), Saya de Malha Bank; dd (1), Amirante Group.

3. *Limacina bulimoides* (d'Orbigny).

Stat. P (13), Chagos Archipelago.

Peraclis* Forbes.

4. *Peraclis reticulata* (d'Orbigny).

Stat. u (1), Farquhar.

Cavoliniidæ.

Creseis.

5. *Creseis virgula* Rang.

Stat. A (1), F (2), N. of Chagos Archipelago; d (1), Mauritius; e (1), Mauritius—Cargados Carajos; dd (13), nn (1), Amirante Group.

6. *Creseis acicula* Rang.

Stat. P (1), Chagos Archipelago; u (3), Farquhar; x (3), Providence; kk (6), nn (4), Amirante Group.

Styliola Lesueur.

7. *Styliola subula* (Quoy et Gaimard).

Stat. e (1), Mauritius; n (1), N. of N. Saya de Malha Bank.

Hyalocylix Fol.

8. *Hyalocylix striata* (Rang).

Stat. A (1), B (2), N. of Chagos Archipelago; H (1), L (4), Chagos Archipelago; e (1), Mauritius—Cargados Carajos; n (8), N. of N. Saya de Malha Bank; v (1), Farquhar; kk (4), mm (1), Amirante Group.

Cuvierina Boas.

9. *Cuvierina columnella* (Rang).

Stat. N (2), Chagos Archipelago; mm (1), nn (1), Amirante Group.

* With regard to the recent paper of Meisenheimer (*Die Pteropoden der deutschen Südpolar-Expedition*, 1901—1903, 1906) in which a chapter occurs on the genus *Peraclis*, I am doubtful about the specific distinctness of his species *P. apicifulva* and another form, described almost simultaneously, by Pelseneer, *P. brevispira* (Biscayan Plankton collected during a cruise of H.M.S. "Research," 1900, Part vii., Mollusca (excluding Cephalopoda), *Trans. Linn. Soc. London*, vol. x. Part 5, February 1906). The general shape of the shell is somewhat the same, differing only in the fact that in *P. apicifulva* there are 4 coils, whereas in Pelseneer's species there are only $2\frac{1}{2}$. The opercula agree closely, especially in the striated portions around the central coils of the nucleus. The small rim-like elevations, perpendicular to the suture on the last whorl, in *P. apicifulva* occur also in *P. brevispira* in the form of "petites lamelles rayonnantes, surtout visibles au dernier tour." Finally the sculpture seems to be alike in both species.

Clio Linné.

10. *Clio pyramidata* Linné.

Stat. C (8), N. of Chagos Archipelago; N (1), P (3), Chagos Archipelago; c (3), d (3), Mauritius; e (1), Mauritius—Cargados Carajos; n (5), Saya de Malha Bank; q (3), Farquhar; *y* (1), Providence; aa (4), N. of Providence; ee (1), kk (1), ll (10), mm (7), nn (13), Amirante Group. Dredging Stat. C 20 (3), Saya de Malha Bank.

11. *Clio cuspidata* (Bosc).

Stat. C (7), N. of Chagos Archipelago; N (1), Chagos Archipelago. Dredging Stat. C 20 (2), Saya de Malha Bank.

Cavolinia Abildgaard.

12. *Cavolinia tridentata** (Forskål).

Stat. e (1), Mauritius—Cargados Carajos; x (3), Providence; kk (2), Amirante Group.

13. *Cavolinia longirostris* (Lesueur).

Stat. F (2), N. of Chagos Archipelago; x (2), Providence; dd (1), mm (3), nn (1), Amirante Group.

14. *Cavolinia uncinata* (Rang).

Stat. C (1), N. of Chagos Archipelago; ee (2, 1 empty), Amirante Group. Dredging Stat. C 16 (2, empty), C 20 (4, empty), Saya de Malha Bank.

15. *Cavolinia gibbosa* (Rang).

Dredging Stat. C 16 (3, empty), C 20 (4, empty), Saya de Malha Bank.

16. *Cavolinia globulosa* (Rang).

Stat. C (2), N. of Chagos Archipelago; aa (1†), N. of Providence; ll (10), mm (1), Amirante Group. Dredging Stat. C 16 (2, empty), Saya de Malha Bank.

17. *Cavolinia inflexa* (Lesueur).

Stat. p (1), Farquhar.

Diacria Gray.

18. *Diacria trispinosa* (Lesueur).

Stat. C (5), N. of Chagos Archipelago; nn (1), Amirante Group. Dredging Stat. C 16 (3, empty), Saya de Malha Bank.

19. *Diacria quadridentata* (Lesueur).

Stat. u (3‡), Farquhar; mm (2) Amirante Group. Dredging Stat. C 16 (7, empty), Saya de Malha Bank.

* All specimens were in a young stage (*Pleuropus longifilis* Troschel).

† This specimen was also in a young stage (*Hyalæa rotundata* Boas).

‡ All specimens were young (*Cleodora pygmæa* Boas); it is, however, not quite certain whether this form really should be referred to *Diacria quadridentata*.

B. PSEUDOTHECOSOMATA.

Cymbuliidæ.

CYMBULIA Péron et Lesueur.

20. *Cymbulia* sp.

Stat. B (3), C (47), F (4), N. of Chagos Archipelago; L (1), W. of Chagos Archipelago; d (2), Mauritius; l (1), Nazareth Bank; p (1), q (2), Farquhar; x (1), Providence; aa (2), bb (2), N. of Providence; nn (1), Amirante Group.

At many stations representatives of the genus *Cymbulia*, apparently mostly young forms, were obtained. They all possessed in a more or less advanced stage of growth a ventral lobe to the fin, and the larger specimens seemed to agree in all essential features with *Cymbulia sibogæ* Tesch, which has already been recorded by Meisenheimer* from the Chagos Archipelago and from the Seychelles. Unfortunately none of my specimens possessed a concha; a clear determination was not therefore possible.

DESMOPTERUS Chun.

21. *Desmopterus papilio* (Chun).

Stat. A (10), B (3), F (4), N. of Chagos Archipelago; Q (1), Chagos Archipelago; x (1), Providence; kk (2), Amirante Group.

The specimens had lost all pigment; the tentacular process on the fins was always more or less broken off.

22. *Desmopterus gardineri*, n. sp. (Plate **12**, figs. 1, 2.)

Stat. B (1), N. of Chagos Archipelago.

The general form of the body is about the same as in *D. papilio*, on the whole cylindrical; proximally, however, it becomes gradually more slender and forms a short proboscis, almost perpendicular to the axis of the trunk; distally, it bears a ventral groove, composed of large glandular cells. The very thin, transparent integument is provided with a great many unicellular, but rather large, roundish glands. Similar glands have also been described by Meisenheimer† in *D. papilio*, though they are here much smaller. The musculature of the fins forms the most prominent character of the new species; this musculature is composed of rather broad bands, all distinctly separated, and running in two main directions, the one at right angles to the other. Distally a few bands only of the horizontal system, after passing into the inner ventral lobe of the fin, take an opposite direction and form part of the vertical bands. The whole system is very much like that of *D. papilio* except for the much broader and clearly separated bands; there accordingly exists in the musculature of the fins a similar difference like that of *Cymbulia* compared with *Corolla*. The knob-like, small agglomerations of glands, described by Meisenheimer‡ on the fins of *D. papilio* I also found in *D. gardineri*.

The only specimen obtained was in the ♂ stage, as is shown by the presence of a distinct penis, invaginated at the right side of the head (fig. 2, *p*). The gonad (fig. 1, *gon*)

* *Pteropoden der deutschen Tiefsee-Expedition*, p. 38.

† *l.c.* p. 209, Pl. XIV. figs. 8, 13.

‡ *l.c.* p. 209, Pl. XIV. fig. 6.

occupies the hinder part and a great deal of the left side of the visceral mass. At the right side is situated an accessory gland (fig. 1, *acc. gl*), the rather advanced stage of development of which shows, according to Meisenheimer's investigations*, that the specimen will soon pass into the ♀ sexual stage.

As to the other organs, they are quite like those of the previously described species. On the head, close to the buccal mass (fig. 2, *bm*) two small tentacles are visible (*t*) and a pair of salivary glands. The very short œsophagus opens directly into a very wide and large, thin-walled stomach (fig. 1, *st*), from the right upper corner of which issues a thin intestine (*int*), which passes over to the left side and opens distally at the ventral margin of the hinder glandular groove. The heart and kidney are situated distally from the accessory sexual gland, the heart with its ventricle directed forwards.

Diameter across the fins 5 mm.

I have dedicated this species to its discoverer, Prof. J. Stanley Gardiner.

2. LIST OF THE STATIONS, FROM WHICH PTEROPODS HAVE BEEN RECORDED.

A. Plankton Stations.

Stat. A, May 16, 2.58—3.43 P.M. 3° 31′ S., 72° 27′ E.
25—0 fms. *Creseis virgula* (1), *Desmopterus papilio* (10).
125—0 fms. *Hyalocylix striata* (1).

Stat. B, May 17, 2.20—2.55 P.M. 4° 16′ S., 71° 53′ E.
75—0 fms. *Cymbulia* sp. (1), *Desmopterus papilio* (1).
125—0 fms. *Hyalocylix striata* (2), *Cymbulia* sp. (2), *Desmopterus papilio* (2), *Desmopterus gardineri* (1).

Stat. C, May 17, 3.30—6.30 P.M. Same position.
1200—0 fms. *Clio cuspidata* (7), *Clio pyramidata* (8), *Cavolinia uncinata* (1), *Cavolinia globulosa* (2), *Diacria trispinosa* (5), *Cymbulia* sp. (47).

Stat. F, May 18, 2.10—3.10 A.M. Same position.
Surface. *Creseis virgula* (1), *Desmopterus papilio* (4).
25—0 fms. *Creseis virgula* (1), *Cavolinia longirostris* (2), *Cymbulia* sp. (4).

Stat. H, May 18, 3.58—5.40 P.M. Same position.
Surface. *Hyalocylix striata* (1).

Stat. L, June 6, 8.40—9.40 P.M. N.E. Gt Chagos Bank.
75—0 fms. *Hyalocylix striata* (1).
125—0 fms. *Hyalocylix striata* (3), *Cymbulia* sp. (1).

Stat. N, June 30, 12—12.40 P.M. Peros Atoll.
600—0 fms. *Clio cuspidata* (1), *Clio pyramidata* (1), *Cuvierina columnella* (2).

* *l.c.* pp. 216, 217, Pl. xv.

Stat. P, June 30—July 1, 6.30 P.M.—6.30 A.M. Salomon Atoll.
10—0 fms. *Limacina inflata* (124), *Limacina trochiformis* (3), *Limacina bulimoides* (13), *Creseis acicula* (1), *Clio pyramidata* (3).

Stat. Q, July 4—5, 7.15 P.M.—7.15 A.M. Same position.
Surface. *Limacina inflata* (2), *Desmopterus papilio* (1).

Stat. c, Aug. 22, 4.40—5.20 P.M. Mauritius.
250—0 fms. *Styliola subula* (1), *Clio pyramidata* (3).

Stat. d, Aug. 22—23, 7 P.M.—5 A.M. Same position.
Surface. *Creseis virgula* (1), *Clio pyramidata* (3), *Cymbulia* sp. (2).

Stat. e, Aug. 25, 1.30—3 P.M. 18° 9′ S., 58° 21′ E.
150—0 fms. *Cavolinia tridentata* (2, "*Pleuropus longifilis*").
200—0 fms. *Creseis virgula* (1).
300—0 fms. *Creseis virgula* (3), *Hyalocylix striata* (1).
400—0 fms. *Clio pyramidata* (2).

Stat. l, Sept. 2, 11.45 A.M.—12.30 P.M. 14° 38′ S., 60° 1′ E.
250—0 fms. *Cymbulia* sp. (1).

Stat. n, Sept. 8. N. of N. Saya de Malha Bank.
Surface. *Limacina trochiformis* (1), *Styliola subula* (1), *Hyalocylix striata* (8), *Clio pyramidata* (5).

Stat. p, Sept. 27, 7—9.30 A.M. 10° 27′ S., 51° 17′ E.
300—0 fms. *Cavolinia inflexa* (1), *Cymbulia* sp. (1).

Stat. q, Sept. 27, 7—9.30 A.M. Same position.
1000—0 fms. *Clio pyramidata* (3), *Cymbulia* sp. (2).

Stat. u, Sept. 29—30, 7 P.M.—7 A.M. Farquhar.
Surface. *Limacina inflata* (3), *Peraclis reticulata* (1), *Creseis acicula* (3), *Diacria quadridentata* (3, "*Cleodora pygmæa*").

Stat. v, Sept. 30—Oct. 1, 7 P.M.—5 A.M. Same position.
Surface. *Limacina inflata* (1), *Hyalocylix striata* (1).

Stat. x, Oct. 2—3, 8 P.M.—6 A.M. Providence.
Surface. *Creseis acicula* (3), *Cavolinia tridentata* (3, "*Pleuropus longifilis*"), *Cavolinia longirostris* (2), *Cymbulia* sp. (1), *Desmopterus papilio* (1).

Stat. y, Oct. 4—5, 8 P.M.—6 A.M. Same position.
Surface. *Clio pyramidata* (1).

Stat. aa, Oct. 6, 11.30 A.M.—1.30 P.M. 8° 16′ S., 51° 26′ E.
900—0 fms. *Clio pyramidata* (4), *Cavolinia globulosa* (1, "*Hyalæa rotundata*"), *Cymbulia* sp. (2).

Stat. bb, Oct. 6, 3—3.30 P.M. Same position.
140—0 fms. *Cymbulia* sp. (2).

Stat. dd, Oct. 7, 4—5.30 P.M. Alphonse Island.
Surface. *Limacina trochiformis* (1), *Creseis virgula* (13), *Cavolinia longirostris* (1).

Stat. ee, Oct. 7—8, 9 P.M.—6 A.M. 10 miles S.E. of Alphonse Island.
Surface. *Clio pyramidata* (1), *Cavolinia uncinata* (2, 1 empty).

Stat. kk, Oct. 16, 8—9.30 A.M. Desroches Atoll.
50—0 fms. *Hyalocylix striata* (4).
100—0 fms. *Hyalocylix striata* (2), *Desmopterus papilio* (2).
150—0 fms. *Creseis acicula* (6), *Hyalocylix striata* (3).
300—0 fms. *Clio pyramidata* (1), *Cavolinia tridentata* (2, "*Pleuropus longifilis*").

Stat. ll, Oct. 16, morning. Same position.
750—0 fms. *Clio pyramidata* (10), *Cavolinia globulosa* (10).

Stat. mm, Oct. 16, noon. Same position.
400—0 fms. *Hyalocylix striata* (1), *Cuvierina columnella* (1), *Clio pyramidata* (7), *Cavolinia longirostris* (3), *Cavolinia globulosa* (1), *Diacria quadridentata* (2, 1 "*Cleodora pygmæa*").

Stat. nn, Oct. 16, afternoon. Same position.
200—0 fms. *Creseis virgula* (1), *Creseis acicula* (4), *Cuvierina columnella* (1), *Clio pyramidata* (13), *Cavolinia longirostris* (1), *Diacria trispinosa* (1), *Cymbulia* sp. (1).

B. Dredging Stations.

Stat. C 16, Sept. 6. Saya de Malha Bank, 26 fms. Dredge triangular.
Diacria trispinosa (3), *Diacria quadridentata* (7), *Cavolinia uncinata* (2), *Cavolinia globulosa* (2), *Cavolinia gibbosa* (3). Only empty shells.

Stat. C 20, Sept. 7. Saya de Malha Bank, 331—500 fms. Trawl.
Clio pyramidata (3), *Clio cuspidata* (2), *Cavolinia uncinata* (4, empty), *Cavolinia gibbosa* (4, empty).

3. VERTICAL DISTRIBUTION.

As closing nets were used by the expedition only a few times, and no Pteropods were brought up by them, we are obliged to restrict ourselves to the results of the vertical hauls with open nets. Though for our special purpose their results are more vague and not quite so decisive as that of closing nets, they can be taken into account, as the exact hour of catch is nearly always given.

Now, as is well known, the Pteropoda make daily migrations in a vertical direction. At day-time they remain in deeper layers; as soon as it is getting dark, however, they rise to the surface. This seems especially to be the case with Euthecosomata and

Pseudothecosomata*, although we can as yet give no sufficient explanation of these periodical migrations.

Looking over the foregoing list we may remark that the following species were caught at or near the surface down to 10 fms.

Limacina inflata, Stat. P, Q, u, v.
Limacina trochiformis, Stat. P, n, dd.
Limacina bulimoides, Stat. P.
Peraclis reticulata, Stat. u.
Creseis acicula, Stat. P, u, x.
Creseis virgula, Stat. F, d, dd.
Styliola subula, Stat. n.
Hyalocylix striata, Stat. H, n, v.
Clio pyramidata, Stat. P, d, n, y, ee.
Cavolinia longirostris, Stat. x, dd.
Cavolinia uncinata, Stat. ee.
Cavolinia tridentata ("*Pleuropus longifilis*"), Stat. x.
Cymbulia sp., Stat. d, x.
Desmopterus papilio, Stat. F, Q, x.

From this list, if compared with Prof. Stanley Gardiner's list, it may be seen that all these species with the exceptions of *Creseis virgula*, *Hyalocylix striata* and *Cavolinia longirostris*, were caught *during the night*†; they thus afford another proof of the general rule mentioned above.

The bathymetric occurrence of *Peraclis* is worth mentioning: it was found during night at the surface. Formerly I noted a similar circumstance‡, though here the exact hour could not be given. More than any other genus of the Thecosomata, *Peraclis* seems to belong to the mesoplankton. Miss Anne L. Massy§ mentions seven specimens of *P. triacantha* (Fischer) from a depth of 0—5 fms, off the S.W. coast of Ireland; we have here another of the rare instances of the epiplanktonic occurrence of this genus.

II. HETEROPODA.

The number of species of this group of pelagic Mollusca is likewise small. By far the greater number of the specimens belong to the Atlantidæ or to *Firoloida*, other genera being very scantily represented, a result which seems to agree with that of the Siboga Expedition.

Though no new species were obtained, the material enables me to contribute somewhat to our knowledge of little-known species.

* See for instance Meisenheimer, *l.c.* pp. 97—99.

† The hour on which Stat. n was made is not recorded in the list of stations.

‡ The Pteropoda of the Leyden Museum, *Notes Leyden Museum*, vol. xxix. p. 202.

§ The Pteropoda and Heteropoda of the coasts of Ireland, *Fisheries Ireland Sc. Inv.* 1907, ii. (1909), p. 26.

1. ENUMERATION OF THE SPECIES.

Atlantidæ.

OXYGYRUS Benson.

1. *Oxygyrus rangi* (Souleyet). (Plate **12**, fig. 3.)

Stat. N (1), Chagos Archipelago.

The only specimen has been figured here in order to show the extension of the chalky part of the shell with the spiral undulating lines, which part is very distinctly separated (at the under side of the shell at least) from the horny part. The shell, with a maximum diameter of $1\frac{1}{2}$ mm. without the keel, represents a stage of growth, immediately following that figured by Macdonald*. As to further particulars I may refer to my former publications on this subject†.

PROTATLANTA Tesch.

2. *Protatlanta souleyeti* (E. A. Smith).

Stat. n (14), N. of N. Saya de Malha Bank.

Contrary to my former statement‡ about Souleyet's specimens, I may remark that the shell is quite chalky and not at all horny, as has been rightly pointed out by E. A. Smith§. This difference may possibly be ascribed to the very long conservation of Souleyet's specimens, though they looked quite well preserved. Except for this difference, I have nothing to add to my former investigations. All the specimens had lost their keel, which, as is well known, is very liable to be detached.

This is the first record of this species from the Indian Ocean, all former notes mentioning it as occurring in the Atlantic.

ATLANTA Lesueur.

3. *Atlanta peroni* Lesueur.

Stat. N (1), P (3), Chagos Archipelago; q (2), u (1), Farquhar; hh (1), mm (1), Amirante Group.

4. *Atlanta lesueuri* Souleyet.

Stat. L (1), E. of Chagos Archipelago; n (21), N. of N. Saya de Malha Bank; u (1), Farquhar; mm (1), Amirante Group.

5. *Atlanta inflata* Souleyet.

Stat. n (132), N. of N. Saya de Malha Bank.

* On the anatomy and classification of the Heteropoda, *Trans. Roy. Soc. Edinb.* vol. xxiii. 1862. The figure here referred to has been copied by me (Die Heteropoden der Siboga-Expedition, *Siboga-Expeditie*, Monogr. li. Leiden, 1906, Pl. VII. fig. 5.

† Especially to: Systematic monograph of the Atlantidæ, etc., *Notes Leyden Museum*, vol. xxx. pp. 6, 7.

‡ *l.c.* p. 3.

§ *Challenger Report*, lxxii. (Heteropoda), 1888, p. 44.

6. *Atlanta helicinoides* Souleyet.

Stat. u (1), Farquhar.

7. *Atlanta turriculata* d'Orbigny.

Stat. P (1), Chagos Archipelago.

8. *Atlanta inclinata* Souleyet.

Stat. N (1), Chagos Archipelago; q (2), u (3), Farquhar; nn (2), Amirante Group.

9. *Atlanta gibbosa* Souleyet.

Stat. u (2), Farquhar.

Carinariidæ.

Carinaria Lamarck.

10. *Carinaria* sp.

"Investigator" specimens: 12° 20′ N., 85° 8′ E., 1803 fms, one small broken shell; 7 miles S.E. by E. of Ross Island, 265 fms, 1 sp.

This last specimen, of a length of about 30 mm., had lost nearly all its shell, only a few broken fragments adhering to the visceral nucleus, which itself was greatly damaged; the actual form of the shell could not be made out. The animal was preserved in weak alcohol and was consequently very liable to damage by any manipulation. It showed a huge proboscis and a small rounded fin with a sucker at the usual place in *Carinaria*, viz. at the distal margin, near the base. The eyes had the general shape of those of *Pterotrachea s.s.*, a character not previously, so far as I know, met with in *Carinaria*, the left eye exhibited a small tentacle at the inner side. The visceral nucleus, or rather its remnants, was highly elevated.

The shell from the other locality showed in the form and disposition of the spire some resemblance to *C. cithara* Benson, recorded from the Indian Ocean, but it could not be determined with certainty.

Pterosoma Lesson.

I take this opportunity of rectifying some mistakes in my former notes about the history of this genus*, the literature of which I had no opportunity of studying at that time.

The genus was established by Lesson† and a few years later redescribed by the same author‡ in a manner which clearly shows his opinion about its affinity to *Pterotrachea*, as is proved by the following passage: "un animal fort remarquable, très voisin des firoles§." The damaged condition of his specimens did not enable Lesson to give an accurate description and reliable figures, so it is not at all astonishing that only about forty

* Die Heteropoden der Siboga-Expedition, *Siboga-Expeditie*, Monogr. li. 1906, p. 21.

† *Mém. de la Soc. d'Hist. Nat. de Paris*, t. 3, p. 414, Pl. x. fig. A, 1827.

‡ Voyage autour du monde de la "Coquille," *Zool.* par M. Lesson, T. ii. pp. 254—256, Pl. iii. fig. 3, 3 *bis*.

§ So I have been wrong (*l.c.*) in stating that Lesson had not recognized the true systematic affinity of *Pterosoma* with other Heteropods.

years later Cuthbert Collingwood*, who collected some specimens of *Pterosoma* in the channel of Formosa and ascribed them to the same species as that of Lesson, should nevertheless have been somewhat doubtful about his determination. He did not however give any further information about his specimens, only stating that they belonged in fact to the Heteropods.

Under these circumstances it is easy to understand how Moseley fell into the error, on the suggestion of von Willemoes Suhm, of identifying Lesson's *Pterosoma* with a pelagic Nemertean that he was describing†. Moseley's opinion has been adopted by Fischer‡. It was not before the year 1895, when Whitelegge was fortunate enough to collect some specimens, cast ashore by an easterly gale at Mavoubra Bay near Sydney, and handed over his specimens to Hedley, that the doubts about the mysterious genus *Pterosoma* were definitely removed.

Hedley§ showed the true nature of *Pterosoma*, described the general characters of the body, fin, proboscis and shell from the only intact specimen at his disposal, and gave the first figure of the radula, thus showing its affinity to the Heteropods in general. He did not express his conviction that his species and that of Lesson, *Pt. plana* (strictly speaking, *planum*, as has been rightly advanced by Crosse‖) were identical, though this seems to result from his description.

I myself¶ lately recorded *Pterosoma* among the material of the Challenger Expedition and felt justified in bestowing a new name, *Pt. challengeri*, upon it. After further study of Hedley's figures I think, however, that no true specific difference exists, and it is for this reason that I readily give up my new species, being now convinced that it is the same as *Pt. planum*.

I now describe the species more accurately than former circumstances permitted me.

11. *Pterosoma planum* (Lesson). (Plate **13**, figs. 1—5.)

Stat. kk (1), Desroches Atoll (Amirante Group). Only one specimen (♂) was caught, fortunately without any injury, except to the shell.

As previous authors have mentioned, the animal is remarkable for its broad, wing-like expansions at either side of the body. These are produced by the strong development of the cutis, which is very thick on the body and beyond this forms the large wings, gradually thinning out at the margins**. The thickening of the cutis begins just at the transition between proboscis and body, before the eyes; distally from the visceral nucleus it becomes thinner, finally almost disappearing on the tail (fig. 2). Seen from above (fig. 1) the animal is broadly heart-shaped, with a small emargination between the eyes, ending

* *Rambles of a Naturalist*, 1868, p. 54.

† On a young specimen of *Pelagonemertes rollestoni*, *Ann. Mag. Nat. Hist.* (4), vol. xvi. pp. 377—382, Pl. xi. 1875.

‡ *Manuel de Conchyliologie*, p. 537, 1883—1887.

§ *Pterosoma* Lesson claimed as a Heteropod, *Proc. Malac. Soc. London*, vol. i. 1895, pp. 333—335, figs. 1—4. The author was apparently not acquainted with Moseley's hypothesis, else he would not have indicated Fischer's opinion as "a mere conjecture."

‖ Note sur le genre *Pterosoma* Lesson, *Journ. de Conchyliologie*, vol. xliv. pp. 207—212, 1896.

¶ *l.c.* pp. 22, 23, Pl. iii. fig. 75.

** According to Hedley (*l.c.* p. 334) the wings are not thinner at the margins.

distally in a rather long, slender tail. The proboscis is short and stout. In the centre of the disc is placed the visceral nucleus. A side view (fig. 2) shows the fin, with rounded edges, situated somewhat more distally than the visceral nucleus; a sucker is visible at the hinder margin, near the base of the fin.

The animal measures from tip of the proboscis to end of the tail 12 mm., the breadth of the disc is 6 mm. Lesson* gives for the length about 80 mm., for the breadth 40 mm. This seems to be a quite extraordinary size, as Hedley† notes 30 mm. and 13 mm. respectively, the first measurement being taken from the eyes to the end of the tail. The specimen of the Challenger, which I described‡, was about as long as the animal now under consideration.

The disc, as has been said above, exhibits a heart-shaped form, slightly emarginated at the anterior edge. The whole cutis, of which the disc is formed, consists of a gelatinous, but tough, wholly transparent substance, which, on microscopical examination, proves to originate from small branching cells, widely scattered within the gelatinous material, thus forming a tissue such as is found in pelagic animals, and especially in such forms as *Carinaria*, *Pterotrachea*, etc. Numerous nerve-threads and -cells are distinctly visible in the cutis. The most conspicuous feature however consists in the differently shaped opaque dots, which are distributed all over the surface of the cutis, also on the proboscis, though lying beneath the outer epithelium. These dots have already been noted by Lesson and Hedley; I myself described them in *Cardiapoda*§ and in *Carinaria macrorhynchus* Tesch; here in *Pterosoma* they exhibit essentially the same structure, so I have thought it superfluous to figure them again. Whether these dots are glandular or not seems to be uncertain; I could never detect any efferent duct, and the constituent elements of the agglomeration have not the aspect of unicellular glands. The close resemblance, however, of these speckles with those described and figured by Vayssière‖ in *Carinaria pseudorugosa*, called by the author "corpuscules glandulaires" and examined under a very strong magnification, pleads for a similar nature in *Pterosoma*. At the margins and in the middle the dots are small, very elongated and situated in a longitudinal direction, except distally from the visceral nucleus, where they are placed transversely (fig. 1). Between the two regions named above the dots assume a rounded shape and are a trifle larger. Here and there, especially on the proximal half of the disc, some few tubercles are scattered about.

The great development of the cutis and the formation of a disc, eminently adapted to a pelagic habit, renders powerful muscles superfluous. In fact the whole musculature on the body has been diminished in the extreme, and is scarcely visible through the cutis. Near the mouth, the usual muscles for moving the buccal mass and the radula are present, in the same way as in *Cardiapoda*; distally, on the proboscis, and on the body within the cutis, only a very faint longitudinal musculature exists; on the proboscis this is crossed by a few transverse fibres. On the tail there are some rather strong longitudinal muscular

* Voyage de la "Coquille," *Zool.* T. ii. p. 255, Pl. III. figs. 3, 3 *bis*.

† *l.c.* p. 333. ‡ *l.c.* p. 23. § *l.c.* pp. 73, 76, Pl. x. figs. 49, 52.

‖ Mollusques Hétéropodes provenant des campagnes des yachts Hirondelle et Princesse Alice, *Camp. Sc. Albert I. de Monaco*, Fasc. xxvi. p. 21, Pl. VI. figs. 82—84, 1904.

bands. The fin on the other hand exhibits very clearly the two crossing systems (figs. 2, 4), generally met with in *Carinaria*; it is composed of two plates, slightly converging from the base of the fin towards the undermost margin. Each of these plates consists of a system of parallel, separate muscular bands, stretching vertically from the base of the fin towards the margin, and in their course gradually becoming thinner, some towards the end dividing into two tiny branches. In the proximal part of the fin these bands are directed somewhat forward. Beneath this system lies another, constituted of stronger bands, which are fewer in number than those of the first system, all running across from the base and directed distally. I have not been able to make out whether this last system is double, like the first; it seemed to me as if it was not double. These bands do not branch towards the extremity, but anastomose now and then or are forked at their origin. At the hinder margin of the fin, near the base, is placed a small sucker (fig. 4, *s*), from the convex side of which radiate some tiny muscles.

So the whole structure is very like that of the fin in *Carinaria*, and in *Pterosoma* the same delicate network of crossing muscular bands is also a striking character of the swimming organ.

The eyes are rather large, with a broad base and the same distribution of areas devoid of pigment, as in other Carinariidæ. At the front margin of the eye, somewhat nearer to the median line, is situated a tentacle. Now it is a curious fact, that I have again to record the total absence of the right tentacle, of which no trace could be detected, while the left was clearly developed (fig. 1, *t*). Perhaps this is a constant character, generic or specific, as on a former occasion* a right tentacle was not found by me in this species.

The mouth is surrounded by an annular musculature, in the same manner as in *Cardiapoda*. Two salivary glands (fig. 1, *sg*), of a rather long, cylindrical shape, open into the buccal cavity dorso-laterally, and are sharply bent ventrally towards their blind endings. In the mouth itself, the two longitudinal folds situated at the dorsal roof and slightly converging distally indicate the beginning of the œsophagus; the folds are toothless, as in other Carinariidæ. The radula, at either side of which a cartilaginous attachment for the radula-muscles is found, as formerly described by me† in *Atlanta* (indeed they occur in all Heteropoda), consists of 35 transverse rows, all of the usual formula 2. 1. 1. 1. 2. The plates agree in most respects with those of *Carinaria* and *Cardiapoda*; the intermediate plate has the typical crest (fig. 5a, *ip*)‡, the first and second lateral plates (1st *lp*, 2nd *lp*) are of nearly equal length and elegantly curved, while the central plate (fig. 5, *cp*) exhibits the usual three cusps. In the proximal rows of the radula, these cusps of the central plate are very unequal, the middle one being by far the largest. I have figured such a plate of the 6th row (*cp'*). More distally the lateral cusps of the central plate become larger, though remaining slender and perfectly straight, till in about the 27th row their ends are slightly curved outwards (*cp* represents the central plate of the 31st row).

* *l.c.* p. 22, Pl. III. fig. 75. Moreover the same feature has been noted by me (p. 73) in *Carinaria macrorhynchus*. Hedley (*l.c.* p. 335), however, ascribes two tentacles to *Pterosoma*.

† *l.c.* p. 48, Pl. VI. fig. 1.

‡ This crest was not noted by Hedley (*l.c.* p. 335, fig. 3).

The course of the intestine from the buccal mass to the visceral nucleus is the usual one (fig. 1). The rather stout œsophagus gradually widens out into an elongate swelling, which seems to act like a crop, in which food is preliminarily stored. Afterwards the intestine becomes a slender thin-walled tube, entering finally into the visceral nucleus (fig. 3, *n*). Here it is joined by the liver, enlarges into the stomach, and leaves the visceral nucleus at the left side of the foremost portion of the last named organ, bends over to the right side and forms an anus (fig. 1, *a*) beneath the thickened margin of the mantle.

The visceral nucleus, composed of the liver and the gonads, exhibits an elongated shape (figs. 1—3), and is placed in the centre of the disc, in a broad, longitudinal groove of the cutis; at the posterior pole two spiral turns of the gonad, indicating the former position of the shell, are visible, at least as seen from the right side (fig. 2). As has been already mentioned the shell itself was not present in my specimen. According to Hedley's statement*, it is much like a very depressed *Carinaria* shell, with a small spiral portion of $2\frac{1}{2}$ whorls, "at right angles to which extends the adult, boat-shaped shell, white, glassy, shining, most brittle, ornamented by a double, lamellar keel, running from the embryonic shell along its periphery; from keel to margin curved growth lines undulate the side of the shell." From this description it may be inferred that the shell is like that of *Carinaria*, though, judging after the general shape of the visceral nucleus, one would rather think that the shell must resemble that of *Cardiapoda*.

The nucleus is enclosed within the very thin mantle, showing at its foremost part a thickened margin (fig. 3, *mr*, fig. 1). Perpendicular to the longitudinal axis of the nucleus, a parallel row of about eight tiny gills (fig. 3, *g*), of the same structure as in *Cardiapoda*, extends downwards, accompanied at the left side of the base by a much elongated osphradium (*os*). Dorsally to this is situated the heart (fig. 1, *at*, *v*), with the atrium turned forward towards the gills, and receiving from them the aerated blood. On examining the mantle from above, we may also, through its thin walls, detect the kidney (fig. 1, *k*), lying proximally and close to the rectum, on the median line. Its structure is likewise the same as in *Cardiapoda*, showing the same complicated structure of its walls. I could not observe the opening to the exterior, nor the renopericardial passage.

Finally we may note, at the right side of the base of the fin, the small penis (fig. 4, *p*). As in all Heteropods, the copulating apparatus consists of two parts, (1) the penis properly so called with a very deep seminal groove, and (2) distally from this a somewhat larger accessory apparatus probably to ensure copulation, though I could not observe the glandular structure, so distinct in *Carinaria*, the mucous secretion of which is obviously a help in copulating.

As to the place of *Pterosoma* in the system, we may safely say that it is nearly related to *Carinaria*, as is indicated by the visceral nucleus and the shape of the shell, also by the separate muscles in the fin. It occupies a position intermediate between *Carinaria* and *Cardiapoda*, but is distinct from both genera by its broadly expanded body.

Pterosoma planum was first found, about 90 years ago, by Lesson, between the Moluccas and New Guinea, afterwards by Cuthbert Collingwood in the Channel of Formosa, by Hedley near Sydney, by the Challenger† on the route between the

* *l.c.* p. 335, fig. 2.

† Recorded by me, *l.c.* p. 23.

Admiralty Islands and Japan. By the Sealark it is now recorded from the Amirante Group *.

Cardiapoda d'Orbigny.

12. *Cardiapoda trachydermon* Tesch.

Stat. hh (1), N. of Darros Island (Amirante Group); one specimen (♀) of about 30 mm. from tip of the proboscis to end of the tail. "Investigator" specimen: 40° 13′ N. 93° 40′ E. 370—419 fms.; one specimen (♀) with a total length of 28 mm.

I have very little to add to my former account† of this species. I have found tubercles, cutaneous glands, tentacles, tail, fin, and radula quite similar to those of the Siboga specimens. The right tentacle is somewhat smaller than the left, and both are innervated by a small nerve, issuing from the top of the central ganglia, as will be described in the following species. Here I must state that my former figure of the eye of this species is not quite sufficient, as the distribution of pigment and the general shape of the eye, as it was designated by me, needs some rectification, which will be given in the figure of the next species.

I think the *Carinaroida placenta* Souleyet‡ must be the same as this species, judging from the general shape of the body and the length (35 mm.), though it is almost impossible to obtain absolute certainty, without renewed investigation of the type-specimens. These were found in the tropical Atlantic and near the Sandwich Islands.

13. *Cardiapoda sublævis* Tesch. (Plate **12**, figs. 4, 5.)

Stat. y (1), Providence; mm (1), Desroches Atoll, Amirante Group. At the first station was found a ♀, at the second a ♂, each with a total length of 13 mm.

As I pointed out in my former paper§, this species closely resembles *C. trachydermon*. The general appearance is exactly the same, and the only difference consists in the total absence of tubercles on the skin, and perhaps in the three cusps of the central plate in the radula being of equal length, whereas in *C. trachydermon* the lateral ones are smaller than the median. Yet the specific distinctness of the two species may seem to be not sufficiently established, as perhaps the presence of tubercles is due to advanced age (the specimens of *C. trachydermon* measured from 30 to 35 mm., those of *C. sublævis* from 12 to 25 mm.).

I have figured (fig. 4) the eyes which are of the same general shape as in the Carinariidæ. They are rather large, much depressed, with a round lens (*le*) and the usual distribution of pigment in the hinder part. The retina extends along the whole distal margin of the eye, and is connected with the cerebral ganglion by a strong but short optic nerve (*ne*), showing elongated swellings at both ends. The eye itself is surrounded dorsally and laterally by the skin which is considerably raised, thus forming

* After the above description had been written, I became acquainted with a short note by Raff. Issel on "*Aloysia phyllosoma*" (Un nuovo genere di Molluschi Eteropodi, *Monitore Zool. ital.* Anno XVIII, No. 7, pp. 174—176); this *Aloysia*, as may be inferred from the description and the accompanying figure, is a young *Pterosoma*, as indeed the author himself communicated to me by a letter. (Note added during press.)

† *l.c.* p. 77, Pl. x. fig. 52, Pl. xi. figs. 53—56.

‡ Voyage de la "Bonite," *Zoologie*, T. ii. p. 353, Pl. xvii. figs. 1—10.

§ *l.c.* p. 78, Pl. xi. figs. 57—59.

a kind of large chamber, around the eye; at the proximal margin issues the tentacle (*t*), with a broad, membranous base, the right being again slightly smaller than the left. On the base some longitudinal muscular fibres are visible (*mt*) and a tiny nerve (*nt*) proceeds from the top of the cerebral ganglion and innervates the tentacle. The cerebral ganglia (*cg*), to the under side of which the pleural ganglia are attached, are juxtaposed, longitudinally elongated, the right being very slightly larger than the left, and give rise to numerous nerves, only a few of which are shown in the figure.

The visceral nucleus (fig. 5) is compressed, elongated, showing at the ventral pole two coils which are (in the only undamaged specimen) covered by the minute, delicate shell. This shell is apparently very brittle, as I have not been able to see it, even in fragments, in my specimens. The nucleus is, except for the coils, completely enveloped in the cutis, forming here a large mantle, with an opening at the proximal side of the nucleus. I have already described* the various organs within the mantle cavity, and now restrict myself to giving a figure of the nucleus and its surrounding parts. Most conspicuous are the gills (*g*) and, within the mantle cavity, the kidney (*k*), the walls of which show the same structure as in *Pterosoma*. The osphradium, situated near the left margin of the mantle opening, outside the row of small gills, exhibits a similar elongated shape.

It may be noted here that the *Cardiapoda placenta* mentioned by E. A. Smith† from Arron Island most likely is the same as my *C. sublævis*, though Smith's specimen is much larger (77 mm.). I found this suggestion merely on the radula, investigated by me‡, of the Challenger specimen, the central plate of which shows three exactly equal cusps, just as in *C. sublævis*; moreover this last species may prove to be identical with *C. trachydermon*. The same perhaps is to be said about the *Cardiapoda placenta* recorded by André§ from Amboina. The only information the author gives is a figure of the radula, which shows the same character as mentioned above.

14. *Cardiapoda acuta* Tesch.

Stat. mm (1), nn (1), Desroches Atoll, Amirante Group. Two specimens, both females, one of 20, the other of 55 mm. length.

I have scarcely been able to discover further characteristic features of this species, formerly described by me‖. Both specimens, which seemed to be badly preserved, possessed a stout proboscis and a long, slender tail, without any appendage; this tail is longer in my specimens than the stalk carrying the visceral nucleus, around which are placed nearly 20 gills. Tubercles are found especially on the dorsal side; they give a rather rough appearance to the body. Gland-like spots of various shape are found all over the body, in the same way as in the previous species. Yet it is distinguished at first sight by its tail being devoid of appendages, and by its yellowish colour. Thus the animal, though preserved in the same fluid (formol), forms a striking contrast with the tiny, wholly transparent *C. trachydermon* and *C. sublævis*. I observed a similar difference in the Siboga specimens of *Cardiapoda*.

* *l.c.* pp. 75, 76.

† *Challenger Report*, lxxii. Heteropoda, p. 26, fig. 2.

‡ *l.c.* p. 25.

§ Mollusques d'Amboine, *Revue Suisse d. Zool.* T. iv. p. 405, Pl. xvii. fig. 2.

‖ *l.c.* p. 79, Pl. xi. figs. 60—63.

Pterotrachea placenta Lesson* is probably the same as this species, as the author emphasizes the fact of the tail having "ni nageoire à sa pointe†, ni chapelet à sa suite"; moreover the animal is described to be "d'aspect tuberculeux." Lesson found a specimen, of a length of 50 mm., off the coast of New Guinea.

Notwithstanding some difference in the shape of the fin and the position of the sucker, I suppose *Cardiapoda pedunculata* d'Orbigny‡ is also to be classed with the species under discussion, as no appendages at the tail have been recorded. d'Orbigny's specimens (length 30—40 mm.) were taken in the tropical Atlantic Ocean.

Pterotracheidæ.

Pterotrachea Forskål.

Subgenus *Pterotrachea s. s.* Tesch.

15. *Pterotrachea* (*s. s.*) sp.

Stat. kk (1), Desroches Atoll, Amirante Group.

It is impossible for me to determine this species with any certainty, as the only specimen is a female, and so the relative size of the sucker at the fin cannot be measured.

The animal has a total length of 33 mm., of which the proboscis measures 6 mm., the tail 8 mm.; the maximum breadth of the fin is 5 mm. There are no spines before the eyes. At the left side of the visceral nucleus, which is slender and pointed as in all species of this subgenus, four gills, two of which are very inconspicuous, are to be seen.

The middle plate of the radula bears a central cusp, which is rather long, pointed and very slender; at either side follow five or six shorter ones, somewhat curved inwards. On the dorsal roof of the buccal cavity two longitudinal muscular folds, leading into the œsophagus, show some chitinous teeth, five at either side, the proximal ones being very small.

I have not ventured to name this specimen, which, though beyond doubt belonging to the above named subgenus, does not exhibit any characteristic feature. To give it a name would only serve to increase the already great confusion in the nomenclature of the *Pterotrachea* species.

16. *Pterotrachea* (*s. s.*) *microptera*? Tesch.

Stat. a (1), Mauritius; k (1), Nazareth Bank.

Both specimens were females; the determination to my regret therefore cannot be regarded as quite certain. They were of nearly the same size, the first specimen of a total length of 21 mm., the second, in which the tail and also the fin are torn away, of 23 mm. The proboscis in both measures 6 mm., and is slender and pointed. In the first specimen the fin is extremely small, its maximum diameter being only 2 mm. It is mainly on account of this small fin that I have referred the specimens, which in general aspect are very much alike, to the species mentioned above. The skin is without any

* Voyage de la "Coquille," *Zoologie*, T. ii. p. 253, Pl. III. fig. 2.

† From this we may conclude that Souleyet and also E. A. Smith were wrong in identifying their species with that of Lesson.

‡ *Voyage dans l'Amérique méridionale*, T. v. p. 156, Pl. XI. fig. 5.

tubercles, neither are there spines before the eyes. At the left side of the very slender visceral nucleus three or four minute gills are present.

The middle plate of the radula, investigated by me in the only intact specimen, exhibits a short, broad central cusp, at either side of which extends a row of four or five smaller ones. The palatinal teeth number four in each row.

17. *Pterotrachea* (*s. s.*) *scutata* (Gegenbaur). (Plate **14**, figs. 1—3.)

Stat. 1 (1), Nazareth Bank. Dredging station D 5 (1), Providence. Two specimens, both females, were caught, with a total length of 52 and 76 mm. respectively.

The most remarkable character of this species is the considerable development of the cutis on the proximal half of the body (figs. 1, 2). It is true that in all intact specimens of *Pterotrachea*, if rightly preserved, the cutis on the first part of the body, especially at the ventral side, is somewhat thickened, leaving a kind of gular groove ventrally; here, in *Pt. scutata* however this character is much more accentuated. Seen from above (fig. 2) the body is much broadened out at its proximal half by the thick cutis, exhibiting at the ventral side a rather deep groove, into which the proboscis can be bent back. The whole cutis is perfectly transparent, and of a tough, semi-cartilaginous nature, as in *Pterosoma*. Also in other respects a comparison with this genus may be allowed as in *Pt. scutata* the foremost margin of the cutis projects beyond the eyes and forms a slight emargination. Distally the thick envelopment of the body is soon reduced, though it remains very tough. Everywhere spines and tubercles are found, especially on the dorsal side, where some indistinct longitudinal rows are formed (fig. 2), at either side of the gular groove, in the region of the visceral nucleus (which is surrounded, proximally and distally, by two longitudinal, minutely toothed crests), and on the tail where the lateral rows follow exactly the second and third muscular bands. There are no spinules on the proboscis nor any denticles in front of the eyes, except those on the anterior margin of the thickened cutis.

The proboscis is rather weak, measuring only $\frac{1}{5}$ of the total length of the animal. The rounded fin, without sucker in my female specimens, is situated half-way between the eyes and the visceral nucleus (fig. 1) and is very small. The visceral nucleus is elongated, slender, with about eight gills at its front and left side. The tail ends in a pair of horizontal, unusually tiny fins.

I have no doubt this species is the same as that described by Gegenbaur*, who particularly emphasizes the existence of the thickened cutis between the eyes and the region of the fin, in the following words: "der Vorderteil ist...durch eine beträchtliche, vorzüglich nach der Seite hin ausgedehnte Masse der glashellen Bindesubstanz ausgezeichnet, und unterscheidet somit diese Art leicht von den übrigen bekannten Arten. Diese Ausbreitung der Leibeshülle beginnt vorn an der Basis der Rüssels, setzt sich in sanfter Wölbung...über den Anfangsteil des Rückens fort, schlägt sich an beiden Seiten in Form starker Wülste nach unten und begrenzt dort eine vorn schmale und tief nach hinten zu sich erweiternd auslaufende Grube, in welche der Rüssel sich teilweise einlagern kann. Gegen die übrige Körperoberfläche ist diese kapuzenartige Wulstung überall scharf abgesetzt."

* *Untersuchungen über Pteropoden und Heteropoden*, p. 185, Pl. VIII. figs. 19, 20, 1855.

Gegenbaur notes in his specimens ten to twelve gills; I myself found no more than eight.

The rounded whitish spots with a filament in their centres, as they are generally found in *Pterotrachea*, and also mentioned by Gegenbaur in this species, seemed to be quite absent in my specimens, as I found no trace of them.

Recently a new species, *Firola gegenbauri*, has been described by Vayssière* which in my opinion is identical with Gegenbaur's species; indeed Vayssière himself, though denying the identity, alluded to the close resemblance of the two forms, on account of the cutis on the anterior part forming at either side a large lobe, hanging down from the body, without being connected to that of the opposite side; moreover toothed crests in the region of the visceral nucleus and denticles on the tail are particularly mentioned as characteristic features. The same is shown in fig. 1. It is remarkable that Vayssière notes no less than twenty-two gills.

To confirm my suggestion that *Pt. scutata* and *Pt. gegenbauri* are identical, I have prepared the radula and sought after the palatinal teeth. As to the first, I counted 30 rows (25 according to Vayssière), with the usual formula 2. 1. 1. 1. 2. All plates in a transverse row quite agreed with those represented in Vayssière's figure†. The breadth of the central plate I found three times the length of the same; the measurements of this plate in the 5th row are $\frac{2}{3}$ of the corresponding one in the 16th row; on account of this exact agreement with Vayssière's statements, I have thought it superfluous to figure the radula again.

The peribuccal teeth (fig. 3) form a very remarkable character of this species; they also have been mentioned by the French author. On the large muscular fold at the roof of the buccal cavity I noted six palatinal teeth, the proximal ones very inconspicuous (Vayssière found five such teeth at either side). The peribuccal teeth are very numerous, situated at the lips, chiefly crowded together at the dorsal and ventral halves. A single somewhat larger tooth is placed dorsally, just on the median line. On the dorsal side there are three indistinct rows; laterally the teeth are more scanty; towards the ventral half they even entirely disappear, but form on the ventral region an isolated small group. All these teeth are slender and feebly curved. Here again I must mention a difference between my observations and Vayssière's description, according to which the peribuccal teeth are most numerous dorsally and laterally. This curious armature of the buccal cavity has as yet been found only in this species and in *Pt. talismani* Vayssière.

Subgenus *Euryops* Tesch.

18. *Pterotrachea* (*Euryops*) *mutabilis* Tesch. (Plate **14**, fig. 4.)

Stat. kk (1), Desroches Atoll, Amirante Group. A single specimen (♂) with a total length of 40 mm.

The excellent preservation induces me to give a figure, to complete my former descrip-

* Mollusques Hétéropodes de "l'Hirondelle" et de la "Princesse Alice," *Résult. Camp. Scient. Albert I^er^ de Monaco*, Fasc. xxvi. pp. 39–42, Pl. III. figs. 45—50.

† Viz., his figure 50; fig. 49 represents probably a central plate of an abnormal character, as Vayssière himself also believes.

tion*. The body is cylindrical, enveloped in a thin, but inflated cutis, forming at the throat at either side a fold, such as generally occurs in *Pterotrachea*. On the fold some minute spinules are to be found, the only structure of the kind in this species, as I observed none elsewhere, neither on the body, nor before the eyes. The proboscis is stout, measuring $\frac{1}{4}$ of the total length. Fin large, rounded; sucker conspicuous. Visceral nucleus inflated, short, bearing about nine gills at its proximal and left side. Tail high, owing to accidental contraction; the muscular bands and the horizontal fins do not exhibit any characters worth mention except for a row of spines on the third muscular band. In the region of the fin the characteristic circular glandular organs of *Pterotrachea* are scattered about; on the anterior part of the body and on the proboscis occur numerous pale spots, likewise of a glandular nature, and similar to those occurring in the Carinariidæ.

The eyes of this species have the characteristic shape on account of which I founded† the subgenus *Euryops*. They are figured very accurately by Hesse‡.

One of the specimens of this species in the Siboga material exhibited a few indistinct purpureous spots on the body. For this reason, and because of the lack of spines before the eyes, I think it not improbable that my species is identical with *Pt. mutica* Gegenbaur, Keferstein, Carus, *nec* Lesueur, Vayssière. The great confusion however in the nomenclature, especially of the Pterotracheidæ, does not warrant any certainty about the truth of my surmise, and a renewed and thorough review of this group of animals, notably from the Mediterranean, would be a valuable task for any naturalist.

Firoloida Lesueur.

19. *Firoloida kowalewskyi* Vayssière.

Stat. A (2), N (1), Chagos Archipelago; a (6), c (2), Mauritius; x (2), Providence; aa (2), bb (1), N. of Providence; dd (12), ee (1), kk (3), ll (1), mm (2), Amirante Group.

This species was found at 12 stations, especially from the Amirante Group, with a total number of 36 specimens. It is remarkable for its distinct sexual dimorphism, pronounced (1) in the presence or absence of a sucker and of tentacles, (2) in the different form of the tail, (3) in the unequal development of the very small gills. To my former statements§ I can add that I found this last character somewhat modified, as in some female specimens the gills are very inconspicuous, or even altogether wanting.

I am much inclined to suppose all the so-called different species of *Firoloida* described by various authors will prove to be the same species, identical with *F. kowalewskyi*. All *Firoloida* specimens I have examined exhibited essentially the same features. Even *F. desmaresti*, as figured recently by Vayssière‖, notwithstanding the accurate description, does not differ in the main from the species now recorded from the Sealark. The male of *F. kowalewskyi* agrees in all respects with that of *F. desmaresti*, judging from Vayssière's account, except for the caudal filament, which is not always provided with

* *l.c.* p. 88, Pl. XIII. figs. 86—89.

† *l.c.* pp. 83, 84.

‡ Die Augen einiger Mollusken, *Zeitschr. wiss. Zool.* Bd. lxviii. 1900, Pl. XXIX. figs. 57, 58.

§ *l.c.* pp. 90—95, Pl. XIV.

‖ *l.c.* pp. 43—45, Pl. IV. figs. 66—68, Pl. V. figs. 69, 70, 76.

small swellings at equal distances, but in some cases has a somewhat articulated appearance, as in the female of Vayssière's *F. desmaresti*. I would emphasize the fact that I cannot explain, in this author's figure, the curious arrangement by which the two little lobes, in which the body ends, and the caudal appendage are both inserted on the *proximal* part of the visceral nucleus*. This peculiarity is not alluded to in any way in the text, though it differs largely from all that is known about the tail of *Firoloida*. However, if any error may be assumed to be excluded and the figure is taken from a normal specimen, this character indeed is wholly different from that of *F. kowalewskyi*.

2. LIST OF THE STATIONS, FROM WHICH HETEROPODS HAVE BEEN RECORDED.

A. Plankton Stations.

Stat. A, May 16, 2.58—3.43 P.M. N. of Chagos Archipelago.
Surface. *Firoloida kowalewskyi* (2 ♂♂†).

Stat. L, June 6, 8.40—9.40 P.M. Peros—Diego Garcia.
100—0 fms. *Atlanta lesueuri* (1).

Stat. N, June 30, 1—2.45 P.M. Peros Atoll.
600—0 fms. *Oxygyrus rangi* (1), *Atlanta peroni* (1), *Atlanta inclinata* (1).

Stat. P, June 30—July 1, 6.30 P.M.—6.30 A.M. Salomon Atoll.
10—0 fms. *Atlanta peroni* (3), *Atlanta turriculata* (1).

Stat. Q, July 4—5, 7.15 P.M.—7.15 A.M. Same position.
Surface. *Firoloida kowalewskyi* (1 ♂).

Stat. a, Aug. 22, 1.43—2.30 P.M. Mauritius.
25—0 fms. *Pterotrachea* (*s. s.*) sp. (1 ♀), *Firoloida kowalewskyi* (4 ♀♀).
50—0 fms. *Firoloida kowalewskyi* (2, ♂, ♀).

Stat. c, Aug. 22, 4.40—5.20 P.M. Same position.
200—0 fms. *Firoloida kowalewskyi* (1 ♂).
275—0 fms. *Firoloida kowalewskyi* (1 ♂).

Stat. k, Sept. 2, 10.30—11.20 A.M. Nazareth Bank.
300—0 fms. *Pterotrachea* (*s. s.*) sp. (1 ♀).

Stat. l, Sept. 2, 11.45—12.30 A.M. Same position.
250—0 fms. *Pterotrachea* (*s. s.*) *scutata* (1 ♀).

Stat. n, Sept. 8, hour? N. of N. Saya de Malha Bank.
Surface. *Protatlanta souleyeti* (14), *Atlanta lesueuri* (21), *Atlanta inflata* (132).

Stat. q, Sept. 27, 7—9.30 A.M. S. by E. of Farquhar.
1000—0 fms. *Atlanta peroni* (2), *Atlanta inclinata* (2).

* *l.c.* fig. 67. Here Vayssière depicted the visceral nucleus, and the neighbouring parts, of the female of *F. desmaresti*.

† Within brackets is indicated the number of specimens caught.

Stat. u, Sept. 29—30, 7 P.M.—7 A.M. Farquhar.
Surface. *Atlanta peroni* (1), *Atlanta lesueuri* (1), *Atlanta inclinata* (3), *Atlanta helicinoides* (1), *Atlanta gibbosa* (2).

Stat. x, Oct. 2—3, 8 P.M.—6 A.M. Providence.
Surface. *Firoloida kowalewskyi* (1 ♂).

Stat. y, Oct. 4—5, 8 P.M.—6 A.M. Same position.
Surface. *Cardiapoda sublævis* (1 ♀).

Stat. aa, Oct. 6, 11.30 A.M.—1.30 P.M. Between Providence and Alphonse.
900—0 fms. *Firoloida kowalewskyi* (2 ♀♀).

Stat. bb, Oct. 6, 3—3.30 P.M. Same position.
140—0 fms. *Firoloida kowalewskyi*? (1, head only).

Stat. dd, Oct. 7, 4—5.30 P.M. S. of Alphonse Island.
Surface. *Firoloida kowalewskyi* (12, 10 ♂♂, 2 ♀♀).

Stat. ee, Oct. 7—8, 9 P.M.—6 A.M. S.E. of Alphonse Island.
Surface. *Firoloida kowalewskyi* (1 ♂).

Stat. hh, Oct. 12—13, 8 P.M.—6 A.M. Amirante, N. of Darros Island.
Surface. *Atlanta peroni* (1), *Cardiapoda trachydermon* (1 ♀).

Stat. kk, Oct. 16, 8—9.30 A.M. Amirante, Desroches Atoll.
50—0 fms. *Pterosoma planum* (1 ♂), *Firoloida kowalewskyi* (2 ♂♂).
100—0 fms. *Firoloida kowalewskyi* (1 ♀).
200—0 fms. *Pterotrachea* (*s. s.*) sp. (1 ♀).
250—0 fms. *Pterotrachea* (*Euryops*) *mutabilis* (1 ♂).

Stat. ll, Oct. 16, morning. About same position.
750—0 fms. *Firoloida kowalewskyi* (1 ♀).

Stat. mm, Oct. 16, about noon. About same position.
400—0 fms. *Atlanta peroni* (1), *Atlanta lesueuri* (1), *Cardiapoda sublævis* (1 ♂), *Cardiapoda acuta* (1 ♂), *Firoloida kowalewskyi* (2 ♂♂).

Stat. nn, Oct. 16, afternoon. About same position.
200—0 fms. *Atlanta inclinata* (2), *Cardiapoda acuta* (1 ♀).

B. Dredging Stations.

Stat. D 5, Oct. 4, Providence, 230 fms. Dredge rectangular.
Pterotrachea (*s. s.*) *scutata* (1 ♀).

C. "Investigator" Specimens.

12° 20′ N., 85° 8′ E., 1803 fms., *Carinaria* sp. (one small broken shell).
7 miles S.E. by E. of Ross Island, 265 fms., *Carinaria* sp. (1, beyond recognition).
(Stat. 235), 40° (?) 13′ N., 93° 40′ E., 370—419 fms.; *Cardiapoda trachydermon* (1 ♀).

3. DISTRIBUTION.

Horizontal distribution. As has been repeatedly pointed out, the Heteropods are typical inhabitants of tropical and subtropical waters. Like many other pelagic organisms they seem to extend within these regions over vast areas and some species are almost universally distributed. The occurrence of *Protatlanta souleyeti* in the Indian Ocean may first be mentioned; this species had been hitherto only observed in the Atlantic*. All other Atlantidæ here recorded were already known to inhabit the area explored. Among the Carinariidæ *Pterosoma*, which was found off the coasts of New Guinea, in the Channel of Formosa, between the Admiralty Islands and Japan, near Sydney, and in the gulf of Bengal, has been obtained by the Sealark from the western part of the Indian Ocean; further the three species of *Cardiapoda* of the Siboga Expedition were caught in this same region. As to the Pterotracheidæ the most noteworthy fact is the catch of *Pterotrachea* (*s. s.*) *scutata*, a species known to inhabit the Mediterranean (Gegenbaur, Oberwimmer) and also the eastern part of the Atlantic (Vayssière under the name *Firola gegenbauri*). *Pterotrachea* (*Euryops*) *mutabilis* has been recorded recently by the Siboga Expedition from the Malay Archipelago. Finally *Firoloida kowalewskyi*, which not only inhabits the seas around the Canaries and the Malay Archipelago, seems to be abundant in the tropical Indian Ocean.

It is remarkable that most of the Heteropods were found during the second part of the expedition, and especially in the Amirante Group. To what cause this must be ascribed, is difficult to say. The hydrographical conditions of the area do not seem to differ essentially from other parts of the Indian Ocean visited by the Sealark. Whether perhaps we may explain the fact by some particular method of pelagic fishing we shall now try to find out.

Vertical distribution. So far as I know, Oberwimmer was the first to impose upon the Heteropods a similar rule as had been erected by many naturalists already for the Pteropods, viz. migrations to the surface as soon as darkness begins and disappearance at daybreak†. According to this author both groups of organisms were most plentiful at the surface from 6.45 P.M. to 8.45 P.M., afterwards became rarer, and showed from 3.45 A.M. to 5.30 A.M. another though smaller maximum, whereas surface-fishing during the day gave only poor results.

From the foregoing list of the stations from which Heteropods have been recorded it may be inferred that the following species were caught at or near the surface down to 25 fms.

Protatlanta souleyeti, Stat. n.
Atlanta peroni, Stat. P, u, hh.
Atlanta lesueuri, Stat. n, u.
Atlanta inflata, Stat. n.

* See my recent publication: Monograph of the Atlantidæ, with description of the species in the Leyden Museum, *Notes from the Leyden Museum*, vol. xxx. p. 29, 1908.

† Heteropoden und Pteropoden, *Sinusigera*, gesammelt von S.M. Schiff "Pola," 1890—1894, *Denkschr. Kais. Ak. Wiss. Wien, Mathem.-Naturwiss. Cl.*, Band 65, 1898, pp. 574, 575.

Atlanta helicinoides, Stat. u.
Atlanta turriculata, Stat. P.
Atlanta inclinata, Stat. u.
Atlanta gibbosa, Stat. u.
Cardiapoda trachydermon, Stat. hh,
Cardiapoda sublævis, Stat. y,
Firoloida kowalewskyi, Stat. A, Q, a, x, dd, ee.

Of the stations here named, only A, a and dd were worked during the daytime*. *Firoloida kowalewskyi* was the only species taken during these hours, whilst all other species were obtained exclusively at night or by heaving in the pelagic nets from a depth of 50—1000 fms. Oberwimmer's experience in the Mediterranean seems therefore to refer to a fairly general rule, according to which the Heteropods effect daily vertical migrations like the Pteropods and other pelagic organisms. It is clear, however, that we must wait for much more information before forming our conclusion. Only it may be supposed perhaps that the richer catches of Heteropods in the Amirante Group are due to a frequently employed method of pelagic fishing during many hours *of the night*; at least we cannot think that the waters around these islands should be richer in Heteropods than other parts of the ocean.

As to the normal depth to which the Heteropods descend we know as yet very little. The Sealark caught species of *Atlanta* and *Firoloida* if the pelagic net was sunk down to a depth of 1000—900 fms. and heaved in to the surface, but of course it is impossible to say at which depth the specimens got in the net, as no closing nets were used. Further we have some notes about the bathymetrical occurrence of *Carinaria mediterranea* off the coast of Ireland†, where this species is recorded to live at depths of 768, 550, 450, 345 and 100 fms. The temperature in such depths of more than 700 fms. we may assume to be rather unsuitable for such typical warm-water organisms.

EXPLANATION OF PLATES 12—14.

Plate 12.

Fig. 1. *Desmopterus gardineri*, n. sp., from the hind side. × 16.

Fig. 2. Head and part of fins of same, proximal view. × 25. Explanation of letters in figs. 1 and 2. *acc.gl.* accessory sexual gland; *b.m.* buccal mass; *gon*, gonad; *h.gl.* hinder gland; *int.* intestine; *m.o.* mouth opening; *nephr.* kidney; *o.int.* opening intestine; *p.* penis; *st.* stomach; *t.* tentacle.

Fig. 3. *Oxygyrus rangi*, from the left side; animal withdrawn within its shell. × 40.

Fig. 4. Cerebral ganglia and eyes of *Cardiapoda sublævis*. × 18. *cbg.* nerve to the buccal mass; *cg.* cerebral ganglion; *le.* lens; *mt.* muscles to the tentacle; *ne.* optic nerve; *not.* nerve to the otocyst; *nt.* nerve to the tentacle; *ot.* otocyst; *t.* tentacle.

Fig. 5. Visceral nucleus of same, from the right. × 35. *a.* anus; *g.* gills; *int.* intestine; *k.* kidney; *ok.* opening kidney to the exterior; *vg.* visceral ganglion; *vn.* visceral nucleus.

* Unfortunately the hour of Stat. n has not been recorded. Yet it would be most interesting to know it, as here a great many specimens, apparently a swarm, of *Atlanta* were obtained. [6—8 A.M. J. S. G.]

† Miss Anne L. Massy, The Pteropoda and Heteropoda of the Coasts of Ireland, *Fisheries, Ireland, Sc. Invest.* 1907, ii. (1909), pp. 50, 51.

Plate 13.

Fig. 1. *Pterosoma planum*, seen from above. × 12. *a.* anus; *at.* atrium of the heart; *e.* eye; *k.* kidney; *sg.* salivary gland; *t.* tentacle; *v.* ventricle of the heart; *vn.* visceral nucleus.

Fig. 2. The same, seen from the right side. × 12.

Fig. 3. Visceral nucleus of the same, seen from the left. × 24. *at.* atrium of the heart; *g.* gills; *int.* intestine; *mr.* thickened margin of mantle; *n.* visceral nucleus; *os.* osphradium.

Fig. 4. Fin and its neighbourhood, from the right. × 30. *f.* fin; *p.* penis; *s.* sucker.

Figs. 5, 5 a. Transverse row (31st) of radula of same. × 320. Fig. 5 central plate; fig. 5 a intermediate and lateral plates. *cp.* central plate; *cp'.* central plate of 6th row; *ip.* intermediate plate; 1st *lp.* 2nd *lp.* first and second lateral plate.

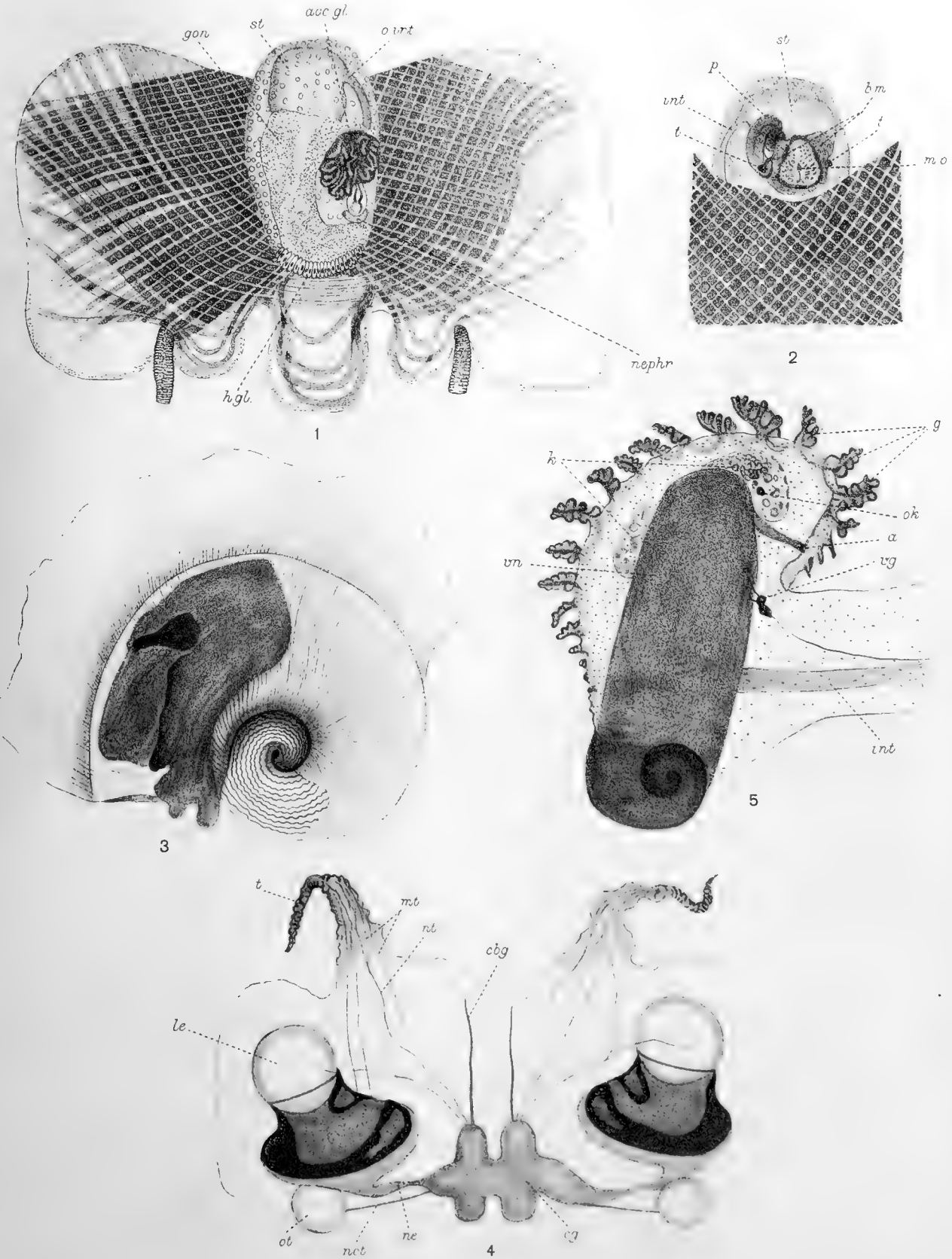
Plate 14.

Fig. 1. *Pterotrachea scutata*, from the left. × 3.

Fig. 2. Head and proximal part of trunk of same, another specimen, from above. × 3½.

Fig. 3. Mouth of same, from within, cut open ventrally, and spread out to show the peribuccal teeth. × 20. *dg.* dorsal group of peribuccal teeth; *lg.* lateral group; *vg.* ventral group.

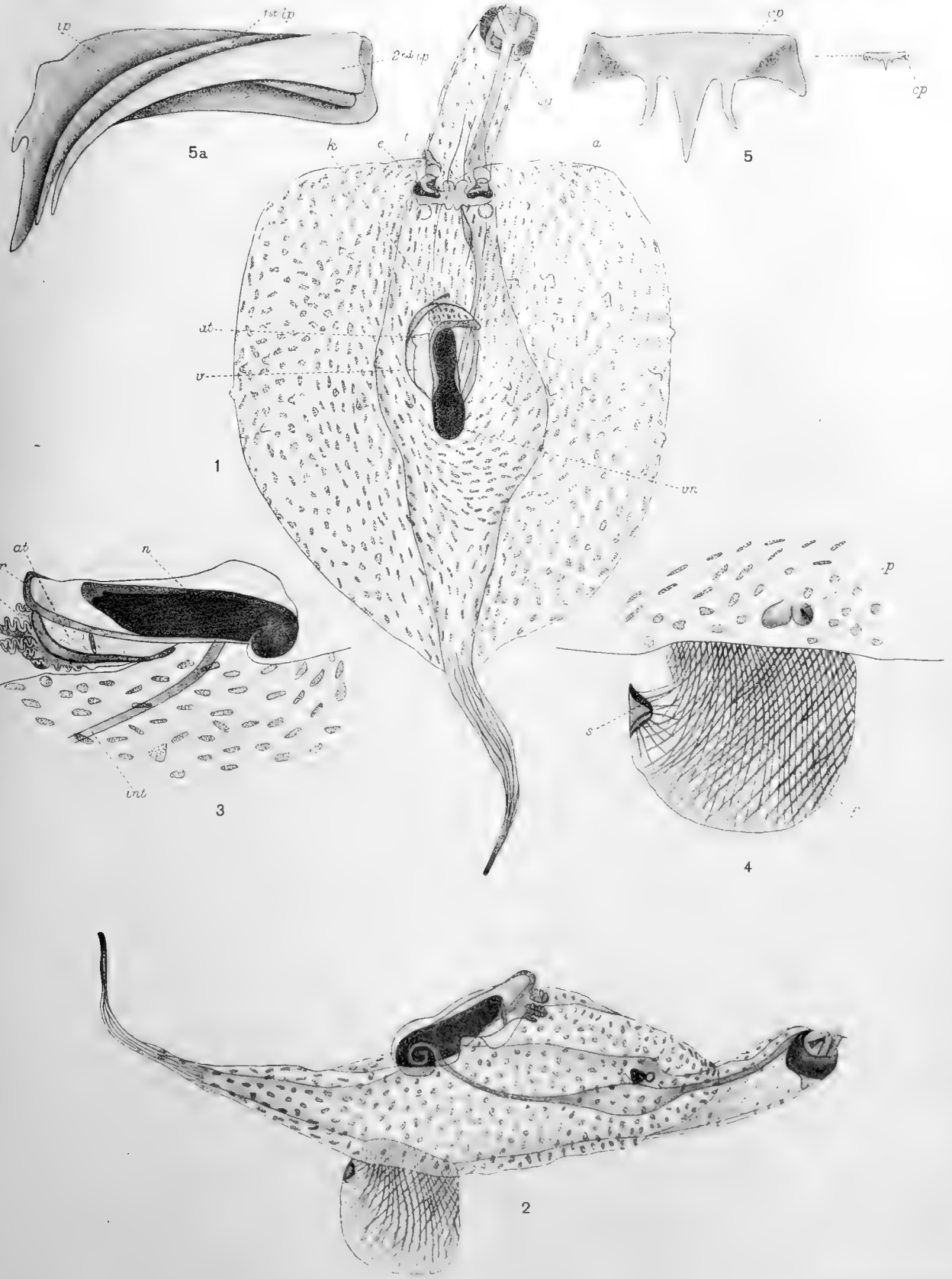
Fig. 4. *Pterotrachea* (*Euryops*) *mutabilis*, from the right side. × 4. *at.* atrium of the heart *k.* kidney; *ok.* opening kidney to the exterior; *v.* ventricle of the heart.



J. J. Tesch, del.

E. Wilson, Cambridge

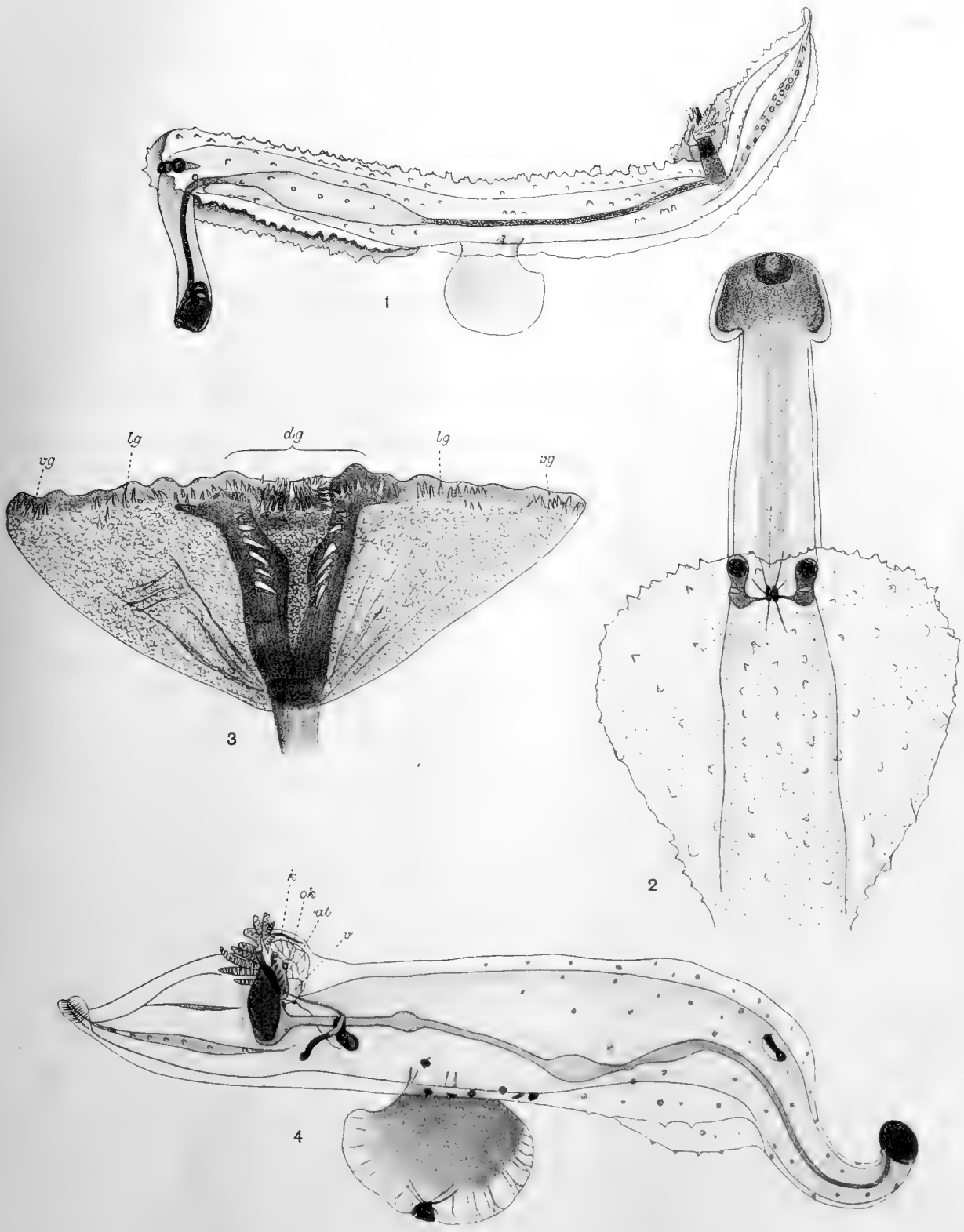
PTEROPODA AND HETEROPODA FROM THE INDIAN OCEAN



J J Tesch, del

E. Wilson, Cambridge

PTEROSOMA PLANUM FROM THE INDIAN OCEAN



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E. Wilson, Cambridge

PTEROTRACHEA FROM THE INDIAN OCEAN

No. XI.—MARINE BRACHYURA.

By Mary J. Rathbun, *Assistant Curator, Division of Marine Invertebrates, United States National Museum, Washington, U.S.A.*

(Plates **15—20** and Text-Figures 1, 2.)

(Communicated by Prof. J. Stanley Gardiner, M.A., F.R.S., F.L.S.)

Read 2nd February, 1911.

The collection of crabs is a large one, comprising 245 species and subspecies; of these, 33 species and 3 subspecies are new to science, and for 3 of the species new genera are constructed.

The majority of the previously described species are entered in the works by Alcock, Laurie or Borradaile on the Brachyura of India, Ceylon and the Maldives, or form part of the Indo-Pacific fauna. Among the exceptions are three species from the Seychelles which have been recorded hitherto only from the Red Sea, or Persian Gulf, or both, viz.: *Atergatopsis signata*, *Actumnus bonnieri* and *Eumedonus granulosus*. Another Red Sea form, *Actumnus globulus*, was taken by the "Sealark" at the Chagos Archipelago.

The results of the expedition show no connection with the West African fauna. The genus *Callinectes*, it is true, is found for the first time in the Indian Ocean. This genus reaches its greatest abundance both as to species and individuals, in temperate and tropical America, and is fairly abundant on the west coast of Africa. The Indian species, however, is similar to, if not identical with, that lately recorded from the "Albatross" collection in the South Pacific.

Most numerous among the "Sealark" crabs are the small oval Xanthids, as *Actæa*, *Carpilodes*, *Pilumnus*, etc. To the same family belongs a new and widely divergent type with a stridulating mechanism, which has been named *Gardineria* in honour of the leader of the expedition. A different arrangement for producing sound is presented by a new species of *Manella*; it is the first occurrence of the sort noted among the Palicidæ. There is an entire absence of Pinnotheridæ and, save for one species of *Typhlocarcinops*, of those hemispherical forms of the Gonoplacidæ which were so abundant in Dr Mortensen's collection in the Gulf of Siam*.

* K. D. Vidensk. Selsk. Skr., 7 R., n.—m., Afd. v. 4, 1910, pp. 303—368, text-figs. 1–44, pls. 1–2, 1 map.

List of species, subspecies and varieties in the collection.

Dromidia cranioides de Man.
Cryptodromia canaliculata Stimpson.
„ *pentagonalis* Hilgendorf.
„ *ornata*, sp. nov.
Homalodromia coppingeri Miers.
Dynomene hispida Desmarest.
„ *prædator* A. Milne Edwards.
„ *pugnatrix brevimana*, subsp. nov.
„ *spinosa*, sp. nov.
Latreillia pennifera Alcock.
Dorippe dorsipes (Linnæus).
Calappa calappa (Linnæus).
„ *hepatica* (Linnæus).
„ *gallus* (Herbst).
„ *bicornis* Miers.
„ *alata*, sp. nov.
Mursia spinimanus Rathbun.
Oreophorus reticulatus Adams & White.
Heteronucia ingens, sp. nov.
Præbebalia extensiva, gen. et sp. nov.
Persephona fugax (Fabricius).
„ *brevimana* (Alcock).
„ *darnleyensis* (Haswell).
Leucosides jecusculum, sp. nov.
„ *angulata*, sp. nov.
Pseudophilyra melita de Man.
Nursilia dentata Bell.
Parathranites orientalis Miers.
Caphyra rotundifrons (A. Milne Edwards).
„ *hemisphærica*, sp. nov.
Lissocarcinus polybioides Adams & White.
„ *orbicularis* Dana.
Portunus (*Achelous*) *petreus* (Alcock).
„ (*Achelous*) *granulatus* (Milne Edwards).
„ (*Achelous*) *orbitosinus*, sp. nov.
„ (*Achelous*) *orbicularis* (Richters).
„ (*Xiphonectes*) *longispinosus* (Dana).
„ (*Xiphonectes*) *macrophthalmus* Rathbun.
Callinectes alexandri Rathbun.
Charybdis erythrodactyla (Lamarck).
„ *paucidentata* (A. Milne Edwards).
„ *hoplites* (Wood-Mason).
„ sp.
Thalamita crenata Latreille.
„ *dance* Stimpson.
„ *prymna* (Herbst).
„ *poissonii* (Audouin).
„ *admete* (Herbst).
„ *margaritimana*, sp. nov.
„ *quadrilobata* Miers.
„ *integra* Dana.
„ *investigatoris* Alcock.
Thalamita exetastica macrospinifera, subsp. nov.
„ *gardineri* Borradaile.
„ *sexlobata* Miers.
„ *cooperi* Borradaile.
„ *bouvieri* Nobili.
„ *oculea* Alcock.
Lupocyclus rotundatus Adams & White.
„ *quinquedentatus* Rathbun.
Carupa læviuscula Heller.
Kraussia integra (de Haan).
„ *nitida* Stimpson.
Carpilius convexus (Forskål).
Carpilodes tristis Dana.
„ *sayademalhensis*, sp. nov.
„ *stimpsonii* A. Milne Edwards.
„ *pediger* Alcock.
„ *vaillantianus* A. Milne Edwards.
„ *cariosus* Alcock.
„ *virgatus* Rathbun.
„ *monticulosus* A. Milne Edwards.
„ *pallidus* Borradaile.
Liomera cinctimana (White).
„ *granosimana* A. Milne Edwards.
Lioxantho latifrons, sp. nov.
Atergatopsis signata (Adams & White).
Platypodia cristata (A. Milne Edwards).
„ *semigranosa* (Heller).
„ *anaglypta* (Heller).
Zosimus æneus (Linnæus).
Lophozozymus dodone (Herbst).
„ *pulchellus* A. Milne Edwards.
Euxanthus rugosus Miers.
„ *herdmani* Laurie.
Hypocolpus diverticulatus (Strahl).
Xantho impressus (Lamarck).
Leptodius exaratus (Milne Edwards), var.
„ *sanguineus* (Milne Edwards).
„ *molokaiensis* Rathbun.
„ *nudipes* (Dana).
„ *gracilis* (Dana).
„ *cavipes* (Dana).
„ *cristatus* Borradaile.
Medæus simplex A. Milne Edwards.
„ *ornatus* Dana.
Cycloxanthops angustus Rathbun.
Etisus dentatus (Herbst).
„ *lævimanus* Randall.
Etisodes electra (Herbst).
Actæa tomentosa (Milne Edwards).
„ *remota* Rathbun.
„ *tessellata* Pocock.
„ *hirsutissima* (Rüppell).

Actæa rufopunctata Milne Edwards.
„ *garretti* Rathbun.
„ *obesa* A. Milne Edwards.
„ *affinis* (Dana).
„ *speciosa* (Dana).
„ *ruppellii* (Krauss).
„ *acies*, sp. nov.
„ *suffuscula*, sp. nov.
„ *variolosa* Borradaile.
„ *hellerii* A. Milne Edwards.
„ *savignyi* (Milne Edwards).
„ *boletaria*, sp. nov.
„ *nodulosa* White.
„ *flosculata* Alcock.
„ *polyacantha* (Heller).
„ *spinosissima* Borradaile.
„ *perspinosa* Borradaile.
„ *cavipes* (Dana).
„ *banareias*, sp. nov.
Daira perlata (Herbst).
Xanthias lamarckii (Milne Edwards).
„ *alcocki* Rathbun.
„ sp.
„ *tuberculidens*, sp. nov.
„ *minutus* (Rathbun).
Chlorodiella niger (Forskål).
„ *lævissima* (Dana).
„ *barbata* (Borradaile).
Phymodius ungulatus (Milne Edwards).
„ *nitidus* (Dana).
„ *sculptus* (A. Milne Edwards).
„ *laysani* Rathbun.
Chlorodopsis spinipes (Heller).
„ *woodmasoni* Alcock.
„ *scabricula* (Dana).
„ *venusta* Rathbun.
„ *melanospinis*, sp. nov.
Pilodius paumotensis Rathbun.
Cymo andreossyi (Audouin).
„ *melanodactylus* de Haan.
„ *quadrilobatus* Miers.
Pseudozius caystrus (Adams & White).
Epixanthus corrosus A. Milne Edwards.
Lydia tenax (Rüppell).
Dacryopilumnus eremita Nobili.
Pilumnus longicornis Hilgendorf.
„ *andersoni* de Man.
„ *hirsutus* Stimpson.
„ *orbitospinis*, sp. nov.
„ *tahitensis* de Man.
„ *tæniola* Rathbun.
„ *turgidulus*, sp. nov.
„ *trichophoroides* de Man.
„ *alcocki* Borradaile.
Actumnus setifer (de Haan), var.
Actumnus setifer amirantensis, subsp. nov.
„ *bonnieri* Nobili.
„ *globulus* Heller.
„ *obesus* Dana.
„ *simplex*, sp. nov.
„ *lævigatus*, sp. nov.
Eriphia sebana (Shaw).
„ *scabricula* Dana.
Maldivia gardineri, sp. nov.
Trapezia cymodoce (Herbst).
„ „ *ferruginea* Latreille.
„ „ *intermedia* Miers.
„ „ *maculata* (MacLeay).
„ *rufopunctata* (Herbst).
„ *digitalis* (Latreille).
Tetralia glaberrima (Herbst).
Quadrella coronata Dana.
„ *maculosa* Alcock.
Polydectus cupulifer (Latreille).
Domecia hispida Eydoux and Souleyet.
Lybia tesselata (Latreille).
„ *pugil* (Alcock).
Gardineria canora, gen. et sp. nov.
Eucrate crenata de Haan.
Pilumnoplax acanthomerus, sp. nov.
Catoptrus nitidus A. Milne Edwards.
„ *inæqualis* (Rathbun).
Typhlocarcinops piroculata, sp. nov.
Palicus jukesii (White).
„ *whitei* (Miers).
Manella gardineri, sp. nov.
Grapsus longitarsis Dana.
Pachygrapsus plicatus (Milne Edwards).
„ *minutus* A. Milne Edwards.
„ *longipes* Rathbun.
Plagusia depressa tuberculata Lamarck.
Percnon planissimum (Herbst).
„ *abbreviatum* (Dana).
Hapalocarcinus marsupialis Stimpson.
Elamena gracilis Borradaile.
Macropodia formosa, sp. nov.
Lambrachæus ramifer Alcock.
Achæus lorina (Adams & White).
„ *brevifalcatus*, sp. nov.
„ *inimicus*, sp. nov.
„ *cadelli* Alcock.
Achæopsis thompsoni (Norman), var.
Oncinopus aranea de Haan.
Ægipinus indicus (Alcock).
Pseudocollodes complectens, gen. et sp. nov.
Xenocarcinus tuberculatus White.
Sphenocarcinus cuneus (Wood-Mason).
Huenia proteus (de Haan).
Simocarcinus simplex (Dana).
Menæthius monoceros (Latreille).

Scyramathia pulchra (Miers).
Halimus inermis, sp. nov.
,, *elongatus* Ortmann.
,, *borradailei* Rathbun.
,, *uncifer* (Calman).
,, *tenuicornis* (Pocock).
Naxioides mammillata (Ortmann).
,, *hirta* A. Milne Edwards.
,, *spinigera* Borradaile.
Hoplophrys oatesii Henderson.
Tylocarcinus styx (Herbst).
Chlorinoides longispinus (de Haan).
Schizophrys aspera (Milne Edwards).
Cyclax suborbicularis (Stimpson).
Ophthalmias cervicornis (Herbst).
Micippa margaritifera Henderson.
Cyphocarcinus minutus A. Milne Edwards.
Macrocœloma nummifer Alcock.
Micippoides angustifrons A. Milne Edwards.
Parthenope (*Parthenope*) *longimanus* (Linnæus).
,, (*Rhinolambrus*) *longispinis* (Miers).
,, ,, *turriger* (Adams & White).
,, (*Aulacolambrus*) *hoplonotus* (Adams & White).
,, (*Pseudolambrus*) *calappoides* (Adams & White).
,, (*Pseudolambrus*) *harpax* (Adams & White).
,, ,, *plana*, sp. nov.
,, ,, *erosa* (Miers).
Daldorfia horrida (Linnæus).
,, *investigatoris* (Alcock).
Cryptopodia pan Laurie.
Eumedonus granulosus MacGilchrist.

ANNOTATED LIST.

Dromiidæ.

1. *Dromidia cranioides* de Man.

Dromia cranioides Alcock (5)*, p. 138.

Cargados Carajos, 24 fms., Sta. B 4†; 1 ♀ juv. without chelipeds; C. l.‡ 7 mm., C. b. 6·8 mm.

Amirante, 28 fms., Sta. E 6; 2 ♂; C. l. 13·6 mm., C. b. 13·4 mm.

2. *Cryptodromia canaliculata* Stimpson.

Dromia (*Cryptodromia*) *canaliculata* Alcock (5), p. 142.

Salomon; 1 ♀. Praslin, reef; 1 ♀.

3. *Cryptodromia pentagonalis* Hilgendorf.

Dromia (*Cryptodromia*) *pentagonalis* Hilgendorf, Monatsb. Akad. Wiss. Berlin, Nov. 1878 (1879), p. 815, pl. 2, figs. 1—2.

Peros, Coin; 1 juv. Cargados Carajos, 30 fms., Sta. B 17; 1 ♀ ovig. Amirante, 29 fms., Sta. E 1; 1 ♀: 20—25 fms., Sta. E 13; 1 ♂. Seychelles, 39 fms., Sta. F 3; 1 ♀ ovig.: 34 fms., Sta. F 7; 1 ♂, under sponge.

* This and similar citations refer to the issues of the following work:

A. Alcock, Materials for a Carcinological Fauna of India. No. 1, "The Brachyura Oxyrhyncha," Jour. Asiat. Soc. Bengal, lxiv. pt. II, No. 2, 1895; No. 2, "The Brachyura Oxystoma," *op. cit.*, lxv. pt. II, No. 2, 1896; No. 3, "The Brachyura Cyclometopa," pt. I, "The Family Xanthidæ," *op. cit.*, lxvii. pt. II, No. 1, 1898; No. 4, "The Brachyura Cyclometopa," pt. II, "The Families Portunidæ, Cancridæ and Corystidæ," *op. cit.*, lxviii. pt. II, No. 1, 1899; No. 5, "The Brachyura Primigenia or Dromiacea," *op. cit.*, lxviii. pt. II, No. 3, 1899; No. 6, "The Brachyura Catometopa or Grapsoidea," *op. cit.*, lxix. pt. II, No. 3, 1900.

† A list of the stations will be found in vol. xii. of these Transactions, p. 163 *et seq.* They are indicated throughout by capital letters as above.

‡ The abbreviations indicating measurements are those employed by Laurie, in Herdman, Ceylon Pearl Fisheries, pt. v, Suppl. Rept. xl. Brachyura, 1906, p. 350.

The largest of these specimens (Sta. E 1) measures, C. l. 6·8 mm., C. b. 7·2 mm.

In most respects they agree with Hilgendorf's figures; the distance between the supraorbital and postorbital angles is greater than is represented by him, being nearly as great as the distance from the supraorbital angle to the lateral tooth of the front. The tooth behind the branchial groove is not developed. The "Sealark" specimens are all smaller than the type. The carapace is so convex as to be hemispherical.

4. *Cryptodromia ornata*, sp. nov. (Plate **15**, fig. 1).

Saya de Malha, 125 fms., Sta. C 5; 1 ♂ type. Seychelles, 34 fms., Sta. F 7; 1 ♀.

♂, C. l. 21·6 mm., C. b. 26·8 mm., antennal peduncle about 12 mm.

Carapace and appendages covered with a very short vesicular tomentum which does not conceal the coarse, crisp granulation. A few longer, fine hairs. Regions plainly marked; protogastric regions convex; 2 convex bosses on the branchial region. Front and upper orbit with a laminar margin; front tridentate, teeth thin, lateral teeth the larger. A small inconspicuous preorbital tooth. Outer angle of the orbit non-dentiform. Lateral margin winged, continued anteriorly downward to the level of the front margin of the buccal cavity, then upward to the lower tooth of the orbit; it is cut into 3 large denticulate teeth in front of the cervical suture, and 3 or 4 smaller teeth behind that suture. A tooth at the buccal angle. Efferent ridge strong; epistome with a deep triangular cut on either side of the ridge.

Chelipeds equal, rough with granulated tubercles, tomentose inside; palm very thick, especially in the upper half, and twice as long as fingers, measured in the middle line, prehensile teeth fitting close together; only the extremities of the fingers are smooth and naked, white and polished.

First and second legs rough like the chelipeds; third and fourth pairs subequal in length and chelate, but the third is broader and rougher and in its general appearance resembles the preceding legs.

Sternal grooves of female far apart, ending opposite the first ambulatory legs.

This species resembles *Petalomera* except in having non-cristate legs. Of the species of *Cryptodromia*, it approaches *C. gilesii* Alcock*, but it is readily distinguished by the alate lateral border extending nearly its full length, and the chelate subdorsal legs.

5. *Homalodromia coppingeri* Miers.

Lasiodromia coppingeri Alcock, Cat. Indian Dec. Crust., pt. 1, fasc. 1, 1901, p. 57, pl. III, figs. 15, 15 *a*.

Amirante, 29 fms., Sta. E 2; 1 ♀: 25—80 fms., Sta. E 11; 1 ♂, soft shell: 30 fms., Sta. E 21; 2 ♂. Seychelles, 34 fms., Sta. F 8; 1 ♀.

♀, Sta. F 8, C. l. 9·5 mm., C. b. 9·2 mm.

Dynomenidæ.

6. *Dynomene hispida* Desmarest.

Dynomene hispida de Man, Archiv. für Naturg., liii. pt. 1, 1888, p. 408.

Salomon; 1 ♀. Coetivy; 1 ♂.

* Catal. Indian Dec. Crust., pt. 1, fasc. 1, 1901, p. 54, pl. 3, fig. 13.

7. *Dynomene prædator* A. Milne Edwards.

Dynomene prædator de Man, Archiv. für Naturg., liii. pt. 1, 1888, p. 409.

Coetivy; 1 ♂.

8. *Dynomene pugnatrix brevimana*, subsp. nov.

Providence, 50—78 fms., Sta. D 4; 2 ♀ ovig.

Type, C. l. 4·8 mm., C. b. 6·3 mm.

These specimens are a little smaller than de Man's type of *D. pugnatrix** and show some differences. They are a little wider, the palm is shorter in relation to the fingers, has a few spinules on its upper edge, while the wrist and the chela are both provided with a few hairs.

9. *Dynomene spinosa*, sp. nov. (Plate **17**, fig. 1).

Coetivy; 3 ♂.

Type ♂, C. l. 19·6 mm., C. b. 24·7 mm.

Carapace and appendages covered with a thick tomentum of club-shaped setæ; and at regular intervals with bunches of long slender hairs, arising from elevations which are granular or bear a single spine, as on the antero-lateral region and on the dorsal surface of chelipeds and legs. Carapace subcircular, regions plainly marked; 5 antero-lateral teeth, each tipped with a strong spine, of which the fourth is most produced. Front broadly triangular, deeply grooved. Upper margin of orbit with two notches, outer angle not dentiform, lower margin armed with 3 or 4 spines or teeth. Chelipeds subequal, stouter and longer than the legs; lower margin of propodus and distal half of fingers bare; fingers deeply spooned, edges dentate, gaping when closed, the tips also dentate, their teeth fitting neatly together, 2 teeth of the dactylus into 3 of the immovable finger. Dactyli of first 3 legs armed with long slender spines on the posterior margin; last leg less than one-third as long as the preceding.

In the largest specimen, type, the claws have the appearance of being normal and the tips of the dactyli of the legs are light brown. In a smaller specimen, 17·5 × 21·9 mm., the claws are relatively much smaller and unequal, and the whole surface of the dactyli, excepting the hairs, is black. In the smallest specimen, 8·8 × 11·3, the chelipeds are equal, resembling those of the type, the dactyli of the legs are dark brown for their distal half.

This species can be distinguished from all others by its numerous spines.

Latreilliidæ.

10. *Latreillia pennifera* Alcock.

Latreillia pennifera Alcock (5), p. 168; Cat. Indian Dec. Crust., pt. 1, fasc. 1, 1901, p. 71, pl. 7, fig. 27—27 *b*.

Saya de Malha, 125 fms., Sta. C 4; 1 ♀ ovig. Seychelles, 39 fms., Sta. F 3; 1 ♀ ovig.: 34 fms., Sta. F 8; 2 ♂.

Largest specimen, Sta. F 3, C. l. 14·5 mm., C. b. 8 mm.

There are 3 cardiac tubercles forming a triangle, the median tubercle behind the pair.

* Zool. Jahrb. Syst., iv. 1889, p. 444, pl. 10, fig. 13.

Dorippidæ.

11. *Dorippe dorsipes* (Linnæus).

Dorippe dorsipes Alcock (2), p. 277.

Cargados Carajos, 30 fms., Sta. B 15; 1 ♂: 29—30 fms., Sta. B 7; 1 ♂ juv.

Calappidæ.

12. *Calappa calappa* (Linnæus).

Calappa fornicata Alcock (2), p. 142.

Praslin, reef; 1 young ♀, 33 mm. long.

In specimens of this size the anterior half of the carapace is covered with flattened tubercles.

13. *Calappa hepatica* (Linnæus).

Calappa hepatica Alcock (2), p. 142.

Farquhar, atoll lagoon; 3 ♂ small. Seychelles, 31 fms., Sta. F 2; 1 ♂ small.

14. *Calappa gallus* (Herbst).

Calappa gallus Alcock (2), p. 146; Laurie, in Herdman, Ceylon Pearl Fisheries, pt. v, Suppl. Rept. xl. Brachyura, 1906, p. 354.

Salomon; 1 ♀, of the (A) type described by Laurie.

15. *Calappa bicornis* Miers (Plate **17**, fig. 8).

Calappa gallus var. *bicornis* Miers, Rept. Zool. Coll. "Alert," Crust., 1884, p. 550, Providence Island, 19 fms.

Calappa wood-masoni Alcock (2), p. 148, pl. 6, fig. 2, south of Ceylon, 34 fms.; Illus. Investigator, Crust., pt. v, 1897, pl. 28, figs. 2, 2 *a*.

Seychelles, 34 fms.; Sta. F 8; 2 ♂ (1 adult, 1 juv.).

Dimensions.—♂, C. l. extreme 41·8 mm., C. b. just before the expansion 41·4 mm., C. b. extreme 50·5 mm.

The adult has the same form as *C. gallus*, from which species it is probably derived. Compared with a male *gallus* of equal size, extreme length greater than width at sinus in front of clypeiform expansion; in *gallus*, length distinctly less than width. Tubercles of carapace and chelipeds high and conical. Clypeiform expansions narrower and their posterior teeth shorter (along their posterior margins). Hepatic cavity shallower. Front deeply divided, the median sinus reaching back to level of lateral teeth of the front. Antennæ $\frac{2}{5}$ as long as carapace. Upper and lower margins of orbit denticulate. The sixth segment of the abdomen is as wide at its distal as at its proximal end, which is not the case in *gallus*, and the terminal segment is considerably longer than in that species, being $1\frac{2}{3}$ times longer than the sixth segment. In both species the sixth segment is the longest of the seven, the last segment excepted. I think that the abdomen described and figured by Alcock is that of a young ♀ rather than ♂.

A young male 15 mm. long is more quadrangular than the adult, and its tubercles sharper; antenna $\frac{2}{3}$ as long as carapace.

16. *Calappa alata*, sp. nov. (Plate **15**, fig. 2).

Amirante, 34 fms., Sta. E 9; 2 ♂.

Dimensions.—♂, apparently adult, C. l. extreme 17·9 mm., C. b. between sinuses just in front of clypeiform expansions 18·4 mm., C. b. extreme 21·8 mm.

A narrow species; width, exclusive of expansions, a little greater than length. Surface depressed; anterior $\frac{3}{5}$ covered with granulated tubercles arranged somewhat in longitudinal lines and separated by granules; posterior $\frac{2}{5}$ crossed by transverse granulated lines, sparsely edged with fine hairs, and separated by almost smooth spaces. Front, $1\frac{1}{2}$ times as wide as either orbit, formed of two oblique lobes deeply separated by a notch rounded at the base. Intersutural lobes of the orbital margin shallow. Antero-lateral margin slightly arched, separated from the clypeiform expansion by a distinct re-entering angle, and cut into 11 shallow but well defined teeth. Greatest transverse width of clypeiform expansion $\frac{2}{3}$ as great as the extreme dimension in an inwardly oblique antero-posterior direction, and cut into 9 teeth, there being three notches on posterior margin. Antennæ twice as long as width of orbit. Endostomial septum extending vertically from the level of the front to the mouth, thickening posteriorly, anterior edge convex.

Crest at distal end of arm faintly four-lobed; upper surface of wrist and outer surface of palm granulate, and with a few tubercles, an oblique line of regular granules on lower part of outer surface of palm. Sixth segment of abdomen of male a little wider than long; seventh segment as long as sixth is wide.

This species is very near *C. depressa* Miers* from the south Australian coast, 2 to 10 fathoms, which differs in its relatively narrower and more triangular carapace, the wings following the antero-lateral outline; obscure antero-lateral teeth; nearly transverse frontal lobes; in having two regular lines of granules on lower half of outer surface of palm.

17. *Mursia spinimanus* Rathbun (Plate **15**, fig. 5).

Mursia spinimanus Rathbun, Bull. U. S. Fish Comm. for 1903, pt. III, 1906†, p. 888, pl. 16, fig. 1, text-fig. 41.

Saya de Malha, 125 fms., Sta. C 2; 1 ♀ juv.

Dimensions.—C. l. extreme 17·2 mm., C. b. at anterior base of spines 19·7 mm., l. of spine on anterior margin 4·7 mm.

This specimen is rougher, as to granules and tubercles, than typical *spinimanus*; the 3 posterior teeth are about as prominent as in the very much larger type specimen, but they are more prominent than in young Hawaiian *spinimanus* of somewhat larger and smaller sizes.

* Challenger Rept., Zool., xvii. 1886, p. 287, pl. 23, fig. 2.

† For the sake of brevity, this report will be referred to further on as "Rathbun, 1906."

Leucosiidæ.

18. *Oreophorus reticulatus* Adams and White (Plate **15**, fig. 4).

Oreophorus reticulatus Alcock (2), p. 174.

Cargados Carajos, 30 fms., Sta. B 17; 1 ♀ ovig. Amirante, 34 fms., Sta. E 9; 1 ♀ ovig. Saya de Malha, 55 fms., Sta. C 15; 1 ♀ ovig. Seychelles, 34 fms., Sta. F 8; 1 ♀ ovig.

Dimensions.—♀, Amirante: C. l. (entire) 11·4 mm., C. b. 15·6 mm. ♀, Saya de Malha: C. l. (entire) 12·3 mm., C. b. 17·1 mm.

The first two specimens agree in most respects with Alcock's description. The granules are flat-topped, in the intestinal-cardiac channel they are mostly stalked. The edge of the front is truncate. The pterygostomian prominence is very protuberant, large and blunt. The two lobes just above the posterior margin are well marked. The sternum on either side of the penultimate segment of the abdomen is very prominent. The palms are a little longer than wide (contrary to Alcock's description), and the fingers are not twice as long as palm. The lower margin of the immovable finger and the upper margin of the dactylus, have throughout their whole length a thin laminate margin with a crenulated edge.

The last two specimens are a little larger than the preceding and of so different an aspect that one might easily consider them a distinct form. They are probably older, better developed specimens of the same species, though all are ovigerous females. The specimen from the Seychelles is coated everywhere except on the legs with a whitish (in alcohol) nullipore, but so far as the characters are in evidence they agree with those of the Saya de Malha specimen. In both, the granules are rounded off, confluent, and the pitting and reticulation is more obscure. The median groove of the front is continued to the edge, bilobing it. The pterygostomian prominence is small, tuberculiform. The two lobes above the posterior margin are small and inconspicuous. The sternum is not protuberant above the abdomen. The palms are more swollen and a little wider than long, the fingers about twice as long as palm; the outer edges of the fingers are less thin.

19. *Heteronucia ingens*, sp. nov. (Plate **17**, fig. 2).

Amirante, 35 fms., Sta. E 14; 1 ♀ adult.

Dimensions.—♀, C. l. to tip of frontal teeth, 10 mm., C. b. 10·8 mm.

♀.—Entire surface except of fingers and dactyli of legs covered with close-set vesiculous granules, which are coarser on the abdomen and arms. On each lateral margin are 7 tubercles or teeth; 1 below the orbit, at angle of buccal cavity and projecting forward beyond the front, 1 less advanced, on the pterygostomian region, 4 on the branchial region, the second of which marks the widest point of the carapace, and 1 faintly indicated at the extremity of the posterior margin. About 5 smaller lower tubercles either side of the dorsal surface besides one on the hepatic region. Intestinal region a little elevated above the surrounding area; a shallow groove each side of mesogastric region. Front broadly bidentate, neither the maxillipeds nor the margin of the buccal

cavity (except the tubercles at the outer corners) projecting beyond it in a strictly dorsal view.

Cheliped (only the right is present) very little longer than the carapace; merus swollen at distal end; palm narrowing distally, slightly longer than fingers; fingers similar, longitudinally grooved, intervening ridges granulate; a narrow slit between fingers when closed. The first (and longest) leg is a little shorter than carapace.

This species is considerably larger than any yet described. In the quality of the granulation, it resembles *H. vesiculosa* Alcock*, but in that species the marginal spines are strong, the chelipeds and fingers much longer. *H. venusta* Nobili† has a tooth on the inner border of each lobe of the front, and the arm has a conical tubercle on its posterior and its anterior border. *H. mesanensis* Rathbun‡ has a much more uneven surface, and no tubercle at the angle of the buccal cavity.

Præbebalia, gen. nov.

(*Præbeo*, to reach out; *Ebalia*.)

Distinguished from *Ebalia* chiefly by its very long chelipeds, more than three times as long as carapace, with slender, prismatic palms, twice as long as fingers.

Carapace wider than long, exclusive of the two posterior spines, less uneven than in *Ebalia*; hepatic and intestinal regions well marked. Extremity of maxillipeds and buccal frame projecting beyond front, and pterygostomian region beyond hepatic region. Orbits very open; two open fissures above, a broad U-shaped fissure below. Merus of maxilliped $\frac{2}{3}$ as long as ischium, measured on inner margin. Legs unusually long and slender. Sutures in coalesced abdominal segment (3rd, 4th and 5th) of ♂ visible.

Type, *Præbebalia extensiva*, sp. nov.

20. *Præbebalia extensiva*, sp. nov. (Plate **15**, fig. 5).

Saya de Malha, 125 fms., Sta. C 4; 4 ♂. Providence, 125 fms., Sta. D 8; 1 ♂ type. Seychelles, 34 fms., Sta. F 7; 1 ♂, 1 ♀.

Dimensions.—♂, C. l. entire 12·7 mm., C. l. middle 11·3 mm., width 13 mm., Ch. l. about 46 mm.

Type ♂.—Extreme length of carapace nearly equal to extreme width; shape subcircular, antero-lateral and postero-lateral distances subequal; frontal region separated by a depression from rest of carapace; surface finely and closely granulate with coarser granules behind and below the front; intestinal and hepatic regions conical, tipped by a tubercle; an interrupted furrow either side of cardiac region; 2 posterior spines subconical, acuminate; a tooth at lateral angle of carapace. Front bilobed by a deep furrow, edge truncate in dorsal view, with small U-shaped median emargination. Of the two upper orbital fissures, the inner is wider and deeper than the outer; lower sinus deeply U-shaped, with a tuberculiform tooth at inner angle; inner gap of orbit not completely

* Journ. Asiat. Soc. Bengal, lxv. 1896, p. 177, pl. 8, fig. 1.

† Bull. Mus. hist. nat., 1906, No. 5, p. 260.

‡ Proc. Biol. Soc. Wash., xxii. 1909, p. 107.

filled by the antenna which reaches sideways to the outer angle of the orbit. The basal segment of the antennule is furnished with a hard plate with spinulous edges and a brush of hairs underneath, which does not close the antennular aperture.

Margin of pterygostomian region coarsely granulated and obtusely angled. The roof of the efferent branchial channels ends in a broad smooth lamina with finely granulated edge; distal half of maxillipeds spinulous; a spinule tips the merus of the endognath, while the largest spinules are at the proximal third of the merus and near the distal end of the ischium. Abdomen more finely granulate than sternum; 6th segment slightly wider than long.

Chelipeds four times as long as carapace exclusive of spines; slender, finely frosted; merus cylindrical, swollen at articulation with carpus; carpus and hand prismatic, the latter widening a little distally, and more than twice as long as fingers, which are equal, grooved, and meet along their denticulated edges except for a narrow gape at the base. The legs diminish noticeably in length from first to fourth; the first reaches nearly to end of arm, the last is about $\frac{2}{3}$ as long as first; a fringe of soft hair on upper margin of dactyli.

In smaller specimens the granulation is more visible to the naked eye, and the pterygostomian region is bordered by slender club-shaped spinules; the posterior and lateral spines are longer, the tip of the intestinal region is prolonged in a spine; the chelipeds are shorter, $3\frac{1}{3}$ times as long as carapace (in ♀ about $2\frac{2}{3}$ times), the palm not twice as long as fingers.

21. *Persephona fugax* (Fabricius).

Myra fugax Alcock (2), p. 202.

Cargados Carajos, 30 fms., Sta. B 8, B 15, B 16, B 17; 1 ♀ immature, 10 juv.

These 11 specimens are similar, and vary from 18·3 mm. wide (hinder part broken) to 9·3 mm. wide. The fine granulation is rather evenly distributed over the carapace; there is no tooth or denticle on the postero-lateral margin or on the antero-lateral margin behind the branchio-hepatic sinus; the teeth at the ends of the posterior margin are rectangular, blunt; the median is short, stout, acute.

22. *Persephona brevimana* (Alcock).

Myra brevimana Alcock (2), p. 206.

Persephona brevimana Rathbun, 1906, p. 891.

Seychelles, 44 fms., Sta. F 6; 1 ovigerous ♀.

The median carina is scarcely evident.

23. *Persephona darnleyensis* (Haswell).

Myra darnleyensis Alcock (2), p. 207.

Seychelles, 39 fms., Sta. F 3; 1 ♂ without chelipeds: 34 fms., Sta. F 8; 1 ♂.

In the smaller of the specimens, 10·8 mm. wide (from F 8) the "cruciform constellation" of granules is plainly visible; in the larger one, 11·8 mm. wide, it is very faintly indicated.

24. *Leucosides jecusculum*, sp. nov. (Plate **15**, fig. 7).

Amirante, 34 fms., Sta. E 9 ; 1 ♀ ovigerous.

Dimensions.—♀, C. l. 10·2 mm., C. b. 9·7 mm.

A smooth, shining species. Carapace very little longer than broad, with a short, projecting front, separated by a hollow from the slightly convex hepatic region. Margin of front trilobed, middle lobe truncate with oblique sides ; outer lobes truncate in front, oblique on outer side. Antero-lateral margin, up to the branchio-hepatic sinus, nearly straight, ornamented with 6 sharpish spaced granules ; lateral rounded angle of carapace with a rim of smaller, close-set bead granules. The thoracic sinus has no definite anterior border, is covered with a mat of short hair which conceals a short line of granules along the lower margin. The whole of the epimeral edge is visible in dorsal view ; it is bordered with a raised line of very fine granules continued on the posterior margin ; surface below the latter smooth.

Arm bordered by large bead granules ; two converging lines of the same on proximal half of upper surface ; two lines of similar but smaller granules along inner edge of lower surface and a few large granules at base of inner surface ; a patch of spongy hair at base of upper and inner surface. Width of hand equal to outer length ; a line of fine granules above, just within inner margin and coarser on basal lobule. Fingers slender, longer than palm, with a narrow gape which diminishes regularly to the crossed tips, the dactylus considerably overreaching the immovable finger.

The merus joints of the legs are flattened, have two rows of fine granules below and one row above except in the first leg where there are two ; propodal joints with sharp crests above and below, dactyli long and slender.

Colour.—The anterior $\frac{2}{3}$ of the carapace is reticulated with light brown (in alcohol), a spot of same colour either side of intestinal region, and another near postero-lateral margin above first ambulatory leg ; a band of yellow across middle of fingers and across merus of legs.

This species belongs to the same group as *L. cumingi*, *L. hilaris* and *L. sima*, the distinctive characters of which are given by Nobili in Bull. Sci. France et Belgique, xl. 1906, p. 102. In order to compare our species with those three, I give below a summary of the above description to correspond with his table :

1. Front rather prominent, trilobate.
2. Hepatic region slightly inflated.
3. Postero-lateral borders granulate as far as the first pair of feet.
4. Thoracic sinus not defined anteriorly.
5. Posterior border not prominent in the ♀, rather wide.
6. Hand with a line of granulations ; fingers longer than palm.
7. Meropodites of ambulatory feet granulate above and below.

25. *Leucosides angulata*, sp. nov. (Plate **15**, fig. 8).

Seychelles, 31 fms., Sta. F 2 ; 1 ♂ type.

Dimensions.—♂, C. l. extreme 12·4 mm., C. b. 11·8 mm.

Carapace high in the middle, smooth; a little longer than broad; front prominent, flattened above, anterior margin 4-lobed, lateral margin forming an obtuse re-entering angle with hepatic margin, which is obscurely granulate; a pronounced hepatic angle; hepatic region not dorsally swollen; postero-lateral margin with a fringe of short hair and a slight concavity behind the lateral angle; thickened epimeral edge visible in dorsal view throughout its extent and continuous with the prominent posterior margin, both granulated; oblique surface below the latter smooth.

Thoracic cavity deep; defined anteriorly by the smooth, convex, overhanging margin of the pterygostomian region; covered with a mat of short spongy hair except on a large suboval tubercle or lamina which projects outward from the base of the cavity. The sternum bears a strong curved tooth directed outward, downward and forward at the outer angle of the ischium of the endognath.

Merus of chelipeds widens distally, its margins armed with large pearly tubercles, three of which on the inner margin are larger and dentiform; at the base there are one or two large tubercles and some spongy hair above and inside, and a few granules below. The palms are a little longer than wide, outer margin cristate, inner margin swollen, a few obscure granules on basal lobe. Dactyl slightly longer than palm; both fingers grooved, separated to a point where they cross some distance from the tips, a small tooth near base of immovable finger.

The legs have two granulated crests below, the first leg two rows of granulations above, the third and fourth legs one row above; second leg absent. Propodi cristate on both edges.

Colour.—A spot of orange-brown on postero-lateral margin above first leg, a small spot near posterior angle, two tiny spots near middle of posterior margin. Underside of body and chelipeds sparingly speckled with same colour; touches of same on articulations of legs, on top of merus-joints and about the middle of dactyli.

This species comes in Alcock's key to the Indian species of *Leucosia* (*op. cit.*, p. 211) next to *L. elata* (p. 214), but is strikingly differentiated by the angular hepatic margin, four-lobed or toothed front, and large tubercle in the thoracic sinus.

26. *Pseudophilyra melita* de Man.

Pseudophilyra melita Alcock (2), p. 253.

Cargados Carajos, 30 fms., Sta. B 13; 1 juv. 4 mm. long, 3·6 mm. wide.

The general features are those of the adult, but the outer lobe of the orbit is more independent, and there is a slight nick in the buccal wall just below the orbit.

27. *Nursilia dentata* Bell (Plate **15**, fig. 6).

Nursilia dentata Alcock (2), p. 260.

Cargados Carajos, 30 fms., Sta. B 15; 2 ♀ (1 ovig.): B 16; 1 ♀ ovig.: B 17; 2 ♀ (1 ovig.). Seychelles, 44 fms., Sta. F 6; 1 ♀ juv.: 34 fms., Sta. F 7; 1 ♂.

In these specimens there is a fourth median spine just above the posterior margin; the ends of the latter are as distinctly dentiform in the ♀ as in the ♂. The abdomen of the male appears to have the first and second segments free, the first being partially hidden by the carapace.

Portunidæ.

28. *Parathranites orientalis* Miers.

Parathranites orientalis Alcock (4), p. 17.

Salomon Bank, 60—120 fms.; 1 ♀. C. l. 13 mm., C. b. 18·7 mm.

29. *Caphyra rotundifrons* (A. Milne Edwards).

Caphyra rotundifrons Rathbun, Mem. Mus. Comp. Zool., xxxv. 1907, p. 60, pl. 1, fig. 4.

Praslin, reef; 1 ♀ ovig.

30. *Caphyra hemisphærica*, sp. nov. (Plate **15**, fig. 9).

Coetivy, 32 feet, by diver; 1 ♂.

C. l. 3·5 mm., C. b. 3·7 mm., thickness 2 mm.

Carapace hemispherical, smooth to the naked eye, microscopically granulous on anterior third; 2 fine transverse ridges, one at the middle running across the carapace, with two interruptions, and curving forward, to the last lateral tooth; the other further forward on the gastric region. Front truncate, a minute median notch, and indications of a shallow lobe on each side of it; outer angles rounded off and separated by a large triangular notch from the subacute but less advanced preorbital angle. Four small antero-lateral teeth, including the post-orbital angle, and diminishing in size from first to fourth.

One cheliped and 2 legs only are present; inner, lower margin of ischium and proximal half of merus armed with slender spines; hand with a blunt superior marginal line; the dactyli of the legs are strongly curved and taper rapidly to a long, slender spine which occupies nearly half their length.

Allied to *C. lævis* A. Milne Edwards (Nouv. Arch. Mus. Hist. Nat., ix. 1873, p. 173, pl. 4, fig. 2) and to *C. natatrix* Zehntner (Rev. Suisse Zool., ii. 1894, p. 162, pl. 7, fig. 10) but differs in the greater convexity, in the front being less cut up into teeth, in the fewer and smaller antero-lateral teeth, in the unarmed wrist and palm.

31. *Lissocarcinus polybioides* Adams and White.

Lissocarcinus polybioides Alcock (4), p. 19.

Seychelles, 31 fms., Sta. F 2; 1 small ♂.

32. *Lissocarcinus orbicularis* Dana.

Lissocarcinus orbicularis Alcock (4), p. 20.

Salomon; 1 ♂, 1 ♀ ovig. Cargados Carajos, 30 fms., Sta. B 23; 1 ♀. Saya de Malha, 55 fms., Sta. C 15; 1 ♀.

33. *Portunus* (*Achelous*) *petreus* (Alcock).

Neptunus (*Amphitrite*) *petreus* Alcock (4), p. 37; Illus. Zool. Investigator, Crust., pt. VIII, 1900, pl. 46, fig. 2.

Cargados Carajos, 30 fms., Sta. B 3; 1 ♂: 30 fms., Sta. B 17; 1 ♀. Providence, 39 fms., Sta. D 1; 1 ♂.

♂, Sta. D 1, C. l. 17·6 mm., C. b. (incl. spines) 27·3 mm.

The sinuses between the frontal teeth are deeper than in the figure cited; the last lateral spine is about twice as long as the preceding. In a smaller specimen (C. l. 12·8 mm.), the lateral spine is $2\frac{1}{2}$ times as long as the preceding.

34. *Portunus* (*Achelous*) *granulatus* (Milne Edwards) (Plate **15**, fig. 10).

Lupea granulata Milne Edwards, Hist. Nat. Crust., i. 1834, p. 454.

Neptunus (*Achelous*) *granulatus* Alcock (4), p. 45 (part); not *Amphitrite gladiator*, var., de Haan, 1837, pl. 18, fig. 1.

Portunus (*Achelous*) *granulatus* Rathbun, 1906, p. 871, pl. 12, fig. 2.

Cargados Carajos, 30 fms., Sta. B 3; 1 ♂, 1 ♀.

Two closely allied forms have been combined by myself and others under the specific name "*granulatus*." The true "*granulatus*," I believe, is that figured in my Hawaiian bulletin (*loc. cit.*), while the other species is that figured by de Haan, Fauna Japonica, Crust., pl. 18, fig. 1, as a variety of *Amphitrite gladiator*. The shape of the chelipeds, maxillipeds and legs is the same in both, and that of the carapace nearly the same.

The chief differences are as follows:

(1) In *granulatus*, the granules cover nearly the whole of the carapace, the smooth sulci between the areoles being narrow; in *orbitosinus* the granules are in patches separated by broad smooth areas.

(2) In *granulatus*, the sinus between the first antero-lateral tooth (the orbital tooth) and the next tooth is as wide as the succeeding sinus; in *orbitosinus* the first sinus is much smaller than (usually half as wide as) the second sinus. This is well shown in de Haan's figure.

(3) In *granulatus*, the suborbital sinus is narrow and very deep, much deeper than its greatest width; in *orbitosinus* the sinus is shallower, approximating an equilateral triangle.

(4) In *granulatus*, the abdomen of the ♂ is triangular, after the 3rd segment*; in *orbitosinus* the margins of the abdomen after the third segment are strongly sinuous and the 6th segment is widest at its middle†.

35. *Portunus* (*Achelous*) *orbitosinus*, sp. nov. (Plate **15**, fig. 11).

Amphitrite gladiator, var., de Haan, Fauna Japon., Crust., 1837, p. 65, pl. 18, fig. 1.

Cargados Carajos, 30 fms., Sta. B 15; 1 ♂, 1 ♀: 30 fms., Sta. B 17; 1 ♂, 1 ♀: 30 fms., Sta. B 23; 2 ♂, 2 ♀. Amirante, 32 fms., Sta. E 5; 1 ♀: 33 fms., Sta. E 8; 1 ♀: 34 fms., Sta. E 9; 2 juv. Seychelles, 31 fms., Sta. F 2; 1 juv.: 44 fms., Sta. F 6; 1 ♀: 34 fms., Sta. F 8; 1 ♂: 37 fms., Sta. F 9; 1 ♀.

For description, see under preceding species.

This appears to be a larger species than *P. granulatus*, and also a commoner one in the western Indian Ocean. ♂ Sta. B 23, C. l. 22·6 mm., C. b. 33·3 mm. The largest *P. granulatus* handled is an ovigerous ♀ from the Caroline Islands, measuring 17 × 24 mm. (A. Milne Edwards, *loc. cit.*, gives 19 × 28 mm.).

* As stated by A. Milne Edwards, Arch. Mus. Hist. Nat., x. 1861, p. 344.

† The abdomen accompanying de Haan's fig. 1, pl. 18, though labelled "♂," is that of a ♀.

36. *Portunus* (*Achelous*) *orbicularis* (Richters).

Neptunus (*Achelous*) *orbicularis* Alcock (4), p. 47.

Cargados Carajos, 30 fms., Sta. B 3; 1 ♂, 2 juv.

♂, C. l. 27 mm., C. b. 34·2 mm.

37. *Portunus* (*Xiphonectes*) *longispinosus* (Dana).

Neptunus (*Hellenus*) *longispinosus* Alcock (4), p. 40.

Salomon, 1 ♂, with the appearance of having been in a fish stomach. Providence, 39 fms., Sta. D 1; 1 ♂, 2 ♀. Seychelles, 31 fms., Sta. F 2; 2 ♂: 34 fms., Sta. F 8; 2 ♂.

38. *Portunus* (*Xiphonectes*) *macrophthalmus* Rathbun.

Portunus (*Xiphonectes*) *macrophthalmus* Rathbun, 1906, p. 871, text-fig. 31, pl. 12, fig. 5.

Cargados Carajos, 30 fms.*, Sta. B 9; 1 ♀. Seychelles, 31 fms., Sta. F 2; 2 ♂.

39. *Callinectes alexandri* Rathbun (Plate **17**, fig. 4).

Callinectes alexandri Rathbun, Mem. Mus. Comp. Zool., xxxv. 1907, p. 61, pl. 2, fig. 1, pl. 9, figs. 3, 3 *a*, 3 *b*.

Cargados Carajos, 30 fms., Sta. B 23; 1 ♂ small, but mature. C. l. 25·3 mm. (approx.), C. b. 53·3 mm.

This species was based on two young specimens from Tahiti and Fiji; the specimen from the Indian Ocean is considerably larger, without being full grown, and, when taken, was about to moult. It presents some differences from the type, differences which it seems best to regard as due to age until more material is available.

(1) The carapace is narrower and the lateral spine shorter. (Compare pl. II, fig. 1, *loc. cit.*, with the figure given here.)

(2) The granulation on the carapace is denser.

(3) The lateral teeth are blunter and less like saw-teeth. Teeth 2 to 6, inclusive, are similar, their posterior margins about $1\frac{1}{2}$ times as long as their anterior margins, tips blunt; tooth 7 has the posterior margin about $1\frac{1}{3}$ times as long as the anterior, tip blunt; tooth 8 is narrower, sharp, anterior margin deeply concave, and having the same length (across the chord) as the posterior margin; lateral spine $3\frac{1}{4}$ times as long as the preceding tooth, its axis transverse.

(4) The last two segments of the abdomen are a little more elongate than in pl. IX, fig. 3 *a*, *loc. cit.* The appendages of the first segment (which were undeveloped in the type) have straight extremities and reach to the terminal fourth of the sixth segment.

40. *Charybdis erythrodactyla* (Lamarck).

Charybdis erythrodactyla Rathbun, 1906, p. 872, pl. 4.

Salomon; 1 ♂. Amirante; 1 ♂.

41. *Charybdis paucidentata* (A. Milne Edwards).

Goniosoma paucidentatum A. Milne Edwards, Nouv. Arch. Mus. Hist. Nat., Paris, x. 1861, p. 381, pl. 35, fig. 3.

* May have been swimming at the surface.

Coetivy; 1 ♂ immature.

C. l. 28·6 mm., C. b. 37·7 mm. The chelipeds and the first leg on the right side are represented only by thin soft appendages of small size. The specimen has a much more *Thalamita*-like aspect than a larger ♂, 47·6 × 63·2 mm., taken at Aldabra by Dr. W. L. Abbott.

42. *Charybdis hoplites* (Wood-Mason).

Charybdis (*Goniohellenus*) *hoplites* Alcock (4), p. 66.

Saya de Malha, 47 fms., Sta. C 11; 1 ♂. C. l. to tip of teeth, 27·5 mm., C. b. 43·6 mm.

Not typical, because the posterior lateral spine is very little longer than the teeth which precede it. The specimen is larger than that noted by Alcock. Compared with a specimen still smaller, received from the Indian Museum, the angles of the posterior margin are scarcely eared, though prominent; the short ridges on the anterior gastric region are single lines of granules. I am not able to say whether these are age variations, or represent a subspecies.

43. *Charybdis*, sp.

Amirante, 25 fms., Sta. E 3; 1 ♂ juv., without chelipeds. C. l. 4·8 mm., C. b. 6·5 mm., f. orb. b. 5·4 mm.

Belongs to the "*Gonioneptunus*" division of the genus, in which the lobular external process of the basal joint of the antenna is not in contact with the front.

Front advanced, arcuate, 8-toothed, submedian pair of teeth a little wider than median pair, two outer pairs subequal and a little smaller than median pair; teeth subtruncate. The two orbits together are nearly as wide as front.

Postero-lateral corners rounded.

Antero-lateral margin making a very slight angle with the axis of the crab; 6 teeth subequal, the 2nd and 5th slightly reduced; 3rd to 6th inclusive sharp.

Granular ridges of dorsal surface prominent and arranged as in *C. subornata* (Ortmann)*, that is a ridge between the teeth of the last pair, three ridges in front of it, the two foremost of which are broken in two, a ridge on the cardiac region, three short ridges, one behind the other, on the branchial region.

Merus of last foot more than twice as long as broad and armed with a strong spine; posterior margin of propodus spinulous.

44. *Thalamita crenata* Latreille.

Thalamita crenata Alcock (4), p. 76.

Praslin, reef; 3 ♂.

45. *Thalamita danæ* Stimpson.

Thalamita danæ (4), p. 77.

Egmont, reef; 1 ♂, 1 ♀.

* Zool. Jahrb. Syst., vii. 1893, p. 79, pl. 3, fig. 9.

46. *Thalamita prymna* (Herbst).

Thalamita prymna Alcock (4), p. 78.

Egmont, reef; 1 ♂ juv. Cargados Carajos, reef; 2 ♂, 1 ♀ juv. Coetivy; 1 ♂, 1 ♀.

47. *Thalamita poissonii* (Audouin).

Thalamita poissonii Alcock (4), p. 81.

Peros, Coin; 2 ♂, 2 ♀ immature. Saya de Malha, 150 fms., Sta. C. 1; 1 ♀ immature.

Largest specimen (♂), C. l. 10·8 mm., C. b. 16 mm.

The tip of the 5th lateral tooth forms a regular curve with a line connecting the 1st, 2nd, and 3rd teeth; all the teeth, except in some cases the 1st, are spiniform. The posterior border of the propodite of the last pair of legs is armed with 4 to 6 spinules. The teeth on the anterior border of the arm are acute.

48. *Thalamita admete* (Herbst).

Thalamita admete Rathbun, 1906, p. 874.

Salomon; 2 ♂. Egmont, reef; 1 ♂, 2 ♀. Amirante, 29 fms., Sta. E 1; 1 ♀ juv.: 29 fms., Sta. E 2; 2 ♀ (1 ovig.). Seychelles, 31 fms., Sta. F 2; 3 juv.: 34 fms., Sta. F 8; 1 ♂ juv., 1 ♀ juv. Coetivy; 1 ♂.

49. *Thalamita margaritimana*, sp. nov. (Plate **15**, fig. 12).

Cargados Carajos, 30 fms., Sta. B 2; 2 ♂ (1 is type), 2 ♀ ovig. Seychelles, 34 fms., Sta. F 7; 1 juv.: 34 fms., Sta. F 8; 1 ♂.

Type ♂, C. l. 15·8 mm., C. b. 26 mm.

Differs from *T. auauensis* Rathbun (Bull. U. S. Fish Comm. for 1903, part III, 1906, p. 874, pl. 12, fig. 1) (1) in having the fifth lateral spine longer, being produced as far as the third tooth; (2) in the great roughness of the whole surface of the hand; it is covered with flattened bead granules, and the ridges are strong and formed by a row of bead granules.

Near *T. granosimana* Borradaile (Fauna Maldives, i. 1902, p. 202) in which the fourth side tooth is small but not vestigial as in this new form.

50. *Thalamita quadrilobata* Miers.

Thalamita quadrilobata Alcock (4), p. 84.

Cargados Carajos, 20—25 fms., Sta. B 17; 1 ♂ juv.

The basal joint of the antenna bears four slender sharp spines.

51. *Thalamita integra* Dana.

Thalamita integra Alcock (4), p. 85.

Diego Garcia, lagoon; 1 ♂: barachois; 3 ♂ (1 soft shell), 1 ♀, 3 juv.

52. *Thalamita investigatoris* Alcock.

Thalamita investigatoris Alcock (4), p. 85; Illus. Zool. Investigator, Crust., pt. VIII, 1900, pl. 47, figs. 1, 1 *a*.

Providence, 29 fms., Sta. D 3; 1 ♀ juv.: 50—78 fms., Sta. D 4; 1 ♂. Amirante, 34 fms., Sta. E 9; 1 ♀ juv.: 20—25 fms., Sta. E 13; 1 ♂ soft shell: 35 fms., Sta. E 14; 1 ♀ ovig.: 39 fms., Sta. E 16; 2 ♀ soft shell: 30 fms., Sta. E 21; 2 ♂, 1 ♀. Seychelles, 34 fms., Sta. F 8; 4 ♂, 6 ♀ (2 ovig.), 4 juv.: 37 fms., Sta. F 9; 1 ♂.

Largest specimen, ♂, Sta. E 21, C. l. 9 mm., C. b. 13·3 mm.

In large specimens the fifth lateral tooth is larger, in proportion to the first three teeth, than in smaller specimens. There are 3, 4 or 5 spines on the palm: in adults 3 or 4; in young specimens 4 or 5.

53. *Thalamita exetastica macrospinifera*, subsp. nov.

Providence, 50 fms., Sta. D 11; 1 juv. Amirante, 39 fms., Sta. E 16; 1 ♂ type.

♂, C. l. 10·2 mm., C. b. 14·3 mm.

Combines the characters of *T. exetastica spinifera* Borradaile and *T. exetastica macrodonta* Borradaile *, that is:

1. There are spines along the hinder edge of the propodite of the last leg.
2. The last side-tooth is nearly as large as the third and projects somewhat more than the rest. Fourth tooth rudimentary.
3. The median frontal lobes are only a trifle narrower than the submedian (as 8 : 9).

In No. 1 it resembles *spinifera*, in No. 2 it resembles *macrodonta*, in No. 3 it is typical *exetastica*.

Our subspecies resembles Borradaile's specimens in having the granulation of the cheliped more dominant than the squamiform markings.

54. *Thalamita gardineri* Borradaile.

Thalamita gardineri Borradaile, in Gardiner, Fauna Maldive and Laccadive Arch., i. 1902, p. 205, text-fig. 36.

Coetivy; 2 ♂, 3 ♀ (2 ovig.).

Largest specimen (♂), C. l. 14·8 mm., C. b. 23 mm.

Agrees with points i to iv of Borradaile's description. The chelipeds of the adult ♂ (larger than his type) are distinctly unequal; the upper surface of the arm beyond the carapace is covered with squamiform markings, as is also, but faintly, the lower part of inner surface of palm. There are from five to seven spines on the hinder edge of the last propodite.

55. *Thalamita sexlobata* Miers.

Thalamita sexlobata Alcock (4), p. 87.

Amirante, 28 fms., Sta. E 6; 1 ♂: 34 fms., Sta. E 9; 1 ♂: 25—80 fms., Sta. E 11; 1 ♂: 20—25 fms., Sta. E 13; 1 ♀. Seychelles, 34 fms., Sta. F 8; 1 ♂. Praslin, from weed; 1 juv.

* Gardiner, Fauna Maldivé Arch., i. 1902, p. 203.

The largest specimen (♀) is only 4·7 × 7 mm. In all the specimens the median and submedian frontal teeth are incompletely separated from each other; the 4th or rudimentary lateral tooth is sometimes indistinguishable. In the smallest specimen (Praslin) the 3rd and 4th teeth are nearly obsolete.

56. *Thalamita cooperi* Borradaile.

Thalamita cooperi Borradaile, Fauna Maldive and Laccadive Arch., i. 1902, p. 206, text-fig. 37.

Amirante, 29 fms., Sta. E 2; 1 ♂, 1 ♀ ovig.: 25—80 fms., Sta. E 11; 5 ♂, 4 ♀: 30 fms., Sta. E 21; 6 ♂ (1 with Rhizocephalid parasite), 4 ♀.

The edge of the front is less convex than in the figure cited.

57. *Thalamita bouvieri* Nobili.

Thalamita bouvieri Nobili, Bull. Mus. Hist. Nat., Paris, 1906, p. 7.

Cargados Carajos, 30 fms., Sta. B 13; 2 ♀. Amirante, 34 fms., Sta. E 9; 1 juv.

Mature ♀, C. l. 7·5 mm., C. b. 11·2 mm.

The antero-lateral lines are nearly parallel to each other; the postero-lateral margins strongly convergent. The posterior margin of the propodus of the last leg is spinulous.

58. *Thalamita oculea* Alcock.

Thalamita oculea Alcock (4), p. 91; Illus. Zool. Investigator, Crust., pt. VIII, 1900, pl. 48, figs. 3, 3 *a*.

Saya de Malha, 26 fms., Sta. C 16; 1 ♀ ovig. Amirante, 34 fms., Sta. E 9; 1 ♀ juv. Seychelles, 34 fms., Sta. F 8; 4 ♂, 8 ♀ (6 ovig.).

Largest specimen, Sta. C 16, ♀; C. l. 13 mm., C. b. 20 mm.

In this series the frontal notch, though small, is visible to the naked eye; the 5th lateral tooth, while very small, is a little larger than the 4th; there are four teeth on the palm, the tooth at the middle of the outer crest of the upper surface being usually, but not always, well developed.

59. *Lupocyclus rotundatus* Adams and White.

Lupocyclus rotundatus Alcock (4), p. 23.

Saya de Malha, 47 fms., Sta. C 12; 1 ♀. Seychelles, 39 fms., Sta. F 3; 1 ♂ immature.

The ♀ is of unusual size, C. l. 17·2 mm., C. b. 23 mm.

60. *Lupocyclus quinquedentatus* Rathbun.

Lupocyclus quinquedentatus Rathbun, 1906, p. 869, text-fig. 28, pl. 12, fig. 7.

Cargados Carajos, 30 fms., Sta. B 9; 1 ♀. Amirante, 25—80 fms., Sta. E 11; 1 ♀ juv. Seychelles, 34 fms., Sta. F 8; 1 ♂.

61. *Carupa læviuscula* Heller.

Carupa læviuscula Alcock (4), p. 26.

Salomon; 2 ♂. Coetivy; 5 ♂, 2 ♀; one of the females, immature, has the 6th and 7th lateral teeth much longer than usual, and actually spiniform: 32 feet, by diver; 1 ♀ juv.

Atelecyclidæ.

62. *Kraussia integra* (de Haan).

Kraussia integra Alcock (4), p. 97.

Salomon; 1 ♀ and half of another.

63. *Kraussia nitida* Stimpson.

Kraussia nitida Rathbun, Bull. Mus. Comp. Zool., xxxix. 1902, p. 132, plate, fig. 13.

Amirante, 20—25 fms., Sta. E 13; 1 ♂ juv.

Xanthidæ.

64. *Carpilius convexus* (Forskål).

Carpilius convexus Alcock (3), p. 80.

Amirante, 25—80 fms., Sta. E 11; 1 ♀ juv.: 20—25 fms., Sta. E 13; 1 ♀ juv. Coetivy; 4 ♂, 3 ♀, all small.

65. *Carpilodes tristis* Dana.

Carpilodes tristis Alcock (3), p. 82.

Salomon; 2 ♂, 5 ♀. Peros, Coin; 1 ♂. Egmont, reef; 3 ♀. Coetivy; 3 ♂.

In most of the specimens the chelipeds (in alcohol) are a light reddish colour, and the legs have a few broad bands of the same.

66. *Carpilodes sayademalhensis*, sp. nov. (Plate **17**, fig. 5).

Saya de Malha, 26 fms., Sta. C 16; 1 ♀.

C. l. 9·5 mm., C. b. 15 mm.

Carapace granulate, granules very fine except on the anterior and antero-lateral portions, where they are coarsest in the depressions between the lobules. Posterior third not lobulate; besides the narrow groove next the hind margin there is another broad shallow furrow between that margin and 3 M; 4 M narrow and ill-defined; 2 M partly divided by a shallow groove anteriorly; 1 M well marked, nearly as long as wide; of the marginal lobes, D is scarcely developed, E and N are shallow lobes, fused with 1 L and 3 L respectively; 2 L anteriorly emarginate; grooves in front of T and S continued inward halfway to the gastric region. Edge of front convex, faintly emarginate, a sharp groove leading back to 3 M; O divided into three lobules by two supraorbital grooves.

Chelipeds and legs granulate; arm denticulate above, wrist nodulous; hand with a longitudinal groove below upper margin; fingers grooved, toothed, moderately gaping. Legs with a groove on the dorsal surface of carpus and propodus. Body a mixture of pink and green, in alcohol, legs banded with pink and white.

In form, resembles *C. lævis* A. Milne Edwards*, but is rougher and has more numerous furrows.

* Nouv. Arch. Mus. Hist. Nat., ix. 1873, p. 179, pl. 5, fig. 3.

67. *Carpilodes stimpsonii* A. Milne Edwards.

Carpilodes stimpsoni Alcock (3), p. 82.

Amirante, 25—80 fms., Sta. E 11; 1 juv.: 30 fms., Sta. E 21; 1 ♂, 1 ♀ immature. Coetivy; 1 ♀ ovig.

This species has a very deep transverse furrow on the hepatic region, not extending quite to the gastric region.

68. *Carpilodes pediger* Alcock.

Carpilodes pediger Alcock (3), p. 83; Illus. Zool. Invest., Crust., part VII, 1899, pl. 36, fig. 4.

Amirante, 29 fms., Sta. E 2; 1 ♀: 25—80 fms., Sta. E 11; 8 ♂ (1 with Rhizocephalid parasite), 8 ♀ (2 ovig.): 30 fms., Sta. E 21; 2 ♀ (1 deformed). Seychelles, 34 fms., Sta. F 8; 1 ♂, 2 ♀.

Largest specimen, ♂, C. l. 7·5 mm., C. b. 11·3 mm.

Most of the specimens are light red, except for the fingers, and a touch of light at the articulations of the legs and just above the horny tip of the dactyls.

69. *Carpilodes vaillantianus* A. Milne Edwards.

Carpilodes vaillantianus Alcock (3), p. 85.

Salomon; 1 ♂. Coetivy; 1 ♂, 2 ♀, 4 juv.

Species variable as to coarseness and amount of granulation.

70. *Carpilodes cariosus* Alcock.

Carpilodes cariosus Alcock (3), p. 86.

Salomon; 2 ♀. Saya de Malha, 29 fms., Sta. C 19; 1 ♂ juv. Providence, 29 fms., Sta. D 3; 2 ♂, 1 ♀ juv. Amirante, 34 fms., Sta. E 9; 2 ♀ juv. (1 with Rhizocephalid parasite): 25—80 fms., Sta. E 11; 1 ♂: 30 fms., Sta. E 21; 1 ♂. Coetivy; 2 ♂.

Largest specimen (Coetivy) C. l. 6·6 mm., C. b. 10·8 mm.

71. *Carpilodes virgatus* Rathbun.

Carpilodes virgatus Rathbun, 1906, p. 843, pl. 8, fig. 3.

Saya de Malha, 55 fms., Sta. C 15; 1 ♂. Amirante, 25—80 fms., Sta. E 11; 7 ♂, 3 ♀ (1 with Rhizocephalid parasite): 30 fms., Sta. E 21; 1 ♂.

72. *Carpilodes monticulosus* A. Milne Edwards.

Carpilodes monticulosus Alcock (3), p. 86.

Salomon; 1 ♂, 1 ♀. Peros, Coin; 1 ♂, 1 ♀.

73. *Carpilodes pallidus* Borradaile.

Carpilodes pallidus Borradaile, Proc. Zool. Soc. London, 1900, p. 586, pl. 40, fig. 1.

Egmont, reef; 1 ♀ juv. C. l. 4 mm., C. b. 6·7 mm.

74. *Liomera cinctimana* (White).

Liomera cinctimana Alcock (3), p. 88.

Salomon; 1 ♂, 2 ♀. Coetivy; 2 ♂, 3 ♀.

The carapace in alcohol is either red, reddish-white, or red with a white band at the extremity of each side; chelipeds and legs red, with distal portion of dactylus (above the horny tip) of each leg white. An exception is a small dark coloured specimen, carapace dull greyish-green, under side still darker, chelipeds and legs yellowish-brown.

75. *Liomera granosimana* A. Milne Edwards (Plate **17**, fig. 6).

Liomera granosimana A. Milne Edwards, Nouv. Arch. Mus. Hist. Nat., Paris, i. 1866, p. 222, pl. 11, figs. 5, 5 *a*.

Coetivy; 1 ♂. C. l. 10 mm., C. b. 15·3 mm.

The carapace, while appearing smooth and polished to the naked eye, under the lens shows distant punctæ, and a fine pavement of flattened granulation. Certain of the furrows are well marked; that between first and second lateral lobes is continued transversely to gastric region; that between second and third lobes bends forward to join the preceding furrow; anterior part of mesogastric region well defined; protogastric lobes anteriorly with a longitudinal groove; it joins the submarginal groove which follows the line of the front, orbits and first lateral lobe; this lobe shows a faint trace of subdivision into two.

Legs thick, flattened; merus-joints with anterior edges roughened with fine, blunt denticulations.

76. *Lioxantho latifrons*, sp. nov. (Plate **16**, figs. 1, 2).

Salomon; 1 ♀.

Not a typical *Lioxantho*, because the fronto-orbital breadth is more than half as great as width of carapace. Carapace flat in posterior half, convex anteriorly, smooth, punctate. Regions (save the hepatic) faintly indicated, fronto-orbital region marked off by a groove; a groove passes inward from the notch between second and third lobes of antero-lateral margin, two-thirds of the distance to the gastric region. Antero-lateral margin divided into four lobes, the first two slightly marked and almost coalescent, the third and fourth projecting a little as small, blunt teeth.

Front bilobed, lobes separated by a broad emargination, and fused with the supra-orbital angles. Width of front a little more than one-third width of carapace.

Chelipeds nearly equal in female, obscurely and finely granulate; an obtuse sub-terminal tooth on arm; wrist bluntly angled within; a shallow longitudinal groove on hand just below upper margin; fingers furrowed and pointed, as long as upper margin of palm. Legs smooth; dactylus and distal half of propodus furrowed.

Abdomen of female from third to seventh segments triangular.

Dimensions of ♀ in mm.: C. l. 4·8, C. b. 7·9, F. orb. b. 4·8, F. b. 2·7, R. Ch. l. 9·5, L. Ch. l. 9·9.

This species is very much like *L. punctata* (Milne Edwards)*, from which it is distinguished at a glance by the greater width across front and orbits; the carapace is also smoother and more shining.

* Alcock (3), p. 91.

77. *Atergatopsis signata* (Adams and White) (Plate **17**, fig. 7).

Atergatopsis signatus A. Milne Edwards, Nouv. Arch. Mus. Hist. Nat., Paris, i. 1866, p. 253.

Coetivy; 1 ♂, 1 ♀, 2 juv. (1 soft shell, the other much broken).

Male, C. l. 31·3 mm., C. b. 46·3 mm., F. b. 10·8 mm.

The male resembles in all essentials the figure of a much larger specimen given by the original describers (Adams and White, Zool. Voy. Samarang, Crust., pl. 10, fig. 1). In the specimen in hand, the third, fourth and fifth abdominal segments are only partially fused, the proximal of the two sutures being best marked. Frontal lobes oblique, well separated by a V-shaped notch. On the outer surface of the palm, a smooth longitudinal ridge just below the middle divides the upper rugose portion from the lower, nearly smooth portion. Three large teeth on immovable finger; three or four smaller teeth on the movable finger.

78. *Platypodia cristata* (A. Milne Edwards).

Lophactæa cristata Alcock (3), p. 100.

Diego Garcia, lagoon; 1 ♂: barachois; 1 ♀ ovig.

79. *Platypodia semigranosa* (Heller).

Lophactæa semigranosa Alcock (3), p. 101.

Salomon; 1 juv. Cargados Carajos, 28 fms., Sta. B 20; 1 ♀, 1 juv. Amirante, 25—80 fms., Sta. E 11; 1 ♂.

The young specimens (5 mm. wide and less) have the dorsal surface of the carapace almost smooth; there are only a few low granules near the antero-lateral teeth.

80. *Platypodia anaglypta* (Heller) (Plate **17**, fig. 3).

Lophactæa anaglypta Alcock (3), p. 102.

Peros, Coin; 1 ♂. Salomon; 1 ♀. Coetivy; 7 ♂, 2 ♀.

81. *Zosimus æneus* (Linnæus).

Zozymus æneus Alcock (3), p. 104.

Peros, Coin; 1 ♀. Salomon; 1 ♂, 1 ♀. Egmont, reef; 1 ♀. Coetivy; 1 ♂, 3 ♀.

82. *Lophozozymus dodone* (Herbst).

Lophozozymus dodone Alcock (3), p. 108.

Cargados Carajos, 28 fms., Sta. B 20; 1 ♀. Amirante, 34 fms., Sta. E 9; 4 ♂, 3 ♀: 30 fms., Sta. E 21; 1 ♀. Seychelles, 34 fms., Sta. F 8; 1 ♀ juv. Coetivy; 2 ♂.

83. *Lophozozymus pulchellus* A. Milne Edwards.

Lophozozymus pulchellus A. Milne Edwards, Ann. Soc. Entom. France (4), vii. 1867, p. 273; Nouv. Arch. Mus. Hist. Nat., Paris, ix. 1873, p. 205, pl. 7, fig. 3.

Egmont, reef; 1 ♀. Seychelles, 34 fms., Sta. F 8; 2 ♀.

Anterior of the three lateral teeth obsolescent, indicated merely as the anterior end of the marginal crest. Network of lines embracing the whole of the dorsal surface except in the immediate neighbourhood of the lateral teeth; network much finer on the Seychelles individuals than on that from Egmont Reef.

84. *Euxanthus rugosus* Miers (Plate **18**, fig. 1).

Euxanthus exsculptus var. *rugosus* Miers, Zool. Alert, Crust., 1884, p. 527.

Salomon; 2 ♀ (1 ovig.). Peros, Coin; 1 ♂. Coetivy; 2 ♂, 3 ♀, mostly small.

Carapace, chelipeds and sternum rugose and granulate; ventral surface of carapace and maxillipeds granulate; lobules rougher and more convex in the adult than in the young. Antero-lateral borders cut into five tuberculiform teeth; interspaces increasing in width from front to back.

A large nodule on the outer surface of the wrist; 3 longitudinal rows of granules on the lower half of outer surface of palm. Fingers coarsely granulate, fitting close together; brown colour of immovable finger running well back on the palm, especially on lower margin and inner surface.

This species, for such I believe it to be, is distinguished easily by its roughness from *E. exsculptus* (Herbst), which also has the second and third teeth of the lateral margin not tuberculiform.

85. *Euxanthus herdmani* Laurie.

Euxanthus herdmani Laurie, in Herdman, Ceylon Pearl Fisheries, pt. v, Suppl. Rept. xl. 1906, p. 400, pl. I, figs. 9, 9 *a*—*c*.

Amirante, 25—80 fms., Sta. E 11; 1 ♀ juv.

C. l. 8·3 mm., C. b. 11 mm.

Surface of carapace not only pitted, but covered with very fine flattened granules.

86. *Hypocolpus diverticulatus* (Strahl).

Cancer sculptus Milne Edwards, Hist. Nat. Crust., i. 1834, p. 376. Not *C. sculptus* Herbst, 1794.

Melissa diverticulata Strahl, Arch. f. Naturg., xxvii. Bd. 1, 1861, p. 103.

Hypocœlus sculptus A. Milne Edwards, Nouv. Arch. Mus. Hist. Nat., Paris, i. 1866, p. 295.

Cargados Carajos, reef; 2 ♂.

87. *Xantho impressus* (Lamarck).

Xantho impressus Alcock (3), p. 115.

Coetivy; 1 ♀. Praslin; 1 ♂.

88. *Leptodius exaratus* (Milne Edwards), var.

Xantho (*Leptodius*) *exaratus* Alcock (3), p. 118.

Praslin, reef; 1 ♂ juv. Saya de Malha, 55 fms., Sta. C 15; 1 ♂ juv., 1 ♀ juv.

These specimens are not typical *exaratus*. The specimen from Praslin, 8·5 mm. long and 11·7 mm. wide, has the lateral teeth narrow, prominent, the last 2 tipped with a sharp spine; the front shows no sign of subdivision into 4 lobes. The specimens from Saya de Malha show even greater divergence in the same directions from typical *exaratus*; carapace still narrower, ♂, 8·8 mm. by 12·2 mm., teeth narrower, the last 3 tipped with a sharp spine, front the same. This form approaches *L. molokaiensis*.

89. *Leptodius sanguineus* (Milne Edwards).

Xantho (*Leptodius*) *sanguineus* Alcock (3), p. 119.

Peros, Coin; 1 ♂, 3 ♀. Salomon; 1 ♂, 2 ♀. Coetivy; 1 ♂, 5 ♀. Praslin; 1 ♂, 1 juv.

90. *Leptodius molokaiensis* Rathbun.

Leptodius molokaiensis Rathbun, 1906, p. 847, pl. 9, fig. 1, text-fig. 10.

Salomon; 2 ♂. Amirante, 30 fms., Sta. E 21; 1 ♂, 1 ♀.

A male from Salomon is much larger than type; C. l. 13 mm., C. b. 19·5 mm. The areolets of the carapace are more plainly marked; the four lobes of front more deeply separated; two stout spines at inner angle of wrist.

91. *Leptodius nudipes* (Dana).

Leptodius nudipes Rathbun, 1906, p. 848, pl. 9, fig. 3.

Peros, Coin; 1 ♂, 1 ♀. Praslin, reef; 1 ♂.

Length of ♂, Praslin, 14·6 mm., breadth 22·8 mm.

92. *Leptodius gracilis* (Dana).

Leptodius gracilis Rathbun, 1906, p. 848, pl. 9, fig. 2.

Salomon; 1 ♀ ovigerous.

93. *Leptodius cavipes* (Dana) (Plate **18**, fig. 10).

Xantho (*Leptodius*) *cavipes* Alcock (3), p. 122.

Peros, Coin; 2 ♂, 5 ♀.

94. *Leptodius cristatus* Borradaile (Plate **17**, fig. 9).

Leptodius (*Xanthodius*) *cristatus* Borradaile, in Gardiner, Fauna Maldives, i. pt. III, p. 252, text-fig. 51.

Peros, Coin; 2 ♂, 4 ♀. Coetivy; 1 ♂.

♀ (Coin) C. l. 5 mm., C. b. 7·6 mm.

There is considerable variability in the depth and definition of the troughs on the legs and chelipeds. The ♂ from Coetivy has these cavities very deep and their borders very thin and sharp.

95. *Medæus simplex* A. Milne Edwards.

Medæus simplex de Man, Abh. Senckenb. naturf. Ges., xxv. Heft III, 1902, p. 603.

Coetivy; 1 ♂ juv.

C. l. 4·7 mm., C. b. 6·2 mm. Compared with ♂, from Hilo, Hawaii, 13·4 × 20·2 mm., the tooth next to the outer orbital tooth does not lie so distinctly below the antero-lateral margin, the accessory denticles are proportionately smaller, the upper surface of hands and wrists are more deeply pitted.

96. *Medæus ornatus* Dana.

Medæus ornatus Rathbun, 1906, p. 849, pl. 9, fig. 5.

Saya de Malha, 55 fms., Sta. C 15; 1 ♂. Amirante, 25—80 fms., Sta. E 11; 11 ♂, 7 ♀: 30 fms., Sta. E 21; 2 ♀, 1 juv. Seychelles, 34 fms., Sta. F 8; 2 ♂, 3 ♀.

97. *Cycloxanthops angustus* Rathbun.

Cycloxanthops angustus Rathbun, 1906, p. 849, pl. 9, fig. 6, text-fig. 13.

Amirante, 25—80 fms., Sta. E 11; 1 ♂, 2 ♀: 16 fms., Sta. E 23; 1 ♀.

Lighter in colour than Hawaiian specimens, being ecru in alcohol, with the fingers a little darker. The antero-lateral teeth are more distinctly separated from one another, the outer surface of the large palm is clearly granulate quite to the lower edge, there are few sharp granules on the upper margin of the carpal joints of the legs.

98. *Etisus dentatus* (Herbst).

Etisus dentatus Alcock (3), p. 129.

Coetivy; 1 ♂ small, 1 ♀ adult.

♀, C. l. 59·6 mm., C. b. (approx.) 88·5 mm.

In both specimens there is a longitudinal row of 5 or 6 granules on the upper half of the outer surface of the palm; also a transverse row of smaller granules at the distal end of the palm at the origin of the dactylus, one or two granules reaching over on to the immovable finger.

99. *Etisus lævimanus* Randall.

Etisus lævimanus Alcock (3), p. 131.

Diego Garcia, barachois; 1 ♀ juv.

100. *Etisodes electra* (Herbst).

Etisodes electra Alcock (3), p. 133.

Egmont, reef; 1 ♀. Praslin, reef; 1 ♂.

101. *Actæa tomentosa* (Milne Edwards).

Actæa tomentosa Alcock (3), p. 140.

Praslin, reef; 4 ♂, 1 ♀. Coetivy; 1 ♂, 1 ♀.

102. *Actæa remota* Rathbun.

Actæa remota Rathbun, *op. cit.*, 1907, p. 43, pl. 1, fig. 9, pl. 7, fig. 1.

Salomon; 1 ♀ juv. Coetivy; 1 ♀; C. l. 5·8 mm., C. b. 8·4 mm.

The mesogastric region shows a tendency to divide into 3 lobules; cardiac region heart-shaped. Middle part of margin of front nearly straight, not emarginate in the larger specimen, minutely so in the smaller specimen. Chelipeds equal and similar; fingers brown with white tips, the brown of the immovable finger not spreading on the palm, but ending in an oblique line.

103. *Actæa tessellata* Pocock (Plate **16**, fig. 3).

Actæa tessellata Pocock, Ann. Mag. Nat. Hist. (6), v. 1890, p. 74.

Coetivy; 1 ♀. C. l. 7·8 mm., C. b. 11·5 mm.

The mesogastric region is composed of 5 lobules; instead of a single transverse posterior lobule as in Pocock's type, there are two, one behind the other and very small, composed of 10 granules. The cardiac region is divided longitudinally into 2 separate lobules; in

the space between the cardiac and intestinal regions there is a small group of 4 granules in the form of a curve, arched forward. Upper surface of wrist indistinctly nodulous, lacking the strong nodule at articulation with hand, which is present in *A. rufopunctata*; outer surface cut by transverse grooves into 3 long transverse lobes, exclusive of a granular area at the proximal end. The fingers cross at tips and do not gape, although they do not fit evenly together; the colour is white in the specimen preserved in alcohol.

104. *Actæa hirsutissima* (Rüppell).

Actæa hirsutissima Alcock (3), p. 141.

Salomon; 1 ♂. Egmont, reef; 1 ♀. Coetivy; 4 ♂, 4 ♀.

105. *Actæa rufopunctata* Milne Edwards.

Actæa rufopunctata Alcock (3), p. 142.

Egmont, reef; 1 ♂ (*a*) 1 ♀ (*b*). Amirante, 25—80 fms., Sta. E 11; 2 ♂ (*c*, *d*) small.

In *c* and *d* (the larger, *c*, C. l. 7·5 mm., C. b. 10·8 mm.) the middle of the 3 mesogastric lobules is much more extensive than in *a* and *b*, and lies partly between the 2 lateral mesogastric lobules; in *a*, 16·3 × 24·5 mm., and *b*, 13·2 × 19·3 mm., the very small median islet is entirely in advance of the postero-lateral lobules of the mesogastric region. In *c* the immovable finger is more arched and the gape correspondingly wider than in *a*; colour of the lobules in *c* red, interspaces dark; *a* and *b* light-coloured, with a few definitely placed red spots, which do not correspond in the two specimens; they are more numerous and relatively smaller in *b*. In *d*, 5 × 7·2 mm., the colour is patchy and the fingers do not gape. The species is most variable and a large assemblage of specimens might indicate distinct varieties.

106. *Actæa garretti* Rathbun.

Actæa garretti Rathbun, 1906, p. 852, pl. 9, fig. 8.

Actæa rufopunctata var. *retusa* Nobili, Ann. Sci. Nat. Zool. (9), iv. 1906, p. 253.

Salomon; 1 ♀. Praslin; 1 ♀.

107. *Actæa obesa* A. Milne Edwards (Plate **16**, figs. 4, 5).

Actæa obesa de Man, Abh. Senckenb. naturf. Ges., xxv. 1902, p. 612.

Amirante, 30 fms., Sta. E 21; 1 ♂ young.

C. l. 4·3 mm., C. b. 7 mm.

Carapace very broad, covered, as also chelipeds and legs, with sharp granules. Grooves narrow. Hairs scanty, not noticeable without a lens, of varying length. Lobules few and low; mesogastric region not subdivided; protogastric regions partially and faintly divided longitudinally. Lateral margin divided by 3 furrows into 4 lobes of which the 3 posterior are prominent, rounded, their lobules continued inward to the large area known as 5 L. The areolets 1 M and 2 F are marked off from the orbital region, but incompletely separated from 2 M and from each other.

Front vertical, the main lobes separated by a V-shaped sinus, and separated from the outer lobes by an acute angle. Three orbital grooves faint. Lower surface of carapace granulate, crossed by grooves proceeding from the lateral margin as above.

The outer angle of the basal antennal joint is less advanced than the lobe at the inner angle of the orbit.

Wrists faintly divided into 3 or 4 flat lobules. The granules of the hand show a tendency to a longitudinal arrangement. Fingers broad with sharp edges, grooved, not gaping; dactylus with spinules on basal half of upper margin, a large shining tooth at base of cutting edge, succeeded by 2 denticles; 2 denticles on basal half of immovable finger; tips crossing, that of the dactylus within the other and curving inward. Granules on the legs sharper than on the carapace; hairs more numerous; carpopodites longitudinally grooved. According to previous descriptions, antero-lateral lobes are less strongly marked in large specimens.

108. *Actæa affinis* (Dana).

Actæa affinis Rathbun, 1906, p. 852.

Peros, Coin; 1 ♂, 1 ♀. Salomon; 5 ♂, 2 ♀. Egmont, reef; 3 ♂, 3 ♀. Coetivy; 8 ♂, 7 ♀.

109. *Actæa speciosa* (Dana).

Actæa speciosa Laurie, in Herdman, Ceylon Pearl Fisheries, pt. v, 1906, p. 402.

Peros, Coin; 1 ♂, 2 ♀ (1 mature, 1 immature), all small. Salomon; 1 ♀ large. Egmont, reef; 1 ♀ large. Coetivy; 1 ♂, 1 ♀ ovig., both small.

These specimens agree with Laurie's description.

110. *Actæa ruppellii* (Krauss).

Actæa ruppellii Alcock (3), p. 144.

Cargados Carajos, 28 fms., Sta. B 20; 1 ♂, 1 ♀ ovig. Amirante, 30 fms., Sta. E 21; 1 ♀. Coetivy; 1 ♂.

111. *Actæa acies*, sp. nov. (Plate **16**, figs. 8, 9).

Saya de Malha, 26 fms., Sta. C 16; 1 ♀ juv. Salomon; 1 ♀ ovig. Egmont, lagoon, 6—7 fms.; 1 ♂ type.

♂ type, C. l. 11·8 mm., C. b. 17·1 mm.

Carapace moderately convex, posterior third flat; antero-lateral margin much longer than postero-lateral, which is concave. Surface broken into many small granulated lobules separated by smooth, naked interspaces; from each granule arise several long, soft, yellow hairs forming a coat which only partially conceals the areolation. Mesogastric region divided into 6 lobules, the largest is the anterior, which is wider than customary in *Actæa* and somewhat diamond-shaped; on each side of its posterior end there is a small lobule; behind each of these, another; and behind these a transverse lobule. Protogastric region divided by a longitudinal curved furrow into a large inner lobule twice as long as the small outer one. Cardiac region divided longitudinally in two. Intestinal region covered with many small islets, the limits of which are not always well defined. Antero-lateral margin divided into 4 lobes besides the orbital angle; first two small, third longer than the sum of first and second, fourth small. Two transverse grooves in front of the posterior margin. Middle lobes of front narrow, rounded, separated from each other by a

large V-notch and from the acute outer lobes by rectangular sinuses. Two closed fissures above the orbit, none below.

Chelipeds and legs long, hairy and granulous; the granules save on the wrist are more scanty than on the carapace. Wrist divided into 3 areas. On the hand the granules are somewhat large and arranged mainly in lines, especially on the middle third; on the lower third the granules become squamiform and the hairs are short. Fingers very broad, smooth and shining, brown except for the white tips, the brown running back a little on the palm, especially in the male; tips acute when crossed, leaving a minute gape at base of fingers; fingers finely dentate in the proximal part of their sharp cutting edges, with a large truncate tooth at the basal third of the immovable finger; proximal half of upper surface of dactylus granulous and hairy; immovable finger with 2 longitudinal grooves; the lower one on the proximal half only, the upper one at the level of the truncate tooth. The carpal joints of the legs have a deep groove on the outer surface.

Near *A. ruppellii*, but distinguished by its longer antero-lateral margin, finer areolation of carapace, broad, flat fingers.

112. *Actæa suffuscula*, sp. nov. (Plate **17**, figs. 10, 11).

Salomon; 1 ♀. Coetivy; 1 ♂ (type), 1 soft-shell and shapeless, which seems to belong here.

Type ♂, C. l. 6·5 mm., C. b. 9·5 mm.

Of the form of *A. ruppellii*; lobules of carapace low, covered with a short fur which partially obscures the granules; a few scattered, longer hairs. Mesogastric region with a transverse lobule posteriorly, remainder showing a tendency to divide in three. Protogastric region divided longitudinally, but not clearly so, the outer portion longer and wider than the inner; in front of the outer portion there is a tiny islet of 2 or 3 granules. 2 F, 1 M, 1 L, 2 L, 3 L, 4 L, 5 L and 6 L are distinct; 5 L is little larger than 6 L, and has an emargination in its anterior border. Posteriorly the areolation is more obscure. Of the 4 lateral lobes the first is fused with the orbital angle and is inconspicuous, the rest are prominent and bluntly dentiform. Two supra-orbital fissures obscure, suborbital one V-shaped. Frontal lobes obliquely truncate, separated from each other by a large V-notch and from the orbital angle by the downward prolongation which joins the inner angle of the basal antennal joint.

Wrists nodulous, hands scarcely so. Chelipeds and legs covered with felt like the carapace but long hairs more numerous. Fingers long, pointed, meeting along their dentate (4 or 5 teeth) edges, light brown, this colour spreading in the ♂ from the immovable finger over a great part of the palm. Carpal joints of legs grooved. Abdomen of ♂ unusually slender.

Can be told at once from *A. ruppellii* by the lack of many long hairs on the carapace, by the truncate lobes of the front and the slender fingers which are a light brown, whence the specific name.

113. *Actæa variolosa* Borradaile.

Actæa variolosa Rathbun, 1906, p. 853.

Amirante, 29 fms., Sta. E 2; 1 juv., 2·8 × 4·2 mm.

114. *Actæa hellerii* A. Milne Edwards (Plate **18**, fig. 2).

Actæa hellerii Nobili, Ann. Sci. Nat., Zool. (9) iv. 1906, p. 256.

Amirante, 30 fms., Sta. E 21; 1 ♂. Coetivy, 32 feet, brought up by diver; 1 ♂, 1 juv.: reef; 2 ♂ 4 juv.

♂ (diver), C. l. 10·4 mm., C. b. 15·3 mm. The other 3 males are nearly the same size; the young are very small, the largest 2·8 mm. long, 4·2 mm. wide. In all the specimens there is a transverse groove extending inward from the antero-lateral margin at about $\frac{2}{3}$ the distance from the orbit to the widest part of the carapace. The grooves limiting the gastric region and its divisions are well marked; the groove subdividing each protogastric lobe does not extend quite to its posterior border; a groove limits the intestinal region anteriorly. The smaller granules of the carapace are very many; the larger ones much less numerous, and absent from the cardiac region and the posterior fourth of the carapace.

115. *Actæa savignyi* (Milne Edwards).

Actæa granulata Alcock (3), p. 151.

Cargados Carajos, 30 fms., Sta. B 3; 1 ♀ with isopod parasite in the branchial cavity: 30 fms., Sta. B 8; 1 ♂: 30 fms., Sta. B 9; 1 juv.: 30 fms., Sta. B 10; 1 ♀: 28 fms., Sta. B 19; 1 ♂: 28 fms., Sta. B 20; 1 ♂ juv. Saya de Malha, 55 fms., Sta. C 15; 1 ♀ Amirante, 29 fms., Sta. E 1; 1 ♂, 2 ♀; 29 fms., Sta. E 2; 1 ♂, 2 ♀. Seychelles, 31 fms., Sta. F 2; 1 ♂ with Rhizocephalid parasite, 1 juv.: 34 fms., Sta. F 7; 1 ♀ juv.: 34 fms., Sta. F 8; 1 ♀.

116. *Actæa boletaria*, sp. nov. (Plate **18**, figs. 3, 4).

Saya de Malha, 29 fms., Sta. C 19; 1 ♂ type. Amirante, 29 fms., Sta. E 2; 1 ♂, 2 juv.: 25—80 fms., Sta. E 11; 3 ♀ juv., one with Rhizocephalid parasite. Seychelles, 31 fms., Sta. F 2; 1 ♂: 34 fms., Sta. F 8; 1 ♀ juv.

Type ♂, C. l. (total) 12·2 mm., C. b. 18 mm.

Carapace $\frac{2}{3}$ as long as broad, posterior half flat; antero-lateral margin much longer than postero-lateral, which is concave. Surface nearly naked and closely covered with tubercles formed of crowded granules largely fungiform, the interstices giving the whole surface an eroded or pitted appearance. Furrows deep; either side of the median furrow there is a longitudinal furrow leading from the margin of the front to the anterior angle of the mesogastric region; antero-lateral margin 4-lobed behind the orbit, lobes ill defined and sub-divided. Front 4-lobed, outer lobes small.

Ornamentation of chelipeds similar to that of carapace but lower and more fungiform, fingers elongate, deflexed, grooved, rough at base, not gaping, prehensile teeth fitting neatly together, tips crossing, colour running back on palm inside and out in male. The ambulatory legs are sparsely fringed with hair; their tubercles along the anterior margin are sharp.

Near *A. nodulosa* but antero-lateral margin longer, tubercles more depressed, fingers longer, black colour on palm of male less extensive.

117. *Actæa nodulosa* White.

Actæa nodulosa Alcock (3), p. 148.

Providence, 50—78 fms., Sta. D 4; 1 ♂, 1 ♀.

In these specimens all the tubercles are formed of confluent granules. In the ♂ the brown colour of the immovable finger is extended over the greater part of the palm within and without, only one row of tubercles distant from the wrist. The sternum and abdomen, save the first segment, are not granulate but eroded.

♂, C. l. 11·8 mm., C. b. 18·8 mm.

♀, C. l. 12·2 mm., C. b. 20 mm.

118. *Actæa flosculata* Alcock.

Actæa flosculata Alcock (3), p. 151; Illus. Zool. Invest., Crust., vii. 1899, pl. 37, fig. 4.

Amirante, 25—80 fms., Sta. E 11; 1 ♀: 20—25 fms., Sta. E 13; 1 ♂, 1 ♀: 39 fms., Sta. E 16; 1 ♂.

119. *Actæa polyacantha* (Heller) (Plate **18**, figs. 5, 6).

Chlorodius polyacanthus Heller, S. B. math.-naturw. Cl. Akad. Wiss., Wien, xliii. 1 Abth., 1861, p. 339, pl. 3, fig. 21.

Actæa polyacantha Nobili, Ann. Sci. Nat., Zool. (9), iv. 1906, p. 259.

Salomon; 1 ♀ with Bopyrid parasite. Coetivy; 1 ♂, 1 ♀.

This species is intermediate between *A. peronii* Milne Edwards, Alcock (3), p. 150, and *A. spinosissima* Borradaile (*infra*). From the former it differs in having the marginal and submarginal projections of the carapace, and all the projections of the chelipeds, stout, pointed spines, instead of rounded, flat-topped tubercles; the armature of the legs consists entirely of true spines; the median sinus of the front is narrower and the divisions of the frontal margin are well marked little lobules instead of crenulations. In *A. spinosissima*, all the spines are slenderer, the front is edged with spines. From both the allied species *A. polyacantha* is at once distinguished by the short mesogastric region which is not continued forward between the protogastric regions, and is therefore broader than long.

120. *Actæa spinosissima* Borradaile.

Actæa spinosissima Borradaile, in Gardiner, Fauna Maldive Arch., i. part 3, 1902, p. 256, text-fig. 55.

Cargados Carajos, 28 fms., Sta. B 20; 1 juv. ♀. C. l. 4·9 mm.; C. b. 6·8 mm.

On the narrow part of the mesogastric region are 4 petaloid tubercles, instead of two in Borradaile's specimen.

121. *Actæa perspinosa* Borradaile.

Actæa perspinosa Borradaile, in Gardiner, Fauna Maldive Arch., i. part 3, 1902, p. 257, text-fig. 56.

Seychelles, 39 fms., Sta. F 3, 1 juv. C. l. 2·2 mm., C. b. 2·8 mm.

122. *Actæa cavipes* (Dana).

Actæa cavipes Alcock (3), p. 147.

Salomon, lagoon, 12 fms.; 1 ♂. Egmont, reef; 1 ♂. Amirante, 30 fms., Sta. E 21; 1 ♀.

123. *Actæa banareias*, sp. nov. (Plate **18**, figs. 7, 8).

Salomon, 10—14 fms.; 1 ♀ ovig. Egmont, lagoon, 6—7 fms.; 1 ♂ (type).

♂, C. l. 6·3 mm., C. b. 9·7 mm.

Entire surface, excepting lobes of front, fingers and horny tips of dactyls of legs, concealed by a thick, shaggy coat; on the greater part of the carapace and the dorsal surface of the chelipeds, the coat consists of fine, rather long, dark hairs; but on hinder and lower parts of the crab and in regular tufts on the carapace it is composed of longer light-coloured tubular hairs. When the hair is removed, the carapace is seen to be moderately convex, the posterior half flat, regions distinctly marked, but not lobulate; irregularly placed, conical granules scattered over the surface. Antero-lateral margin divided into 4 ill marked teeth, besides the orbital angle, all of which are granulate. Orbital margin granulate, a larger granule above near outer angle; no emarginations; a distinct gap below outer angle; a thick subacute tooth at inner angle. Front narrow, a little more than $\frac{1}{4}$ as wide as carapace, lobes deflexed, separated from each other and from the narrow, prominent blunt outer tooth, by a broad V. Chelipeds equal; arm with a small, subdistal tooth above; wrist and palm granulate; the granules cover the outer surfaces of the palm and the larger ones are arranged somewhat in rows; the granules as well as the hair are continued a short way on the fingers; the latter are flat and brown, the colour extending back half the length of the palm; a longitudinal groove near upper margin of dactylus. Legs short and broad, dactyli long and very slender.

This species is distinguished by its shaggy coat, quite different from that of any other *Actæa* and resembling that of *Banareia*; it also differs from typical *Actæa* in lacking lobules or subdivisions of regions. In many respects it resembles *B. armata* A. Milne Edwards (Ann. Soc. Entom. France (4), ix. 1869, p. 168, pl. 8), but lacks the deep excavations in the edge of the buccal cavity (which is said to be an unstable character in *B. armata*), the areolations of the carapace, and the bare space in the palms.

124. *Daira perlata* (Herbst).

Alcock (3), p. 155.

Salomon; 1 ♂. Coetivy; 1 ♀, 1 juv.

125. *Xanthias lamarckii* (Milne Edwards).

Xanthodes lamarckii Alcock (3), p. 157.

Peros, Coin; 2 ♀. Salomon; 7 ♂, 6 ♀. Egmont, reef; 1 ♂, 3 ♀. Coetivy; 2 ♂, 2 ♀. Praslin, reef; 1 ♂.

126. *Xanthias alcocki* Rathbun.

Xanthias alcocki Rathbun, Bull. Mus. Comp. Zool., xxxix. 1902, p. 128, plate, figs. 9—10.

Saya de Malha, 29 fms., Sta. C 19; 1 ♀. Providence, 39 fms., Sta. D 1; 1 ♀ ovig.: 29 fms., Sta. D 3; 2 ♀: 50 fms., Sta. D 11; 1 ♀ not typical. Amirante, 34 fms., Sta. E 9; 1 ♂, 2 ♀: 25—80 fms., Sta. E 11; 3 ♂: 20—25 fms., Sta. E 13; 1 ♂: 30 fms., Sta. E 21; 1 ♀: 20—44 fms., Sta. E 25; 1 ♀. Seychelles, 31 fms., Sta. F 2; 1 ♂: 34 fms., Sta. F 8; 2 ♂, 3 ♀ (1 ovig.).

♂, Sta. E 11, C. l. 4·4 mm., C. b. 6·7 mm.

In the largest specimen, considerably larger than the type, the carapace is not so rough as in small specimens. Chelipeds of ♂ very unequal; fingers of large chela broad, pollex not deflexed; prehensile teeth large; tips crossing and no gape when fingers are closed. Abdomen of ♂ constricted at the suture between 5th and 6th segments; last 2 segments each broader than long; last segment subtriangular.

The ♂ from Sta. D 11 varies from the type in having the 1st and 4th teeth of the lateral margin larger and yet not nearly so large as the 2nd and 3rd.

127. *Xanthias* sp.

Cargados Carajos, 30 fms., Sta. B 10; 1 ♀. C. l. 4·1 mm., C. b. 6·2 mm.

This specimen (the carapace of which is broken) is allied to *X. cumatodes* (MacGilchrist) (Illus. Zool. Investigator, Crust., xii. pl. 79, fig. 1). The carpal joints of the legs, instead of having 2 humps on the dorsal margin, are simply spinulous. The first of the 4 antero-lateral teeth is nearer the orbit and slightly in advance of the subhepatic spinule.

128. *Xanthias tuberculidens*, sp. nov. (Plate **18**, fig. 9).

Saya de Malha, 125 fms., Sta. C 5; 1 ♂.

A *Xanthias* with rough surface, subtruncate front, and prominent, tuberculiform side teeth.

Carapace distinctly hexagonal, $\frac{2}{3}$ as long as broad, deeply areolated, rough with sharp granules; 4 prominent antero-lateral teeth, with narrow rounded tips, besides the small tooth at the outer angle of the orbit; first tooth smallest, third most prominent; a subhepatic tubercle between first tooth and orbit; postero-lateral margins nearly straight. Front little convex, a tooth at outer angle, a narrow median notch, edge crenulate. Inner angle of orbit dentiform; two equal, separated teeth below, the outer one separated from the supra-orbital tooth by a large V-shaped notch. Flagella of antennæ $2\frac{1}{2}$ times as long as width of orbit.

Lower surface of crab granulate. Merus of maxillipeds with outer angle strongly produced laterally. Male abdomen short, broad at base; last two segments broader than long.

Chelipeds unequal in ♂, very rough with granules which form irregular bunches on the wrist and some longitudinal lines on the hand. Arm with a few spinules above; an obtuse tooth at inner angle of wrist, with a very small one at its base. Fingers granulate, deeply grooved, brown, edges irregularly toothed and meeting.

Legs granulate, upper margin spinulous, last 2 segments hairy, a strong distal tooth on merus, carpus cristate, with a truncate, proximal tooth.

Dimensions of ♂ type in mm.: C. l. 12, C. b. 18·2, Exorb. b. 9·7, F. b. 5·7, R. Ch. l. 24, H. l. (above) 7, H. h. 7·1, Prop. l. 13·6, Dact. l. 7·1, W. L. 1 21·2, W. L. 2 (tip broken), W. L. 3. 21·3, W. L. 4. 17·8.

Allied to *X. cumatodes* (MacGilchrist), Ann. Mag. Nat. Hist. (7), xv. 1905, p. 258; Illus. Invest., Crust., xii. pl. 79, figs. 1, 1 *a*, from which it differs in the shorter antero-lateral margin with more projecting teeth; presence of a tooth at outer angle of front, more highly ornamented legs, and very different form of merus of maxilliped.

129. *Xanthias minutus* (Rathbun).

Xanthias minutus Rathbun, 1906, p. 855, pl. 9, fig. 14, text-fig. 16.

Salomon; 2 ♂. Amirante, 34 fms., Sta. E 9; 2 ♂, 2 ♀: 25—30 fms., Sta. E 11; 6 ♂, 3 ♀. Seychelles, 37 fms., Sta. F 9; 1 ♂.

The largest specimen (♂, Salomon) measures, C. l. 10·9 mm., C. b. 17·3 mm.

130. *Chlorodiella niger* (Forskål).

Chlorodius niger Alcock (3), p. 160.

Salomon; 5 ♂, 2 ♀. Diego Garcia, lagoon; 5 ♂, 7 ♀ (2 ovig.). Praslin, reef; 1 ♀. Coetivy; 1 ♂, 2 ♀.

131. *Chlorodiella lævissima* (Dana).

Chlorodius lævissimus Alcock (3), p. 161.

Salomon; 1 ♂, 1 ♀. Cargados Carajos, 28 fms., Sta. B 19; 1 juv. Saya de Malha, 55 fms., Sta. C 15; 1 ♀: 29 fms., Sta. C 19; 5 ♂, 4 ♀. Amirante, 29 fms., Sta. E 2; 1 ♂: 25—80 fms., Sta. E 11; 9 ♂, 11 ♀: 30 fms., Sta. E 21; 8 ♂, 12 ♀. Coetivy, 3 ♂, 7 ♀: Coetivy, by diver, 32 feet; 1 ♀.

132. *Chlorodiella barbata* (Borradaile).

Chlorodius barbatus Borradaile, Proc. Zool. Soc. London, 1900, part III, p. 587, pl. 41, figs. 4—4 *c*.

Salomon, lagoon, 12 fms.; 2 ♂: 10—14 fms.; 1 ♂, 1 ♀: reef; 1 ♂, 1 ♀. Egmont, reef; 2 ♂, 3 ♀: lagoon, 6—7 fms.; 1 ♀.

133. *Phymodius ungulatus* (Milne Edwards).

Phymodius ungulatus Alcock (3), p. 162.

Salomon; 1 ♀. Egmont, reef; 1 ♂, 2 juv. Diego Garcia, lagoon, 10 fms., 1 ♀: 12 fms.; 1 ♂. Cargados Carajos, reef; 1 juv.: 28 fms., Sta. B 19; 1 juv. Coetivy; 14 ♂, 13 ♀.

134. *Phymodius nitidus* (Dana).

Pilodius nitidus Dana, Crust. U. S. Expl. Exped., pt. I, 1852, p. 218; atlas, 1855, pl. 12, fig. 7.

Praslin, from weed; 1 juv. Coetivy; 1 ♂, 1 ♀.

135. *Phymodius sculptus* (A. Milne Edwards).

Phymodius sculptus Alcock (3), p. 164.

Salomon; 1 ♀. Praslin, reef; 2 ♂, 2 ♀.

136. *Phymodius laysani* Rathbun.

Phymodius laysani Rathbun, 1906, p. 858, pl. 12, fig. 8, text-fig. 19.

Salomon; 1 ♂.

C. l. 8 mm., C. b. 11·3 mm.

This specimen is larger than the type, the interlobular furrows are deeper and the areolæ are more subdivided. There are two grooves between the posterior margin and the gastric region; the posterior lobule thus formed projects forward at the middle; the lobule in front of it is broken in two at the middle; the cardiac lobule has a small lobule separated from it at either end; the inner branchial lobule is subdivided into three tubercles. The median sinus of the front is broadly U-shaped and the lobes either side are correspondingly narrower than in the type.

137. *Chlorodopsis spinipes* (Heller).

Chlorodopsis spinipes Alcock (3), p. 169.

Salomon; 2 ♀. Egmont, reef; 2 ♀. Diego Garcia, lagoon; 1 ♂, 1 ♀. Coetivy; 1 ♂.

138. *Chlorodopsis woodmasoni* Alcock.

Chlorodopsis wood-masoni Alcock (3), p. 170; Illus. Zool. Investigator, Crust., pt. VII, 1899, pl. 37, fig. 7.

Salomon; 3 ♂, 2 ♀: lagoon, 12 fms.; 2 ♂. Egmont, reef; 1 ♀, C. l. 11·3 mm., C. b. 18·4 mm. Praslin, reef; 1 ♀ ovig. Coetivy; 2 ♂, 1 ♀. Peros, Diamant, with swabs, 16 fms.; 1 ♀.

139. *Chlorodopsis scabricula* (Dana).

Chlorodopsis scabricula Rathbun, 1906, p. 859.

Coetivy; 2 ♂ immature.

140. *Chlorodopsis venusta* Rathbun.

Chlorodopsis venusta Rathbun, Mem. Mus. Comp. Zool., xxxv. 1907, p. 49, pl. 1, fig. 5.

Salomon; 1 ♂, 3 ♀ (1 ovig.). Peros, Coin; 1 ♂. Egmont, reef; 1 ♂, 1 ♀. Coetivy; 4 ♂, 4 ♀ (largest ♂, C. l. 7·5 mm., C. b. 12·6 mm.).

141. *Chlorodopsis melanospinis*, sp. nov. (Plate **18**, fig. 11).

Saya de Malha, 26 fms., Sta. C 16; 2 ♂: 29 fms., Sta. C 19; 1 ♂ type, 3 ♀, 11 juv. Amirante, 29 fms., Sta. E 2; 1 ♂.

♂ type, C. l. 11·2 mm., C. b. 17 mm.

Carapace, chelipeds and legs covered with long fine, yellow hairs, which do not conceal the areolation. Entire dorsal surface of carapace lobulate; the three lobules, 3 L, 4 L, 1 R, are each armed with a spine. All the spines of body and appendages are stout and of a dark brown colour. Antero-lateral spines 5, including the one at the orbit; tooth N has a supplementary spine, nearly as long, behind it; while N, T, S may have 1 or 2 small neighbouring spines on the same lobule. Front with a U-shaped median notch; outer tooth triangular; edge granulate. Orbit with 3 distinct notches, upper edge spinous,

lower edge granulate. Chelipeds of ♂ very unequal, spinous; upper and inner edges of merus spinous; outer surface of wrist and palm spinous, spines of palm very unequal, lower fourth of palm smooth; fingers light brown with white tips, widely gaping, those of large claw each with a single tooth; dactyli spinous outside for half their length; one row of spines runs from the palm on to the immovable finger; dark colour extending very little on the palm; tips of fingers broad and deeply hollowed. Upper margin of merus joints of legs armed with a row of spines; upper surface of carpal and propodal joints with 3 rows of spines.

In the females the chelipeds are nearly equal; fingers black with light tips.

This species is more strongly spinous than any other *Chlorodopsis*. In form and general appearance, it resembles *Pilodius flavus* Rathbun (1906, p. 860, text-fig. 21), which is less deeply areolated and devoid of spines on the dorsum and on the upper margin of the orbit.

142. *Pilodius paumotensis* Rathbun.

Pilodius paumotensis Rathbun, Mem. Mus. Comp. Zool., xxxv. 1907, p. 52, pl. 8, figs. 2, 2 *a*, 2 *b*.

Salomon; 1 ♀. Peros, Coin; 1 ♂.

The ♂ resembles closely the type; the ♀ has a dark green colour, and is slightly wider than the ♀ cotype, approaching *Chlorodopsis melanochira* A. Milne Edwards; in *P. paumotensis*, there is no narrow lobule cut off from the posterior end of the mesogastric region.

143. *Cymo andreossyi* (Audouin).

Cymo andreossyi Alcock (3), p. 173.

Coetivy, 32 feet, taken by diver; 1 ♀ ovig.

144. *Cymo melanodactylus* de Haan.

Cymo melanodactylus Alcock (3), p. 174.

Coetivy; 2 ♀.

145. *Cymo quadrilobatus* Miers.

Cymo quadrilobatus Alcock (3), p. 175.

Salomon; 2 ♂, 2 ♀. Egmont, reef; 1 ♀. Praslin; 1 ♂.

Length of largest specimen (♂, Salomon) 17·3, breadth 19 mm.

146. *Pseudozius caystrus* (Adams & White).

Pseudozius caystrus Alcock (3), p. 181.

Diego Garcia, lagoon; 1 ♀. Coetivy; 13 ♂, 11 ♀.

147. *Epixanthus corrosus* A. Milne Edwards.

Epixanthus corrosus A. Milne Edwards, Nouv. Arch. Mus. Hist., Paris, ix. 1873, p. 241, pl. 9, figs. 1, 1 *a*. De Man, Arch. f. Naturg., liii. 1888, p. 292, pl. 11, fig. 3.

Peros, Coin; 1 ♂, 1 ♀.

♂, C. l. 12 mm., C. b. 19·8 mm.

148. *Lydia tenax* (Rüppell).

Ozius (*Euruppellia*) *tenax* Alcock (3), p. 187.

Coetivy; 1 ♀ juv.

149. *Dacryopilumnus eremita* Nobili (Plate **16**, figs. 6, 7).

Dacryopilumnus eremita Nobili, Bull. Mus. Hist. Nat., Paris, 1906, p. 264.

Peros, Coin; 1 adult ♀.

C. l. 4·2 mm., C. b. 6·4 mm.

The ♀ is a little wider than the ♂ described by Nobili. Orbits wholly dorsal. The convergent lateral margins are interrupted by the granulate marginal line of the anterior half turning inward on the carapace. Supra-frontal lobes not strongly marked. Area between orbit and frontal margin flat, crossed by a closed fissure.

Epistomial openings of the efferent branchial channels circular.

Chelipeds nearly equal, covered with a short, dense pubescence; the black colour of the dactyl covers only the distal $\frac{2}{3}$, the black of the thumb ends with an oblique line where it joins the palm. Ambulatory legs nearly naked, upper and lower surfaces finely denticulate, the largest denticles near the proximal end of the lower margin of the merus of the last pair.

150. *Pilumnus longicornis* Hilgendorf.

Pilumnus longicornis Alcock (3), p. 193.

Diego Garcia, 14 fms.; 1 ♀, 1 juv. Cargados Carajos, 30 fms., Sta. B 9; 1 ♂, 3 juv.: 30 fms., Sta. B 13; 2 ♂, 1 ♀, 2 juv.: 28 fms., Sta. B 19; 2 ♂, 1 ♀, 2 juv.: 28 fms., Sta. B 20; 1 juv. Saya de Malha, 55 fms., Sta. C 15; 1 ♀: 29 fms., Sta. C 19; 1 ♂. Amirante, 20—25 fms., Sta. E 13; 1 ♀ juv. Seychelles, 34 fms., Sta. F 7; 1 ♂, 2 ♀, 4 juv.

Largest specimen (Sta. F 7) ♀, C. l. 14 mm., C. b. 20 mm.

This species has normally a small spine at the outer angle of the orbit, but it is often broken off. Usually not more than half the outer surface of the larger palm is granulate and hairy. In the young ♀ from station E 13, the granules and hairs cover the outer surface of the large palm, and the claw is smaller than is customary, approaching the lesser claw in size as well as ornamentation.

151. *Pilumnus andersoni* de Man.

Pilumnus andersoni Alcock (3), p. 194.

Cargados Carajos, 30 fms., Sta. B 8; 1 ♀ ovig.: 30 fms., Sta. B 13; 1 ♂, 4 juv.: 30 fms., Sta. B 14; 1 ♂: 30 fms., Sta. B 15; 4 juv.: 28 fms., Sta. B 19; 2 ♀. Saya de Malha, 47 fms., Sta. C 12; 1 juv.: 55 fms., Sta. C 15; 2 ♂, 2 ♀; one ♀ of large size, 15·7 mm. wide, has the anterior third of the carapace overgrown with a long worm tube and an encrusting bryozoan. Amirante, 29 fms., Sta. E 1; 6 ♂, 10 ♀: 29 fms., Sta. E 2; 1 juv.: 25 fms., Sta. E 3; 4 ♂, 7 ♀, 6 juv.: 32 fms., Sta. E 5; 1 ♂, 1 ♀: 28 fms., Sta. E 6; 30 ♂, 38 ♀; an adult ♀ has the larger claw deformed; from the base of the thumb, a short, stout spine projects downward; although almost entirely beyond the line of brown colour on the thumb, this spine is also brown; its tip is broken off: 34 fms., Sta. E 9; 7 ♂, 4 ♀. Seychelles, 34 fms., Sta. F 7; 1 ♂: 34 fms., Sta. F 8; 1 ♂, 3 ♀. Praslin, reef; 1 ♀ ovig.

152. *Pilumnus hirsutus* Stimpson.

Pilumnus hirsutus Stimpson, Smithson. Misc. Coll., xlix. 1907, p. 69, pl. 9, fig. 1.

Providence, 29 fms., Sta. D 3; 1 ♀: 50—78 fms., Sta. D 4; 15 specimens, 1 with Rhizocephalid parasite. Amirante, 39 fms., Sta. E 16; 1 ♂: 20—44 fms., Sta. E 25; 1 ♂.

The species to which I give the name *P. hirsutus* has a strong resemblance to *P. andersoni*. In *P. andersoni*, the front is almost bare in front of the transverse fringe of long hair, so that the outline of its oblique lobes is plainly visible; in *P. hirsutus*, the long fine hairs which cover the greater part of the dorsal front obscure the margin, the lobes of which are less oblique. The immovable finger of the large chela is longer in *hirsutus*.

The ♂ from station E 25 is possibly not conspecific with the others; it is only 2·9 mm. long and has a breadth of 4·4 mm., being much distorted from a Bopyrid parasite in each branchial chamber.

153. *Pilumnus orbitospinis*, sp. nov. (Plate **16**, figs. 14, 15).

Salomon Bank, 60—120 fms.; 2 ♀ (1 ovig.).

♀ ovigerous, C. l. 8·1 mm., C. b. 10·7 mm.

Carapace subrotund, covered, as are chelipeds and legs, with short pubescence, and long, soft yellow hairs; surface smooth, regions scarcely indicated. Antero-lateral margins armed with 3 long and slightly curved spines, besides a shorter spine at the orbital angle. Postero-lateral margins markedly convergent. Front with a V-shaped emargination of good size, lobes slightly convex, outer angle a small triangular tooth. Orbital notches indistinct; upper margin granulous, lower margin spinulous; at the inner angle but separated from the antenna, a long slender spine pointing forward and slightly inward.

Chelipeds unequal, covered with spines and spinules; 2 long curved spines near end of upper margin of arm; strong spines on wrists, smaller palm and upper half of larger palm; on the lower half of the latter the spines are reduced to sharp granules and disappear near the lower and distal margins. The spinules extend at least half way down the fingers of the small claw and about $\frac{1}{3}$ the upper surface of the large dactylus. Fingers brown, the colour not reaching the proximal end. Legs long and slender.

This species has much the appearance of *P. maldivensis* Borradaile (Fauna Maldive Arch., i. 1902, p. 247, text-fig. 47) but the hairs are longer, the lateral spines not lobiform at base, the larger hand stouter than in fig. 47 *b*, the smaller hand with thumb deflexed. Characteristic of this species is the long spine of the inner orbit visible from above and the pair of long spines on the upper arm.

154. *Pilumnus tahitensis* de Man.

Pilumnus tahitensis de Man, Notes Leyden Mus., xii. 1890, p. 61, pl. 3, figs. 4, 4 *a*, 4 *b*.

Saya de Malha, 29 fms., Sta. C 19; 1 ♂. C. l. 8·4 mm., C. b. 10·8 mm.

155. *Pilumnus tæniola* Rathbun.

Pilumnus tæniola Rathbun, 1906, p. 864, pl. 11, fig. 3, text-fig. 24.

Saya de Malha, 55 fms., Sta. C 15; 1 ♀. Amirante, 25—80 fms., Sta. E 11; 3 ♂: 39 fms., Sta. E 16; 1 ♀.

Smaller than the type. The claws of the ♂ are equal and alike, as in the ♀.

156. *Pilumnus turgidulus*, sp. nov. (Plate **19**, figs. 1, 2).

Amirante, 25—80 fms., Sta. E 11; 3 ♂, 3 ♀, (1 ♂ type): 20—25 fms., Sta. E 13; 1 ♂: 30 fms., Sta. E 21; 1 juv.

♂, C. l. 5·2 mm., C. b. 7 mm.

A narrow, subquadrate species, the carapace little broader than long, postero-lateral margins nearly parallel, antero-lateral margins short, with 3 small spiniform teeth diminishing in size from first to third, third minute, first tooth remote from orbital angle, which is neither spiniform nor produced. Front strongly deflexed, lobes moderately convex, outer angle inconspicuous. Surface of carapace short-pubescent, with scanty long hairs of which there is a row above the front. Orbital fissures obscure.

Chelipeds and legs clothed with long soft hairs. Chelipeds unequal in both sexes; in the females and smaller males they are similar, the palm is roughened with low granules. In the well developed males the palm of the large cheliped is almost entirely smooth and naked. Fingers, as a rule, long and slender, narrowly gaping, tips sharp and crossing each other; dark colour confined to the terminal $\frac{2}{5}$, except on the prehensile teeth where it extends the whole length of the fingers; in the old males the larger thumb is swollen at the base, having in the type specimen almost the appearance of malformation. Legs long and narrow.

This species is very near *P. tæniola* in the form of carapace and legs; the latter is, however, wider, lobes of front more prominent and their outer angles more accented; the fingers are not so regularly tapering, nor the tips so acuminate.

157. *Pilumnus trichophoroides* de Man.

Pilumnus trichophoroides de Man, Zool. Jahrb., Syst., viii. 1895, p. 549; ix. 1897, pl. 13, figs. 8 *a*—8 *e*.

Egmont, reef; 1 ♀ adult. C. l. 9·8 mm., C. b. 13·5 mm.

Larger than the type specimen; antero-lateral teeth less distinctly marked; the brown colour of the fingers, while restricted to the distal two-fifths on the outer margins of the fingers, runs along the prehensile edge as far as the teeth extend.

158. *Pilumnus alcocki* Borradaile.

Pilumnus alcocki Borradaile, in Gardiner, Fauna Maldive Arch., i. 1902, p. 248, text-fig. 48.

Amirante, 29 fms., Sta. E 1; 1 juv.: 29 fms., Sta. E 2; 2 juv.: 39 fms., Sta. E 16; 1 juv.: 30 fms., Sta. E 21; 3 ♂, 1 ♀.

The largest specimen, ♀, measures: C. l. 7·2 mm., C. b. 11 mm. It is more densely covered with long hair than smaller specimens.

159. *Actumnus setifer* (de Haan), var.

Actumnus setifer Alcock (3), p. 202.

Seychelles, 34 fms., Sta. F 7; 1 ♂ varying towards the form described below, in having the thumb of the large claw a little longer than is typical and the lower marginal line of granules on the palm very indistinct.

160. *Actumnus setifer amirantensis*, subsp. nov. (Plate **16**, figs. 12, 13).

♂, type, C. l. 8·8 mm., C. b. 11·7 mm., fronto-orbital b. 9·4 mm.

The most abundant *Actumnus* in the western Indian Ocean if this collection is an indication.

Carapace moderately convex; tomentum short, thick and smooth; areolations little prominent, well separated, sparingly granulate; front broader than in *A. setifer* (de Haan), outer tooth triangular, distinct, and separated by an obliquely angled sinus from the obtuse upper angle of the orbit; three lateral teeth tipped with a spine. Wrist sparingly granulate, smaller palm sharply granulate.

The upper part (less than half) of the outer surface of both palms is thinly tomentose; the sharp granules disappear on the lower distal portion of the large palm; inner surface smooth and shining; no inferior marginal line except near the wrist. The fingers are rather long and the immovable fingers deflexed, that of the small claw more deflexed than that of the large claw.

In small specimens the larger palm has a larger area of granulation than in adults, and the ridge on the immovable finger has a line of granules on its basal half.

This subspecies, as represented by a lot of 143 specimens from Station E 6, is quite distinct from typical *Actumnus setifer*. There are before me seven specimens of the latter, from three widely separated localities, Japan, Pulo Edam, and Gulf of Siam. They differ from the subspecies *amirantensis*, not only in the greater convexity of the carapace and its areoles, as mentioned by Alcock in comparing it with *A. tomentosus* Dana, but in the more granulated palm, shorter fingers, more horizontal thumb, and the inferior marginal line of granules separating the outer from the inner surface of the palm. Our subspecies is also smaller, the largest specimens averaging about 12 mm. in width.

The subspecies was obtained at 19 different stations, and at some of these there are specimens which incline toward typical *A. setifer*. These variations are indicated below in the list of localities.

Cargados Carajos, 30 fms., Sta. B 8; 2 ♂, 1 juv.; the largest ♂, about 13 mm. wide, approaches the convexity in carapace and areolæ of *A. setifer*; chelipeds lacking: 30 fms., Sta. B 14; 1 ♂, 1 ♀: 30 fms., Sta. B 15; 8 ♂, 6 ♀: 30 fms., Sta. B 16; 1 ♂ juv.: 30 fms., Sta. B 17; 1 ♂, 1 ♀, 1 juv.; the ♂ about 11·5 mm. wide varies toward *A. setifer*, that is, the outer surface of the larger palm is nearly all granulate, the immovable finger is shorter, but not so short as in *A. setifer*, there is an inferior line of granules on the proximal half of the palm. Saya de Malha, 47 fms., Sta. C 12; 1 ♂ without chelipeds: 55 fms., Sta. C 15; 1 ♂, 2 ♀, 1 juv.; ♂, C. b. 14 mm. Providence, 70 fms., Sta. D 7; 1 ♀. Amirante, 29 fms., Sta. E 1; 7 ♂, 11 ♀ (8 ovig.); vary toward *A. setifer*, several specimens having a short thumb, the lower part of palm chiefly bare, but with a few scattered granules and granules on the proximal end of the ridge on the thumb: 29 fms., Sta. E 2;

1 juv.: 25 fms., Sta. E 3; 9 ♂, 6 ♀: 32 fms., Sta. E 5; 1 ♀ ovig.: 28 fms., Sta. E 6; 143 specimens without noticeable variations (1 ♂ is type): 34 fms., Sta. E 9; 5 ♂, 8 ♀, 2 juv. (1 ♂ with Bopyrid): 32 fms., Sta. E 12; 1 ♀. Seychelles, 39 fms., Sta. F 3; 2 juv.: 44 fms., Sta. F 5; 3 juv.: 44 fms., Sta. F 6; 1 ♂: 34 fms., Sta. F 8; 1 ♂, 2 juv.

161. *Actumnus bonnieri* Nobili.

Actumnus bonnieri Nobili, Bull. Sci. France et Belg., xl. 1906, p. 132, pl. 6, fig. 32.

Seychelles, 31 fms., Sta. F 2; 1 ♀ juv. C. b. 4·2 mm.

The lobules of the carapace are high and deeply separated from one another. The outline of the lateral teeth is not obscured by tomentum; the teeth are denticulated. The marginal projections of wrist, palm and movable finger are so sharp as to resemble spines.

162. *Actumnus globulus* Heller.

Actumnus globulus A. Milne Edwards, Nouv. Arch. Mus. Hist. Nat., Paris, i. 1866, p. 286, pl. 18, fig. 4.

Salomon; 1 ♀. C. l. 9 mm., C. b. 12 mm.

The antero-lateral margin is cut by three closed fissures, each lobe thus formed overlapping the one anterior to it. The two frontal lobes are oblique and are separated from the orbital angles by a well-marked sinus.

163. *Actumnus obesus* Dana.

Actumnus obesus Rathbun, 1906, p. 865, pl. 11, fig. 2.

Amirante, 29 fms., Sta. E 2; 1 ♀: 20—25 fms., Sta. E 13; 1 ♂; C. l. 7·7 mm., C. b. 10·1 mm.: 30 fms., Sta. E 21; 2 ♀.

In the specimen measured, the lateral teeth are better marked than in the larger specimen from the Hawaiian Islands described in the report cited above. In the females, which are all small, about 6·6 mm. wide, the tomentum almost conceals the regional divisions of the carapace.

164. *Actumnus simplex*, sp. nov. (Plate **16**, figs. 10, 11).

Amirante, 32 fms., Sta. E 12; 1 ♀.

Ovigerous female, C. l. 8·6 mm., C. b. 11 mm.

Carapace covered with a very short, scant pubescence, not visible to the naked eye; a transverse line of long hairs behind the front; chelipeds and legs furnished with long, ragged hairs which, on the arms, wrists and legs, are confined chiefly to the margins, but cover the whole outer surface of the palms. Carapace very convex in both directions. The only separation into regions is indicated by shallow branchio-cardiac furrows. Front narrow, a median emargination, lobes oblique, their outer angles connected by a straight line with the orbital angles. Two superior orbital fissures faintly indicated; external fissure V-shaped. Antero-lateral margin cut by three shallow notches into lobes, the posterior of which is bluntly dentiform. From it a low, finely granulate ridge runs inward on the carapace.

Chelipeds not very unequal; inner angle of wrist spinulous; palm granulous on outer surface, granules concealed beneath long hair. Fingers brown, not gaping, toothed along prehensile edges, immovable fingers as long as wide.

This species, in the smoothness of its carapace, resembles *A. nudus* A. Milne Edwards (*Conf.* de Man, Journ. Linn. Soc. London, Zool., xxii. 1887, p. 49, pl. 2, figs. 2, 3), but the latter is much broader, with strong antero-lateral teeth and smooth palms.

165. *Actumnus lævigatus*, sp. nov. (Plate **19**, figs. 3, 4).

Amirante, 25—30 fms., Sta. E 11; 1 ♀ ovig. C. l. 6·8 mm., C. b. 9·3 mm.

Carapace very convex in all directions; scarcely any indication of regions; covered with a short, fine, light-coloured pubescence. Antero-lateral margin with three conical teeth, each tipped with a slender spine; the first of these teeth has a secondary spine on its posterior slope; besides there is a small spine at the outer angle of the orbit. Front composed of two oblique lobes, separated by a broad emargination, and without a distinct tooth at the outer end. Two faint notches in upper margin of orbit, and a broad sinus beneath the outer angle; margin granulate; inner angle armed with a spinule.

The chelipeds and legs have many longer hairs mixed with the short tomentum. Chelipeds unequal; arms with two sharp teeth above; wrists and palms granulate; lower distal half of larger palm smooth and bare; a few granules near the palmar end of the dactyls; fingers of large claw very broad and smooth; those of small claw narrower and with one or two grooves; prehensile edges with low irregular teeth which leave no gape; tips acute, crossing; colour of fingers (in alcohol) light pinkish, this colour not reaching quite to base of immovable finger. Legs rather stout, except for the long slender, yellow, horny tips of the dactyls.

This species, like the preceding, resembles *A. nudus* in the smoothness of the carapace, but differs in form, character of lateral teeth and in its hairy covering.

166. *Eriphia sebana* (Shaw).

Eriphia lævimana Alcock (3), p. 214.

Salomon; 1 ♀. Peros, Coin; 1 ♂. Egmont, reef; 1 ♀ juv.

167. *Eriphia scabricula* Dana.[1]

Eriphia scabricula Alcock (3), p. 216.

Salomon; 1 ♀. Peros, Coin; 1 ♂. Egmont, lagoon, 6—7 fathoms; 1 ♂. Praslin, reef; 1 ♂, 1 ♀ ovig. Coetivy; 1 ♂.

168. *Maldivia gardineri*, sp. nov. (Plate **19**, figs. 5, 6).

Salomon; 1 ♀ ovig.

C. l. 3·3 mm., C. b. 4·4 mm., F. b. 1·8 mm.

Carapace broader than long, slightly convex, smooth to the eye, but microscopically granulate, regions scarcely indicated; sparsely hairy with very fine soft hairs, of which there is a row just behind the margin of the front. Body covered with numerous very small irregular dots of reddish-brown, which have nearly faded out except along the frontal and antero-lateral borders of the carapace and the anterior part of the ventral

surface. Two denticles on the antero-lateral margin. Postero-lateral margins strongly convergent. Front very broad, slightly deflexed, divided into two subtruncate lobes. Orbital margin crenulate, not fissured. Eyes large, peduncles stout. Basal joint of antenna not nearly reaching the front. Epistome short. Efferent ridge strong. Merus of maxillipeds broader than long, outer angle rounded, inner angle notched for the insertion of the palpus.

Chelipeds very unequal, outer surface very rough and pubescent. Arm stout, nearly smooth; wrist granulate, the granules increasing in size toward the palm. Larger palm much swollen, covered with granules which increase in size towards the upper surface where they become tubercles and are arranged in rows. Smaller palm about half as high as the other, similarly roughened, the large granules being sharp. Fingers of large claw roughened to near the tips, not gaping; prehensile edges irregularly toothed, tips sharp pointed, crossing when flexed. Fingers of small claw thin, curved, dactylus rough, immovable finger smooth, punctate; fingers not gaping; prehensile edges sharp, entire, fitting neatly together, tips small, curved and overlapping.

Legs narrow, thin, margins granulate, upper edge of carpal segments terminating in a denticle, margins scantily provided with long hairs.

The general aspect of this species is much like that of *M. symbiotica* Borradaile (Fauna Maldives, i. 1902, p. 270, text-fig. 60), but the unequal chelipeds, the peculiar fingers of the small claw, as well as the wider carapace and front, easily distinguish it.

169. *Trapezia cymodoce* (Herbst).

Trapezia cymodoce Alcock (3), p. 219.

Salomon; 10 ♂, 7 ♀: dredged, 10—14 fms.; 1 ♂, 1 ♀. Peros, Coin; 1 ♂, 1 ♀. Egmont, reef; 1 ♂, 2 ♀: lagoon, 6—7 fms.; 4 ♂, 3 ♀. Diego Garcia, lagoon; 1 ♂, 1 ♀: 12 fms.; 2 ♂. Cargados Carajos, 30 fms., Sta. B 2; 3 ♂, 2 ♀. Saya de Malha, 26 fms., Sta. C 16; 1 ♂, 4 ♀. Amirante, 29 fms., Sta. E 2; 1 ♂, 1 ♀: 25—80 fms., Sta. E 11; 2 ♂, 1 ♀: 20—25 fms., Sta. E 13; 7 ♂, 7 ♀: 30 fms., Sta. E 21; 2 ♂, 3 ♀. Seychelles, 34 fms., Sta. F 8; 1 ♂, 2 ♀ (1 with Bopyrid). Praslin, reef; 2 ♂, 2 ♀. Coetivy; 4 ♂, 5 ♀.

The specimens vary considerably in the length and sharpness of the lateral tooth, and to a lesser degree in the form and prominence of the frontal teeth; while the upper border of the palm is sharp and its outer surface hairy. These characters connect the species with the subspecies *ferruginea*.

170. *Trapezia cymodoce ferruginea* Latreille.

Trapezia ferruginea Alcock (3), p. 220.

Salomon; 6 ♂, 5 ♀: dredged, 10—14 fms.; 1 ♂, 1 ♀, varying toward *T. guttata* Rüppell. Peros, Coin; 1 ♂, 1 ♀. Egmont, reef; 2 ♂, 2 ♀. Seychelles, 20 fms., Sta. F 8; 2 ♀. Praslin, reef; 2 ♂, 1 ♀. Coetivy; 2 ♂, 1 ♀.

The two specimens dredged at Salomon have the merus and carpus of the legs spotted, the propodus and dactylus striped, the stripes having a tendency to break up.

171. *Trapezia cymodoce intermedia* Miers.

Trapezia ferruginea var. *intermedia* Alcock (3), p. 220.

Praslin, reef; 1 ♀ ovig. Coetivy; 1 ♀ ovig.

172. *Trapezia cymodoce maculata* (MacLeay).

Trapezia maculata Alcock (3), p. 221.

Salomon; 2 ♂, 1 ♀. Egmont, reef; 1 ♀.

173. *Trapezia rufopunctata* (Herbst).

Trapezia rufopunctata Alcock (3), p. 222.

Salomon; 3 ♂, 4 ♀, 4 juv. Egmont, reef; 1 ♂: lagoon, 6—7 fms.; 1 ♂.

174. *Trapezia digitalis* (Latreille).

Trapezia digitalis Alcock (3), p. 222.

Salomon; 1 ♂, 1 ♀ ovig. Peros, Coin; 1 ♀. Egmont, reef; 1 ♂, 2 ♀ (1 ovig.). Amirante, 29 fms., Sta. E 1; 1 ♂ juv. Praslin, reef; 1 ♂. Coetivy; 1 ♂, 1 ♀.

175. *Tetralia glaberrima* (Herbst).

Tetralia glaberrima Alcock (3), p. 223.

Salomon; 1 ♂, 3 ♀ ovig. Cargados Carajos, 28 fms., Sta. B 19; 1 juv. (identification not certain). Saya de Malha, 26 fms., Sta. C 16; 1 ♂: 29 fms., Sta. C 19; 1 ♂. Coetivy; 3 ♂, 3 ♀: by diver, 32 feet; 1 ♂, 2 ♀ (1 ovig.).

176. *Quadrella coronata* Dana.

Quadrella coronata Alcock (3), p. 226.

Providence, 50 fms., Sta. D 11; 6 ♂, 3 ♀ (1 ovig.). Amirante, 22—85 fms., Sta. E 10; 1 ♀ ovig.: 36 fms., Sta. E 14; 1 ♂, 1 ♀ ovig.: 39 fms., Sta. E 16; 4 ♂, 3 ♀. Seychelles, 34 fms., Sta. F 8; 1 ♂: 37 fms., Sta. F 9; 1 ♂, 1 ♀.

177. *Quadrella maculosa* Alcock.

Quadrella coronata var. *maculosa* Alcock (3), p. 226.

Cargados Carajos; 45 fms., Sta. B 29; 1 ♀ ovig. Amirante, 32 fms., Sta. E 12; 2 ♂, 1 ♀.

In the well-developed ♀ the palms are not inflated, and their upper and lower margins are subparallel, which is not the case in a ♀ of *Q. coronata* of the same size.

178. *Polydectus cupulifer* (Latreille).

Polydectus cupulifer Rathbun, 1906, p. 866.

Coetivy; 1 ♀ holding an actinian in each claw.

179. *Domecia hispida* Eydoux and Souleyet.

Domecia hispida Alcock (3), p. 230.

Diego Garcia, 12 fms.; 1 juv. Cargados Carajos, 28 fms., Sta. B 19; 1 juv. Amirante, 16 fms., Sta. E 23; 1 ♂. Coetivy; 1 ♂, 1 ♀ ovig.: by diver, 32 feet; 4 ♂, 2 ♀, all small.

180. *Lybia tesselata* (Latreille).

Melia tessellata Borradaile, in Gardiner, Fauna and Geogr. Maldive and Laccadive Arch., i. 1902, p. 250, text-fig. 49.

Salomon; 2 ♂, 5 ♀ (4 ovig.). Saya de Malha, 29 fms., Sta. C 19; 1 ♂. Amirante, 25—30 fms., Sta. E 11; 5 ♂, 5 ♀: 30 fms., Sta. E 21; 1 ♀. Coetivy; 6 ♂, 7 ♀ (3 ovig.), 2 juv.; one of the females, 10 mm. in width, is grasping anemones which measure 5 mm. in diameter across the expanded tentacles.

181. *Lybia pugil* (Alcock).

Melia pugil Alcock (3), p. 231. Illus. Zool. Investigator, Crust., pt. VII, 1899, pl. 38, fig. 5.

Saya de Malha, 47 fms., Sta. C 12; 1 ♀ ovig. Amirante, 34 fms., Sta. E 9; 1 ♀.

These specimens have the indentation on the postero-lateral border of the carapace, the dorsal surface is distinctly tuberculous. Both hands of the specimen from Saya de Malha carry an anemone, only the right hand of that from Amirante.

Gardineria, gen. nov.

Carapace transverse; antero-lateral margin directed obliquely downward to the angle of the buccal cavity and furnished with a stridulating mechanism. Orbit subentire, pear-shaped.

Antennules large, nearly transverse. Peduncular segments of antennæ narrow; basal segment falling far short of the front, the following segment just touching the front; flagellum standing in the orbital hiatus. Efferent ridge well developed posteriorly but not reaching the anterior edge of the buccal cavity. Merus of maxillipeds expanded at outer angle.

Chelipeds stout, smooth. Legs slender, flattened. Abdomen of ♂ with all the segments free.

Type, *Gardineria canora*, sp. nov.

This genus is an anomaly among the Xanthidæ; it belongs to the section *Hyperolissa*, the efferent ridges being strong but not continued to the epistome. The character of the lateral margins, the formation of the orbits, the development of the wrists, are peculiar to the genus.

182. *Gardineria canora*, sp. nov. (Plate **19**, figs. 7, 8).

Providence, 29 fms., Sta. D 3; 1 ♂.

C. l. 7·7 mm., C. b. 11·2 mm.

Carapace oval, convex; regions, except the cardiac, not defined; surface punctate; antero-lateral margin a thin, granulated rim, ending posteriorly in two tuberculiform denticles at the widest part of the carapace; a ridge on the hindmost tooth is continued inward for a short distance; anteriorly the marginal rim passes a little outside the angle of the orbit and is prolonged to the angle of the buccal cavity; a weaker ridge connects it with the orbital angle; the under side of the marginal rim forms a stridulating ridge

crossed by fine striæ; postero-lateral margin sinuous. The front viewed from above is arcuate, but the true edge is invisible, the surface being bent abruptly down; edge viewed from in front, the shape of a cupid's bow, and not separated from the angle of the orbit; the sides of the front slope gradually into the orbital margin. Orbits pear-shaped; eyes stout. Two faint notches near together in the superior margin of the orbit; inferior margin thickened, showing some irregular crenations. Suborbital area granulate. Basal segment of antennules deeply channeled along its ventral face. The flagellum of the antennæ is shorter than the major diameter of the orbit. Ischium of maxillipeds longer than merus and produced at the antero-internal angle; merus with a lobe of good size at its antero-external angle.

Chelipeds unequal, smooth, punctate; arm with a thin edge above, having a small blunt tooth near the distal end; wrist enlarged, a laminiform expansion along its inner side, whose thin, smooth edge can be scraped along the stridulating ridge on the ventral edge of the carapace; palms swollen; fingers rather long, coloured like the palm, not gaping, tips curved and crossing, prehensile edges armed with a few acute teeth, the largest one near the base of the larger pollex, the dactyli almost unarmed in their distal half; four impressed lines of punctæ on each digit.

Legs narrow, flat, varying little in length, dactyli scantily hairy.

Male abdomen small, suboblong, segments of about equal length, save the first and seventh.

Gonoplacidæ.

183. *Eucrate crenata* de Haan.

Eucrate crenata Alcock (6), p. 300.

Seychelles, 34 fms., Sta. F 8; 1 ♀ juv.

184. *Pilumnoplax acanthomerus*, sp. nov. (Plate 18, fig. 13).

Amirante, 30 fms., Sta. E 21; 1 ♂ type, 1 ♀ ovig.

Carapace slightly convex; surface closely covered with granules which are smaller posteriorly; regions indicated by narrow grooves; front and orbits set off by broad furrows. Front obliquely inclined, $\frac{2}{5}$ as wide as carapace; edge sinuous, a median V-shaped emargination, a small lobe at outer corners, between which is a raised transverse granulated line. Orbit separated from front by a rectangular notch; upper margin with a single notch, prolonged inward by a fissure. Eyes large, reniform. Antero-lateral margin half as long as postero-lateral, quadridentate, including tooth at outer angle of orbit; first three teeth subequal, first obtuse, second and third acute, third narrower, fourth very small, spiniform, close to third. Postero-lateral margins slightly concave, converging at an acute angle.

Last joint of antennal peduncle reaches end of outer lobe of front; flagellum $1\frac{1}{3}$ times as long as width of orbit.

Chelipeds unequal in both sexes; arm, wrist and upper part of hand granulate, the large granules acute or spinuliform; four spines on inner edge of arm; two spines, one above the other, at inner angle of wrist; hand with a double row of blunt spines above,

ending at the dark colour on the distal extremity; fingers broad and thick, brown except for white tips; the brown colour covers $\frac{2}{5}$ of the length of propodus measured on lower margin; dactylus with three low prehensile teeth; pollex with one larger tooth near the tip; a small tuft of yellow hairs on inner and outer sides of each finger on the distal half.

Legs of moderate length, fringed with long hair mostly on the anterior margin; merus, carpus and propodus spined anteriorly, a subdistal spine on posterior border of merus of first two pairs; dactylus bearing a double row of spines posteriorly and a few spines anteriorly near the tip.

Third, fourth and fifth segments of male abdomen fused.

Dimensions in mm.:

	♂	♀
C. l.	9·1	10·7
C. b.	13·1	15·3
F. b.	5·1	6·0
Exorb. b.	10·2	11·8
R. Ch. l.	23·9	19·6
L. Ch. l.	22·8	21·5
W. L. 3	20·5	22·8

This species has the carapace broader and rougher, and the palms more elongate than in other species of the genus.

Catoptrus A. Milne Edwards.

A series of 47 specimens in the collection shows that there are two well-marked species, which occur together but are separable by a number of characters.

C. nitidus.	*C. inæqualis.*
Carapace very convex, sloping evenly in all directions.	Carapace moderately convex, transversely flattened for half its width.
Outer margin of front sloping gradually into posterior margin of orbit.	Outer margin of front nearly at right angles to posterior margin of orbit.
Antero-lateral region and sub-orbital region with some coarse granules mixed with the fine ones.	Antero-lateral region and sub-orbital region with granulation uniformly fine.
Lateral teeth very uneven: the 2nd, 3rd, 4th and 5th decrease in size in order named.	Lateral teeth: 2nd, 3rd and 4th nearly the same size.
Lower margin of orbits armed with three denticles or tubercles.	Lower margin of orbit unarmed.
Two spines on arm, one near each end.	One spine on arm, near distal end; it may be reduced to a small tooth, especially in larger specimens.
Distal half of fingers brown.	Distal half of fingers pink.
Terminal segment of abdomen of ♂ triangular, with straight sides.	Terminal segment of abdomen of ♂ with sides partly concave.
Appendages of ♂ abdomen with tips bidentate.	Appendages of ♂ abdomen with tips slender, acuminate.

185. *Catoptrus nitidus* A. Milne Edwards.

Catoptrus nitidus Alcock (6), p. 307 (part). Laurie, in Herdman, Ceylon Pearl Fisheries, pt. v, Suppl. Rept. XL, 1906, p. 422 (part).

Goniocaphyra truncatifrons de Man, Archiv für Naturg., liii. 1887, p. 339, pl. 14, fig. 1.

Amirante, 25—80 fms., Sta. E 11; 11 ♂, 4 ♀ (2 ovig.): 30 fms., Sta. E 21; 2 ♂. Coetivy, 1 ♂.

Largest specimen, ♂ (Sta. E 11), C. l. 6 mm., C. b. 8·7 mm. Smaller ♂, same station, C. l. 3·3 mm., C. b. 5 mm. A. Milne Edwards gives 15 × 23 mm.

In the specimens before me, *C. nitidus* is uniformly narrower than *C. inæqualis*.

186. *Catoptrus inæqualis* (Rathbun).

Catoptrus nitidus Alcock (6), p. 307 (part). Laurie, in Herdman, Ceylon Pearl Fisheries, pt. v, Suppl. Rept. XL, 1906, p. 422 (part).

Goniocaphyra inæqualis Rathbun, 1906, p. 870, text-fig. 29, pl. 12, fig. 9.

Saya de Malha, 55 fms., Sta. C 15; 1 ♂, 1 ♀. Providence, 29 fms., Sta. D 3; 1 ♀. Amirante, 22—85 fms., Sta. E 10; 1 ♀: 25—80 fms., Sta. E 11; 6 ♂, 12 ♀ (8 with Bopyrid parasites): 30 fms., Sta. E 21; 1 ♂, 1 ♀. Seychelles, 34 fms., Sta. F 8; 3 ♂.

Largest specimen, ♂ (Sta. E 11), C. l. 5·4 mm., C. b. 8·6 mm. Smaller ♂, same station, C. l. 3·6, C. b. 5·7 mm.

187. *Typhlocarcinops piroculata*, sp. nov. (Plate **20**, figs. 1, 2).

Amirante, 34 fms., Sta. E 9; 3 ♀ (1 adult type, 2 juv.).

Surface pubescent; carapace, chelipeds, and legs long-hairy on the margins; median regions faintly indicated. Anterior and antero-lateral margins of carapace regularly arched; postero-lateral margins parallel; posterior margin nearly transverse, sinuous. Upper surface smooth, sides with a raised, granulate rim. Anterior third of carapace strongly deflexed, front not twice as wide as orbit, sides parallel, lower margin obtuse-angled at the middle. Orbits transverse, completely filled by the pear-shaped eyes, with small corneæ.

Peduncle of antenna flattened; flagellum not exceeding it in length.

Chelipeds (of ♀) of moderate size, subequal; inner angle of wrist rounded; palm with length and breadth equal, outer surface covered with longitudinal rows of sharp granules and short hairs; fingers as long as middle of palm, deeply grooved, partly hairy, unevenly dentate and narrowly gaping, tips crossing. Second, third, and fourth legs subequal, rather broad; dactyli styliform.

All the segments of the ♀ abdomen are free; the first covers the sternum and is longest in its middle third; second and third segments a trifle wider than $\frac{1}{3}$ of the sternal width; seventh segment equilateral.

Dimensions of type female in mm. : C. l. 5·6, C. b. 7·2, Exorb. b. 4·4, F. b. 2, Ch. l. 8, W. L. 1. 8·7, W. L. 2. 11, W. L. 3. 11·1, W. L. 4. 11·9.

This species differs from *T. canaliculata* Rathbun* in the greater hairiness, angular front, more elongated orbits, rougher hands and wider legs.

Palicidæ.

188. *Palicus jukesii* (White) (Plate **19**, fig. 9).

Palicus jukesii Alcock (6), p. 451. Calman, Trans. Linn. Soc. London, Ser. 2, Zool. viii. (1900), p. 29, pl. 1, figs. 9—13.

Palicus jukesi Laurie, Rept. Pearl Oyster Fish., v. 1906, p. 430, pl. 1, fig. 12.

Saya de Malha, 55 fms., Sta. C 15 ; 2 ♀. Amirante, 25—80 fms., Sta. E 11 ; 1 ♀ ovigerous.

C. l. 13·7 mm., C. b. 14·6 mm.

In this specimen the sides of the carapace are nearly parallel, and the notches in the same very small, the last one scarcely visible. Outer supra-orbital notch subtriangular. Infero-orbital margin as represented in Calman's fig. 10 (*op. cit.*). An arcuate subhepatic ridge which is lost outwardly in a cluster of granules.

189. *Palicus whitei* (Miers) (Plate **19**, fig. 10).

Palicus whitei Alcock (6), p. 453. Calman, Trans. Linn. Soc. London, Ser. 2, Zool. viii. (1900), p. 31, pl. 2, figs. 14—19.

Seychelles, 34 fms., Sta. F 8 ; 1 ♀ ovigerous.

C. l. to tips of frontal teeth 14·9 mm., C. b. 15·5 mm.

The teeth of the carapace are somewhat different from the descriptions and figures of Miers and Calman. Median sinus of front V-shaped, but with the bottom of the sinus a little rounded. From the frontal teeth to the tip of the innermost orbital tooth the margin is distinctly sinuous ; inner orbital sinus a narrow slit ; next sinus narrow at the base, widening anteriorly ; beyond this there is a third sinus which is triangular. Infra-orbital sinus narrow but open. Lateral teeth defined by narrow, almost horizontal, sinuses ; as in the preceding species, there is a faint indication of a third tooth and sinus.

190. *Manella gardineri*, sp. nov. (Plate **20**, fig. 9).

Saya de Malha, 29 fms., Sta. C 19 ; 1 ♀ juv. Amirante, 25—80 fms., Sta. E 11 ; 1 ♀ juv. : 30 fms., Sta. E 21 ; 2 ♂ (1 juv., 1 is type). Seychelles, 37 fms., Sta. F 9 ; 1 ♂ juv.

Dimensions of ♂ type in mm. : C. l. 10·2, C. b. 12·2, right Ch. l. 14·5, W. L. 1. 11·2, W. L. 2. 14, W. L. 3. 14, W. L. 4. 8·8.

Carapace about $\frac{5}{6}$ as long as broad, subhexagonal, regions separated, surface covered with short dark hairs which do not obscure the tubercles or granules arranged regularly either singly or in groups, as follows : 3 on the mesogastric region, 3 on each protogastric region, 4 in a transverse row on the cardiac region, 3 transversely on the intestinal

* Proc. Biol. Soc. Wash., xxii. 1909, p. 112.

region; about 7 branchial, separable into 2 groups divided by a groove, 4 tubercles on the posterior area, and 2 or 3 on the anterior.

Margin of front (between the antennal flagella) a little more than $\frac{1}{4}$ as wide as the carapace, quadridentate, the median pair of teeth bilobate, the inner lobe the smaller; median sinus broadly triangular, rounded at the base, other sinuses acute at base.

Upper margin of orbit cut by 2 V-shaped sinuses separated by a truncate tooth, remainder of margin irregularly crenulate. Outer tooth of orbit falciform, followed by 2 acute teeth, the second of which is broad and bidentate and situated at the lateral angle of the carapace. Postero-lateral margins long, convergent, and armed with obtuse teeth or lobes which posteriorly become smaller and more elevated. Posterior margin slightly convex, crenulate, terminating at either end in a small lobe directed laterally.

The ♂ abdomen, as in the type species of the genus, *M. spinipes* (de Man)*, has 7 distinct segments, the first very wide and crossed transversely by a sharp and finely granulated crest, fringed above with appressed hairs; the lateral margin of the second to the seventh segments, inclusive, is sinuous; surface of abdomen and sternum coarsely punctate.

The right or larger cheliped of the male is about $1\frac{1}{2}$ times as long as carapace, and bears a heavy propodus; left cheliped somewhat shorter and much slenderer; both are pubescent, and have shaggy hair on the upper surface of the fingers; merus trigonal, dentate on inner margin, granulate above; carpus tuberculate above, a sharp crest on outer margin. Palm widening distally; upper surface granulate; outer edge bimarginate, denticulate; lower surface smooth, punctate; inner edge crenulate, crossed in larger chela by curved stridulating lines, which probably are scraped along the outer surface of the left palm and wrist. Fingers stout, equal in small chela; immovable about half as long as movable finger in large chela.

Meropodites of legs broad, margins coarsely serrated; two rows of spinules above; carpopodites serrated anteriorly, terminating posteriorly in a small spine; propodites and dactyli finely dentate, the former nearly covered with superimposed hairs.

Differs from *M. spinipes* in carapace wider, surface less hairy, projections less spinous, presence of a distinct stridulating mechanism.

Grapsidæ.

191. *Grapsus longitarsis* Dana.

Grapsus longitarsis Rathbun, 1907, p. 28.

Egmont, reef; 1 large ♂.

C. l. 36·6 mm., C. b. 41·8 mm. Carapace squarish and front broad, as in other, but always smaller, specimens previously examined; legs relatively shorter and stouter.

192. *Pachygrapsus plicatus* (Milne Edwards).

Pachygrapsus plicatus Rathbun, 1907, p. 29.

Peros, Coin; 1 ♂, 1 ♀. Coetivy; 1 ♂, 1 juv.

* *Conf.* Rathbun, 1906, p. 837, pl. 7, fig. 6, text-fig. 3.

193. *Pachygrapsus minutus* A. Milne Edwards.

Pachygrapsus minutus Alcock (6), p. 399.

Praslin, reef; 1 ♀ ovigerous. Coetivy; 1 ♀ ovigerous.

194. *Pachygrapsus longipes* Rathbun.

Pachygrapsus longipes Rathbun, 1907, p. 30.

Coetivy; 1 ♀ ovigerous.

195. *Plagusia depressa tuberculata* Lamarck.

Plagusia depressa tuberculata Rathbun, 1906, p. 841.

Egmont, reef; 1 ♂, 1 ♀.

196. *Percnon planissimum* (Herbst).

Percnon planissimum Rathbun, 1906, p. 842.

Praslin, reef; 1 ♂. Coetivy; 1 ♂, 2 ♀ juv.

197. *Percnon abbreviatum* (Dana).

Percnon abbreviatum Rathbun, 1906, p. 842.

Coetivy; 1 ♂, 1 ♀ ovigerous.

Hapalocarcinidæ.

198. *Hapalocarcinus marsupialis* Stimpson.

Hapalocarcinus marsupialis Rathbun, 1906, p. 892. Stimpson, Smithsonian Misc. Coll., xlix. No. 1717, 1907, p. 170, pl. 14, fig. 8.

Salomon; 2 ♀ (1 ovigerous).

Dimensions in mm.: Ovigerous ♀, C. l. 4·7, C. b. 5·5, Abd. b. 8·8. Adult ♀, C. l. 4, C. b. 3·7, Abd. b. 4.

Hymenosomidæ.

199. *Elamena gracilis* Borradaile.

Elamena gracilis Borradaile, in Gardiner, Fauna Maldive and Laccadive Arch., ii. pt. 2, 1903, p. 684, text-fig. 122.

Coetivy; 1 ♂, 1 ♀.

In these specimens the eyes do not project beyond the sides of the front; their dark corneæ are however visible in dorsal view through the thin carapace.

Inachidæ.

200. *Macropodia formosa*, sp. nov. (Fig. 1).

Cargados Carajos, 30 fms., Sta. B 17; 1 ♂ type.

A *Macropodia* with elongated body, short rostrum, extremely long slender legs, and with such scanty hairs that it appears nearly bare to the naked eye.

Cardiac tubercle largest; 3 gastric tubercles, of which the median is the largest; a strong branchial tubercle in line with the cardiac tubercle; hepatic region terminating in an acute tubercle; a minute tubercle on the antero-lateral margin of the branchial region.

Neck long; orbital arches unarmed; rostrum reaching to middle of second movable joint of antennæ, composed of two narrow, acute, flattened horns close together; median fissure extending back nearly to the distal end of the basal joint of the antennæ, and continued by a groove on the carapace to the posterior end of the orbits. In the single specimen the right horn is a little shorter than the left. Eye-stalks strongly enlarged at the corneal end where they are produced obliquely forward and upward in a tubercle. Pterygostomian region armed with a tubercle which shows in dorsal view behind the hepatic region. The buccal

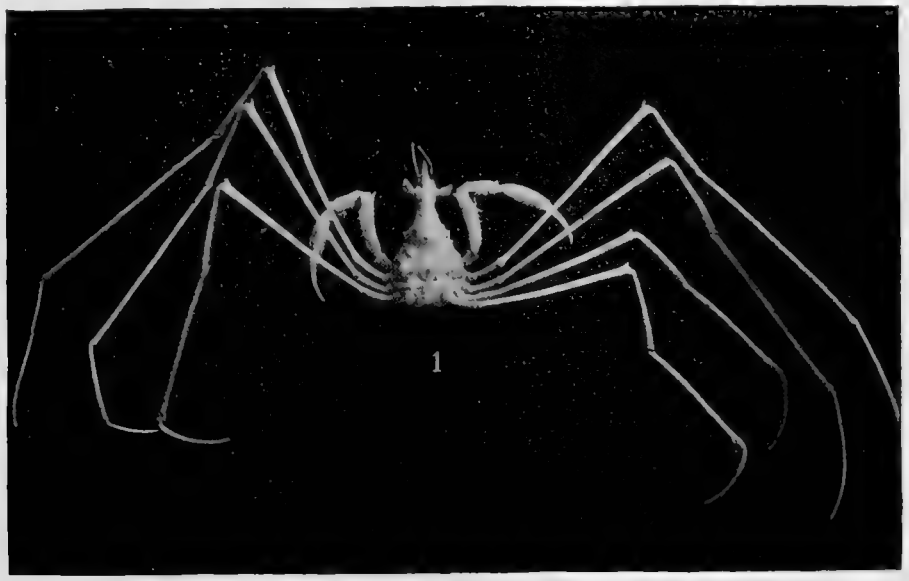


Fig. 1. *Macropodia formosa*, sp. nov.

cavity widens distally, and its anterior angles are so expanded that they too are visible in dorsal view, but in front of the hepatic region. The sternum bears a tubercle on either side just in front of the abdomen of the ♂.

Chelipeds of ♂ moderately stout, and with straight hairs on inner margins, and some curled hairs outside. Arm with a distal spine above, and a row of spinules on the inner and outer margins. Wrist and propodus with similar spinules arming both margins of the inner surface. Fingers about as long as palm, occludent margins denticulate, a slightly enlarged truncate tooth near base of dactylus, a very slight gape for basal third.

Legs extremely long, with a line of curled hairs on the anterior surface except on the dactyls, and a few straight hairs especially on the first two dactyls; merus with a short terminal spine on the anterior edge; first two dactyls nearly straight, last two a little more curved and finely spinulous on their proximal third. The third right leg is abnormally short.

Dimensions of ♂ in mm.:

C. l. 8·4.
C. b. 5·2.
R. l. (from front edge of orbit) 1·7.
Antenna, free portion, 4·5.
H. l. 3·5.

H. b. 1·6.

W. L. 1. 48 ; merop. l. 14 ; carp. l. 5·5 ; prop. l. 15 ; dact. l. 11·5.

W. L. 2. 45 ; merop. l. 13·6 ; carp. l. 6 ; prop. l. 13·4 ; dact. l. 9.

W. L. 3. 37·5 ; merop. l. 12 ; carp. l. 6·5 ; prop. l. 10·5 ; dact. l. 6.

W. L. 4. 32·3 ; merop. l. 10·5 ; carp. l. 6 ; prop. l. 8·6 ; dact. l. 5·3.

This species is distinguished from all others of the genus* by its slenderness, scarcity of hair, and flattened rostral spines.

201. *Lambrachæus ramifer* Alcock.

Lambrachæus ramifer Alcock (1), p. 168, pl. 3, fig. 1 ; Illus. Zool. Investigator, Crust., pt. IV, 1896, pl. 18, fig. 3.

Amirante, 30 fms., Sta. E 21 ; 1 ♂.

The rostrum is broken off near its base. The specimen is somewhat larger than the figured type, being 7·6 mm. wide, and 10·4 mm. long from the anterior of the supraorbital spinules to the posterior margin. The carapace appears considerably rougher, and the tubercles of the third abdominal somite more prominent.

202. *Achæus lorina* (Adams and White).

Achæus lorina de Man, Abh. Senck. naturf. Ges., xxv. 1902, p. 645.

Amirante, 22—85 fms., Sta. E 10 ; 1 ♀ : 35 fms., Sta. E 14 ; 1 ♀ ovigerous. Seychelles, 39 fms., Sta. F 3 ; 3 ♂, 1 ♀ : 34 fms., Sta. F 8 ; 1 ♂, 1 ♀ ovigerous.

These specimens agree with de Man's description above cited.

203. *Achæus brevifalcatus*, sp. nov.

Achæus affinis Rathbun, 1906, p. 877 ; not *A. affinis* Miers, Alcock.

Seychelles, 39 fms., Sta. F 4 ; 1 ♀ : 44 fms., Sta. F 5 ; 1 ♂.

♂.—The body is much like that of *A. lorina*, but more elongate. The rostral horns

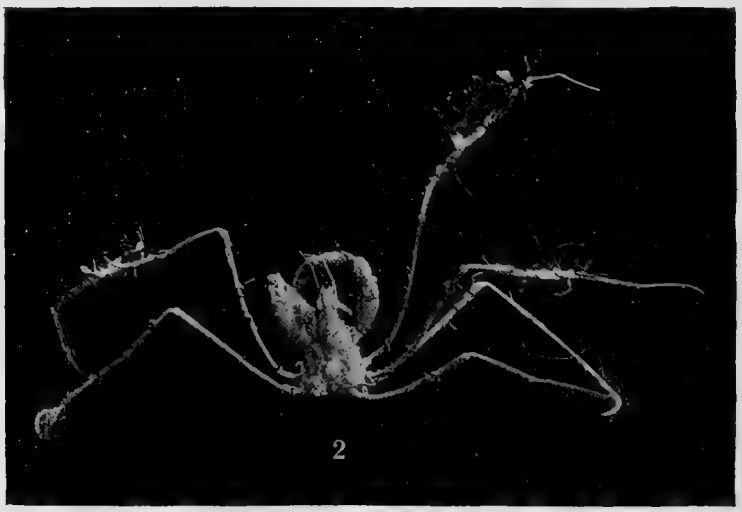


Fig. 2. *Achæus brevifalcatus*, sp. nov.

end in small slender spines ; the angle separating them is less than a right angle, is rounded at the base, and is continued posteriorly by a deep furrow. Upper margin of

* Type, *M. rostrata* (Linnæus) = *Stenorhynchus rostratus* of authors.

orbit without spine. Median gastric elevation conical and blunt; lateral elevations low and small. The conical hepatic projection terminates in an outward-pointing cylindrical spine and bears a spinule on its anterior border. The margin between the orbits and the hepatic region shows several minute spinules. The cardiac region has 2 large tubercles side by side and a very small one on the posterior slope. There is a large low tubercle on the branchial region just in front of the base of the last leg; also a small sharp spine pointing downward and a little forward, just below the antero-lateral margin of the branchial region. A small pterygostomian spine shows slightly in dorsal view in the sinus between hepatic and branchial regions.

The long slender eye-stalks have a small tubercle on middle of anterior margin and an outward-pointing spinule above near end of eye. Basal joint of antenna spinulous; the next segment reaches a little beyond tips of rostrum; the third is as long as the first; movable portion of antenna half as long as carapace, and fringed on each side with long hair. A spinule on lower surface near angle of buccal cavity.

The last or coalesced segment of the abdomen bears a spinule at its middle.

Chelipeds stout in the full-grown males, fringed with long hair on their inner edge; arm with margins spinulous. Wrist with a row of curled hairs and spinules along the supero-external border, the proximal spinules largest. Hand with a few very small spinules above and some curled hairs on the outer surface. Immovable finger arched downward so that the fingers gape strongly in their basal half, the small truncate tooth at the base of the dactyl fits against, and distal to, an acute tooth on the end of the palm, pointing obliquely upward. Fingers fringed with long hair in the gape; the distal portions where the fingers meet are finely crenulate, and the immovable finger bears a tooth at the distal end of the gape. Dactyli of first two legs long and slightly curved; of last two legs short and very strongly curved. The first 3 of the long segments are furnished with curled hairs, while the propodi and dactyli have some long straight hairs, most numerous about the distal articulation of the propodi of the last two pairs.

Dimensions of ♂ in mm.:

C. l. 6·6.
C. b. 4·5.
R. l. (from front edge of orbit) 1.
Antenna, free portion, 3·3.
H. l. 3·7.
H. b. 1·7.
W. L. 1. 32·5; merop. l. 10·3; carp. l. 4; prop. l. 10; dact. l. 6.
W. L. 2. 32; merop. l. 10; carp. l. 4·5; prop. l. 9·4; dact. l. 5·8.
W. L. 3. 25; merop. l. 9·5; carp. l. 5; prop. l. 6·5; dact. l. 2·1.
W. L. 4. 19·5; merop. l. 7·6; carp. l. 4·8.; prop. l. 4·6; dact. l. 1·8.

In the ♀, the chelipeds are slender and the fingers meet throughout their length.

Having been able, through the courtesy of Dr. Calman, to examine a cotype of *Achæus affinis* Miers (♂ from Thursday Island) in the British Museum, I find that the present species is quite distinct; the carapace more slender, the horns sharper, the chelipeds stouter with gaping fingers and the legs longer.

Differs from *A. lorina* in lacking a spine above the orbit, in the shorter falcate dactyli of the last 2 pairs, and the partially gaping fingers. In *A. lorina*, the falcate dactyli are half as long as their propodi, and the fingers meet throughout.

204. *Achæus inimicus*, sp. nov. (Plate **20**, fig. 3).

Mauritius, 100—200 fms., Sta. A 1 ; 1 ♀ type.

An *Achæus* without a "neck," armed with slender spines including a supraorbital spine, and with the last two dactyli falcate.

Body short, high, triangular, pubescent, widening directly behind the orbits, 3 gastric spines, the posterior one long, erect, the two lateral much smaller, directed obliquely forward ; 2 cardiac spines, side by side, suberect, a little divergent, shorter than the median gastric spine ; 2 dorsal branchial spines, one long, above the base of the first leg and pointing strongly outward and a little upward ; the other small, in front of the base of the last leg and directed outward, also a spinule near inner angle of region ; supraorbital spine directed a little outward and forward ; below the lateral margins of the carapace are 5 spines partly visible in dorsal view ; 2 are hepatic, the posterior one with a bifid tip ; 2 are branchial, while the middle spine is on the pterygostomian region. Rostral teeth ending in short, blunt spines, interspace rounded, median furrow extending back to posterior margin of orbit. A few spinules on anterior surface of eye-stalk, a tubercle above at extremity.

The basal joint of the antenna is spinulous, with the two distal spines larger. The surface of maxillipeds and abdomen is roughened with spinules. Chelipeds rather slender, furnished with straight hairs and spinules along the margins of their inner surface, 2 long spines on inner edge of wrist ; fingers as long as palm, edges crenulate, meeting. Legs of moderate length (first one missing) ; dactyli long in relation to propodi.

Dimensions of ♀ in mm. :

C. l. 5·4.

C. b. (exclusive of spines) 3·4.

R. l. (from front edge of orbit) ·5.

Antenna, free portion, 2.

H. l. 1·4.

H. b. ·8.

W. L. 2. 14 ; merop. l. 4 ; carp. l. 2·3 ; prop. l. 3·8 ; dact. l. 2·7.

W. L. 3. 12 ; merop. l. 3·2 ; carp. l. 2·4 ; prop. l. 3 ; dact. l. 2·1.

W. L. 4. 10 ; merop. l. 3 ; carp. l. 2·2 ; prop. l. 2·7 ; dact. l. 1·7.

This species is quite unlike any hitherto described ; its spines distinguish it readily from all but *A. spinosus* Miers, which has an elongated "neck," and no spines on the wrist.

205. *Achæus cadelli* Alcock.

Achæus cadelli Alcock (1), p. 171, pl. 5, fig. 1.

Amirante, 28 fms., Sta. E 6 ; 1 ♂, with the anterior part of the body, including the orbits, absent. Carapace, 2·7 mm. wide.

The species is remarkable for the great slenderness of its legs and the similarity of the four pairs of dactyli. The immovable finger of the chela has a large tooth at its proximal third, while the movable finger has two or three teeth not so large, situated near the palm.

206. *Achæopsis thomsoni* (Norman), var.

Lispognathus thomsoni Doflein, Brachyura "Valdivia," 1904, p. 75, and synonymy.

Saya de Malha, 300—500 fms., Sta. C 20; 1 ♂, adult.

This specimen has parallel horns about $\frac{1}{4}$ as long as remainder of carapace. It differs from typical specimens in having the anterior gastric and anterior branchial spines obsolete or reduced to low tubercles.

The species is very close to *A. spinulosus* Stimpson*, which has shorter legs, described as "minutely spinulous above," but there is no indication, in description or figure, of the terminal spine on the merus joints. *A. spinulosus* is an inhabitant of shallower water (10 fathoms in Simons Bay, Cape of Good Hope).

207. *Oncinopus aranea* de Haan.

Oncinopus aranea Alcock (1), p. 183.

Cargados Carajos, 30 fms., Sta. B 14; 1 ♀: 30 fms., Sta. B 23; 1 ♂. Providence, 50—78 fms., Sta. D 4; 1 ♀. Amirante, 34 fms., Sta. E 9; 2 ♂: 25—80 fms., Sta. E 11; 4 ♂, 6 ♀ (2 ovig.): 20—25 fms., Sta. E 13; 1 ♂, 1 ♀: 30 fms., Sta. E 21; 1 ♀. Seychelles, 39 fms., Sta. F 3; 1 ♂, 2 ♀ (1 ovig.): 39 fms., Sta. F 4; 1 ♀: 34 fms., Sta. F 8; 4 ♂, 3 ♀ (1 ovig.): 37 fms., Sta. F 9; 1 ♀, measuring 9·3 mm. long in the carapace.

The unbroken antennæ in one case measure $\frac{1}{2}$ length of carapace; the slender flagellum is often broken off near the peduncle.

208. *Æpinus indicus* (Alcock).

Apocremnus indicus Alcock (1), p. 188, pl. 4, figs. 2, 2 *a*.

Amirante, 22—85 fms., Sta. E 10; 1 ♀, mature, with the abdomen filled with a Rhizocephalid parasite. Seychelles, 39 fms., Sta. F 3; 1 ♀, immature.

In both these specimens the postocular spine is present; there is no cardiac spine, but a tubercle in its place; a low blunt gastric spinule or tubercle; the 7 segments of the abdomen (♀) are distinct.

PSEUDOCOLLODES, gen. nov.

Carapace subtriangular. Rostrum short, bifid. An interantennular spine, visible from above. Eyes retractile against a strong postocular tooth. Basal antennal joint very narrow, spinous, less advanced than rostrum. Maxillipeds fitting loosely in buccal cavity. Merognath elongate-oval, narrower than ischiognath, the latter strongly advanced at its inner angle. Chelipeds of moderate size. First pair of legs extremely long; remaining legs diminishing rapidly in length; dactyli elongate. In both sexes the last 2 segments of abdomen are fused.

Type, *Pseudocollodes complectens*, sp. nov.

This genus differs from *Collodes* Stimpson† in its interantennular spine, form of merognath, greater length of first leg, in the 6 instead of 5 abdominal segments of the ♀; from *Euprognatha* Stimpson‡ in the lesser prominence of the basal antennal segment and the form of the maxilliped.

* Smithson. Misc. Coll., xlix. 1907, p. 21, pl. 3, figs. 5, 5 *a*.

† Ann. Lyc. Nat. Hist. N. Y., vii. 1860, p. 193. ‡ Bull. Mus. Comp. Zool., ii. 1871, p. 122.

209. *Pseudocollodes complectens*, sp. nov. (Plate **20**, fig. 4).

Seychelles, 34 fms., Sta. F 7; 4 ♂, 3 ♀ ovig. (1 ♂ is type).

The body and appendages are covered with a short pubescence which is inconspicuous and in no way obscures the markings. Length of carapace little greater than width; posterior margin very broad, concave. Dorsal surface with 4 cylindrical spines, 1 gastric, 1 cardiac, 1 on each branchial region; 4 tubercles in a transverse row on gastric region, and one on each branchial region above origin of last leg. The carapace is also roughened with very fine spinules on the higher parts and near the lateral margins. The 2 frontal teeth are acute and curve inward. Interantennular spine less advanced than front. Three longitudinal furrows on front. Basal antennal joint with 2 rows of spinules, the distal inner spine a little longer; distal end visible from above, but less advanced than base of frontal sinus. Antenna longer than width of front. A small emargination separates the orbital arch from the postocular tooth, the end of which curves strongly forward. Hepatic region with 2 lateral prominences, the anterior one angular and well advanced. Eyes with corneæ enlarged, a tubercle at the summit. Orbit partially defined below by a short spinulous crest. Abdomen with a median carina in both sexes, abdomen of ♀ smooth, of ♂ spinulous as is also the sternum.

Chelipeds about $1\frac{1}{2}$ times as long as carapace, spinulous and on the margins more or less spinous. Fingers and palm subequal in length, palm inflated in ♂, fingers compressed and curved, minutely gaping in ♂. First leg $3\frac{1}{2}$ times as long as carapace; last 3 legs noticeably slenderer than the first; second reaching to end of propodus of first; third nearly to end of propodus of second; fourth to middle of carpus of second. No one specimen is provided with all its legs.

Dimensions:

	♂	♀	♂		♂	♀	♂
C. l.	9·0	11·8	7·1	Dact. 2	5·2*	6·3	4·4
C. b.	8·4	11·1	6·4	W. L. 3			16·0
W. L. 1	36·0	39·5	29·0	Merop. 3			6·2
Merop. 1	11·0	11·7	8·0	Carp. 3			2·0
Carp. 1	4·8	5·0	3·5	Prop. 3			4·1
Prop. 1	9·6	10·5	8·0	Dact. 3			3·0
Dact. 1	9·0	10·3	7·2	W. L. 4	15·5	18·0	
W. L. 2	28·0*	30·3	21·0	Merop. 4	5·5	5·5	
Merop. 2	10·6	10·4	7·5	Carp. 4	2·2	2·3	
Carp. 2	3·2	3·7	2·5	Prop. 4	3·7	4·5	
Prop. 2	6·7	7·0	5·2	Dact. 4	3·0	4·2	

210. *Xenocarcinus tuberculatus* White.

Xenocarcinus tuberculatus Alcock (1), p. 192.

(*a*) Cargados Carajos, 30 fms., Sta. B 17; 1 ♀ without legs. (*b*) Diego Garcia 14 fms.; 1 ♀ ovigerous.

Dimensions in mm.: (*a*) C. l. 9·3, rostrum (to anterior edge of orbit) 2·7. (*b*) C. l. 9·7, rostrum (to anterior edge of orbit) 3·5.

* Tip broken off.

The carapace of these specimens is very smooth, there being only an enlargement on the outer margin of the branchial region, while the gastric and cardiac regions are separately tumid. Rostrum strongly tapering (most slender in *b*), but spreading again at the horns. A minute spinule in advance of the eye and two spinules on the basal antennal joint, one at the angle, the other behind it; 3 or 4 spinules on pterygostomian region. The projections on upper border of arm and merus joints of legs are spinules except for 1 or 2 nodules on the last pair.

211. *Sphenocarcinus cuneus* (Wood-Mason).

Sphenocarcinus cuneus Alcock (1), p. 193; Illus. Zool. Investigator, Crust., pt. IV, 1896, pl. 21, figs. 1, 1 *a*.

Providence, 70 fms., Sta. D 7; 1 ♀ ovigerous.

Dimensions in mm.: C. l. 27·2; rostrum (from anterior margin of orbit) 13·2.

Cardiac islet transverse, more than twice as wide as long; inner margin of branchial islet deeply concave at middle third; these islets have very much the shape of those in *Oxypleurodon stimpsoni* Miers*. The carinæ on the legs ascribed to the species are, in this specimen, evident on the carpal segments as blunt ridges, on the meral and propodal segments they are very obscure; this may be due to the greater size of the specimen.

212. *Huenia proteus* (de Haan).

Huenia proteus Alcock (1), p. 195.

Amirante, 25—80 fms., Sta. E 11; 2 ♀ (each with a Rhizocephalid parasite filling the abdomen): 20—25 fms., Sta. E 13; 3 ♂ (one small, with relatively large Rhizocephalid parasite). Seychelles, 34 fms., Sta. F 8; 2 ♂, 1 ♀ (the latter with Rhizocephalid parasite filling the abdomen).

The males resemble most fig. 4, on pl. 4 of Adams and White's "Crust. Samarang," while the females are of the form of fig. 6 of the same plate.

213. *Simocarcinus simplex* (Dana).

Simocarcinus simplex Alcock (1), p. 196.

Coetivy; 1 ♂. C. l. 10 mm., rostrum (from anterior border of orbit) 3·7 mm.

Three tubercles on gastric region; a lobe at either end of posterior margin of carapace. Rostrum straight and horizontal. Chelipeds feeble.

214. *Menœthius monoceros* (Latreille).

Menœthius monoceros Alcock (1), p. 197.

Diego Garcia, 14 fms.; 1 ♂. Cargados Carajos, reef; 1 ♀ immature. Saya de Malha, 29 fms., Sta. C 19; 1 ♀ with Rhizocephalid. Peros, Coin; 1 ♀. Salomon; 1 ♀ immature. Egmont, lagoon, 6—7 fms.; 1 ♂. Amirante, 25—80 fms., Sta. E 11; 4 ♂, 3 ♀. Seychelles, 31 fms., Sta. F 2; 1 ♂, 1 ♀ with eggs: 34 fms., Sta. F 8; 1 ♂, 1 ♀ with eggs. Praslin, reef; 3 ♀.

* *Challenger* Brachyura, 1886, p. 38, pl. 6, figs. 1—1 *c*.

Of the 8 males 5 are like Dana's pl. 4, fig. 7 *a*; 2 from Amirante and one from station F 2 are like pl. 5, fig. 3. Ten of the 12 females are like pl. 4, fig. 7 *c*; one female from Amirante and one from Saya de Malha have a large anterior lateral branchial lobe and a short rostrum.

215. *Scyramathia pulchra* (Miers).

Scyramathia pulchra Alcock (1), p. 202.

Scyramathia livermorei Alcock, Illus. Zool. Investigator, Crust., pt. III, pl. 14, fig. 3.

Saya de Malha, 125 fms., Sta. C 5; 2 ♀ ovigerous. Seychelles, 34 fms., Sta. F 7; 1 ♂.

Dimensions in mm.: (*a*) ♀, C. l. on median line 18·3, l. entire 27·6, b. entire 19·7, b. without spines 13, b. between tips of horns 8, l. of horns 9·9. (*b*) ♀, C. l. on median line 18·2, l. entire 25·8, b. entire 19·2, b. without spines 13, b. between tips of horns 5, l. of horns 7·7 (tips broken off). (*c*) ♂, C. l. on median line 12·6, l. entire 18·2, b. entire 14, b. without spines 8·1, b. between tips of horns 6, l. of horns 6·8. The horns of *b* are much less divergent than those of *a*.

216. *Halimus inermis*, sp. nov. (Plate **20**, fig. 6).

Cargados Carajos, 30 fms., Sta. B 8; 1 ♂, with slender chelipeds: 30 fms., Sta. B 14; 1 ♂, with slender chelipeds: 30 fms., Sta. B 15; 1 ♂, 1 ♀ immature; the ♂ has slender chelipeds, its left branchial region has a large spherical excrescence caused by a Bopyrid parasite: 30 fms., Sta. B 17; 1 ♀ immature, with the horns absent; the bases of the horns are smoothly rounded and polished. Saya de Malha, 47 fms., Sta. C 12; 1 ♂, with slender chelipeds. Amirante, 28 fms., Sta. E 6; 4 ♂, 4 ♀, 1 juv.; 2 ♂ have strong chelipeds, one is the type; 2 ♀ are ovigerous: 32 fms., Sta. E 12; 1 ♂, with chelipeds of intermediate size and gape. Seychelles, 39 fms., Sta. F 3; 3 ♂, 3 ♀, 11 juv.: 2 of the males have slender chelipeds, the other is soft-shelled and has stout chelipeds; one of the females bears eggs, the other two have shed their eggs: 39 fms., Sta. F 4; 1 ♀ ovigerous: 44 fms., Sta. F 5; 3 ♂, one with strong chelipeds: 44 fms., Sta. F 6; 1 ♂, with weak chelipeds, 1 ♀: 34 fms., Sta. F 7; 1 ♀ immature: 34 fms., Sta. F 8; 1 ♀ with eggs, 1 ♀ immature, 1 juv.: Praslin, reef; 1 ♀ ovigerous.

Adult male.—Body and legs tomentose. Carapace subpyriform, rather high; regions well defined, excepting the hepatic from the gastric region. Denuded carapace pitted, pits separated. Dorsal surface without spines or tubercles. Two tubercles on pterygostomian region in line with projecting angle of buccal cavity, and not visible from above. Rostral horns horizontal, divergent, $\frac{1}{4}$ as long as carapace on median line; space between tips nearly as long as each horn. Supra-ocular eave produced anteriorly in a strong tooth, posterior angle lobiform. Anterior margin of postocular tooth sinuous. Antennæ slightly exceeding rostral spines; the outer anterior angle of the basal segment is produced anteriorly in a stout tooth visible in dorsal view; outer border partly convex; a tubercle just outside the green gland.

Chelipeds rather stout; palm $1\frac{1}{2}$ times as long as wide; 2 tubercles on wrist, one on outer surface, one on inner edge; two tubercles on hand on proximal portion of outer surface, one just below upper margin, the other just above lower margin. Fingers widely

gaping in the basal half, the immovable finger bowed downward; a tooth near the base of the dactyl; both fingers minutely denticulated. Dactyli of legs entire.

In the ♀ the horns are proportionally shorter, and in the ♀ and undeveloped ♂ the chelipeds slenderer, the fingers nearly meeting at base.

Dimensions in mm.:

♂, Sta. E 6, C. l. med. 15·5, C. l. entire 19·3, C. b. 10·4, Horns l. 4·2, Ch. l. 17·8, W. L. 1. l. 28.

♀, Sta. E 6, C. l. med. 13·8, C. l. entire 16, C. b. 9·2, Horns, l. 2·4, Ch. l. 12·2, W. L. 1. l. 18·6.

The species has great resemblance to *H. irami* Laurie*, which is also unarmed, but has a tooth on the orbital border between the preocular and postocular lobes, and horns half as long as the rest of the carapace.

The "small and young female dredged [by the *Challenger*] at the Philippines in 18 fathoms, lat. 11° 37′ 0″ N., long. 123° 31′ 0″ E. (Station 208)" and referred by Miers† to *Hyastenus diacanthus,* is probably *Halimus inermis.* The orbits, antennæ and pterygostomian region are similar to those of *H. diacanthus,* but the latter has subparallel horns, and tubercles and spines on the carapace; moreover it is a large species while *H. inermis* is a small one.

217. *Halimus elongatus* Ortmann.

Hyastenus diacanthus Miers, Proc. Zool. Soc. London, 1879, p. 26 (part; immature ♀, near Cape Sima, 18 fathoms).

Hyastenus diacanthus var. *elongata* Ortmann, Zool. Jahrb. Syst., vii. 1893, p. 55.

Amirante, 29 fms., Sta. E 1; 1 ♂ (*a*): 34 fms., Sta. E 9; 1 ♂ (*b*), 1 ♀ juv.

The largest male (*a*) is only 9·3 mm. long, 6 mm. wide, has one horn completely broken off and the other broken not far from the base. The carapace is more oblong than in *H. diacanthus,* and is without spines or tubercles except a vestige of one on the summit of the gastric region; setæ awl-shaped. Orbital and antennal region similar to that of *H. diacanthus.* The chelipeds have the appearance of belonging to an adult; palm twice as long as wide, a tubercle at the middle of the upper margin; fingers gaping for half their length, dentate, the proximal tooth of the dactyl being slightly larger. Dactyli of legs armed with spines visible to the naked eye and increasing in size toward the tip of the dactyl.

(*b*) is 9·1 mm. long, 5·6 wide, horns 4·2 mm.

218. *Halimus borradailei* Rathbun (Plate **20**, fig. 5).

Halimus borradailei Rathbun, Mem. Mus. Comp. Zool., xxxv. 1907, p. 64.

Cargados Carajos, 28 fms., Sta. B 20; 3 ♂. Amirante, 20—25 fms., Sta. E 13; 1 ♀ ovigerous.

The female is larger than that taken at Funafuti, but considerably smaller than Borradaile's figured specimen from Rotuma.

* In Herdman, Ceylon Pearl Fisheries, pt. v, Suppl. Rept. xl, Brachyura, 1906, p. 379, pl. 1, figs. 4, 4 *a*.

† *Challenger* Brachyura, 1886, p. 57.

Female.—Tomentose, with a few longer hairs. A tubercle on the branchial margin at the widest part of the carapace; two granules on the anterior part of the branchial region, 1 on the hepatic margin, five on the gastric region. Horns slender, strongly divergent, inclined downward, slightly curved, nearly as long as carapace (in middle line). Supra-ocular eave with a distinct but small anterior spine, outer margin oblique, almost straight. Anterior edge of postocular cup straight. Antennal spine scarcely visible in dorsal view. Antenna reaching about $\frac{5}{6}$ of length of rostrum. A spine at distal end of arm and of merus joints of legs; dactyli of legs spinulous.

Dimensions in mm.: ♀, C. l. med. 8, C. b. 5·2, R. l. 6. ♂, C. l. med. 4·8, C. b. 3·2, R. l. 4·2.

219. *Halimus uncifer* (Calman) (Plate **20**, fig. 7).

Hyastenus uncifer Calman, Proc. Zool. Soc. London, 1909, p. 712, pl. 72, figs. 8, 9.

Diego Garcia, 12 fms.; 1 ♂.

Thinly tomentose. Carapace subpyriform, regions well defined, areolated. A stout curved intestinal spine, a smaller curved spine on the branchial margin and a small straight spine on the hepatic margin. On the gastric region two median tubercles and in a curved line with the anterior one 4 other tubercles; on the branchial region two tubercles arranged longitudinally, the posterior one in transverse line with the marginal spine, the anterior one has a granule in front of it.

Rostral horns very slender, about $1\frac{1}{4}$ times as long as carapace, well separated at base, slightly curved, nearly horizontal, their middle third beset with curled hairs. Interorbital space with 3 deep grooves. Supraocular eave oblique, anterior angle spiniform, posterior angle tuberculiform and widely separated from the shallow postocular cup. Basal joint of antenna with an antero-external spine, outer margin sinuous; flagellum not reaching middle of horn. Pterygostomian region trispinose, middle spine smallest.

The chelipeds reach beyond middle of rostrum, are moderately stout; arm and wrist each with a distal spine, three spines on outer surface of wrist; palm increasing distally, $2\frac{3}{4}$ times as long as wide; fingers gaping in basal half, where there is a large tooth on the dactyl, and the immovable finger is arched. The merus joints of the legs bear a stout tooth at their extremity; and the dactyli are armed with unusually long and very conspicuous spines, which are directed proximally.

Horns marked with 3 or 4 broad bands of colour.

Dimensions in mm.: C. l. med. 9·8, C. b. incl. spines 6·5, R. l. 12.

This species in its few protuberances and length of horns resembles *H. brockii* de Man*, but the carapace is less ovate, the postocular lobe more transverse, while the rake-like dactyli of the legs are unique.

220. *Halimus tenuicornis* (Pocock).

Hyastenus tenuicornis Alcock (1), p. 215.

Cargados Carajos, 30 fms., Sta. B 3; 1 ♀ ovig.: 20—25 fms., Sta. B 17; 1 ♂. Salomon; 1 ♂ juv. Egmont, reef; 1 ♂ juv. Amirante, 29 fms., Sta. E 2; 2 ♂, 1 ♀ ovig.:

* Arch. f. Naturg., liii. 1887, p. 221, pl. 7, fig. 1.

28 fms., Sta. E 6; 1 ♀ ovig.: 34 fms., Sta. E 9; 2 ♂, 4 ♀ (3 ovig.): 22—85 fms., Sta. E 10; 1 ♀ ovig.: 25—80 fms., Sta. E 11; 5 ♂, 11 ♀ (4 immature, 4 ovigerous, 3 with Rhizocephalid in abdomen): 32 fms., Sta. E 12; 3 ♂ (1 juv.), 3 ♀ (2 ovig., one with Rhizocephalid): 20—25 fms., Sta. E 13; 1 ♂, 1 ♀ immature: 35 fms., Sta. E 14; 2 ♂, 2 ♀ (1 ovig.): 35 fms., Sta. E 15; 4 ♀ (2 ovig., 2 with Rhizocephalid): 39 fms., Sta. E 16; 2 ♂, 1 ♀ (with Rhizocephalid): 20—44 fms., Sta. E 25; 2 ♀ ovig. Seychelles, 39 fms., Sta. F 3; 1 ♂ soft shell: 34 fms., Sta. F 8; 5 ♂, 5 ♀ (3 ovig.).

In this series the horns vary in the male from the same length as the carapace to $\frac{3}{4}$ of the carapace; and in the female from $\frac{4}{5}$ to $\frac{3}{5}$ of the length of the carapace. In the very young, the postocular lobe appears like a bifid spine, being much more slender in top view and not so flattened on the side.

Many of the specimens are disguised by a growth of sponges, tunicates, hydroids or alcyonarians.

221. *Naxioides mammillata* (Ortmann).

Naxia mammillata Ortmann, Zool. Jahrb. Syst., vii. 1893, p. 56, pl. 3, fig. 7.

Salomon Bank, 60—120 fms.; 1 ♂ juv. C. l. median, 14·7 mm., C. b. 9 mm. (exclusive of spines).

The left horn is broken off at its middle, the right one near the tip. The rostral tooth is situated on the upper surface near the inner margin, and is directed upward, forward and a little inward, but not so as to project beyond the margin.

222. *Naxioides hirta* A. Milne Edwards.

Naxia hirta Alcock (1), p. 218.

Seychelles, 34 fms., Sta. F 8; 2 ♂. C. l. median 20·3 mm., C. l. total 27·2 mm., C. b. (without spines) 13·7 mm., W. L. 1. 52 mm.

223. *Naxioides spinigera* Borradaile (Plate **20**, fig. 8).

Naxioides spinigera Borradaile, in Gardiner, Fauna Maldive and Laccadive Arch., ii. pt. 2, 1903, p. 687, pl. 47, fig. 3.

Amirante, 35 fms., Sta. E 14; 2 ♂: 39 fms., Sta. E 16; 1 ♂, 3 ♀ ovigerous. Seychelles, 39 fms., Sta. F 3; 4 ♂ juv., 7 ♀ (2 ovigerous, 5 juv.): 39 fms., Sta. F 4; 1 ♂: 34 fms., Sta. F 8; 6 ♂ (2 juv.), 3 ♀ (1 ovig., 1 juv.): 37 fms., Sta. F 9; 1 ♂.

Dimensions in mm.:

	♂ (F 8)	♀ (E 16)
C. l. median	17·8	16·2
C. l. entire	25·3	21·6
C. b. (without spines)	12·0	10·9
W. L. 1	52·0	

224. *Hoplophrys oatesii* Henderson.

Hoplophrys oatesii Alcock (1), p. 233.

Providence, 50 fms., Sta. D 11; 1 ♂. Amirante, 39 fms., Sta. E 16; 1 ♂.

The largest specimen (Sta. D 11) is 8 mm. long. Neither shows any bifurcation of the lateral branchial spine.

225. *Tylocarcinus styx* (Herbst).

Tylocarcinus styx Alcock (1), p. 235.

Salomon; 2 ♂, 5 ♀ (1 adult): Egmont, reef; 1 ♀ ovigerous. Praslin, reef; 1 ♀ ovigerous. Coetivy; 7 ♂, 7 ♀ (1 juv.).

226. *Chlorinoides longispinus* (de Haan).

Paramithrax (Chlorinoides) longispinus Alcock (1), p. 242.

Providence, 29 fms., Sta. D 3; 1 ♂.

C. l. from posterior margin to end of horn 12 mm., C. b. without spines 6·7 mm. The knobs on the spines are very slight.

227. *Schizophrys aspera* (Milne Edwards).

Schizophrys aspera Alcock (1), p. 243.

Salomon; 1 ♀ ovigerous. Amirante, 29 fms., Sta. E 2; 1 ♂: 34 fms., Sta. E 9; 1 ♂ juv.: 25—30 fms., Sta. E 11; 2 ♂, 1 ♀ ovig., 4 juv.: 20—25 fms., Sta. E 13; 1 ♂, 3 juv.: 30 fms., Sta. E 21; 1 ♂, 1 ♀ ovig. Seychelles, 37 fms., Sta. F 9; 1 juv.

228. *Cyclax suborbicularis* (Stimpson).

Cyclax (Cyclomaia) suborbicularis Alcock (1), p. 245.

Mithrax suborbicularis Stimpson, Smithson. Misc. Coll., xliv. 1907, p. 18, pl. 4, fig. 1.

Peros, Coin; 1 ♀ ovig. Salomon; 1 ♂. Egmont, reef; 1 ♀ ovig. Praslin, reef; 2 ♂, 1 ♀ ovig. Coetivy; 5 ♂ (2 juv. and soft shell), 2 ♀ ovig.

229. *Ophthalmias cervicornis* (Herbst).

Stenocionops cervicornis Alcock (1), p. 248.

Amirante, 29 fms., Sta. E 2; 1 ♂. Seychelles, 34 fms., Sta. F 8; 1 ♀ juv.

Carapace behind the orbits suboval, very uneven, tuberculate, tufts of hairs on many of the tubercles and on the horns; a sharp supero-posterior margin forms a prominent overhanging intestinal lobe. Rostral horns slender, $\frac{2}{5}$ as long as rest of carapace, subparallel, bowed slightly outwards, tips recurved upward. A long slender supra-ocular spine is broken off in our specimens. Basal antennal joint armed with two blunt spines, one at anterior angle, the other on outer margin and directed downward and backward. A strong spine just outside the green gland, another on the pterygostome; subhepatic region tuberculous. Extremities of epistome dilated, overhanging the buccal cavity which is strongly widened anteriorly; exognath longitudinally grooved; first four segments of endognath deeply hollowed; condyle at distal end of ischium a smooth oval lobe, inner margin of ischium denticulate; merus strongly produced at the outer angle, inner margin deeply incised; palpus lamellate.

Chelipeds of male as long as carapace and half the rostrum, moderately stout and tuberculate; fingers $\frac{3}{4}$ as long as palm, which is twice as long as wide. First leg $1\frac{2}{5}$ times

as long as carapace with rostrum; legs decreasing rapidly in length, furnished with tufts of curled hair.

Dimensions of ♂ in mm.: C. l. median 25, C. l. including horns 34·7, C. b. 16·8, Ch. l. 29·2, W. L. 1. 48, W. L. 2. 35·3, W. L. 3. 30·4, W. L. 4. 23·3.

230. *Micippa margaritifera* Henderson.

Micippa margaritifera Alcock (1), p. 253; Illus. Invest., Crust., 1898, pl. 35, figs. 3, 3 *a*.

Cargados Carajos, 20—25 fms., Sta. B 17; 1 ♂. Providence, 39 fms., Sta. D 1; 1 ♀ ovig. Amirante, 28 fms., Sta. E 6; 1 ♀ ovig.: 30 fms., Sta. E 21; 1 ♂. Seychelles, 34 fms., Sta. F 8; 2 ♀ ovig.

In all these specimens the outer of the three posterior "pearls" are very much smaller than the median one and inconspicuous.

In describing *Lophomicippa limbata**, its relationship to *M. parca* Alcock was overlooked. The principal difference lies in the absence from the carapace of *M. limbata* of the coarse granulation plainly visible in *M. parca*; instead there are numerous punctæ not visible to the naked eye. It is possible that the single punctate specimen from the reef at Makemo is really *M. parca* with the granules entirely worn off.

231. *Cyphocarcinus minutus* A. Milne Edwards.

? *Cyphocarcinus minutus* Alcock (1), p. 254.

Cyphocarcinus minutus Nobili, Bull. Sci. France et Belgique, xl. 1906, p. 109.

Amirante, 25—80 fms., Sta. E 11; 1 ♂. Coetivy; 1 ♀ ovig.

These specimens are very different from each other; the male corresponds to the description by Nobili (*loc. cit.*), but the female has a much more triangular carapace, broader behind; the rostrum is shorter and the horns nearer together, contiguous at their middle, separated behind by a very narrow slit (overlooked in A. Milne Edwards' figures, pl. 19, figs. 8 and 9, Nouv. Arch. Mus. Hist. Nat., Paris, iv. 1868), and at the extremities slightly diverging; the legs are shorter and broader, the merus of the first leg does not reach the base of the spine at the angle of the basal antennal segment, while in the male, the same merus reaches quite to the tip of the spine.

In Edwards' figs. 7 and 10 (*op. cit.*) the gastric region is represented as overhanging the front, which it does not do in either of the "Sealark" specimens.

The male from Amirante has a long cylindrical sponge projecting horizontally from the rostrum, as noted by Nobili (*op. cit.*, p. 111).

Dimensions in mm.: C. l. ♂ 7·0, ♀ 7·3, C. b. ♂ 2·7, ♀ 3·8.

232. *Macrocœloma nummifer* Alcock.

Macrocœloma nummifer Alcock (1), p. 255, pl. 4, fig. 4.

Saya de Malha, 55 fms., Sta. C 15; 2 ♂, 4 ♀ ovig. Amirante, 29 fms., Sta. E 2; 1 ♂: 25—80 fms., Sta. E 11; 1 ♀ ovig.: 30 fms., Sta. E 21; 2 ♂. Seychelles, 31 fms., Sta. F 2; 1 ♂: 44 fms., Sta. F 6; 1 ♂: 34 fms., Sta. F 8; 1 ♂, 1 ♀.

* Rathbun, 1907, p. 65.

The immature males, as well as the females, have a more flexed rostrum than the adult males. The protuberances on the outer and lower margins of the arm, and some of those on the outer surface of the wrist, are short, stout spines.

233. *Micippoides angustifrons* A. Milne Edwards (Plate **18**, fig. 14).

Micippoides angustifrons A. Milne Edwards, Jour. Mus. Godeffroy, iv. 1873, p. 78[2], pl. 1, figs. 2—2 *c*.

Coetivy; 1 ♂.

Surface, except ends of fingers, covered with coarse tubular setæ, mixed with longer curved hairs of which there are many fine ones on the carapace, especially near the lateral margins, and very coarse ones on the margins of front, antennæ and legs. Carapace subtriangular, with the lateral angles more rounded than shown in Edwards' figure 2 (*op. cit.*), regions well delimited except the hepatic; a small areolet is situated on the inner side of the branchial region contiguous to the posterior half of the cardiac region. Front less deflexed than in Edwards' figure 2 *c*. Rostral horns about $\frac{1}{6}$ length of remainder of carapace, upturned near the extremity, tips incurved. Basal joint of antenna no broader than long, most advanced at inner angle, unarmed; remainder of antenna visible beside rostrum; first movable joint twice as long as second, together they exceed the flagellum. Postocular lobe set off by a deep gap, above and below; supraocular eave entire. The orbit is much less tubular than in *Macrocœloma*.

Chelipeds equal to median length of carapace, stoutish, palms inflated, narrowed distally, $1\frac{1}{3}$ times as long as fingers, which have denticulated edges and gape in their basal half. The fringes of curled hair on the legs make them appear stouter and more prismatic than they really are; the first pair reaches beyond the cheliped by the length of the dactylus.

There are two or three tubercles on the pterygostome. The merus of the outer maxillipeds is not so strongly produced outward as in Edwards' fig. 2 *b* (*op. cit.*). The seven segments of the male abdomen are distinct.

Dimensions of ♂ in mm.: C. l. median 11, R. l. 2·3, C. b. 8·2, Ch. l. 11, W. L. 1. 15·6, W. L. 2. 11·8, W. L. 3. 10·2, W. L. 4. 9·2.

Parthenopidæ.

234. *Parthenope* (*Parthenope*) *longimanus* (Linnæus).

Lambrus longimanus Alcock (1), p. 260.

Cargados Carajos, 30 fms., Sta. B 13; 1 ♂, 1 ♀: 30 fms., Sta. B 14; 1 ♂ juv., 1 ♀ juv.: 30 fms., Sta. B 15; 3 ♂: 30 fms., Sta. B 16; 1 ♂ juv. Saya de Malha, 47 fms., Sta. C 12; 1 ♂.

In most of these specimens, none of which exceeds 17 mm. in length, there is an acute granule on the posterior margin of the carapace between the outer and the median pair of tubercles.

235. *Parthenope* (*Rhinolambrus*) *longispinis* (Miers).

Lambrus (*Rhinolambrus*) *longispinis* Alcock (1), p. 266.

Amirante, 34 fms., Sta. E 9; 1 juv.: 25—80 fms., Sta. E 11; 2 ♂: 20—25 fms., Sta. E 13; 1 ♂: 30 fms., Sta. E 21; 1 ♀ ovig. Seychelles, 31 fms., Sta. F 2; 1 juv.: 39 fms., Sta. F 3; 1 ♀: 34 fms., Sta. F 8; 4 ♂, 1 ♀; in two of these males the left cheliped, and in one case the first and second legs also, were broken off at the basis before shedding and the ischium is represented by a soft-skinned stump.

In all the specimens (except where the rostrum has evidently been broken off) the rostrum narrows suddenly and bears two pairs of spinules on the narrow portion.

236. *Parthenope* (*Rhinolambrus*) *turriger* (Adams and White).

Lambrus (*Rhinolambrus*) *turriger* Alcock (1), p. 269.

Seychelles, 39 fms., Sta. F 3; 2 ♂, 2 ♀: 34 fms., Sta. F 8; 1 ♂: 37 fms., Sta. F 9; 2 ♂.

Dimensions of ♂, Sta. F 9, in mm.: C. l. on median line 12·1, C. b. 11·3, Ch. l. 64·6, Arm l. 27·2, H. l. 26·6, W. L. 2. 26·3.

237. *Parthenope* (*Aulacolambrus*) *hoplonotus* (Adams and White).

Lambrus (*Aulacolambrus*) *hoplonotus* Alcock (1), p. 273.

Cargados Carajos, 20—25 fms., Sta. B 17; 1 ♂. C. l. 5·5 mm., C. b. 8·3 mm.

238. *Parthenope* (*Pseudolambrus*) *calappoides* (Adams and White) (Plate **18**, fig. 12).

Lambrus (*Parthenolambrus*) *calappoides* Alcock (1), p. 275.

Saya de Malha, 55 fms., Sta. C 15; 2 ♀. Providence, 39 fms., Sta. D 1; 1 ♀. Amirante, 34 fms., Sta. E 9; 1 ♂: 39 fms., Sta. E 16; 2 ♀. Seychelles, 34 fms., Sta. F 8; 1 ♂, 2 ♀.

The series shows some variability, but in the main corresponds to Laurie's "var. *calappoides**." The two females from F 8 approach "var. *confragosus*." In all the specimens, however, the tubercles on inner border of arm are well developed and situated near together at middle of margin.

It may be noted that in typical *calappoides*, as figured by Adams and White, the post-hepatic notch is well indicated.

The largest specimen (♀, Sta. E 16), 22·2 mm. long, 27·2 mm. broad, has the principal tubercles of the carapace very prominent and nodular, inconspicuously granulated, the median gastric tubercle bifid in the median line. In the accompanying ♀, 17·8 mm. long, 23·3 mm. broad, the characters are similar but less developed.

239. *Parthenope* (*Pseudolambrus*) *harpax* (Adams and White).

Lambrus (*Parthenolambrus*) *harpax* Alcock (1), p. 278.

Amirante, 30 fms., Sta. E 21; 1 ♀ juv. Seychelles, 34 fms., Sta. F 8; 4 ♂, 1 ♀.

Largest ♂, C. l. 20·4 mm., C. b. 22·1 mm., Ch. l. 50·5 mm.

240. *Parthenope* (*Pseudolambrus*) *plana*, sp. nov. (Plate **20**, fig. 10).

Amirante, 25—80 fms., Sta. E 11; 1 ♂ adult, 1 ♂ juv., 2 ♀ juv.; the adult male lacks chelipeds: 30 fms., Sta. E 21; 1 ♀ type.

* In Herdman, Ceylon Pearl Fisheries, pt. v, 1906, Suppl. Rept. xl, p. 390.

This species is as flat as a *Cryptopodia*, but the carapace is shaped much as in *P. harpax*.

Female.—Carapace semi-elliptical, a little broader than long, nearly smooth. Gastric and cardiac regions granulate; an obscure, oblique ridge on the branchial region, which does not reach the postero-lateral angles. Postero-lateral and posterior margins in almost a transverse line.

Margins cristiform; no post-orbital constriction; hepatic and branchial regions separated by a deep notch; branchial margin divided by slits into four denticulate lobes in front of the rounded postero-lateral angle, and one lobe next to the posterior margin; the latter is faintly produced at the middle. Front broadly triangular, moderately deflexed, edge denticulate.

Chelipeds uneven, less than twice as long as carapace. Arm with upper surface broad, bordered by denticulate teeth; under edge denticulate. Wrist with two teeth on outer edge. Right hand heavy; both hands with outer edge bilobed, inner edge of upper surface with a few small teeth, one at the middle most prominent; inner edge of hand denticulate, as also outer edge of dactylus. Legs with a few lobes and spines.

Dimensions in mm. of the type (♀): C. l. 12·2, C. b. 13·7, Ch. l. 23·3.

241. *Parthenope* (*Pseudolambrus*) *erosa* (Miers) (Plate **20**, fig. 11).

Lambrus (*Parthenopoides*) *erosus* Miers, Ann. Mag. Nat. Hist. (5), iv. 1879, p. 25, pl. 5, fig. 8.

Peros, Coin; 1 ♂. Coetivy; 1 juv.

Carapace not much broader than long, posterior half rectangular, the postero-lateral margins transverse and a little in advance of the transverse posterior margin; postero-lateral angles a little produced sideways; sides of branchial region nearly perpendicular, the margins barely visible in dorsal view; hepatic regions slightly projecting. Front and anterior gastric region deflexed; edge of front subtruncate, sides concave. Surface regularly pitted and eroded, the largest depressions bounding the cardiac and posterior gastric regions. The elevated portions are covered with confluent stellar granules, and similar isolated granules are numerous in the depressions. Under surface of body similarly pitted.

Chelipeds short and very stout, rough with granules like the carapace, but without pits except near the proximal end; a dentiform tubercle on upper surface of arm; inner margin of upper surface of palm crenated, most prominent at middle; immovable finger half as wide again as long. Legs stout, reticulated with pits, except the dactyli, armed with acorn-shaped spines.

Dimensions of ♂ in mm.: C. l. 15·2, C. b. 18·7, C. b. between postero-lateral angles 18·4, Ch. l. (right or larger) 19·6, H. l. 8·8, H. b. 8·2.

In the young (C. l. 5·3 mm., C. b. 6·2 mm.) the carapace and chelipeds are everywhere covered with small cavities separated by narrow reticulating lines.

242. *Daldorfia horrida* (Linnæus).

Parthenope horrida Alcock (1), p. 279.

Amirante, 25—80 fms., Sta. E 11 ; 1 ♀ : 30 fms., Sta. E 21 ; 2 ♂, 1 ♀.

The specimens are similar to that figured in pl. 14, fig. 5, Bull. U. S. Fish Comm. for 1903, part III, 1906, p. 886.

243. *Daldorfia investigatoris* (Alcock).

Parthenope investigatoris Alcock (2), p. 296 ; Illus. Investigator, Crust., iv. 1896, pl. 23, figs. 1, 1 *a*.

Amirante, 34 fms., Sta. E 9 ; 1 ♂ : 20—44 fms., Sta. E 25 ; 1 ♂ juv.

The sternum of the ♂ has a semi-elliptical cavity between the chelipeds ; the ornamentation of the abdomen is similar to that in the ♀.

244. *Cryptopodia pan* Laurie.

Cryptopodia pan Laurie, *op. cit.*, p. 392, pl. 1, fig. 6 and text-fig. 4.

Cargados Carajos, 30 fms., Sta. B 14 ; 1 ♂ : 30 fms., Sta. B 15 ; 1 ♂.

The specimens are nearly of a size, the larger one (B 15) having C. l. 15·2 mm., C. b. 21·2 mm. The meropodites of all the walking legs have their upper and lower borders spiniferous, the lower border having also a secondary or less strongly marked crest.

245. *Eumedonus granulosus* MacGilchrist.

Eumedonus granulosus MacGilchrist, Ann. Mag. Nat. Hist. (7), xv. 1905, p. 253 ; Illus. Investigator, Crust., xii. 1907, pl. 27, figs. 2, 2 a.

Amirante, 28 fms., Sta. E 6 ; 1 ♀ juv. : 25—80 fms., Sta. E 11 ; 1 ♂, 2 adult ♀ (1 ovig.).

Dimensions in mm. : ♂, C. l. 11·8, C. b. 10·6, Ch. l. 17·8. Ovigerous ♀, C. l. 12, C. b. 11·4, Ch. l. 12·8.

In the two largest specimens, measured above, the rostrum is more deeply cleft than in MacGilchrist's figure, the protogastric lobule is better defined anteriorly, and from it a slight furrow runs obliquely forward to the edge of the orbit.

EXPLANATION OF PLATES 15—20.

PLATE 15.

Fig. 1. *Cryptodromia ornata*, sp. nov., ♂ type. × 1½.
Fig. 2. *Calappa alata*, sp. nov., ♂ type. × 1½.
Fig. 3. *Mursia spinimanus* Rathbun, var., ♀ juv., Sta. C 2. × 1½.
Fig. 4. *Oreophorus reticulatus* Adams & White, ♀, Sta. E 9. × 1½.
Fig. 5. *Præbebalia extensiva*, sp. nov., ♂ type. × 1½.
Fig. 6. *Nursilia dentata* Bell, ♂, Sta. F 7. × 3.
Fig. 7. *Leucosides jecusculum*, sp. nov., ♀ type. × 2.
Fig. 8. *Leucosides angulata*, sp. nov., ♂ type. × 2.
Fig. 9. *Caphyra hemisphærica*, sp. nov., ♂ type, Coetivy. × 4.
Fig. 10. *Portunus* (*Achelous*) *granulatus* (Milne Edwards), ♂, Funafuti, ventral view. Nat. size.
Fig. 11. *Portunus* (*Achelous*) *orbitosinus*, sp. nov., ♂, Sta. B 23, ventral view. Nat. size.
Fig. 12. *Thalamita margaritimana*, sp. nov., ♂ type. × 1½.

Plate 16.

Fig. 1. *Lioxantho latifrons*, sp. nov., ♀ type, dorsal view. × 3.
Fig. 2. Same, ventral view. × 3.
Fig. 3. *Actæa tessellata* Pocock, ♀, Coetivy. × 2.
Fig. 4. *Actæa obesa* A. Milne Edwards, ♂ juv., Sta. E 21, dorsal view. × 3.
Fig. 5. Same, ventral view. × 3.
Fig. 6. *Dacryopilumnus eremita* Nobili, ♀, Peros, dorsal view. × 3.
Fig. 7. Same, front view. × 3.
Fig. 8. *Actæa acies*, sp. nov., ♂ type, dorsal view. × 1½.
Fig. 9. Same, ventral view. × 1½.
Fig. 10. *Actumnus simplex*, sp. nov., ♀ type, dorsal view. × 3.
Fig. 11. Same, ventral view. × 3.
Fig. 12. *Actumnus setifer amirantensis*, subsp. nov., ♂ type, dorsal view. × 2.
Fig. 13. Same, ventral view. × 2.
Fig. 14. *Pilumnus orbitospinis*, sp. nov., ♀ type, dorsal view. × 3.
Fig. 15. Same, ventral view. × 3.

Plate 17.

Fig. 1. *Dynomene spinosa*, sp. nov., ♂ type. Nat. size.
Fig. 2. *Heteronucia ingens*, sp. nov., ♀ type. × 3.
Fig. 3. *Platypodia anaglypta* (Heller), ♂, Coetivy. × 1½.
Fig. 4. *Callinectes alexandri* Rathbun, ♂ juv., Sta. B 23. × 1½.
Fig. 5. *Carpilodes sayademalhensis*, sp. nov., ♀ type. × 2.
Fig. 6. *Liomera granosimana* A. Milne Edwards, ♂, Coetivy. × 2.
Fig. 7. *Atergatopsis signata* (Adams & White), ♂, Coetivy. Nat. size.
Fig. 8. *Calappa bicornis* Miers, ♂, Sta. F 8. Nat. size.
Fig. 9. *Leptodius cristatus* Borradaile, ♂, Coetivy. × 3.
Fig. 10. *Actæa suffuscula*, sp. nov., ♂ type, dorsal view. × 3.
Fig. 11. Same, ventral view. × 3.

Plate 18.

Fig. 1. *Euxanthus rugosus* Miers, ♀, Salomon. Nat. size.
Fig. 2. *Actæa hellerii* A. Milne Edwards, ♂ type. × 2.
Fig. 3. *Actæa boletaria*, sp. nov., ♂ type, dorsal view. × 1½.
Fig. 4. Same, ventral view. × 1½.
Fig. 5. *Actæa polyacantha* (Heller), ♂, Coetivy, dorsal view. × 3.
Fig. 6. Same, ventral view. × 3.
Fig. 7. *Actæa banareias*, sp. nov., ♂ type, dorsal view. × 4.
Fig. 8. Same, ventral view. × 4.
Fig. 9. *Xanthias tuberculidens*, sp. nov., ♂ type. × 1½.
Fig. 10. *Leptodius cavipes* (Dana), ♂, Peros. × 1½.
Fig. 11. *Chlorodopsis melanospinis*, sp. nov., ♂ type. × 2.
Fig. 12. *Parthenope* (*Pseudolambrus*) *calappoides* (Adams & White), ♂, Sta. E 16. Nat. size.
Fig. 13. *Pilumnoplax acanthomerus*, sp. nov., ♀ cotype. × 2.
Fig. 14. *Micippoides angustifrons* A. Milne Edwards, ♂, Coetivy. × 3.

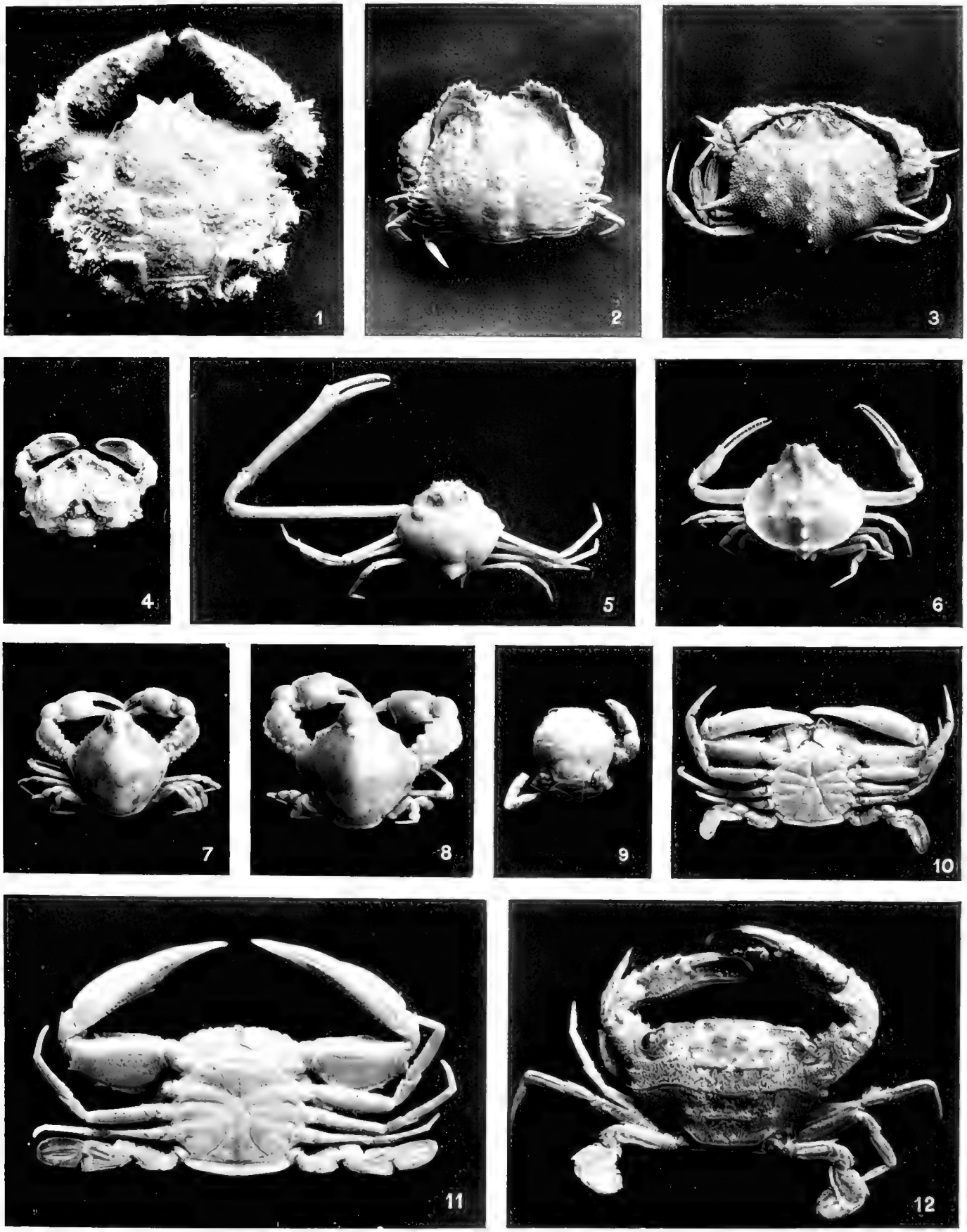
Plate 19.

Fig. 1. *Pilumnus turgidulus*, sp. nov., ♂ type, dorsal view. × 3.
Fig. 2. Same, ventral view. × 3.
Fig. 3. *Actumnus lævigatus*, sp. nov., ♀ type, dorsal view. × 3.
Fig. 4. Same, ventral view. × 3.

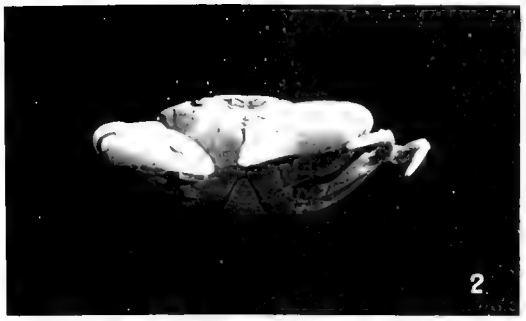
Fig. 5. *Maldivia gardineri*, sp. nov., ♀ type, dorsal view. × 3.
Fig. 6. Same, ventral view. × 3.
Fig. 7. *Gardineria canora*, sp. nov., ♂ type, dorsal view. × 3.
Fig. 8. Same, ventral view. × 3.
Fig. 9. *Palicus jukesii* (White), ♀, Sta. E 11. × 2.
Fig. 10. *Palicus whitei* (Miers), ♀, Sta. F 8. × 2.

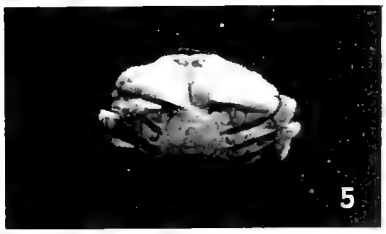
Plate 20.

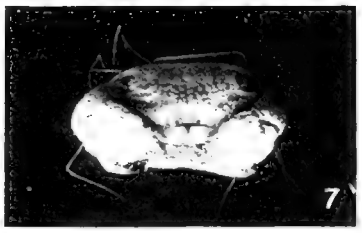
Fig. 1. *Typhlocarcinops piroculata*, sp. nov., ♂ type, dorsal view. × 3.
Fig. 2. Same, ventral view. × 3.
Fig. 3. *Achœus inimicus*, sp. nov., ♀ type. × 3.
Fig. 4. *Pseudocollodes complectens*, sp. nov., ♂ type. × 2.
Fig. 5. *Halimus borradailei* Rathbun, ♀, Sta. E 13. × 3.
Fig. 6. *Halimus inermis*, sp. nov., ♂ type. × 2.
Fig. 7. *Halimus uncifer* (Calman), ♂ type. × 2.
Fig. 8. *Naxioides spinigera* Borradaile, ♂, Sta. F 8. × 1½.
Fig. 9. *Manella gardineri*, sp. nov., ♂ type. × 2.
Fig. 10. *Parthenope* (*Pseudolambrus*) *plana*, sp. nov., ♀ type. × 2.
Fig. 11. *Parthenope* (*Pseudolambrus*) *erosa* (Miers), ♂, Peros. × 1½.

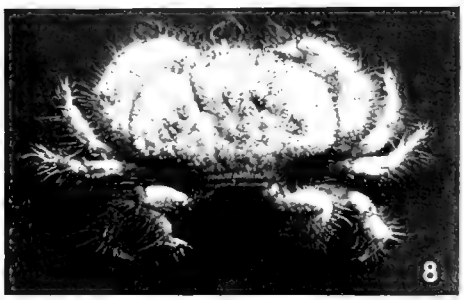


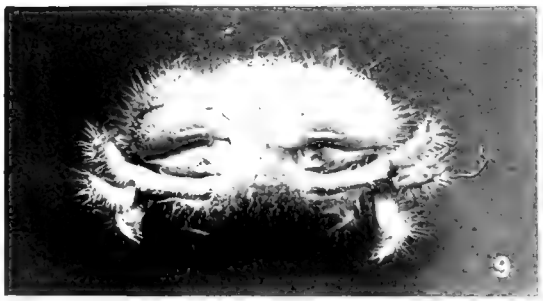
BRACHYURA FROM THE INDIAN OCEAN

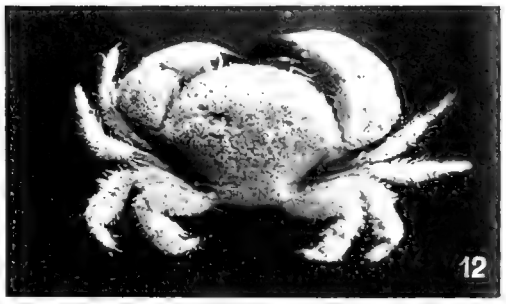


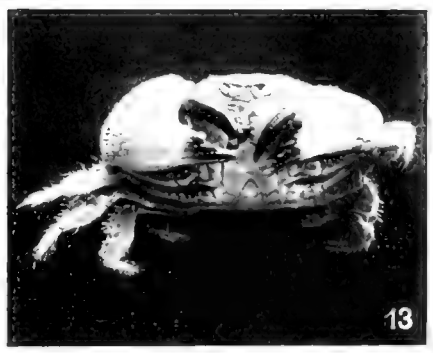


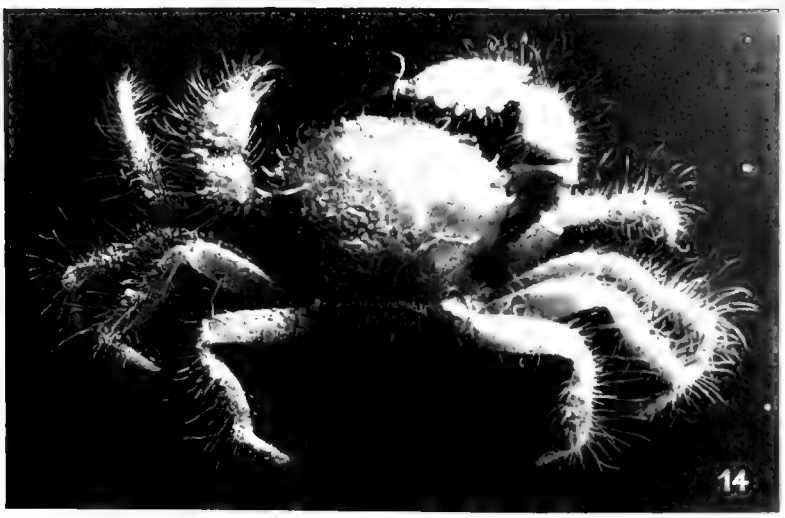












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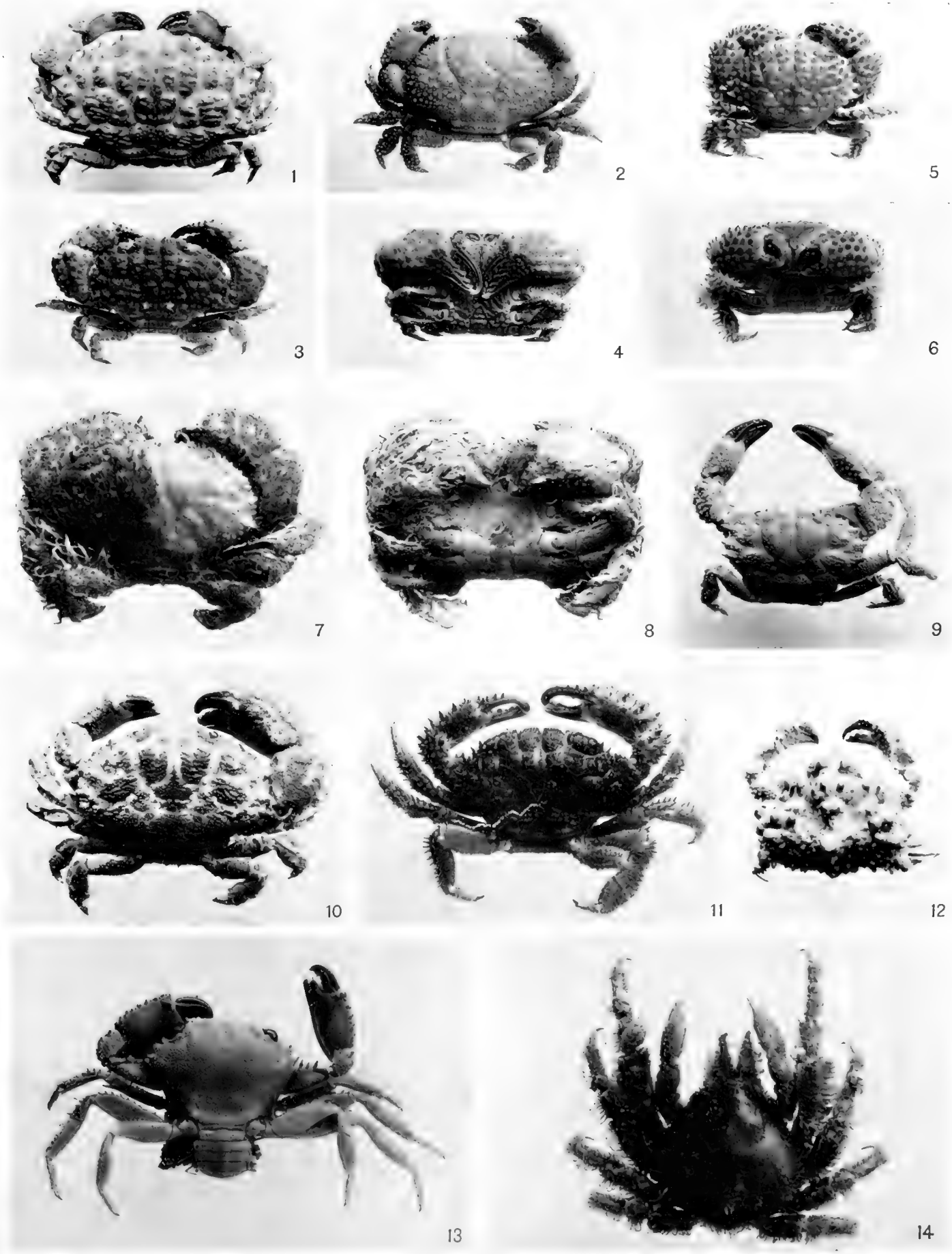

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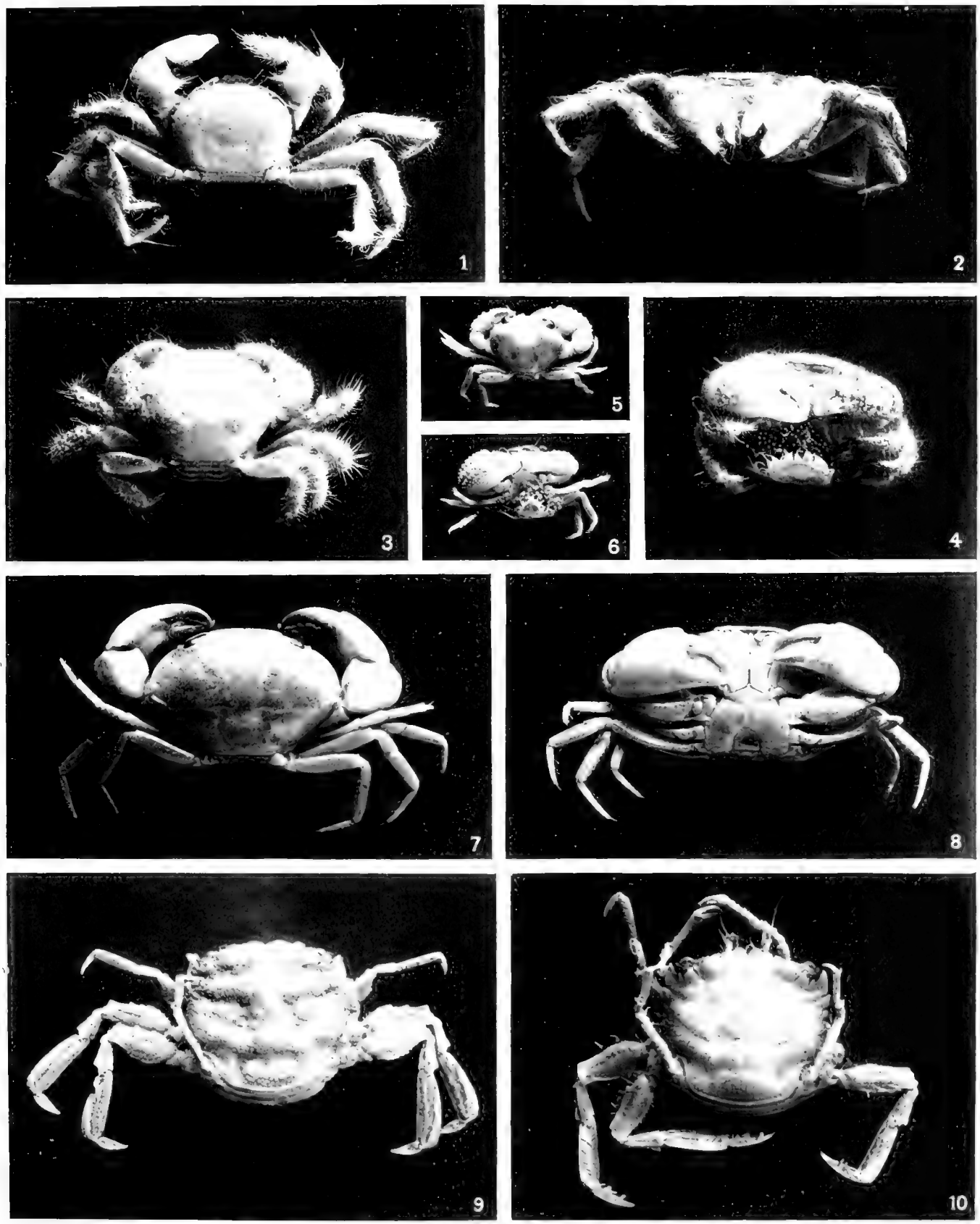

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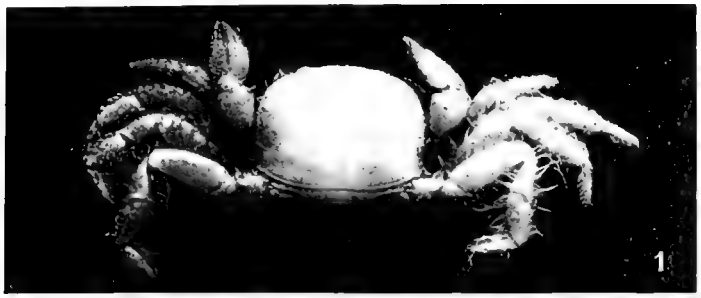
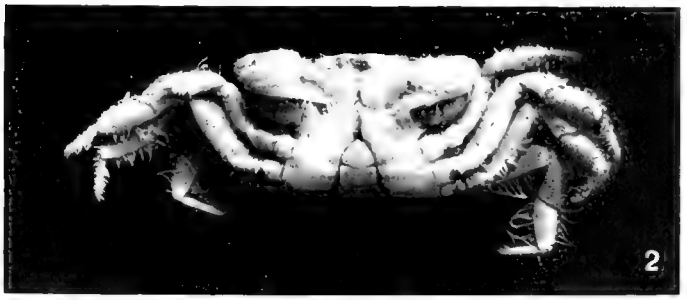
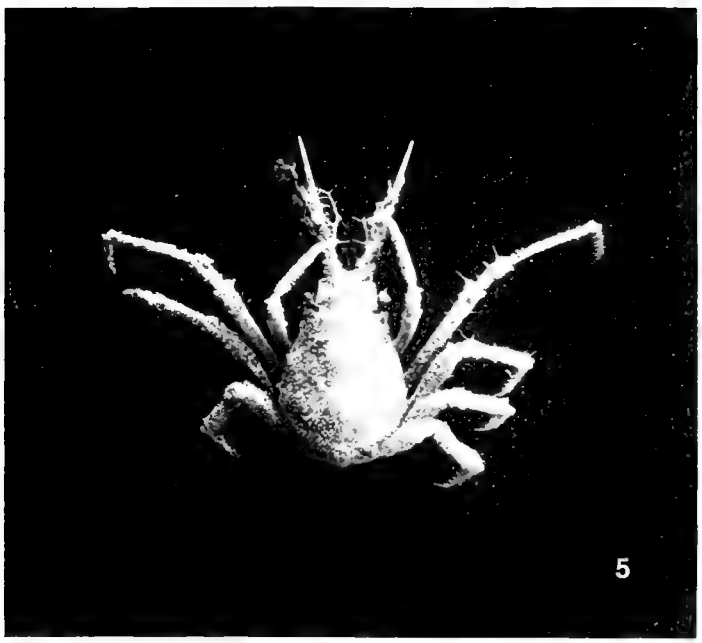
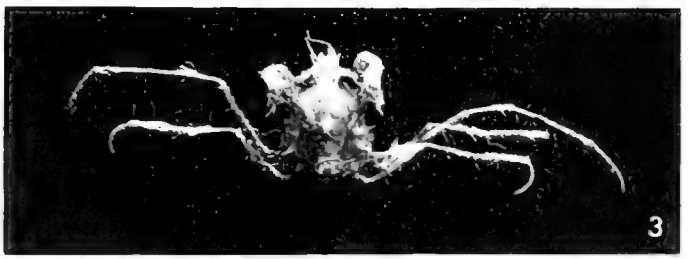
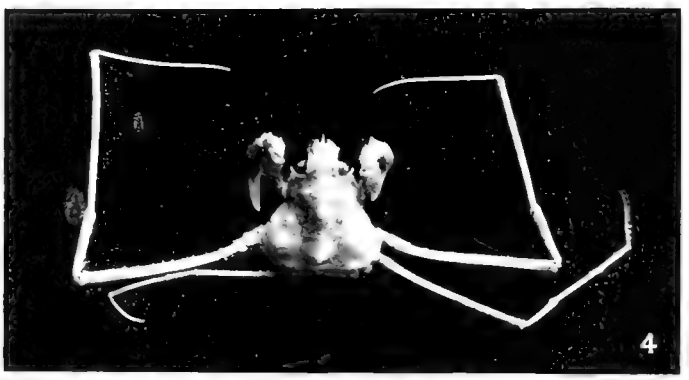
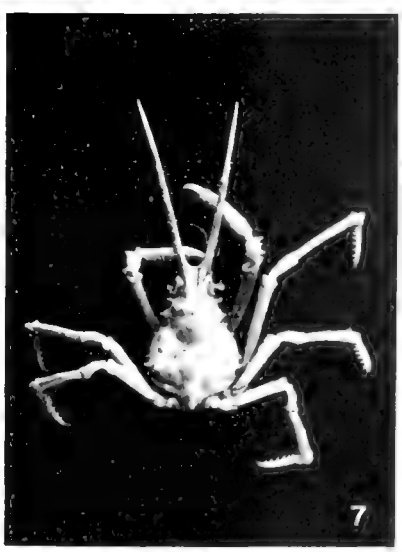


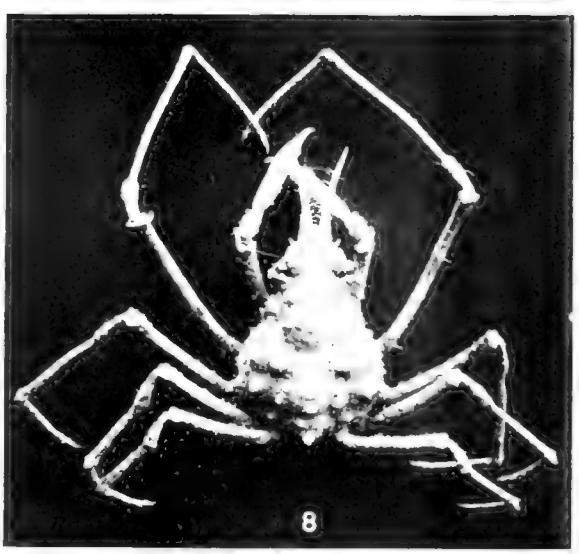












BRACHYURA FROM THE INDIAN OCEAN

No. XII.—TORTRICINA AND TINEINA.

By E. Meyrick, B.A., F.R.S.

(Communicated by Prof. J. Stanley Gardiner, M.A., F.R.S., F.L.S.)

Read 19th January, 1911.

The consignment of specimens submitted to me contained 120 species in recognisable condition, besides others representing perhaps half-a-dozen species probably new but so far defective that they could not be advantageously described. The Seychelles and Aldabra species being quite distinct, it will be convenient to discuss the general character and relations of these two faunas separately, and afterwards to give a list of the whole, with descriptions of the new species.

I. FAUNA OF THE SEYCHELLES.

No previous records of any species exist. In the present collection there are 111 species, of which 90 are unknown elsewhere and probably truly endemic; the other 21 are in my opinion probably all artificially introduced, judging from their known distribution. Of these latter, 4 are domestic refuse-feeders, 5 are known to be attached to cultivated plants, and the remaining 12 are in all likelihood similarly attached, but their larval habits are at present unknown.

The 90 endemic species are referred to 43 genera; the high proportion of genera would however undoubtedly be reduced by more extended collecting. Of these 43 genera, 29 are represented by one species each, 5 by two each, 4 by three each, 3 by four each, and 2 by fourteen each; these figures are suggestive, and therefore I will group the genera on this basis, and consider their individual affinities and distribution.

1. Apodemic Genera of one endemic species.

Adoxophyes Meyr. Contains 11 Australasian species, of which 3 range into the Indian region, and 1 European.

Eucosma Hueb. Cosmopolitan; the species is probably of African type.

Bactra Steph. Cosmopolitan.

Aristotelia Hueb. Cosmopolitan.

Idiophantis Meyr. A small Indian genus, with 1 Australian species; the species is near Ceylon forms.

Chaliniastis Meyr. A single Australian species is known.

Onebala Walk. A characteristic Indian genus, most numerous in Ceylon.

Allocota Meyr. Contains several Indian and 1 Australian species.

Cholotis Meyr. Principally Indian, but extending into Africa and Australia.

Syntomactis Meyr. Indian and Australian.

Calicotis Meyr. A small Indian genus, extending into Australia.

Stathmopoda Staint. An extensive Indian and Australian genus, represented also less freely in Africa, and by one species in Europe.

Ethmia Hueb. The species belongs to a closely allied group of Indo-Malayan and African forms.

Simæthis Leach. Cosmopolitan in the tropics, where the species are usually associated with various forms of fig (*Ficus*); with these therefore they are sometimes transported, and this species may not be truly native.

Macarostola Meyr. Principally Indian and Australian.

Argyresthia Hueb. Characteristic of the northern hemisphere; but the single species is related to a Ceylon form.

Lyonetia Hueb. A nearly cosmopolitan genus of few species.

Opogona Zell. Principally Indian and Australian.

Melasina Boisd. A large Indian and African genus, with stragglers in Europe.

Proterodesma Meyr. Based on one species from the Auckland Islands.

Scardia Treit. A small but nearly cosmopolitan genus.

These genera number 21, half the total; with the exception of *Proterodesma* and *Chaliniastis* (represented elsewhere only by single species in the New Zealand and Australian regions, respectively, on which in the present state of our knowledge not much stress can be laid) all occur in the Indian region, and might have been derived thence.

2. Apodemic genera of 2—4 endemic species.

Argyroploce Hueb. Nearly cosmopolitan, but most abundant in the northern hemisphere, and especially in the Indian region; the two species are of Indian type.

Brachmia Hueb. Especially characteristic of the Indian region, where it is very numerously developed, but also represented by a certain number of species in Europe and Africa.

Stagmatophora Herr.-Schäff. Occurs throughout the Old World; the four species are however all allied to Indian forms.

Cuphodes Meyr. A small Indian and Australian genus.

Blastobasis Zell. Cosmopolitan, or nearly so.

Glyphipteryx Hueb. Cosmopolitan.

Acrocercops Wall. Numerous in India and Australia, with a few species in other regions.

Oinophila Steph. Besides the three species described there is one common to Europe and Africa, and a second (possibly only a geographical form) from the Canary Isles, and I have five from Mauritius.

Decadarchis Meyr. A small Indian and Australasian genus.

Ereunetis Meyr. Mainly Indian and Australian.

Tinea Linn. Cosmopolitan; three of the four endemic species are nearly allied together, and related to a peculiar Indian group.

These amount to 11 genera, with 31 species. All are probably derivable from the Indian region except *Oinophila*; this last appears to be characteristically Mascarene.

3. Apodemic genera of 14 endemic species.

Metachanda Meyr. The only other known species at present are two from Mauritius.

Hieroxestis Meyr. Represented by several Indian species and two or three from Africa and Mauritius.

These 2 genera, containing 28 endemic species, nearly a third of the total number, are so evidently at home that it is not unreasonable to regard them as truly endemic in origin, the few apodemic species having spread from this source.

4. Endemic genera.

Herpystis Meyr. Related to the cosmopolitan *Eucosma*; one species.

Chanystis Meyr. A development of the characteristic Seychelles genus *Metachanda*, from which it does not greatly differ; two species.

Platactis Meyr. Not obviously near any other; one species.

Paraclada Meyr. Possibly related to the Indian *Hermogenes*; one species.

Anachastis Meyr. Allied to the Indian and African *Odites*; one species.

Mastigostoma Meyr. A singular form, allied to the apparently cosmopolitan *Setomorpha*; one species.

Progonarma Meyr. Probably related to the preceding; one species, found also in the Carajos Islands, but probably derived from the Seychelles.

Sporadarthra Meyr. A singular development of the cosmopolitan *Tinea*; one species.

Scalmatica Meyr. Allied to *Amydria*, which is widely distributed, but perhaps commonest in South Africa; one species.

These 9 genera contain 10 species; their affinities may be Indian or African, but do not display any obvious leaning to one or the other.

General Results.

Summarising these particulars, we find as the main factor in the situation an ancient but highly specialised fauna, represented by the *Metachandidæ* (2 genera, 16 species) and the *Hieroxestis* group of *Tineidæ* (2 genera, 19 species); a similar, quite distinct fauna, based on the same groups but somewhat more primitive in character, is found in Mauritius and Réunion, and doubtless something analogous will be found in Madagascar, of which nothing is known at present. All the rest of the fauna might apparently have been derived sporadically from the Indian region, except two or three forms more probably originating in Africa, immigration having taken place at intervals through a long period of time, but having now long ceased (for all recent introductions, where the specific forms are unchanged, are probably artificial).

It is noticeable that a considerable proportion of the whole fauna consists of genera of typical *Tineidæ* whose larvæ are known to feed on dead wood or dead vegetable material; this is characteristic of insular faunas where the wind has been the principal agent in distribution, since insects with these habits can find food in any region, whilst those genera whose larvæ feed on leaves are usually restricted in each individual case to some particular plant, and fail to establish themselves in a new region where they are unable to find the foodplant to which they are accustomed. Genera whose larvæ feed on lichens or animal refuse are equally advantageously circumstanced. The habits of the *Metachandidæ* are entirely unknown and should be ascertained; I think it likely they may be lichen-feeders. Some of the other genera doubtless also owe their establishment to suitability of habit; thus the species of *Bactra* probably feed on rushes (*Juncus*), and *Calicotis* on ferns, and these are always available.

II. FAUNA OF ALDABRA.

This interesting fauna is represented by 9 species, all endemic, so far as is known. Unfortunately Madagascar, with which they have probably the nearest relationship, is unknown at present, and the Aldabra fauna is therefore very much in the air. The genera are as follows:

Meridarchis Zell. Characteristic of India, but there is one African species and one Australian.

Eboda Walk. A small genus, but occurring throughout the tropics.

Eucosma Hueb. Cosmopolitan; the species is allied (not closely) to the Seychelles species.

Laspeyresia Hueb. Cosmopolitan.

Trichotaphe Clem. American, Indian, and African.

Cholotis Meyr. Indian, African, and Australian.

Stathmopoda Staint. Mainly Indian, Australian, and African.

Imma Walk. Throughout the tropics.

Opogona Zell. Principally Indian and Australian.

All are therefore seen to be genera of wide distribution; they are doubtless all to be regarded as casual immigrants, distributed by the winds, and in general of doubtful origin.

III. SYSTEMATIC LIST.

Carposinidæ.

MERIDARCHIS Zell.

1. *Meridarchis cæmentaria*, n. sp.

♀. 13 mm. Head whitish-ochreous sprinkled with grey. Palpi 3, ochreous-whitish irrorated with grey and blackish, base of terminal joint dark grey. Thorax ochreous-whitish sprinkled with grey and blackish. Abdomen pale greyish-ochreous irrorated with grey. Forewings elongate, rather narrow, costa slightly arched, apex obtuse, termen

slightly rounded, oblique; pale greyish-ochreous sprinkled with grey and blackish, more whitish-ochreous on margins; seven small spots of blackish irroration on costa, two in disc at $\frac{2}{5}$ and $\frac{2}{3}$, one on submedian fold before tornus, and several along termen; a bent subterminal shade of grey suffusion sprinkled with black: cilia whitish-ochreous sprinkled with grey and blackish. Hindwings grey, paler towards base; cilia whitish-ochreous tinged with grey.

Aldabra; one specimen.

Tortricidæ.

Adoxophyes Meyr.

2. *Adoxophyes ergatica*, n. sp.

♀. 20—21 mm. Head, palpi, and thorax light ochreous-brownish more or less sprinkled with fuscous. Abdomen grey, anal tuft whitish-ochreous. Forewings suboblong, rather broad, costa anteriorly strongly arched, posteriorly nearly straight, apex obtuse, termen sinuate, vertical; brown or light brown, sometimes with violet reflections, with more or less indicated scattered strigulæ of dark ferruginous-fuscous scales; edge of basal patch indicated by a dark stria, angulated below middle; central fascia moderate, irregular, oblique, reddish-fuscous, in one specimen indistinctly indicated throughout, in the other reduced to costal and dorsal spots and traces of connecting striæ; costal patch flattened-triangular, reddish-fuscous, in the darker specimen ill-defined; in the lighter specimen a dark stria runs from near its apex to tornus: cilia light brownish-ochreous, sometimes mixed towards base with ferruginous-brown. Hindwings light grey, towards costa and in disc posteriorly broadly suffused with ochreous-whitish, apex narrowly light grey; cilia whitish-grey, with grey subbasal shade.

Silhouette, Mare aux Cochons plateau and edge of forest, about 1000 feet, in September; two specimens.

Eboda Walk.

3. *Eboda amblopis*, n. sp.

♀. 13 mm. Head and palpi white mixed with fuscous and dark fuscous; palpi 2, subascending, second joint much expanded with projecting scales towards apex. Thorax fuscous-whitish irrorated with fuscous. Abdomen light fuscous, beneath ochreous-whitish. Forewings oblong, costa abruptly arched near base, thence straight, apex obtuse, termen somewhat oblique, rounded beneath; fuscous, finely irrorated with ochreous-whitish, with scattered blackish strigulæ of raised scales; several spots of darker suffusion along costa, and one in disc at $\frac{3}{4}$; larger tufts mixed with blackish above and beneath submedian fold near its extremity, upper anterior: cilia light fuscous irrorated with whitish, barred on basal half with dark fuscous. Hindwings with 4 absent, 5 closely approximated at base to 3; grey, paler towards base; cilia pale grey.

Aldabra; one specimen.

Eucosmidæ.

HERPYSTIS, n. gen.

Palpi porrected, second joint rough-scaled above and beneath, terminal moderate. Thorax without crest. Forewings with 7 to termen, separate. Hindwings with 3 widely remote, parallel, 4 from angle, 5 approximated to 4 towards base, 6 and 7 closely approximated towards base.

A development of *Eucosma*, characterised by the peculiar neuration of hindwings.

4. *Herpystis rusticula*, n. sp.

♂. 9 mm. Head whitish, with a few fuscous scales. Palpi white, second joint with a lateral streak of fuscous irroration. Thorax fuscous-whitish, shoulders infuscated. Abdomen greyish. Forewings elongate, costa gently arched, without fold, apex obtuse, termen slightly sinuate, hardly oblique, rounded beneath; ochreous-whitish, indistinctly strigulated with fuscous irroration, with a few blackish scales, costa and dorsum more or less strigulated with dark fuscous; basal patch represented by a small spot of dark fuscous irroration on costa at $\frac{1}{3}$, and a rather outwards-oblique fascia suffusedly outlined with dark fuscous irroration from dorsum at $\frac{2}{5}$, reaching more than half across wing; central fascia with costal and dorsal thirds narrow, formed of dark fuscous irroration or suffusion, dorsal concave anteriorly, middle third absent except an oblique blackish spot representing angle, above which is a small whitish-yellowish spot; beyond this a pale leaden-metallic stria; a slender dark fuscous fascia before termen, forming an acute angular projection inwards above middle, finely attenuated towards tornus, followed below middle by a pale leaden-metallic striga. Hindwings grey; cilia whitish-grey, with grey subbasal shade.

Silhouette, Mare aux Cochons plateau, 1000 feet, in September; one specimen, not in good condition.

EUCOSMA Hueb.

5. *Eucosma plebeiana* Zell.

Bird Island, Seychelles, in July, one specimen (Fryer); and I have also a specimen taken by Mr T. B. Fletcher in Farquhar Island. Doubtless introduced; now nearly cosmopolitan in suitable climates. Larva on *Malva* and allies.

6. *Eucosma chlorobathra*, n. sp.

♀. 9—10 mm. Head whitish-ochreous. Palpi whitish-ochreous, a spot on second joint and base of terminal joint fuscous. Thorax whitish-ochreous, shoulders infuscated. Abdomen grey. Forewings elongate, slightly dilated posteriorly, costa slightly arched, apex obtuse, termen sinuate beneath apex, vertical, rounded beneath; whitish-ochreous, irregularly sprinkled with fuscous; costa strigulated with blackish-fuscous; edge of basal patch indicated by a thick curved blackish-fuscous line; space between this and termen mostly occupied by several thick irregular subconfluent bluish-leaden metallic striæ rising from ochreous-whitish costal strigulæ; an irregular curved series of blackish-fuscous marks representing posterior edge of central fascia; two small blackish spots

in ocellus; a whitish streak along termen, bifurcate on costa and interrupted beneath apex: cilia bluish-leaden-grey, with a blackish basal line, tips whitish. Hindwings with 3 and 4 stalked; dark grey; cilia grey.

Aldabra; two specimens.

7. *Eucosma temenitis*, n. sp.

♂♀. 9—10 mm. Head whitish-ochreous tinged with rosy. Palpi whitish-ochreous, second joint with a lateral streak of dark fuscous irroration, terminal joint whitish. Thorax pale ochreous more or less suffused with rosy or grey, with a dark grey transverse post-median band. Abdomen grey. Forewings elongate, costa slightly arched, without fold, apex obtuse, termen nearly straight, somewhat oblique; pale ochreous slightly tinged with rosy, with a few scattered blackish scales; basal patch large, dark grey sprinkled with black, containing a pale ochreous and grey mark on dorsum near base, and edged by a thick curved blackish line; median area sometimes much suffused with whitish; central fascia represented by a moderate deep ochreous streak running from $\frac{2}{3}$ of costa to dorsum before tornus, suffused with blackish towards costa, curved or angulated inwards above middle; apical area beyond this irregularly clouded with dull rosy and leaden-grey, especially towards tornus, with a quadrate blackish subapical spot connected by bars with apex and middle of termen: cilia dark bluish-grey. Hindwings with 3 and 4 stalked; rather dark grey; cilia grey.

Silhouette, Mare aux Cochons and forest above it, in September; six specimens. Allied to the preceding, though very distinct.

Bactra Steph.

8. *Bactra legitima*, n. sp.

♀. 14—16 mm. Head, palpi, and thorax whitish-ochreous or ochreous-whitish, palpi $2\frac{1}{2}$. Abdomen grey. Forewings elongate, costa slightly arched, apex obtuse, termen straight, oblique; pale ochreous, partially slightly sprinkled with pale greyish and pale ferruginous, veins more or less marked with lines of blackish scales; costa shortly and closely strigulated with whitish, edge irrorated with blackish between the strigulæ; costal $\frac{2}{5}$ undefinedly suffused with ochreous-whitish; lower angle of cell sometimes marked with a cloudy whitish dot preceded by slight ferruginous suffusion; terminal edge irrorated with black: cilia whitish-ochreous. Hindwings grey; cilia grey-whitish.

Silhouette, Mare aux Cochons plateau, and south side of Mont Pot-à-eau, 1000—1500 feet, in August and September; two specimens.

Argyroploce Hueb.

9. *Argyroploce illepida* Butl. (=*carpophaga* Wals.)

Mahé, Cascade Estate; one specimen. A species now widely distributed in South Africa, the Indo-Malayan region, and Australia, doubtless artificially spread; the larva feeds in fruits of *Cassia*, *Feronia*, *Nephelium*, and doubtless other trees.

10. *Argyroploce aprobola* Meyr.

Mahé, Cascade Estate, Morne Blanc, Mare aux Cochons district; Silhouette, Mare aux Cochons plateau and south side of Mont Pot-à-eau, 800—1500 feet; from August

to February, twenty-two specimens. Also taken commonly by Mr T. B. Fletcher in the Amirantes and Chagos Islands. Widely distributed in the Indo-Malayan region, S. Pacific islands, and E. Australia; probably attached to some cultivated plant.

11. *Argyroploce nebulana* Wals.

♂. 23 mm. Head fuscous-whitish suffused with grey on crown, face with two black spots. Palpi porrected, fuscous-whitish with several blackish spots. Thorax grey. spotted anteriorly with whitish-ochreous and behind this with fuscous-crimson, thoracic crest mixed with whitish-ochreous and crimson. (Abdomen broken.) Posterior femora beneath tufted with long whitish-ochreous hairs, with an erect apical light ochreous scale-tooth, tibiæ with light fuscous rough hairscales above, and whitish-ochreous ones beneath. Forewings elongate-triangular, costa gently arched, apex obtuse, termen bowed, hardly oblique; light brownish, extreme tips of scales ochreous-whitish, irregularly strigulated with dark fuscous, and with some spots of ferruginous-reddish suffusion; costal edge black marked with pairs of whitish-ochreous strigulæ; a large black blotch extending along dorsum from $\frac{1}{4}$ to $\frac{3}{4}$, sides vertical, upper margin with central third forming a broad truncate projection reaching $\frac{3}{4}$ across wing; a triangular brown-reddish spot on costa beyond middle; some greyish clouding in disc posteriorly; an oblique brown-reddish mark partially suffused with black below apex resting on middle of termen: cilia grey mixed with brown-reddish, with a patch of whitish-ochreous suffusion on tornus. Hindwings rather narrowed, dorsum formed into a strong thickened whitish-ochreous projecting lobe, adjoining which is a groove on upper surface, containing some long grey hairs, termen excavated between lobe and vein 1 b; dark grey; cilia grey with darker subbasal shade, tips whitish.

Mahé, Cascade Estate, 800 feet, in February; one specimen. Also from W. Africa. Described by Lord Walsingham from a single ♀; I therefore describe the ♂.

12. *Argyroploce hygrantis*, n. sp.

♂. 17 mm. Head and palpi dark fuscous, palpi ascending. Thorax dark fuscous, patagia and crest bright leaden-metallic. Posterior tibiæ and basal joint of tarsi with large expanded brush of white hairs above, suffused with grey beneath, tarsi short. Forewings elongate-triangular, costa gently arched, apex obtuse, termen slightly rounded, rather oblique; dark fuscous, thickly strewn with small irregular spots of raised bright bluish-leaden-metallic scales except along costa, in middle of disc only thinly, posteriorly tending to coalesce into thick striæ: cilia rather dark leaden-fuscous. Hindwings reduced in size, beneath with subdorsal groove terminating in a tornal patch of dense rough whitish-ochreous scales; grey, along dorsum suffused with whitish; cilia whitish, round apex tinged with grey, round tornus with ochreous.

Silhouette, south side of Mont Pot-à-eau, at 1500 feet, in August; one specimen.

13. *Argyroploce leucaspis* Meyr.

Silhouette, Mare aux Cochons plateau; Felicité; in September and December, two specimens. Common in India and Ceylon, and occurs also in the Maldive Islands; probably introduced.

14. *Argyroploce conchopleura*, n. sp.

♂. 12 mm. Head ochreous-brownish. Palpi porrected, whitish, slightly marked with fuscous, terminal joint rather long. Thorax light brownish, sides beneath wings suffused with violet-white. Abdomen grey. Posterior tibiæ without tuft. Forewings elongate, rather dilated posteriorly, costa anteriorly gently, posteriorly hardly arched, apex obtuse, termen slightly sinuate, vertical; brownish sprinkled with black, more ochreous-brown towards apex, crossed throughout by oblique irregular blue-leaden-metallic striæ rising from pairs of whitish costal strigulæ, costal edge blackish between these; costal third of central fascia moderate, obliquely blackish; a blackish longitudinal mark resting on termen above middle, cut by a white mark; ocellus margined laterally with blue-leaden-metallic, and containing a transverse series of four linear black marks: cilia fuscous mixed with blackish. Hindwings with 3 and 4 connate; dark grey; cilia light grey with darker subbasal shade, tips whitish.

Silhouette, Mare aux Cochons plateau, 1000 feet, in September; one specimen. Allied to the Indian *dimorpha* Meyr.

LASPEYRESIA Hueb.

15. *Laspeyresia miranda*, n. sp.

♂♀. 13 mm. Head pale ochreous, crown suffused with rosy-grey. Palpi ochreous-whitish. Thorax greyish-purple. Abdomen dark purplish-grey. Forewings elongate, moderate, rather dilated posteriorly, costa slightly arched, apex obtuse, termen somewhat sinuate beneath apex, rounded, little oblique; red-brown, crossed by suffused purple striæ rising from pairs of very short whitish costal strigulæ; two larger wedge-shaped white strigulæ on costa before apex; undefined patches of darker or greyish suffusion on dorsum before middle and about $\frac{3}{4}$, indicating margins of a dorsal patch hardly lighter than ground-colour; two small blackish dots towards termen in middle: cilia grey, with blackish-grey basal line. Hindwings orange; a moderate blackish-grey terminal fascia; cilia whitish-grey, with blackish-grey basal line.

Aldabra; two specimens.

Gelechiadæ.

ARISTOTELIA Hueb.

16. *Aristotelia schematias*, n. sp.

♀. 10 mm. Head and thorax ochreous-whitish, shoulders dark fuscous. Palpi rather stout, whitish, second and terminal joints each with two blackish rings. Abdomen grey. Forewings elongate, narrow, costa gently arched, apex obtuse, termen extremely obliquely rounded; 6 separate; brown suffused with dark fuscous irroration; an oblique ochreous-white fascia towards base; an oblique whitish streak from costa at $\frac{1}{3}$, running into a rather narrow somewhat curved whitish postmedian fascia, both these somewhat mixed with blue-grey; stigmata indistinct, formed by blackish irroration, discal approximated, plical before first discal, a curved white line running from postmedian fascia round upper edge of first discal and thence direct beyond plical to dorsum; a white spot on costa

at $\frac{5}{6}$, whence a blue-grey line edged anteriorly with white and containing a blackish dot in disc runs to tornus; three minute white dots on termen extending into cilia: cilia pale greyish, with two blackish lines, each followed by an ochreous line. Hindwings light grey; cilia whitish-ochreous tinged with grey.

Mahé, Cascade Estate, in December; one specimen. Seemingly more allied to the widely distributed *peltosema* Low. than to any other known species.

Idiophantis Meyr.

17. *Idiophantis spectrata*, n. sp.

♂. 15 mm. Head light fuscous, sides of crown tinged with yellow, face whitish, eyes crimson. Palpi grey. Thorax light fuscous. Abdomen dark grey. Forewings elongate, rather narrow, costa slightly arched, termen with deep semicircular excavation between narrow pointed apical and broad rounded-obtuse tornal prominence; 2 and 3 separate, 6 present; light fuscous; a white stria from $\frac{2}{3}$ of costa to tornus, rounded-angulated in middle, edged with dark grey and on lower half suffused with grey, margined anteriorly by an orange-ochreous stria, and posteriorly on upper half by a similar stria terminated beneath by a black dot; an orange streak in apical prominence: cilia golden-metallic with coppery-purple reflections. Hindwings light grey, lower margin of cell somewhat darker-suffused, on lower surface with a fringe of hairs along it; cilia ochreous-whitish with two grey shades, round apex yellower between these.

Mahé, Cascade Estate, about 1300 feet, in a spot with many large *Pandanus Hornei*, in February; two specimens.

Chaliniastis Meyr.

18. *Chaliniastis chromatica*, n. sp.

♀. 10 mm. Head grey, sides ochreous-whitish. Palpi ochreous-whitish, second and terminal joints each with two black bands, terminal as long as second. Thorax ferruginous mixed with grey dorsally, patagia edged with whitish. Abdomen grey. Forewings elongate, narrow, costa slightly arched, apex obtuse, termen faintly sinuate, oblique; ferruginous, sprinkled with grey; costa suffused with dark fuscous, and marked with four irregular oblique white streaks, and two ochreous-white spots before apex; a trilobate patch of ground colour on middle of dorsum edged with some black scales and then with a white line; before and beyond this are curved white lines in disc, edged beneath with black scales, appearing to indicate somewhat rounded patches, but not extended to dorsum; a sinuate white line from penultimate costal spot to tornus; a white line along termen, edged with some black scales: cilia ochreous-whitish, with a ferruginous ante-median line mixed with black. Hindwings 1, apex prominent, termen sinuate; light grey; cilia ochreous-grey-whitish.

Silhouette, forest above Mare aux Couchons in September; one specimen.

Thiotricha Meyr.

19. *Thiotricha tenuis* Wals.

(*Polyhymno* (?) *tenuis* Wals., Trans. Ent. Soc. Lond., 1891, 96, pl. iv. 33.)

♂♀. 8—9 mm. Head and thorax shining white. Palpi white, anterior edge of terminal joint dark fuscous. Abdomen ochreous-whitish. Forewings elongate, narrow, costa almost straight, apex pointed, termen sinuate, oblique; 6, 7, 9 separate; shining white; sometimes an irregular oblique dark fuscous spot from dorsum before middle; a very oblique dark fuscous wedge-shaped spot on costa about $\frac{3}{4}$, from apex of which a dark fuscous line runs back to submedian fold before tornus, terminating usually in an irregular dark fuscous spot along posterior third of dorsum, which spot is however in one specimen obsolete; a fuscous or ochreous-fuscous apical patch touching angle of preceding, and including a black apical dot: cilia whitish or whitish-grey, towards base silvery-metallic on upper part of termen, at apex with three diverging dark fuscous hooks. Hindwings light grey, thinly scaled anteriorly; an oblique bar between vein 1c and middle of cell; cilia whitish-ochreous-grey or grey-whitish.

Silhouette, Mare aux Cochons plateau; Mahé, near Morne Blanc, 1000 feet; in September and October, two specimens. Also two specimens from Cerf Island (Fletcher) in October, and occurs in W. Africa. Varies rather considerably in development of markings.

Phthorimæa Meyr.

20. *Phthorimæa operculella* Zell.

Mahé, near Morne Blanc; one specimen. Also one received from Mr T. B. Fletcher. An introduced species, of which the larva is a highly injurious pest of the potato.

Onebala Walk.

21. *Onebala cubiculata*, n. sp.

♂. 12—13 mm. Head and thorax fuscous, crown with a whitish-ochreous line above each eye. Palpi ochreous-whitish, second joint light fuscous except apex, terminal joint with some light fuscous suffusion towards middle. Antennæ whitish-ochreous. Abdomen pale fuscous. Forewings elongate, somewhat dilated posteriorly, costa gently arched, apex obtuse, termen nearly straight, rather oblique; 3 absent, 2 and 4 stalked, 5 approximated, 7 absent, 8 and 9 stalked; fuscous; a dark fuscous basal patch occupying $\frac{2}{5}$ of wing, edged by an irregularly sinuate cloudy line of whitish-ochreous suffusion; second discal stigma well marked, transverse, dark fuscous; a small whitish spot on costa at $\frac{4}{5}$, whence an irregularly sinuate cloudy whitish-ochreous line runs to dorsum before tornus: cilia fuscous. Hindwings grey; cilia whitish-fuscous, with fuscous subbasal shade.

Silhouette, Mare aux Cochons plateau, 1000 feet, in September; two specimens.

Brachmia Hueb.

22. *Brachmia nesidias*, n. sp.

♀. 10—11 mm. Head ochreous-whitish. Palpi ochreous-whitish, second joint slightly sprinkled with brownish. Thorax pale whitish-ochreous, shoulders mixed with ferruginous-ochreous. Abdomen pale greyish. Forewings elongate, rather narrow, costa gently arched, apex obtuse, termen rounded, rather strongly oblique; 7 to apex, 8 and 9

out of 7; pale whitish-ochreous, longitudinally streaked with ferruginous-brownish suffusion between veins; plical and first discal stigmata indicated by a few longitudinally scattered dark fuscous scales, second discal forming a distinct dark fuscous dot; some dark fuscous scales on termen towards apex: cilia ferruginous-brownish, mixed with whitish-ochreous. Hindwings pale grey; cilia whitish-ochreous.

Mahé, Cascade Estate, 800 feet, in February, one specimen. Also two taken by Mr T. B. Fletcher in same locality in November. Allied to the European *rufescens*.

23. *Brachmia cricopa*, n. sp.

♂♀. 13 mm. Head pale ochreous. Palpi whitish-ochreous, irrorated with dark fuscous except at apex. Thorax dark fuscous. Abdomen grey. Forewings elongate, rather narrow, costa gently arched, apex obtuse, termen slightly rounded, somewhat oblique; 7 and 8 stalked, 7 to apex; purplish-fuscous; discal stigmata represented by a few blackish scales surrounded by pale ochreous rings, second larger, plical reduced to a pale ochreous dot, slightly before first discal: cilia fuscous. Hindwings and cilia light grey.

Mahé, near Morne Blanc, 800 feet, in October; Silhouette, low cultivated country, in September; two specimens.

24. *Brachmia microsema*, n. sp.

♀. 15 mm. Head, palpi, and thorax dark fuscous, apex of palpi whitish. Abdomen grey. Forewings elongate, rather narrow, costa slightly arched, apex obtuse, termen nearly straight, somewhat oblique; 7 and 8 stalked, 7 to apex; dark purplish-fuscous; stigmata black, plical beneath first discal, edged anteriorly by a small whitish dot; an ochreous-whitish dot on costa at $\frac{3}{4}$: cilia dark purplish-fuscous. Hindwings and cilia grey.

Mahé, near Morne Blanc, 800 feet, in October; one specimen.

Paraspistes Meyr.

25. *Paraspistes ioloncha* Meyr.

Two examples, more strongly marked than usual, discal stigmata especially well marked; Mahé, Cascade Estate, in January and February. A common Ceylon species, probably introduced; the larva feeds in pods of *Crotalaria* (Indian hemp).

Allocota Meyr.

26. *Allocota procax*, n. sp.

♂. 11 mm. Head and thorax grey-whitish. Palpi white irrorated with grey, second joint blackish except towards apex, tuft very short, terminal joint twice second, thickened with scales but without distinct projection, with five indistinct dark fuscous rings. Abdomen grey, genital organs clothed with whitish-ochreous hairs. Forewings elongate, rather narrow, costa moderately arched, apex obtuse, termen very obliquely rounded; 6 to termen; whitish irrorated with grey; a black linear dot beneath costa near base; a dark fuscous costal mark at $\frac{1}{5}$, a black subdorsal dot at $\frac{1}{4}$, and some indistinct grey marking between these; some undefined fuscous suffusion in middle of

disc, round which are a blackish dot above middle at $\frac{2}{5}$, a moderate dark fuscous spot on middle of costa, and an undefined streak of blackish scales along fold beneath middle; two or three small dark fuscous spots on costa beyond middle; terminal fourth irregularly suffused with fuscous, with some blackish scales towards tornus. Hindwings 1, grey; cilia light grey.

Mahé, Cascade Estate, 800 feet, in February; one specimen.

Trichotaphe Clem.

27. *Trichotaphe seminata*, n. sp.

♀ 11—12 mm. Head and thorax fuscous. Palpi whitish, second joint dark fuscous except apex, anterior edge of terminal joint suffused with dark fuscous. Abdomen fuscous. Forewings elongate, rather narrow, costa anteriorly gently arched, posteriorly nearly straight, apex obtuse, termen slightly rounded, oblique; ashy-fuscous, with scattered black scales, posteriorly more numerous and tending to form series between veins; extreme costal edge ochreous-whitish from base to middle; a blackish dot in disc at $\frac{1}{4}$; stigmata cloudy, blackish, discal approximated, plical small, rather before first discal; a cloudy ochreous-whitish dot on costa at $\frac{2}{3}$; a hardly defined curved shade of black irroration from this to tornus; a series of black dots round apical part of costa and termen: cilia pale greyish, towards base paler barred with darker and limited by a darker antemedian line. Hindwings rather dark grey; cilia light grey, with darker subbasal shade.

Aldabra; two specimens.

Ypsolophus Fabr.

28. *Ypsolophus ianthes* Meyr.

(*Ypsolophus ianthes* Meyr., Trans. Ent. Soc. Lond., 1887, 273; *Y. ochrophanes* Meyr., Journ. Bomb. Nat. Hist. Soc. xvii. 981.)

Mahé, Port Victoria, in February; one specimen. Also occurs in India, Ceylon, and Réunion, doubtless artificially spread; the larva feeds on *Medicago*, *Cyamopsis*, and other *Leguminosæ*. I have recognised from the material now available that the two names quoted above indicate only one species, the type of *ianthes* being an example with the normal dark clouding nearly obsolete.

Metachandidæ.

Metachanda, n. gen.

Head with appressed scales; ocelli absent; tongue developed. Antennæ $\frac{4}{5}$, in ♂ ciliated, basal joint moderate, without pecten. Labial palpi very long, recurved, second joint with appressed scales, terminal shorter, moderate, acute. Maxillary palpi very short, filiform, appressed to tongue. Posterior tibiæ rough-scaled above. Forewings with 2 from near angle, 7 absent, 11 from middle. Hindwings 1, trapezoidal-ovate, cilia $\frac{1}{2}$; 3 and 4 connate, transverse vein obsolete, 5 and 6 absent (median fold well marked, looking like a vein).

Type *M. thaleropis*. This genus is the type of a group, characterised by the absence

of veins 7 of forewings and 6 of hindwings, and not known at present except from the Mascarene Islands. It appears to be probably allied to the considerable Indo-Malayan genus *Autosticha*, in which however vein 6 of hindwings is present as usual. The other described genera of the group are *Chanystis* described below; and *Ancylometis* Meyr., which contains two species from Mauritius and Réunion; the third species attributed to it, viz. *astrapias* Meyr., is properly referred to *Metachanda*, and is also from Mauritius. In my description of *Ancylometis* vein 6 of hindwings is wrongly stated to be present, as I mistook the submedian fold for it; otherwise the characters are correctly given, *Ancylometis* being distinguished from *Metachanda* by the presence of vein 5 of hindwings; it is therefore the most primitive of the three genera. I have three other genera from Mauritius.

29. *Metachanda trixantha*, n. sp.

♂♀. 9—11 mm. Head and thorax ochreous-yellow, shoulders dark fuscous. Palpi ochreous-yellow, second joint with dark fuscous subapical ring. Abdomen grey, anal tuft whitish-ochreous. Forewings elongate, rather narrow, costa gently arched, apex obtuse, termen very obliquely rounded; orange-yellow; markings dark purplish-fuscous edged with black irroration; a small elongate spot on base of costa; moderately broad fasciæ at $\frac{1}{3}$ and $\frac{2}{3}$, somewhat dilated on margins; an apical patch or terminal fascia narrowed beneath, not reaching tornus: cilia dark purplish-fuscous. Hindwings and cilia grey.

Silhouette, Mare aux Cochons plateau, 1000 feet; Mahé, Morne Seychellois (1500 feet) and Cascade Estate; in September, and from December to February, twenty-four specimens.

30. *Metachanda columnata*, n. sp.

♂♀. 9—10 mm. Head pale yellowish, sides of crown dark fuscous. Palpi yellow-whitish, towards base sprinkled with dark fuscous. Thorax pale yellow, anterior margin dark fuscous. Abdomen ochreous-whitish. Forewings elongate, rather narrow, costa gently arched, apex obtuse, termen rounded, rather strongly oblique; pale yellow; markings purplish-fuscous irrorated with black; a spot on base of costa; a narrow fascia from $\frac{3}{4}$ of costa to dorsum before tornus, more or less obsolete towards costa: cilia pale yellowish. Hindwings and cilia ochreous-whitish.

Silhouette, south side of Mont Pot-à-eau, 1500 feet, in August; three specimens.

31. *Metachanda hydraula*, n. sp.

♀. 12 mm. Head whitish, crown with a fuscous central patch. Palpi white, posteriorly blackish. Thorax whitish, with a dark fuscous stripe on each side. Abdomen grey. Forewings elongate, narrow, costa slightly arched, apex obtuse, termen very obliquely rounded; blackish-fuscous; veins marked with irregular-edged ochreous-white lines; an ochreous-white line along dorsum and termen: cilia whitish, with dark fuscous basal shade. Hindwings rather dark grey; cilia grey.

Silhouette, Mare aux Cochons plateau, in September; one specimen.

32. *Metachanda glaciata*, n. sp.

♀. 15 mm. Head and thorax blackish-grey. Palpi black, second joint with two undefined rings and extreme apex white, terminal joint with submedian ring and apex white. Abdomen grey. Forewings elongate, costa gently arched, apex obtuse, termen obliquely rounded; ochreous-white; markings dark ashy-grey mixed with black; a moderate basal fascia; a trapezoidal spot on costa at $\frac{2}{5}$; stigmata large, plical slightly beyond first discal, second discal confluent with angle of lower of two confluent triangular blotches occupying tornus and termen; a quadrate blotch on costa at $\frac{2}{3}$, its angles touching second discal stigma and angle of terminal blotch: cilia ashy-grey, mixed with dark grey towards base. Hindwings and cilia grey.

Silhouette, Mare aux Cochons plateau, 1000 feet, in September; one specimen.

33. *Metachanda mormodes*, n. sp.

♂. 12 mm. Head, thorax, and abdomen dark fuscous, face paler. Palpi grey, terminal joint darker. Forewings elongate, rather dilated posteriorly, costa gently arched, apex obtuse, termen rounded, rather oblique; dark purplish-fuscous; base blackish; black fascia-form blotches from dorsum at $\frac{1}{3}$ and beyond middle, first reaching $\frac{3}{4}$ across wing, margined above and on upper $\frac{2}{3}$ posteriorly by a curved orange black-edged streak, second reaching $\frac{2}{3}$ across wing, with a curved orange line running round its upper half, and an oblique orange mark across its lower anterior angle; a somewhat curved orange black-edged streak running from $\frac{2}{3}$ of costa towards tornus but not quite reaching it, attenuated beneath: cilia purplish-grey, with blackish basal line. Hindwings blackish-grey; cilia light grey, with blackish basal line.

Mahé, near Morne Blanc, 800 feet, in October; two specimens.

34. *Metachanda noctivaga*, n. sp.

♂. 8 mm. Head and thorax shining dark grey, lower part of face suffused with ochreous-whitish. Palpi rather short, ochreous-white, second and terminal joints each with two suffused dark fuscous bands. Abdomen dark fuscous, anal tuft mixed with pale ochreous. Forewings elongate, costa gently arched, apex obtuse, termen rounded, rather strongly oblique; shining dark leaden-fuscous; markings blackish-fuscous; a spot on costa near base, edged beneath with an ochreous-whitish dot; a narrow fascia at $\frac{1}{3}$, on which first discal and plical stigmata appear as black spots preceded by ochreous-whitish dots; a larger spot on costa at $\frac{2}{3}$, from which proceed a fascia to dorsum at $\frac{3}{4}$, containing two black spots preceded by ochreous-whitish dots, upper representing second discal stigma, and also a slender angulated fascia running to tornus: cilia shining dark leaden-fuscous. Hindwings dark fuscous; cilia fuscous, darker towards base.

Silhouette, Mare aux Cochons plateau, 1000 feet, in September; one specimen.

35. *Metachanda prodelta*, n. sp.

♂♀. 9—11 mm. Head and thorax rather dark bronzy-fuscous. Palpi blackish, more or less sprinkled with ochreous-whitish, apex of joints ochreous-whitish. Abdomen dark fuscous. Forewings elongate, rather narrow, somewhat dilated posteriorly, costa gently arched, apex obtuse, termen very obliquely rounded; dark fuscous tinged with purplish, sometimes more or less sprinkled with ochreous-whitish; markings blackish,

edged in ♂ with scattered ochreous-whitish scales, in ♀ with whitish-ochreous suffusion; a quadrate blotch on base of costa; a triangular blotch on costa before middle, its apex formed by first discal stigma; plical stigma represented by a moderate spot rather obliquely before this; an 8-shaped spot representing second discal stigma, and a spot on dorsum beneath it; a spot on costa at $\frac{3}{4}$, whence a curved interrupted line runs to tornus, these pale-edged posteriorly only: cilia dark grey. Hindwings dark fuscous; cilia dark grey.

Mahé, Cascade Estate, 1000 feet; Silhouette, forest above Mare aux Cochons, 1000 feet; Felicité; in September and from December to February, ten specimens.

36. *Metachanda thaleropis*, n. sp.

♂♀. 8—10 mm. Head, thorax, and abdomen fuscous, face whitish-tinged. Palpi dark fuscous sprinkled with whitish. Forewings elongate, rather narrow, costa gently arched, apex obtuse, termen very obliquely rounded; whitish, irrorated with dark fuscous, in ♀ more or less wholly suffused with brown-grey; markings variably mixed with ferruginous brown and black; a spot on costa near base; first discal and plical stigmata round, plical rather obliquely beyond first discal, sometimes united into a bar; a similar spot between and above first and second discal; second discal similar, forming with a spot on costa at $\frac{3}{4}$ and a transverse mark from dorsum before tornus a more or less complete slender fascia; a spot towards termen in middle; two or three undefined dots on costa posteriorly: cilia ochreous-whitish, sprinkled or dotted with blackish irroration. Hindwings and cilia grey.

Mahé, Cascade Estate (1000 feet) and Port Victoria; Silhouette, Mare aux Cochons plateau (1000 feet) and south side of Mont Pot-à-eau (1500 feet); in August, September, and from December to February, thirty-one specimens.

37. *Metachanda classica*, n. sp.

♂♀. 10—11 mm. Head and thorax whitish, sometimes sprinkled with grey. Palpi whitish, suffusedly sprinkled or banded with blackish. Abdomen grey, anal tuft whitish-ochreous. Forewings elongate, rather narrow, costa gently arched, apex obtuse, termen very obliquely rounded; white sprinkled with dark fuscous; blackish spots on costa near base and at $\frac{2}{5}$, accompanied beneath by ferruginous-ochreous marks; stigmata small, blackish, accompanied by small ferruginous-ochreous spots, plical obliquely before first discal, an additional dot beneath second discal, and a small spot between and above first and second discal; a spot of blackish and ochreous scales on costa at $\frac{2}{3}$, one on dorsum before tornus, and one towards termen in middle, united by a more or less defined angulated ferruginous-ochreous line: cilia ochreous-whitish, base sprinkled with dark fuscous. Hindwings in ♂ pale grey, in ♀ grey; cilia whitish-ochreous, in ♀ tinged with grey.

Mahé, Cascade Estate, 1000 feet; Silhouette, south side of Mont Pot-à-eau, 1500 feet; in September, January, and February, three specimens. More brightly marked than the preceding, from which it may be distinguished by different position of plical stigma.

38. *Metachanda fortunata*, n. sp.

♂♀. 8—10 mm. Head shining fuscous, sides whitish-ochreous. Palpi dark fuscous sprinkled with whitish-ochreous, second joint with a blackish subapical ring. Thorax fuscous sprinkled with whitish-ochreous. Abdomen fuscous. Forewings elongate, rather narrow, costa gently arched, apex obtuse, termen very obliquely rounded; shining fuscous or purplish-grey, suffusedly sprinkled with whitish-ochreous; markings black, edged with ferruginous-ochreous; a spot on costa near base; a spot beneath costa at $\frac{2}{5}$; first discal stigma small, its margin confluent with preceding, plical large, irregular, obliquely before first discal, second discal represented by an 8-shaped spot; a spot on dorsum before tornus, sometimes touching second discal stigma; a small spot on costa at $\frac{3}{4}$, whence an angulated line of black and ferruginous scales runs to tornus: cilia grey, basal half dark grey barred with whitish-ochreous. Hindwings rather dark grey; cilia grey.

Mahé, Cascade Estate, 1000 feet; Silhouette, forest above Mare aux Cochons, 1000 feet; Felicité; in September, December, and February, thirteen specimens.

39. *Metachanda miltospila*, n. sp.

♂♀. 12—13 mm. Head and thorax greyish-ochreous, shoulders with a spot of blackish suffusion. Palpi ochreous-whitish, second joint blackish except apex, terminal joint sometimes sprinkled with black. Abdomen pale ochreous irrorated with grey. Forewings elongate, rather narrow, slightly dilated posteriorly, costa gently arched, apex obtuse, termen very obliquely rounded; brownish-ochreous, sometimes irrorated with light grey; an irregular black spot on costa near base, containing a tuft of scales, beyond which are an orange-red dot beneath costa and oblique mark on fold; an orange-red dot above dorsum near base; stigmata orange-red, first discal elongate, connected with a triangular black spot of raised scales on costa at $\frac{2}{5}$, plical obliquely before first discal, plical and second discal accompanied by a few black scales or black dot beneath, and a similar red spot on dorsum obliquely before second discal; a black mark on costa at $\frac{3}{4}$, whence an angulated interrupted orange-red line with a few black scales runs to tornus: cilia pale ochreous, basal half tinged with orange-reddish and indistinctly spotted with blackish-grey irroration. Hindwings grey or pale grey; cilia pale greyish-ochreous or whitish-ochreous.

Mahé, Cascade Estate and near Morne Blanc, 800 feet; Silhouette, forest above Mare aux Cochons and south side of Mont Pot-à-eau, 1500 feet; from August to January, five specimens.

40. *Metachanda fumata*, n. sp.

♂♀. 9—13 mm. Head grey, sides of crown pale ochreous. Palpi ochreous-whitish, second joint dark fuscous except apex. Thorax pale ochreous sometimes suffused with grey, shoulders suffused with blackish. Abdomen in ♂ blackish-grey, anal tuft pale ochreous suffused with grey towards base, in ♀ dark grey. Forewings elongate, rather narrow, costa gently arched, apex obtuse, termen very obliquely rounded; pale ochreous more or less sprinkled with grey or dark grey, sometimes clouded with rather dark purplish-fuscous; a blackish blotch on base of costa; an undefined streak of blackish

irroration along costa towards middle, and a black dot beneath middle of costa touching it; plical and second discal stigmata black, often partly edged with light ferruginous, and an additional similar dot beneath and slightly beyond second discal; sometimes a short light ferruginous streak in middle of disc; a black dot on dorsum before tornus; a small black spot on costa at $\frac{3}{4}$, whence an angulated ferruginous line runs to tornus, sometimes marked with black at angle: cilia pale ochreous, towards base more or less spotted or barred with blackish suffusion. Hindwings dark grey, in ♂ with basal half blackish-tinged, cilia grey.

Mahé, Cascade Estate and near Morne Blanc (1000 feet); Silhouette, Mare aux Cochons plateau and south side of Mont Pot-à-eau (1500 feet); Felicité; from August to February, thirty-seven specimens.

41. *Metachanda crypsitricha*, n. sp.

♂♀. 10—12 mm. Head and thorax whitish-ochreous, shoulders blackish. Palpi whitish-ochreous, second joint dark fuscous except towards apex. Abdomen whitish-ochreous, more or less suffused with grey. Forewings elongate, rather narrow, costa gently arched, apex obtuse, termen rounded, rather strongly oblique; whitish-ochreous, with some scattered dark fuscous scales, and more or less marked with variable elongate patches of brown suffusion in disc and towards dorsum and posteriorly; a blackish mark extending along basal fifth of costa; a blackish streak along costa from $\frac{1}{4}$ to $\frac{3}{5}$, attenuated and sometimes indistinctly marked posteriorly; stigmata rather small, black, first discal absent, an additional dot beneath and slightly beyond second discal; an oblique black strigula on costa at $\frac{3}{4}$, and one on dorsum towards tornus: cilia on costa whitish-ochreous, on termen pale grey, basal third whitish-ochreous barred with blackish. Hindwings light grey, paler in ♀; in ♂ on under-surface with a deep groove beneath cell, filled with blackish hairscales and with some long pale yellowish hairs towards its apex; cilia pale whitish-ochreous.

Mahé, Mare aux Cochons, Morne Blanc, Cascade Estate, Port Victoria, and Anonyme Island; Silhouette, Mare aux Cochons and Mont Pot-à-eau; from September to February, eighty-three specimens.

42. *Metachanda autocentra*, n. sp.

♂. 12—13 mm. ♀. 15 mm. Head and thorax light brownish-ochreous, in ♀ somewhat infuscated. Palpi ochreous-whitish, second joint irrorated with dark fuscous except at apex, terminal joint irrorated with dark fuscous at base and on anterior edge. Abdomen greyish, anal tuft whitish-ochreous. Forewings elongate, posteriorly slightly dilated, costa gently arched, apex obtuse, termen rounded, oblique; in ♂ light brownish-ochreous, in ♀ fuscous; some scattered dark fuscous scales towards costa, and sometimes posteriorly; a black dot on base of costa, one beneath costa near base, and one above dorsum near base; stigmata well marked, black, plical somewhat before first discal; a more or less developed strongly curved subterminal series of blackish dots running from a small spot on costa at $\frac{2}{3}$ to a well-marked dot on dorsum before tornus; sometimes a terminal series of indistinct dark fuscous dots: cilia in ♂ whitish-ochreous, in ♀ greyish-

ochreous spotted with fuscous at base. Hindwings in ♂ light grey, cilia whitish, in ♀ grey, cilia grey.

Silhouette, forest above Mare aux Cochons; Felicité; in September and December, seven specimens.

Chanystis, n. gen.

Head with loosely appressed scales; ocelli absent; tongue developed. Antennae $\frac{4}{5}$, in ♂ shortly ciliated, basal joint elongate, without pecten. Labial palpi very long, recurved, second joint clothed with dense scales, roughly projecting above and angularly at apex beneath, terminal joint as long as second, moderate, sometimes loosely scaled posteriorly, acute. Maxillary palpi rudimentary. Posterior tibiæ clothed with rough scales above. Forewings with 2 from near angle, 7 absent, 11 from middle. Hindwings 1, elongate-ovate, cilia $\frac{4}{5}$; 3 and 4 connate, transverse vein obsolete, 5 and 6 absent.

Type *C. syrtopa*. Only differs essentially from *Metachanda* in the scaling of the palpi.

43. *Chanystis syrtopa*, n. sp.

♂♀. 15—16 mm. Head and thorax whitish-ochreous, patagia with a fuscous stripe. Palpi ochreous-whitish, second joint sprinkled with dark fuscous except at apex, terminal joint with some dark fuscous scales towards middle. Abdomen whitish-ochreous irrorated with grey. Forewings elongate, rather narrow, costa gently arched, apex obtuse, termen obliquely rounded; whitish-ochreous; some irregular purplish-fuscous markings, viz., a rather broad subdorsal streak from near base to $\frac{3}{5}$, another from base of costa above fold to tornus, a third from $\frac{1}{3}$ of costa to disc beyond middle, and a fourth rather downcurved from near costa beyond this to apex, marked with a patch of blackish irroration beyond its middle; some scattered black scales along costa; a black scaletuft beneath costa near base; stigmata represented by black scaletufts, first discal large, plical beneath first discal, below fold, second discal reduced to a few scales, an additional black tuft beneath and rather beyond this; an oblique interrupted series of scattered black scales from costa at $\frac{3}{5}$, reaching $\frac{1}{3}$ across wing: cilia whitish-ochreous, with a median series of black spots. Hindwings whitish-ochreous suffused with pale grey; cilia whitish-ochreous.

Silhouette, south side of Mont Pot-à-eau, 1500 feet, in August; two specimens.

44. *Chanystis botanodes*, n. sp.

♂♀. 15—18 mm. Head whitish-ochreous. Palpi whitish-ochreous, second joint sprinkled with dark fuscous except towards apex, terminal joint loosely scaled posteriorly, sprinkled with dark fuscous towards middle. Thorax whitish-ochreous, tinged with brownish and irrorated with dark fuscous on shoulders and sometimes also in middle. Abdomen whitish-ochreous, variably irrorated with dark fuscous. Forewings elongate, rather narrow, costa gently arched, apex obtuse, termen obliquely rounded; whitish-ochreous or pale yellow-ochreous, with some scattered dark fuscous scales; a suffused dark fuscous spot on costa towards base, terminated beneath by a large tuft of yellow-ochreous scales mixed with dark fuscous; stigmata forming tufts of blackish and yellow-ochreous scales, first discal very large, placed with plical on a fascia of dark fuscous

suffusion, second discal and a dark fuscous spot beneath it edged with yellow-ochreous so as to form a somewhat 8-shaped patch, discal area before, between, and beyond stigmata forming a large greyish-purple patch sometimes reaching dorsum anteriorly; a spot of dark fuscous suffusion on costa at $\frac{2}{3}$; a large irregular suffused dark fuscous apical spot: cilia whitish-ochreous, on basal half spotted with dark fuscous. Hindwings in ♂ pale whitish-ochreous tinged with grey, in ♀ pale grey; cilia whitish-ochreous, with faint greyish subbasal shade.

Silhouette, forest above Mare aux Cochons, and south side of Mont Pot-à-eau, 1500 feet, in August and September; six specimens.

Cosmopterygidæ.

Cosmopteryx Hueb.

45. *Cosmopteryx mimetis* Meyr.

Mahé, Cascade Estate, and near Morne Blanc, 800 feet, in October and February; six specimens. Occurs also in Mauritius, Ceylon, India, Borneo, New Guinea, and Australia; probably attached to some cultivated plant.

46. *Cosmopteryx ingeniosa* Meyr.

St Anne Island, one specimen received from Mr T. B. Fletcher. Occurs also in India; probably introduced.

Stagmatophora Herr.-Schäff.

47. *Stagmatophora ilarcha*, n. sp.

♂♀. 14 mm. Head shining white, crown with a brownish-ochreous central line, eyes crimson. Palpi white, anterior edge of terminal joint dark fuscous. Thorax shining white, patagia and an incomplete central line brownish-ochreous. Abdomen grey. Forewings elongate-lanceolate; deep yellow-ochreous, sometimes tinged with ferruginous-brown; costal edge slenderly suffused with white, sometimes posteriorly extending broadly over wing; a violet-blue-metallic streak from base through disc to $\frac{2}{3}$, then curved downwards and running up to a black anteriorly white-edged mark on costa at $\frac{5}{6}$; a rather broad irregular-edged white streak along dorsum from base to tornus, with a more or less marked prominence posteriorly, and margined towards this with some blackish scales; apical area more or less wholly shining white: cilia pale grey or whitish, on termen broadly ferruginous-brown or ferruginous towards base. Hindwings grey; cilia whitish-ochreous, sometimes partially suffused with grey.

Silhouette, Mare aux Cochons plateau, 1000 feet; Mahé, near Morne Blanc and Cascade Estate, 1000 feet; in September, October, and February, six specimens.

48. *Stagmatophora hieroglypta*, n. sp.

♀. 15 mm. Head and thorax pale shining brownish-ochreous. Palpi whitish, second and terminal joints each with three blackish rings. Abdomen ochreous-whitish, beneath with oblique blackish lateral bars. Forewings elongate-lanceolate; shining pale brownish, slightly pinkish-tinged, suffusedly irrorated with fuscous; a blackish dot on base of costa, edged beneath with whitish; a slightly curved oblique white transverse line at $\frac{1}{3}$,

anteriorly edged with black: stigmata rather large, black, partly edged with white, united by a trifurcate white line, plical beneath first discal; a suffused white oblique line running along central fifth of costa and thence to above second discal stigma, and an oblique white costal striga near beyond this, separated from it by blackish suffusion; a suffused white mark along lower part of termen, and two small wedgeshaped white marks on upper part, separated with black; a small white wedgeshaped mark on costa towards apex, followed by some black suffusion: cilia pale greyish-ochreous, round apex whitish with a black hook, beneath apex with a basal patch of black suffusion between the white wedgeshaped marks. Hindwings grey; cilia light greyish-ochreous.

Mahé, near Morne Blanc, 1000 feet, in October; one specimen.

49. *Stagmatophora acris*, n. sp.

♂♀. 8—10 mm. Head ochreous-whitish, back of crown more or less suffused with pinkish-brown, eyes marginally suffused with crimson. Palpi whitish, terminal joint with blackish subapical band. Antennæ whitish ringed with dark fuscous, towards apex with several alternate blackish and whitish bands. Thorax light pinkish-ochreous-brown. Abdomen grey. Forewings narrowly elongate-lanceolate, very long-pointed; light pinkish-ochreous-brown; an oblique curved whitish transverse line at $\frac{1}{3}$, edged anteriorly with some black scales on lower half, posteriorly suffused, expanded towards costa and marked on posterior edge with a black subcostal dot; stigmata irregular, black, partly edged with white, first discal in middle, plical beneath it; termen somewhat marked with whitish, especially towards apex: cilia light pinkish-ochreous-brown, towards tornus light grey, beneath apex mixed with black at base. Hindwings dark grey; cilia grey.

Mahé, Mare aux Cochons, Morne Blanc, and Cascade Estate, about 1000 feet; Felicité; from September to December, thirty-three specimens.

50. *Stagmatophora tentoria*, n. sp.

♂♀. 8—10 mm. Head ochreous-whitish, back of crown tinged with pinkish-ochreous. Palpi ochreous-whitish, with three fuscous rings of second joint and two of terminal indistinctly indicated, and a blackish subapical band. Antennæ whitish ringed with dark fuscous, towards apex with several alternate blackish and whitish bands. Thorax ochreous-brown, with white postmedian bar. Abdomen grey, three basal segments yellow-whitish with black margins. Forewings narrowly elongate-lanceolate; ochreous-brown; base narrowly white; a slender direct white transverse fascia at $\frac{1}{4}$, somewhat expanded on costa and containing a black subcostal dot; a slender white median fascia forming two diverging branches on lower half, marked with a black dot on anterior edge beneath costa, and another at furcation, latter sometimes obsolete; an inwardly oblique white mark from costa at $\frac{3}{4}$, edged posteriorly with blackish; a white streak along termen, interrupted rather above middle, upper portion black-edged beneath: cilia ochreous-brown, towards tornus grey, on termen with a black basal line towards apex. Hindwings and cilia dark grey.

Mahé, Cascade Estate, 1000 feet; Silhouette, Mare aux Cochons plateau, 1000 feet; in September and February, eight specimens. Also taken in Chagos Islands, in May, by Mr T. B. Fletcher.

CHOLOTIS, n. gen.

Head smooth-scaled; ocelli present; tongue developed. Antennæ $\frac{4}{5}$, in ♂ minutely ciliated, basal joint very long. Labial palpi long, recurved, second joint thickened with appressed scales towards apex, terminal joint as long as second or somewhat shorter, rather thick, slightly roughened anteriorly, acute. Maxillary palpi very short, filiform, appressed to tongue. Posterior tibiæ rough-haired above. Forewings with 7 and 8 out of 6, 7 to costa, 11 from middle. Hindwings $\frac{1}{2}$—$\frac{3}{5}$, narrow-lanceolate or linear-lanceolate, cilia 4—8; 2—5 remote, parallel, 6 and 7 approximated at base.

Type *C. semnostola* Meyr. I have hitherto included the species of this genus under *Stagmatophora*, but now recognise that the different structure of the terminal joint of palpi calls for generic separation. The typical species *semnostola* occurs in Australia and Africa, probably also elsewhere; other described species referable here are *exodroma* Meyr. from Australia, and *phalacra* Meyr. from Africa, and I have a number of undescribed Indian species, the whole constituting an evidently natural group. Phylogenetically the genus may be regarded as the progenitor of *Stagmatophora*, probably indicating its connection with *Syntomactis*.

51. *Cholotis sindonia*, n. sp.

♂♀. 7—8 mm. Head and thorax shining dark fuscous, face paler. Palpi dark fuscous, more or less suffused with ochreous-whitish towards upper and lower margins. Antennæ dark fuscous, towards apex white. Abdomen pale grey. Forewings lanceolate; dark purplish-fuscous; a rather broad ochreous-white fascia near base, considerably narrowed towards costa; discal stigmata blackish, approximated; a small whitish spot before tornus and similar costal spot opposite to it, second discal stigma lying between these: cilia grey, round apex dark purplish-fuscous. Hindwings grey, darker posteriorly; cilia grey.

Aldabra; four specimens.

52. *Cholotis isotacta*, n. sp.

♂. 8 mm. Head pale brownish-ochreous, crown sprinkled with blackish. Palpi pale ochreous, irregularly sprinkled with blackish. Thorax pale brownish-ochreous tinged with fuscous. Abdomen light fuscous. Forewings lanceolate; light brownish-ochreous, indistinctly striated transversely with fuscous, with some blackish strigulæ; a blackish transverse line near base; stigmata moderately large, blackish, plical beneath first discal; costa suffused with blackish irroration on posterior half; whitish-ochreous opposite costal and dorsal spots at $\frac{3}{4}$: cilia pale grey, round apex sprinkled with black points. Hindwings grey; cilia pale grey, towards base suffused with pale ochreous.

Mahé, near Morne Blanc, 1000 feet, in October; one specimen. Differs from the nearest Indian species by having plical stigma directly beneath first discal.

SYNTOMACTIS Meyr.

53. *Syntomactis firma*, n. sp.

♂♀. 10—11 mm. Head dark fuscous, forehead and face white. Palpi clothed throughout with numerous whorls of blackish white-tipped scales, apex of second joint

whitish. Thorax dark purplish-fuscous. Abdomen whitish-ochreous sprinkled with grey and blackish. Forewings very narrow, elongate-lanceolate; shining dark purplish-leaden-fuscous; black subcostal and median dots near base; four very large blackish tufts obscurely edged with light ochreous-yellowish, viz., one on fold before $\frac{1}{3}$, one beneath middle of costa, one above dorsum slightly beyond this, and one in disc at $\frac{2}{3}$; a bent submetallic bluish-leaden transverse line at $\frac{3}{4}$; some black dots on costa and termen towards apex: cilia slaty-grey. Hindwings dark grey; cilia slaty-grey.

Mahé, Mare aux Cochons district, 1500 feet, in January; two specimens.

Calicotis Meyr.

54. *Calicotis animula*, n. sp.

♂♀. 7—8 mm. Head, palpi, and thorax white. Antennæ and abdomen whitish. Posterior legs white banded more or less indistinctly with dark fuscous. Forewings very narrow, widest near base, thence narrowed to acute apex; white; an inwards-oblique grey-yellowish transverse line before middle; a suffused grey-yellowish or greyish spot with some blackish scales on tornus: cilia white. Hindwings and cilia white.

Mahé, Mare aux Cochons district, near Morne Blanc, and Cascade Estate, 1000 feet; Silhouette, Mare aux Cochons plateau, and south side of Mont Pot-à-eau, 1000—1500 feet; from August to March, twenty-six specimens.

Cuphodes Meyr.

55. *Cuphodes tridora*, n. sp.

♂♀. 7 mm. Head, palpi, antennæ, and thorax ochreous-white. Abdomen light grey. Posterior legs white ringed with blackish. Forewings narrow, widest near base, unevenly narrowed posteriorly, rather short-pointed; blackish; three short white streaks from base, between which are two ochreous-yellow streaks; irregular rather inwardly oblique white transverse fasciæ at $\frac{1}{3}$ and $\frac{2}{3}$; median area mostly occupied by a longitudinal ochreous-yellow streak above middle and a roundish patch below; a suffused white spot on middle of termen: cilia blackish-grey, towards tips and beneath tornus whitish, round apex sprinkled with ochreous-yellowish towards base. Hindwings dark grey; cilia whitish, sometimes partially suffused with grey.

Silhouette, Mare aux Cochons plateau, 1000 feet upwards, in September; five specimens, one labelled "highest point, 2467 feet."

56. *Cuphodes luxuriosa*, n. sp.

♂♀. 7—8 mm. Head dark purple-bronze, forehead and face shining bronzy-whitish. Palpi yellow-whitish. Antennæ dark grey, extreme tip whitish, in ♂ with short very fine scattered cilia, basal joint long, greyish-ochreous. Thorax deep purple, sides and apex of patagia golden. Abdomen dark bronzy-fuscous, sides golden, beneath yellow-whitish. Posterior tibiæ with basal third blackish, central third orange, apical third purple, apical bristles orange with black base. Forewings very narrow, widest near base, thence narrowed to acute apex; deep purple; a pale metallic brassy-yellowish triangular spot on

dorsum towards base, reaching $\frac{2}{3}$ across wing: cilia dark fuscous. Hindwings and cilia dark fuscous.

Mahé, Cascade Estate, 1000 feet; Silhouette, Mare aux Cochons plateau and south side of Mont Pot-à-eau, 1000—1500 feet, in August, September and February; nine specimens.

STATHMOPODA Staint.

57. *Stathmopoda epilampra*, n. sp.

♀. 10—12 mm. Head and thorax dark shining bronzy-fuscous, face shining ochreous-whitish. Palpi ochreous-whitish, terminal joint anteriorly dark fuscous. Abdomen dark fuscous. Forewings very narrow, widest near base, thence narrowed to acute apex; shining dark leaden-fuscous; a narrow irregular orange fascia near base, not quite reaching dorsum, edged with some black scales, anterior edge prominent below middle; two longitudinal orange streaks in disc beyond middle, upper much longer: cilia dark grey. Hindwings and cilia dark grey.

Mahé, Cascade Estate, 1000 feet, in January and February; five specimens. Nearly allied to an undescribed Ceylon species.

58. *Stathmopoda biclavis*, n. sp.

♀. 10 mm. Head shining ochreous-whitish, back of crown yellowish. Palpi ochreous-white. Thorax deep yellow. Abdomen pale whitish-ochreous. Forewings very narrow, widest near base, thence narrowed to acute apex; rather dark purplish-fuscous; two broad deep yellow fasciæ, first near base, not reaching costa, second beyond middle, not reaching costa except at posterior angle: cilia pale whitish-ochreous. Hindwings and cilia whitish-ochreous.

Aldabra; one specimen.

59. *Stathmopoda auriferella* Walk.
(*Gelechia auriferella* Walk. Cat. xxx, 1022.)

Mahé, Cascade Estate and Port Victoria, in January and February; five specimens. An African species, probably introduced. *S. divisa* Wals. and *S. theoris* Meyr. only differ from this in reduction or obsolescence (respectively) of yellow posterior fascia but appear to be constant locally. *S. theoris* is a common Indian species, of which the larva feeds in flower-heads of artichoke (*Helianthus*). All the Seychelles specimens appear to be true *auriferella*.

Blastobasidæ.

BLASTOBASIS Zell.

60. *Blastobasis acarta*, n. sp.

♂. 15—16 mm. Head whitish-ochreous mixed with pale fuscous. Palpi whitish-ochreous irrorated with fuscous, terminal joint moderate, acute. Antennæ moderately ciliated, and also with long fine scattered ciliations, with notch above basal joint. Thorax light greyish-ochreous, anterior margin suffused with dark fuscous. Abdomen grey, anal tuft whitish-ochreous. Forewings elongate-lanceolate; light greyish-ochreous,

irregularly tinged with purple-brownish and sprinkled with dark fuscous; a spot of purplish-fuscous suffusion towards base of costa; an angulated transverse line of dark fuscous suffusion before middle, its extremities forming purplish-fuscous spots, its angle resting on black first discal stigma; second discal stigma black, and an additional dot beneath it, resting on a tornal spot of fuscous suffusion; an undefined spot of fuscous suffusion on costa beyond this; some dark fuscous dots round posterior part of costa and termen: cilia light greyish-ochreous tinged with purplish-fuscous. Hindwings grey; cilia light grey.

Mahé, Morne Blanc and Cascade Estate, 1000 feet; Silhouette, Mare aux Cochons plateau, 1000 feet; in September, October and February, three specimens. There is also a female specimen probably referable to this species, but so worn as to be unidentifiable.

61. *Blastobasis intrepida*, n. sp.

♂. 10 mm. Head and thorax pale ochreous suffusedly mixed with fuscous. Palpi dark fuscous, apex of joints pale ochreous, terminal joint much thickened with scales, as stout as second, rather blunt-pointed. Antennæ shortly ciliated, without notch. Abdomen dark fuscous, apex whitish-ochreous. Forewings elongate, somewhat lanceolate, pointed; light greyish-ochreous suffusedly irrorated with dark fuscous; a spot of darker suffusion in middle of disc, preceded by a paler space; second discal stigma represented by a dark fuscous suffused spot, edged with paler, and a similar spot beneath it resting on tornus; indistinct dark fuscous dots round posterior part of costa and termen. Hindwings grey, basal $\frac{2}{5}$ whitish-ochreous tinged with yellowish.

Mahé, Cascade Estate, in December; one specimen, in bad condition, and therefore the above description may be defective, but the species should be readily recognisable by the sexual characters of palpi and antennæ, and colouring of hindwings.

Œcophoridæ.

Platactis, n. gen.

Head with dense appressed hairs; ocelli present; tongue short. Antennæ $\frac{4}{5}$, in ♂ strongly ciliated ($2\frac{1}{2}$), basal joint elongate, with large anterior flap of dense scales. Labial palpi long, curved, ascending, second joint thickened with dense scales, terminal joint much shorter than second, moderate, acute. Maxillary palpi very short, filiform, appressed to tongue. Posterior tibiæ rough-scaled above. Forewings with 2 from angle, 7 absent (coincident with 8), 8 and 9 stalked, 11 from somewhat before middle. Hindwings almost 1, elongate-ovate, cilia $\frac{3}{5}$; 3 and 4 connate, 5—7 parallel.

A distinct genus, belonging to the *Eulechria* group.

62. *Platactis hormathota*, n. sp.

♂. 16—18 mm. Head, palpi, thorax, and abdomen pale whitish-ochreous, second joint of palpi sometimes reddish-fuscous externally except apex, thorax more or less tinged or suffused with reddish-fuscous anteriorly. Forewings elongate, moderate, costa gently arched, apex rounded, termen obliquely rounded; whitish-ochreous; a short subcostal reddish-fuscous dash near base; stigmata rather large, black, plical beneath

first discal; a patch of reddish-fuscous suffusion, sometimes mixed with dark grey, extending along costa from $\frac{2}{5}$ to $\frac{3}{4}$, and between stigmata nearly to fold; a curved subterminal series of eight large irregular black dots between veins: cilia whitish-ochreous. Hindwings pale grey or whitish-ochreous-grey; cilia pale whitish-ochreous tinged with grey.

Mahé, near Morne Blanc, 1000 feet, in October; three specimens.

Xyloryctidæ.

Paraclada, n. gen.

Head with loosely appressed hairs; ocelli present; tongue developed. Antennæ $\frac{3}{4}$, in ♂ shortly ciliated, basal joint moderate, above with dense projecting scales. Labial palpi long, recurved, second joint beneath expanded with rough projecting scales towards apex, forming a short tuft, terminal joint as long as second, moderate, acute. Maxillary palpi short, filiform, appressed to tongue. Posterior tibiæ rough-scaled above. Forewings with 2 from $\frac{3}{4}$, 3 from considerably before angle, 4 from angle, 7 absent, 11 from middle. Hindwings somewhat over 1, trapezoidal-ovate, cilia $\frac{2}{5}$; 3 and 4 rather approximated towards base, 5 parallel, 6 and 7 long-stalked.

Perhaps allied to *Hermogenes*.

63. *Paraclada tricapna*, n. sp.

♂. 17 mm. Head, palpi, thorax, and abdomen whitish-ochreous; palpi with second joint externally blackish on lower $\frac{3}{5}$, terminal joint with some blackish irroration in front below middle, and blackish subapical ring; thorax tinged with fuscous. Forewings elongate, costa moderately arched towards base, faintly sinuate in middle, apex rounded-obtuse, termen rounded, somewhat oblique; pale greyish-ochreous, sprinkled with light grey or fuscous; three spots of dark grey suffusion on costa at $\frac{1}{5}$, $\frac{2}{5}$, and $\frac{2}{3}$, first smallest; plical stigma faint, brownish, second discal indicated by a small brownish tuft of scales: cilia ochreous-grey-whitish. Hindwings pale whitish-grey; cilia whitish.

Silhouette, Mare aux Cochons plateau, 1000 feet, in September; one specimen.

Anachastis, n. gen.

Head with loosely appressed hairs; ocelli present; tongue developed. Antennæ $\frac{4}{5}$, basal joint moderately elongate, without pecten. Labial palpi very long, recurved, second joint with appressed scales, terminal joint shorter, moderate, acute. Maxillary palpi short, filiform, appressed to tongue. Posterior tibiæ rough-scaled above. Forewings with 2—4 closely approximated from angle, 5 and 6 parallel, 7 and 8 stalked, 7 to termen, 11 from $\frac{1}{3}$. Hindwings $1\frac{1}{4}$, trapezoidal-ovate, cilia $\frac{2}{5}$; 3 and 4 connate, 5—7 nearly parallel, with a rather long oblique bar joining 7 and 8 beyond cell.

Allied to *Odites*, from which it differs in the neuration of hindwings.

64. *Anachastis digitata*, n. sp.

♀. 21 mm. Head pale greyish-ochreous. Palpi ochreous-whitish, sprinkled with fuscous and crimson. Thorax pale greyish-ochreous tinged with brownish and sprinkled with reddish-fuscous. Abdomen grey, anal tuft whitish-ochreous. Forewings elongate,

costa gently arched, apex obtuse, termen straight, somewhat oblique; pale greyish-ochreous irregularly tinged with crimson-pink, with scattered brown and blackish scales; second discal stigma dark grey; a reddish-fuscous outwardly oblique streak from dorsum before middle, not reaching fold, and a similar inwardly oblique streak from tornus: cilia pale greyish-ochreous suffused with dull crimson-pink, with a few blackish scales. Hindwings light grey; cilia grey-whitish, greyer towards base.

Silhouette, Mare aux Cochons plateau, 1000 feet, in September; one specimen.

Ethmiadæ.

ETHMIA Hueb.

65. *Ethmia meteoris*, n. sp.

♂♀. 22—26 mm. Head grey-whitish, with a black spot on crown and a black mark behind each eye. Palpi grey-whitish, second joint with some black scales above middle and a black submedian band, terminal joint mostly occupied by two black bands. Antennal ciliations of ♂ $1\frac{1}{4}$. Thorax grey-whitish, with eight black spots, viz. on shoulders, at base of patagia, and dorsal and posterior pairs. Abdomen yellow, with dorsal series of seven black spots, less marked in ♂, beneath with two series of six large black spots each. Forewings elongate, costa moderately arched, apex obtuse, termen nearly straight, rather oblique; 7 to apex; pale whitish-grey, with about seventeen small black spots or dots, partially elongate, more or less indistinctly edged with white, viz. one in middle of base, two transversely placed beneath costa near base, one beneath costa at $\frac{1}{4}$, one towards dorsum beneath this, one on fold beyond these, one in disc before middle, one near dorsum beneath this, one on fold beyond these, one towards costa at $\frac{2}{3}$, one in disc at $\frac{4}{5}$, two beneath this obliquely before and beyond it respectively, and a curved series of four towards apex; eight irregular black dots round termen and apex, on extremities of veins 2—9: cilia grey, basal half pale whitish-grey, tips whitish. Hindwings with 5 and 6 nearly approximated at base; ochreous-yellow; a blackish-grey apical patch extending over about $\frac{1}{5}$ of wing, not nearly reaching cell; cilia pale ochreous-yellow, round apex and upper part of termen dark grey.

Dennis Island, Seychelles (Fryer); Coetivy; in August and September, six specimens. Also four others received from Mr T. B. Fletcher. This species, belonging to a puzzling group of which the members are extremely similar, appears nearest the Hawaiian *E. colonella* Wals., which is itself regarded by Lord Walsingham as probably introduced there; it differs by the apical patch of hindwings not being angularly produced to reach cell, and the presence of eight (not seven) terminal black dots of forewings.

Glyphipterygidæ.

IMMA Walk.

66. *Imma quæstoria*, n. sp.

♂♀. 18—19 mm. Head, palpi, thorax, and abdomen pale brownish-ochreous, or whitish-ochreous tinged with brownish; thorax in ♂ with an expansible pencil of hairs from beneath base of forewings; abdomen of ♂ with a patch of dense expansible scales

on each side towards apex. Middle tibiæ in ♂ with dense expansible hairs beneath; posterior tibiæ in ♂ beneath fringed with very long projecting whitish hairs. Forewings elongate, posteriorly dilated, costa hardly arched, slightly prominent beyond middle, apex obtuse, more prominent in ♂, termen faintly sinuate, little oblique; 7 and 8 short-stalked, 8 to termen; pale brownish-ochreous; suffused dark fuscous dots on costa at $\frac{2}{5}$, at end of cell, and on dorsum at $\frac{3}{4}$, in ♂ connected by a fine suffused sinuate fuscous line; a terminal series of minute triangular dark fuscous dots connected by a fine line, less marked in ♀: cilia pale ochreous tinged with grey. Hindwings fuscous, suffused with pale ochreous towards costa anteriorly; cilia ochreous-whitish, with light fuscous subbasal shade.

Aldabra; two specimens. Allied to *transversella* Snell. rather nearly, with similar structure of legs in ♂, but distinct by different form of wing (prominence of costa and sinuation of termen), paler colouring, and less developed transverse line.

Simaethis Leach.

67. *Simaethis gratiosa*, n. sp.

♂. 13 mm. Head dark fuscous partially sprinkled with white. Palpi with five whorls of dark fuscous white-tipped scales. Thorax ferruginous-brown sprinkled with whitish. Abdomen dark fuscous, segmental margins sprinkled with whitish. Forewings elongate-triangular, costa gently arched, apex obtuse, termen rounded, somewhat oblique; dark fuscous; an orange-fulvous elongate patch extending beneath costa from base to about middle, and another occupying dorsal area beneath fold from base to middle; some scattered whitish scales on basal area; two fine transverse lines of white irroration, first before middle, sinuate inwards below middle, second about $\frac{2}{3}$, rather irregular, from $\frac{1}{5}$ to below middle forming a quadrangular loop outwards; a white dot in disc beyond first line, and a short fine white transverse mark in disc at $\frac{2}{3}$, beneath costal section of second line; some slight orange-fulvous suffusion in disc between these; a patch of orange-fulvous suffusion along termen, preceded by some whitish irroration: cilia white, with basal third dark fuscous, and dark grey patches at apex, middle of termen, and tornus. Hindwings dark fuscous; cilia white, with dark fuscous basal line, at apex and towards tornus suffused with grey.

Dennis Island, Seychelles (Fryer), in August; one specimen.

Glyphipteryx Hueb.

68. *Glyphipteryx dichalina*, n. sp.

♂♀. 5—6 mm. Head and thorax fuscous or whitish-fuscous. Palpi whitish, indistinctly banded with dark fuscous, scales short. Abdomen grey. Forewings elongate, rather narrow, costa gently arched, apex obtuse, termen faintly sinuate, very oblique; 7 and 8 separate; dark fuscous; a rather broad somewhat oblique wedge-shaped white mark from dorsum beyond middle, reaching more than half across wing; two somewhat curved parallel white striæ from costa beyond middle to just before tornus; three short white wedge-shaped marks on costa posteriorly, extending into cilia; apex suffused with blackish; a minute white dot on termen beneath apex: cilia grey, round

apex with a blackish antemedian line followed by a white shade, beneath apex indented with white. Hindwings dark fuscous; cilia grey.

Mahé, Mare aux Cochons district and near Morne Blanc, above 1000 feet; Silhouette, south side of Mont Pot-à-eau, 1500 feet; in August, January, and February, five specimens.

69. *Glyphipteryx medica*, n. sp.

♂♀. 7—8 mm. Head and thorax dark bronzy-fuscous. Palpi white with four black rings, apex black in front, scales short. Abdomen dark fuscous, beneath banded with white, anal segment very elongate, blackish, apex white. Forewings elongate, costa gently arched, apex obtuse, termen hardly sinuate, rather strongly oblique; 7 and 8 separate; dark bronzy-fuscous; a thick rather oblique somewhat curved white streak from middle of dorsum, reaching more than half across wing; five rather oblique white strigulæ from posterior half of costa, second continued as an obtusely angulated violet-golden-metallic stria to a white dot on dorsum before tornus, third becoming violet-golden-metallic beneath; two small violet-golden-metallic spots before lower half of termen, and one on termen beneath apex; apex suffused with blackish: cilia grey-whitish, basal half dark bronzy-fuscous limited by a blackish line indented with white beneath apex, above apex with a dark fuscous projecting hook. Hindwings dark fuscous; cilia grey.

Mahé, Cascade Estate, 1000 feet, in February; six specimens.

Gracilariadæ.

Acrocercops Wall.

70. *Acrocercops euryphanta*, n. sp.

♂. 8 mm. Head, palpi, antennæ, and thorax white. Abdomen ochreous-grey. Forewings very narrowly elongate, moderately pointed; light ochreous suffused with grey; a rather broad white basal fascia; a very broad white median fascia, somewhat expanded on costa; a white tornal spot just beyond this; a white apical spot: cilia white, towards tornus tinged with greyish-ochreous. Hindwings grey; cilia grey, round apex whitish.

Felicité, in December; one specimen.

71. *Acrocercops pentaplaca*, n. sp.

♂♀. 6—7 mm. Head white. Palpi white, second joint suffused with fuscous towards apex, terminal joint with dark fuscous median ring. Abdomen light grey, anal tuft ochreous-whitish. Forewings very narrow, elongate-lanceolate; brownish-ochreous, suffused with dark fuscous towards costa; a white dot on costa near base; five somewhat oblique shining white transverse fasciæ edged with dark fuscous, second before, third beyond middle, fourth sometimes interrupted beneath costa, last two sometimes narrow; a white mark across apex: cilia grey (imperfect). Hindwings rather dark grey; cilia whitish-grey.

Mahé, Cascade Estate, 1000 feet; Silhouette, south side of Mont Pot-à-eau, 1500 feet; in August and February, three specimens, of which two are much worn.

72. *Acrocercops rhombocosma*, n. sp.

♀. 8 mm. Head white. Palpi white, second joint loosely rough-scaled beneath with blackish median ring, terminal joint with black basal ring. Abdomen grey, on sides white obliquely striped with dark fuscous. Legs white ringed with dark fuscous. Forewings very narrowly elongate, moderately pointed; fuscous, apical third suffused with brownish-ochreous; two moderate angulated white fasciæ anteriorly, interrupted in middle; a third fascia in middle, more widely interrupted; a large oblique-triangular white spot on costa about $\frac{3}{5}$; an oblong white spot on dorsum beyond this; small opposite costal and terminal white spots towards apex; an elongate suffused black apical spot: cilia white, with basal and apical thirds dark grey, towards tornus greyish. Hindwings dark grey; cilia grey.

Mahé, Cascade Estate, 1000 feet, in February; one specimen.

Gracilaria Haw.

73. *Gracilaria prosticta* Meyr.

Mahé, Port Victoria, in February; one specimen. A South African species, probably introduced.

Macarostola Meyr.

74. *Macarostola parolca*, n. sp.

♂. 11 mm. Head and thorax pale ochreous mixed with whitish. Palpi with appressed scales. Abdomen white, towards base greyish, posteriorly with a lateral groove filled with pale yellowish scales. Posterior tibiæ with short dense scales above. Forewings extremely narrow, short-pointed, obtuse; whitish sprinkled with dark fuscous, appearing to indicate oblique strigæ from costa and dorsum, posteriorly distinctly marked with oblique white strigæ from costa and dorsum separated by blackish scales, on termen towards apex with a blackish marginal streak, on costa before apex with a small blackish spot. Hindwings dark fuscous; cilia grey.

Mahé, Anonyme Island, in January; one specimen. In bad condition, description therefore incomplete, but it should be easily recognisable by structure of abdomen and legs.

Plutellidæ.

Argyresthia Hueb.

75. *Argyresthia lustralis*, n. sp.

♂♀. 9—11 mm. Head, palpi, and thorax white, shoulders narrowly brownish. Abdomen whitish-grey. Forewings elongate-lanceolate; 7 and 8 separate; brownish strigulated with blackish; a broad snow-white streak occupying dorsal half of wing, attenuated posteriorly, reaching to near apex, cut somewhat beyond middle of wing by a slightly oblique dark fuscous bar, and upper edge notched with dark fuscous midway between this and apex; a small dark fuscous apical spot: cilia pale brownish, towards tornus whitish, round apex with tips dark fuscous. Hindwings grey; cilia ochreous-grey-whitish.

Mahé, Morne Seychellois, over 1500 feet; Silhouette, Mare aux Cochons plateau, 1000 feet; in September and February, eleven specimens. Allied to an undescribed Ceylon species.

Tineidæ.

Lyonetia Hueb.

76. *Lyonetia probolactis*, n. sp.

♂♀. 9—10 mm. Head, palpi, antennæ, and thorax silvery-white, crown smooth. Abdomen light grey, apex white. Forewings very narrowly elongate, short-pointed, apex shortly produced, caudulate; 4 absent, 6 and 7 stalked, 7 to costa, 8 absent; pale shining silvery-grey; an ochreous-brown fascia about $\frac{2}{3}$, triangularly expanded towards costa, where it unites with an ochreous-brown apical patch, within which is a small round black apical spot, preceded by two small white costal marks partly in cilia: cilia pale grey, beneath apex blackish grey towards base, at apex with two blackish hooks. Hindwings and cilia grey.

Mahé, Morne Blanc (1000 feet), Morne Seychellois (over 1500 feet), Mare aux Cochons district (1000—2000 feet); Silhouette, Mare aux Cochons plateau and south side of Mont Pot-à-eau (1000—1400 feet); from August to February, twenty-two specimens. The species of *Lyonetia* show some variation in the scaling of the head and in neuration, but the genus is small and admits of satisfactory definition.

Opogona Zell.

77. *Opogona sultana*, n. sp.

♂♀. 10—14 mm. Crown dark purple-fuscous, face and fillet shining whitish-ochreous. Palpi dark fuscous, internally whitish-ochreous. Antennæ ochreous-whitish, basal joint dark fuscous. Thorax yellow, anterior half purple-blackish. Abdomen fuscous. Forewings lanceolate, acute; clear yellow; a wedgeshaped dark purple-fuscous spot along basal sixth of costa; a dark purple-fuscous streak along posterior part of dorsum and termen from middle of wing to apex, edge sharply marked but ragged and irregular, often with some black scales: cilia purplish-fuscous, on costa pale yellow. Hindwings and cilia fuscous.

Silhouette, Mare aux Cochons plateau and south side of Mont Pot-à-eau, 1000—1500 feet, in August and September; twenty-two specimens.

78. *Opogona harpalea*, n. sp.

♂♀. 10—11 mm. Crown violet-grey, face and fillet shining ochreous-whitish. Palpi dark fuscous, internally whitish. Antennæ ochreous-whitish. Thorax dark violet-grey, posterior extremity pale yellow. Abdomen ochreous-whitish. Forewings lanceolate, acute; ochreous-yellow; markings dark purple-fuscous; a moderate streak along basal fourth of costa, not attenuated, reaching dorsum at base; a patch occupying apical half of wing, its anterior edge vertical, rather irregular, marked with some blackish scales, containing a rather large subtriangular yellow spot on costa about $\frac{3}{4}$: cilia grey, towards base purple-tinged. Hindwings rather dark grey; cilia pale yellowish-grey.

Aldabra; three specimens.

HIEROXESTIS Meyr.

In its normal forms this genus closely approaches *Opogona* in structure, and is evidently the direct progenitor of that genus, differing from it only by the tuft or fringe of rough hairs which rises from behind the fillet and projects over it, leaving the face, fillet, and back of crown quite smooth. The neuration exhibits a deceptive tendency to partial obsolescence, several of the veins (especially 2—4 and 11 of forewings, and 6 of hindwings) being liable to almost complete disappearance, though a very faint trace or impression is barely perceptible; stress cannot be laid on this, the extent of obsolescence varying individually and specifically.

79. *Hieroxestis florea*, n. sp.

♂♀. 6—7 mm. Crown dark purple-fuscous, face and fillet ochreous-whitish. Palpi whitish, externally with a dark fuscous lateral line. Antennæ ochreous-whitish, suffused above with dark fuscous towards base. Thorax dark purple-fuscous, posterior extremity yellow. Abdomen grey, apex whitish. Forewings lanceolate, acute, apex somewhat twisted and bent upwards; deep orange-yellow; a wedgeshaped dark fuscous spot occupying basal sixth of costa; a rather broad deep indigo-blue transverse fascia beyond middle, anterior edge convex; posterior edge suffused with blackish, confluent with a black streak along upper part of termen to apex: cilia light purplish-grey, with a slender blackish bar at apex. Hindwings grey; cilia pale greyish.

Mahé, Cascade Estate, 1000 feet, in February; six specimens.

80. *Hieroxestis cyanodesma*, n. sp.

♀. 8 mm. Head and thorax orange-ochreous, forehead and face shining whitish. Palpi whitish, second joint dark fuscous externally. Antennæ 1. Abdomen ochreous-whitish. Forewings elongate-lanceolate, apex produced, acute, upturned; orange-yellow; a dark leaden-grey transverse line near base, interrupted beneath costa; narrow rather oblique dark shining blue-grey fasciæ at $\frac{2}{5}$ and $\frac{3}{4}$: cilia yellow-whitish, round apex ochreous-yellow except at tips, with a black subapical line. Hindwings grey-whitish; cilia whitish-ochreous.

Silhouette, Mare aux Cochons plateau, 1000 feet, in September; one specimen.

81. *Hieroxestis selacta*, n. sp.

♂. 10—11 mm. Head shining greyish-bronze, tuft reduced to a short fringe, face and fillet shining whitish. Palpi grey, internally whitish. Thorax shining olive-bronze. Abdomen pale bronzy-grey, apex ochreous-whitish. Forewings elongate-lanceolate, apex produced, acute, turned downwards; shining olive-bronze, with prismatic reflections; a small spot of grey-whitish suffusion at base of costa; apical half beyond a straight oblique fine line of dark fuscous scales running from before $\frac{2}{5}$ of costa to $\frac{3}{4}$ of dorsum shining silvery-whitish, containing patches of bronzy-grey suffusion on costa at $\frac{3}{5}$, towards tornus, and towards apex; a black line along posterior fourth of costa into apex, interrupted towards apex: cilia whitish, above apex with a blackish line near base, forming a short apical hook. Hindwings grey; cilia pale greyish.

Mahé, Cascade Estate, 1000 feet; Silhouette, Mare aux Cochons plateau, 1000 feet; in February and September; two specimens.

82. *Hieroxestis tarsota*, n. sp.

♂. 7—8 mm. Head white, crown with an irregular transverse blackish bar mixed with ferruginous, occipital tuft mixed with dark fuscous. Palpi white, second joint externally with a blackish line. Thorax blackish marked with white. Abdomen dark fuscous. Forewings lanceolate, apex produced, acute, upturned; shining bronzy-fulvous; costa suffused with black, but extreme costal edge white; a narrow white basal fascia, and a narrow inwardly oblique white posteriorly black-margined fascia at $\frac{1}{3}$, connected below middle by a white streak edged beneath with black suffusion; a trapezoidal white blotch on middle of costa, and an irregular white blotch crossing wing at $\frac{3}{4}$, separated on costa by a patch of black suffusion; a white longitudinal streak beneath middle of wing, edged beneath with black; a white spot on termen beneath apex, sometimes confluent with preceding transverse patch: cilia white, on costa with a black basal line running into apex and blackish median shade becoming fulvous towards apex, beneath apex with a bluish-silvery spot, towards tornus suffused with grey, mixed with blackish towards base except on a white extension of terminal spot. Hindwings dark grey; cilia grey.

Mahé, near Morne Blanc, 1000 feet; Silhouette, Mare aux Cochons plateau, 1000 feet; in September and October, two specimens.

83. *Hieroxestis heliogramma*, n. sp.

♂. 8—9 mm. Head and thorax pale bronzy-yellowish sprinkled with ferruginous-orange, fillet, face, and palpi whitish. Antennæ over 1. Abdomen light grey, anal tuft whitish. Forewings elongate-lanceolate, apex produced, acute, strongly upturned; shining brassy-whitish; some scattered orange scales beneath costa; narrow golden-orange median and subdorsal streaks from base, uniting in disc at $\frac{2}{3}$, thence rather upcurved and continued along costa to apex; a line of scattered black scales along lower margin of discal portion of this streak beyond $\frac{2}{3}$, continued anteriorly to dorsum; a slender golden-orange streak along termen: cilia on costa pale ochreous, at apex with a golden-orange bar, on termen whitish irregularly sprinkled with blackish points. Hindwings light grey, apex whitish; cilia whitish-grey, at tips and round apex whitish.

Silhouette, Mare aux Cochons plateau, 1000 feet, in September; two specimens.

84. *Hieroxestis rhothiaula*, n. sp.

♂. 8 mm. Head white. Palpi whitish, suffused with dark grey externally. Antennæ 1. Thorax white, patagia bronzy-fuscous. Abdomen grey. Forewings elongate-lanceolate, apex produced, acute, upturned; bronzy-fuscous becoming dark fuscous posteriorly, with prismatic reflections; a moderately broad white streak along dorsum from base to tornus, where it is truncate, but connected on margin with a narrow white streak along termen to near apex; a fine white very oblique strigula from costa near apex: cilia whitish, on costa with a black basal streak, round apex with a blackish median line, above apex with a grey patch towards tips. Hindwings grey; cilia pale grey.

Silhouette, forest above Mare aux Cochons, in September; one specimen.

85. *Hieroxestis ensifera*, n. sp.

♂♀. 9—10 mm. Head white. Palpi white, second joint dark fuscous externally, terminal joint loosely rough-scaled anteriorly. Antennæ over 1. Thorax white, spots on

shoulders and on each side of back greyish-ochreous irrorated with dark fuscous. Abdomen prismatic-grey. Forewings elongate-lanceolate, apex produced, acute, upturned; shining white, with slight violet reflections; markings ochreous suffusedly irrorated with dark fuscous; a narrow median streak from near base to near apex; a broad patch extending along dorsum from base to tornus, narrowed posteriorly, interrupted by an oblique bar of groundcolour beyond middle; a spot before termen beneath median streak; a very oblique blackish striga from middle of costa to $\frac{3}{4}$, not reaching median streak, and another from $\frac{3}{4}$ of costa to an elongate black apical mark: cilia whitish, round apex with a brown patch on basal $\frac{2}{3}$. Hindwings grey, with prismatic brassy reflections; cilia light grey, tinged with violet.

Silhouette, south side of Mont Pot-à-eau, 1500 feet, in August; two specimens.

86. *Hieroxestis irenica*, n. sp.

♂♀. 6—7 mm. Head and thorax pale ochreous-bronze, fillet and face white. Palpi white, second joint with a dark fuscous line on side. Abdomen whitish-grey. Forewings lanceolate, apex slenderly produced, acute, upturned; bronzy-ochreous, becoming golden-ochreous towards apex; three oblique white fasciaform patches from costa at $\frac{1}{4}$, middle, and $\frac{3}{4}$, reaching half across wing; some undefined whitish suffusion towards dorsum, apparently indicating corresponding oblique patches; a small round black apical spot: cilia whitish, on costa with three somewhat diverging dark fuscous bars, on termen grey towards base. Hindwings light grey; cilia grey-whitish.

Mahé. Cascade Estate, 1000 feet; Silhouette, Mare aux Cochons plateau, 1000 feet; in September and February, five specimens.

87. *Hieroxestis rhodothicta* n. sp.

♂♀. 10—11 mm. Head whitish-ochreous, face shining white. Palpi white. Thorax pale ochreous. Abdomen grey. Forewings rather broadly lanceolate, apex produced, acute, somewhat twisted, rather upturned; pale yellow-ochreous, costal edge suffusedly white; blackish subbasal dots on costa and in middle; small spots of fuscous suffusion immediately beneath costa at $\frac{1}{5}$, $\frac{2}{5}$, and $\frac{3}{4}$; disc slightly tinged with fuscous; small blackish oblique triangular spots on dorsum at $\frac{1}{4}$, middle, and $\frac{3}{4}$; an apical patch of pale rose-pink suffusion, including a small black apical spot: cilia ochreous-whitish, more ochreous towards base, round apex with basal half deep ochreous, at origin on costa with a small fuscous spot, on termen tinged with grey. Hindwings dark grey; cilia grey.

Mahé, near Morne Blanc, 1000 feet; Silhouette, Mare aux Cochons plateau; in September and October, two specimens.

88. *Hieroxestis hermatias*, n. sp.

♂♀. 8—11 mm. Head and thorax light fuscous, face whitish. Palpi whitish, second joint dark fuscous externally. Abdomen whitish-fuscous. Forewings elongate-lanceolate, apex acute, upturned; light fuscous, sometimes mostly suffused with whitish, or posteriorly suffused with dark fuscous irroration; oblique streaks of dark fuscous suffusion from costa and dorsum near base, often obsolete; three strong very oblique dark fuscous streaks from costa between $\frac{2}{5}$ and apex, separated by white streaks, reaching half across wing, first often preceded by a suffused white streak, third running into apex and

becoming blackish; two less developed variable oblique dark fuscous streaks from $\frac{1}{2}$ and $\frac{3}{4}$ of dorsum, sometimes meeting first two of preceding, often separated and followed by more or less white suffusion; sometimes some brownish-ochreous suffusion towards apex: cilia white, towards tornus tinged with grey, on costa with three diverging black bars on basal half, at apex with two black projecting hooks, beneath apex with a black subbasal line. Hindwings grey; cilia light grey, towards tips whitish.

Mahé, Mare aux Cochons district, near Morne Blanc, Cascade Estate (1000—2000 feet), Port Victoria, and Anonyme Island; Silhouette, Mare aux Cochons plateau and south side of Mont Pot-à-eau, 1000—1500 feet; Felicité; from August to March, forty-five specimens. Varies much in extent of white suffusion and development of dark markings, so that the extreme forms differ much in appearance.

89. *Hieroxestis nephalia*, n. sp.

♂♀. 9—12 mm. Head and thorax whitish-ochreous, fillet and face ochreous-whitish. Palpi ochreous-whitish, externally more or less infuscated. Abdomen whitish-ochreous. Forewings narrowly lanceolate, apex produced, acute, upturned; whitish-ochreous, on dorsal half sometimes brownish-tinged or irrorated with brownish; four very oblique streaks of dark fuscous suffusion from costa, not reaching half across wing, and four longer very oblique slightly curved streaks from dorsum, reaching more than half across wing; an oval black spot in apex, preceded by some ochreous-brown suffusion: cilia ochreous-whitish, above apex with a dark fuscous patch, beneath apex with a black subbasal line, on lower part of termen sprinkled with fuscous towards base. Hindwings ochreous-whitish tinged with grey; cilia ochreous-whitish.

Mahé, Cascade Estate, 1000 feet; Silhouette, forest above Mare aux Cochons; in September and February, twenty-three specimens.

90. *Hieroxestis ichnora*, n. sp.

♂♀. 10—11 mm. Head and thorax pale greyish-ochreous, crown sometimes dark fuscous, fillet and face ochreous-whitish. Palpi fuscous, internally ochreous-whitish. Abdomen light greyish-ochreous. Forewings narrowly lanceolate, apex produced, acute, somewhat downturned; light greyish-ochreous or ochreous-grey, with prismatic reflections; costal edge blackish towards base; a blackish spot beneath costa at $\frac{1}{5}$, three in disc at $\frac{2}{5}$, $\frac{3}{5}$ and $\frac{4}{5}$, and two towards dorsum posteriorly; an oblique blackish mark on costa towards apex; an elongate black spot in apex: cilia ochreous-grey-whitish, above apex with a fuscous subbasal shade tinged with ochreous, on termen sprinkled with fuscous towards base. Hindwings grey; cilia greyish-ochreous, becoming grey towards base.

Mahé, Mare aux Cochons district (1000—2000 feet), near Morne Blanc, and Cascade Estate; Silhouette, forest above Mare aux Cochons, and south side of Mont Pot-à-eau, 1500 feet; from August to February, thirteen specimens.

91. *Hieroxestis fricata*, n. sp.

♂♀. 10—11 mm. Head and thorax fuscous or whitish-fuscous, fillet and face ochreous-whitish. Palpi dark fuscous, internally ochreous-whitish. Abdomen greyish. Forewings narrowly lanceolate, apex rather produced, acute, downturned; pale fuscous; a small inwardly oblique dark fuscous mark on costa near base; four irregular ill-defined

patches of dark fuscous suffusion towards costa and three towards dorsum; an elongate black mark in apex: cilia whitish-fuscous, on costa with a dark fuscous basal shade towards apex but not reaching it, above apical black mark with a brown patch not reaching tips. Hindwings grey; cilia whitish-fuscous.

Mahé, Mare aux Cochons district (1000—2000 feet), near Morne Blanc, and Cascade Estate; Silhouette, Mare aux Cochons plateau, and south side of Mont Pot-à-eau, 1500 feet; from August to February, nineteen specimens.

92. *Hieroxestis lactiflua*, n. sp.

♀. 7—8 mm. Head, palpi, thorax, and abdomen whitish, occipital tuft dark fuscous. Forewings elongate-lanceolate, apex produced, acute, somewhat downturned; ochreous-whitish; a blackish-grey apical patch, with two acute projections anteriorly: cilia whitish, round apex with a blackish median line. Hindwings and cilia ochreous-grey-whitish.

Mahé, near Morne Blanc, 1000 feet; Silhouette, Mare aux Cochons plateau, 1000 feet; in September and October, two specimens.

93. *Hieroxestis phæochalca* Meyr.

Silhouette, Mare aux Cochons plateau and south side of Mont Pot-à-eau, 1000—1500 feet, in August and September; forty-one specimens. Occurs also in Réunion and South Africa, probably artificially spread.

94. *Hieroxestis subcervinella* Walk.

(*Tinea subcervinella* Walk. Cat. xxviii, 477.)

Mahé, near Morne Blanc, 1000 feet; Silhouette, Mare aux Cochons plateau, 1000 feet; Felicité; from September to December, nine specimens. Occurs also in Mauritius.

Oinophila Steph.

Characterised by having tufts both before and behind the fillet (frontal and occipital), whilst the fillet itself, back of crown, and face are smooth.

95. *Oinophila glomerata*, n. sp.

♂♀. 6—7 mm. Head ochreous-grey-whitish, mixed on crown with fuscous. Palpi ochreous-whitish, externally grey. Thorax pale greyish-ochreous mixed with dark fuscous. Abdomen grey. Forewings elongate-lanceolate, apex produced, acute; pale greyish-ochreous, sometimes faintly tinged with yellowish, coarsely and irregularly irrorated with blackish; the confluence of this irroration often produces irregular blackish patches, viz., two larger ones towards costa before and beyond middle, smaller ones before and beyond middle of dorsum and on tornus, two or three spots on costa posteriorly, and always one at apex: cilia ochreous-whitish more or less suffused with grey, round apex sprinkled with blackish at base. Hindwings and cilia grey.

Mahé, Cascade Estate, Morne Seychellois, Morne Blanc (1000—1500 feet), and Port Victoria; Silhouette, Mare aux Cochons plateau; from September to February, thirty-six specimens.

96. *Oinophila rorida*, n. sp.

♂♀. 6—7 mm. Head ochreous, face whitish. Palpi fuscous, internally whitish. Thorax ochreous, spotted with glistening grey-whitish. Abdomen grey, beneath white.

Forewings narrowly lanceolate; yellowish-ferruginous; a moderate suffused dark fuscous or blackish streak along costa; markings glistening silvery-white or grey-whitish, with violet reflections; a small spot at base; a variable suffused patch beneath costa at $\frac{1}{4}$; a suffused subdorsal streak from near base to $\frac{2}{5}$; an oblique patch from middle of costa, reaching half across wing; a dot on costa at $\frac{2}{3}$, and a patch at $\frac{5}{6}$; a spot on dorsum before tornus, whence an irregular streak runs above margin to lower of two small spots on termen: cilia whitish, towards tornus suffused with grey. Hindwings dark grey; cilia grey.

Silhouette, forest above Mare aux Cochons, sixteen specimens, one labelled "highest point, 2467 feet"; also one from Mahé, Cascade Estate, 1000 feet; in September and February.

97. *Oinophila crobylora*, n. sp.

♂. 12 mm. Head ochreous-whitish, frontal tuft and lower half of high occipital tuft fuscous. Palpi ochreous-whitish. Thorax whitish-ochreous. Abdomen grey. Forewings narrow-lanceolate, apex slenderly produced, acute, down-turned; pale brownish-ochreous, rather deeper posteriorly; a subdorsal series of three or four small dark fuscous spots anteriorly; seven oblique whitish strigulæ from posterior half of costa, edged posteriorly with black specks, last vertical, wedgeshaped; a blackish subdorsal dot towards tornus; a blackish longitudinal strigula in disc at $\frac{3}{4}$; a streak of blackish irroration in apex: cilia whitish-ochreous, round apex with a median line of dark fuscous specks, beneath apex with two short blackish lines near base. Hindwings rather dark leaden-grey; cilia grey-whitish.

Silhouette, forest above Mare aux Cochons, in September; one specimen.

Decadarchis Meyr.

98. *Decadarchis methodica*, n. sp.

♂♀. 10—11 mm. Head fuscous-whitish, hairs of forehead mixed with dark fuscous. Palpi dark fuscous, projecting hairs and apex whitish. Thorax brownish, with a black dot on each shoulder, and one at posterior extremity. Abdomen pale fuscous. Forewings elongate, narrow, costa slightly arched, apex obtuse, strongly upturned, termen extremely obliquely rounded; brown irrorated with whitish; costal edge blackish towards base; a broad streak of whitish suffusion along costa from base, narrowed posteriorly and becoming obsolete towards $\frac{3}{4}$; costal area strewn with scattered black scales; black dots towards costa rather near base and before middle, one on fold at $\frac{1}{3}$, and one beneath middle at $\frac{2}{3}$; an elongate apical patch of dark fuscous suffusion, terminated anteriorly by a small black spot, and edged above by a patch of ochreous-whitish suffusion, in which is a fine very oblique blackish line from costa: cilia dark grey with rows of whitish points, round apex with a black subbasal line, beneath apex with a basal patch of black irroration. Hindwings light grey; cilia whitish-grey.

Silhouette, Mare aux Cochons plateau, 1000 feet, in September; two specimens.

99. *Decadarchis trichodora*, n. sp.

♂. 8 mm. Head whitish-ochreous, face whitish. Palpi long, wholly clothed with dense rough expanded ochreous-whitish hairs. Thorax whitish-ochreous. Abdomen

ochreous-whitish. Forewings elongate, rather narrow, apex produced, acute, upturned; ochreous-whitish, suffusedly mixed with yellow-ochreous, with some minute scattered blackish specks; two undefined oblique yellow-ochreous streaks from dorsum anteriorly, and an oblique yellow-ochreous blotch on costa posteriorly, edged by two very oblique black costal strigulæ, first very short, second moderately long: cilia whitish, with a blackish mark at base above apex, a median blackish line, and sprinkled with blackish towards tornus. Hindwings with pencil of long hairs from base lying along costa; ochreous-whitish; cilia ochreous-whitish, round apex with two lines of blackish points.

Mahé, Port Victoria, in February; one specimen.

100. *Decadarchis molynta*, n. sp.

♂♀. 12—19 mm. Head and thorax whitish-fuscous, variably mixed with fuscous. Palpi in ♂ long, in ♀ very long, fuscous, second joint towards apex and terminal joint clothed with long rough projecting scales beneath and shorter ones above. Abdomen in ♂ light yellow-ochreous, in ♀ fuscous. Forewings elongate, costa gently arched, apex obtuse, strongly upturned, termen extremely obliquely rounded; whitish-fuscous sprinkled with dark fuscous, sometimes suffused with fuscous; markings formed by fuscous suffusion mixed with dark fuscous or blackish; four angulated series of three cloudy spots each, first series near base, the spots on costa in middle and at $\frac{3}{4}$, and in disc before and beyond middle largest and most distinct; a cloudy apical spot: cilia whitish-fuscous, round apex fuscous with three blackish lines. Hindwings in ♂ light ochreous-yellowish, with an elongate-oval patch of fulvous modified scales beneath costa anteriorly, concealed by forewings, in ♀ light fuscous; cilia in ♂ whitish, in ♀ whitish-fuscous.

Mahé, Cascade Estate (1000 feet), Port Victoria, and Anonyme Island; Silhouette, Mare aux Cochons plateau and south side of Mont Pot-à-eau, 1000—1500 feet; Bird Island, Seychelles; Praslin; from July to September, and in January and February, twenty-eight specimens. I have this species also from the Chagos Islands and Amirantes Islands (Fletcher).

101. *Decadarchis eurylyta*, n. sp.

♂. 14 mm. Head white. Palpi long, white, second joint with moderately long projecting scales, mixed with dark fuscous towards base. Thorax bronzy-ochreous, patagia white. Abdomen whitish. Forewings elongate, costa moderately arched, apex pointed, slightly upturned, termen slightly sinuate, very oblique; white, suffusedly mixed with bronzy-ochreous along fold and posteriorly; markings purplish-fuscous mixed with blackish; a spot on costa near base; an oblique patch from dorsum at $\frac{1}{3}$, crossing fold; a moderate rather oblique fascia from middle of costa, reaching $\frac{3}{4}$ across wing; a similar fascia from $\frac{3}{4}$ of costa to near termen, thence curved round to apex. Hindwings and cilia grey-whitish.

Mahé, near Morne Blanc, 1000 feet, in October; one specimen, in indifferent condition. Allied to an undescribed New Guinea species.

Ereunetis Meyr.

102. *Ereunetis scaligera*, n. sp.

♂♀. 7—8 mm. Head and thorax whitish-ochreous, centre of crown with a few

dark fuscous hairs. Palpi whitish, second joint externally with a dark fuscous line. Abdomen whitish-ochreous. Forewings lanceolate, apex somewhat produced, acute, down-turned; whitish-ochreous, suffusedly irrorated with brownish or rather dark fuscous; a moderate very oblique ill-defined shining white or silvery-whitish fascia from costa beyond middle, usually terminated beneath by a black longitudinal dash above tornus (but in one good specimen this is absent); a similar whitish patch on apical portion of costa, terminated beneath by a black longitudinal mark in apex: cilia whitish, round apex with a fine black median line. Hindwings grey-whitish; cilia whitish.

Mahé, near Morne Blanc, 1000 feet; Silhouette, Mare aux Cochons plateau, 1000 feet; in September and October, six specimens.

103. *Ereunetis calypta*, n. sp.

♂. 15 mm. Head fuscous mixed with dark fuscous, hairs of face blackish. Palpi blackish. Antennæ pale fuscous. Thorax fuscous. Abdomen grey, anal tuft whitish-ochreous. Forewings elongate, very narrow, short-pointed, obtuse, apex upturned; 4 absent, 7 present, separate; light fuscous, sprinkled with brown; costal edge suffusedly dark fuscous; a moderate streak of dark fuscous suffusion along dorsum from base to tornus, attenuated posteriorly; an undefined elongate patch of dark fuscous irroration towards apex, terminating in a round blackish apical spot; a very oblique white striga from $\frac{4}{5}$ of costa to apical spot, edged with dark fuscous suffusion: cilia fuscous. Hindwings grey; cilia pale grey.

Silhouette, Mare aux Cochons plateau, 1000 feet, in September; one specimen.

104. *Ereunetis xenica*, n. sp.

♂♀. 7—11 mm. Head grey-whitish or whitish-fuscous, face and palpi blackish. Thorax fuscous-whitish, shoulders blackish. Abdomen whitish-grey. Forewings elongate, rather narrow, costa gently arched, apex pointed, upturned, termen somewhat sinuate, very oblique; ochreous-whitish, sometimes more or less suffused with fuscous on dorsal half; markings black; an irregular posteriorly expanded blotch along basal third of costa; two oblique blotches from costa about middle and $\frac{3}{4}$, reaching half across wing, connected in disc, angle of second running into a small round spot at apex, which receives also a line running along posterior part of costa; two undefined cloudy oblique marks from dorsum at $\frac{1}{4}$ and $\frac{1}{2}$; a line along termen: cilia whitish, sometimes partially fuscous-tinged, round apex with a blackish median line. Hindwings grey; cilia whitish, at apex with a grey bar.

Mahé, Cascade Estate, 1000 feet, in January and February; two specimens. Also from Kandy, Maskeliya, and Puttalam, Ceylon (Green, Pole); N. Coorg (Newcome) and Khasi Hills, India; Kuching, Borneo (Hewitt).

Mastigostoma, n. gen.

Head with appressed hairs, face flat, retreating, smooth, forehead prominent, somewhat raised; ocelli absent; tongue absent. Antennæ $\frac{3}{4}$, in ♂ simple, basal joint long, stout, without pecten. Labial palpi long, somewhat curved, subascending, widely diverging, second joint thickened with dense appressed scales, terminal joint as long

as second, laterally compressed, flat and rather broad, tolerably pointed. Maxillary palpi 4-jointed, basal joint moderate, thick, second joint long, rather stout, clothed with dense erect hairs, third joint extremely long, slender, filiform, furnished above with a series of erect hairs, terminal joint short, slender. Posterior tibiæ with rough projecting scales above and beneath. Forewings with 2 from towards angle, 7 and 8 sometimes stalked, 7 to costa, 11 from $\frac{1}{4}$. Hindwings 1, elongate-ovate, cilia $\frac{2}{3}$; 3 and 4 separate, 5 and 6 approximated or connate, 7 parallel.

Probably allied to *Setomorpha*, but with singular characters; the remarkable maxillary palpi are unique in their exceptional length and peculiar hairs.

105. *Mastigostoma gypsatma*, n. sp.

♂♀. 15—20 mm. Head ochreous-whitish. Labial palpi ochreous-whitish, slightly sprinkled with black. Maxillary palpi orange-ochreous, basal joint black. Thorax ochreous-whitish, with a variable black transverse mark behind collar, sometimes obsolete. Abdomen grey. Forewings elongate, rather narrow, costa gently arched, apex obtuse, termen very obliquely rounded; white, strewn throughout with irregular dots and elongate marks of black irroration, of which the larger are more or less suffused with brown: cilia white, with an interrupted line of blackish irroration. Hindwings light grey, with brassy and purplish reflections; cilia whitish, with a faint grey shade.

Mahé, near Morne Blanc (1000 feet), Cascade Estate, and Port Victoria; Silhouette, Mare aux Cochons plateau (1000 feet), and in low cultivated country; in September, October, and February, sixteen specimens.

Setomorpha Zell.

106. *Setomorpha rutella* Zell.

Mahé, Cascade Estate (1000 feet) and Port Victoria, in January and February; four specimens. This species is now very widely distributed in tropical countries, the larva feeding on various dried vegetable substances.

Progonarma, n. gen.

Head loosely haired; ocelli present; tongue absent. Antennæ $\frac{3}{4}$, in ♂ minutely ciliated, basal joint moderate, with slight pecten. Labial palpi long, rather curved, subascending, second joint beneath with rough projecting scales, externally with several long bristles, terminal joint as long as second, moderate, obtuse. Maxillary palpi long, several-jointed, folded. Posterior tibiæ clothed with long hairs above. Forewings with 2 from towards angle, 3 and 4 approximated or connate, 7 and 8 sometimes stalked, 7 to costa, 11 from $\frac{1}{4}$. Hindwings 1, elongate-ovate, cilia $\frac{2}{3}$; 3 and 4 remote, 5 and 6 rather approximated at base, 7 parallel.

Apparently related to *Mastigostoma* and *Scardia*.

107. *Progonarma pagetodes*, n. sp.

♂♀. 13—17 mm. Head white, sometimes tinged with fuscous. Palpi white, second joint externally blackish except apex and projecting scales, terminal joint in one specimen with two blackish bands. Thorax white, with a black spot on each shoulder, sometimes

much mixed with black dorsally. Abdomen grey. Forewings elongate, costa gently arched, apex obtuse, termen obliquely or very obliquely rounded; white, somewhat sprinkled with fuscous, in one specimen tinged with fuscous; markings black; costal edge black towards base; a variable spot on base of costa containing a white spot; an irregular mark from costa about $\frac{1}{4}$, sometimes interrupted, preceded and followed by one or two variable costal dots; a narrow irregular inwardly oblique transverse median fascia, expanded dorsally, sometimes interrupted in disc; a more or less developed inwardly oblique mark from costa at $\frac{3}{4}$; an irregular streak along termen, rather triangularly dilated on tornus, sometimes rather widely interrupted above this, or forming a series of cloudy dots, sometimes extending round apical part of costa; in one specimen apical area largely suffused with fuscous: cilia white, sometimes variably sprinkled with dark fuscous on basal half, at apex and beneath tornus with grey spots. Hindwings light grey with brassy reflections; cilia whitish.

Mahé, near Morne Blanc and Cascade Estate, 1000 feet; Silhouette, Mare aux Cochons plateau, 1000 feet; from September to December, seven specimens. There is great variability in development of dark markings and fuscous suffusion, and the shape of forewings also varies somewhat, but I am unable to separate any of these forms specifically. I have also six worn specimens taken by Mr T. B. Fletcher from Siren Island in the Cargados group of the Carajos Islands, which I refer to the same species.

Sporadarthra, n. gen.

Head roughly tufted; ocelli absent, tongue absent. Antennæ $\frac{5}{6}$, in ♂ simple, basal joint elongate, without pecten. Labial palpi moderate, porrected, with appressed scales, second joint with several projecting bristles externally, terminal joint shorter than second, somewhat pointed. Maxillary palpi several-jointed, filiform, folded. Posterior tibiæ clothed with hairs above. Forewings with 2 represented by detached apical portion only, 3 from angle, 4 nearly connate with 7, 5 and 6 out of 7, 7 to costa, 8 out of 7, 9 and 10 from cell posteriorly, 11 nearly obsolete, from near base of cell. Hindwings $\frac{3}{5}$, narrow-lanceolate, cilia 3; 2—4 remote, 5 approximated to 4 at base, 6 imperfectly developed, to costa, 7 approximated to 6 at base.

A development of the *Tinea* group, with neuration in process of simplification.

108. *Sporadarthra sicaria*, n. sp.

♂♀. 9—11 mm. Head whitish-ochreous on crown, rough hairs more or less brownish, lower part of face whitish. Palpi dark grey, internally whitish. Thorax whitish-ochreous, patagia dark purplish-fuscous. Abdomen pale greyish-ochreous. Forewings elongate-lanceolate, acute; dark purplish-fuscous; a whitish-ochreous dorsal stripe from base to beyond tornus, its upper edge forming three very obtuse angulations upwards and two downwards, latter including some blackish scales; apex suffused with blackish: cilia whitish-ochreous, round apex with a dark fuscous subbasal line. Hindwings grey; cilia whitish-ochreous tinged with grey.

Mahé, Cascade Estate (1000 feet), Port Victoria, and Anonyme Island; Silhouette, Mare aux Cochons plateau, 1000 feet; in September, January, and February, twelve specimens.

Tinea Linn.

109. *Tinea milichopa*, n. sp.

♀. 13—15 mm. Head, palpi, and thorax pale ochreous. Antennæ $\frac{5}{6}$. Abdomen whitish-ochreous. Forewings elongate, rather narrow, costa gently arched, apex obtuse, termen very obliquely rounded; all veins separate; brownish-ochreous; basal area mixed or strigulated with white; seven fine oblique white strigulæ from costa between $\frac{2}{5}$ and $\frac{3}{4}$, first three uniting with a patch of whitish suffusion or confluent strigulæ beneath costa; a series of gradually diminishing white strigulæ from middle of dorsum to middle of termen; a transverse bar of dark fuscous or blackish suffusion before apex, with two or three minute white dots: cilia whitish, round apex with basal third brownish-ochreous finely tipped with dark fuscous, at apex with a brownish-ochreous bar. Hindwings pale grey with brassy reflections; cilia whitish.

Silhouette, Mare aux Cochons plateau and south side of Mont Pot-à-eau, 1000—1500 feet, in August and September; three specimens.

110. *Tinea trochæa*, n. sp.

♂♀. 8—9 mm. Head dark fuscous, face grey or whitish. Palpi whitish, second and terminal joints each with blackish median band. Antennæ almost 1. Thorax dark fuscous, somewhat sprinkled with whitish posteriorly. Abdomen dark fuscous. Forewings elongate, rather narrow, costa gently arched, apex obtuse, termen very obliquely rounded; all veins separate; brown, finely sprinkled with black; a broad streak of black suffusion along costa; basal fourth sprinkled with white, towards dorsum suffused with white and sprinkled with black; a rather oblique white median fascia formed of confluent strigulæ, expanded towards costa; a broader fascia of black suffusion from $\frac{3}{4}$ of costa to tornus, sprinkled with white dots in disc, expanded on tornus, towards costa marked with three very fine oblique greyish lines; a small white spot on termen beneath apex, and one or two white dots or strigulæ above this: cilia white with two black lines, beneath apex with a wholly white patch, beneath this suffused with dark grey. Hindwings and cilia dark fuscous.

Mahé, near Morne Blanc and Cascade Estate, 1000 feet; Silhouette, Mare aux Cochons plateau and south side of Mont Pot-à-eau, 1000—1500 feet; from August to October and in February, twenty specimens.

111. *Tinea coronata*, n. sp.

♂♀. 9—11 mm. Head dark fuscous, face more or less mixed with whitish-ochreous. Palpi dark fuscous, internally whitish-ochreous. Antennæ almost 1. Thorax dark fuscous, marked posteriorly with white suffusion. Abdomen dark fuscous. Forewings elongate, rather narrow, costa gently arched, apex obtuse, termen very obliquely rounded; all veins separate; dark fuscous; basal third strigulated with white on costa and dorsum, and mixed with white in disc; seven fine oblique white strigulæ from costa between $\frac{2}{5}$ and $\frac{5}{6}$, first three connected with an irregular white patch or group of suffused strigulæ

beneath costa; four or five white strigulæ from posterior half of dorsum, and three or four from lower part of termen, with a dark space on tornus between these groups; usually some scattered white specks above these and towards apex; apex sometimes brownish: cilia whitish, with a black subbasal line, at apex with a blackish bar expanded at tips. Hindwings and cilia dark fuscous.

Mahé, Mare aux Cochons district, near Morne Blanc, and Cascade Estate, 1000 feet; Silhouette, Mare aux Cochons plateau and south side of Mont Pot-à-eau, 1000—1500 feet, from August to October and in January and February, twenty-eight specimens.

112. *Tinea misella* Zell.

Mahé, near Morne Blanc, 1000 feet, in November; one specimen. An introduced European species; larva feeds on refuse.

113. *Tinea fuscipunctella* Hb.

Mahé, near Morne Blanc and Cascade Estate, 1000 feet, in November and December; two specimens. A cosmopolitan species, introduced; larva feeds on excrementitious refuse.

114. *Tinea pachyspila* Meyr.

Mahé, Cascade Estate, 1000 feet; Silhouette, Mare aux Cochons, 1000 feet; in September, January, and February. A common Ceylon species, doubtless introduced; larva feeding on flannel, fur, &c.

115. *Tinea saucropis*, n. sp.

♂. 7 mm. Head white, with some grey hairs above eyes. Palpi blackish, apex white. Antennæ over 1, stout, ochreous-whitish. Thorax and abdomen whitish. Forewings elongate, rather narrow, apex pointed; white; a fascia of light brownish suffusion near base, touched with dark fuscous on costa; a yellow-ochreous spot in disc before middle, resting on a small costal spot of fuscous suffusion; three or four scattered yellow-ochreous dots posteriorly; two or three fuscous dots on costa posteriorly: cilia white. Hindwings and cilia whitish.

Mahé, near Morne Blanc, 1000 feet, in November; one specimen. Not in good order, and the neuration is not discernible, but it appears to be a true *Tinea*; the larva would probably feed on lichens.

Melasina Boisd.

116. *Melasina tabernalis*, n. sp.

♀. 11 mm. Head pale ochreous, crown mixed with dark fuscous (damaged). Palpi whitish-ochreous, terminal joint rather long, slender. Thorax dark fuscous, spotted with pale ochreous (damaged). Abdomen dark fuscous, anal tuft large, fuscous. Forewings elongate, somewhat dilated posteriorly, costa moderately arched, apex rounded-obtuse, termen obliquely rounded; all veins separate, 7 to apex; deep purple, suffused with dark fuscous along costa, irregularly strewn with small whitish-ochreous suffused spots and strigulæ; four or five more sharply marked small whitish-ochreous triangular spots on costa, three or four on dorsum, and a series of marks round apex and termen. Hindwings

deep purple, strewn with small whitish-ochreous spots; several more distinct and larger round lower $\frac{2}{3}$ of termen.

Mahé, Cascade Estate, in December; one specimen.

Pitharcha Meyr.

117. *Pitharcha chalinæa* Meyr.

One specimen received from Mr T. B. Fletcher as taken in the Seychelles, without further record. It is widely distributed in Central Africa from east to west, and is probably artificially spread.

Scalmatica, n. gen.

Head rough; ocelli present; tongue absent. Antennæ $\frac{3}{4}$, in ♂ clothed with moderately long thinly strewn cilia, basal joint moderate, stout, with pecten of cilia. Labial palpi moderately long, ascending, second joint with rough scales beneath and some projecting lateral bristles, terminal joint shorter than second, with tolerably appressed scales, obtuse. Maxillary palpi short, loosely scaled, ascending. Posterior tibiæ clothed with long hairs. Forewings with 2 from towards angle, 7 absent, 11 from $\frac{1}{3}$. Hindwings 1, elongate-ovate, cilia $\frac{4}{5}$; 2—4 remote, 5 and 6 rather approximated at base.

Allied to *Amydria*.

118. *Scalmatica rimosa*, n. sp.

♂♀. 18—19 mm. Head, palpi, thorax, and abdomen pale greyish-ochreous. Forewings elongate, narrow, costa gently arched, apex obtuse, termen extremely obliquely rounded; pale greyish-ochreous tinged with fuscous, and with a very faint pinkish tinge; numerous undefined scattered transverse strigulæ of dark fuscous irroration; stigmata cloudy, dark fuscous, first discal near before middle, plical very obliquely beyond first discal; a series of cloudy dark fuscous dots round posterior part of costa and termen: cilia pale greyish-ochreous. Hindwings pale fuscous, with a slight violet tinge; cilia whitish-ochreous.

Mahé, near Morne Blanc and Cascade Estate, 1000 feet, in October and February; two specimens.

Proterodesma Meyr.

119. *Proterodesma tomæa*, n. sp.

♀. 12 mm. Head and thorax whitish-fuscous sprinkled with fuscous. Palpi fuscous-whitish sprinkled with dark fuscous. Abdomen grey. Forewings elongate, costa gently arched, apex obtuse, termen very obliquely rounded; 7 and 8 stalked; fuscous, scales pale-edged; scattered dark fuscous strigulæ, especially on margins: cilia whitish-fuscous, with several indefinite dark fuscous lines. Hindwings pale grey; cilia whitish-grey.

Felicité, in December; one specimen.

Scardia Treit.

120. *Scardia lochæa*, n. sp.

♀. 12 mm. Head fuscous-whitish, sides of crown more fuscous-tinged. Palpi whitish, second joint mixed with dark fuscous towards base, terminal joint with dark fuscous subapical spot. Thorax whitish-fuscous, shoulders with suffused dark fuscous blotch. Abdomen grey. Forewings elongate, rather narrow, costa gently arched, apex obtuse, termen extremely obliquely rounded; 7 and 8 stalked; fuscous-whitish, sprinkled and coarsely strigulated with mixed brown and blackish scales; two or three larger transverse spots on dorsum: cilia whitish-fuscous, darker towards tornus, with two interrupted dark fuscous shades. Hindwings grey; cilia pale grey.

Silhouette, jungle above Mare aux Cochons plateau, in September; one specimen.

No. XIII.—HYMENOPTERA, CYNIPIDÆ.

Par J. J. Kieffer, Doct. Phil. (Bitsch).

(Communiqué par Prof. J. Stanley Gardiner, M.A., F.R.S., F.L.S.)

Lu le 15 juin, 1911.

La famille des Cynipides parait être faiblement représentée dans les Iles Seychelles. Les trente-quatre exemplaires que Hugh Scott y a recueillis, ne forment que huit espèces différentes, dont sept appartiennent à la sous-famille des *Eucoilinæ* et une à celle des *Charipinæ*; toutes les huit reviennent donc à la Section des Cynipides zoophages. La plus grande de ces huit espèces n'atteint même pas 2 mm. en longueur, tandis qu'en Europe, en Asie, en Afrique, en Amérique et en Australie on trouve des Cynipides zoophages dont la taille atteint 10 à 15 mm.

Eucoilinæ.

Gronotoma, Förster.

Gronotoma, A. Förster, Verh. Ges. Wien, 1869, vol. xix. Abh. p. 342, 346; Dalla Torre et Kieffer, Das Tierreich, 24. Lieferung (Berlin, 1910), p. 241.

1. *Gronotoma seychellensis*, n. sp.

♂♀. Noir brillant; mandibules, hanches et pattes d'un roux jaunâtre, les trois premiers articles antennaires ordinairement roussâtres. Tête transversale vue d'en haut, pas plus longue que large vue de devant, un sillon oblique va de la base de l'œil à la bouche, face avec un enfoncement longitudinal de chaque côté du clypeus, joues dépassant le milieu des yeux. Antennes du mâle de 15 articles, beaucoup plus longues que le corps, articles 1 et 2 pas plus longs que gros, 3e presque double du 4e, arqué assez fortement, 4—15 subcylindriques, au moins deux fois aussi longs que gros. Antennes de la femelle de 13 articles, au moins aussi longues que le corps, 3e article mince, arqué faiblement, de moitié plus long que le 4e qui est 2 fois ½ aussi long que gros, les suivants plus gros et graduellement raccourcis, le 5e deux fois aussi long que gros, les derniers encore un peu plus longs que gros. Thorax plus étroit que la tête, convexe, aussi haut que long, sillons parapsidaux profonds, fortement convergents en arrière, où ils ne sont distants que de leur largeur, scutellum à fossettes obliques et très transversales, cupule grande, occupant presque tout le disque, elliptique, plane, avec une petite fossette circulaire en arrière du milieu. Ailes hyalines, ciliées, cellule radiale fermée, grande, plus de deux fois aussi longue

que sa distance de la nervure basale, non dépassée par la postmarginale, 1e partie du radius un peu plus longue que la 3e partie de la sous-costale, 2e partie du radius deux fois et demie aussi longue que la 1e, aréole indiquée par un point calleux, duquel part la partie distale du cubitus. Pétiole glabre, transversal, grossièrement cannelé, abdomen faiblement comprimé, tronqué en arrière chez la femelle. Taille : 1,5—1,8 mm.

Habitat. Iles Seychelles. Silhouette : Mare aux Cochons plateau and jungle near by, VIII. 1908, 1 ♀ ; Mare aux Cochons, IX. 1908, 2 ♀ ; Mare aux Cochons and forest immediately above, IX. 1908, 2 ♀ ; low coconut-planted country near the coast, Pointe Étienne, 17. IX. 1908, 2 ♂ ; Mare aux Cochons and forest above, IX. 1908, 1 ♀.

Cothonaspis, Hartig.

Cothonaspis (part.), T. Hartig, Z. Ent. Germar, vol. ii. 1840, pp. 186, 200 ; Dalla Torre et Kieffer, *l. c.* p. 104.

Subgenus Pentarhoptra, Kieffer.

2. *Cothonaspis* (*Pentarhoptra*) *scotti*, n sp.

♂♀. Noir brillant ; mandibules, hanches et pattes jaunes, 3e article antennaire du mâle et les huit premiers de la femelle, jaune brunâtre. Tête vue de devant un peu plus longue que large, un sillon réunit la base de l'œil à la mandibule. Antennes du mâle beaucoup plus longues que le corps, 3e article un peu arqué, deux fois aussi long que gros, les suivants de moitié plus longs que gros, subcylindriques ; chez la femelle le 3e article est deux fois aussi long que gros, les cinq suivants serrés et pas plus longs que gros, les cinq derniers grossis, subcylindriques, un peu plus longs que gros. Cupule allongée et étroite. Ailes hyalines et longuement ciliées, cellule radiale ouverte à la marge, à peine plus longue que sa distance de la nervure basale, 3e partie de la sous-costale ponctiforme, 1e partie du radius égale à la 2e. Abdomen de la femelle aussi long que le reste du corps, faiblement comprimé, ceinture étroite et noirâtre. Taille : 0,8—1,2 mm.

Habitat. Iles Seychelles. Mahé : Cascade Estate, 800—1000 feet, 1 ♀ ; Cascade Estate, about 1008 feet, II. and III. 1909, 2 ♂ ; Mare aux Cochons district, about 1500 feet, 26. I.—2. II. 1909, 1 ♂ ; Cascade Estate, about 800—1500 feet, 1909, 2 ♂, 3 ♀.

Eucoila, Westwood.

Eucoila, Westwood, Mag. Nat. Hist., vol. vi. 1833, p. 494 ; Dalla Torre et Kieffer, *l. c.* p. 128.

Subgenus Tetramerocera, Ashmead.

3. *Eucoila* (*Tetramerocera*) *seychellensis*, n. sp.

♀. Roux marron ; dessus de la tête et massue antennaire noirs, reste des antennes, hanches et pattes, jaunes. Col, métapleures et pétiole avec un gros feutrage jaune blanchâtre. Tête vue de devant plus haute que large, yeux d'un tiers plus longs que les joues. Article 3e des antennes deux fois aussi long que gros, 3—9 également minces,

4—9 un peu plus longs que gros, cylindriques, massue formée par quatre articles un peu plus longs que gros, le premier moins gros que les suivants, soies courtes et dressées. Thorax un peu plus long que haut, capule étroite, à peine aussi large que sa distance du bord. Ailes hyalines, longuement ciliées, presque tronquées à l'extrémité, nervures brunes, cellule radiale fermée, à peine plus longue que sa distance de la nervure basale, dépassée d'un tiers par la postmarginale, aréole remplacée par un point calleux, cubitus faiblement marqué, 3e partie de la sous-costale presque ponctiforme, 1e partie du radius égale à la 2e. Abdomen comprimé, aussi long que le reste du corps, ceinture blanc jaunâtre. Taille: 1,5 mm.

Habitat. Iles Seychelles. Silhouette: Mare aux Cochons and forest near by, IX. 1908, 1 ♀. Mahé: high forest of Morne Blanc, 24. X. 1908, 1 ♀.

Subgenus Psichacra, Förster.

4. *Eucoila* (*Psichacra*) *scottiana*, n. sp.

♀. Roux clair; tête noire sauf les mandibules, antennes jaune pâle, plus sombres vers l'extrémité. Yeux trois fois aussi longs que les joues. Antennes plus longues que le corps, 3e article un peu plus court que le 4e qui est trois fois aussi long que gros, 5e et 6e égalant le 4e, les six ou sept derniers à peine plus gros, 2—3 fois aussi longs que gros. Thorax plus long que haut, cupule allongée, étroite. Ailes hyalines, ciliées, cellule radiale fermée, deux fois aussi longue que sa distance de la nervure basale, 1e partie du radius égale à la 2e, trois à quatre fois aussi longue que la 3e partie de la sous-costale, partie distale du cubitus à peine arquée. Abdomen comprimé, ceinture étroite et jaunâtre. Taille: 1,3 mm.

Habitat. Iles Seychelles. Mahé: near Morne Blanc, X. 1908, 1 ♀.

Ganaspis, Förster.

Ganaspis, A. Förster, Verh. Ges. Wien, 1869, vol. xix. Abh. p. 334, 355; Dalla Torre et Kieffer, Das Tierreich, 24. Lieferung (Berlin, 1910), p. 181.

5. *Ganaspis mahensis*, n. sp.

♀. Noir brillant; mandibules, quatre ou cinq premiers articles antennaires, hanches et pattes jaunes. Tête vue de devant à peine plus haute que large; 3e article antennaire deux fois aussi long que gros, les suivants de moitié plus longs que gros, huit derniers graduellement un peu grossis, les cinq derniers d'égale grosseur, un peu plus longs que gros, subcylindriques. Ailes longuement ciliées, hyalines, cellule radiale fermée, de moitié plus longue que sa distance de la nervure basale, non dépassée par la postmarginale, 1e partie du radius égale à la 2e, triple de la 3e partie de la sous-costale, partie distale du cubitus arquée et percurrente. Cupule elliptique, occupant presque tout le dessus du scutellum, plane, avec une fossette circulaire située près du bout postérieur. Abdomen faiblement comprimé, sans ceinture à sa base. Taille: 1—1,3 mm.

Habitat. Iles Seychelles. Mahé: Cascade Estate, 800—1000 feet (1 ♀); Ibidem, (2 ♀); Cascade Estate, about 1000 feet, I. 1909 (2 ♀); Cascade Estate, about 800 feet and over, collected by H. P. Thomasset and H. Scott, X. 1908.—I. 1909 (2 ♀); Cascade Estate, about 800—1500 feet, 1909 (1 ♀).

ECTOLYTA, Förster.

Ectolyta, A. Förster, Verh. Ges. Wien, 1869, vol. xix. Abh. p. 342, 347 ; Dalla Torre et Kieffer, Das Tierreich, 24. Lieferung (Berlin, 1910), p. 233.

6. *Ectolyta atraticeps*, n. sp.

♀. Roux ; tête noire, sauf les mandibules, hanches et pattes jaunes, antennes roux jaune en entier. Tête vue de devant pas plus haute que large. Antennes plus courtes que le corps, articles 3 et 4 deux fois aussi longs que gros, les suivants au moins de moitié plus longs que gros, six ou sept derniers plus gros, le 7e plus mince que le 8e, 8—13 d'égale grosseur, subcylindriques, un peu plus longs que gros. Cupule petite, pas plus large que sa distance du bord du scutellum, creusée, elliptique, pas plus longue que les fossettes basales. Ailes hyalines, ciliées, cellule radiale ouverte au bord, de moitié plus longue que sa distance de la nervure basale, 1e partie du radius faiblement arquée par en haut, trois fois aussi longue que la 3e partie de la sous-costale, égale à la 2e partie du radius, qui est arquée faiblement par en bas, partie distale du cubitus faiblement marquée. Abdomen comprimé, aussi long que le reste du corps, sans ceinture basale. Taille : 1,5 mm.

Habitat. Iles Seychelles. Silhouette : Mare aux Cochons ; 1 ♀.

ERISPHAGIA, Förster.

Erisphagia, A. Förster, *l.c.* p. 342, 347 ; Dalla Torre et Kieffer, *l.c.* p. 226.

7. *Erisphagia mahensis*, n. sp.

♂. Noir brillant ; antennes, hanches et pattes d'un roux jaune, tiers distal des antennes assombri. Tête vue de devant pas plus haute que large, yeux deux fois aussi longs que les joues. Antennes plus longues que le corps, deux premiers articles pas plus longs que gros, 3e plus mince que les suivants, cylindrique, deux fois aussi long que gros, 4e de moitié plus long que le 3e, à peine plus long que le 5e, les suivants graduellement amincis, le 14e égal au 15e, trois fois aussi long que gros. Thorax très convexe, guère plus long que haut, cupule petite, moins large que sa distance du bord du scutellum, en ellipse amincie. Ailes hyalines, ciliées, cellule radiale fermée, de moitié plus longue que sa distance de la nervure basale, 1e partie du radius arquée par en haut, un peu plus courte que la 2e, trois fois aussi longue que la 3e partie de la sous-costale. Abdomen piriforme, à peine comprimé, sans ceinture à sa base. Taille : 1,5 mm.

Habitat. Iles Seychelles. Mahé : Mare aux Cochons district, 1000—2000 feet, 26. I. 1909—2. II. 1909 (1 ♂).

Charipinæ.

CHARIPS, Haliday.

Charips, Haliday, Ent. Mo. Mag. vol. vi. 1870, p. 181 ; Dalla Torre et Kieffer, *l.c.* p. 267.

8. *Charips mahensis*, n. sp.

♂. Noir brillant ; mandibules, bas de la face, métapleures et segment médian roux marron, 4 premiers articles antennaires, hanches et pattes jaune clair, reste des

antennes brun noir. Tête transversale vue d'en haut, plus haute que large vue de devant. Antennes de 15 articles, de moitié plus longues que le corps, 2e article subglobuleux, 3—15 subégaux, plus de deux fois aussi longs que gros, cylindriques, le 3e à peine plus court que le 4e, qui est un peu grossi et peu distinctement arqué. Mesonotum fortement convexe. Ailes subhyalines, radius aboutissant après le second tiers de l'aile, cellule radiale fermée, longue, 2—3 fois aussi longue que large, 1e partie du radius triple de la 3e partie de la sous-costale, 2e partie du radius de moitié plus longue que la 1e, toutes deux droites, partie distale du cubitus percurrente, sans trace d'aréole. Abdomen piriforme. Taille : 1 mm.

Habitat. Iles Seychelles. Mahé : Cascade Estate, about 800 feet and over, collected by H. P. Thomasset and H. Scott, X. 1908—I. 1909 (1 ♂).

No. XIV.—DIPTERA, CECIDOMYIIDÆ,

der Seychellen-Inseln

aus der Sammlung von Mr H. Scott.

Von Prof. Dr. J. J. Kieffer, Bitsch.

(Mitgeteilt von Prof. J. Stanley Gardiner, M.A., F.R.S., F.L.S.)

(27 Text-figuren.)

Vorgelegt am 19. Januari 1911.

Es war bisher keine Gallmücke für die Seychellen-Inseln bekannt. Die Arten, welche in vorliegender Arbeit beschrieben werden, sind somit die ersten, welche für diese Inselgruppe erwähnt werden. Sie wurden von Herrn Hugh Scott auf Silhouette, und auf Mahé (mit Anonyme I.) gesammelt; wahrscheinlich gehört keine derselben zu den gallenerzeugenden Mücken, da sie solchen Gattungen angehören, deren Vertreter keine Gallen bewirken.

Ledomyia Kieffer,

Bull. Soc. Ent. France, lxiv. 320 (1895).

Die 4 Arten, die ich zur Gattung *Ledomyia* stelle, zeigen dasselbe Flügelgeäder, während sie andererseits durch die Zahl und die Gestalt der Antennenglieder sehr von einander abweichen. Sie lassen sich unterscheiden wie folgt:

1. Mesonotum mit anliegenden, goldgelben Schuppen; Antennen des ♀ 2 + 7-gliedrig, kaum länger als dick, beim ♂ 2 + 8-gliedrig, Flagellumglieder walzenförmig, Zange wie bei *Perrisia*. .....1. *L. aurofulgens*, n. sp.

Mesonotum mit schwarzen Schuppen; Antennen des ♀ 2 + 8-gliedrig, Flagellumglieder walzenförmig, 2-mal so lang wie dick, Antennen des ♂ wenigstens 2 + 10-gliedrig. .....2.

2. Proximaler Teil der Flügel ziemlich linealisch, ein Drittel der Länge des übrigen Flügels erreichend (♀). .....2. *L. styloptera*, n. sp.

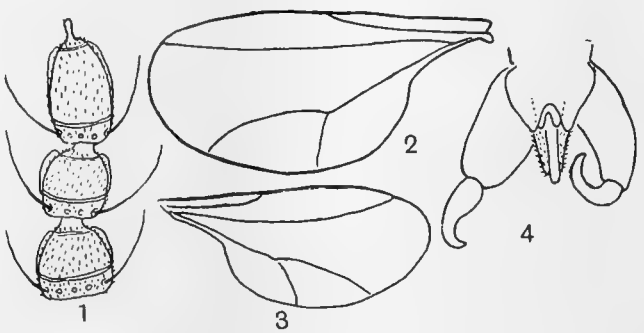
Proximaler Teil der Flügel keilförmig, kürzer als ein Drittel des übrigen Flügels (♂). .....3.

3. Flagellumglieder walzenförmig, fast 2-mal so lang wie dick, stielartiger Fortsatz wenigstens 2-mal so lang wie dick. .....3. *L. mahensis*, n. sp.

Flagellumglieder kuglig, stielartiger Fortsatz nicht länger als dick..... .....4. *L. monilicornis*, n. sp.

1. *Ledomyia aurofulgens*, n. sp.

♂♀. Gelbrot; Beine gelb, mit schwarzen Schuppen; Schwinger und, beim ♀, das Scutellum gelblichweiss; beim ♂ ist der Thorax rot, das Mesonotum etwas dunkler, das Scutellum hellrot, das Abdomen schwarzbraun. Augen kahl. Palpen 4-gliedrig, das 1. Glied wenig länger als dick, das 2. kaum kürzer als das 3., dieses 2—3-mal so lang wie dick, 4. distal etwas verengt, 4-mal so lang wie dick. Antennen des ♀ 2+7-gliedrig; 1. und 2. Glied obkonisch, nicht länger als dick; die folgenden fast walzenförmig, kaum länger als dick, distal mit einem fast queren, stielartigen Fortsatz, Endglied um die Hälfte länger als das 6., mit einem kurzen, unbehaarten, griffelartigen Fortsatz; Bogenwirtel durch einen glashellen, querlaufenden Faden ersetzt, welcher durch einen Längsfaden mit dem Distalende des Gliedes verbunden ist (Fig. 1). Antennen des ♂ 2+8-gliedrig,



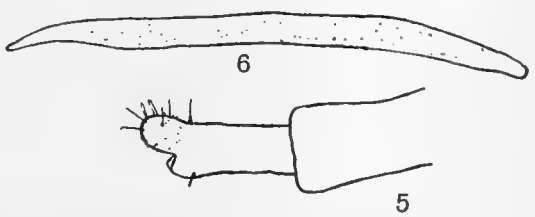
Figs. 1—4, *Ledomyia aurofulgens*, n. sp. Fig. 1, die 3 letzten Antennenglieder des ♀; Fig. 2, Flügel des ♀; Fig. 3, Flügel des ♂; Fig. 4, Zange.

Flagellumglieder walzenförmig, $1\frac{1}{2}$-mal so lang wie dick, mit einer halsartigen Verlängerung, welche fast die Länge eines Gliedes erreicht; Bogenwirtel $1\frac{1}{2}$-mal so lang wie ein Glied. Mesonotum mit zwei breiten, aus anliegenden, goldgelben Schuppen bestehenden Längsbinden, zwischen welchen nur eine Linie frei bleibt. Flügel (Fig. 2) dunkel, stark irrisirend, mit dichten, angedrückten und ziemlich langen Haaren; Vorderrand mit breiten, schwarzen, anliegenden Schuppen, dazwischen mit zerstreuten und abstehenden Haaren; Querader undeutlich; Cubitus gerade beim ♀, etwas nach unten gebogen beim ♂ (Fig. 3), ziemlich weit vor der Flügelspitze mündend, Costalis an dieser Stelle nicht unterbrochen; Posticalis weit vor der Flügelmitte gegabelt. Tibien etwas länger als die zwei ersten Tarsenglieder zusammen, bedeutend länger als die Femora; Metatarsus wenig länger als dick; Krallen sehr dünn, einfach, vom Grunde aus fast rechtwinkelig gebogen, ohne deutliches Empodium. Abdomen des ♂ nach hinten allmählich verengt; Zange (Fig. 4) mit 3 Lamellen, wie bei *Perrisia*, die obere und die mittlere Lamelle sind 2-lappig und reichen nicht bis zur Mitte der Basalglieder, die untere Lamelle, welche mit ihren beiden Hälften den Griffel umgibt, erreicht die Mitte der Basalglieder; Endglieder in der distalen Hälfte dünn, und etwas eingekrümmt. Abdomen des ♀ nach hinten nicht verschmälert, aber abgestutzt, ohne vorstehende Legeröhre. Länge: 1,20 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800 feet and over, collected by H. P. Thomasset and H. Scott, X. 1908—I. 1909, 1 ♀; Cascade Estate, 800—1500 feet, 1909, 2 ♀, 1 ♂.

2. *Ledomyia styloptera*, n. sp.

♀. Rötlichgelb; Mesonotum, Abdomen und Beine mit breiten, kurz gestielten, schwarzen Schuppen. Kopf von vorn gesehen, höher als breit, Augen oben breit zusammenstossend. Palpen 4-gliedrig. Antennen 2 + 8-gliedrig; Flagellumglieder walzenförmig, 2-mal so lang wie dick, fast sitzend, nur durch ein queres Stielchen getrennt, 8. Glied dreimal so lang wie dick, distal allmählich zugespitzt; Borstenwirtel so lang wie ein Glied; alle Flagellumglieder haben, von der Mitte bis zum Distalende, beiderseits einen glashellen Faden oder eine sehr dünne Lamelle, welche oben und unten mit einem ringförmig um das Glied laufenden Faden verbunden ist. Flügel glashell, Vorderrand schwarz beschuppt; Geäder wie beim ♂ von *L. aurofulgens* (Fig. 3), der proximale verengte Teil des Flügels ist aber länger, fast linealisch und erreicht ein Drittel der Länge des übrigen Flügels. Femora und Tibien verdickt, die Vorderbeine mässig lang, 2. Tarsenglied kürzer als die Tibien, doch noch 6-mal so lang wie der Metatarsus, welcher 2-mal so lang wie dick ist; 5. Glied wenig kürzer als das 4., 3—4-mal so lang wie dick; Krallen sehr fein, bogig gekrümmt, wahrscheinlich tief 2-spaltig, 2—3-mal so lang wie das Empodium; an den Hinterbeinen sind die Tibien länger als die Femora. Legeröhre lang hervorstreckbar



Figs. 5, 6. *Ledomyia styloptera*, n. sp. Fig. 5, Legeröhre; Fig. 6, eine *Anguillula*.

(Fig. 5), am Ende mit 2 kleinen, dicht nebeneinander liegenden Lamellen, die so breit wie lang sind und dorsal abstehende spitze Borsten und einige dickere, abgestutzte, griffelartige Borsten tragen; unter diesen liegen noch 2 kleinere Läppchen. Länge: 1 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, 800—1500 feet, 1909.

Bemerkung. Beim Zerdrücken eines Exemplares, kam eine grosse Menge von Anguilluliden zum Vorschein, und zwar sowohl aus dem Halse und dem Thorax der Mücke als aus dem Abdomen derselben. Diese Würmer waren glashell, an einem Ende fein zugespitzt, am anderen stumpf und abgerundet (Fig. 6).

3. *Ledomyia mahensis*, n. sp.

♂. Dunkelrot; Abdomen schwarzbraun; Beine weisslich, mit schwarzen Schuppen. Antennen wenigstens 2 + 11-gliedrig (beide Antennen waren nämlich hinter dem 6. Glied abgebrochen, am Vorderbein der Mücke hingen noch die 5 Endglieder des Flagellums); Flagellumglieder walzenförmig, fast 2-mal so lang wie dick, stielartiger Fortsatz $\frac{2}{3}$ so lang wie ein Glied, das Endglied ohne Fortsatz, distal kaum verengt und abgerundet; Bogenwirtel gestaltet wie bei voriger Art. Flügel wie beim ♂ von *L. aurofulgens* (vgl. Fig. 3). Krallen einfach, bogig, Empodium kaum sichtbar. Endglieder der Zange dünn und gestaltet wie bei *Clinodiplosis*. Länge: 0,6 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, 800—1500 feet, 1909.

4. *Ledomyia monilicornis*, n. sp.

♂. Braunrot, Abdomen dunkler, Körper und Beine schwarz beschuppt. Palpen 4-gliedrig, Augen breit zusammenstossend. Antennen 2+10-gliedrig; Flagellumglieder ziemlich kuglig, stielartiger Fortsatz nicht länger als dick, Endglied eirund; Bogenwirtel wie bei *Perrisia*, Borsten länger als ein Glied. Flügel mit schwarz beschupptem Vorderrand, Gestalt und Geäder wie beim ♀ von *L. aurofulgens* (vgl. Fig. 3). Beine schlank, 3-mal so lang wie der Körper; Krallen 2—3-mal so lang wie das Empodium, wahrscheinlich tief 2-spaltig. Endglieder der Zange wie bei *Clinodiplosis*. Länge: 0,5 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, 800—1500 feet, 1909.

Chrysodiplosis, n. gen.

Diese Gattung unterscheidet sich von *Clinodiplosis* durch die anliegend beschuppten Beine, und von allen Gattungen der *Diplosariæ* durch den dicht beschuppten Flügelvorderrand, wie bei *Lasioptera*, sowie durch die goldgelben Schuppen des Mesonotums. Die 2 Arten unterscheiden sich wie folgt:

Distaler Knoten der Flagellumglieder birnförmig, mit 2 Bogenwirteln, proximaler Knoten kuglig. .....1. *C. pulchricornis*, n. sp.

Distaler Knoten der Flagellumglieder kuglig wie der proximale und nur mit 1 Bogenwirtel. .....2. *C. homotomus*, n. sp.

5. *Chrysodiplosis pulchricornis*, n. sp.

♂. Kopf, Thorax und Schwinger rötlichgelb; Beine gelb, dicht schwarz beschuppt, diese Schuppen breit, anliegend und leicht ablösbar; Abdomen schwarzbraun. Antennen bräunlich, länger als der Körper, 2+12-gliedrig (Fig. 7); Flagellumglieder aus 2 Knoten zusammengesetzt, proximaler Knoten etwas quer, der distale fast birnförmig, wenig länger als dick, die stielförmige Einschnürung zwischen den beiden ist so lang wie der untere Knoten, der stielartige Fortsatz am Distalende der Glieder erreicht die Länge eines distalen Knotens; Endglied mit einem kurzen Fortsatz, der kaum länger als dick ist; an jedem Glied trägt der proximale Knoten einen bis zum distalen Knoten reichenden Bogenwirtel und, unter demselben, einen längeren Borstenwirtel; der distale Knoten hat dagegen 2 Bogenwirtel und, zwischen denselben einen längeren Borstenwirtel; die beiden ersten Flagellumglieder sind miteinander verwachsen. Die Antennen dieser Art sind durch 3 Eigentümlichkeiten ausgezeichnet, nämlich alle Wirtel, sowohl die Bogen- als die Borstenwirtel sind der Längsaxe der Antenne parallel, also nicht ausgebreitet wie üblich; die Borstenwirtel bestehen nicht aus einfachen, steifen Haaren, sondern aus Borsten, die nach aussen fein gezähnelt erscheinen; diese Borstenwirtel bilden nicht blos eine Querreihe, aber sie stehen dicht gedrängt auf dem ganzen Zwischenraum der beiden Bogenwirtel. Thorax dorsal mit gelben Schuppenhaaren. Flügel am Vorderrand schwarz beschuppt, wie bei *Lasioptera*, am Hinterrand bewimpert; Fläche braun, dicht und schwarz behaart, mit helleren Flecken,

7

Fig. 7. *Chrysodiplosis pulchricornis*, n. sp. Zwei Endglieder der Antennen.

deren 3 quere in der distalen Hälfte liegen und vom Vorderrand bis zur Cubitalis reichen, der proximale von diesen 3 Querflecken liegt an der Mündung der Radialis, der mittlere verlängert sich noch über die Cubitalis bis zur Posticalis; 4 andere Querflecke liegen am Hinterrande, der distale derselben befindet sich in der Flügelspitze, der 2. und 3. umgeben die beiden Zinken der Posticalis, der 4. liegt der Mündung der Radialis gegenüber; Cubitalis gerade, kaum vor die Flügelspitze mündend, Posticalis gegabelt. Hintertibia so lang wie die 2 ersten Tarsenglieder, Metatarsus 2-mal so lang wie dick, 2. Glied so lang wie die 3 folgenden zusammen, diese allmählich verkürzt, 5. Glied kaum länger als dick; Krallen blass, klein, einfach, kaum länger als das Empodium. Länge: 1 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800 feet and over, collected by H. P. Thomasset and H. Scott, X. 1908—I. 1909.

6. *Chrysodiplosis homotomus*, n. sp.

♂. Braun, Mesonotum mit 2 aus goldgelben Schuppen bestehenden Längsreihen, Scutellum rot, Abdomen schwarzbraun. Antennen fast doppelt so lang wie der Körper; die 2 ersten Flagellumglieder miteinander verwachsen; die beiden Knoten der Flagellumglieder kuglig und nur mit einem Bogen- und einem Borstenwirtel (Fig. 8), Bogenwirtel lang, kaum kürzer als die Borstenwirtel, welche die Mitte des folgenden Knotens erreichen; stielartiger Fortsatz der beiden Knoten gleichlang, kaum kürzer als der Knoten. Flügel dunkel, Vorderrand dicht schwarz beschuppt, wie bei *Lasioptera*; die Strecke zwischen dem Vorderrand und der Cubitalis vom Grunde bis zur Spitze, ein langer Streifen zwischen der Cubitalis und der Posticalis in der proximalen Hälfte, ein Längsfleck zwischen der Posticalis und der Cubitalis in der distalen Hälfte, der Zwischenraum von der Posticalis bis zum Hinterrand, vom Grunde bis zur hinteren Zinke, und ein Streifen längs der vorderen Zinke angeraucht und stark blau irrisirend; die Querader trifft die Radialis in der Mitte; Cubitus ziemlich gerade, kaum hinter die Flügelspitze mündend; vordere Zinke der Posticalis stark bogig gekrümmt, die hintere gerade und fast senkrecht. Beine schlank, 3-mal so lang wie der Körper, mit schwarzen und anliegenden Schuppen; 5. Tarsenglied nur doppelt so lang wie dick; Krallen einfach, stark gebogen, 2-mal so lang wie das Empodium. Endglieder der Zange dünn, kahl, gestaltet wie bei *Clinodiplosis*; die beiden Lamellen gleichlang, 2-lappig, das Distalende der Basalglieder fast erreichend. Länge: 1 mm.

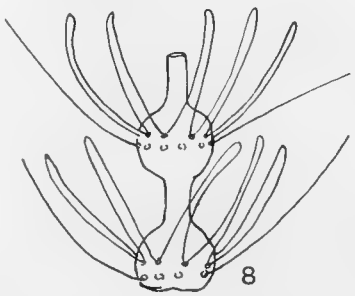


Fig. 8. *Chrysodiplosis homotomus*, n. sp. Ein Flagellumglied.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800 feet and over, collected by H. P. Thomasset and H. Scott, X. 1908—I. 1909.

Lepidodiplosis, n. gen.

Von der in Europa und Algerien vorkommenden Gattung *Xylodiplosis*, ist die Gattung *Lepidodiplosis* besonders durch die nicht behaarten aber anliegend beschuppten Beine zu unterscheiden.

7. *Lepidodiplosis seychellensis*, n. sp.

♀. Gelblich, mit schwarzen, fast schuppenartigen Haaren bedeckt, Beine schwarz und schwarz beschuppt, Hinterrand der Tergite und dorsale Seite der Femora und der Tibien mit langen Haaren, diese Haare 2-mal so lang wie die Dicke der Beine; vordere Tibien, die beiden Ende der 4 hinteren Tibien und aller Femora, sowie das Distalende der 4 proximalen Tarsenglieder gelb und gelb beschuppt; Legeröhre gelb. Scheitel mit einem walzenförmigen, griffelartigen und fein pubeszirten Fortsatz, welcher 2-mal so lang wie dick ist und eine sehr lange, braune, nach vorn eingekrümmte Borste trägt. Mund ziemlich lang, länger als ein Drittel des Kopfes. Palpen mit 4 langen Gliedern. Antennen 2 + 12-gliedrig (Fig. 9); Flagellumglieder walzenrund, 3-mal so lang wie dick, mit einem Stielchen, das nicht länger als dick ist, die beiden ersten Flagellumglieder verwachsen, das letzte mit einem Fortsatz, welcher die halbe Länge des Gliedes erreicht und in seiner proximalen, verdickten Hälfte, einen Haarwirtel trägt; jedes Flagellumglied trägt proximal einen langen, wenig abstehenden Borstenwirtel und im übrigen, eine Anzahl kleinerer, nicht quer

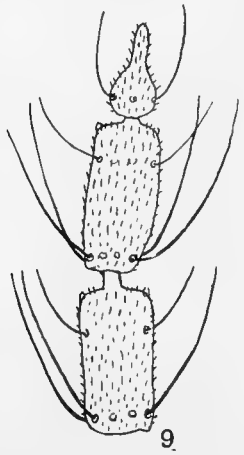


Fig. 9. *Lepidodiplosis seychellensis*, n. sp. Zwei Endglieder der Antennen.

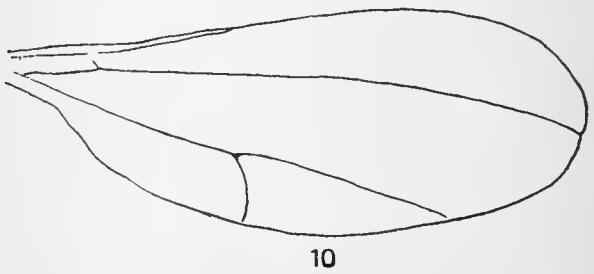


Fig. 10. *Lepidodiplosis squamosipes*, n. sp. Flügel.

gereihter Borsten; Bogenwirtel wie bei *Perrisia*. Flügel dunkel, wegen der dichten, schwarzen, anliegenden Haare; Vorderrand und Radialis mit abstehenden und sehr dichten gelben Haaren; Cubitalis schwach gebogen, kaum hinter die Flügelspitze mündend, der Vorderrand an dieser Stelle unterbrochen; vordere Zinke der Posticalis schwach bogig gekrümmt, die hintere fast senkrecht vom Stiel abgehend. Querader im proximalen Viertel die Radialis treffend. Beine schlank; Endglied der Tarsen 4—5-mal so lang wie dick; Krallen einfach, Empodium fehlend. Legeröhre sehr lang hervorstreckbar, $1\frac{1}{2}$-mal so lang wie der Körper, am Ende mit 2 kurzen, oberen Lamellen und mit 2 noch kürzeren unteren Lamellen. Länge: 1,8 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800 feet and over, collected by H. P. Thomasset and H. Scott, X. 1908—I. 1909, 26 ♀.

8. *Lepidodiplosis mahensis*, n. sp.

♂♀. Rot, Scutellum heller, Flagellum schwarz, Palpen und Schwinger weiss, Mesonotum mit 3 schwarzbraunen Längsbinden, Beine mit schwarzen Schuppen. Palpen 4-gliedrig,

das 1. Glied nicht länger als dick, die anderen länglich. Antennen 2 + 12-gliedrig, die 2 ersten Flagellumglieder miteinander verwachsen; beim ♂ haben die Flagellumglieder 3 gleichlange, glashelle Bogenwirtel, welche die Länge eines Stieles erreichen, und 2 braune, ungleichlange Borstenwirtel, jedes Glied mit einem proximalen kugligen und einem distalen, am Grunde etwas engeren Knoten, welcher 2-mal so lang wie dick ist; Borsten des kugligen Knotens länger, das Distalende des folgenden Knotens überragend; stielartiger Fortsatz an jedem Knoten ziemlich gleich, wenigstens so lang wie ein distaler Knoten; am 1. Flagellumglied ist der proximale Knoten eirund. Flagellumglieder des ♀ walzenrund, 2-mal so lang wie dick, die zwei ersten etwas länger, stielartiger Fortsatz fast halb so lang wie ein Glied, Bogenwirtel wie bei *Perrisia*. Flügel glashell, behaart, Cubitalis in der distalen Hälfte stark gebogen, hinter die Flügelspitze mündend, Vorderrand an dieser Stelle unterbrochen, hintere Zinke fast senkrecht, vordere Zinke am Grunde kaum nach oben gebogen, dann gerade; Querader kaum distal vom proximalen Drittel die Radialis treffend. Beine schlank, 3-mal so lang wie der Körper, mit sehr schmalen Schuppen, Femora länger als die Tibien, welche so lang wie der Körper sind; 5. Tarsenglied 6-mal so lang wie dick; Krallen lang, dünn, einfach, schwach gebogen, Empodium fehlt. Endglieder der Zange dünn, fast fadenförmig, Griffel lang, die Basalglieder weit überragend. Legeröhre hervorstreckbar, an einem Exemplar fast körperlang, mit 2 langen, parallelen, lanzettlichen Lamellen, diese 3-mal so lang wie breit, ziemlich lang beborstet. Länge: 1,5—2 mm.

Vorkommen. Seychellen. Mahé: Anonyme Island, from grass, ferns, trees, etc., I. 1909, 2 ♂, 1 ♀.

9. *Lepidodiplosis squamosipes*, n. sp.

♀. Rot; Mesonotum mit 3 schwarzbraunen Längsbinden; Antennen schwarz, die 2 ersten Glieder weisslichgelb, Beine schwarz beschuppt. Palpen lang; Augen oben breit zusammenstossend. Flagellumglieder um die Hälfte länger als dick, walzenförmig, stielartiger Fortsatz quer und sehr kurz, Haarwirtel höchstens so lang wie ein Glied. Flügel (Fig. 10) glashell, Vorderrand und Fläche behaart, Querader am proximalen Drittel die Radialis treffend; Cubitalis in die Spitze mündend, der Vorderrand an dieser Stelle unterbrochen; Gabelung der Posticalis gegenüber der Mündung der Radialis liegend, vordere Zinke gerade, die Richtung des Stieles fortsetzend, die hintere fast senkrecht. Beine sehr lang, 3-mal so lang wie der Körper, sehr dünn und anliegend beschuppt; Femora ventral mit langen abstehenden Haaren; 2. Tarsenglied so lang wie die Tibien, 2.—5. allmählich verkürzt, 4. Glied fast doppelt so lang wie das 5., dieses 8—10-mal so lang wie dick; Krallen einfach, vom Grunde aus fast rechtwinkelig eingebogen; Empodium fehlend. Abdomen mit 2 Lamellen. Länge: 1,8 mm.

Vorkommen. Seychellen. Mahé: Anonyme Island, from grass, ferns, trees, etc., I. 1909.

10. *Lepidodiplosis filipes*, n. sp.

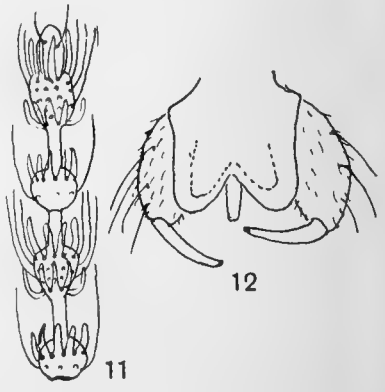
♀. Schwarzbraun; Pleuren und Lamellen hellbraun; 1. und 2. Antennenglied blassgelb, Beine mit anliegenden, schwarzen Schuppen. Palpen lang und 4-gliedrig. Antennen 2 + 12-gliedrig; Flagellumglieder walzenrund, doppelt so lang wie dick, stielartiger Fortsatz quer und sehr kurz, 12. Glied mit einem Fortsatz, der scheinbar ein 13. Glied darstellt.

Flügel dunkel, dicht und anliegend schwarz behaart, Vorderrand abstehend behaart, Querader etwas hinter dem proximalen Drittel die Radialis treffend; Cubitalis schwach gebogen, in die Flügelspitze mündend; vordere Zinke der Posticalis fast gerade, die Richtung des Stieles fortsetzend, doppelt so lang wie die hintere, diese fast senkrecht. Beine sehr schlank, 3-mal so lang wie der Körper, die Schuppen gestielt, anliegend, lanzettlich und gestreift, dazwischen kurze, zerstreute Borsten; Tibien den Femora gleich, etwas kürzer als das 2. Tarsenglied; Metatarsus doppelt so lang wie dick; 3. Tarsenglied um ein Drittel länger als das 4.; das 5. halb so lang wie das 4., fast 12-mal so lang wie dick; Krallen einfach, sehr klein, Empodium undeutlich oder fehlend. Abdomen flach gedrückt, mit 2 kleinen Lamellen. Länge: 1,5 mm., Beine: 5 mm. lang.

Vorkommen. Seychellen. Silhouette: Mare aux Cochons and forest immediately above, IX. 1908.

11. *Lepidodiplosis nocticolor*, n. sp.

♂. Braun, Beine schwarz beschuppt. Antennen 2+12-gliedrig; die 2 ersten Flagellumglieder miteinander verwachsen, und sowie die folgenden, aus einem proximalen kugligen und einem distalen, kurz birnförmigen Knoten zusammengesetzt (Fig. 11), proximaler Knoten mit einem langen Borstenwirtel und einem kurzen Bogenwirtel, distaler Knoten mit 2 kurzen Bogenwirteln und einem langen Borstenwirtel; die Borstenwirtel sind nicht ausgebreitet aber angedrückt, der Längsaxe der Antennen parallel, sehr dicht, bis zur Mitte des folgenden Knotens reichend, wenigstens doppelt so lang wie die Bogenwirtel, welche ebenfalls der Längsaxe der Antennen parallel sind; stielartiger Fortsatz des distalen Knotens etwas kürzer als der Fortsatz des proximalen Knotens, dieser kaum länger als der proximale Knoten; Endglied mit einem dicken Fortsatz, welcher fast so lang wie der Knoten ist. Flügel fast glashell, anliegend behaart; Querader vor der Mitte der Radialis; Cubitalis in der distalen Hälfte kaum gebogen, in die Flügelspitze mündend; hintere Zinke ziemlich senkrecht, die vordere schwach gebogen. Schuppen der Beine anliegend und lanzettlich; Femora so lang wie die Tibien, diese dem 2. Tarsenglied gleich; Metatarsus nicht doppelt so lang wie dick, 5. Glied halb so lang wie das 4., 3-mal so lang wie dick; Krallen einfach, klein, Empodium nicht sichtbar. Endglieder der Zange (Fig. 12) sehr dünn und kahl; die 2 Lamellen zweilappig. Länge: 0,8 mm.



Figs. 11, 12. *Lepidodiplosis nocticolor*, n. sp. Fig. 11, die zwei letzten Antennenglieder; Fig. 12, Zange.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800—1500 feet, 1909.

Xylodiplosis Kieffer,

Bull. Soc. Ent. France, lxiv. 193 (1895).

12. *Xylodiplosis calopus*, n. sp.

♀. Bräunlichgelb, Flagellum schwarzbraun, Beine schwarz beschuppt, Femur und Tibia der Vorderbeine, Kniee der vier übrigen, Distalende des 2. und 3. Gliedes der mittleren und hinteren Tarsen sowie die lange Legeröhre hellgelb. Antennen 2 + 12-gliedrig, Flagellumglieder um ein Drittel länger als dick, Bogenwirtel wie bei *Perrisia*, halsartige Einschnürung quer, Endglied mit einem am Grunde verdickten und mit einem Bogenwirtel gezierten Fortsatz. Flügel getrübt, Vorderrand behaart, vom Grunde bis zur Mündung des Radius schwach bewimpert, Cubitus distal schwach gebogen, kaum hinter die Flügelspitze mündend, Vorderast der Posticalis schwach bogig, Hinterast schräg, Querader distal vom proximalen Drittel des Radius liegend. Legeröhre dünn, körperlang. Länge: 1,2 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800 feet and over, collected by H. P. Thomasset and H. Scott, X. 1908—I. 1909.

Planodiplosis, n. gen.

Diese neue Gattung unterscheidet sich von *Arthrocnodax* Rübs. besonders durch den beschuppten Vorderrand der Flügel und durch die einfachen Krallen; von *Ledomyia* Kieff., mit der sie grosse Aehnlichkeit aufweist, ist sie durch die Gestalt der Bogenwirtel ihrer Geisselglieder sowie durch die Zahl der Antennenglieder getrennt.

13. *Planodiplosis insularis*, n. sp.

♀. Orangegelb, Abdomen ventral heller, Flagellum schwarzbraun, Beine schwarzbeschuppt. Palpen 4-gliedrig, 1. Glied fast quer. Antennen 2 + 12-gliedrig, Flagellumglieder walzenrund, doppelt so lang wie dick, Endglied ohne Fortsatz, halsartige Einschnürung quer, Bogenwirtel wie bei *Perrisia*, die zwei Borstenwirtel sind der Längsaxe des Gliedes fast parallel und so lang wie diese. Flügel behaart und dunkel, Vorderrand mit schmalen schwarzen Schuppen, Cubitus weit vor der Flügelspitze mündend, genau wie bei *Ledomyia aurofulgens* ♀, an der Mündung von der Costalis nicht überragt; Vorderast der Posticalis gerade, länger als der Stiel und die Richtung desselben fortsetzend, doppelt so lang wie der schiefe Hinterast. Beine um ein Drittel länger als der Körper, 2. Tarsenglied fast so lang wie die Tibia, 2.—5. allmählich verkürzt, das 5. noch fünfmal so lang wie dick, Krallen einfach, sichelartig gekrümmt, Empodium kaum sichtbar, kürzer als ein Drittel der Krallen. Abdomen dick, so lang wie der übrige Körper, Lamellen kaum länger als breit. Länge: 1 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800—1500 feet, 1909.

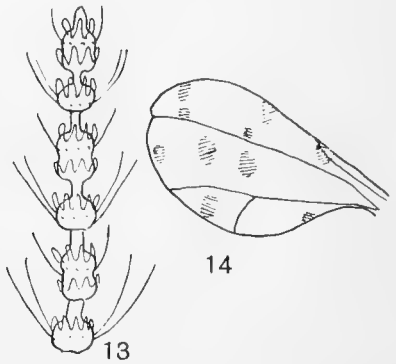
Lestodiplosis Kieffer,

Bull. Soc. Ent. France, lxiii. 28. 1 (1894).

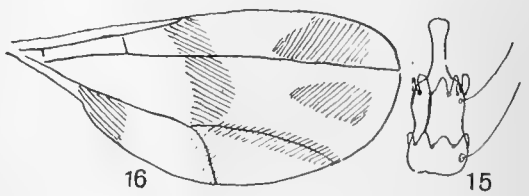
14. *Lestodiplosis squamosus*, n. sp.

♂. Gelblich, Thorax etwas dunkler, Antennen braun; Beine mit schwarzen anliegenden Schuppen, unter diesen, gelb erscheinend. Antennen viel länger als der Körper, 2 + 12-gliedrig; die 2 ersten Flagellumglieder miteinander verwachsen, und so wie die folgenden,

mit 3 gleichlangen Bogenwirteln und 2 ungleichlangen Borstenwirteln geziert (Fig. 13), aus einem proximalen kugligen und einem distalen fast walzenrunden, in der Mitte schwach eingeschnürten Knoten bestehend, die stielartigen Fortsätze zwischen den Knoten gleichlang, kaum kürzer als der kuglige Knoten; letzterer mit einem kurzen Bogenwirtel und einem langen, abstehenden Borstenwirtel, welcher 4—5-mal so lang wie der Bogenwirtel ist und bis zum Ende des distalen Knotens reicht; dieser $1\frac{1}{2}$-mal so lang wie dick, mit einem



Figs. 13, 14. *Lestodiplosis squamosus*, n. sp. Fig. 13, die 3 letzten Antennenglieder; Fig. 14, Flügel.



Figs. 15, 16. *Lestodiplosis scottianus*, n. sp. Fig. 15, Flagellumglied; Fig. 16, Flügel.

Borstenwirtel, und 2 Bogenwirteln, der Borstenwirtel nur 2-mal so lang wie die Bogenwirtel; Endglied mit einem dicken Fortsatz, welcher die Hälfte seiner Länge erreicht. Flügel weisslich (Fig. 14), mit 3 schwarzen Flecken am Vorderrande und 7 braunen, runden Flecken, von denen einer zwischen den 2 Zinken der Posticalis, und drei, in der distalen Hälfte, zwischen der Cubitalis und der vorderen Zinke liegen, die drei übrigen sind sehr klein, zwei liegen an der Cubitalis, in der distalen Hälfte und der dritte am Hinterrande, nahe an der Flügelwurzel; Flügelrand mit halbkreisförmig eingekrümmten Wimperhaaren, dazwischen längere und gerade Haare; in der proximalen Hälfte des Vorderrandes sind alle Haare gerade abstehend; Cubitus fast gerade, kaum hinter die Flügelspitze mündend; Vorderrand an dieser Stelle unterbrochen; vordere Zinke der Posticalis die Richtung des Stieles fortsetzend, die hintere fast senkrecht. Metatarsus nicht doppelt so lang wie dick; Krallen einfach, Empodium fehlend oder sehr klein. Endglieder der gelben Zange lang, sehr dünn, fast fadenförmig und kahl. Länge: 0,8 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800—1500 feet, 1909.

15. *Lestodiplosis scottianus*, n. sp.

♀. Antennen braun; Thorax schiefergrau, Beine bräunlich, Abdomen weisslich, lateral schwarzbraun, Schwinger weiss. Flagellumglieder (Fig. 15) ziemlich walzenförmig, in der Mitte kaum verengt, doppelt so lang wie dick, stielartiger Fortsatz die Hälfte oder die $\frac{2}{3}$ der Länge eines Gliedes erreichend, die 2 Bogenwirtel ein Viertel so lang wie ein Glied, beide Wirtel durch einen Längsfaden miteinander verbunden; 12. Flagellumglied distal abgerundet, ohne Fortsatz. Flügel (Fig. 16) dicht behaart, glashell, mit rauchbraunen Flecken, von denen 3 nahe der Spitze, nämlich ein grosser, länglicher, vom Vorderrande bis zur Cubitalis, ein etwas kürzerer, länglicher, zwischen der Cubitalis und der vorderen

Zinke der Posticalis, ein schmaler, der die ganze vordere Zinke umgibt; eine durchlaufende Querbinde beginnt an der Mündung der Radialis und umgibt die hintere Zinke bis zum Hinterrande des Flügels; ein Fleck verbindet die Mitte des Stieles der Posticalis mit dem Hinterrande; Querader wenig distal von der Mitte der Radialis; Cubitalis gerade, in die Flügelspitze mündend. Beine kurz und behaart; Femora und Tibien dorsal mit langen, abstehenden und zerstreuten Haaren, welche 2—3-mal so lang wie die Dicke der Beine sind, auch die Tarsenglieder dorsal mit 1—3 sehr langen Haaren; Tibien so lang wie die Femora oder wie das 2. Tarsenglied, 2.—5. Glied allmählich verkürzt, 4. doppelt so lang wie dick, 5. kaum um die Hälfte länger als dick; Krallen einfach, sichelartig gekrümmt, Empodium fehlt. Abdomen mit 2 Lamellen. Länge: 1 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800—1500 feet, 1909.

16. *Lestodiplosis ciliatipennis*, n. sp.

♀. Rötlich, Antennen braun, Beine weisslich. Antennen 2 + 12-gliedrig, Flagellumglieder doppelt so lang wie dick, 1. und 2. verwachsen, die ersten in der Mitte schwach eingeschnürt, die folgenden walzenrund, 12. am Ende abgerundet, alle mit einem Bogenwirtel wie bei *Perrisia* und mit 2 Borstenwirteln, deren proximaler länger als der distale ist und in dem 1 oder 2 längere Borsten vorragen. Flügel glashell, mit 2 durchlaufenden, rauchfarbigen Querbinden und einem proximalen rauchfarbigen Fleck, die Binden und der Fleck sind stark irrisirend und dichter behaart, beide Binden bestehen aus drei grossen Flecken, die nur durch den Cubitus und die Posticalis voneinander getrennt sind, die distale liegt wenig vor der Flügelspitze, die proximale durchzieht den Hinterast der Posticalis, der proximale Fleck liegt am Hinterrande des Flügellappens; der ganze Vorderrand ist so lang bewimpert wie der Hinterrand, Costalis mit den Wimpern gelb, ausgenommen an den Flecken, wo sie schwarz erscheinen, Cubitus gerade, in die Flügelspitze mündend. Länge: 0,8 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800—1500 feet, 1909.

17. *Lestodiplosis* (*Coprodiplosis*) *nanus*, n. sp.

♂. Ganz dottergelb. Antennen länger als der Körper; Flagellumglieder mit 2 ziemlich kugligen, kaum queren Knoten, der proximale deutlicher quer, mit einem Borstenwirtel, welcher doppelt so lang wie der Bogenwirtel ist und den folgenden Knoten überragt, dieser kaum quer, mit 2 Bogenwirteln und einem Borstenwirtel; stielartiger Fortsatz so lang wie ein Glied; distaler Knoten des 12. Gliedes eirund. Flügel glashell, ungefleckt; Cubitalis in die Flügelspitze mündend, Vorderrand an dieser Stelle unterbrochen. Beine kurz, behaart, dorsal mit einzelnen, langen, abstehenden Haaren; Metatarsus 3-mal so lang wie dick, fast halb so lang wie das 2. Glied; 5. wenig länger als dick, Krallen einfach, 2-mal so lang wie das Empodium. Endglieder der Zange schlank, und unbehaart; obere Lamelle 2-lappig, die mittlere ungeteilt, linealisch, am Ende abgerundet. Länge: 0,08 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800—1500 feet, 1909, 6 ♂.

CLINODIPLOSIS Kieffer,

Feuille jeun. Natural., xxiv. 121 (1894).

18. *Clinodiplosis scotti*, n. sp.

♀. Ganz dottergelb. Palpen 4-gliedrig. Antennen 2 + 12-gliedrig, die 2 ersten Glieder des Flagellums miteinander verwachsen, länger als die folgenden, welche 2-bis $2\frac{1}{2}$-mal so lang wie dick und walzenrund sind, an den beiden Wirteln ist eine Borste doppelt so lang wie die anderen, stielartiger Fortsatz $\frac{2}{3}$ so lang wie ein Glied, Endglied mit einem Fortsatz, welcher in der proximalen Hälfte schwach verdickt und kurz behaart ist; Bogenwirtel gestaltet wie bei *Perrisia*. Flügel glashell, lang und behaart; Cubitalis kaum bogig, hinter die Flügelspitze mündend, vordere Zinke gerade, die Richtung des Stieles fortsetzend; hintere Zinke stark abgebogen; keine sichtbare Querader. Beine behaart und sehr lang; 2.—5. Tarsenglied allmählich verkürzt, 5. Glied noch 5-mal so lang wie dick, Krallen einfach, sichelförmig gebogen, kaum länger als das Empodium. Lamellen des Abdomens 2—3-mal so lang wie breit, mit abstehenden Borsten; Legeröhre nicht hervorstreckbar. Länge: 2 mm.

Vorkommen. Seychellen. Silhouette: Mare aux Cochons and forest immediately above, IX. 1908.

19. *Clinodiplosis insularum*, n. sp.

♂♀. Ganz blassgelb, die Seiten des Abdomens etwas dunkler (♂), oder bräunlichgelb, Flagellum braunschwarz (♀). Antennen des ♂ fast doppelt so lang wie der Körper, 1. und 2. Flagellumglied miteinander verwachsen, ihr proximaler Knoten eirund, der distale doppelt so lang wie dick; an den folgenden Gliedern ist der proximale Knoten kuglig, der distale kaum um die Hälfte länger als dick, Einschnürung zwischen den beiden Knoten und halsartige Einschnürung am Ende gleichlang, so lang wie der distale Knoten; jedes Glied mit 3 Bogenwirteln, diese glashell, gleichlang, der obere erreicht das folgende Glied, der untere befindet sich am proximalen Knoten; Borstenwirtel dicker, bräunlich, um $\frac{1}{3}$ oder um $\frac{1}{2}$ länger als die Bogenwirtel. Flagellumglieder des ♀ walzenrund, wenig länger als dick, doppelt so lang wie ihr Hals; Endglied mit einem griffelartigen Fortsatz (♂♀). Flügel lang, Vorderrand behaart, an der Mündung des Cubitus unterbrochen, dieser stark bogig, hinter die Flügelspitze mündend; Vorderast der Posticalis gerade, Hinterast fast senkrecht. Beine behaart, 5. Tarsenglied 5—6-mal so lang wie dick, Empodium $\frac{2}{3}$ so lang wie die sichelförmig gebogenen Krallen. Endglied der Zange kahl und dünn wie üblich, die beiden Lamellen zweilappig. Lamellen des ♀ länglich. Länge: 1—1,5 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800—1500 feet, 1909; Silhouette: Mare aux Cochons and forest above, IX. 1908.

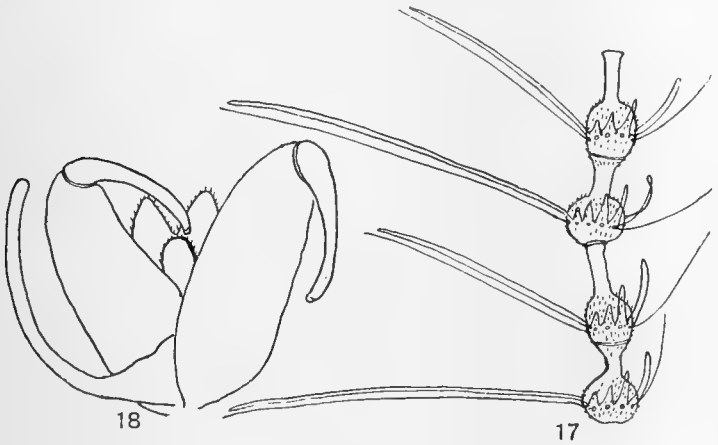
BREMIA Rondani,

Atti Soc. Sc. Nat. Milano, ii. 287 (1860).

20. *Bremia mahensis*, n. sp.

♂. Rot, Flagellum schwarz, Mesonotum mit 3 braunen Längsbinden, Schwinger weiss, Beine schwarz beschuppt. Antennen 2 + 12-gliedrig, die 2 ersten Flagellumglieder

miteinander verwachsen, mit zwei eirunden Knoten, die folgenden mit einem proximalen kugligen, und einem distalen eirunden Knoten, jeder Knoten mit einem unregelmässigen Bogenwirtel und einem unregelmässigen Borstenwirtel (Fig. 17), an welchen, nach aussen, ein Bogen, resp. eine Borste, überaus stark verlängert ist, nämlich 2-mal so lang wie das ganze Doppelglied, an dem kugligen Knoten, 1½-mal so lang wie das Doppelglied, am



Figs. 17, 18. *Bremia mahensis*, n. sp. Fig. 17, zwei Flagellumglieder; Fig. 18, Zange von unten gesehn.

Fig. 19. *Prowinnertzia mahensis*, n. sp., Flügel.

eirunden Knoten; der folgende Bogen ist der kleinste, die übrigen, nach innen zu, allmählich länger werdend; stielartiger Fortsatz des distalen Knotens kaum kürzer als der Knoten selbst, fast doppelt so lang wie der Fortsatz des proximalen Knotens; am Grunde des distalen Knotens befindet sich ein ringförmig um das Glied laufender Faden, der die Stelle des üblichen basalen Bogenwirtels vertritt. Flügel glashell; Vorderrand behaart; Querader die Radialis proximal von der Mitte treffend; Cubitalis fast gerade, in die Spitze mündend, hintere Zinke der Posticalis ziemlich rechtwinkelig abbiegend, vordere Zinke gerade, nur am Grunde schwach gehoben. Beine sehr lang, 3-mal so lang wie der Körper, Femora ventral mit zerstreuten, langen Haaren, Krallen 2-spaltig, vom Grunde aus fast rechtwinkelig gebogen, Empodium fehlt. Zange (Fig. 18) mit einer oberen zweilappigen und einer mittleren abgerundeten Lamelle; Endglieder dünn und kahl; Griffel nach unten stark bogenförmig gekrümmt, bis zum Grunde der Endglieder reichend. Länge: 1 mm.

Vorkommen. Seychellen. Mahé: Anonyme Island, from grass, ferns, trees, etc., I. 1909.

PROWINNERTZIA, n. gen.

Von *Winnertzia* besonders durch die Zahl der Antennenglieder und die Form der Legeröhre zu unterscheiden.

21. *Prowinnertzia mahensis*, n. sp.

♀. Zitronengelb; Antennen schwarzbraun, Beine bräunlich. Palpen 4-gliedrig. Antennen 2 + 10-gliedrig; die beiden ersten Glieder wie gewöhnlich; Flagellumglieder ungestielt, etwas länger als dick, ziemlich walzenförmig, Haarwirtel abstehend, Bogenwirtel durch einen queren, glashellen, ringförmig um das Glied laufenden Faden ersetzt, welcher distal von der Mitte liegt; Endglied eirund. Flügel (Fig. 19) behaart und

bewimpert; Vorderrand mit abstehenden Haaren; Radialis die Flügelmitte nicht erreichend; Cubitalis fast gerade, wenig hinter die Mitte mündend; Posticalis einfach und fast gerade; 4. Längsader im distalen Drittel plötzlich nach dem Hinterrand eingebogen; an der Mündung der Cubitalis ist der Vorderrand breit unterbrochen; Querader distal vom 2. Drittel den Radius treffend. Beine schlank, mit zerstreuten Haaren; Metatarsus wenig länger als dick, Krallen tief 2-spaltig, Empodium sehr klein. Legeröhre weit hervorstreckbar, Endglied säckchenartig, wie bei *Perrisia*, 2—3-mal so lang wie dick, am Grunde ventral mit einem sehr kleinen Läppchen. Länge: 1 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800—1500 feet, 1909.

Holoneurus Kieffer,

Ent. Nachr. xxi. 115 nota (1895).

22. *Holoneurus mahensis*, n. sp.

♂. Braun, Antennen und Beine etwas heller. Palpen 4-gliedrig. Flagellumglieder ziemlich walzenförmig, um die Hälfte länger als dick, mit einem halsartigen Fortsatz, welcher halb so lang wie ein Glied ist; eine Seite des Gliedes ist mit dicken Warzen versehen, deren jede eine lange, abstehende Borste trägt; eigentliche Borstenwirtel sind also nicht vorhanden. Flügel (Fig. 20) am Grunde allmählich verengt, behaart, mit 3 einfachen Längsadern; die Radialis überragt die Flügelmitte; Cubitalis fast gerade, hinter die Flügelspitze mündend; Posticalis den Hinterrand nicht erreichend; an der Mündung der Cubitalis ist der Vorderrand nicht unterbrochen; die Querader ist braun und trifft die Radialis distal von der Mitte. Beine schlank, zerstreut behaart, Metatarsus nicht 2-mal so lang wie dick, 5. Glied 5—6-mal so lang wie dick, Krallen einfach, etwas länger als das Empodium. Endglieder der Zange 2—3-mal so lang wie dick, distal keulenförmig verdickt. Länge: 1,2 mm.

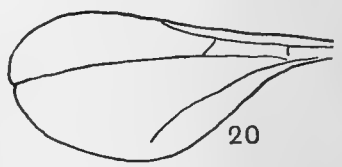


Fig. 20. *Holoneurus mahensis*, n. sp., Flügel.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800—1500 feet, 1909.

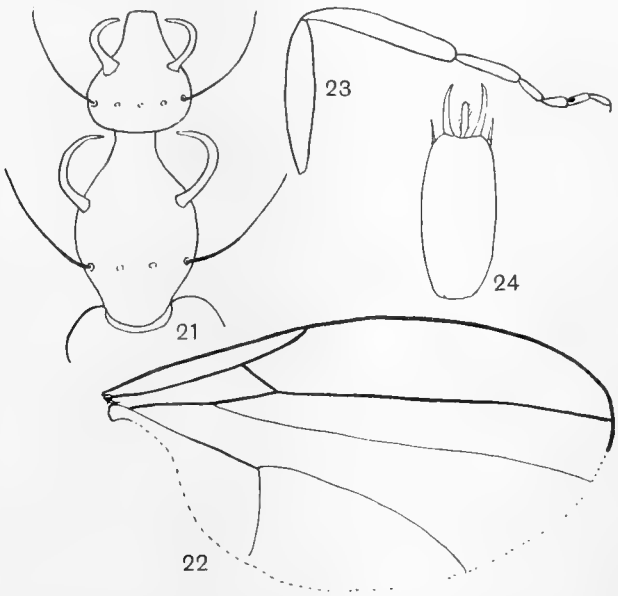
Joannisia Kieffer,

Bull. Soc. Ent. France, lxiii. 175 (1894).

23. *Joannisia latipennis*, n. sp.

♀. Orangegelb; Thorax dorsal etwas dunkler; Beine etwas heller; Flagellum braun. Palpen 4-gliedrig, 1. Glied doppelt so dick wie die übrigen, um die Hälfte länger als dick; 2. und 3. Glied fadenförmig, das 3. etwas länger als das 2.; 4. kürzer als das 3., schwach keulenförmig. Antennen 2 + 10-gliedrig, 1. und 2. Glied nicht länger als dick, 3. doppelt so lang wie dick, an beiden Enden schwach verengt (Fig. 21), die folgenden kürzer, ziemlich keglig, $1\frac{1}{2}$-mal so lang wie dick, Endglied eirund; Haarwirtel wenig länger als ein Glied, in der Mitte jedes Flagellumgliedes befinden sich pfriemliche, glashelle, stark eingebogene Fortsätze, welche einen Wirtel bilden. Flügel (Fig. 22) sehr breit, nicht 2-mal so lang wie breit, mit langen, anliegenden Haaren; Distalende der Cubitalis kaum weiter von der Discoidalis als von der Cubitalis entfernt; die Radialis überragt ein wenig das proximale

Flügeldrittel, nach ihrem 2. Drittel ist sie durch eine lange, schräge Querader mit der Cubitalis verbunden; Cubitalis fast gerade, in die Flügelspitze mündend; Discoidalis ziemlich gerade, proximal von der Querader entspringend, die Querader ist von dem Ursprung der Discoidalis um mehr als ihre Länge getrennt; die Posticalis verzweigt sich gegenüber der Querader, die vordere Zinke ist viel länger als der Stiel und bogig, die hintere fast senkrecht und gerade. Beine mit anliegenden, spatelförmigen oder lanzettlichen,



Figs. 21—24. *Joannisia latipennis*, n. sp. Fig. 21, die 2 ersten Flagellumglieder; Fig. 22, Flügel; Fig. 23, Vorderfuss; Fig. 24, Endglied des Tarsus.

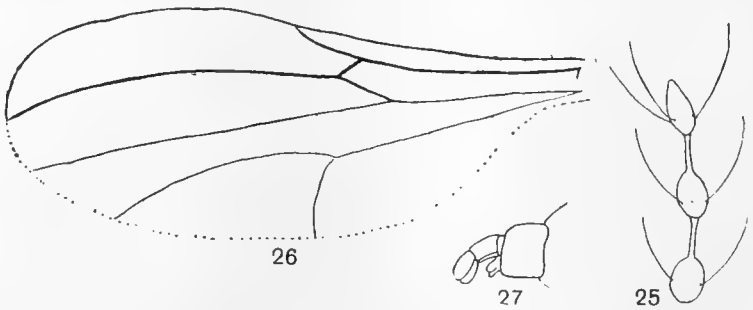
gelblichen Schuppen; Tibien etwas länger als die Femora, Tarsen viel dünner als die Tibien, hintere Tarsen kaum länger als die Tibien, Metatarsus etwas kürzer als die 3 folgenden Glieder zusammen, 2.—5. Glied allmählich und sehr wenig verkürzt, das 2. fast 4-mal so lang wie dick, das 5. noch 2½-mal (Fig. 23); Krallen einfach, wenig gebogen, klein, doppelt so lang wie das Empodium (Fig. 24). Körper dick und plump; Abdomen nicht doppelt so lang wie der übrige Körper, zweimal so lang wie dick; Legeröhre sehr klein, kaum vorstehend, ohne Lamellen, aber mit einem sehr kleinen, ziemlich kreisrunden Fortsatz. Länge: 2,5 mm.

Vorkommen. Seychellen. Mahé: Forest behind Trois Frères, about 2000 feet, 14. I. 1909, 2 ♀.

24. *Joannisia seychellensis*, n. sp.

♂♀. Orangegelb, Mesonotum dunkler, oftmals eine Spur von braunen Querbinden auf der Oberseite des Abdomens. Augen kahl, Palpen 3-gliedrig, die Glieder wenig länger als dick. Antennen des ♀ 2 + 8-gliedrig; Flagellumglieder (Fig. 25) ellipsoidal, fast 2-mal so lang wie dick, mit langen, abstehenden Borstenwirteln, stielartiger Fortsatz fast so lang wie ein Glied, am vorletzten etwas kürzer, Endglied kurz zugespitzt. Antennen des ♂ mehr als 2 + 9-gliedrig; Flagellumglieder kuglig, stielartiger Fortsatz fast 2-mal so lang

wie ein Glied, Borsten der Wirtel dicht und abstehend (die Glieder nach dem 9. Flagellumglied abgebrochen). Flügel wenig breit (Fig. 26); Radialis in die Mitte des Vorderrandes mündend, sein distaler Abschnitt $2\frac{1}{2}$-mal so lang wie die Querader; Cubitus distal kaum gebogen, in die Flügelspitze mündend und von der Costalis nicht überragt; Querader um



Figs. 25—27. *Joannisia seychellensis*, n. sp. Fig. 25, die 3 letzten Antennenglieder des ♀; Fig. 26, Flügel; Fig. 27, Legeröhre.

ihre doppelte Länge vom Grunde der Discoidalis entfernt; Posticalis hinter der Querader gegabelt, ihre beiden Zinken schwach bogig, vordere Zinke wenig kürzer als der Stiel. Hintere Femora die Mitte des Abdomens erreichend; vorderer Metatarsus so lang wie die 2 folgenden Glieder zusammen, 2.—5. Glied ziemlich gleich, wenig länger als dick, das 5. kaum länger als das 4., an den 4 Hinterbeinen sind die Tarsenglieder länger, 2. und 5. Glied wenigstens 2-mal so lang wie dick; Krallen fast rechtwinkelig gebogen, etwas länger als das schmale Empodium. Endglieder der Zange klein und fast eiförmig. Legeröhre des ♀ (Fig. 27) mit zwei 3-gliedrigen Lamellen und ventral mit zwei kleinen Läppchen; Abdomen dick und keglig. Länge, ♂: 0,5 mm., ♀: 0,8 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800—1500 feet, 1909, 1 ♂, 5 ♀.

No. XV.—DIPTERA, CHIRONOMIDÆ

Der Seychellen-inseln, aus der Sammlung von Mr H. Scott.

Von Prof. Dr J. J. Kieffer (Bitsch).

(Tafel **21**.)

(Mitgeteilt von Prof. J. Stanley Gardiner, M.A., F.R.S., F.L.S.)

Vorgelegt am 19. Januar 1911.

Von den Seychellen-Inseln war bisher kein Vertreter der Familie der Zuckmücken oder *Chironomidæ* bekannt. Deshalb freute ich mich sehr, als das Universitätsmuseum von Cambridge mir die Mitteilung machte, Herr Hugh Scott habe, von Juli 1908 bis März 1909, eine Anzahl von Chironomiden auf den Seychellen-Inseln erbeutet, und wünsche, dass ich die Bestimmung derselben übernehme. Wegen der geringen Entfernung dieser Inseln vom Aequator, hatte ich mich auf neue und höchst interessante Formen erwartet; beim Durchmustern der Sendung wurde ich aber enttäuscht. Die darin befindlichen Arten gehörten insgesammt zu den in Deutschland vorkommenden Gattungen, mit alleiniger Ausnahme eines Vertreters der Gattung *Pachyleptus* Walk., welche Gattung bisher nur für Süd-Amerika bekannt war. Auch scheint die Zahl der auf den Seychellen vorkommenden Arten der Chironomiden eine geringe zu sein; die Ausbeute des Herrn Hugh Scott bestand nämlich aus 433 Exemplaren, welche sich in die geringe Zahl von 48 Arten und 5 Unterarten verteilten; in einem Falle gehörten 87 Exemplare zu einer und derselben Art und zwar stammten dieselben aus 4 verschiedenen Inseln und aus 14 verschiedenen Standorten. Ferner scheinen grössere Arten von Chironomiden, im Gegensatz zu Käfern, Schmetterlingen u. a., auf den Seychellen nicht vorzukommen; Arten, deren Länge 5—14 mm. beträgt, wie solche in Europa und Nord-Amerika vorkommen und mir auch aus British-Indien sowie aus Zentral-Africa bekannt sind, wurden auf den Seychellen nicht beobachtet.

Die in Betracht kommenden Inseln, auf denen gesammelt wurde, sind: *Mahé*, mit Anonyme Island, *Silhouette*, *Praslin*, *Félicité* und *Bird*. Auf *Mahé* wurden 47 Arten und 5 Unterarten—also alle Arten mit einer einzigen Ausnahme—in 401 Exemplaren erbeutet; auf *Silhouette* 6 Arten in 21 Exemplaren; auf *Félicité* 2 Arten in 2 Exemplaren; auf *Praslin* 1 Art in 8 Exemplaren; auf *Bird* 1 Art in 1 Exemplar.

Zur Unterfamilie der *Ceratopogoninæ* gehören 22 Arten und 5 Unterarten in 319 Exemplaren; zu den *Chironominæ*, 23 Arten in 107 Exemplaren; zu den *Tanypinæ*, 3 Arten in 7 Exemplaren.

1. Subfamilie **Ceratopogoninæ.**

Genus Ceratopogon Meigen.

Illiger's Magaz. Insect., 1803, vol. ii. p. 261.

1. Augen behaart; Flügel mit mikroskopisch kleinen Borsten .....1. *C. trichotomma*, n. sp.
   Augen kahl; Flügel mit anliegenden langen Borsten oder Haaren .....2.
2. Flügel gefleckt; Antennen-Busch des ♂ in der distalen Hälfte goldgelb .....2. *C. chrysolophus*, n. sp.
   Flügel ungefleckt; Busch schwarzbraun .....3.
3. Körper schwarz oder schwarzbraun .....4.
   Körper rot .....8.
4. Mesonotum dicht gelb behaart; 2. Palpenglied stark verdickt, 3-mal so dick wie die übrigen .....3. *C. lasionotus*, n. sp.
   Mesonotum kahl, Palpenglieder fast gleichdünn .....5.
5. Flügel mit 2 Radialzellen, ihre Fläche mit mikroskopisch kleinen und zerstreuten längeren Borsten; Mesonotum glänzend .....4. *C. lampronotus*, n. sp.
   Flügel nur mit einer distalen Radialzelle und anliegenden langen Haaren; Mesonotum matt .....6.
6. Metatarsus aller Beine kürzer als das 2. Glied .....5. *C. psilonotus*, n. sp.
   Metatarsus aller Beine wenigstens 2-mal so lang wie das 2. Glied.....7.
7. Krallen länger als das 5. Tarsenglied, stark sichelförmig .....8. *C. falcinellus*, n. sp.
   Krallen kürzer als das 5. Tarsenglied .....9. *C. mahensis*, n. sp.
8. Cubitus bis zu seiner Mündung mit dem Radius verbunden .....6. *C. aplonotus*, n. sp.
   Cubitus nur bis zur Mitte mit dem Radius verbunden .....7. *C. seychelleanus*, n. sp.

1. *Ceratopogon trichotomma*, n. sp. (Tafel **21**, Fig. 1, 2).

♂♀. Schwarz, glänzend und kahl; Schwinger milchweiss; Antennen und Zange braun; Beine weisslich. Augen behaart; 2. Palpenglied nicht verdickt, so lang wie die 2 folgenden zusammen. Antennen 14-gliedrig; beim ♂ sind die Flagellumglieder quer oder kaum so lang wie dick, mit einem dicken, queren Hals; 11. Glied etwas länger als dick, 12. und 13. dünner und länger, das 12. 4-mal so lang wie dick, 13. und 14. 3-mal, das 14. so dick wie das 11., mit einem kleinen Endgriffel; Busch schwarzbraun. Beim ♀ sind die 8 ersten Flagellumglieder kuglig, gedrängt und ohne Hals, Haarwirtel wenig länger als ein Glied; die 5 Endglieder zusammen doppelt so lang wie das übrige Flagellum, das 10. Antennenglied etwas kürzer als das 11.; 11.—13. wenigstens 3-mal so lang wie dick, distal wenig dünner; das 14. 4-mal so lang wie dick, mit einem kurzen Endgriffel. Flügel glashell, mit dichten, mikroskopisch feinen Borsten (Fig. 1), beim

♂ ausserdem mit einzelnen, zerstreuten längeren Haaren längs der Ränder; Adern ohne andere Borsten als die der Flügelfläche; Cubitus über die Flügelmitte hinausragend, beim ♂ (Fig. 1) in der proximalen Hälfte, beim ♀ (Fig. 2) in seiner ganzen Länge mit dem Radius verbunden; distale Zinke der Discoidalis etwas bogig, kaum hinter die Flügelspitze mündend; proximale Zinke an oder kaum distal von der schiefen Querader entspringend; die Gabelung der Posticalis liegt der Mitte des Cubitus gegenüber. Metatarsus so lang wie die 4 folgenden Glieder zusammen; 2. Glied 2-mal so lang wie dick, 3.—5. wenig länger als dick; Empodium bei ♂♀ breit und wenig kürzer als die Krallen. Endglieder der Zange lang, dünn, allmählich zugespitzt. Länge: 1, 5 mm.

Vorkommen. Seychellen. Mahé: near Morne Blanc, 1 ♀; from near Morne Blanc, X.—XI. 1908, 1 ♀; Mare aux Cochons district, about 1500 feet, 26. I.—2. II. 1909, 1 ♀; Cascade Estate, about 800—1500 feet, 1909, 1 ♂, 1 ♀; marshy ground near sea-level, Cascade, 20. II. 1909, 3 ♀; marshes on coastal plain at Anse aux Pins and Anse Royale, 19—21. I. 1909, 1 ♀; Mahé, 2 ♂, 1 ♀.

2. *Ceratopogon chrysolophus*, n. sp. (Tafel **21**, Fig. 3).

♂♀. Schwarzbraun und matt; Schwinger weiss; Beine mit Ausnahme der Coxæ, Flagellum des ♂ mit Ausnahme der 3 Endglieder, und die Zange gelb; Pleuren, Sternum und, beim ♂, die vordere Hälfte des Abdomens gelbbraun; Femora und Tibien mit 2 breiten schwarzen Querbinden, deren eine am Proximalende, die andere distal von der Mitte; ebenso zeigen die 3—4 ersten Tarsenglieder einen schwarzbraunen Ring. Flagellumglieder des ♂ zuerst quer, dann so breit wie lang und walzenförmig, ohne Einschnürungen, 11. Glied schief abstehend, fast 2-mal so lang wie das 12., welches dem 13. gleich ist, nämlich 2—3-mal so lang wie dick; 14. etwas länger als das 13.; Busch in der proximalen Hälfte schwarzbraun, in der distalen schön goldgelb. Flagellumglieder des ♀ kurz eiförmig, jedes durch eine quere Einschnürung von dem folgenden getrennt, ihr Haarwirtel 2-mal so lang wie ein Glied, 10.—13. Glied walzenförmig, wenig länger als dick, das 14. doppelt so lang wie dick. Thorax mit langer, abstehender, grauer Behaarung beim ♂, mit kurzer anliegender gelber Behaarung auf dem Mesonotum des ♀, und sehr langen Haaren am Scutellum. Flügel (Fig. 3) gefleckt, stark irrisirend, schwach getrübt, mit zahlreichen, langen und anliegenden Haaren, dazwischen mikroskopisch fein beborstet; Vorderrand, Subcostalis, Querader und Cubitus mit schwarzen Schuppen; an der Mündung des Cubitus befindet sich ein schwarzbrauner Fleck, drei andere Flecke sind weniger deutlich und liegen einer am Vorderrand, der Mündung der distalen Zinke der Posticalis gegenüber, die 2 anderen an der Mündung der beiden Zinken der Posticalis; Cubitus mit dem Radius verbunden, nur am Distalende von ihm getrennt, in die Flügelmitte mündend; distale Zinke der Discoidalis gerade, die Richtung des Stieles fortsetzend, in oder kaum vor die Flügelspitze mündend, proximale Zinke an der schiefen Querader entspringend; die Gabelung der Posticalis liegt der Mündung des Cubitus gegenüber oder kaum distal von derselben. Beine mit anliegenden, spatelförmigen und gestreiften Schuppen wie in der Gattung *Lasioptera*; Tibien mit abstehenden Haaren, welche 3—4-mal so lang als die Dicke der Tibien sind; hintere Tibien so lang wie die Femora, wenig kürzer als die Tarsen; Metatarsus der Hinterbeine

3-mal so lang wie dick, 2. Glied um die Hälfte länger als das 1.; 3. dem 1. gleich; 4. und 5. doppelt so lang wie dick; Empodium kürzer als die Krallen. Abdomen des ♂ schlank, dicht und lang grauhaarig, beim ♀ breit und fast unbehaart. Länge: 1,5 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800—1500 feet, 1909, 2 ♂, 2 ♀.

3. *Ceratopogon lasionotus*, n. sp.

♂♀. Kopf und Thorax dunkelbraun; Antennen bräunlich beim ♀, gelblich beim ♂; Schwinger weiss; Coxæ und Beine blassgelb, Tarsen dunkler; Abdomen schwarzbraun. Schläfe mit langen, nach vorn eingekrümmten Haaren; Augen kahl, oben breit zusammenstossend; Mund bei ♂♀ etwas kürzer als der Kopf, aus 6 langen, fast pfriemlichen Stücken zusammengesetzt, die 4 inneren etwas kürzer als die 2 äusseren und an einer Seite fein gezähnelt. Palpen 4-gliedrig; 2. Glied sehr dick, länger als das 3. und 4. zusammen, 3-mal so dick wie dieselben, am Distalende plötzlich eingeschnürt; 3. und 4. wenig länger als dick. Antennen 14-gliedrig; 2.—9. Glied beim ♀ fast 2-mal so lang wie dick, in der distalen Hälfte allmählich verengt, Wirtel fast doppelt so lang wie ein Glied, die 2 hyalinen Anhänge pfriemlich und etwas kürzer als ein Glied; 10.—14. Glied walzenförmig, 3-mal so lang wie dick, mit langen, abstehenden, spärlichen Haaren, zusammen deutlich länger als das übrige Flagellum. Beim ♂ sind die Antennenglieder 2—9 quer, fast kuglig; Busch schwarzbraun, die Mitte des 13. Gliedes erreichend; 10.—14. Glied in schiefer Richtung laufend, walzenförmig, 3-mal so lang wie dick, zusammen länger als das übrige Flagellum, proximaler Wirtel etwas länger als ein Glied. Thorax so hoch wie lang; Mesonotum dicht gelb-behaart; Scutellum mit je 4—5 sehr langen Borsten. Flügel schwarzbraun beim ♀, etwas heller beim ♂, mit dichten, schwarzen, anliegenden Haaren, diese Behaarung bildet einen kleinen schwarzen Fleck am Distalende des Cubitus; Querader schief; Cubitus beim ♀ fast in der ganzen proximalen Hälfte dem Radius anliegend; 2. Radialzelle 3-eckig, 2-mal so lang wie hoch; Cubitus in die Flügelmitte mündend; die gegabelte Schaltader zwischen dem Cubitus und der Discoidalis sehr deutlich; distale Zinke der Discoidalis gerade, die Richtung des Stieles fortsetzend, in die Flügelspitze mündend; proximale Zinke am Grunde erloschen; die Gabelung der Posticalis liegt dem Distalende des Radius gegenüber. Beim ♂ ist der Cubitus in mehr als in der Hälfte mit dem Radius verbunden. Beine mit gelben, dichten, anliegenden Haaren und langen, spärlichen und abstehenden Haaren, oftmals zeigt das hintere Femur einen dunklen Fleck am Distalende, oftmals auch sind die Tarsen etwas dunkler; Vordertibien so lang wie die Femora, wenig kürzer als der Tarsus, ihre Haare 2-mal so lang wie ihre Dicke beim ♀, fast 3-mal beim ♂; Metatarsus 2—3-mal so lang wie dick; 2. Glied doppelt so lang wie das 1.; 4. und 5. kaum länger als dick, Krallen einfach, so lang wie das grosse, breite Empodium; Mittelbeine den vorderen gleich; an den Hinterbeinen ist das 2. Tarsenglied fast 3-mal so lang wie das 1., dieses $1\frac{1}{2}$-mal so lang wie dick; 4. fast 2-mal so lang wie dick, etwas länger als das 5. Abdomen des ♂ doppelt so lang wie der übrige Körper, mit breiten, weisslich gelben Querbinden und langen, abstehenden gelblichen Haaren; Endglieder der Zange schlank, fast kahl, allmählich zugespitzt; Lamelle abgerundet, so lang wie die

Basalglieder, unter derselben liegt ein gelbes, unbehaartes, tief gegabeltes Stück, welches kaum kürzer ist. Abdomen des ♀ flach gedrückt, so breit und wenig länger als der übrige Körper, besonders in der hinteren Hälfte dicht und kurz gelbbehaart. Länge 2 mm. Beschrieben nach 77 Exemplaren (44 ♂, 33 ♀).

Vorkommen. Seychellen. Félicité, 1 ♂. Silhouette: near Pot-à-eau, VIII. 1908, 1 ♀; Mare aux Cochons and forest above, IX. 1908, 3 ♀; Mare aux Cochons plateau and jungle near by, VIII. 1908, 2 ♀; forest above Mare aux Cochons, highest point of Silhouette, 2. IX. 1908, 2 ♂. Insel Bird: VII. 1908, collected by J. C. F. Fryer, 1 ♀. Insel Mahé: Cascade Estate, about 800 feet and over, collected by H. P. Thomasset and H. Scott, X. 1908—I. 1909, 7 ♂; jungle between Trois Frères and Morne Seychellois, about 1500—2000 feet, XII. 1908, 1 ♀; near Morne Blanc, X.—XI. 1908, 1 ♂, 1 ♀; Morne Seychellois, over 1500 feet, 4. II. 1909, 1 ♀; Mare aux Cochons district, about 1500 feet, 26. I.—2. II. 1909, 1 ♀, 1 ♂; Cascade Estate, about 800—1500 feet, 1909, 32 ♂, 19 ♀; Cascade Estate, III. 1909, 2 ♀; scrubby forest vegetation, top of Mount Sebert, 1800 feet or more, I. 1909, 1 ♀.

Bemerkung. Bei manchen Exemplaren ist die Behaarung auf dem Mesonotum, den Flügeln, den Beinen und dem Abdomen abgerieben, so dass man versucht sein könnte dieselben als eine eigene Art anzusehen.

Var. *callithorax*, n. var.

♂♀. Thorax hellgelb wie die Beine; die 5 Endglieder der Antennen des ♀ nur 2-mal so lang wie dick; Busch des ♂ schwarz mit weisslicher Spitze.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800 feet and over, collected by H. P. Thomasset and H. Scott, X. 1908—I. 1909, 7 ♂, 1 ♀; Cascade Estate, about 800—1500 feet, 1909, 1 ♂, 1 ♀.

4. *Ceratopogon lampronotus*, n. sp. (Tafel **21**, Fig. 4, 5).

♂♀. Braun; proximale Hälfte der Antennen, Prothorax, Scutellum, Pleuren, Sternum, Coxæ und Beine hellgelb; Schwinger weiss; Abdomen schwarzbraun, beim ♀ ventral heller. Augen kahl, oben breit zusammenstossend; Mund vorgestreckt und zugespitzt, aus 4 langen, linealen, am Ende zugespitzten Teilen zusammengesetzt, deren innere an einem der beiden Ränder fein gesägt sind. Palpen 4-gliedrig; 1. Glied kaum 2-mal so lang wie dick, 2. so lang wie das 3. und 4. zusammen, und kaum dicker als dieselben; 3. und 4. etwa 2-mal so lang wie dick. Antennen 14-gliedrig; 2.—4. Glied eirund oder fast kuglig, 5.—10. etwas quer, voneinander durch Einschnürungen getrennt, welche kürzer als ein Glied und kaum so lang wie dick sind; jedes der Glieder 2—10, wie auch noch der Grund des 11., mit einem dichten Wirtel, dessen angedrückte und sehr lange Haare die Richtung der 10 ersten Flagellumglieder fortsetzen; der Wirtel des 11. Gliedes erreicht fast die Spitze des 13. Gliedes; an der Innenseite der Glieder werden diese langen Haare durch 3 kurze und abstehende Borsten ersetzt, welche nur 2-mal so lang wie die Dicke eines Gliedes sind; das 11. Glied besteht aus einem proximalen Knoten und einem dünneren, exzentrischen, schief nach innen laufenden Hals, welches 2-mal so lang wie dick ist und kurze, abstehende, spärliche Borsten trägt;

12.—14. Gliedes die schiefe Richtung des distalen Teiles des 11. Gliedes fortsetzend und 4-mal so lang wie derselbe, walzenförmig, mit abstehenden Borsten, welche 3—4-mal so lang wie die Dicke eines Gliedes sind; 12. Glied etwas länger als das 13.; 14. dem 13. gleich, am Ende mit einem kurzen Griffel; 11.—14. Glied miteinander so lang wie die 10 vorigen zusammen. Beim ♀ sind die Antennenglieder 2—9 fast kuglig, kaum länger als dick, ihr Haarwirtel abstehend und nicht 2-mal so lang wie ein Glied; oberhalb der Mitte tragen diese Glieder je 1 hyalines, pfriemliches, fast borstenartiges Gebilde, welches kürzer als der Haarwirtel ist; 10.—14. Glied walzenförmig, 4-mal so lang wie das 9. Glied, mit abstehenden, zerstreuten Haaren, welche deutlich länger als der Wirtel des 9. Gliedes sind; 14. Glied am Ende mit einem kurzen Griffel. Mesonotum glänzend und kahl; Scutellum mit langen, gereihten Borsten. Flügel beim ♀ (Fig. 4) glashell, mit dichter mikroskopischer Beborstung, ferner am Distalende und am ganzen Hinterrande mit zerstreuten, längeren, abstehenden Borsten; solche längere Borsten kommen auch auf allen Adern vor, ausgenommen auf dem Stiel der Discoidalis sowie auf der ungegabelten Analader; der Radius mündet wenig vor der Flügelmitte, der Cubitus vor dem distalen Drittel; distale Radialzelle gleichschmal, 4-mal so lang wie die proximale, welche fast das Distalende des Radius erreicht; zwischen dem Cubitus und der Discoidalis befindet sich eine ziemlich deutliche, gegabelte, eingeschaltene Ader; Discoidalis kurz gestielt, ihre distale Zinke setzt die Richtung des Stieles fort und verläuft gerade bis in die Flügelspitze; ihre proximale Zinke wenig distal von der Querader entspringend; Posticalis distal von der Gabelung der Discoidalis gegabelt. Flügel des ♂ nur mit der mikroskopischen Beborstung; Radius in die Flügelmitte mündend, Cubitus vor das distale Viertel, von der Costa ein wenig überragt wie beim ♀; distale Radialzelle 5-mal so lang wie die proximale, welche kaum sichtbar ist, indem der Radius dem Cubitus anliegt; Stiel der Discoidalis länger als beim ♀, so lang wie die schiefe Querader. Beine fast unbehaart; an den vorderen und mittleren Beinen sind die Femora so lang wie die Tibien, letztere distal mit einigen langen, hintereinander stehenden Borsten aber ohne Kamm; Metatarsus kaum länger als die Hälfte der Tibien, fast so lang wie die 4 folgenden Glieder zusammen, 4. und 5. Glied gleichlang, um die Hälfte länger als dick; Krallen einfach, etwas kürzer als das breite und dicht behaarte Empodium; hintere Tibien mit einem doppelten braunen Kamm; Metatarsus aller Beine ventral mit 2 Reihen kurzer Borsten, jede Borste entspringt aus einer braunen, zwiebelartigen, beiderseits mit einem mikroskopischen Börstchen versehenen Verdickung (*setæ bulbosæ*). Abdomen matt, beim ♂ 2-mal so lang wie der übrige Körper und schmaler als der Thorax; Zange (Fig. 5) mit dünnen, allmählich zugespitzten Endgliedern; Lamelle abgerundet, so lang wie die Basalglieder; Abdomen des ♀ so lang wie der übrige Körper, etwas breiter als der Thorax. Länge ♂♀: 2,5 mm. Beschrieben nach 70 Exemplaren.

Vorkommen. Seychelle. Félicité: from forest, 14—17. XII. 1908, 1 ♀. Silhouette: high forest, 2000 feet, 1908, 5 ♀; near Mont Pot-à-eau, VIII. 1908, 1 ♀; Mare aux Cochons, collected by J. S. Gardiner, 2 ♀; Mare aux Cochons plateau and jungle near by, VIII. 1908, 1 ♀. Mahé: Cascade Estate, about 800 feet and over, collected by H. P. Thomasset and H. Scott, X. 1908—I. 1909, 1 ♂; near Morne Blanc, X.—XI. 1908,

1 ♀; Cascade Estate, about 800—1500 feet, 1909, 32 ♂, 20 ♀; forest behind Trois Frères, about 2000 feet, 14. I. 1909, 6 ♀.

5. *Ceratopogon psilonotus*, n. sp. (Tafel **21**, Fig. 6).

♂. Schwarzbraun und matt, Antennen bräunlich, Scutellum rotbraun, Coxæ und Beine hellgelb. Mund spitz, so lang wie der Kopf; Palpen mit 4 gleichdünnen Gliedern, Augen kahl. Antennen 14-gliedrig; 2.—10. Glied kuglig, mit einem schrägen Haarwirtel und einer halsartigen distalen Einschnürung, welche an den ersten Gliedern so lang als dick, an den folgenden länger als dick ist, Busch schwarzbraun, das vorletzte Glied erreichend; 11. Glied mit einem schief abstehenden Hals, welcher länger ist als die 3 vorhergehenden Glieder zusammen; 12. Glied wenig kürzer als das 11. und ebenso dünn, am Proximalende schwach kuglig verdickt, 13. und 14. walzenförmig und dicker aber bedeutend kürzer als das 12., nur 2—3-mal so lang wie dick, das 14. mit einem kurzen Griffel. Mesonotum kahl. Flügel glashell, mit zerstreuten und anliegenden Haaren; Querader vor der Mitte liegend, Cubitus mit dem Radius verbunden, nur im distalen Viertel sind beide getrennt und bilden eine sehr kleine Zelle, Mündung des Cubitus vor der Flügelmitte; alle übrigen Adern sehr blass; distale Zinke der Discoidalis gerade, in die Flügelspitze mündend, zwischen ihr und dem Vorderrand befindet sich eine lange, gegabelte Schaltader, proximale Zinke an der Querader entspringend; Gabelung der Posticalis wenig hinter der Mündung des Cubitus liegend. Tibien und Tarsen mit langen Haaren, welche 3—4-mal so lang wie die Dicke der Tibien sind; vordere Tibien so lang wie die Femora, oder wie die 3 ersten Tarsenglieder zusammen, ohne Kamm; Metatarsus kaum kürzer als das 2. Glied, 4—5-mal so lang wie dick, beide ventral mit 2 Reihen von *setæ bulbosæ*, 3. und 4. Glied ventral mit einer distalen Borste; 5. 2-mal so lang wie dick, Krallen stark gebogen, kaum länger als das breite Empodium; an den 4 hinteren Tarsen ist das 2. Glied $2\frac{1}{2}$-mal so lang wie der Metatarsus, das 5. Glied 3-mal so lang wie dick; hintere Tibien mit einem doppelten Kamm. Endglieder der Zange dünn und zugespitzt. Länge: 1,8 mm.

Vorkommen. Seychellen. Mahé: Anonyme Island, from grass, ferns, trees, etc. I. 1909, 15 ♂.

6. *Ceratopogon aplonotus*, n. sp. (Tafel **21**, Fig. 7).

♀. Rot; Antennen dunkelbraun; Thorax rotbraun, Mesonotum, Scutellum und Metanotum meist braun; Schwinger weiss; Beine hellgelb. Augen oben breit zusammenstossend, kahl; Mund spitz, fast so lang wie die Höhe des Kopfes; 2. Palpenglied wenig dicker als die 3 übrigen. Antennen kürzer als Kopf und Thorax; 2.—9. Glied kuglig, Haarwirtel nicht doppelt so lang wie ein Glied; 10.—14. Glied zusammen so lang wie das übrige Flagellum, jedes derselben 2-mal so lang wie dick, und distal allmählich verengt. Mesonotum matt, fein grauhaarig. Flügel gleichmässig und anliegend behaart (Fig. 7); Cubitus dem Radius bis zur Mündung anliegend, bei starker Vergrösserung bemerkt man, dass beide von einander schwach getrennt und vor der Mitte durch eine Querader verbunden sind, Mündung des Cubitus wenig distal von der Flügelmitte; Querader schief, vor dem 2. Flügeldrittel entspringend; distale Zinke der Discoidalis

gerade, die Richtung des Stieles fortsetzend, in die Flügelspitze mündend, zwischen ihr und dem Vorderrand eine gegabelte Schaltader; proximale Zinke der Discoidalis kaum proximal von der Querader entspringend; die Gabelung der Posticalis liegt der Mündung des Cubitus gegenüber. Beine ziemlich kurz; Femora, Tibien und Tarsen fast gleichdick; Tibien und Tarsen dorsal mit langen Haaren, welche etwa 3-mal so lang sind, wie die Dicke der Glieder; Metatarsus aller Beine kaum länger als das 2. Glied, 3-mal so lang wie dick, die folgenden Glieder allmählich kürzer, das 4. deutlich länger als dick, 5. wenig kürzer als das 4.; Empodium fast so lang wie die stark bogigen Krallen. Abdomen flach gedrückt, wenig länger als der übrige Körper. Länge: 1—2 mm.

Vorkommen. Seychellen. Mahé: marshes on coastal plain at Anse aux Pins and Anse Royale, 19—21. I. 1909, 1 ♀; Cascade Estate, about 800 feet and over, collected by H. P. Thomasset and H. Scott, X. 1908—I. 1909, 4 ♀; near Morne Blanc, about 1000 feet, 3. II. 1909, 1 ♀; Cascade Estate, about 800—1500 feet, 1909, 14 ♀; Anonyme Island from grass, ferns, trees, etc. I. 1909, 2 ♀; scrubby forest vegetation, top of Mount Sebert, 1800 feet or more, I. 1909, 1 ♀; marshes on coastal plain at Anse aux Pins and Anse Royale, 19—21. I. 1909, 1 ♀.

7. *Ceratopogon seychelleanus*, n. sp. (Tafel **21**, Fig. 8).

♀. Von *aplonotus* nur durch die Flügel zu unterscheiden. Dieselben sind feiner anliegend behaart, und glashell, während sie bei *aplonotus*, wegen der breiteren Behaarung dunkel erscheinen. Der Cubitus ist nur bis zur Mitte mit dem Radius verbunden, in der distalen Hälfte ist er von demselben getrennt und bildet mit ihm eine deutliche Radialzelle, seine Mündung liegt in der Flügelmitte; die Gabelung der Posticalis liegt etwas distal von der Mündung des Cubitus. Länge: 1 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800 feet and over, collected by H. P. Thomasset and H. Scott, X. 1908—I. 1909, 3 ♀.

Var. *fulvithorax* n. var.

Thorax orangerot, Abdomen schwarzbraun. Länge ♀: 1,2 mm. Sonst wie bei der typischen Form.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800—1500 feet, 1909, 2 ♀.

8. *Ceratopogon falcinellus*, n. sp. (Tafel **21**, Fig. 9, 10).

♀. Schwarz, matt und kahl; Schwinger weiss; Beine bräunlich. Augen kahl; Mund zugespitzt, halb so lang wie die Höhe des Kopfes; 2. Palpenglied lang und kaum verdickt, 3. kaum länger als dick, 4. so lang wie das 3. Antennen kurz; Flagellumglieder ziemlich kuglig, kaum länger als dick; 10.—13. walzenförmig, 2-mal so lang wie dick; 14. $2\frac{1}{2}$-mal so lang wie dick, mit einem ziemlich langen Endgriffel. Flügel (Fig. 9) mit sehr dichten, langen, anliegenden Haaren; der Cubitus überragt die Flügelmitte, in seiner proximalen Hälfte ist er mit dem Radius verschmolzen, dieser nur halb so lang wie der Cubitus; distale Zinke der Discoidalis fast gerade, in oder kaum hinter die Flügelspitze mündend; proximale Zinke an der schiefen Querader entspringend; Gabelung der Posticalis distal von der Mündung des Radius, aber

proximal von der Mündung des Cubitus liegend. Beine mit abstehenden Haaren, welche 2—3-mal so lang wie die Dicke der Tibien sind; Femora kaum länger als die Tibien; Metatarsus aller Beine länger als die Hälfte der Tibien, $2\frac{1}{2}$-mal so lang wie das 2. Glied, ventral mit dichten *setæ bulbosæ*; 2. Glied $2\frac{1}{2}$-mal so lang wie dick, 3. 2-mal, 4. wenig länger als das 5., welches kaum länger als dick ist; Krallen etwas länger als das 5. Tarsenglied, sichelförmig gebogen, länger als das breite Empodium (Fig. 10). Länge: 1 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800 feet and over, collected by H. P. Thomasset and H. Scott, X. 1908—I. 1909, 1 ♀; Cascade Estate, about 800—1500 feet, 1909, 2 ♀. Silhouette: marshy plateau of Mare aux Cochons or edge of forest close by, IX. 1908, 1 ♀.

9. *Ceratopogon mahensis*, n. sp. (Tafel **21**, Fig. 11).

♀. Schwarzbraun, Schwinger weisslich, Beine gelblich. Augen kahl; Mund zugespitzt, $\frac{2}{3}$ der Höhe des Kopfes erreichend, von einer fein behaarten, linealen, am Ende zweilappigen Lippe bis über die Mitte bedeckt, aus 6 spitzen, kahlen, paarweise geordneten Teilen zusammengesetzt, die 2 inneren Teile sind an der Aussenseite fein gesägt. Palpenglieder nicht verdickt, 2. und 4. doppelt so lang wie dick, 3. kaum länger als dick; das 1. wenig länger als dick, einem walzigen, feinhaarigen Fortsatz entspringend, den man als ein eigentliches Glied betrachten könnte. Flagellumglieder kurz eirund, Wirtel 2-mal so lang wie ein Glied; die 5 Endglieder lang gestreckt, fast walzenförmig, distal kaum dünner, proximal mit einer schwachen ringförmigen Verdickung, 3—4-mal so lang wie dick, das 14. wenig länger als das 13. und mit einem kurzen Endgriffel, alle 5 zusammen deutlich länger als das übrige Flagellum, ihr proximaler Wirtel wenig länger als ein Glied. Mesonotum matt und ziemlich kahl. Flügel glashell, mit langen, anliegenden Haaren und dazwischen fein punktirt; Cubitus dem Radius scheinbar anliegend, nur bei starker Vergrösserung wird eine Trennung zwischen beiden sichtbar, sowie eine fast punktförmige Querader in der Mitte derselben; Mündung des Cubitus hinter der Flügelmitte; Schaltader gegabelt und kaum sichtbar; distale Zinke der Discoidalis in die Flügelspitze mündend, die proximale entspringt an der schiefen Querader; Gabelung der Posticalis dem 2. Drittel des Cubitus gegenüber liegend. Beine mit zerstreuten Haaren, welche kaum doppelt so lang wie die Dicke der Tibien sind; vorderer und mittlerer Metatarsus fast 3-mal so lang wie das 2. Glied, beide ventral mit dichten *setæ bulbosæ*; 3. Glied wenig kürzer als das 2., kaum mehr als 2-mal so lang wie dick; 4. wenig länger als das 5., welches kaum länger als dick ist; Krallen kürzer als das 5. Tarsenglied, kaum länger als das breite Empodium (Fig. 11). Abdomen am Grunde etwas verengt. Länge: 1,2 mm.

Vorkommen. Seychellen. Mahé: Mare aux Cochons district, about 1500 feet, 23. I.—2. II. 1909.

Genus Culicoides Latreille.

Genera Crust. et Insect. 1809, vol. iv. p. 251.

1. Flügel braun, mit 14 weissen Flecken; Discoidalis lang gestielt
.....10. *C. leucostictus*, n. sp.

Flügel glashell, ungefleckt; Discoidalis ungestielt (an der Querader gegabelt) .....2.

2. Körper schwarz; Cubitus in oder hinter die Flügelmitte mündend .....3.
Körper orangerot; Cubitus deutlich vor der Flügelmitte mündend .....13. *C. aurantiacus*, n. sp.

3. Gabelung der Posticalis proximal von der Mündung des Cubitus liegend; Mesonotum matt .....11. *C. seychellensis*, n. sp.

Gabelung der Posticalis distal von der Mündung des Cubitus liegend; Mesonotum glänzend .....12. *C. scotti*, n. sp.

10. *Culicoides leucostictus*, n. sp. (Tafel **21**, Fig. 12).

♀. Schwarzbraun, matt und fast unbehaart; Antennen proximal weisslich, distal bräunlich; Schwinger weiss; Beine bräunlich. Mund dünn und zugespitzt, so lang wie die Höhe des Kopfes; das 2. Palpenglied keulenförmig. Flagellumglieder kuglig, die Endglieder 2-mal so lang wie dick, schwach kegelförmig. Flügel (Fig. 12) braun, stark irrisirend, mit 14 weissen Flecken und einem grösseren schwarzbraunen Fleck, mit zerstreuten Borsten, die am Rande und an der Spitze dichter stehen, dazwischen mikroskopisch fein beborstet; der schwarzbraune Fleck bedeckt die beiden Radialzellen; die weissen Flecken sind klein und rundlich, 3 bilden eine Querreihe am Spitzenrande und liegen zwischen Vorderrand und Discoidalis, zwischen den beiden Zinken der Discoidalis und zwischen der proximalen Zinke der Discoidalis und der Posticalis; 5 andere bilden eine Querreihe, der grösste liegt hinter der Mündung des Cubitus, der kleinste zwischen dem grössten und der Discoidalis, die 3 übrigen zwischen den beiden Zinken der Discoidalis, zwischen der Discoidalis und der Posticalis und zwischen den beiden Zinken der Posticalis; eine weitere Querreihe besteht aus 4 Flecken, deren 1. zwischen dem Cubitus und der Gabelung der Discoidalis, der 2. zwischen der Gabelung der Discoidalis und der Gabelung der Posticalis, die 2 übrigen übereinander zwischen der Gabelung der Posticalis und dem Flügelhinterrand; zwei grosse Flecken liegen, der eine proximal von der Mitte des Stieles der Posticalis, der andere dicht proximal von der Querader und reicht von der Discoïdalis bis zum Vorderrand; Cubitus distal von der Flügelmitte mündend, in seiner Mitte durch eine Querader mit dem Radius verbunden, beide Radialzellen gleichbreit; Discoidalis weit distal von der schiefen Querader aber proximal von der Mündung des Cubitus gegabelt, distale Zinke am Grunde schwach bogig, in die Flügelspitze mündend; die Gabelung der Posticalis liegt der Gabelung der Discoidalis gegenüber. Vordere Tibien so lang wie die Femora, 2-mal so lang wie der Metatarsus, dieser fast 3-mal so lang wie das 2. Glied, welches um die Hälfte länger als das 3. ist; 4. wenig kürzer als das 3., kaum kürzer als das 5., 2-mal so lang wie dick; Empodium durch einige Borsten ersetzt; alle Tibien mit abstehenden Haaren, welche doppelt so lang wie die Dicke der Tibien sind. Länge: 1 mm.

Vorkommen. Seychellen. Mahé: marshes on coastal plain at Anse aux Pins and Anse Royale, 19—21. I. 1909.

11. *Culicoides seychellensis*, n. sp.

♂♀. Schwarz oder schwarzbraun, matt und fast kahl; Schwinger weisslich, Coxæ und Beine gelblichweiss; Scutellum rotgelb; Abdomen des ♀ ventral rotbraun. Mund und Palpen kurz. Antennenglieder des ♂ ziemlich kuglig, die 4 letzten walzenförmig und 2—3-mal so lang wie dick, Busch schwarzbraun und bis zum Grunde des Endgliedes reichend. Flagellumglieder des ♀ ziemlich gleichgestaltet, kurz keglig, 2-mal so lang wie dick, mit kurzen Wirteln, Endglied länger und allmählich zugespitzt. Flügel glashell, gleichmässig, lang, und anliegend behaart, dazwischen fein und dicht punktirt; Cubitus überall mit dem Radius verschmolzen, etwas hinter die Flügelmitte mündend, von der Costa nicht überragt; Querader sehr schief und lang, deutlich proximal von der Flügelmitte liegend; distale Zinke der Discoidalis gerade, in die Flügelspitze mündend, proximale Zinke am Grunde fast erloschen, wenig vor der Querader entspringend; Gabelung der Posticalis so weit von der Querader entfernt als von der Mündung des Cubitus. Hintertibien mit einem doppelten Kamm, Metatarsus der Hinterbeine so lang wie die 4 folgenden Glieder zusammen; 2. Glied um die Hälfte länger als das 3., welches fast doppelt so lang wie das 4. ist; dieses um die Hälfte länger als dick; 5. Glied dünn, so lang wie das 3.; Krallen einfach, gleichlang, am Grunde mit einigen Borsten, ohne deutliches Empodium. Länge: 1,5 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 1000 feet and over, 1 ♀; Cascade Estate, about 800—1500 feet, 1909, 1 ♂.

12. *Culicoides scotti*, n. sp. (Tafel **21**, Fig. 13).

♂♀. Schwarz und glänzend, fast unbehaart; Antennen braun; Schultern, Tegulæ, ein Fleck unter der Flügelwurzel, und Scutellum gelb, oftmals nur das Scutellum gelb; Schwinger milchweiss; Coxæ und Beine schmutzig weiss. Augen sehr fein und kurz behaart; Mund zugespitzt, nur halb so lang wie die Höhe des Kopfes; 2. Palpenglied länger als die übrigen aber nicht verdickt. Antennen 14-gliedrig; Flagellumglieder des ♂ in der Mitte etwas dicker als an beiden Enden, um die Hälfte länger als dick, mit einem queren Hals; die 4 Endglieder in der Richtung der vorigen liegend, 2—3-mal so lang wie das 10., unterhalb der Mitte etwas eingeschnürt, ausgenommen das 14., ihr proximaler Wirtel länger als die übrigen Borsten; Busch schwarzbraun. Beim ♀ sind alle Flagellumglieder gleichgestaltet, mit Ausnahme des Endgliedes, 2-mal so lang wie dick, schwach keglig, das 14. 3-mal so lang wie dick. Flügel (Fig. 13) glashell, fein und dicht punktirt, mit langen und abstehenden Borsten längs der Ränder und auf allen Adern, auch auf der schwachen Analader; 1 oder 2 Längsreihen solcher Borsten befinden sich zwischen dem Vorderrand und der Discoidalis, zwischen den beiden Zinken der Discoidalis, sowie zwischen der Discoidalis und der Posticalis; Cubitus in die Flügelmitte mündend, scheinbar mit dem Radius verschmolzen, bei starker Vergrösserung erscheint er von dem Radius getrennt und distal von der Mitte durch eine punktförmige Querader mit demselben verbunden; distale Zinke der Discoidalis gerade, die Richtung des Stieles fortsetzend, in die Flügelspitze mündend, proximale Zinke an der schiefen Querader entspringend; Gabelung der Posticalis wenig distal von der Mündung des Cubitus liegend. Beine mit abstehenden Haaren, welche 2—3-mal so lang wie die Dicke der Tibien sind; hintere

Tibien etwas kürzer als der Tarsus, mit einem doppelten Kamm, Metatarsus der Hinterbeine $2\frac{1}{2}$-mal so lang wie das 2. Glied, welches um die Hälfte länger als das 3. ist; das 4. deutlich kürzer als das 3., doppelt so lang wie dick, wenig kürzer als das etwas dünnere 5.; Empodium durch einige Borsten ersetzt. Abdomen matt. Länge: 0,6—1 mm. Beschrieben nach 51 Exemplaren (47 ♀, 4 ♂).

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800 feet and over, collected by H. P. Thomasset and H. Scott, X. 1908—I. 1909, 1 ♀; Cascade Estate, about 800—1500 feet, 1909, 4 ♂, 40 ♀; marshy ground near sea-level, Cascade, 20. II. 1909, 6 ♀.

13. *Culicoides aurantiacus*, n. sp.

♂♀. Orangerot. Antennen braunschwarz, Schwinger weisslich, Beine schmutzig weiss, Abdomen dorsal mit 8 breiten, schwarzbraunen Querbinden; die Lamellen des ♀ schwarzbraun und fast kreisrund. Augen behaart; Palpen nicht verdickt, 4. Glied klein; Mund zugespitzt, die Hälfte oder die $\frac{2}{3}$ der Höhe des Kopfes erreichend. Antennen des ♀ mit ziemlich gleichen Flagellumgliedern, diese fast keglig, 2 bis $2\frac{1}{2}$-mal so lang wie dick, 10.—14. 3-mal so lang wie dick, Haarwirtel doppelt so lang wie ein Glied. Flagellumglieder des ♂ fast kuglig, die 4 Endglieder verlängert, zusammen so lang wie das übrige Flagellum; Busch schwarzbraun. Mesonotum matt und kahl. Flügel glashell, mit zerstreuten Haaren, dazwischen dicht und fein punktirt; Cubitus dem Radius bis zur Mündung anliegend, seine Mündung deutlich vor der Flügelmitte, der Gabelung der Posticalis gegenüberliegend; distale Zinke der Discoidalis gerade, in die Flügelspitze mündend, proximale Zinke an oder kaum proximal von der Querader entspringend. Beine schlank, Tibien etwas kürzer als die Tarsen, die 4 hinteren mit zerstreuten, abstehenden Haaren, welche 2—3-mal so lang wie die Dicke der Tibien sind; Metatarsus aller Beine ventral mit 2 Reihen dichter *setæ bulbosæ*, 3-mal so lang wie das 2. Glied, welches $2\frac{1}{2}$-mal so lang wie dick ist; 4. Glied noch um die Hälfte länger als dick, etwas kürzer als das 5.; Empodium durch einige Borsten ersetzt. Abdomen beim ♀ etwas keglig. Länge: 1—1,5 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800—1500 feet, 1909, 1 ♂, 3 ♀.

Var. *mahensis*, n. var.

Abdomen dorsal einfarbig schwarzbraun. Länge: 1 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800—1500 feet, 1909, 2 ♀.

Genus Sphæromias Curtis.

Brit. Entom. 1829, vol. vi. Pl. 285.

Ueber den Begriff der Gattung *Sphæromias* besteht bis zur Zeit keine Klarheit. Dem Dipterologen, Herrn J. E. Collin, aus Newmarket, habe ich es zu verdanken, wenn ich nun in der Lage bin, die richtige Deutung derselben zu erkennen und hier aufstellen zu können.

Der Name *Sphæromias* wurde, im Jahre 1829, von Stephens, in Syst. Cat. Brit. Ins. vol. ii. p. 236 auf folgende Weise aufgestellt: "*Sphæromias* mihi: 1° *annulitarsis* mihi,

2° *varipes* mihi, 3° *albomarginatus* mihi." Da Stephens weder die Gattung noch irgend eine der dazugestellten Arten beschrieben hat, so bleibt der Name *Sphæromias* Stephens ein nomen nudum. In demselben Jahre hat Curtis, a.a.O., sowohl die Gattung *Sphæromias*, als auch zwei der von Stephens benannten Arten, beschrieben, nämlich 1° *albomarginatus* und 3° *varipes*; *annulitarsis* wird an 2. Stelle genannt aber nicht beschrieben. Aus der langen Gattungsdiagnose ist nur Folgendes von Belang: "Antennen in beiden Geschlechtern gleich (?), nicht ganz so lang wie der Thorax, schwach borstig behaart und 14-gliedrig; Grundglied dick, fast kreiselförmig; 2. länger als eins der 7 folgenden, welche beinahe walzenförmig sind; das 10. und die folgenden 2-mal so lang als eins der 7 vor dem 10. befindlichen Glieder, Endglied ziemlich zugespitzt...Palpen 4-gliedrig, 1. und 2. Glied gleichlang, das 1. etwas dicker und am Grunde gekrümmt, 3. das kürzeste, 4. das längste und keulenförmig. Flügel mit einer Costal- und 2 ausgebildeten Radialzellen. Beine ziemlich dick, Tibien einfach, 1. Tarsenglied das längste, 2. und 5. kürzer und gleichlang, 4. das kürzeste, Endglied mit einer doppelten Reihe von dornartigen Borsten; Krallen sehr lang und stark gekrümmt." Die typische Art, das heisst, die an erster Stelle, nach dieser Gattungsdiagnose, beschriebene Art ist *S. albomarginatus*. Das Flügelgeäder derselben, wie aus der beigegebenen Abbildung des Flügels erhellt, stimmt mit dem unserer *S. pulchripennis* n. sp. (Fig. 15) überein, ausgenommen dass der distale Abschnitt des Radius nicht, wie hier, an der Spitze, sondern wenig distal von der Mitte, durch eine Querader, mit dem Cubitus verbunden ist; ferner ist die Mündung des Cubitus, bei *albomarginatus*, der Flügelspitze noch näher als bei *pulchripennis*. Die Gattung *Sphæromias* muss somit in dem Sinne genommen werden, wie sie von Curtis beschrieben worden ist. So wurde sie auch etwas später (1833) von Haliday aufgefasst. Im Jahre 1856 hat dagegen Walker (Insecta Britannica, Dipt. vol. iii. p. 208) der Gattung *Sphæromias* einen ganz anderen Sinn beigelegt; er führt nämlich dieselbe für seine species 64 und 65 auf, also für *tibialis* Meig. und *fasciatus* Meig., deren Femora bedornt sind. Somit fällt *Sphæromias* Walker zusammen mit *Palpomyia* Megerlé, und könnte höchstens, wegen des bedornten 5. Tarsengliedes, als Untergattung bei *Palpomyia* stehen, wenn der Name nicht vergeben wäre; in diesem Sinne hatte ich auch bisher *Sphæromias* aufgefasst.

Sphæromias Curtis, non Walker, tritt nun an Stelle von *Ceratolophus* Kieff. und erhält als Synonymen: *Ceratopogon* Meigen partim, *Ceratolophus* Kieffer und *Johannseniella* Williston.

Die 3 folgenden Arten wurden auf den Seychellen entdeckt:

1. Das 5. Tarsenglied ventral mit je 3 langen, schwarzen, stumpfen Dornen; Flügel ungefleckt .....14. *S. hexacantha*, n. sp.
   Das 5. Tarsenglied unbewehrt; Flügel gefleckt .....2.
2. Die beiden Radialzellen linealisch .....15. *S. pulchripennis*, n. sp.
   Proximale Radialzelle eine kleine rhombische Areola bildend 16. *S. areolaris*, n. sp.

14. *Sphæromias hexacantha*, n. sp. (Tafel **21**, Fig. 14).

♀. Glänzend schwarz; Abdomen glänzend braun, Stiel der Schwinger und die Tarsen weisslich, Femora und Tibien braunschwarz. Mund zugespitzt, ein Drittel so lang wie der

Kopf; 2. Palpenglied verdickt, so lang wie das 3. und 4. zusammen. Antennenglieder 2—9 walzenförmig, mit einem kurzen Hals, das 2. doppelt so lang wie dick, die folgenden um die Hälfte länger als dick, Wirtel nicht 2-mal so lang wie ein Glied; 10.—14. Glied zusammen etwas länger als das übrige Flagellum, walzenförmig, jedes doppelt so lang wie das 9. Flügel schwach getrübt, unbehaart; Radius wenig vor seiner Spitze durch eine gerade Querader, mit dem Cubitus verbunden; Cubitus bis zum distalen Flügeldrittel reichend, von der Costa nicht überragt, weniger weit von der Flügelspitze entfernt als die distale Zinke der Posticalis, aber weiter als die proximale Zinke der Discoidalis; die 2 Radialzellen gleichbreit, die distale fast 3-mal so lang wie die proximale; gewöhnliche Querader senkrecht; distale Zinke der Discoidalis gerade, die Richtung des Stieles fortsetzend, wenig hinter die Flügelspitze mündend, proximale Zinke kaum proximal von der Querader entspringend, sanft S-förmig geschwungen; die Gabelung der Posticalis liegt der Querader gegenüber, distale Zinke die Richtung des Stieles fortsetzend, die proximale sehr schief. Beine fein und schwach behaart, nur die hinteren Tibien mit spärlichen abstehenden Haaren; die Hinterbeine deutlich länger und etwas dicker als die 4 vorderen; alle Tibien etwas kürzer als die Femora, die vorderen mit einem einfachen Kamm, hinter welchem noch andere Stacheln sind, die hinteren mit einem doppelten Kamm; Tarsen wenig länger als die Tibien; vorderer Metatarsus $2\frac{1}{2}$-mal so lang wie das 2. Glied, dieses fast 3-mal so lang wie dick; 3. wenig länger als dick; 4. kaum länger als dick; 5. proximal mit je 3 schwarzen, stumpfen und langen Dornen, schwach bogig, länger als die 2 vorhergehenden zusammen; alle Krallen ungleich, die längere erreicht die 2 Drittel des 5. Tarsengliedes, die kürzere nur $\frac{1}{3}$ so lang wie die längere (Fig. 14); die 4 hinteren Tarsen wie die vorderen, ihr Metatarsus etwas länger. Körper ziemlich kahl. Länge: 2 mm.

Vorkommen. Seychellen. Mahé: Mare aux Cochons district, about 1500 feet, 26. I.—2. II. 1909.

15. *Sphæromias pulchripennis*, n. sp. (Tafel **21**, Fig. 15—17).

♂♀. Glänzend schwarz; Schwinger weiss; Tarsen weisslich, Gelenke schwärzlich; Antennenglieder 2—9 gelb beim ♂, Flagellum bräunlich beim ♀. Augen kahl, oben wenig getrennt; Palpen 4-gliedrig, 1. Glied kurz, 2. doppelt so lang wie dick, 3. und 4. um die Hälfte länger als dick; Mund klein und spitz. Antennen 14-gliedrig; beim ♂ sind die Glieder 3—10 walzenförmig, um die Hälfte länger als dick, 11. Glied kürzer als das 12., über dem Grunde etwas schief verlaufend; 12.—14. doppelt so lang wie das 9. und etwas dünner, am Grunde schwach verdickt und mit einem Wirtel; Busch in der proximalen Hälfte gelb, in der distalen schwarzbraun, die Mitte des Endgliedes erreichend; beim ♀ sind die Flagellumglieder walzenrund, zuerst $1\frac{1}{2}$-mal, dann 2-mal so lang wie dick; 10.—14. um die Hälfte länger als das 9.; Endglied in beiden Geschlechtern mit einem kurzen Griffel. Flügel (Fig. 15) weiss, mit schwarzen Flecken, Fläche unbehaart, dicht punktirt; ein kleiner Fleck proximal von der Querader, zwischen Radius und Discoidalis; ein grosser querer Fleck von der Querader bis zur Mündung des Radius einerseits, und vom Radius bis zur proximalen Zinke der Discoidalis andererseits; zwischen den beiden Zinken der Discoidalis verlängert sich dieser Fleck distal bis zu einem etwas schmaleren

Querfleck, welcher von der Mündung des Cubitus bis zur proximalen Zinke der Discoidalis reicht; ein weniger deutlicher Fleck liegt zwischen den beiden Zinken der Posticalis; Radius distal von der Flügelmitte mündend, an seiner Spitze mit dem Cubitus durch eine Querader verbunden; Cubitus bis zum distalen Flügelviertel reichend; die beiden Radialzellen gleichbreit, die distale $2\frac{1}{2}$-mal so lang wie die proximale; distale Zinke in die Flügelspitze mündend, proximale Zinke am Grunde erloschen; die Gabelung der Posticalis liegt der schiefen Querader gegenüber. An den 2 hinteren Beinen sind die Femora und Tibien gleichdick und gleichlang, länger als an den 4 übrigen und doppelt so dick als an den übrigen; die hinteren Tibien mit einem doppelten Kamm, die Stacheln des längeren sind weit abstehend; Metatarsus um die Hälfte länger als das 2. Glied, ventral mit 2 Reihen von *setæ bulbosæ*, proximal und distal mit einem schwarzen Stachel; die 3 folgenden ventral, wenig vor dem Distalende, mit 1—2 Stacheln; 5. Glied ohne Stacheln, um die Hälfte länger als das 4., welches etwas länger als das 3. ist; Krallen einfach, ungleich, die längere fast so lang wie die 2 letzten Tarsenglieder zusammen, die kürzere erreicht ein Drittel der längeren (Fig. 16); an den 4 vorderen Tarsen ist das 4. Glied deutlich kürzer als das 3.; Tibien der mittleren Beine dünner als die der vorderen, etwas länger als die Femora; Krallen der 4 vorderen Beine einfach, gleichlang, höchstens halb so lang wie das 5. Tarsenglied. Endglieder der Zange (Fig. 17) in der proximalen Hälfte schwach verdickt und fein behaart, in der distalen Hälfte sehr dünn und unbehaart. Länge: 1,5 mm.

Vorkommen. Seychellen. Praslin: Côtes d'Or Estate, especially from Coco-de-Mer forest, in the Vallée de Mai, 28. XI. 1908, 5 ♂, 3 ♀. Mahé: Mare aux Cochons district, about 1500 feet, 26. I.—2. II. 1909, 2 ♂; marshes on coastal plain at Anse aux Pins and Anse Royale, 19—21. I. 1909, 1 ♀.

16. *Sphæromias areolaris*, n. sp. (Tafel **21**, Fig. 18, 19).

♀. Schwarzbraun; Thorax rotbraun, Oberseite oftmals dunkelbraun, Schwinger weiss; Beine schmutzig gelb; Abdomen vorn etwas heller. Antennen länger als Kopf und Thorax zusammen; Flagellumglieder 2—3-mal so lang wie dick, fast walzenförmig, die 4—5 Endglieder viel länger und fadenförmig. Palpenglieder dünn, das 2. länger. Mesonotum matt. Flügel (Fig. 18) bräunlich, stellenweise heller, eine schwarzbraune Querbinde reicht von der Gabelung der Discoidalis durch die proximale Radialzelle bis zum Vorderrand; Fläche mikroskopisch fein beborstet; Querader kaum proximal von der Flügelmitte entspringend, schief und lang; distaler Abschnitt des Radius sehr kurz, seine Mündung liegt der Querader gegenüber, in seiner Mitte ist er mit dem Cubitus durch eine schiefe Querader verbunden; Cubitus fast das distale Flügeldrittel erreichend; proximale Radialzelle kaum länger als breit, eine kleine rhombische Areola bildend; distale Radialzelle dreieckig, 3-mal so lang wie die proximale; distale Zinke der Discoidalis gerade, die Richtung des Stieles fortsetzend, kaum hinter die Flügelspitze mündend; proximale Zinke kaum distal von der Querader entspringend; Gabelung der Posticalis wenig distal von der Querader liegend. Beine feinhaarig, Tibien dorsal mit 4—5 langen abstehenden Borsten; vordere Tibien etwas kürzer als die Tarsen, die 4 hinteren so lang wie die Tarsen; die 2 hinteren mit einem doppelten Kamm; alle Tarsen

sehr dünn; Metatarsus so lang wie die 4 folgenden Glieder zusammen, ventral mit 2 Reihen dichter *setæ bulbosæ*; 2. Glied mehr als doppelt so lang wie das 3. und 4. zusammen; 3. kaum länger als dick; 4. so lang wie das 3. aber distal schief abgestutzt; 5. Glied so lang wie das 2., etwas bogig, am Grunde mit einem braunen Stachel; Krallen ungleich, die längere fast so lang wie das ganze Glied, 3-mal so lang wie die kürzere (Fig. 19). Abdomen vorn etwas verengt. Länge: 1,5 mm.

Vorkommen. Seychellen. Mahé: from near Morne Blanc, X—XI. 1908, 1 ♀; Cascade Estate, about 800—1500 feet, 1909, 3 ♀.

Genus Serromyia Meigen.

Syst. Beschr. der bek. europ. zweifl. Ins. 1818, vol. i. p. 66.

Der Name *Serromyia* findet sich bei Meigen, a. a. O., nach der Beschreibung seines *Ceratopogon femoratus* Fabr., in folgender Bemerkung: "Auch aus dem Kais. Königl. Museum als *Serromyia geniculata* mitgeteilt." Hierzu gehört als Synonym *Prionomyia*; dieser Name wurde von Stephens (1829), aber ohne Beschreibung aufgestellt und blieb somit nomen nudum, bis Westwood, im Jahre 1840 (Introduction to the Modern Classif. of Insects, vol. ii., Generic Synopsis, p. 126) folgende Diagnose desselben gab: "*Prionomyia* unterscheidet sich von *Ceratopogon* durch die verdickten Hinterbeine"; Westwood gab *femoratus* Fabr., Meig. als Type an.

17. *Serromyia festiva*, n. sp.

♂. Kopf hellgelb; 1. Antennenglied braunrot, proximale Hälfte des Flagellum gelb, die distale Hälfte und der Busch braun; Palpen und Thorax bräunlichgelb, vordere Hälfte des Mesonotum hellgelb, mit zahlreichen schwarzen Punkten, hintere Hälfte bräunlich, unpunktirt; Scutellum und Schwinger gelblichweiss; Beine braun, an den 2 hinteren sind die Trochantere und Coxæ glänzend schwarz, Vorderbeine und Tarsen der 2 Hinterbeine schmutzigweiss, Femora der 2 Hinterbeine gelb, seitlich mit je 3 schwarzen Höckern, am Distalende mit 2 schwarzen Ringen; Abdomen gelblichweiss und matt. Augen kahl, oben breit zusammenfliessend. Drittletztes Palpenglied so lang wie die 2 folgenden zusammen und etwas dicker als dieselben. Mesonotum matt, kahl oder mit sehr spärlicher und sehr kurzer Behaarung; Scutellum mit 2 langen Borsten. Flügel fast glashell, das Abdomen etwas überragend, unbehaart, Adern blass; Querader etwas distal von der Flügelmitte liegend; Radius halb so lang wie der Cubitus, am Distalende mit dem Cubitus durch eine schräge Querader verbunden; Cubitus gerade, bis zum distalen Flügeldrittel reichend, sein Distalende ist der Flügelspitze kaum näher als das Ende der distalen Zinke der Posticalis; Gabelung der Discoidalis proximal von der Querader beginnend, vordere Zinke schwach nach hinten gebogen, kaum hinter die Flügelspitze mündend, hintere Zinke kaum sichtbar; Gabelung der Posticalis kaum proximal von der Querader. Die 4 vorderen Femora und Tibien sind dünn, die Femora am Distalende aussen mit 2 Borsten, innen mit 1 Borste, die Tibien mit einer ähnlichen Borste oberhalb der Mitte und 1 oder 2 Borsten am Distalende; hintere Femora überaus stark verdickt und etwas seitlich zusammengedrückt, so breit wie das Abdomen, 3—4-mal so breit wie die Tibien, überall gleichbreit, beiderseits von der Ventralseite,

mit je 4 schwarzen Stacheln in der distalen Hälfte und je 3 schwarzen Höckern in der proximalen Hälfte; hintere Tibien kaum kürzer als die Femora und der ventralen Seite derselben in der Ruhe angedrückt, etwas dicker als die 4 vorderen Femora, am Distalende mit einem braunen, kräftigen, doppelten Kamm; die 4 vorderen Tibien etwas kürzer als ihre Femora; Metatarsus aller Beine ventral mit kurzen, dichten und weisslichen Stacheln, so lang wie die 3 folgenden Glieder zusammen, 4. Glied fast 2-mal so lang wie dick, distal schief abgestutzt, nicht dicker als die übrigen; 5. bogig gekrümmt, so lang wie das 3. und 4. zusammen; Krallen einfach und klein; Empodium und Pulvillen fehlend. Abdomen fast lineal, flach gedrückt; Zangenglieder schlank, das Endglied sehr dünn. Länge: 2 mm.

Vorkommen. Seychellen. Silhouette: low coconut-planted country near the coast, Pointe Étienne, 17. IX. 1908.

Genus Pachyleptus Walker.

Insect. Saunders, vol. i. Dipt. 1856, p. 426.

18. *Pachyleptus rufipes*, n. sp.

♀. Glänzend schwarz; Spitze der Coxæ und Beine hellgelb, Tarsen etwas dunkler. Augen oben ziemlich breit getrennt, Scheitel glänzend, dreieckig, zwischen den Augen zugespitzt. Palpen 4-gliedrig, 2. Glied etwas dicker als die übrigen, so lang wie das 3. und 4. zusammen. Antennen 14-gliedrig; 2.—9. Glied fast walzenrund, 2-mal so lang wie dick, Wirtel so lang wie ein Glied; 10.—14. Glied walzenförmig, 3-mal so lang wie das 9., zusammen um die Hälfte länger als die 9 vorigen miteinander, Haare so lang wie der Wirtel des 9. Gliedes. Flügel glashell, dicht und fein punktirt, unbehaart; Hilfsader bis zur Querader reichend; Radius weit hinter der Flügelmitte mündend, vom Cubitus weit entfernt und nicht durch eine Querader mit ihm verbunden; Distalende des Cubitus vor dem distalen Viertel des Flügels; Gabelung der Discoidalis an der Querader liegend, distale Zinke die Richtung des Stieles fortsetzend, hinter die Flügelspitze mündend; Gabelung der Posticalis kaum distal von der Querader liegend. Vordere Femora stark verdickt, 3-mal so dick wie die Tibien, 3-mal so lang wie dick, ventral beiderseits mit einer Reihe kurzer, dicker, schwarzer Stacheln oder Dornen; vordere Tibien schwach bogig, der Ventralseite der Femora dicht anliegend, mit einem einfachen Kamm; die 4 Hinterbeine schlank und länger als die vorderen; Tibien der 2 Hinterbeine so lang wie die Femora, um die Hälfte länger als der Metatarsus, mit einem doppelten Kamm, deren längerer weit abstehende Stacheln trägt; Metatarsus fast 2-mal so lang wie das 2. Glied, ventral mit 2 Reihen von dichten *setæ bulbosæ*; 3. und 4. Glied kaum länger als dick, das 4. distal schief abgestutzt; 5. Glied dünner, schwach bogig, wenig kürzer als das 2., und so lang wie das 3. und 4. zusammen; Krallen einfach und klein; Empodium fehlend. Abdomen lang, flach gedrückt und kahl wie der übrige Körper. Länge: 2,5 mm.

Vorkommen. Seychellen. Silhouette: Mare aux Cochons, 6. IX. 1908, 1 ♀. Mahé: Cascade Estate, about 800 feet and over, collected by H. P. Thomasset and H. Scott,

X. 1908—I. 1909, 1 ♀; near Morne Blanc, X.—XI. 1908, 2 ♀; Cascade Estate, III. 1909, 1 ♀.

Var. *femoralis*, n. var.

Distale Hälfte der hinteren Femora schwarzbraun.

Vorkommen. Mahé: Cascade Estate, about 800—1500 feet, 1909, 1 ♀.

Genus Probezzia Kieffer.

Kieffer in: Wytsman, Genera Insectorum, Chironomidæ, 1906, p. 57.

1. Krallen lang und zweispaltig; 5. Tarsenglied ventral mit schwarzen, stumpfen und langen Dornen .....2.
   Krallen klein und einfach; 5. Tarsenglied unbewehrt.....3.
2. Schwarz, nur die Tarsen hell .....19. *P. scotti*, n. sp.
   Schwarz; Beine, Schwinger und Abdomen hell .....20. *P. longipennis*, n. sp.
3. Beine gelb, schwarz geringelt .....21. *P. ornatissima*, n. sp.
   Beine einfarbig braungelb .....22. *P. seychelleana*, n. sp.

19. *Probezzia scotti*, n. sp.

♀. Ganz mattschwarz, mit Einschluss der Schwinger, nur die 4 ersten Tarsenglieder schmutziggelb, Flagellum schwarzbraun. Mund vorgestreckt und zugespitzt, länger als die Palpen, ein Drittel der Höhe des Kopfes erreichend; Augen oben breit zusammenstossend. Antennen 14-gliedrig, 2. Glied dicker und etwas länger als das 3.; 3.—9. kurz ellipsoidal, Wirtel doppelt so lang wie das Glied, 10.—14. walzenförmig, proximal schwach kuglig verdickt, jedes 3—4-mal so lang als das 9., zusammen doppelt so lang wie das 2.—9. Glied zusammen, mit langen abstehenden Borsten. Thorax höher als lang; Mesonotum matt, kahl. Flügel kahl, schwach getrübt, das Abdomen ziemlich überragend, die Adern in der Nähe des Vorderrandes braun, wie auch die Posticalis; Querader vor der Flügelmitte liegend; Radius fast halb so lang wie der Cubitus; dieser etwa gerade, von der Costalis nicht überragt, das distale Viertel der Flügel erreichend, so weit vom Ende der proximalen Zinke der Discoidalis als von der distalen Zinke der Posticalis entfernt; distale Zinke der Discoidalis kaum hinter die Flügelspitze mündend, die Richtung der Basis fortsetzend; proximale Zinke sehr blass, proximal von der Querader entspringend; Gabelung der Posticalis kaum distal von der Querader liegend, distale Zinke die Richtung des Stieles fortsetzend, kaum gebogen, die proximale Zinke sehr schräg; hinter der Posticalis mit Spur einer gegabelten Ader; ohne Spur einer gegabelten Ader zwischen dem Cubitus und der Discoidalis. Femora ziemlich walzenförmig und wenig dicker als die Tibien, die vorderen kaum länger als die Tibien, die 4 hinteren wenigstens um ein Drittel länger als die Tibien; alle Tibien bewimpert, doppelt so lang wie der Metatarsus; Tarsenglieder allmählich verkürzt bis zum 5., welches so lang wie das 3. und 4. zusammen ist; Metatarsus so lang wie die 3 folgenden Glieder zusammen, ventral mit 2 Reihen kurzer Stacheln, welche am Grunde zwiebelartig verdickt sind; 3. Glied 3-mal so lang wie dick; 4. um die Hälfte länger als dick;

5. ventral mit langen, schwarzen, stäbchenartigen Bildungen; Krallen aller Füsse 2-spaltig, die 2 grössern Zinken erreichen zwei Drittel der Länge des Tarsengliedes, die 2 kleineren erreichen nur ein Drittel der Länge der grösseren. Länge: 2,8 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800—1500 feet, 1909; marshes on coastal plain at Anse aux Pins and Anse Royale, 19—21. I. 1909.

20. *Probezzia longipennis*, n. sp.

♀. Matt schwarz; Antennen schwarzbraun; Schwinger, Coxæ und Beine bräunlichgelb; Abdomen schmutziggelb. Antennen dünner als bei voriger Art, Wirtel kaum länger als ein Glied. Flügel vollkommen glashell, das Abdomen um die Hälfte überragend. Im Übrigen mit voriger Art übereinstimmend. Länge: 2,8 mm.

Vorkommen. Seychellen. Mahé: marshes on coastal plain at Anse aux Pins and Anse Royale, 19—21. I. 1909.

21. *Probezzia ornatissima*, n. sp.

♂♀. Schwarz; Antennen des ♂, mit Ausnahme der drei braunen Endglieder, Busch, Schwingerstiel, Beine grösstenteils und Abdomen hellgelb; Coxæ, Trochanteren, Distalende aller Femora, ein Ring vor dem Distalende der vorderen Femora, die beiden Ende und ein in der Mitte befindlicher Ring an den vorderen Tibien, proximales Drittel und Distalende der 4 hinteren Tibien, sowie Gelenke der Tarsen schwarz; die 6 ersten Tergite mit einem sehr kurzen schwarzen Mittellängsstrich, Zange des ♂ und Analsegment des ♀ schwarz; Antennen des ♀ bräunlich, die Einschnürungen zwischen den Gliedern heller. Augen oben breit zusammenstossend beim ♀, durch den matten dreieckigen Scheitel getrennt beim ♂; Palpen 4-gliedrig, alle Glieder gleichdünn, etwa 3-mal so lang wie dick. Antennen 14-gliedrig; Flagellumglieder des ♀ kuglig, durch Einschnürungen untereinander getrennt, die 5 distalen Glieder walzenförmig, 1½ bis 2-mal so lang wie dick, zusammen etwas kürzer als das übrige Flagellum; Wirtel klein; beim ♂ sind die Flagellumglieder 2—10 walzenförmig, breit aneinander stossend, zuerst wenig länger als dick, dann um die Hälfte länger als dick, ihr Busch reicht bis zum 12. Glied; 11.—14. Glied verlängert und walzenförmig, nicht schief abstehend, das 11. fast so lang wie das 12. und 13. zusammen, diese gleichlang, 3-mal so lang wie dick, das 14. um die Hälfte länger als das 13., distal allmählich verengt. Mesonotum matt und kahl. Flügel glashell, mit mikroskopisch feiner Beborstung; Hilfsader die Querader etwas überragend; Radius kaum distal von der Flügelmitte mündend, mit dem Cubitus nirgends verbunden; Cubitus doppelt so lang wie der Radius, bis zum distalen Flügeldrittel reichend, von der Costa nicht überragt; Querader schief, weit proximal von der Flügelmitte; die Discoidalis gabelt an der Querader, ihre distale Zinke gerade, die Richtung des Stieles fortsetzend, hinter die Flügelspitze mündend; Gabelung der Posticalis weit distal von der Querader, distale Zinke die Richtung des Stieles fortsetzend, proximale Zinke sehr schief. Beine ohne deutliche Behaarung; die vorderen etwas kürzer als die 4 hinteren; alle ziemlich schlank; vordere Femora walzenrund, ventral mit 3 kleinen, schwarzen Dornen in der distalen Hälfte; vordere Tibien kaum kürzer als die Tarsen, Metatarsus so lang wie die 2 folgenden Glieder zusammen, 2. Glied 3-mal so lang wie dick, das 3. 2-mal, das 4. kaum

länger als dick, 5. dünn, so lang wie das 3. und 4. zusammen; Krallen klein, einfach und gleichlang; die 2 hinteren Tibien mit einem doppelten Kamm; Tarsen der 4 hinteren Beine deutlich länger als die Tibien, Metatarsus um die Hälfte länger als der Metatarsus der Vorderbeine, 4. Glied noch 2-mal so lang wie dick; die beiden ersten Tarsenglieder an allen Beinen ventral mit 2 Reihen von kurzen und dichten *setæ bulbosæ*. Abdomen matt, fast kahl, flach gedrückt; Zange mit sehr dicken Basalgliedern, Endglieder nur halb so lang, dünn, schwach bogig, fein behaart, am Ende allmählich zugespitzt. Länge: 2,5 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800 feet and over, collected by H. P. Thomasset and H. Scott, X. 1908—I. 1909, 1 ♂; marshy ground near sea-level, Cascade, 20. II. 1909, 1 ♂; marshes on coastal plain at Anse aux Pins and Anse Royale, 19—21. I. 1909, 3 ♂, 1 ♀.

Var. *bipunctata*, n. var.

Abdomen schmutziggelb, dorsal mit einer breiten schwarzbraunen Mittellängsbinde auf den 5 ersten Tergiten; 6. Tergit mit einem kurzen, schwarzen Mittellängsstrich und je einem kleinen, kreisrunden, schwarzen Fleck.

Vorkommen. Seychellen. Mahé: marshy ground near sea-level, Cascade, 20. II. 1909, 1 ♀.

22. *Probezzia seychelleana*, n. sp.

♂. Schwarz, Beine braungelb. Augen kahl; Palpen 4-gliedrig, alle Glieder gleichdünn, das 2. so lang wie das 3. und 4. zusammen, diese nicht 2-mal so lang wie dick. Flügel glashell, mit einer mikroskopisch feiner Beborstung; Querader in der Flügelmitte liegend, Cubitus fast 3-mal so lang wie der Radius, das letzte Flügelviertel erreichend, an seiner Mündung so weit von der Flügelspitze entfernt als die proximale Zinke der Discoidalis; distale Zinke der Discoidalis gerade, kaum hinter die Flügelspitze mündend, die proximale Zinke am Grunde erloschen, sichtbar von der Querader ab; Gabelung der Posticalis unter der Querader liegend, distale Zinke die Richtung des Stieles fortsetzend. Beine schlank; Tibien so lang wie die Femora, etwas kürzer als die Tarsen; Tibien und Tarsen dorsal mit gereihten, ziemlich langen Borsten; die 2 ersten Tarsenglieder ventral mit 2 Reihen dichter, kurzer *setæ bulbosæ*, hintere Tibien mit einem doppelten Kamm, die vorderen mit einem einfachen Kamm, hinter welchem noch zahlreiche angedrückte Stacheln vorhanden sind; vorderer Metatarsus fast 2-mal so lang wie das 2. Glied, dieses doppelt so lang wie das 3., welches 3-mal so lang wie dick ist; 4. kaum länger als dick; 5. so lang wie das 3., aber dünner; Krallen einfach und klein; hinterer Metatarsus mehr als 2-mal so lang wie das 2. Glied. Abdomen schlank. Länge: 1,5 mm.

Vorkommen. Seychellen. Mahé: Mare aux Cochons district, about 1500 feet, 26. I.—2. II. 1909.

2. Subfamilie **Chironominæ.**

A. Chironomus—Gruppe.

Mittlere und hintere Tibien, am Distalende, mit einem unvollständigen, gezähnelten Ring oder mit einem Kamm (Querreihe von Stacheln), vordere Tibien meist viel kürzer, selten etwa so lang wie der Metatarsus, ohne Sporn; basale Zangenglieder innen mit einem langen durch zurückgekrümmte Haare ausgezeichneten, und einem (*Chironomus*) oder zwei (*Tanytarsus*) kürzeren Anhängen versehen.

Genus Chironomus Meigen.

Illiger's Magazin, 1803, vol. ii. p. 260.

Bei allen folgenden Arten sind die Flügel ungefleckt und die vorderen Tarsen beim Männchen ohne abstehende Behaarung; die Körperlänge schwankt zwischen 1 und 4,5 mm. Die gesammelten Arten unterscheiden sich wie folgt:

1. Beine grösstenteils von heller Farbe, gelb oder weisslich.....2.
   Beine schwarz oder schwärzlich, oftmals mit helleren Gelenken .....11.
2. Mesonotum matt .....3.
   Mesonotum glänzend .....7.
3. Querader tiefschwarz und schwarz gesäumt, wie auch die angrenzenden Teile des Cubitus und der Discoidalis .....23. *C. callichirus*, n. sp.
   Querader blass oder schwarzbraun, nicht gesäumt .....4.
4. Abdomen vorn grün oder grünlich; Mesonotum mit 3 gelben Binden .....24. *C. scotti*, n. sp.
   Abdomen ohne grüne Färbung .....5.
5. Thorax rötlichbraun, ohne Binden; Länge 1,5 mm. .....25. *C. brunneicornis*, n. sp.
   Mesonotum mit 3 Binden; Länge 4,5 mm. .....6.
6. Binden des Mesonotum rostfarbig; 12. Antennenglied 2-mal so lang wie die vorigen zusammen .....26. *C. linearis*, n. sp.
   Binden des Mesonotum schwarzbraun; 12. Antennenglied 3-mal so lang wie die vorigen zusammen .....27. *C. leptogastrus*, n. sp.
7. Mesonotum mit je einer rotbraunen Binde .....28. *C. binotatus*, n. sp.
   Mesonotum mit 3 Binden oder ohne Binde .....8.
8. Mesonotum, ausgenommen die 3 gelben Binden, und Abdomen in der vorderen Hälfte grün.....29. *C. chloronotus*, n. sp.
   Körper ohne grüne Färbung.....9.
9. Schwarzbraun, Mesonotum dunkelbraun mit 3 schwarzen Binden; ♀. .....30. *C. melanophilus*, n. sp.
   Körper anders gefärbt; ♂ .....10.

10. Mesonotum weisslich mit 3 schwarzbraunen Binden, Abdomen schwarzbraun, Antennen des ♂ 12-gliedrig, das 12. Glied 3-mal so lang wie die vorigen zusammen .....31. *C. seychelleanus*, n. sp.
Körper blassgelb, Antennen des ♂ 14-gliedrig, das 14. Glied um die Hälfte länger als die vorigen zusammen .....32. *C. pandani*, n. sp.
Körper bräunlich, ohne Binden, Antennen des ♂ 14-gliedrig, das 14. Glied nur halb so lang wie die vorigen zusammen.
.....33. *C. limnocharis*, n. sp.

11. Körper ganz schwarzbraun, Antennen des ♀ 6-gliedrig
.....34. *C. nocticolor*, n. sp.
Thorax und Abdomen grösstenteils gelblich, Antennen des ♀ 7-gliedrig, Mesonotum mit zwei eingedrückten Mittellängslinien
.....35. *C. nigratipes*, n. sp.

23. *Chironomus callichirus*, n. sp.

♀. Antennen und Palpen hellgelb, das 6. Antennenglied schwarzbraun; Thorax bräunlichgelb; Mesonotum matt und weisslich, mit 3 rotbraunen Längsbinden, deren seitlichen vorn abgekürzt sind, die mittlere hinten, letztere am Hinterende mit zwei dunkleren Flecken; Metanotum schwarzbraun; Schwinger weisslich; Beine gelb, Distalende der vorderen Femora, proximales Drittel der vorderen Tibien, äusserstes Distalende der 4 übrigen Tibien sowie der 5 Glieder aller Tarsen schwarz, Kniee der 4 Hinterbeine gebräunt; Abdomen schwarz oder schwarzbraun, stellenweise bräunlich. Augen stark gebogen, oben verschmälert und nur um ihre Endbreite von einander getrennt, was auch für alle folgenden Arten gilt. Antennen 6-gliedrig; 2. Glied walzenförmig, 3.—5 spindelförmig, zweimal so lang wie dick, Haarwirtel zweimal so lang wie das Glied; Endglied dünn, walzenrund, kaum doppelt so lang wie das vorletzte. Flügel glashell, Adern blass, Querader tiefschwarz, und schwarz gesäumt, wie auch die angrenzenden Teile des Cubitus und der Discoidalis; Cubitus distal bogig gekrümmt, fast in die Flügelspitze mündend, von der Costa nicht überragt; Gabelung der Posticalis kaum distal von der Querader gelegen. Vorderer Metatarsus zweimal so lang wie die Tibia, 4. Glied kürzer als das 3., mehr als doppelt so lang wie das 5., welches 6—8-mal so lang wie dick ist; Vorderbeine ohne abstehende Behaarung. Abdomen seitlich zusammengedrückt, vorn verengt, fast doppelt so lang wie der übrige Körper. Länge: 3,5 mm.

Vorkommen. Seychellen. Mahé: marshes on coastal plain at Anse aux Pins and Anse Royale, 19—21. I. 1909.

24. *Chironomus scotti*, n. sp.

♂♀. Kopf, Antennen und Thorax gelb; 6. Antennenglied beim ♀ schwarzbraun, Flagellum des ♂ braun; Mesonotum matt, weisslich wie das Scutellum, mit 3 gelben an den Seitenrändern etwas dunkleren Längsbinden, deren mittlere hinten abgekürzt ist, die seitlichen hinten; Schwinger weisslich; Beine gelblich, äusserstes Distalende der drei ersten Glieder der Vordertarsen schwarz, die 2 folgenden Glieder sowie das Distalende der drei ersten Glieder an den 4 Hinterbeinen gebräunt; Abdomen beim ♂ grünlich in der

vorderen Hälfte, im Leben grün, hinten gelblich oder gebräunt ; Abdomen des ♀ gelblichgrün am 1. Segment, das 2. Segment gelbgrün mit einem grossen braunen Flecken, die folgenden dunkelbraun mit helleren Rändern. Die 4-gliedrigen Palpen so lang wie die Antennen des ♀. Antennen des ♂ 12-gliedrig, 2. Glied länglich, 3.—11. dreimal so breit wie lang, 12. dreimal so lang wie das 2.—11. zusammen, Busch graubraun ; Antennen des ♀ 6-gliedrig, 2. Glied walzenrund, 3.—5. spindelförmig, 2—3-mal so lang wie dick, Haarwirtel zweimal so lang wie das Glied, 6. Glied fast dreimal so lang wie das 5., dünn, proximal etwas dicker. Flügel glashell, Adern blass, Querader schwarzbraun, Radius und Cubitus gebräunt ; Cubitus kaum bogig, fast in die Flügelspitze mündend, von der Costa nicht überragt; Gabelung wenig distal von der Querader liegend. Vorderbeine ohne abstehende Behaarung, ihr Metatarsus fast doppelt so lang wie die Tibia, 4. Glied kaum länger als das 3. beim ♂, deutlich länger beim ♀, mehr als doppelt so lang wie das 5., welches 8—10-mal so lang wie dick ist; die 4 Hinterbeine abstehend behaart beim ♂, ohne lange Behaarung beim ♀, hintere Femora des ♂ im proximalen Drittel etwas verdickt. Zange mit langen, im Enddrittel dünnen Endgliedern ; die längeren Anhänge sowie die Lamellenspitze wenigstens die Mitte der Endglieder erreichend. Abdomen des ♀ doppelt so lang wie der übrige Körper, depress, hinten etwas verbreitert. Länge : 4,5 mm. Diese Art ist Herrn Hugh Scott gewidmet.

Vorkommen. Seychellen. Mahé : Cascade Estate, about 800—1500 feet, 1909, 6 ♀, 1 ♂ ; *ibidem*, collected by H. P. Thomasset and H. Scott, X. 1908—I. 1909, 1 ♀.

25. *Chironomus brunneicornis*, n. sp.

♀. Antennen und Thorax rotbraun, die Stiele der Antennenglieder etwas heller ; Mesonotum matt, ohne Binden ; Schwinger weisslich, Keule distal schwarz ; Beine gelblich, die 2 oder 3 letzten Tarsenglieder gebräunt ; Abdomen schwarzbraun, Hinterrand der Tergite heller. Antennen 6-gliedrig, 2. Glied walzenrund und länglich, 3.—5. spindelförmig, etwas mehr als zweimal so lang wie dick ; 6. dünn, walzenrund, doppelt so lang wie das 5., vom Haarwirtel des 5. Gliedes überragt. Flügel glashell, alle Adern blass, Cubitus kaum gebogen, fast in die Flügelspitze mündend ; Gabelung der Posticalis weit hinter der Querader liegend. Vorderbeine nicht abstehend behaart, Metatarsus doppelt so lang wie die Tibia, 4. Glied kürzer als das 3., doppelt so lang wie das 5., welches 8-mal so lang wie dick ist ; Tibia der 4 Hinterbeine abstehend behaart. Abdomen kaum länger als der übrige Körper, vorn etwas verengt, höher als breit. Länge : 1,5 mm.

Vorkommen. Seychellen. Mahé : Mare aux Cochons district, about 1500 feet, 26. I.—2. II. 1909, 1 ♀ ; Cascade Estate, about 800—1500 feet, 1909, 3 ♀.

26. *Chironomus linearis*, n. sp.

♂. Kopf und 1. Antennenglied hellrot, Flagellum rötlichbraun, Thorax rotbraun, Mesonotum matt, weisslich wie das Scutellum, mit 3 rostfarbigen Längsbinden, deren mittlere hinten abgekürzt ist, die seitlichen vorn ; Schwinger weiss ; Beine dottergelb, alle Kniee und äusserste Spitze der drei ersten Tarsenglieder schwärzlich, die 2 übrigen Glieder gebräunt (vordere Tarsen abgebrochen !) ; Abdomen auf den 3 vorderen Segmenten bräunlichweiss, 2. und 3. Tergit mit einem grossen braunen Fleck, die folgenden

allmählich dunkler, Zange schwarzbraun. Antennen 12-gliedrig, 2. Glied länglich, 3.—11. quer, 12. doppelt so lang wie die vorigen zusammen, Busch grau, distal dunkler. Flügel glashell, Adern blass, Querader schwarzbraun; Cubitus gerade, von der Costalis nicht überragt, der Flügelspitze wenigstens so nahe wie die Discoidalis; Gabelung der Posticalis kaum hinter der Querader liegend. Vordere Femora wenigstens um die Hälfte länger als die Tibien, die 4 Hinterbeine ohne abstehende Behaarung, die 2 hinteren Femora wenig länger als die Tibien, die Mitte des Abdomens erreichend, die folgenden Glieder allmählich verkürzt, 5. Tarsenglied 2—3-mal so lang wie dick. Endglied der Zange lang, in der hinteren Hälfte dünn und kahl, am Ende mit 3 Borsten auf der Innenseite; längere Anhänge linealisch, die Mitte der Endglieder erreichend, kurz abstehend behaart, nur am Ende mit einigen langen und geraden Borsten. Länge: 4,5 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800 feet and over, collected by H. P. Thomasset and H. Scott, X. 1908—I. 1909.

27. *Chironomus leptogastrus*, n. sp.

♂. Kopf und 1. Antennenglied hellgelb, Flagellum gebräunt; Thorax matt und schwarzbraun, Mesonotum weisslich wie das Scutellum, mit 3 schwarzbraunen Längsbinden, deren mittlere hinten abgekürzt ist, die seitlichen vorn; Schwinger weisslich; Beine gelb, Distalende der Femora, proximales Drittel der Vordertibien, äusserstes Proximalende der 4 übrigen Tibien, äusserstes Distalende der Tibien und der 5 Tarsenglieder schwarz; Abdomen weisslichgelb, 2.—5. Tergit mit einem grossen, kreisrunden, schwarzbraunen Fleck, 6.—8. Tergit schwarzbraun mit helleren Seitenrändern; Zange gelblich. Antennen 12-gliedrig; 3.—11. Glied 2-mal so breit wie lang, 12. fast 3-mal so lang wie das 2.—11. zusammen; Busch braun. Flügel glashell, Adern blass, Querader schwarzbraun, Cubitus fast gerade, von der Costa nicht überragt, der Flügelspitze so nahe wie die Discoidalis; Gabelung der Posticalis unter der Querader liegend. Vorderbeine ohne abstehende Behaarung, ihre Femora um die Hälfte länger als die Tibien, Metatarsus fast doppelt so lang wie die Tibia, 4. Glied dem 3. gleich, doppelt so lang wie das 5., welches 8—10-mal so lang wie dick ist; Tibia der 4 hinteren Beine mit abstehenden Haaren, welche so lang als seine Dicke sind. Abdomen schlank, $2\frac{1}{2}$-mal so lang wie der übrige Körper; Endglieder der Zange lang, im hinteren Drittel verengt, die längeren Anhänge und die Lamellenspitze erreichen fast die Spitze der Endglieder. Länge: 4,5 mm.

Vorkommen. Seychellen. Mahé: Mare aux Cochons district, about 1500 feet, 26. I.—2. II. 1909, 2 ♂.

28. *Chironomus binotatus*, n. sp.

♂. Kopf, 1. Antennenglied und Thorax hellgelb; Mesonotum stark glänzend, beiderseits mit einer vorn und hinten abgekürzten rotbraunen Längsbinde, Metanotum rotbraun; Schwinger weisslich; Beine gelb, an den vorderen ist das Distalende der Femora und der Tibien schwarz und die Tarsen gebräunt, ausgenommen das Proximalende des Metatarsus; Abdomen in der vorderen Hälfte grünlichweiss, in der hinteren schwach gebräunt; Zange weiss. Antennen 12-gliedrig; 3.—11. Glied quer, 12. fast 2-mal so

lang wie das 2.—11. zusammen, Busch grau. Flügel fast glashell, alle Adern blass, Cubitus gerade, von der Costa nicht überragt, der Flügelspitze so nahe wie die Discoidalis; Gabelung der Posticalis unter der Querader liegend. Vorderer Metatarsus doppelt so lang wie die Tibia, Vorderbeine ohne abstehende Behaarung. Endglieder der Zange lang, an beiden Enden kaum schmäler, längere Anhänge bis zur Mitte der Endglieder reichend. Länge: 2,5 mm.

Vorkommen. Seychellen. Mahé: marshes on coastal plain at Anse aux Pins and Anse Royale, 19—21. I. 1909.

29. *Chironomus chloronotus*, n. sp.

♂♀. Kopf gelb; beim ♂ ist das 1. Antennenglied gelb, das Flagellum bräunlich, Thorax gelb, Mesonotum glänzend und grün wie das Scutellum, mit 3 gelben Längsbinden, deren mittlere von einer schwarzen Mittellängslinie durchzogen und hinten abgekürzt ist, die seitlichen vorn abgekürzt; Schwinger weisslich; Beine grünlichgelb, an den vorderen sind das Distalende der Femora, die beiden Ende der Tibien und die Tarsen mit Ausnahme der proximalen Hälfte des Metatarsus gebräunt; an den 4 hinteren Beinen sind die 2—3 letzten Tarsenglieder gebräunt; Abdomen in der vorderen Hälfte grün, in der hinteren braun; Zange braun. Antennen des ♀ gelb, Endglied schwarzbraun; die mittlere Längsbinde des Mesonotum ohne schwarze Mittellängslinie; vordere Tibien weisslich, äusserstes Distalende schwarz, 5. Tarsenglied schwach gebräunt; die 2 ersten Segmente des Abdomens lebhaft grün, die folgenden rotbraun; die übrige Färbung wie beim ♂. Palpen lang. Antennen des ♂ 12-gliedrig, 3.—11. Glied fast 2-mal so breit wie lang, das 12. doppelt so lang wie das 2.—11.; Busch dunkelgrau. Antennen des ♀ 6-gliedrig, 3.—5. Glied spindelförmig, doppelt so lang wie dick, Haarwirtel zweimal so lang wie das Glied, 6. Glied etwas mehr als doppelt so lang wie das 5., dünn, am Proximalende etwas dicker. Flügel glashell, Adern blass, Querader schwarzbraun; Cubitus schwach bogig, von der Costalis nicht überragt, fast in die Flügelspitze mündend; Gabelung der Posticalis kaum distal von der Querader liegend. Vorderbeine ohne abstehende Behaarung, ihre Femora fast doppelt so lang wie die Tibien, Metatarsus so lang wie das Femur, 4. Glied deutlich länger als das 3., $2\frac{1}{2}$-mal so lang wie das 5., welches 6-mal so lang wie dick ist; die 4 hinteren Beine abstehend behaart. Endglieder der Zange lang, im hinteren Drittel verengt, längere Anhänge und Lamellenspitze die Mitte der Endglieder erreichend, erstere breit und abgestutzt. Abdomen des ♀ fast zweimal so lang wie der übrige Körper, schlank, hinten etwas dicker. Länge: 3,5 mm.

Vorkommen. Seychellen. Mahé: Mare aux Cochons district, about 1500 feet, 26. I.—2. II. 1909, 3 ♂, 1 ♀; Cascade Estate, about 800—1500 feet, 1909; Cascade Estate, III. 1909.

30. *Chironomus melanophilus*, n. sp.

♀. Schwarzbraun; Antennen gelblich, Endglied schwarzbraun; Mesonotum sehr dunkel rotbraun wie das Scutellum, mit 3 glänzenden, wenig deutlichen, schwarzen Längsbinden, deren mittlere hinten, die seitlichen vorn abgekürzt sind; Schwinger schwarz, mit weisslichem Stiel; Beine gelb. Antennen 6-gliedrig; 3.—5. Glied zweimal so lang wie

dick, spindelförmig; 6. doppelt so lang wie das 5., von dem letzten Haarwirtel überragt. Flügel fast glashell, das Abdomen überragend, alle Adern bräunlich, Cubitus schwach bogig, der Flügelspitze so nahe wie die Discoidalis; Gabelung der Posticalis distal weit von der Querader entfernt. Vorderer Metatarsus mehr als doppelt so lang wie die Tibia, 4. Glied etwas kürzer als das 3., mehr als zweimal so lang wie das 5., welches 4-mal so lang wie dick ist; Vorderbeine ohne abstehende Haare. Abdomen seitlich zusammengedrückt, etwas länger als der übrige Körper, vorn verengt. Länge: 1,5 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800 feet and over, collected by H. P. Thomasset and H. Scott, X. 1908—I. 1909.

31. *Chironomus seychelleanus,* n. sp.

♂♀. Palpen braun und lang; 1. Antennenglied beim ♂ gelb, die folgenden gebräunt; Thorax bräunlichgelb, Mesonotum glänzend, weisslich, mit 3 schwarzbraunen Längsbinden, deren mittlere hinten, die seitlichen vorn abgekürzt sind; Scutellum gelblich, hintere Hälfte des Metanotum schwarzbraun; Schwinger weisslich; Beine dottergelb, an den vorderen ist das Distalende der Femora, das Proximalende der Tibien, an allen Tibien das äusserste Distalende sowie das Distalende der 3 ersten Tarsenglieder schwarz, 4. und 5. Glied der Tarsen gebräunt; Abdomen schwarzbraun, an den Seiten gelblich; Zange braun, hintere Hälfte der Endglieder weisslich. Beim ♀ sind die Antennen, ausgenommen das schwarzbraune Endglied, der Thorax und die Beine gelblich, Mesonotum mit 3 glänzendbraunen und abgekürzten Längsbinden, deren mittlere fast durchlaufend und hinten allmählich verschmälert ist; Schwinger weisslich; an den Vorderbeinen das Distalende der Femora und der Tibien schwarz, die 3 oder 4 Endglieder der Tarsen sowie das 5. Tarsenglied der übrigen Beine gebräunt; Abdomen schwarzbraun. Antennen des ♂ 12-gliedrig; 3.—11. Glied zweimal so breit wie lang, 12. fast 3-mal so lang wie das 2.—11. zusammen; Busch weisslichgrau. Antennen des ♀ 6-gliedrig, 3.—5. Glied spindelförmig, 2-mal so lang wie dick, 6. dünn und kaum um die Hälfte länger als das 5., vom letzten Haarwirtel überragt. Flügel fast glashell, Adern beim ♂ blass, die Querader schwarzbraun, Adern des ♀ bräunlich, Discoidalis blass; Cubitus fast gerade, von der Costalis nicht überragt, fast in die Flügelspitze mündend; Gabelung der Posticalis unter der Querader beim ♂, hinter der Querader beim ♀. Vorderbeine ohne abstehende Behaarung, ihr Metatarsus um die Hälfte länger als die Tibia beim ♂, kaum 2-mal beim ♀; 4. Tarsenglied kürzer als das 3., mehr als doppelt so lang wie das 5., welches 6-mal (♂) oder 4-mal (♀) so lang wie dick ist; Tibia der 4 hinteren Beine mit abstehenden Haaren, welche so lang wie ihre Dicke sind. Endglieder der Zange lang, an beiden Enden kaum schmaler, längere Anhänge kaum die Mitte derselben erreichend, von der Lamellenspitze kaum überragt. Abdomen des ♀ etwas länger als der übrige Körper, seitlich zusammengedrückt. Länge, ♂: 3,5 mm., ♀: 2,5 mm.

Vorkommen. Seychellen. Mahé: marshes on coastal plain at Anse aux Pins and Anse Royale, 19—21. I. 1909, 1 ♂, 1 ♀.

32. *Chironomus pandani,* n. sp.

♂. Körper blassgelb, nur die 4 Palpenglieder, das Flagellum und, an den Vorderbeinen, die Tibien und Tarsen, sowie das Ende der Schwingerkeule gebräunt, die vorderen

Femora und die 4 hinteren Beine weisslich. Augen oben sehr schmal und nur um ihre Endbreite voneinander getrennt, unten so genähert wie oben. Antennen 14-gliedrig, 3.—13. Glied kaum quer, 14. Glied um die Hälfte länger als das 2.—13., Busch grau. Mesonotum schwach glänzend, ohne Binden. Flügel glashell, fast die Spitze des Abdomens erreichend, Adern blass, die in der Nähe des Vorderrandes gelb; Cubitus fast gerade, von der Costalis nicht überragt, der Flügelspitze so nahe wie die Discoidalis; Gabelung der Posticalis ziemlich distal von der Querader liegend. Vorderbeine nicht abstehend behaart, ihre Femora wenigstens um die Hälfte länger als die Tibien, Metatarsus wenigstens 2-mal so lang wie die Tibien, 3. Glied um $\frac{1}{3}$ länger als das 4., dieses doppelt so lang wie das 5., welches 5—6-mal so lang wie dick ist; Tibien und Tarsen der 4 hinteren Beine abstehend behaart, ihre Haare 2-mal so lang wie ihre Dicke. Zange schlank; Endglieder in der hinteren Hälfte allmählich verengt, fein behaart, dorsal mit einigen sehr langen Haaren, am Ende mit einigen kürzeren Haaren; längere Anhänge fast bis zur Mitte der Endglieder reichend, ziemlich gleichdick, aussen und am Ende mit langen zurückgekrümmten Haaren; kürzere Anhänge wie gewöhnlich, nämlich schmal, unbehaart und bogig gekrümmt; Lamelle ohne den gewöhnlichen stielartigen Fortsatz, nur scharf zugespitzt. Länge: 2,5 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800—1500 feet, 1909, 8 Exemplare.

33. *Chironomus limnocharis*, n. sp.

♂. Kopf und 1. Antennenglied gelb, Flagellum braun; Thorax bräunlich, Mesonotum glänzend, ohne Binden; Schwinger schmutzigweiss, am Ende schwarzbraun; Beine bräunlichgelb; Abdomen etwas heller als der Thorax. Antennen 14-gliedrig, 3.—13. Glied 2—3-mal so lang wie dick, das 14. halb so lang wie die 12 vorhergehenden zusammen, Busch braun. Flügel fast glashell, alle Adern bräunlich, Cubitus fast gerade, distal beborstet, in die Flügelspitze mündend, von der Costalis nicht überragt; Gabelung der Posticalis etwas distal von der Querader liegend. Vorderer Metatarsus $2\frac{1}{2}$-mal so lang wie die Tibia, diese halb so lang wie das Femur, 4. Tarsenglied kürzer als das 3., mehr als doppelt so lang wie das 5., welches 4-mal so lang wie dick ist; vordere Femora und an den 4 hinteren Beinen, die Tibien und die Tarsen lang abstehend behaart. Endglieder der Zange hinten nicht verschmälert, fast gleichbreit; die längeren Anhänge überragen kaum die Basalglieder. Länge: 2 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800 feet and over, collected by H. P. Thomasset and H. Scott, X. 1908—I. 1909, 1 Exemplar; Mare aux Cochons district, about 1500 feet, 26 I.—2. II. 1909, 3 Exemplare.

34. *Chironomus nocticolor*, n. sp.

♀. Schwarzbraun, nur die Schwinger bräunlichweiss, Mesonotum glänzend, mit 3 schwarzen und wenig deutlichen Längsbinden, deren mittlere hinten und die seitlichen vorn abgekürzt sind. Antennen 6-gliedrig; 2. Glied walzenrund, 3.—5. kurz spindelförmig, nicht 2-mal so lang wie dick, Haarwirtel doppelt so lang wie das Glied, 6. Glied schmal, kaum so lang wie das 4. und 5. zusammen. Flügel schwach gebräunt, Adern

bräunlich; Cubitus bogig, in die Flügelspitze mündend, Gabelung hinter der Querader liegend. Vordere Femora fast doppelt so lang wie die Tibien, Metatarsus doppelt so lang wie die Tibien, 4. Glied etwas kürzer als das 3., doppelt so lang wie das 5., welches 4-mal so lang wie dick ist; Vorderbeine ohne abstehende Behaarung, Tibien und Dorsalseite der Tarsen der 4 hinteren Beine lang abstehend behaart. Abdomen seitlich zusammengedrückt, etwas länger als der übrige Körper, vorn verengt. Länge: 1,5 mm.

Vorkommen. Seychellen. Mahé: Mare aux Cochons district, about 1500 feet, 26. I. —2. II. 1909, 2 Exemplare.

35. *Chironomus nigratipes*, n. sp.

♀. Kopf, Palpen, Flagellum und Thorax schmutziggelblich, 1. Antennenglied und Schwinger weisslich, Metanotum schwarzbraun, ausgenommen der Hinterrand; Beine schwärzlich, die Gelenke gelblich; Abdomen gelblichweiss, 2.—5. Tergit mit einer breiten, schwarzbraunen Querbinde in der vorderen Hälfte, die folgenden Segmente dunkel und sehr klein. Palpen lang. Antennen 7-gliedrig, 3.—6. Glied spindelförmig, 2-mal so lang wie dick, 7. doppelt so lang wie das 6., dünn und walzenförmig, vom letzten Haarwirtel kaum überragt. Mesonotum mit 2 nebeneinander liegenden, eingedrückten Längslinien, die nach hinten allmählich verschwinden. Flügel fast glashell, alle Adern blass; Cubitus kaum bogig, von der Costalis nicht überragt, fast in die Flügelspitze mündend und derselben viel näher als die Discoidalis; Gabelung der Posticalis distal von der Querader liegend. Alle Tibien mit langer, abstehender Behaarung; vorderer Metatarsus 2-mal so lang wie die Tibien, 4. Glied dem 3. gleich, mehr als doppelt so lang wie das 5., dieses 6-mal so lang wie dick. Abdomen flach gedrückt, 4. und 5. Segment breiter, die folgenden sehr klein. Länge: 3,5 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800—1500 feet, 1909.

Genus Tanytarsus Van der Wulp.

Tijdschr. vor Entom. 1874, vol. xvii. p. 134.

Flügel gleichmässig behaart, Cubitus dem Vorderrande nahe
.....36. *T. pallidissimus*, n. sp.

Flügel unbehaart, Cubitus vom Vorderrande sehr weit entfernt
.....37. *T. glabripennis*, n. sp.

36. *Tanytarsus pallidissimus*, n. sp.

♂♀. Blassgelb, Abdomen etwas grünlichgelb, in der hinteren Hälfte kaum dunkler; Flagellum des ♂ und, an den Vorderbeinen, die Tibien und Tarsen schwach gebräunt, Beine im übrigen weisslich. Augen stark bogig gekrümmt, oben um mehr als ihre grösste Breite voneinander abstehend. Antennen des ♂ 12-gliedrig, 3.—11. Glied länger als dick, das 12. kaum mehr als halb so lang wie das 2.—11. zusammen, Busch grau. Beim ♀ sind die Antennen 6-gliedrig; 2. Glied walzenrund und wenig länger als dick, 3.—5. ellipsoïdal, ihr Wirtel nicht doppelt so lang wie das Glied; das 6. Glied fast walzenförmig, dünn, um die Hälfte länger als das vorhergehende. Mesonotum glänzend. Flügel

des ♂ fast das Distalende des Abdomens erreichend, glashell, gleichmässig behaart, proximal allmählich verengt, ohne Lappen; Cubitus dem Vorderrande ziemlich nahe, von der Costalis nicht überragt, ziemlich weit vor der Flügelspitze mündend; Discoidalis fast in die Flügelspitze mündend; Querader scheinbar fehlend, die Richtung des Cubitus fortsetzend; Gabelung der Posticalis weit distal vom Grunde des Cubitus liegend. Vorderbeine ohne abstehende Behaarung, ihr Metatarsus fast 3-mal so lang wie die Tibia, 4. Glied kürzer als das 3., fast 3-mal so lang wie das 5., welches 3—4-mal so lang wie dick ist; an den 4 hinteren Beinen sind die Tibien und Tarsen lang abstehend behaart; Krallen 2—3-mal so lang wie die sehr kleinen Pulvillen. Zange wie bei *Chironomus pandani*, doch sind die Endglieder verhältnissmässig kürzer. Länge: 1—2,5 mm. Diese Art hat grosse Aehnlichkeit mit *Chironomus pandani* und könnte mit demselben leicht verwechselt werden, wenn man nicht auf die Gestalt der Flügel und der Augen sowie der Pulvillen Acht geben würde.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800 feet and over, collected by H. P. Thomasset and H. Scott, X. 1908—I. 1909, 2 ♂, 4 ♀; Cascade Estate, about 800—1500 feet, 1909, 7 ♂, 11 ♀.

37. *Tanytarsus glabripennis*, n. sp. (Tafel **21**, Fig. 20).

♂♀. Sehr blassgelb; Flagellum des ♂ gebräunt. Augen oben, in beiden Geschlechtern, nur um ihre Endbreite voneinander getrennt. Antennen des ♂ 12-gliedrig und gestaltet wie bei voriger Art; Antennen des ♀ 6-gliedrig, 3.—5. Glied ellipsoïdal, Wirtel wenig lang, 6. Glied dünn, um die Hälfte länger als das vorhergehende. Flügel schmal, fein und dicht punktirt aber ohne Behaarung, proximal allmählich verschmälert; Cubitus stark beborstet, bogig gekrümmt, vom Vorderrande sehr weit entfernt, von der Costalis nicht überragt, in die Flügelspitze mündend; Querader schief, wie bei *Chironomus*. Vorderbeine ohne abstehende Behaarung, ihr Metatarsus 2-mal so lang wie die Tibia, 4. Glied wenig kürzer als das 3., doppelt so lang wie das 5., welches nur 2-mal so lang wie dick ist; Tibia der 4 hinteren Beine lang abstehend behaart. Zange (Fig. 20) mit schlanken Endgliedern, welche fast gleichbreit, am Ende nur wenig verengt sind, und auf der Innenseite 2 kräftige Borsten tragen, Distalende mit einer kurzen Borste; längere Anhänge gleichbreit, die Mitte der Endglieder nicht erreichend, aussen mit langen, zurückgekrümmten Haaren; kleinere Anhänge sehr schmal und zugespitzt; Spitze der Lamellendecke kürzer als die längeren Anhänge. Abdomen des ♀ so lang wie der übrige Körper. Länge, ♂: 1 mm., ♀: 0,8 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800 feet and over, collected by H. P. Thomasset and H. Scott, X. 1908—I. 1909.

B. Orthocladius—Gruppe.

Die 4 vorderen Tibien ohne Kamm und ohne Ring; die 2 hinteren mit einem aus langen Stacheln bestehenden Kamm am Distalende; vordere Tibien wenigstens so lang wie der Metatarsus; Zange ohne Anhänge, höchstens mit einem von der Mitte der Basalglieder ausgehenden Anhang.

Genus Metriocnemus Van der Wulp.

Tijdschr. vor Entom., 1874, vol. xvii. p. 136.

Die Gattung *Metriocnemus* war bisher für Europa, Nord- und Süd-Amerika und Australien bekannt.

38. *Metriocnemus mahensis*, n. sp.

♀. Antennen, Thorax und Beine bräunlichgelb; Mesonotum glänzend, mit 3 wenig deutlichen Längsbinden, deren seitlichen vorn abgekürzt sind, die mittlere durch eine Längslinie geteilt; Schwinger bräunlichgelb, Abdomen schwarzbraun. Antennen 6-gliedrig; 3.—5. Glied 2-mal so lang wie dick, im Enddrittel halsartig verengt, Haarwirtel nicht doppelt so lang wie ein Glied; Endglied fast walzenförmig, um die Hälfte länger als das vorletzte. Flügel glashell, gleichmässig und anliegend behaart; Querader vor der Flügelmitte liegend; Cubitus $2\frac{1}{2}$-mal so lang wie der Radius, gerade, weit von der Spitze entfernt, fast so weit als die distale Zinke der Posticalis, von der Costa um ein Drittel seiner Länge überragt; 2. Längsader dem Radius deutlich näher als dem Cubitus; Costa bis in die Flügelspitze verlängert; Discoidalis wenig abbiegend, wenig hinter die Flügelspitze mündend; Gabelung der Posticalis weit distal von der Querader, fast so weit von der Spitze als die Mündung des Radius. Beine schwach behaart, ihre Haare kürzer als ihre Dicke; vordere Tibien so lang wie die Femora, aber dünner, kaum länger als der Metatarsus, welcher fast die Länge der 4 folgenden zusammen erreicht; 5. Glied kürzer als das 4., 2—3-mal so lang wie dick. Abdomen wenig länger als der übrige Körper. Länge: 1,3 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800—1500 feet, 1909, 2 ♀.

Genus Trichocladius Kieffer.

Ann. Soc. scient. Bruxelles, 1906, vol. xxx. p. 356.

Dieses Genus war bisher nur für Europa und Süd-Amerika bekannt; folgende Art wurde auf den Seychellen gesammelt.

39. *Trichocladius quadrifasciatus*, n. sp.

♂♀. Bräunlichgelb; Flagellum in beiden Geschlechtern gebräunt; Mesonotum, Scutellum und Metanotum braun, ohne Binden, stark glänzend; Schwinger gelblich, Beine bräunlichgelb, vordere Tibien und die 2 proximalen Drittel der mittleren Tibien weiss, Tarsen gebräunt; Abdomen hellgelb, 2., 3., 5. und 8. Tergit schwarzbraun, ausgenommen ein schmaler Vorderrand, Zange weisslichgelb. Augen bogig gekrümmt, dicht behaart, oben um ihre ganze Länge getrennt. Palpen 4-gliedrig, 1. Glied kaum länger als dick, 2. doppelt so lang wie das 1., 3. fast doppelt so lang wie das 2., 4. so lang wie das 2. und 3. zusammen, aber dünner. Antennen des ♂ 14-gliedrig, 2. Glied länglich, 3. und 4. so lang wie dick, 5.—13. doppelt so lang wie dick, 14. viel kürzer als die vorigen zusammen, Busch schwarzbraun. Antennen des ♀ 6-gliedrig, Flagellumglieder walzenförmig, etwas länger als dick, ohne deutlichen Wirtel, 6. Glied zugespitzt und doppelt so lang wie das 5. Flügel schwach getrübt, alle Adern braun; Radius von der Flügelspitze

weiter entfernt als die proximale Zinke der Posticalis; Cubitus so weit von der Flügelspitze entfernt als die distale Zinke der Posticalis, von der Costalis ziemlich weit überragt; Discoidalis in die Flügelspitze mündend; Gabelung der Posticalis distal von der Querader liegend. Vorderbeine ohne abstehende Behaarung, ihre Tibien um die Hälfte länger als der Metatarsus, Tarsenglieder allmählich verkürzt, 5. Glied 3—4-mal so lang wie dick, Empodium fadenförmig, etwas kürzer als die Krallen, Pulvillen fehlend. Abdomen bei ♂♀ etwas länger als der übrige Körper, beim ♀ seitlich zusammengedrückt; Zange ohne Anhänge; Basalglieder dick, zweimal so lang wie das Endglied und dreimal so dick; Endglieder fein behaart, fast gleichdick, nur am Ende eingekrümmt und etwas verengt. Länge: 1,5—2 mm. Beschreibung nach 19 Exemplaren (11 ♂, 8 ♀).

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800 feet and over, collected by H. P. Thomasset and H. Scott, X. 1908—I. 1909, 1 ♂; near Morne Blanc, X.—XI, 1908, 6 ♂, 1 ♀; Cascade Estate, about 800—1500 feet, 1909, 4 ♂, 6 ♀. Silhouette: marshy plateau of Mare aux Cochons or edge of forest close by, IX. 1908, 1 ♀.

Genus Dactylocladius Kieffer.

Ann. Soc. scient. Bruxelles, 1906, vol. xxx. p. 356.

1. Vorderer Metatarsus so lang wie die Tibien; die Gabelung der Posticalis liegt der Mündung des Radius gegenüber.....44. *D. megalochirus*, n. sp.
   Vorderer Metatarsus halb so lang wie die Tibien, oder Gabelung der Posticalis vor der Mündung des Radius .....2.
2. Die Gabelung der Posticalis liegt proximal von der Mündung des Radius; Körper schwarz .....3.
   Die Gabelung der Posticalis liegt distal von der Mündung des Radius; Körper gelb .....4.
3. Beine schmutziggelb; Antennen 12-gliedrig .....40. *D. mahensis*, n. sp.
   Beine schwarz; Antennen 14-gliedrig .....41. *D. melanostolus*, n. sp.
4. Mesonotum ohne Längsbinden, vordere Tibien 2-mal so lang wie der Metatarsus .....42. *D. xanthostolus*, n. sp.
   Mesonotum mit 3 braunen Längsbinden, vordere Tibien 1½-mal so lang wie der Metatarsus .....43. *D. heterostolus*, n. sp.

40. *Dactylocladius mahensis*, n. sp. (Tafel **21**, Fig. 21).

♂. Schwarzbraun; Scutellum, Beine und Schwinger schmutziggelb, Antennen braun, Zange bräunlich. Antennen 12-gliedrig; 3.—11. Glied deutlich länger als dick, das 12. fadenförmig und so lang wie die vorigen zusammen; Busch schwarzbraun. Flügel glashell, unpunktirt, bewimpert; die Hilfsader überragt die Querader; Mündung des Radius distal von der Gabelung der Posticalis, die 2. Längsader ist dem Radius näher als dem Cubitus; der Cubitus ist 2-mal so lang wie der Radius, gerade, von der Costa um mehr als sein Drittel überragt, von der Flügelspitze kaum weiter entfernt als die distale Zinke der Posticalis; Costa fast in die Flügelspitze mündend; Querader schief, vor der Mitte liegend; Discoidalis gerade, kaum hinter die Flügelspitze

mündend; Gabelung der Posticalis weit distal von der Querader. Behaarung der Beine wenig länger als ihre Dicke; hintere Tibien um die Hälfte länger als der Metatarsus, 5. Glied 2-mal so lang wie dick (vordere Tarsen abgebrochen). Abdomen schlank, 2-mal so lang wie der übrige Körper; Endglied der Zange (Fig. 21) schmal, fast walzenrund, $\frac{2}{3}$ der Länge der Basalglieder erreichend; Lamelle in eine kleine Spitze endigend. Länge: 1,5 mm.

Vorkommen. Seychellen. Mahé: Anonyme Island, from grass, ferns, trees, etc. I. 1909.

41. *Dactylocladius melanostolus*, n. sp. (Tafel **21**, Fig. 22).

♂. Mattschwarz, Scutellum bräunlich, Schwinger weiss. Augen nierenförmig, kahl, oben weit voneinander abstehend. Palpen 4-gliedrig; 1. Glied kurz, von einem Vorsprung ausgehend, der als erstes Glied aufgefasst werden könnte; 2.—4. Glied 3—4-mal so lang wie dick. Antennen 14-gliedrig; 2. Glied doppelt so lang wie dick; 3.—5. quer; 6.—13. allmählich länger als dick; 14. etwas länger als das 2.—13. zusammen; Busch schwarzbraun. Flügel kahl, unpunktirt, bewimpert; Hilfsader deutlich, die Querader etwas überragend; das Distalende des Radius ist von der Flügelspitze kaum weiter entfernt als die proximale Zinke der Posticalis; Cubitus von der Flügelspitze weiter entfernt als die distale Zinke der Posticalis, von der Costa weit überragt; Querader schief, proximal von der Flügelmitte liegend; distaler Abschnitt der Discoidalis am Grunde abbiegend, hinter die Flügelspitze mündend; Gabelung der Discoidalis sehr weit hinter der Querader liegend. Vordertibien kaum kürzer als die Femora, fast 2-mal so lang wie der Metatarsus, 5. Glied 4-mal so lang wie dick, Krallen einfach, Empodium fadenförmig, ventral mit einigen abstehenden Haaren, so lang wie die Krallen; an den 4 hinteren Beinen sind die Tibien und die 2 proximalen Tarsenglieder mit sehr langen und abstehenden Haaren versehen; Kamm der 2 Hintertibien braun. Abdomen schlank; Basalglieder der Zange (Fig. 22) innen mit einem dreieckigen Fortsatz oberhalb der Mitte, Endglieder halb so lang wie die Basalglieder, feinhaarig, dünn und fast walzenrund. Länge: 2 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, III. 1909, 7 ♂.

Bemerkung. Alle 7 Exemplare haben vorn, auf der rechten Seite des Mesonotum, einem weisslichen Fleck, vielleicht ein dünnes Häutchen.

42. *Dactylocladius xanthostolus*, n. sp. (Tafel **21**, Fig. 23).

♀. Hellgelb; Tergite mit einer kurzen, breiten, braunen Querbinde; Beine und Antennen bräunlichgelb. Augen oben breit getrennt, eiförmig und kahl. Das 1. Palpenglied kurz, die 3 folgenden 3—4-mal so lang wie dick, das 2. dicker als das 3. und 4. Flagellumglieder 2-mal so lang wie dick, in ihrer distalen Hälfte halsartig verengt, Wirtel nicht doppelt so lang wie ein Glied, die 2 Anhänge glashell, pfriemlich, so lang wie ein Glied; Endglied länger, allmählich schmaler werdend. Mesonotum glänzend. Flügel (Fig. 23) glashell, kahl, unpunktirt, bewimpert; Cubitus fast 3-mal so lang wie der Radius, von der Flügelspitze weiter entfernt als die distale Zinke der Posticalis, von der Costa fast um die Hälfte seiner Länge überragt; Querader schief, vor der Flügelmitte liegend; Costa von der Flügelspitze weiter entfernt als die Discoidalis,

welche die Richtung ihres Stieles nicht fortsetzt und kaum hinter die Flügelspitze mündet; Gabelung der Posticalis weit hinter der Querader, deutlich hinter der Mündung des Radius liegend; die 2. Längsader fehlt. Behaarung der Beine nicht länger als die Dicke derselben; vordere Tibien fast 2-mal so lang wie der Metatarsus, 4. und 5. Glied doppelt so lang wie dick, Empodium etwas kürzer als die Krallen, fadenförmig, ventral mit gereihten, abstehenden, langen Haaren; hintere Tibien mit einem Kamm, wie bei *Orthocladius*. Abdomen wenig länger als der übrige Körper, von den Flügeln überragt. Länge: 1 mm.

Vorkommen. Seychellen. Mahé: Anonyme Island, from seaweed, I. 1909, 3 ♀.

43. *Dactylocladius heterostolus*, n. sp.

♀. Antennen bräunlich; Thorax braun, Mesonotum matt, weisslich, mit 3 braunen Längsbinden, deren mittlere hinten, die seitlichen vorn abgekürzt sind; Schwinger weisslich; Beine und Abdomen schmutziggelb, Tergite mit einer kurzen, breiten, braunen Querbinde. Flagellumglieder kurz ellipsoidal, ohne halsartige Einschnürung; Endglied doppelt so lang wie das vorletzte, ziemlich walzenförmig. Flügel genau wie bei *xanthostolus*. Vorderer Metatarsus halb so lang wie die Tibien, 5. Glied wenig länger als dick. Länge: 1,5 mm. Das übrige wie bei *xanthostolus*.

Vorkommen. Seychellen. Mahé: Anonyme Island, from seaweed, I. 1909.

44. *Dactylocladius megalochirus*, n. sp.

♂. Mattschwarz, Schwinger und Beine weisslich, Scutellum rotbraun. Busch der Antennen schwarzbraun. Flügel glashell; 2. Längsader dem Radius deutlich näher als dem Cubitus, aber wenig deutlich ausgebildet; Cubitus 2½-mal so lang wie der Radius, gerade, von der Flügelspitze so weit entfernt als die distale Zinke der Posticalis, von der Costa wenigstens um ein Drittel seiner Länge überragt; die Costa ist der Flügelspitze so nahe wie die Discoidalis, welche fast gerade ist und die Richtung des Stieles nicht fortsetzt; die Gabelung der Posticalis liegt der Mündung des Radius gegenüber. Vordere Tibien so lang wie der Metatarsus, welcher wenigstens um die Hälfte länger als das 2. Glied ist; 3. Glied kaum kürzer als das 2., fast doppelt so lang wie das 4.; dieses um die Hälfte länger als das 5., welches 2—3-mal so lang wie dick ist; die 4 hinteren mit abstehenden Haaren, welche 2—3-mal so lang wie die Tibien sind. Länge: 1,2 mm.

Vorkommen. Seychellen. Mahé: scrubby forest vegetation, top of Mount Sebert, 1800 feet or more, I. 1909.

Genus Corynoneura Winnertz.

Stettin, Entom. Zeitg. 1846, vol. vii. p. 12.

Diese Gattung war bisher nur für Europa und Groenland bekannt.

45. *Corynoneura seychellensis*, n. sp.

♂♀. Bräunlichgelb; Schwinger und Beine weisslich, Mesonotum mit 3 braunen Längsbinden, deren mittlere hinten, die seitlichen vorn abgekürzt sind. Augen kahl, kaum ausgeschnitten, oben um mehr als ihre Länge voneinander getrennt. Palpen

4-gliedrig; 1. Glied quer; 2. und 3. Glied etwas dicker aber auch sehr kurz und quer; 4. länger als die vorigen zusammen aber dünner. Antennen des ♂ 12-gliedrig; die ersten Flagellumglieder 2-mal so lang wie dick, die folgenden 3-mal oder fast 3-mal; 9.—11. miteinander verwachsen, nur durch Einschnürungen voneinander getrennt; das 12. wenig länger als die 2 vorhergehenden zusammen und distal allmählich verdickt; jedes Flagellumglied mit 2 Haarwirteln, deren Länge etwa die doppelte Länge eines Gliedes beträgt. Antennen des ♀ 6-gliedrig; 2. Glied walzig, 3-mal so lang wie dick, 3.—5. mitten kaum verdickt, 2-mal so lang wie dick, 6. 3-mal. Flügel glashell, unpunktirt und kahl, proximal allmählich verengt; Cubitus am Distalende keulenförmig verdickt, seine Mündung befindet sich innerhalb des proximalen Flügeldrittels beim ♂, in der Flügelmitte beim ♀; die feine Ader, welche dem Vorderrande parallel und genähert läuft, erlischt allmählich vor der Flügelspitze; Discoidalis hinter die Flügelspitze mündend; die Gabelung der Posticalis liegt hinter der Flügelmitte. Beine mit zerstreuten Haaren, welche wenig länger als die Dicke der Tibien sind; Femora 2-mal so dick wie die Tibien; hintere Tibien am Distalende stark erweitert und mit einem Kamm, wie bei *Orthocladius*, die 4 vorderen ohne Kamm; vordere Tibien so lang wie die Femora, fast 2-mal so lang wie der Metatarsus; 2. Glied halb so lang wie der Metatarsus und fast doppelt so lang wie das 3.; 4. kaum länger als dick, fast halb so lang wie das 3.; 5. deutlich länger als das 4., 2-mal so lang wie dick; Krallen einfach, Empodium fehlend. Endglieder der Zange viel dünner und nur halb so lang wie die Basalglieder, nach hinten schwach verdickt und mit einem kurzen nach innen gerichteten Endgriffel. Länge: 0,6 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800—1500 feet, 1909, 2 ♂, 1 ♀.

3. Subfamilie **Tanypinæ.**

Genus Isoplastus Skuse.

Proc. Linn. Soc. N. S. Wales, 1889, ser. 2, vol. iv. p. 279.

1. Cubitus vom Vorderrande getrennt, ziemlich weit vor der Flügelspitze mündend .....47. *I. minimus*, n. sp.
   Cubitus dem Vorderrande im distalen Drittel anliegend .....2.
2. Blassgelb; Cubitus von der Costa nicht überragt, fast in die Flügelspitze mündend .....46. *I. pallidissimus*, n. sp.
   Orangefarbig; Cubitus von der Costa weit überragt, von der Flügelspitze entfernt .....48. *I. aurantiacus*, n. sp.

46. *Isoplastus pallidissimus*, n. sp.

♀. Sehr blassgelb, 12. Antennenglied gebräunt. Augen stark bogig gekrümmt, oben um mehr als ihre grösste Breite voneinander getrennt. Antennen 12-gliedrig, 3.—11. Glied kuglig, ihre Haarwirtel doppelt so lang wie das Glied, 12. Glied dicker als die übrigen, 2—3-mal so lang wie das vorhergehende. Flügel fast glashell, das Abdomen um ihre Hälfte überragend, gleichmässig behaart; Cubitus, im distalen Drittel, der Costalis anliegend, fast in die Flügelspitze mündend, von der Costalis nicht überragt; gewöhnliche

Querader schräg, die 2. Querader treffend, diese senkrecht, den Grund der distalen Zinke der Posticalis treffend. Vorderbeine nicht abstehend behaart, ihre Tibia etwas länger als das Femur oder als der Metatarsus, die folgenden Glieder allmählich verkürzt, das 4. um die Hälfte länger als das 5., welches 3—4-mal so lang wie dick ist. Abdomen schwach seitlich zusammengedrückt. Länge: 1 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800 feet and over, collected by H. P. Thomasset and H. Scott, X. 1908—I. 1909; Cascade Estate, about 800—1500 feet, 1909.

47. *Isoplastus minimus*, n. sp.

♂. Bräunlichgelb; Beine gebräunt, Tibien dunkler; Abdomen dorsal von einer schwarzbraunen, sehr schmalen Mittellängslinie durchzogen; Zange weiss. Augen bogig, oben sehr genähert. Die 4 Palpenglieder ziemlich lang. Antennen 15-gliedrig, 3.—13. Glied zuerst so lang wie dick, dann länger als dick; das 14. halb so lang wie die vorigen zusammen, schwach spindelförmig; 15. Glied keglig, halb so lang wie das 14., Busch braun. Flügel gleichmässig behaart; 2. Querader kaum proximal von der gewöhnlichen Querader liegend, den Grund der distalen Zinke der Posticalis treffend; Cubitus dem Vorderrande nahe, ziemlich weit vor der Flügelspitze mündend, fast so weit wie die distale Zinke der Posticalis, vom Vorderrande nicht überragt; Discoidalis in die Flügelspitze mündend; (Tarsen abgebrochen). Zange klein, mit dicken Basalgliedern. Länge: 1,5 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800—1500 feet, 1909.

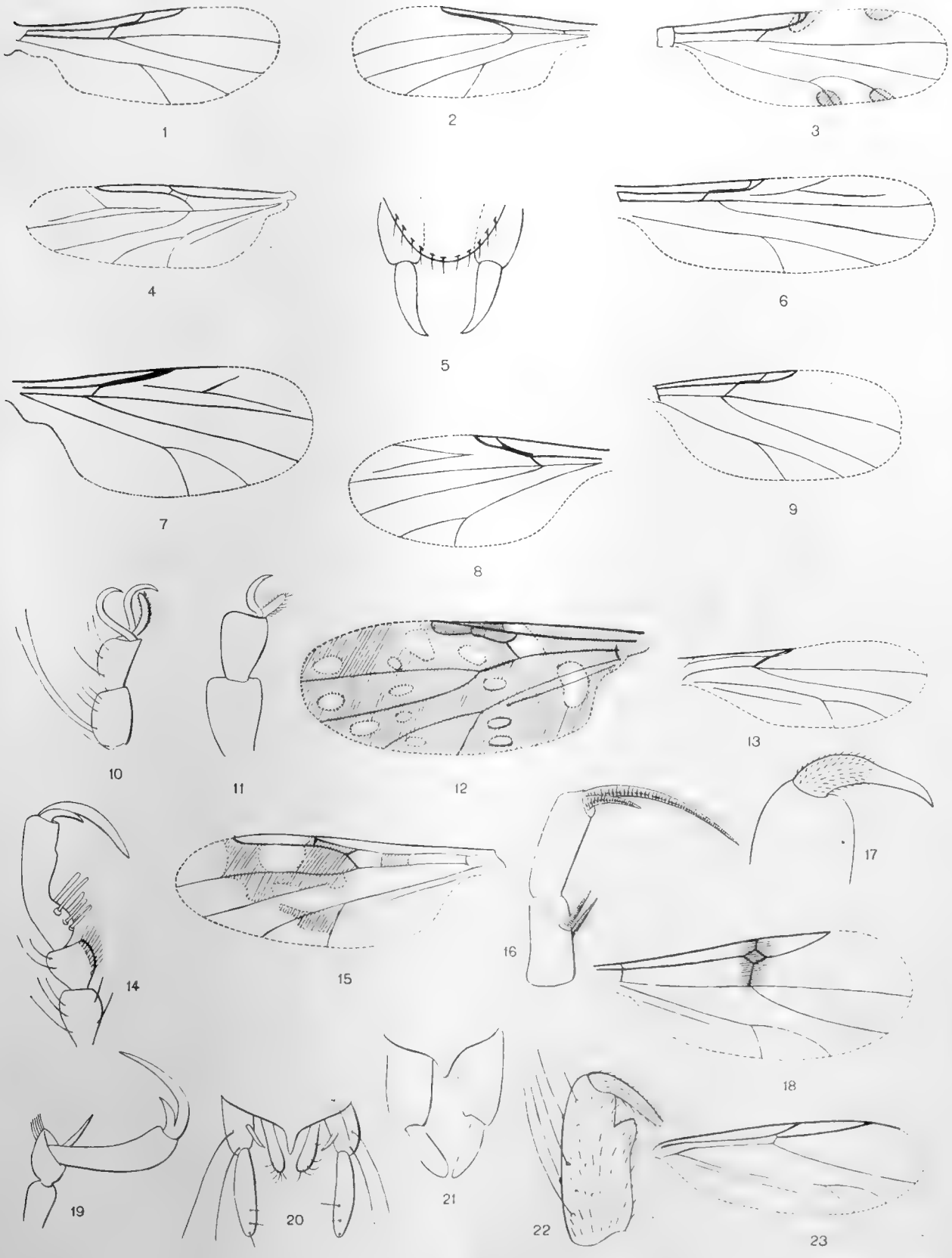
48. *Isoplastus aurantiacus*, n. sp.

♀. Orangerot, zuletzt braun; Antennen bräunlich; Mesonotum und Metanotum schwarzbraun, matt; Beine bräunlich, Tibien schwärzlich, Metatarsus aller Beine so lang wie die Tibien, Tarsenglieder allmählich verkürzt, 5. Glied zweimal so lang wie dick. Glieder des Flagellum kuglig, Wirtel lang, 3—4-mal so lang wie ein Glied; Endglied zugespitzt, so lang wie die 2 vorhergehenden zusammen. Flügel gleichmässig anliegend behaart; Querader hinter dem proximalen Flügeldrittel liegend, mit der 2. Querader zusammenstossend; Cubitus doppelt so lang wie der Radius, in der distalen Hälfte der Costa anliegend, von derselben weit überragt, Costa nicht bis zur Flügelspitze reichend; Discoidalis hinter die Flügelspitze mündend; 2. Querader den Grund der distalen Zinke der Posticalis treffend. Behaarung der Beine nicht viel länger als die Dicke der Tibien. Abdomen ziemlich depress, so breit wie der Thorax, fast kahl, kaum länger als der übrige Körper. Länge: 1,5 mm.

Vorkommen. Seychellen. Mahé: Cascade Estate, about 800—1500 feet, 1909, 2 ♀; Cascade Estate, about 800 feet and over, collected by H. P. Thomasset and H. Scott, X. 1908—I. 1909, 2 ♀.

ERKLÄRUNG DER TAFEL **21**.

Fig. 1. *Ceratopogon trichotomma*, n. sp., Flügel des ♂.
Fig. 2. „ „ „ Flügel des ♀.
Fig. 3. „ *chrysolophus*, n. sp., Flügel des ♂.
Fig. 4. „ *lampronotus*, n. sp., Flügel des ♀.
Fig. 5. „ „ „ Zange des ♂.
Fig. 6. „ *psilonotus*, n. sp., Flügel.
Fig. 7. „ *aplonotus*, n. sp., Flügel.
Fig. 8. „ *seychelleanus*, n. sp., Flügel.
Fig. 9. „ *falcinellus*, n. sp., Flügel.
Fig. 10. „ „ „ Die zwei letzten Glieder der mittleren Tarsen.
Fig. 11. „ *mahensis*, n. sp., Die zwei Endglieder des Vordertarsus.
Fig. 12. *Culicoides leucostictus*, n. sp., Flügel.
Fig. 13. „ *scotti*, n. sp., Flügel des ♀.
Fig. 14. *Sphæromias hexacantha*, n. sp., Die drei letzten Glieder der Vordertarsus.
Fig. 15. „ *pulcripennis*, n. sp., Flügel des ♀.
Fig. 16. „ „ „ Die zwei Endglieder des Hintertarsus.
Fig. 17. „ „ „ Zangenglied des ♂.
Fig. 18. „ *areolaris*, n. sp., Flügel.
Fig. 19. „ „ „ Die zwei letzten Tarsenglieder des Hinterfusses.
Fig. 20. *Tanytarsus glabripennis*, n. sp., Zange des ♂.
Fig. 21. *Dactylocladius mahensis*, n. sp., Zange des ♂.
Fig. 22. „ *melanostolus*, n. sp., Zangenglied.
Fig. 23. „ *xanthostolus*, n. sp., Flügel.



E. Wilson, Cambridge

DIPTERA, CHIRONOMIDÆ FROM SEYCHELLES

No. XVI.—FOSSORIAL HYMENOPTERA FROM THE SEYCHELLES AND OTHER ISLANDS IN THE INDIAN OCEAN.

By Rowland E. Turner, F.Z.S., F.E.S.

(Communicated by Prof. J. Stanley Gardiner, M.A., F.R.S., F.L.S.)

Read 19 January, 1911.

The fossorial Hymenoptera of the expedition to the Seychelles and Aldabra (1908—9) have been handed to me by Mr Scott for identification. Those from the Seychelles are very few in number, only including thirteen species. Several of these have doubtless been imported, such as the two species of *Sceliphron* and *Ampulex compressa*. Of the ten remaining species one, *Sphex umbrosus*, is wide ranging; three are identical with Madagascar species, one with a Mauritius species, and five only are peculiar; two of these last belong to the genus *Crabro*, two to *Pison*, and one to *Notogonia*. But it is not unlikely that some even of these have been imported, though not yet recorded from elsewhere, the habits of *Trypoxylon* and *Pison*, which often make their nests in holes in wood, rendering their transportation on ships easy. Of the eleven species recorded in this paper from Aldabra and adjacent islands, six are common Madagascar forms, and five are wide-ranging. One common Eastern species obtained in the Chagos Islands is also referred to, namely *Sceliphron bengalense*; this makes a total of 25 species from all the islands investigated by the Percy Sladen Trust Expeditions of 1905 and 1908.

Fam. **Scoliidæ.**

Genus Scolia Fabr.

1. *Scolia* (*Triscolia*) *hyalinata* Sich.

Scolia (*Triscolia*) *hyalinata* Sichel, Sauss. et Sich. Spec. gen. Scolia, p. 53, 1864, ♀.

Localities. Cosmoledo and Astove, 1907 (H. P. Thomasset); Aldabra, 1908, 1 ♂ (J. C. F. Fryer). Described from Madagascar.

The male has the wings clear hyaline and the abdomen faintly glossed with blue, but otherwise only differs from the female by the usual sexual characters.

2. *Scolia* (*Dielis*) *cœlebs* Sich.

Elis (*Dielis*) *cœlebs* Sich., Spec. gen. Scolia, p. 184, 1864, ♀.

Localities. Assumption, 1909, several ♀♀ (R. P. Dupont). Astove, 1907, 1 ♂ (H. P. Thomasset).

Probably the name *eriophora* Klug should be used for this wide-ranging African species, but as I am not certain I prefer to retain Sichel's name.

3. *Scolia* (*Dielis*) *pilosella* Sauss.

Elis pilosella Sauss., Grandidier: Hist. Madagascar xx. p. 220, 1892.

Locality. Astove. (R. P. Dupont.) Described from Madagascar. The specimen from Astove is in the British Museum. This species was not obtained by the Percy Sladen Trust Expeditions of 1905 and 1908.

Fam. **Pompilidæ.**

Genus Mygnimia Shuck.

4. *Mygnimia nenitra* Sauss.

Mygnimia nenitra Sauss., Mitth. Schweiz. entom. Ges. viii. 1, p. 268, 1891; Sauss., Grandidier: Hist. Madagascar xx. p. 410, 1892, T. 9, F. 33.

Locality. Seychelles: Silhouette Island, Mare aux Cochons, 1000 feet, August and September, 1908. Four specimens, all females; they settled and ran swiftly on the ground, with quivering wings (H. Scott). Described by Saussure from Madagascar.

There is a tubercle just in front of the intermediate coxæ, as in the Eastern genus *Macromeris*. The tibiæ however in *Macromeris* are smooth, which is not the case in the present species. The tubercle is also present, though less developed in *M. hova* Sauss. from Madagascar, but is absent in *combusta* Sm. and other allied species from the mainland of Africa.

Fam. **Sphegidæ.**

Genus Ampulex Jur.

5. *Ampulex compressa* Fabr.

Sphex compressa Fabr., Spec. Insect. i. p. 445, 1781.

Ampulex compressa (Fabr.) Cam., Trans. Linn. Soc., Ser. 2, Zool., xii. 1907, p. 76.

A common eastern species, doubtless imported on ships.

Localities. Seychelles: Mahé; "frequents the outsides of houses &c. in Port Victoria" (Scott, 1908—9). Chagos Islands, 1905 (see Cameron, *l.c.*).

Genus Sceliphron Klug.

6. *Sceliphron* (*Chalybion*) *madecassum* Gribodo.

Pelopœus madecassus Grib., Ann. Mus. Civ. Genova xviii. p. 263, 1882.

Sceliphron violaceum Sauss., Grandidier: Hist. Madagascar xx. p. 440, 1892.

Sceliphron madecassum Kohl., Denkschr. R. Akad. Wissen. Math.-Naturwiss. Klasse lxxi. p. 193, 1906.

Sceliphron bengalense Cam., Trans. Linn. Soc. Ser. 2, Zool., xii. 1907, p. 76 (nec Dahlb.).

Specimens of this species from Mahé and Silhouette all show the very long petiole characteristic of *madecassum*, and differ from the specimens from the Chagos Islands referred to *bengalense* correctly by Cameron, but I must consider his record from the Seychelles as mistaken.

Localities. Seychelles: Mahé, road below Morne Blanc, X. 1908, Cascade Estate, II. 1909, Long Island, VII. 1908: Silhouette, cultivated country, IX. 1908 (Scott). Also from Madagascar.

7. *Sceliphron* (*Chalybion*) *bengalense* Dahlbom.

Sceliphron bengalense Dahlbom, Hym. Eur. i. 433; Cam., Trans. Linn. Soc., Ser. 2, Zool., xii. 1907, p. 76.

This species was obtained in the Chagos Islands by the "Sealark" Expedition in 1905, and recorded by Cameron, *l.c.* [As stated above, the specimens obtained during that expedition in the Seychelles, and referred to this species, are really *S. madecassum.*]

8. *Sceliphron hemipterum* Fabr.

Sphex hemiptera Fabr., Suppl. ent. syst. p. 244, 1798.

Pelopœus hemipterus Fabr., Syst. Piez. p. 204, 1804.

Sceliphron hemipterum (Fabr.), Cam., Trans. Linn. Soc., Ser. 2, Zool., xii. 1907, p. 75.

Localities. Seychelles: Mahé, Silhouette, Praslin (1905 and 1908—9). Also from Africa and Madagascar.

Genus Ammophila Kirby.

9. *Ammophila* (*Psammophila*) *capensis* Lepel.

Ammophila capensis Lepel, Hist. Nat. Insect. Hym. iii. p. 368, 1845.

Localities. Assumption (J. C. F. Fryer, and R. P. Dupont). Cosmoledo, 1907 (H. P. Thomasset). A common African species, probably only a race of *A. tydei* Guillou. It also occurs in Madagascar.

10. *Ammophila* sp.

A single specimen (♂) of a true *Ammophila* has been received from Mr R. P. Dupont, who obtained it in Assumption Island in 1910. It resembles a form obtained in Réunion and referred by Saussure (in Grandidier, Hist. Madagascar xx. p. 436) to *A. sabulosa* Linn.: but Saussure's determination of the species may be incorrect.

Genus Sphex Linn.

11. *Sphex torridus* Sm.

Sphex torrida Sm., Ann. and Mag. Nat. Hist., Ser. 4, xii. p. 291, 1873.

Localities. Aldabra; many specimens, chiefly found at coast (1908, J. C. F. Fryer). Assumption (1909 and 1910, R. P. Dupont). Cosmoledo (1907, H. P. Thomasset). A common species in Madagascar.

12. *Sphex umbrosus* Christ.

Sphex umbrosa Christ, Naturg. d. Insect. p. 293, 1791: Cam., Trans. Linn. Soc., Ser. 2, Zool., xii. 1907, p. 75.

Sphex rufinervis Pérez, Ann. Soc. Entom. France lxiv. p. 209, 1895.

Localities. Seychelles: Praslin, Mahé (1905 and 1908—9). Also known from S. Europe, Africa, India and Australia.

The male has the wings darkened on the basal half, but is only a slight variety of this common species.

13. *Sphex* (*Harpactopus*) *ægyptius* Lep.

Sphex ægyptia Lep., Hist. Nat. Ins. Hym. iii. p. 356, 1845.

Locality. Astove (R. P. Dupont). A common species in East Africa and Western Asia. The Astove specimens are in the British Museum: the species was not obtained by the Percy Sladen Trust Expeditions.

Genus Cerceris Latr.

14. *Cerceris nenitra* Sauss.

Cerceris nenitra Sauss., Soc. entom. ii. p. 25, 1887.

Cerceris nenitra Sauss., Grandidier: Hist. Madagascar xx. p. 551, 1892.

Locality. Aldabra (Fryer). Also from Madagascar.

Genus Notogonia Costa.

15. *Notogonia reticulata* Sauss.

Notogonia reticulata Sauss., Grandidier: Hist. Madagascar xx. p. 512, 1892.

Notogonia mahensis Cam., Trans. Linn. Soc., Ser. 2, Zool., xii. 1907, p. 78.

Localities. Seychelles: Silhouette, Mare aux Cochons, over 1000 ft., August and September, 1908: Mahé, near Morne Blanc, October 1908; above Port Glaud, 500—1000 ft. November 1908 (H. Scott). Many specimens of both sexes. Also known from Madagascar.

16. *Notogonia seychellensis* Cam.

Notogonia seychellensis Cam., Trans. Linn. Soc., Ser. 2, Zool., xii. 1907, p. 77, ♀ (♂).

Notogonia rufofemorata Cam., *l.c.* p. 78, 1907 (♂).

Cameron states that he is describing both sexes of *N. seychellensis*, but I have seen the types of *seychellensis* ♀ and *rufofemorata* and consider that the differences are merely sexual. He does not point out the differences between the sexes of *seychellensis* or compare the males of his species.

Localities. Seychelles: Silhouette; Mont Pot-à-eau, over 1000 ft. (August): Mahé, Cascade Estate, &c. Specimens always seen singly (H. Scott).

Genus Tachysphex Kohl.

17. *Tachysphex micromegas* Sauss.

Tachysphex micromegas Sauss., Grandidier: Hist. Madagascar xx. p. 481, 1892.

Localities. Seychelles: Silhouette, numerous specimens settling and running on paths on plateau of Mare aux Cochons, over 1000 ft., VIII.—IX. 1908; Mahé, from near Morne Blanc, about 800 ft., XI. 1908, and from Cascade Estate in March 1909 (H. Scott). Astove, one specimen (R. P. Dupont). Described by Saussure from Madagascar.

Genus Bembex Fabr.

18. *Bembex madecassa* Sauss.

Bembex madecassa Sauss., Mitth. Schweiz. entom. Ges. viii. p. 260, 1891.

Localities. Aldabra, many specimens, found in all places where sand or guano is present (1908—9, J. C. F. Fryer). Assumption (1909, R. P. Dupont). Cosmoledo (H. P. Thomasset). Also Madagascar.

Genus Pison Jur.

19. *Pison speculare*, sp. n.

♀. Nigra, nitida, capite opaco; segmento mediano nitido, in medio longitudinaliter sulcato; alis hyalinis, leviter infumatis.

Clypeus clothed with short, delicate, silver pubescence, the anterior margin slightly incurved, produced in the middle into a distinct angle. Head opaque, the eyes rather deeply emarginate, the distance between them at the base of the clypeus greater by one half than that on the vertex; the posterior ocelli very near to the eyes, twice as far from each other. Antennæ inserted as near to the eyes as to each other, the second joint of the flagellum about twice as long as the first and equal in length to the third. Thorax shining, microscopically punctured, the mesopleuræ rather more strongly punctured; median segment shining, with a longitudinal median sulcus not quite reaching the apex, the sulcus broad at the base and marked with a short longitudinal carina and a few faint oblique striæ, except in the sulcus the segment is smooth. Abdomen smooth and shining, the three basal segments a little depressed at the apex, the first segment a little longer than the breadth at the apex. Second cubital cell reaching the middle of the second transverse cubital nervure, receiving the first recurrent nervure close to the base, the second recurrent nervure received close to the base of the third cubital cell.

Entirely black, the abdominal segments without bands of pubescence. Wings hyaline, clouded with fuscous; nervures black.

Length 8 mm.

Localities. Seychelles: Praslin (November): Mahé, Morne Blanc, 1000 ft. (November 1908, H. Scott).

The median segment resembles in the want of sculpture that of *P. insulare* Sm. from the New Hebrides, but the shape of the clypeus is different.

20. *Pison argentatum* Shuck.

Pison argentatus Shuck., Trans. Ent. Soc. London ii. p. 79, 1837.

Locality. Aldabra (J. C. F. Fryer). A wide-ranging species, originally described from Mauritius.

21. *Pison* (*Parapison*) *isolatum*, sp. n.

♀♂. Niger, punctatus, abdomine nitido, pedibus, tegulis, scapo et flagello basi rufo-ferrugineis.

♀. Clypeus nearly twice as broad as long, finely punctured, produced and narrowly rounded on the middle of the apical margin. Head opaque, obscurely punctured, a carina from the base of the clypeus reaching half-way to the anterior ocellus. Second joint of the flagellum distinctly longer than the third; eyes separated on the vertex by a distance about equal to twice the length of the third joint of the flagellum; the posterior ocelli rather further from each other than from the eyes; the emargination of the eyes rather deep, the eyes are twice as far apart on the clypeus as on the vertex. Thorax finely and rather sparsely punctured; the median segment shorter than the mesonotum, narrowed posteriorly, irregularly and indistinctly obliquely striated, with a median sulcus not quite reaching the apex, the surface of the posterior truncation indistinctly transversely striated with a deep median sulcus. Abdomen subpetiolate, smooth and shining, the first segment longer than its breadth at the apex. First abscissa of the radius longer than the second; first recurrent nervure received close to the apex of the first cubital cell, second at one-third from the base of the second (third) cubital cell.

Black; scape, four basal joints of the flagellum, mandibles in the middle, tegulæ and legs (except the coxæ and the apical joint of the tarsi) ferruginous. Wings hyaline, tinged with fuscous, nervures black.

Length 8 mm.

♂. Clypeus produced into a point on the middle of the apical margin; apical dorsal segment of the abdomen large, rounded at the apex. Otherwise as in the female.

Localities. Seychelles: Silhouette, specimens settling on paths on plateau of Mare aux Cochons, over 1000 ft., VIII—IX. 1908: Mahé, Cascade Estate, about 1000 ft., III. 1909 (H. Scott).

Genus Trypoxylon Latr.

22. *Trypoxylon errans* Sauss.

Trypoxylon errans Sauss., Reise Novara Zool. ii. Hym. p. 84, 1867.

Trypoxylon gardineri Cam., Trans. Linn. Soc., Ser. 2, Zool., xii. 1907, p. 76.

Localities. Mauritius (Saussure). Mahé, Cascade Estate, November to March, and Long Island, July (H. Scott). Coetivy, 1905 (J. Stanley Gardiner).

"This species comes into rooms at Port Victoria and goes into nail holes in walls." Species of *Trypoxylon* and *Pison* have similar habits in other countries, often forming their nests in key-holes.

Saussure gives the colour of the clypeus as yellow (Hist. Madagascar xx. p. 527, 1892); in the Seychelles the colour is black, but this is also the case in specimens from Mauritius in the British Museum, and Saussure's original description only gives "Clypei margo testaceus."

23. *Trypoxylon scutifrons* Sauss.

Trypoxylon scutifrons Sauss., Grandidier: Hist. Madagascar xx. p. 523, 1892.

Locality. Astove (R. P. Dupont). Also from Madagascar. The Astove specimen is in the British Museum. This species was not obtained by the Percy Sladen Trust Expeditions.

Genus Crabro Fabr.

24. *Crabro* (*Rhopalum*) *oceanicus*, sp. n.

♀. Minuta, nigra, scapo, pedibusque anterioribus et intermediis flavis; abdomine subtus ferrugineo, segmento dorsali tertio fusco-ferrugineo; alis hyalinis.

♀. Mandibles bidentate at the apex; clypeus flat, without a carina, covered with delicate silver pubescence. Antennæ inserted close to the eyes, much further from each other than from the eyes, which are separated by a distance equal to about half the length of the scape, the first joint of the flagellum a little longer than the second. Posterior ocelli near together, about twice as far from the eyes as from each other and further from the posterior margin of the head than from the eyes. Head, thorax and median segment smooth and shining, the anterior angles of the pronotum slightly rounded; the mesonotum with a delicately impressed line from the anterior margin to the middle; median segment with a longitudinal sulcus, shallow on the dorsal surface, deep on the posterior slope. Petiole very slender, as long as the thorax without the median segment, swollen at the apex; second abdominal segment more than half as long as the petiole, very narrow at the base, gradually widened to the apex; the fourth segment the broadest; apical segment broadly triangular. Posterior tibiæ swollen towards the apex, with a few delicate spines on the outer margin. The recurrent nervure is received beyond the middle of the cubital cell.

Black; the scape and the anterior and intermediate legs pale yellow; abdomen beneath ferruginous, the third and fourth dorsal segments ferruginous at the base, the third at the apex fuscous. Tegulæ testaceous; wings hyaline, iridescent, nervures black.

Length 5 mm.

♂. Similar to the female. There are four minute teeth on the anterior margin of the clypeus.

Length 4 mm.

Localities. Seychelles: Mahé, 1 specimen obtained flying round a *Roscheria*-palm in high damp forest on summit of "montagne Anse Major," over 2000 ft., 1. II. 1909: Silhouette, 1 specimen obtained in forest above Mare aux Cochons, 1908 (H. Scott).

25. *Crabro* (*Dasyproctus*) *scotti*, sp. n.

♀. Nigra, alutacea, mandibulis, clypeo, flagelloque basi ferrugineis; scapo, pronoto, pro- et mesopleuris, tegulis, mesonoti macula magna margine posteriore lineisque lateralibus ante tegulas, scutello, postscutello, segmento mediano basi apice lateribusque, pedibusque ochraceis.

♀. Mandibles tridentate at the apex, the inner tooth small and short. Clypeus much broader than long, opaque and almost smooth, with an obscure median carina, with

two broad short teeth on the middle of the apical margin, clothed with short close silver pubescence. Head large and massive, much broader than the thorax, opaque, with a shining furrow on the inner margin of each eye near the summit; antennæ inserted nearer to the eyes than to each other, the second joint of the flagellum a little longer than the third and half as long again as the first. Posterior ocelli as far from each other as from the eyes and fully half as far again from the posterior margin of the head as from each other; eyes separated at the base of the clypeus by a distance equal to about one-third of the length of the scape, the facets in front much larger than elsewhere. Thorax opaque, the scutellum slightly shining; pronotum transverse, rounded at the angles, with a deep groove in the middle; mesonotum broadly and shallowly depressed in the middle anteriorly, with short longitudinal striæ on the middle of the apical margin; scutellum almost smooth, with a few scattered punctures; median segment with a deep sulcus from base to apex, obliquely striated at the base. Mesopleuræ opaque, with a vertical sulcus below the anterior wings, moderately hollowed for both the anterior and intermediate femora. Abdomen petiolate; the first segment a little longer than the mesonotum and scutellum combined, gradually and evenly broadened from the base, about half as wide at the apex as long; apical segment pointed, very narrow. Posterior tibiæ spinose, intermediate almost smooth. The recurrent nervure is received beyond two-thirds from the base of the cubital cell.

Black; the mandibles, except at the apex, clypeus and four basal joints of the flagellum dull ferruginous brown; scape, pronotum, tegulæ, pro- and mesopleuræ, a large spot on the posterior margin of the mesonotum, a line above the tegulæ, scutellum, postscutellum, a large triangular mark at the base of the median segment, the apex of the median segment extending onto the sides, a very small obscure spot on each side of the first abdominal segment near the apex and the legs reddish chrome. Wings hyaline, nervures black.

Length 9 mm.

♂. The first abdominal segment is much narrower than in the female, very little broadened to the apex, and is longer. The median segment is wholly black.

Localities. Seychelles: Silhouette, Mare aux Cochons, over 1000 ft. (September): Mahé, Cascade Estate (February). 3 ♀, 1 ♂.

The colour of the markings is reddish chrome (Roy. Horticultural Soc. Colour Chart 51, shade 4). Mr Scott informs me that the colour is natural and not changed by cyanide.

No. XVII.—LIST OF THE BATRACHIANS AND REPTILES OBTAINED BY PROF. STANLEY GARDINER* ON HIS SECOND EXPEDITION TO THE SEYCHELLES AND ALDABRA.

By G. A. Boulenger, F.R.S.

(Communicated by Prof. J. Stanley Gardiner, M.A., F.R.S., F.L.S.)

(3 Text-figures.)

Read 2nd February, 1911.

I. SEYCHELLES.

BATRACHIANS.

Apoda.

1. *Hypogeophis rostratus*, Cuv.

Mahé: sea coast below Cascade; Baie Lazare; Cascade, 800 ft.; W. side of Mt. Seychellois, 1200 ft. Praslin. Silhouette: Mare aux Cochons, 1400 ft.

2. *Hypogeophis alternans*, Stejn.

Mahé: Baie Lazare, Cascade (J. C. Fryer). Praslin. Silhouette: Mare aux Cochons, 1400 ft. (a pied albino).

3. *Hypogeophis brevis*, sp. n. (Fig. 1.)

About 12 teeth on each side of each jaw. Snout obtusely pointed, very strongly projecting; eyes very indistinct, the distance between them less than the length of the snout; tentacle below and a little behind the nostril. Body very short, its diameter 14 or 15 times in the total length; 130 folds, the first 9 to 15 complete, the following alternately complete and incomplete, the last 93 to 100 complete. Tail indistinct, rounded. Uniform dark brown.

Total length 112 mm.

Two specimens from Mahé, the smaller (measuring only 40 mm.) from Cascade, the larger from the west side of Mt. Seychellois, altitude 1200 ft.

* [I made no attempt to obtain complete collections of these groups on this Expedition, having secured a large number of specimens in 1905 (see G. A. Boulenger, Trans. Linn. Soc., vol. xii. p. 291). Indeed I only collected in the indigenous jungle and even then rejected forms which I knew I had previously obtained. The present list raises the number of Seychelles species of the Amphibia from 8 to 11. Mr J. C. Fryer visited Bird and Dennis coral islands to the north of the Seychelles Bank, spending a fortnight on each. He then went to Aldabra for four months visiting other islands *en route*. J. Stanley Gardiner.]

4. *Dermophis sechellensis*, sp. n. (Fig. 3.)

14 or 15 teeth on each side of upper jaw, 12 on each side (outer row) of lower jaw. Snout obtusely pointed, prominent; eyes rather indistinct or scarcely distinct, the distance between them nearly equal to the length of the snout; tentacle in front of and below the eye, three times as distant from the nostril as from the eye. Body short, its diameter 17 to 22 times in the total length; 147 to 160 folds, the first 18 to 26 complete, the following alternately complete and interrupted, the last 43 to 77 complete. Tail indistinct, rounded. Dark brown or blackish; vent usually in a whitish spot.

Total length 190 mm.

Overlooking the very small inner mandibular teeth, I referred the first specimens obtained by Prof. Gardiner to the allied *Cryptopsophis multiplicatus*, and recorded them under that name in my previous list. The larger material which has now been placed at my disposal shows this Cæcilian to belong to the genus *Dermophis*, of which four species occur in Tropical America, one in the West-African Island San Thomé, and one in British East Africa.

Mahé: Cascade (J. C. Fryer); W. side of Mt. Seychellois, 1200 ft. Praslin. Silhouette: Mare aux Cochons, 1400 ft.

5. *Praslinia cooperi*, Blgr.

Mahé: Cascade (J. C. Fryer).

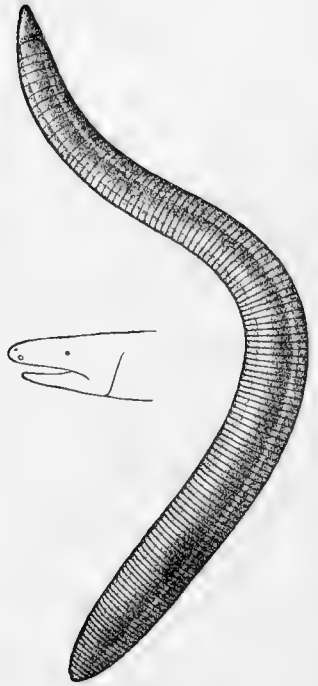


Fig. 1. *Hypogeophis brevis.* Nat. size. Head × 3.

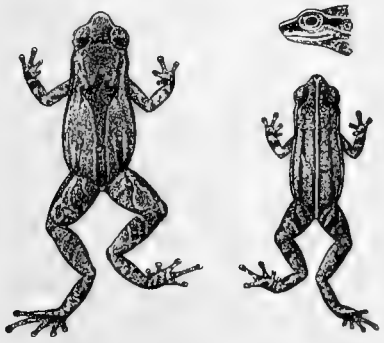


Fig. 2. *Nectophryne gardineri.* ×1½.

Fig. 3. *Dermophis sechellensis.* × 3.

ECAUDATA.

6. *Rana mascareniensis*, Dum. and Bibr.

Mahé: Cascade; Marsh at Anse Takamaka. Silhouette.

7. *Nesomantis thomasseti*, Blgr.

Mahé: Top Mt. Pilot, 2700 ft.; Top of Mt. Harrison, 2400 ft. Silhouette: Summit, 2467 ft.

8. *Sooglossus sechellensis*, Boettg.

Mahé: Mt. Harrison over 2000 ft.; high jungle over Cascade; Top mountain, 2700 ft. Silhouette: high jungle, Morne Capucin, 1800 ft.

9. *Megalixalus sechellensis*, Dum. and Bibr.

Mahé: Cascade (J. C. Fryer). Silhouette: Mare aux Cochons, 1400 ft.

10. *Nectophryne gardineri*, sp. n. (Fig. 2.)

Snout pointed, prominent, hardly as long as the eye; loreal region vertical; interorbital space broader than the upper eyelid; tympanum hidden. Fingers and toes short, much depressed, with a rudiment of web and no subarticular tubercles, the former terminating rather suddenly into a point, the latter expanded into well developed round disks; two feebly prominent metatarsal tubercles. Tarso-metatarsal articulation reaching the tip of the snout. Head and back more or less distinctly granular; a flat round tubercle on the upper eyelid, sometimes followed by a series of four similar tubercles along each side of the back. Pinkish brown above, blackish brown on the sides, the two shades sharply deliminated; dark brown spots or markings, sometimes confluent into a broad band along the middle of the back, may be present; one specimen with a light vertebral streak; oblique dark bands may be present on the limbs; lower parts yellowish, spotted or marbled with dark brown.

Total length 15 mm.

This tiny toad, one of the smallest known, belongs to a genus represented by several species in the African and Oriental regions, and which probably includes the viviparous toad described by Tornier as *Pseudophryne vivipara*.

Mahé: Morne Pilot, 2700 ft. Silhouette: highest jungle.

REPTILES.

Lacertilia.

1. *Hemidactylus frenatus*, Dum. and Bibr.

Bird I. (J. C. Fryer).

2. *Æluronyx sechellensis*, Dum. and Bibr.

Praslin. Silhouette.

3. *Phelsuma madagascariense*, Gray.

Praslin. Silhouette. Bird I. (J. C. Fryer). Dennis I. (J. C. F.).

4. *Mabuia sechellensis*, Dum. and Bibr.

Silhouette. Dennis (J. C. Fryer).

5. *Scelotes braueri*, Boettg.

Mahé: Cascade (J. C. Fryer): high jungle. Silhouette.

6. *Scelotes gardineri*, Blgr.

Mahé: high jungle. Silhouette.

RHIPTOGLOSSA.

7. *Chamæleon tigris*, Kuhl.

Mahé. Silhouette.

OPHIDIA.

8. *Boodon geometricus*, Schleg.

Silhouette.

9. *Lycognathophis sechellensis*, Schleg.

Mahé: Cascade. Silhouette.

II. ALDABRA, ETC.

(COLLECTED BY MR J. C. FRYER.)

REPTILES.

1. *Hemidactylus gardineri*, Blgr.

Aldabra: Malabar, Takamaka, Picard. Cosmoledo: Menai. Astove.

2. *Phelsuma madagascariense*, var *abbotti*, Stejn.

Aldabra: Malabar, Takamaka, Picard. Assumption.

3. *Zonosaurus madagascariensis*, Gray.

Cosmoledo: N.E. Island. Peculias.

4. *Ablepharus boutonii*, var. *peronii*, Coct.

Aldabra: Takamaka, Picard. Cosmoledo: Menai. Assumption. Astove.

The only other species recorded from Aldabra, but unrepresented in this collection, are: *Testudo gigantea**, Schweigg, and *Hemidactylus mabouia*, Mor. The latter, however, rests on Stejneger's identification and is probably the same as the small form described by me as *H. gardineri*.

* [Mr Fryer's notes on this species will be found in his report on Aldabra in this volume. J. S. G.]

No. XVIII.—THE ARANEÆ, OPILIONES AND PSEUDOSCORPIONES.

By S. Hirst.

(*Published by permission of the Trustees of the British Museum.*)

(Communicated by Prof. J. Stanley Gardiner, M.A., F.R.S., F.L.S.)

(11 Text-figures.)

Read 2nd February, 1911.

I. NOTES ON DISTRIBUTION.

The total number of species of spiders in the collection is forty-nine; forty-five of which occur in the Seychelles group. Thirteen of them had not been recorded previously from these islands, but four of these cannot be determined with certainty, owing to the immaturity of the specimens collected; they belong, however, to genera hitherto unrecorded from these localities. Five others are new species. The total number of spiders now known from the Seychelles is seventy-one, more than half of which are believed to be peculiar to them, and seven of the latter (*Sason seychellanum* Sim., *Cryptothele alluaudi* Sim., *Drassodes inaudax* Sim., *Steriphopus lacertosus* Sim., *Clubiona nigromaculosa* Blackw., *Tetragnatha nigrigularis* Sim., and *T. modesta*, n. sp. (and also *Conothele* sp. which is only represented by immature specimens)), are of especial interest in that they are closely allied to species which occur in the Oriental region or in Australasia. Two others (*Argiope anasuja* Thor., and *Gasteracantha brevispina* Dol.) are also known to inhabit the Oriental region. Two species (*Nephila madagascariensis* Vins., and *Oxyopes dumonti* Vins.), are found also in Mauritius, Madagascar and East Africa. Nearly all the remaining species have a wide range and none of them are of especial interest.

Six out of the eight species of spiders which were collected in the Farquhar islands, have a wide distribution. Another species (*Rhitymna valida* Blackw.), occurs besides in the Amirantes and Seychelles, and the remaining species (*Lathrodectus menavodi* Vins.) was only known from Madagascar. An immature example of a species of *Platyoides*, a genus which has representatives in S. Africa and Madagascar, was also collected in Farquhar.

From the islands of the Chagos group, nine species of spiders were obtained. Five of them belong to species which have a wide range in the tropics. Another species (*Scytodes velutina* Lowe) is known to occur in the Canary islands, in many parts of Africa, in Madagascar and in the Seychelles. Two of the others (*Carrhotus viduus* Thor., and *Gasteracantha brevispina* Dol.) have a wide distribution in the Oriental region; the former has been recorded from the Laccadives (Minikoi) and the latter from both the

Maldives and the Laccadives, and, as mentioned above, it is also found in the Seychelles (Coetivy). The remaining species (*Argiope anasuja* Thor.), occurs in the Seychelles, Laccadives, and in Southern India, but the specimens from the Seychelles and Chagos belong to a well-marked variety, which differs from the Indian form in coloration.

Apparently the central islands of the Seychelles group are the only ones of those visited by the expedition in which Opiliones are found. Six species belonging to this order have already been recorded from these islands and examples of five of these are present in Prof. Stanley Gardiner's collection. In addition, four new species were obtained, so that ten species of Opiliones are now known from the Seychelles, all of them being peculiar to this group. They all belong to the Opiliones laniatores. It is interesting to note that the family Triænonychiidæ*, which has a number of representatives in S. Africa and Madagascar, does not occur in the Seychelles. From a zoogeographical standpoint the most interesting of the seven genera into which these species fall is *Ibalonius*, which is represented by four species; it has representatives also in New Guinea, Fiji and the Philippines. Four of the remaining genera are peculiar to the Seychelles, but one of them (*Holozoster*) is closely allied to *Ibalonius*. The genus *Sitalces*† occurs besides in the island of Réunion, whilst *Hinzuanius* has a wide distribution but is practically restricted to the countries bordering on the Indian Ocean.

The Pseudoscorpion in the collection (*Feaella affinis*, n. sp.) belongs to a genus, which has been recorded from Portuguese Guinea and Natal. It is probable that this species has been introduced into the Seychelles, whilst clinging to some insect host.

I must express my sincere thanks to Prof. J. Stanley Gardiner for having allowed me to study the material on which this paper is based, and also to Prof. L. Jägerskiöld, Dr J. C. C. Loman, and M. Eugène Simon, for their kindness in lending me specimens of Arachnids from the Seychelles and of closely allied species from other localities.

* This interesting family is considered to be restricted to the Southern continents and neighbouring islands, I take the opportunity to point out that the genus *Sclerobunus* Banks (occurring in the Western United States of N. America and Alaska) also belongs to the *Triænonychiidæ*. Immature specimens of a species from Bassett, Queen Charlotte Island, British Columbia, which either belongs to the genus *Sclerobunus* or to some closely allied genus, are preserved in the Brit. Mus. Coll.

† Some time after this paper had left my hands, my attention was directed to Dr W. Sörensen's report on the Opiliones collected by the Swedish expedition to Kilimandjaro and Meru. In this report Dr Sörensen describes, amongst other novelties, a new genus (*Palpipes*) with two new species, for which he creates a new family (*Palpipedoidæ*), the principal character being that the tarsi of the first and second legs are divided into two joints.

It seems to me that *Sitalces novem-tuberculatus* Sim., and *S. gardineri*, n. sp., are congeneric with these two species described by Dr Sörensen under the name *Palpipes*. The tarsi of the anterior legs of *S. gardineri* are formed exactly as described by Dr Sörensen for his species.

In his well-known paper on the extra-European Opiliones (Zool. Jahrb. (Syst.) 1902, pp. 198 and 200), Dr J. C. C. Loman places the genus *Sitalces* in the family Epedanidæ. I must say here that I, also, think that it belongs to that family. Quite recently, I have received a specimen of an Opilion from Izu, Japan, which resembles the species of *Sitalces* rather closely in structure, the shape of the ocular-tubercle, pectination of the femur of the first leg and granulation of the body being remarkably similar. This Japanese species undoubtedly belongs to a genus (undescribed), which is closely allied to *Sitalces*. The tarsi of its legs are very different from those of *Sitalces*, however, for that of the first has three segments and that of the second four. From this it would appear that the number of the tarsal segments in these Opiliones is, at the most, only of generic importance.

II. LIST OF THE SPECIES.

Araneæ.

		Localities *.
1.	*Conothele*, sp.?	Silhouette.
2.	*Sason seychellanum*, Simon	Silhouette.
3.	*Nesiergus insulanus*, Sim.	Silhouette, Récif.
4.	*Chætopelma gardineri*, n. sp.	Silhouette, Praslin, Félicité.
5.	*Uloborus geniculatus*, Oliv.	Mahé. Egmont.
6.	*Dinopis*, sp.?	Silhouette.
7.	*Scytodes velutina*, Lowe	Mahé. Coetivy. Salomon.
8.	„ *pholcoides*, Sim.	Mahé.
9.	*Platyoides*, sp.	Farquhar.
10.	*Steriphopus lacertosus*, Sim.	Mahé.
11.	*Cryptothele alluaudi*, Sim....	Mahé, Silhouette, Praslin.
12.	*Artema mauriciana*, Walck.	Farquhar. Mahé, Praslin, Bird Island. Coin (Peros).
13.	*Smeringopus elongatus*, Vins.	Siren (Cargados). Farquhar. Poivre (Amirantes). Mahé, Long Island, Praslin. Coetivy. Egmont, Coin (Peros), Salomon.
14.	*Lathrodectus geometricus*, C. L. Koch ...	Establishment Island (Cargados).
15.	„ *menavodi*, Vins.	Farquhar.
16.	*Argyrodes cognatus*, Blackw.	Mahé.
17.	„ *rostratus*, Blackw.	Poivre. Silhouette. Coetivy.
18.	*Tetragnatha nigrigularis*, Simon	Mahé, Silhouette, Praslin, Félicité.
19.	„ *foliifera*, Sim.	Mahé, Silhouette.
20.	„ *mandibulata*, Walck.	Praslin. Coetivy.
21.	„ *modesta*, n. sp.	Mahé, Silhouette.
22.	*Nephila madagascariensis*, Vins.	Astove. Poivre and St Joseph (Amirantes). Mahé, Silhouette, Praslin. Coetivy.
23.	„ *cruentata*, Fabr.	Farquhar. St Pierre. Providence. Mahé, Silhouette, Praslin.
24.	*Argiope trifasciata*, Forsk.	Establishment Island (Cargados). Praslin.
25.	„ *anasuja*, Thor, var. *fletcheri*, var. n.	Salomon, Coin (Peros), Diego Garcia. Mahé (a single specimen only).
26.	*Araneus citricola*, Forsk	Mahé, Silhouette, Praslin.
27.	„ *theis*, Walck.	Farquhar. St Pierre. Mahé, Silhouette, Bird Island. Coetivy. Salomon, Diego Garcia.
28.	„ *rumpfi*, Thor.	Farquhar. St Pierre. Mahé.
29.	*Arachnura*, sp.	Silhouette.
30.	*Cyclosa insulana*, Costa	Mahé.
31.	*Gasteracantha brevispina*, Dol.	Coetivy. Salomon, Coin (Peros).
32.	*Firmicus marginatus*, Sim.	Mahé, Silhouette.

* [Mahé, Silhouette, Praslin, Félicité and Récif are among the larger granite islands of the Seychelles. Long and Anonyme are islands in the fringing reef of Mahé. Bird and Dennis are coral islands on the N. edge of the Seychelles bank. Coetivy is a coral island lying to the S.E. of the Seychelles from which it is separated by comparatively deep water. Poivre, St Joseph, Darros and Desroches are islands of the Amirantes to the S.W. of the Seychelles. Providence, St Pierre, Farquhar and Astove are isolated coral islands between the last and Madagascar. Cargados lies due N. of Mauritius, and the atolls of the Chagos group are Peros, Salomon, Egmont and Diego Garcia. J. S. G.]

		Localities.
33.	*Phrynarachne*, sp.?	Mahé, Silhouette.
34.	*Selenops secreta*, n. sp.	Mahé, Long Island, Silhouette.
35.	*Rhitymna valida*, Blackw.	Farquhar. Desroches, Darros, St Joseph, Poivre. Mahé, Silhouette, Praslin, Bird Island, Dennis Island.
36.	*Heteropoda regia*, Fabr.	Desroches, Poivre. Mahé, Praslin, Bird Island, Dennis Island. Diego Garcia, Coin (Peros), Salomon.
37.	*Rhacocnemis guttatus*, Blackw.	Mahé, Silhouette.
38.	„ *elegans*, n. sp.	Mahé, Silhouette.
39.	*Thomasettia seychellana*, n. sp.	Mahé, Silhouette.
40.	*Clubiona nigromaculosa*, Blackw.	Anonyme Island.
41.	„ *mahensis*, Sim.	Mahé, Silhouette.
42.	*Voraptus tenellus*, Sim.	Mahé, Silhouette.
43.	*Lycosa urbana*, Cambr.	Astove. St Pierre. Mahé, Praslin, Félicité.
44.	*Asemonea pallens*, Blackw.	Mahé, Silhouette, Dennis Island.
45.	*Hispo striolata*, Sim.	Mahé, Silhouette.
46.	*Baviola braueri*, Sim.	Mahé, Silhouette.
47.	*Myrmarachne constricta*, Blackw.	Mahé, Silhouette, Praslin, Dennis Island.
48.	*Carrhotus viduus*, C. L. Koch	Coin (Peros).
49.	*Plexippus paykulli*, Aud.	Siren, Establishment Island (Cargados). Bird Island. Coetivy.

Opiliones.

1.	*Ibalonius inscriptus*, Loman	Mahé, Silhouette, Praslin.
2.	„ *karschii*, Lom.	Mahé.
3.	„ *flavopictus*, n. sp.	Mahé.
4.	„ *lomani*, n. sp.	Silhouette.
5.	*Holozoster ovalis*, Lom.	Mahé.
6.	*Sitalces gardineri*, n. sp.	Mahé.
7.	*Mitraceras crassipalpum*, Lom.	Mahé, Silhouette.
8.	*Hinzuanius parvulus*, n. sp.	Praslin.
9.	*Acudorsum albimanum*, Lom.	Mahé.

Pseudoscorpiones.

1.	*Feaella affinis*, n. sp.	Silhouette, Praslin.

So far as I am aware, the only other species of Pseudoscorpion, which has been found in the islands, is *Garypus insularis* Tullgr.

III. THE NEW SPECIES, WITH NOTES ON SOME INCOMPLETELY KNOWN SPECIES.

Araneæ.

3. *Nesiergus insulanus*, Sim.

Nesiergus insulanus, Sim., Hist. Nat. Araign., Vol. ii. (1903) p. 928.

♀. *Carapace* much longer than wide, and about equal in length to the patella and tibia (together) of the first or fourth legs; the cephalic part considerably elevated. Eyes of anterior row slightly procurved and equidistant from one another; the medians rounded and of considerably larger size than the elongated laterals. Apex of *labium* and the inner angles of the *maxillæ* furnished with numerous spinules. *Legs* 4, 1, 2, 3. Anterior legs unarmed except for a single apical spine on the ventral side of the metatarsi; the tibiæ and metatarsi of the posterior legs armed with a number of spines. Patella and tibia of first leg (together) slightly longer than those of the fourth. Patella and tibia of third (together) slightly shorter than the metatarsus of the fourth. *Spinnerets* very short, the distal segment conical in shape and shorter than that which precedes it.

Measurements in mm. Length of body 15, of carapace 8·5, greatest width of carapace 6, length of first leg (from base of femur) 22·5, of second 19·5, of third 17·25, of fourth 25·25.

Material. An adult female example from Silhouette, and three young examples from Récif (H. P. Thomasset).

4. *Chætopelma gardineri*, n. sp. (Fig. 1).

Colour: russet brown, the carapace yellowish to yellowish brown.

Carapace. Fovea of small size and very slightly recurved. Anterior row of eyes much more strongly procurved than is the case in *C. olivaceum* C. Koch; the anterior medians slightly further apart from one another than from the elongate anterior laterals, and of smaller size than them.

Legs: less hairy than those of *C. olivaceum*, and the anterior surface of the trochanter and of the femur of the first and second legs (and the posterior surface of the trochanter and femur of the palp) are not furnished with a scopula. Scopulæ of the metatarsi and tarsi of the anterior legs undivided; those of the tarsi of the third and fourth divided by a line of setæ; that of the metatarsus of the fourth occupies about half the length of the segment and is interspersed with long pale-coloured hairs. Tibia of second leg armed below on the outer side towards the base, with a pair of spines as in *C. olivaceum*, but the spine which is present in the middle part of the tibia in that species is absent. The armature of the other legs is the same as in *C. olivaceum*.

Fig. 1. *Chætopelma gardineri*, n. sp. Palpal organ from the outer side.

♂. *Carapace*: about equal in length to the patella and tibia of the second leg and to the metatarsus of the fourth, and shorter than the patella and tibia of the first or fourth.

Palp. Spine of palpal organ long and fine, but shorter than in *C. olivaceum*; its point blunt and very slightly enlarged (Fig. 1).

Legs. Tibial spurs of first leg resembling those of *C. olivaceum* very much in general appearance, but the outer spur is more strongly curved, and the spines of the longitudinal series are only nine in number. Inner spur stouter than that of *C. olivaceum*. Metatarsus of first leg straight.

Measurements in mm. Length of carapace 11, of patella and tibia of first leg 13, of patella and tibia of fourth 13, of metatarsus of fourth 11·5.

♀. *Carapace*: usually about equal in length to the patella and tibia of the first leg and a little shorter than the patella and tibia of the fourth.

Measurements in mm. Length of carapace 10·25, of patella and tibia of first leg 10·5, of patella and tibia of fourth 11·25, of metatarsus of fourth 9.

Material. A single male (the type) and several females from Silhouette. Females and immature examples from Mahé, Praslin and Félicité.

Remarks. The genus *Chætopelma* is known to occur in Egypt, Syria, Central Arabia, and German East Africa (Bagamoyo).

18. *Tetragnatha nigrigularis*, Sim.

Tetragnatha nigrigularis, Sim., Ann. Soc. Ent. France, lxvi. p. 377 (1897).

Material. Numerous examples from Mahé, Silhouette, Praslin, and Félicité.

Remarks. A minute anterior tooth is present below on the chelicera in the female of this species; and there are 9—12 inner teeth, besides the large tooth. *T. nigrigularis* is closely allied to the species from Fiji, Tonga, and Samoa, which was referred with doubt by Keyserling and Koch to *T. mandibulata*, Walck., and to which the name *T. keyserlingii* was subsequently given by Simon*.

20. *Tetragnatha mandibulata*, Walck.

Tetragnatha mandibulata, Walck., Ins. Apt. ii. p. 211 (1841): *T. minax*, Blackw., Proc. R. Irish Acad. Ser. 2, iii. (1877) p. 20, pl. 2, fig. 14: *T. minax*, Sim., Bull. Soc. Zool. France, xviii. (1893) p. 206.

Material. Several specimens from Coetivy and Praslin.

Remarks. This species has already been recorded from Burma to the Sandwich islands. A number of female specimens from Mauritius (Keyserling Coll.) are preserved in the British Museum. They were identified as *T. protensa* by Keyserling†. Judging from the figure that he gives, the male belongs to some other species; unfortunately the

* Ann. Soc. Ent. France, Sér. 6, x. (1890) p. 134. The references to the descriptions by Keyserling and Koch are given by Simon in this paper.

† Verh. z.-b. Wien. xv. p. 847, pl. 21.

male is no longer present in his material. Examples of the true *T. protensa*, Walck., from Mauritius (collected by Mr T. W. Eyre) are also present in the Brit. Mus. Coll., so that it appears that both species occur in the island.

21. *Tetragnatha modesta*, n. sp. (Fig. 2).

Colour. Carapace fawn colour; maxillæ, labium and sternum infuscate.

Abdomen greenish, and densely sprinkled with minute whitish specks, its dorsal surface marked with five pairs of dark lateral spots, which are arranged in two longitudinal series. Legs greenish brown.

Carapace very long and narrow; the central impression and grooves similar to those of *T. geniculata* Karsch. Median eyes occupying a quadrate area; the anterior medians larger than the posterior medians. Posterior laterals a little smaller than the posterior medians, but slightly larger than the anterior laterals; the lateral eyes being separated from one another by an interval which is greater than the diameter of a posterior lateral.

Fig. 2. *Tetragnatha modesta*, n. sp. Chelicera from below.

Abdomen very long and slender.

Chelicera rather short, the first (distal) tooth of the ventral row being of moderate size and separated by a considerable gap from the ten remaining teeth of the row, which form a continuous series; the two distal teeth of the continuous series of fairly large size, but the others minute. The first tooth of the upper row is a little larger than the first of the lower, and, like it, is separated by a gap from the remaining teeth of the row, but the gap is much greater than is the case in the lower row. The remaining teeth of the upper row are five in number, and the distal one is of fairly large size; they follow one another closely, progressively diminishing in size. Fang of chelicera furnished ventrally, at a little distance from its base, with a strong curved tooth, and also with a minute tubercle at the base (Fig. 2).

Measurements in mm. Length of carapace 2·25, of abdomen 7.

Material. A female specimen (the type) from Mahé, and several others from Silhouette.

Remarks. This new species of *Tetragnatha* is very closely allied to *T. geniculata*, Karsch (a species which occurs in Ceylon and India), but the fang of the chelicera is not geniculate and the armature of the proximal segment of the chelicera is also a little different.

25. *Argiope anasuja*, Thor. (Fig. 3).

Argiope anasuja, Thor., Ann. Mus. Genova, xxv. (1887) p. 162.

var. *fletcheri*, n. var.

This variety differs from the Indian specimens of *A. anasuja* preserved in the British

Museum, in the following respects. The more posterior of the two dark narrow transverse lines, which are present on the pale anterior trapezoidal area of the abdomen, runs backwards on each side so as to join the broad dark central band; a small median pale-coloured patch, which may become divided into two, is thus separated off from the rest of the pale trapezoidal area (Fig. 3).

Fig. 3. *Argiope anasuja* var. *fletcheri*, n. var. Dorsal view of abdomen.

Material. Fourteen examples from Salomon, two from Coin (Peros), a single example from Diego Garcia (Point Marianne) and another from Mahé.

All of them are females.

Remarks. *Argiope anasuja* is known from the south of India and from the Maldives. I have not had the opportunity of comparing examples from the last mentioned locality with my material.

34. *Selenops secreta*, n. sp. (Fig. 4).

Colour brownish, carapace with a broad longitudinal yellowish (or yellowish brown) band occupying the centre; the sides dark brown, variegated with a number of yellowish specks. Femora of legs marked above with yellowish bands, the other segments of the legs with pale spots above; in the paler specimens (badly preserved) the yellowish markings are indistinct.

Carapace about as wide as long.

Chelicera armed in a similar manner to that of *S. radiatus* Latr., and the armature of the tibiæ and metatarsi of the anterior legs also the same as in that species.

Fig. 4. *Selenops secreta*, n. sp. Tibial apophysis of palp from below.

♂. The row formed by the four anterior *eyes* is only very slightly recurved, and these eyes are of larger size than is the case in *S. radiatus*, the inequality in size* between them and the posterior laterals being less marked than in that species. Moreover the anterior medians are only a little smaller than the anterior laterals, and the space which separates the medians from one another is very much less than the diameter of the eye.

Palp. Tibial apophysis very different in shape to that of *S. radiatus*. It is strongly excavated below, the margin of the excavation being produced on its inner side into a rather long and slender process; a minute intermediate tubercle is present on the sharp edge (of the margin) which intervenes between this process and the main (upper) cusp of the apophysis (Fig. 4).

Measurements in mm. Length of body 9·75, of carapace 4·5, breadth of carapace 4·5, length of first leg 23, of second 22·5, of third 22·5, of fourth 23. In the other male

* The relative size of the eyes and the distances which separate them from one another are subject to considerable variation in this species.

specimen length of body 10, of carapace 4·5, breadth of carapace 4·25, length of first leg 22·5, of second 24·5, of third 21·5, of fourth 22·5.

♀. Anterior *eyes* further apart from one another than in the male, and the difference in size between the medians and the laterals a little more pronounced.

Vulva very similar to that of *S. radiatus*, but the anterior part of it rather more strongly chitinized.

Measurements in mm. Length of body 15·5, of carapace 6, breadth of carapace 6, length of first leg 22·75, of second 24·5 (that of the other side 21·75), of third 22·5, of fourth 23·5.

Material. Two males (one of which has been selected as the type) and several females and immature examples from Mahé; females and immature examples were also obtained from Long Island and Silhouette.

Remarks. According to M. Simon, *Selenops radiatus*, Latr., occurs also in the Seychelles, but no specimens of this species were collected by Prof. Stanley Gardiner's Expedition.

3♂. *Rhacocnemis elegans*, n. sp. (Fig. 5 A, B).

This species resembles *R. guttatus*, Blackw., so closely that I have not thought it necessary to give a detailed description of it. It differs from *R. guttatus* in the following respects:

Size larger. Carapace paler in colour and with eight central spots more distinct. *Tibial apophysis* of the palp of the male straighter and its basal portion much inflated, the terminal part being slender; a small dark tooth, which is bifid apically, is present on the tibia, to the inner side of the apophysis (Fig. 5 A).

A. B.

Fig. 5. *Rhacocnemis elegans*, n. sp. A. Tibial apophysis of palp from below. B. Vulva.

Vulva more produced than is the case in the female of *R. guttatus* and differing somewhat in shape (Fig. 5 B).

Measurements in mm. Length of body of male 11·75, of female 16.

Material. An adult male from Mahé, and six specimens from Silhouette, two of them being adult females and one an adult male.

THOMASETTIA, n. gen.

Carapace a little longer than broad, highest posteriorly and sloping downwards to the ocular region; a short median, longitudinal impression is present in the hinder part. Eyes of anterior row sub-equal in size, equidistant from one another and slightly recurved.

Eyes of posterior row almost straight, the posterior medians smaller than the posterior laterals and closer to one another than to them. Width of clypeus about equal to the diameter of an anterior eye.

Labium broader than long.

Metatarsi of anterior *legs* furnished with a single pair of spines, which are situated at a little distance from the proximal end of the segment.

According to M. Simon, who has kindly examined a couple of specimens of this new genus, which I sent to him, it is very closely allied to *Pleorotus* Sim. and is a little intermediate between that genus and *Theleticopis*.

39. *Thomasettia seychellana*, n. sp. (Fig. 6 A—C).

Colour. Carapace pale brown, faintly marked anteriorly and in the middle with fine palish longitudinal stripes, and with a radial series of pale streaks or spots towards the middle; its lateral margins also faintly marked with a series of pale dots and the hinder margin palish (Fig. 6 B). Sternum and ventral surface of coxæ and trochanters of legs pale brown in colour. Femora of legs also pale brown and marked with yellowish bands;

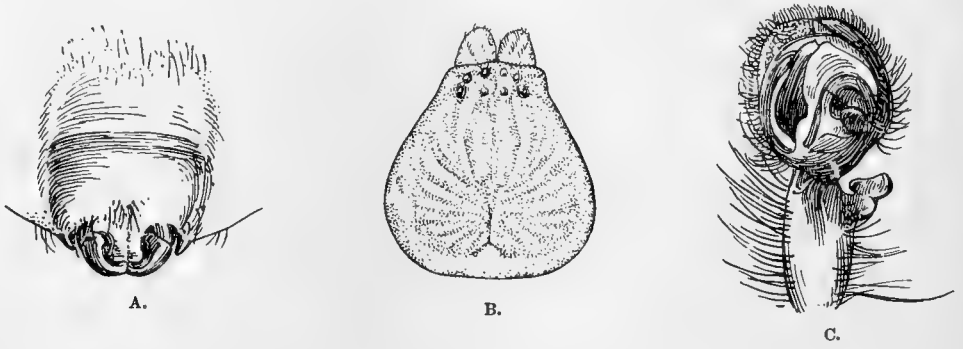


Fig. 6. *Thomasettia seychellana*, n. sp. A. Vulva. B. Carapace. C. Palpal organ from below.

the distal segments (with the exception of the tarsi) are a deeper shade of brown than the femora. In a number of specimens the abdomen is almost quite dark above, but even in these specimens traces of a pattern, picked out in yellowish brown, are usually present. In the paler examples (especially the young ones), in which the abdomen is distended, the ground colour of the abdomen is rather pale yellowish brown (both above and below), the dorsal surface and the sides being speckled with dark brown, the central specks above often uniting to form V-shaped markings, which are arranged in a longitudinal series.

Chelicera. Three teeth are present on the lower side of the fang-groove, the inner one of them is much smaller than the other two and is separated from them by a short interval. The teeth above the fang-groove are also three in number.

Legs. Tibiæ of anterior legs furnished with five pairs of spines below; tibiæ of posterior legs with three pairs below.

♂. *Carapace* very slightly longer than the tibia of the first leg and equal in length to the tibia of the second and to the metatarsus of the fourth.

Palp. Patella and tibia of palp about equal in length. Tibial apophysis bifid, the upper part of it being curiously shaped; inner side of the lower surface of the tibia also

somewhat produced. Tarsal organ complicated in structure (for further details of the tibia of the palp and of the tarsal organ see Fig. 6 c).

Measurements in mm. Length of body 14, of carapace 7, breadth of carapace 6, length of first leg (from base of femur) 25·5, of second 27, of third 22, of fourth 24·25.

♀. Very similar to the male, but with shorter legs (for the structure of the vulva, see Fig. 6 a).

Measurements in mm. Length of body 15, of carapace 7·25, breadth of carapace 6·5, length of first leg 22·5, of second 24, of third 20, of fourth 22·5.

Material. Numerous examples from Mahé and Silhouette (including an adult male (the type) and several adult females). A few specimens, which probably belong to the same species, were collected on Praslin; the vulva is slightly different in shape in the only adult example.

Remarks. This species varies much in size, the carapace of the adult female varying from 4—7·25 mm. in length, yet an immature specimen in the collection has the carapace 6·5 mm. in length.

Opiliones.

1. *Ibalonius inscriptus*, Loman (Fig. 7).

Material. Numerous examples from Mahé and Silhouette, and a few from Praslin.

Remarks. The pattern formed by the dark markings of the scutum is essentially the same in the forms described by Mr Loman under the names *I. bimaculatus* and *I. inscriptus* (see Fig. 7). The two large pale-coloured spots which form so conspicuous a feature of the more typical examples of the former are replaced in others by minute and inconspicuous spots or streaks. It is evident therefore that this character cannot be relied upon to distinguish this species from *I. inscriptus*. There do not seem to be any constant structural characters by which it is possible to separate these two forms from one another, and I think that they should be regarded as belonging to a single species.

Fig. 7. *Ibalonius inscriptus*, Loman. Dorsal view of body.

In many of the specimens the scutum is only armed with the five principal spines. In others it is furnished with a number of small additional processes or tubercles; a pair of them being situated in the middle of the posterior part of the cephalothoracic area, and in the middle of each of the abdominal segments except the last, which has a single median tubercle, besides the large spines. An outer pair of tubercles is also present in these specimens on the second abdominal segment or on both the first and second abdominal segments. Some of the individuals from Mahé in which these additional tubercles are present are very dark in colour and the bands on the legs are scarcely visible, moreover the dorsal surface seems to be more convex in these specimens than is usually the case in *I. inscriptus*.

3. *Ibalonius flavopictus*, n. sp. (Fig. 8).

Colour. Ground-colour of scutum pale yellowish white; its sides much obscured with

blackish markings, which are fused to form continuous dark patches on the cephalothoracic area and first abdominal segment, the centre of these divisions of the scutum being occupied by a well-defined and almost rectilinear band of yellowish ground-colour. Posterior segments with the dark markings more isolated; the bases of the central spines of these segments are ringed round with black (Fig. 8). Ventral surface often darkened, but the coxæ and trochanters are pale in colour. Distal segment of chelicera pale-coloured; palps slightly darkened; the legs banded.

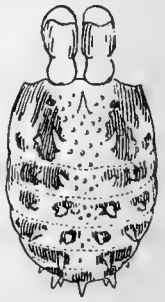


Fig. 8. *Ibalonius flavopictus*, n. sp. Dorsal view of body (Cheliceræ diagrammatic).

Scutum. Grooves of scutum rather indistinct. In addition to the large anterior (unpaired) thorn, the cephalothoracic area is furnished posteriorly with a row of thorns and conical tubercles, and a somewhat similar row is present on each of the abdominal segments. These projections usually diminish in size towards the outsides of the segments, the central pairs being of rather large size. The anterior (unpaired) thorn and the central pair of the row in the hinder part of the cephalothoracic area are especially long, and the thorns placed on either side of the central pair of the series on the third abdominal segment are also very long, sometimes almost equalling them in length. The projections of the row in the hinder part of the cephalothoracic are six in number, the four outer ones being of very small size. Those of the first and second abdominal segments number eight, the central pairs being of moderate size. The projections on the third abdominal segment are also eight in number, but, as mentioned above, in this row those placed next to the central pair are much the largest. Those of the fourth abdominal segment are six in number, the central pair being of moderate size. Three large thorns are present in the middle of the fifth abdominal segment, which is the last of the scutum. A number of scattered granules are present, especially round the large anterior thorn, but most of the surface is free from granules.

Each of the *free abdominal segments* is furnished with a row of small thorns or tubercles.

Palp slightly longer than the body, its armature very similar to that of *I. inscriptus*, Lom. Femur with a single inner spine at the distal end and with 4—5 outer spines below; patella with two inner and one outer, tibia with three inner and three outer, tarsus with two inner and two outer, and with a pair of minute spines (at the distal end) besides.

Legs. Femur of first leg furnished with five long ventral spines, and with a number of tubercles and spines above. Patellæ of legs of all four pairs with a pair of small conical tubercles at the distal end above, each of which bears a hair (smaller tubercles are sometimes present behind this apical pair, and at the apex of the femora). Number of tarsal segments (in the adult example) 3, 9, 5, 5.

Measurements in mm. Length of body 2·5, of palp 2·75.

Material. An adult male example (the type) from Mare aux Cochons, Mahé, and three young examples from the Forêt Noire district, Mahé.

Remarks. Very closely allied to *I. inscriptus*, Lom., chiefly differing in the coloration of the dorsal surface, in the presence of a pair of small conical tubercles on the patellæ of

the legs, and also in the armature of the dorsal surface, but the last-mentioned character is subject to considerable variation in the species of *Ibalonius* and must be used with caution.

4. *Ibalonius lomani*, n. sp.

Colour dark brown, the tarsi pale yellowish.

Scutum strongly convex, and with its surface roughened throughout by minute granules; the grooves ill-defined. Four pairs of long thorns are present, besides the long median anterior thorn; the first pair is situated in the hinder part of the cephalothoracic area, a little in front of the slight groove which indicates the boundary between cephalothorax and abdomen; the remaining pairs occur on the second, third and fifth abdominal segments respectively. The thorns of the first and third pairs are very long, those of the third pair being slightly the longest, and much further apart from one another than is the case with the others.

Ventral surface. Coxæ more closely granular than is the case in *I. inscriptus*; the sternites are also granular.

Palp slightly shorter than the body; its armature is exactly similar to that of *I. flavopictus*, n. sp.

Legs of moderate length. Femur of first furnished with a row of tubercles and spines both above and below. Number of tarsal segments 3, 8, 5, 5.

Measurements in mm. Length of body 3·25, of palp 3.

Material. A single specimen of the male sex from Silhouette.

Remarks. This species is closely allied to *I. inscriptus*, Lom., chiefly differing in that the surface of the scutum is closely granular; the spinal armature of the scutum is also different.

Genus Sitalces, Sim.

Scutum convex, the cephalothoracic area being a little more elevated than the rest of the scutum and separated from it by a well-marked groove. Ocular tubercle high and conical and armed with two or three conspicuous prominences, which are arranged in a longitudinal series; eyes situated at the base of the tubercle.

Palp rather weak and armed with spines, which, with the exception of the two strong basal spines of the femur, are not borne on processes.

Legs. Femur of first leg pectinate.

6. *Sitalces gardineri*, n. sp. (Fig. 9).

Colour pale yellowish brown. Scutum faintly marked with an irregular fuscous pattern: the posterior plates of the ventral surface (and the last abdominal plate) are also fuscous.

Scutum. Grooves rather indistinct, with the exception of that which forms the

boundary between the cephalothoracic area and the rest of the scutum. Ocular-tubercle of large size and furnished dorsally with three prominences, which are arranged in a longitudinal series; the anterior one being very long and pointing forwards and upwards; the second very much smaller; and the posteriormost minute and tubercular (Fig. 9). The whole surface of the scutum is covered with large and conspicuous granules, each of which carries a short and stout hair. A pair of enlarged and almost tubercular granules is present in the middle of the second abdominal segment, they are separated from one another by an interval equal to their diameter. Another pair, which are slightly further apart from one another, are placed in the middle of the third. Slightly enlarged granules, which are also paired, occur on the first and fourth abdominal segments, and the granules of these pairs are further apart from one another than those of the second and third segments. A number of the granules of the middle part of the cephalothoracic area are also enlarged. Posterior margin of the scutum furnished with three conspicuous projections (the middle one being much the largest), and also with enlarged granules.

Fig. 9. *Sitalces gardineri*, n. sp. Ocular-tubercle from the side.

Ventral surface furnished with granules similar to those of the upper surface, but of smaller size. Coxa of fourth leg a little broader and much longer than the coxæ of the other legs; the anterior side of the free part of the segment with 5—6 little projections, and the dorsal side with a somewhat larger projection.

Palp rather weak and shorter than the body. Femur armed below, at the proximal end, with two spines, and with a distal spine on the inner side. Patella about half the length of the femur, about equal in length to the tibia, and a little shorter than the tarsus; it is armed with two inner spines and with a minute outer spine. Tibia with three inner and two outer spines. Tarsus much longer than the claw and furnished with three spines on each side, the distal pair being much more slender than the others.

Legs of moderate length. Femur of first pectinate both above and below, the teeth in the dorsal series 13 in number, those in the ventral series 11—12 in number; its trochanter with 1—2 small dorsal prominences and with three small ventral prominences.

Measurements in mm. Length of body 2·75, of palp (from base of femur) 1·7.

Material. A single mutilated female example from Mahé.

Remarks. M. Eugène Simon, to whom I sent a sketch of the ocular tubercle of the new species described above, kindly informs me that I am right in thinking that it belongs to the genus *Sitalces*. According to Loman, however, the two species of this genus (both of which are from the island of Réunion) probably belong to different genera. Judging from Simon's description I should say that this is very possibly the case, but I have not examined specimens of these species, and therefore I am unable to express a definite opinion upon them. There is little doubt, however, that the species from the Seychelles is closely allied to *S. novem-tuberculatus*, Sim., and I propose to regard the latter as the type-species of the genus *Sitalces*.

8. *Hinzuanius parvulus*, n. sp. (Fig. 10).

Colour. Body dark brown; distal ends of the tibiæ of the second and fourth legs white; the distal tarsal segment of the third and the distal end of the metatarsus and the tarsal segments of the fourth are also pale-coloured; the remaining segments of the legs being dark brown in colour.

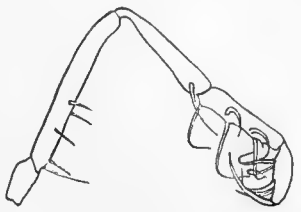


Fig. 10. *Hinzuanius parvulus*, n. sp. Palp from the inner side.

♀. *Scutum.* Dorsal surface of scutum and free segments roughened with minute granules and entirely unarmed. Eyes situated on the outer sides of very slight elevations, and very widely separated from one another; they are separated from the lateral margins of the scutum by an interval which is rather less than twice the diameter of an eye. Cephalothoracic area marked off from the rest of the scutum by a deep groove; a fine transverse groove is also present a little in front of the posterior margin of the scutum, and it is connected with the anterior transverse groove by a pair of fine lateral (longitudinal) grooves (one on each side of the scutum), which run parallel to the outer margins, and are continued a little distance forwards (after joining the anterior transverse groove), coming to an end below the eyes.

Palp very long and slender. Femur of great length and armed below with a few minute spines. Patella longer than tibia, and with only a very short narrowed portion at the base, the rest of the segment gradually increasing in stoutness; it is armed with a single apical spine on the inner side. Tibia with two inner and three outer spines. Tarsus equalling the claw in length and armed with two spines on each side (Fig. 10).

Legs. Proximal tarsal segment of the two posterior pairs of legs longer than the four distal segments together. Number of tarsal segments 3, 5, 5, 5.

Measurements in mm. Length of body 2·25, of palp (including trochanter), 3·9.

♂. Resembling the female very closely in colour and in almost all the structural details also. The structure of the tarsi of the posterior legs is strikingly different, however; the number of tarsal segments of these legs is the same as in the female, but the second segment of the tarsus of the third leg is much swollen and about twice as long as the proximal segment; whilst the corresponding segment of the fourth leg is a little swollen, but is shorter than the proximal. The mandibles are not enlarged, but the genital operculum is distinctly narrower than in the female.

Measurements in mm. Length of body 2·25.

Material. Two females and a male from Praslin.

Remarks. The genus *Hinzuanius* is practically confined to the countries bordering on the Indian Ocean. In the Oriental region, species have been recorded from Sumatra, the Malay Peninsula, Burma and India. In the African continent and neighbouring islands, species are known from Abyssinia, the islands of Socotra and Abd-el-Kuri, Natal, Cape Colony, and from Madagascar.

The new species from the Seychelles does not appear to be very closely allied to any of the previously described species of the genus. The chief characters by which it may be

distinguished from them are the position of the eyes, which are situated very near to the lateral margins of the scutum, the shape and proportions of the segments of the palp (especially the shape of the patella) and the coloration of the legs.

PSEUDOSCORPIONES.

1. *Feaella affinis*, n. sp. (Fig. 11).

Colour reddish brown, the legs and the fingers of the palp paler in colour than the rest of the animal.

Cephalothorax much longer than broad. Prominences of the anterior part the same in number as those of *F. mucronata*, Tullgr., and very similar to them in appearance, but the lateral ones of the anterior row are much broader than the central ones (Fig. 11). A pair of small lateral tubercles are present as in *F. mirabilis*, Ell., and *F. mucronata*. Two transverse depressions or furrows are present; the anterior one, which is situated immediately behind the second row of prominences, is shallow and recurved; the posterior one is rather deep and well marked, and is separated from the anterior furrow by a somewhat elevated area. A slight furrow also occurs between the two rows of prominences. Very similar grooves are present in *F. mucronata*, but they have not been described. Eyes (of each pair) separated from one another by a space which is a little less than the diameter of an eye.

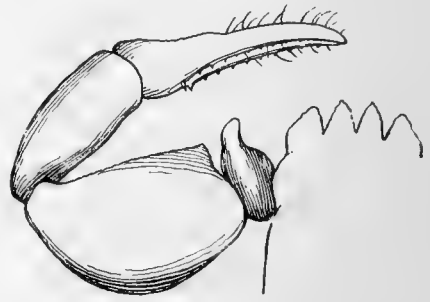


Fig. 11. *Feaella affinis*, n. sp. Palp from above (the anterior row of prominences of the cephalothorax is also shown).

Abdomen resembling closely that of *F. mucronata*; it is as broad as long, and the sculpturing of the tergites is reticulate.

Palp very similar in structure to that of *F. mucronata*, but the spine on the anterior edge of the trochanter is shorter, as compared with the width of the segment, than is the case in that species, and there is only a very slight prominence on the anterior side of the base of the femur. Length of hand (including immovable finger) equal to or a little longer than that of the femur (Fig. 11).

Legs. Trochantin of first leg about equal to the femur in length; tibia shorter than the femur; tarsus very long and considerably exceeding the other segments of the limb in length. Trochantin of fourth leg about half the length of the femur; the latter a little shorter than the tibia or tarsus. A gap is present between the coxæ of the first two legs, much as in *F. mucronata*.

Measurements in mm. Length of cephalothorax ·55 (in the largest example ·64), of abdomen 1·06, of femur of palp ·4, greatest breadth of femur of palp ·28, length of tibia ·37, of hand (including immovable finger) ·46.

Material. Seven specimens from Silhouette and Praslin.

Remarks. The genus *Feaella* was instituted by Mr Ellingsen in 1906, for a highly peculiar species of Pseudoscorpion (*F. mirabilis*, Ell.) collected by the late Sig. Fea in

Portuguese Guinea. A second species (*F. mucronata*, Tullgr.) was collected in Natal by Dr Trägårdh. The new species is very closely allied to the latter species, the principal differences being that the lateral prominences of the anterior margin of the cephalothorax are broader than the middle ones, and that the palp is less strongly armed. These differences are, perhaps, not important enough to be regarded as of specific value, and it is possible that this form should be regarded as a local variety of *F. mucronata*.

IV. LITERATURE.

The following is a list of the papers which contain descriptions of Seychelles Arachnida (belonging to the orders Araneæ, Opiliones and Pseudoscorpiones). Nos. 1—3 deal exclusively with Seychelles Arachnida.

1. A List of Spiders captured in the Seychelles Islands, by Prof. E. Perceval Wright, M.D., F.L.S.; with descriptions of Species supposed to be new to Arachnologists, by John Blackwall, F.L.S. Notes and Preface by the Rev. O. P. Cambridge, M.A., C.M.Z.S., *Proc. R. Irish Acad.* Ser. 2, Sci. iii. (1877) pp. 1—22, pls. 1 and 2.

2. Mission scientifique de M. Ch. Alluaud aux Îles Seychelles (mars, avril, mai 1892), Arachnides, by M. Eug. Simon, *Bull. Soc. zool. France*, xviii. (1893) pp. 204—211.

3. Études Arachnologiques, 29th Mémoire. Arachnides recueillis en 1895 par M. le Dr Brauer (l'Université de Marburg) aux Îles Seychelles; par M. Eug. Simon. *Ann. Soc. Ent. France*, lxvi. (1897) pp. 370—388.

4. Neue aussereuropäische Opilioniden, by Dr J. C. C. Loman, *Zool. Jahrb.* (*Syst.*) xvi. (1902) pp. 163—216, pl. 9: (Seychelles Opiliones, pp. 189, 200—206, 209—210).

5. *Histoire naturelle des Araignées*, by M. Eug. Simon, Vol. ii. (1897—1903) 1080 pp. (Notes on a number of species from the Seychelles and the original description of a new species (*Nesiergus insulanus*, Sim.) are to be found in this work.)

6. Zur Kenntnis aussereuropäischer Chelonethiden, by A. Tullgren, *Jahrb. Hamb Wiss. Anst.* xxiv. (1906) pp. 21—73, pls. 1—5, *Garypus insularis*, Tullgr. pp. 62 and 63, pl. 5, fig. 19.

No. XIX.—THE STRUCTURE AND FORMATION OF ALDABRA AND NEIGHBOURING ISLANDS—WITH NOTES ON THEIR FLORA AND FAUNA.

By J. C. F. Fryer, B.A., *Balfour Student in the University of Cambridge.*

(Plates **22—29** and Text-Figures 1—3.)

(Communicated by Prof. J. Stanley Gardiner, M.A., F.R.S., F.L.S.)

Read 3rd November, 1910.

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I. INTRODUCTION.

Volumes xii. and xiii. (Ser. 2, Zool.) of the Transactions of this Society contain a series of papers dealing with the various biological problems of the Indian Ocean, and constituting the results of the Percy Sladen Trust expedition in H.M.S. "Sealark," under the leadership of Professor J. Stanley Gardiner. In a previous expedition Stanley Gardiner had investigated the Maldive and Laccadive Archipelagoes, and, before turning to what may perhaps be considered the last expedition of the series, it is necessary to refer in greater detail to its forerunners.

The Maldive and Laccadive expedition was mainly devoted to an elaborate investigation of the formation of those archipelagoes, and the results show that their islands were formed by the elevation of flourishing coral reefs, and that the bases, on which these reefs grew, consist of the remnants of a continental bridge, which connected India and Africa approximately from carboniferous to tertiary times.

The two problems thus involved, that of the formation of coral reefs and of the continental land connection, were considered of such importance that the "Sealark" expedition was organised largely, though not entirely, for their further consideration; many of the islands in the western Indian ocean had never been visited by scientific observers, and their structure in most cases was but vaguely known.

The results of the "Sealark" expedition, taken in conjunction with those of the

previous expedition, show that the Indo-African bridge was in all probability reduced by subsidence to a narrow isthmus or chain of islands, and that then by the power of current erosion it was gradually cut down below sea-level, until at the present day the Seychelles archipelago alone remains above water. With the exception of the above archipelago and Mauritius all the islands visited by the "Sealark" were shown to be coralline in structure, and all indications as to their mode of formation, as in the case of the Maldives, favoured the theory of elevation and not of subsidence.

The "Sealark" expedition, however, found it impossible to investigate one group of islands, which Gardiner*, when classifying the islands of the Indian Ocean, has termed the Farquhar series, though, for reasons which will become obvious, I shall in future refer to it as the Aldabra series. It contains the islands of Aldabra, Assumption, Cosmoledo, Astove, Farquhar, Providence and St Pierre, of which the three latter only were visited by the "Sealark." The whole series lies to the north of Madagascar between longitudes 45° E. and 52° E. and between latitudes 9° S. and 10·5° S., the component islands being separated by from 20 miles (Aldabra and Assumption) to 180 miles (Astove and Farquhar). Of the various islands, Astove, Cosmoledo and Assumption were practically unknown, but Aldabra had become famous as the last home in the Old World of the giant land-tortoise; its land avi-fauna also was known to be peculiar, while contradictory reports made difficult any conception of its structure. In 1907 the analysis of samples of guano, received from the locality, pointed to the existence there of rocks other than those of reef formation, and it therefore appeared possible that a further remnant of the Indo-African bridge might yet be existing on Aldabra. Further investigation seemed desirable, and Professor Stanley Gardiner, who with Mr Hugh Scott was planning a further expedition to the Seychelles, made provision for the author to accompany the expedition and undertake the work of thoroughly investigating the Aldabra series of islands. This paper gives a brief history of the latter work, and the deductions made from it, though the reports of the specialists on the material collected must be consulted for confirmatory or contradictory evidence.

Before turning to the description of the expedition a few more facts of general bearing on the region must be mentioned, while in addition the scanty details of history about the islands may at once be disposed of. They first appear on the charts of the early sixteenth century, Aldabra itself being called Alhadara on the "Carte de Madagaskar d'aprés Pilestrina" in the year 1511. In subsequent charts one or more of the other islands are usually indicated but not sufficiently well to make sure as to which is really intended, though the name Joao de Nova for Farquhar is usually constant. In different times Aldabra is called Ya d'Arena, Y d'Areo, Ilhadara and Adarno, names which appear to indicate sand island—as will be seen later, a most inappropriate designation. Voeltzkow, who visited Aldabra in 1895, makes the reasonable suggestion that the island was first discovered by the Arabs†, who named it Al-Khadhra, "the Green," and the early European navigators, the Portuguese, translated it phonetically to Al-hadara, and so obtained the various names, by which it has since been known. No written records of the islands

* Geographical Journal, Oct. 1906, p. 326.

† Arab craft employed in the slave and other trades regularly plied between Zanzibar and the Comoros in very early times.

appear to exist, but we know that during the French occupation of Mauritius there was a regular trade in land-tortoises, which were much esteemed as food both in the Seychelles and Mascarenes; it is from the captains and ships employed in this trade that the names of the various places on Aldabra have been obtained.

As the tortoises became scarce the trade fell off, and eventually, after the Seychelles became British, was prohibited altogether.

Of scientifically-trained observers the first to visit Aldabra was Dr Abbott, who spent some months there in 1893, and obtained fairly complete collections of the larger forms of life*. Dr Voeltzkow, in the course of his travels in East Africa†, spent a month on the atoll, and made observations on its structure; but neither of these explorers in the time at his disposal was able to penetrate the dense jungle with which it is clothed, and so their observations only apply to scattered areas.

A bird collector for the Tring museum spent a year there, and in 1906 Lord Crawford in the "Valhalla"‡ touched for a day or two; in 1907 Messrs Thomasset and Dupont made a short visit, and obtained samples of the flora, rocks and guano. From a structural point of view, however, the atoll was quite unknown, and as the late Professor A. Agassiz even thought of investigating it himself§, no doubt was felt as to the advisability of further exploration.

Politically all the islands of the series are dependencies of the Seychelles, with the exception of Farquhar, which is under the administration of Mauritius. They are leased by the Crown at an annual rent, the lessee importing labourers and deriving what profit he can from the export of guano, mangrove bark and green turtle. The present lessee is M. D'Emmerez de Charmoy, of Mahé, to whom I am very grateful for permission to visit the islands, and for much assistance when there.

To complete this introduction a few more words must be said as to the general topography of the Aldabra series. Their position has already been roughly defined; it may be pointed out in addition that the neighbouring lands are the Seychelles to the north-east, the Amirantes to the north, Africa to the west, the Comoros, volcanic islands, to the south-west, Madagascar to the south, and the Saya de Malha Bank and the open expanse of the Southern Indian Ocean to the east. Of the various islands, Aldabra is the most westerly; Assumption lies 20 miles to the south-east, and Cosmoledo 70 miles to the east (E. by S.); Astove, the most southerly, is some 20 miles south of Cosmoledo, while 180 miles to the east is Farquhar, to the north of which at distances of about 70 miles are Providence and St Pierre.

Unlike the Maldive or the Seychelles series of islands, the Aldabra series has no shallow bank from which its various members arise, though it may be mentioned that there are indications of a deep bank some 1000 fathoms from the surface of the sea; all the islands therefore are separated by depths of at least 1000 fathoms.

* A short account of Aldabra by Dr Abbott is to be found in the Proc. of the U.S.A. Mus. Vol. xvi., p. 597: in the same volume are papers on the mammals, birds and reptiles which he obtained.

† Wissenschaftliche Ergebnisse der Reisen in Madagaskar und Ost-Afrika.

‡ *Vide* Three Voyages of a Naturalist, Nicoll.

§ The Geographical Journal, Sept. 1910, "The South-West Indian Ocean" (discussion on), Prof. J. Stanley Gardiner.

The ocean currents in the neighbourhood are both uniform in direction and strong (2—4 knots); they run from east to west, varying slightly to the north or south according to the seasons, which are respectively those of the S.E. Trades and of the N.W. Monsoon or calm season. The S.E. Trade winds blow strongly from May to October, and the season is one of drought, during which the vegetation on the islands becomes parched, trees lose their leaves, and life generally seems at a standstill. Owing to the partial coincidence of wind and ocean current, the latter is at its strongest during this season. In November the S.E. Trades break and the calm season sets in, for, though sometimes called the season of N.W. Monsoons, the latter winds rarely extend to such southern latitudes. The rainfall is very heavy, and, as a rule, a dead calm prevails, though at times heavy squalls may spring up from any point of the compass, and very occasionally a cyclone is experienced. The temperature is higher than that of the S.E. Trades, and often stands for long periods at or over 100° F., while the atmosphere is almost saturated. The calm season is the one of activity on the islands both for animals and plants. My visit lasted from August 1908 to February 1909, and both seasons were experienced.

With this introduction I now turn to Aldabra, taking this, the most important, island first.

II. ALDABRA. (Plates **22—27.**)

A. Physical Features. (Plate **22.**)

Aldabra is situated in latitude 9° 22′ 35″ South and in longitude 46° 14′ 41″ East, and thus lies 240 miles from Cape Amber and 600 miles from the Seychelles, while the African coast is distant only some 400 miles. In form the island is an atoll measuring 25 miles long and from 4 to 10 miles wide, the long axis running approximately east and west. In total area the atoll perhaps measures 120 square miles, of which some 60 are land, though, owing to the presence of numerous islands in the lagoon and of a large area of mangrove swamp, half land half water, this estimate cannot be considered accurate.

The land consists of the land-rim, forming the circumference of the atoll, and of the various small islands in the lagoon. The former is unusually perfect, and is divided by narrow passes into four main islands, named respectively Picard, Polymnie, Malabar, and Main or South Island. Picard is a small island situated in the north-west, measuring about 2 square miles, and is divided from Polymnie by the Grande Passe, 750 yards wide, of which about 400 yards are deep channel. Polymnie, another small island about 1 square mile in area, may really be considered part of the larger Malabar Island, from which it is divided by a shallow pass, the Johnny Channel. Malabar itself is some 9 miles long, and averages $\frac{3}{4}$ mile in width; it is divided from Main Island by Passe Houareau, a large pass 400 yards wide, though the actual channel is narrower. Main island varies greatly in width, in the east measuring as much as 5 miles, while at one place in the south it is only $\frac{1}{4}$ mile from the lagoon to the sea: it forms at least two-thirds of the total circumference of the land rim, extending from the north-east round the south of the atoll to the west near Picard Island, from which it is divided by the western channels, a series

of shallow passes broken by small islands, which have obviously been cut away from the adjoining portions of the land rim.

Of the numerous islands in the lagoon immediate reference need only be made to the two largest, Michel in the east of the lagoon and Esprit in the west, of which the former is unimportant, the latter of great geological interest.

Other physical features, to which attention should be called, are the fringing reef and the mangrove swamp; the former extends entirely round the atoll, except that it is divided by the channels (passes) into the lagoon, and is indefinite to the east and south-east, where the sea is shallow for about a mile. The mangrove swamp is found round the shores of the entire lagoon and varies up to a mile in width, occupying all suitable spots between tide marks.

It will doubtless be noticed, without further reference to topographical features, that the atoll is divided into certain definite physical divisions, and for convenience in discussion it is proposed to deal with each separately. These sub-sections will be :—

(1) The land.

(2) The lagoon, comprising the lagoon shores (mangrove swamp) and the passes.

(3) The fringing reef and also the outer slope, though as to the latter very little information can be given.

The animals and plants collected are being dealt with in subsequent papers and so lengthy reference would be out of place in this article: a short section will, however, be devoted to those which are not to be treated later, and to other forms of special interest, or from which definite deductions can be made.

B. Land Topography. (Plates 23—25.)

In this sub-section I propose to give some general description of the superficial features of the land of Aldabra, and then pass on to a more detailed account of its structure. All the various islands of which the atoll is composed are formed entirely of rock, which is usually found quite exposed on the surface, and is rarely covered by soil of any kind: exceptions to this generalisation are found in parts of Picard, Main, Michel and Esprit Islands, where sand has been piled up by the joint forces of wind and wave and forms a thin covering. In addition to this, in former times a large quantity of guano was distributed over the atoll, but now it is only found in holes and crevices, the greater bulk having been washed down by rain-water and to a large extent absorbed into the constitution of the rocks.

The rock itself comprises a variety of limestones, all of coral reef origin, though many have been much altered and phosphatised by the guano referred to above; there is no rock on Aldabra which has persisted from any continental connection and the atoll has had an entirely different origin.

The surface of the rock produces perhaps the most striking impression of anything on the atoll, for, instead of being smooth or slightly rough, it has been attacked by rain-water, which has gradually dissolved much of it away leaving a surface fretted as if by a powerful acid; sharp points, projecting pinnacles and deep pits are found everywhere, making work exceedingly trying. Under these circumstances it might be expected that

the Aldabra flora would be very poor even for a coral island, but this is not the case, for it is covered with a type of vegetation which appears to dispense easily with soil, provided there are crannies and fissures in the rock, into which roots can be driven: this vegetation takes the form of a low jungle or bush 10—20 feet high, which densely clothes every foot of rock.

The average height of the land above high tide-mark is about 12 feet, though an elevation of 15 feet is usually found near the seashore, from which point there is a gradual slope down to the lagoon.

Seaward the land is bounded by rocky cliffs (15 feet high), which are always much overhanging, obviously being washed away by the sea. Large fallen masses of rock are frequent, lying on the reef below, and at intervals caverns pass up into the cliff-face, often to find openings to the surface some distance inland. Where the cliffs have been washed away unevenly, small protected bays are formed and these get partly choked with sand and then form small sand-beaches known locally as "lances," the only landing-places for boats and favourite breeding-grounds of the green turtle (*Chelone mydas*). Within a short distance of the top of the cliffs the bush begins. To explore the country tracks about 6 feet wide were cut across the land-rim through the bush from the sea-cliffs to the lagoon and then by means of smaller paths the land surface on each side was examined. This somewhat laborious method was chosen on account of the extreme density of the vegetation, which is so impenetrable that it is quite impossible to proceed in any direction without employing several men to cut a path; in addition these "sections," as I shall in future term them, proved of great interest as showing the complete dependence of each class of vegetation on the type of rock which supports it.

In order to demonstrate more clearly the types of country encountered, two of these sections may be described, one typical of the north of the atoll and the other of the south.

The typical sectional track across the land-rim in the north of the atoll. This section passes across Malabar Island, about 3 miles from Passe Houareau, and is opposite an island in the lagoon known as Verte. From the sea cliffs the rock at first is moderately rough and strikes the observer forcibly from the fact that it is composed of corals which, though fossil, are but little broken and are undoubtedly in the same relative positions as when alive. This type of rock is always found in the sea cliffs and for some little distance inland. It is usually sparsely covered with sand blown up from the reefs forming a little soil which supports the type of vegetation usually found on coral sand islands; bushes of *Scævola** and *Tournefortia*† are common and at intervals large clumps of screw-pines‡ occur. On the northern part of the land-rim this country is only a few yards wide, and then both rock and vegetation rapidly change; the edge of a dense jungle rises like a wall and thenceforward no natural paths or glades occur and every inch has to be gained at the expense of much time and labour. The rock becomes more rough until its surface resembles a miniature forest of little pinnacles and sharp jagged edges, which make progression difficult. The jungle is composed largely of *Pemphis acidula*, a tree known locally as "almond-tree"; it has a very hard wood and grows so thickly that the bush is

* *Scævola kœnigii.* † *Tournefortia argentea.* ‡ *Pandanus vandermeeschii.*

like a continuous well-grown hedge about 15 feet in height. The trees have a short thick trunk, long slender branches, and are very uniform in size, so that it is impossible to climb a tree and obtain any view of the surrounding country. This type of bush is found wherever the jagged pointed rock occurs, and as the latter from its curious appearance is known* as "champignon," the country is always referred to as "champignon country."

Throughout the northern section the *Pemphis* jungle continues and the monotony is only broken by the frequent occurrence of curious natural pits in the rock; up to within a quarter of a mile of the sea they are partially choked with guano but after this are usually found to contain salt water, which fluctuates tidally, thus showing that the land-rim can be more or less completely traversed by sea-water. Naturally the water dissolves the rock away, and thus the sides of the pits overhang and break down, and the pits are always increasing in size.

After a mile of "champignon," creeks from the lagoon were met with and soon after the mangrove swamp was reached. At the junction of land and swamp are low cliffs 3 or 4 feet high which show the effects of erosion in that they are much overhanging, while small islands and large rocks are continually being cut off from the mainland. After a time the latter take on the mushroom shape typical of erosion; then, the "stalk" of the mushroom breaking down, the rock or island tumbles over and is itself gradually eroded away.

The mangrove swamp measured a quarter of a mile in breadth in the section. It is very flourishing, the trees standing in thick white mud, which may be very shallow or may have a thickness of many feet before rock is reached. The trees usually grow in this mud, but may also be found in numbers on the sides of the rocks and islands, and along the lagoon cliffs: their roots then pass down through holes and cracks in the overhanging portions of the rock to the mud underneath and by increasing in size form powerful instruments for breaking off large masses of rock. At high tide the swamp fills with water, which churns up the white mud and then, as it descends, sweeps it away into the lagoon and the finer particles out to sea, though the larger particles remain as sand in the lagoon until sufficiently triturated and reduced by sand-living animals to be carried away also. The loss in this manner must be very large and, as there is no evidence that the total quantity of mud is decreasing, it appears that rock disintegration must be speedy enough to counterbalance such loss, a subject which must be referred to again later.

The typical section for the south-east of the land-rim. The second section passes from the lagoon near a creek known as Abbot's creek past the wells of Takamaka (see Chart) to the south coast. Beginning again at the sea it is at once noticeable that the cliffs, though formed of the same rock as was noted in the cliffs of the northern section, are not so overhanging and are marked by projecting buttresses, indicative of a slower rate of erosion. Descending to the reef to find a reason for this, the quantity of sand was immediately remarked, and it appears that this sand forms a partial protection against the waves, even though the latter are particularly powerful on this, the windward side of the atoll.

* The language usually spoken is Creôle, a debased and often hardly recognisable French patois.

Inland from the cliffs for some distance sand is again the prominent feature; it has been blown up from the reef and further down the coast forms the high sand hills called "Dunes Jean Louis" and "Dunes de Maistre": in the region of our section it supports a somewhat stunted vegetation of coral-sand plants and forms a definite belt 200—300 yards wide, which may be called the "coast-zone." It is bounded by a rocky ridge 20 feet above sea level, which appeared to be the highest point on the section: thence inland a fresh type of country was met with, for the rock, instead of being of the "champignon" type, is flat and smooth. It is formed of fragments of corals and other organisms consolidated together. Under the influence of the weather it exhibits large pavement-like slabs on the surface and is called "platin" in Creôle. Pits and shallow depressions are frequent, the pits being usually deep and containing tidally fluctuating water; as was noticed on the northern section they are all increasing in size owing to erosion. The shallow depressions are not apparently homologous with the pits, for the latter are natural spaces left in the rock during formation, while the former are due to weathering; they usually contain guano mixed with vegetable humus and support a grove of trees. The vegetation of the "platin" country differs markedly from the *Pemphis* scrub, for it is composed of a large number of trees and shrubs, which form small groves separated by open bushy spaces; near the sea the trees were all much stunted by the prevalent winds, even the hardy *Pemphis* trees being dwarfed into a low thick scrub resembling patches of gorse in consistency. As the section passed further inland and the surface of the ground was lower, the vegetation became more luxuriant, the depressions in the rock serving to retain a little rain-water collected during the wet season. The rock remained of the same nature throughout almost the whole section with the exception of two belts of "champignon," overgrown with *Pemphis*, about $\frac{1}{2}$ and $\frac{3}{4}$ mile from the sea. Near Takamaka are found the only permanent wells of fresh water on the atoll: they consist of pits in the rock about 6 feet deep and 2 or 3 feet wide, with a spring at the bottom; apparently a rather impervious stratum of limestone in the immediate neighbourhood has prevented the ingress of salt water and enough rain falls in the wet season to preserve a steady though small flow in the dry. At Takamaka itself is a grove of large banyan and "takamaka"* trees (40 feet)†, the latter not occurring elsewhere on Aldabra. I suspect that the seeds were originally brought by the tortoise-hunters, who regularly visited the wells for water, though it is just possible that they were brought by birds, as the small pigeon, *Alectrocœnas aldabranus*, eats them greedily.

The section ended in the mangrove swamp at Abbot's creek, which does not differ from any other creek found in the swamp into which it extends for about $\frac{1}{4}$ mile.

Other sections were cut from the lagoon to Point Hodoul, the most easterly part of the atoll; opposite Dunes Jean Louis; in the west of Main Island; on Picard Island; and at other places in the north of the atoll, but detailed description is unnecessary. The whole of the north of the atoll, Polymnie, Malabar, the north of main island, supports only *Pemphis*-bush growing on "champignon" rock. The east of Main Island and south as far as Dunes Jean Louis is of the "platin" type, interspersed with belts and patches of *Pemphis*; from Dunes Jean Louis to Dunes de Maistre there is a wide "shore zone,"

* *Calophyllum Inophyllum.* † Where a number of feet is given in brackets, heights or elevations are intended.

a narrow belt of *Pemphis* and then the swamp. The west of Main Island belongs almost entirely to the "champignon" type of country, though at Couroupa a depression in the rock (2 or 3 acres) has been filled with sand and supports a thick jungle.

Picard Island has a narrow sandy belt along the south-west shore, on which the settlement is situated, and behind is a varied jungle and certain peculiar rocks which will be described later: the north of the island is largely *Pemphis* scrub, though opposite Grande Passe is a small sandy area covered with old *Casuarina* trees, marked on the chart as the "Admiralty Observation Spot."

I have now indicated the general nature of Aldabra and in the next subdivision I propose to deal in greater detail with its component rocks, from which even without expert knowledge certain deductions of great importance can be made.

Mr Hughes, of Bangor University, who has very kindly undertaken their examination, writes (19th June, 1910), "All my work up to the present seems to support your theories completely; I cannot think of any other possible explanation," so his paper, which will appear subsequently, may be expected to confirm the general principles of my deductions, though no doubt he will modify many of my details.

C. Structure*.

The rocks of Aldabra fall naturally into two divisions:

(*a*) those which have a high percentage of calcium in the form of calcium carbonate and are obviously of coral reef origin;

(*b*) certain exceptional rocks in which the acid radical in calcium carbonate has been replaced by phosphoric acid derived from guano.

(*a*) *Coralline Limestones.* There are three classes of coralline limestone, of which the first forms a zone encircling the atoll and constituting the outer portions of the land-rim. It is characterised by being composed very largely of reef corals, which have retained their structure very perfectly, and are in most cases in the position of growth, a phrase which means that the different coral colonies are still in the same positions as when alive and stand on the same bases. This rock therefore has been formed by a reef flourishing beneath the sea. From it we can deduce with certainty that the land has been formed by the elevation of a reef in relation to the surface of the sea, and not by the piling of broken fragments during a long period of subsidence, as is demanded by an explanation based on Darwin's theory. From the facies of the corals we can deduce that before elevation the reef was existing in quite shallow water. (Plates **23**, **24**.)

The outer portions of the whole atoll were searched diligently in relation to this type of rock and it was never found to be missing; indeed the most striking impression was given by these elevated corals, which on the face of the cliffs from top to bottom stood out in a way which can be realised only from the illustrations, while on the top of the cliffs so perfect were they, that it was difficult to believe they were long dead.

* [Mr J. O. Hughes, who has been examining the rocks chemically, has kindly read through this section. J. S. G.]

It is felt that this rock satisfactorily determines a most important point in the history of the atoll.

The second class of rock is that which was described as "platin." It also is obviously composed of corals to a large extent, but differs from the preceding class of rock in that the component corals are much broken and triturated, and are seldom if ever* in the position of growth. With the coral fragments are pieces of lithothamnia, numerous mollusc shells, echinoderm spines and pockets of foraminifera, among which *Orbitolites* is prominent. After weathering the surface of the rock becomes flat, and pavement-like slabs break away, leaving again a flat surface underneath. By means of the pits and wells it was possible to make observations at some distance from the surface (6—8 feet), but the components of the rock seemed to be similar, though in consistency they differed somewhat in being softer and more chalky. It is suggested that the pavement-like surface has been produced by successive solutions and re-depositions of calcium carbonate by rain-water. (Plate **25**, fig. 2.)

The formation of this rock is to some degree a matter of speculation, but to me it appears to be strictly comparable with that of the rock found on the inner portions of a reef fringing an atoll, which consists in the consolidation of broken fragments washed from the growing edge. The first class of rock shows that Aldabra once lay beneath the sea and was fringed by a flourishing reef; the currents sweeping over it must have carried large quantities of débris and waste material away from the living corals. Now it is known that the latter are very intolerant of such substances and therefore towards the interior of the reef conditions were unsuitable for them. Consequently the inner portions of the reef must have been built up by débris rather than by live corals.

At present the débris rock or "platin" is found mainly in the east of the atoll, but, as the next class of rock has been much metamorphosed, it is uncertain what its former distribution may have been. Assuming that when Aldabra was under the sea the currents flowed in the same direction as at present (mainly from east to west), it is probable that the east of the reef inside the growing edge was then the most barren, while further west patches of live reef would have existed, becoming more numerous up to the growing edge in the west.

The third class of rock, the "champignon," is a metamorphosed rock, which must be regarded as a secondary derivative of coral-limestone. It is somewhat crystalline, and is always marked by the possession of inclusions of calcium phosphate, the pure calcium carbonate being white, while the inclusions show on a freshly fractured surface as sharply defined brown patches. (Plate **25**, fig. 1.)

Metamorphosis is of course frequent in coral rock, but it must be regarded as peculiar that the metamorphosed coral limestones in Aldabra and the neighbouring islands always contain inclusions of calcium phosphate. The origin of the phosphate is certainly to be found in the deposit of guano, portions of which were washed into spaces in the rock and included during metamorphosis. There appears to be some connection between the metamorphosis and the presence of the phosphate. It is hoped that Mr Hughes may throw further light on the question.

The distribution of this rock is very wide, for it is found over the greater part of

* One large colony of *Cœloria* was noticed in position of growth near Takamaka.

the atoll and always supports the *Pemphis* type of vegetation. Its surface has already been sufficiently described and it will suffice to point out that it indicates extensive rain-water denudation. An experienced observer would without further data be able to hint at the extent of this, but fortunately I have more definite evidence in the abnormal rocks, with which I am about to deal.

(*b*) *Abnormal Rocks.* Rocks, which cannot be considered as normal forms of coral limestone, were found on Picard Island and on Esprit Island, of which the latter will be considered first.

Esprit consists of a crescent-shaped ridge of rock about ½ mile long and 30 feet high, being thus the highest rocky point on the atoll. The ridge itself at its widest measures about 200 yards and is densely clothed in a varied jungle, containing several small forest trees not found elsewhere. The hollow of the crescent is occupied by mangrove swamp.

The ridge is composed of a curious conglomerate or pudding-stone, which is yellow or brown at the higher levels, but which contains a quantity of dark brown, almost black substance lower down: this in places along the shore projects as large boulders, which have been greatly wind-polished, giving the island an appearance most foreign to coral islands. On the top of the ridge is a small quantity of rock, which superficially resembles flint, while on the sides are pinnacles of a rock composed largely of mollusc shells, though a few fossil corals were also found. These pinnacles on the south side were but 3 or 4 feet high, but on the north measured 15 or 16 feet and were arranged like some fantastic natural maze, out of which it was difficult to find a path. The strange form of the rock had evidently been produced by great rain-water denudation and a natural chimney in the ridge appeared to prove that the shell rock penetrated the conglomerate, which must have been formed round it. (Plate **27**.)

A rough analysis of specimens from the ridge shows that all (both conglomerate and flint-like rock) are chiefly composed of calcium phosphate, the colouring being probably due to a small percentage of iron. No evidence as to the mode of formation was found on Esprit, but fortunately similar rocks exist on Picard and here a clue was obtained. In the south-west is a small plain of "platin" rock, in which is a large basin (10 feet at deepest) partially filled with salt water, which is tidal, being in subterranean connection with the lagoon. Round the sides of the basin were found masses of phosphatic rock resembling that of Esprit, while in addition there was some quantity of a highly crystalline mineral resembling calcite, veins of which radiated into the surrounding "platin" rock. A conglomerate containing an anomalous assortment of vertebrate remains, such as teeth of *Carcharias*, of *Diodon*, of *Scarus*, with bones of giant land-tortoises, was also found, its components being apparently cemented together by the calcium phosphate.

The general mode of formation of these rocks was fairly obvious; the basin represents a large cavern, into which various marine deposits and, later, tortoise bones were washed. After the deposition of guano, it also was washed by the rain into the cavern and formed the various phosphatic rocks just described: under the influence of rain-water denudation, assisted by the breaking in of the lagoon, the cavern was thrown open to the surface, and now by erosion is rapidly increasing in size.

The details of this process of rock formation must be left to the specialist, but there seems no doubt that the general method is correct, and applies not only to Picard but also to Esprit Island. It appears, therefore, that the ridge of the latter island was formed underground in a large fissure or series of caverns in the rock, to which guano or a solution of its main constituents obtained entrance. It follows directly then that the general level of Aldabra was originally over 30 feet high and that it has been reduced to its present level by a process of rain-water denudation and erosion; the limestone, being soluble, has been washed away while the insoluble phosphatic rock remains.

Carrying our deductions further, we see that in early times there was no lagoon, for the land round Esprit must have been over 30 feet high. It was probably a low portion of the future atoll, for in order that such a large quantity of phosphate may have collected in one place it is necessary to suppose that the region above Esprit was the lowest part or sink of a large area*.

Though of less interest a word must be said about the shell rock, which was undoubtedly laid down beneath the sea. I have already shown it to be probable that the inner portions of the reef before elevation were built rather by the accumulation of débris than by active coral growth, and therefore were probably somewhat lower than the edge. This depression in the reef before elevation I call the "primary lagoon." As we see from the shell rock, it was a favourable position for mollusc beds. After elevation it must have become dry and was filled with guano, ultimately forming the collecting area from which the phosphatic material drained to form the present Esprit Island.

This small island in the Aldabra lagoon therefore plays a most important part in any attempt to reconstruct the past history of the atoll.

III. ALDABRA. LAGOON AND PASSES†, AND THEIR FAUNA. (Plate **26**.)

The first point to be noticed about the lagoon is its extreme shallowness, for only in the channels radiating from the main passes are more than a few feet of water found. At low spring tides a large area becomes almost dry, and even at low neaps most of its surface is impassable to a large dug-out canoe. In the centre of the lagoon is a slight depression, which at low spring tides contains perhaps 4 feet of water and is known as "Barachois Torti" from the fact that green turtles often become imprisoned there until the tide rises. The channels in the lagoon are 8 or 9 fathoms deep near Grande Passe, but within a mile become very shallow and, except that they float a boat when the rest of the lagoon is impassable, would hardly be noticed by a casual observer.

A second feature of the lagoon is the great extent to which it is landlocked, the passes being wholly inadequate to allow the tides to flow evenly inside and outside

* [Mr Hughes suggests that birds may have especially congregated in this area. This seems to me to be not improbable since in my experience some islands and some areas of islands are occupied by "breeding fairs" while others in the neighbourhood, apparently equally suitable, are quite free from breeding birds. J. Stanley Gardiner.]

† The "passes" are the channels through the land-rim from the outer sea to the lagoon.

the atoll. As an instance of this it may be mentioned that, when the tide has flowed for 3 or 4 hours outside Passe Houareau, it is only just full ebb near Michel island, while at the same time the tide has been ebbing for 3 hours in the west of the lagoon. The currents, especially in the neighbourhood of the passes, are naturally very powerful.

The bottom of the lagoon is rock, but in the centre it is so covered with sand, and near the land-rim with mud, that it is difficult to determine its nature; the few observations made pointed to rock of the "champignon" type. The origin of the mud and sand is of great interest, for owing to the strength of the currents the falling tide is often rendered quite milky or white by the amount of suspended matter. Little material is carried in by the tides and there is no doubt that the mud is the product of lagoon erosion. When describing the typical northern section I pointed out the signs of erosion discovered round the lagoon shores there: these signs extend round the entire lagoon, while all the multitude of islands have overhanging cliffs, and the rocks are all mushroom-shaped owing to the removal of material between tide marks. The evidence leaves no doubt that all the lagoon islands were once connected and formed part of the main land-rim, and thus at least half the present lagoon is due to its own erosive powers. The latter are somewhat difficult to explain; but the low level of the land near the lagoon, when considered in connection with the mangrove swamp, may account for some of them. Mention has already been made of the power of the roots of the mangroves to split off overhanging pieces of rock. A more important factor in lagoon erosion is to be found in the mud of the swamp, which is extremely foul with decaying organic matter; it is therefore charged with carbon dioxide and various organic acids, all of which dissolve or react with the calcium carbonate. The lagoon shores are thus coated with a substance which has considerable power in breaking down limestone and this may be sufficient to account for the rapidity of erosion. In any case there is no doubt that the land-rim is rapidly decreasing in size and is gradually being split up into islands. At this point therefore it is opportune to consider the formation of passes.

An examination of the chart will show that sea erosion has acted very uniformly over long stretches of coast, while lagoon erosion on the other hand is very irregular and tends to the production of long creeks and bays. From this fact and from the foregoing remarks on erosion it will be readily understood that fresh passes must form from the lagoon and not from the sea. All stages of pass formation are demonstrated on Aldabra:

Stage 1. At Camp Frigate a long creek from the lagoon has passed almost through the land-rim, the mangrove swamp extending across and opening into what was formerly a basin in the rock but now is open both to sea and swamp. The sea is thus enabled to sweep right in but yet does not seem to have sufficient erosive power to force a channel, and it remains for the lagoon to dissolve away a little more rock, when a powerful tidal current will sweep through at each tide and speedily cut a pass.

Stage 2. The next stage is shown by several of the western channels, as for instance Passe Femmes, that nearest to Picard Island. The channel itself is fairly open though

a few rocks are still left standing well away from the land; it is very shallow (2 fathoms), but yet, owing to the rapidity of the current, carries a large bulk of water. An important point to notice is that the fringing reef is not broken by a channel opposite the pass and the escaping water therefore has to spread over the reef instead of flowing directly into the ocean. There is evidence however that the reef is being worn away opposite the pass and in time doubtless will be divided by a channel.

Stage 3. The third stage is shown by Passe Johnny dividing Polymnie and Malabar Islands, and Passe Dubois, the oldest of the "Western Channels." They only differ from Passe Femmes in being deeper (4—6 fathoms) and in continuing through the fringing reef to the sea.

Stage 4. The final stage is represented by Grande Passe and Passe Houareau, which differ from passes in stage 3 in the channel being deeper (Grande Passe 10—14 fathoms, Passe Houareau 8 fathoms) and further in that they are fringed at the sides by a reef, which exactly resembles the fringing reef of the whole atoll. This last point is of considerable interest, for from large rocks of elevated coral limestone, still *in situ*, it was abundantly clear that the reef on either side of the pass had not been formed by the active growth of corals, but was in reality a ledge of elevated coral rock and the base of land now washed away.

As soon as the rock of the land-rim by a pass has been cut down below low water-mark it is colonised by corals and lithothamnia, which protect it from further erosion, while above low water-mark it is unprotected, and therefore the reef by the pass is due to the difference in rate of erosion above and below low water-mark. From this we see that the channel of a pass may speedily reach a limit in width, yet the reef will increase in size continually at the expense of the land. Thus ultimately the islands will become separated by increasing stretches of reef, a point which is of great assistance in considering the present state of the atoll of Cosmoledo, and also the formation of the fringing reefs of all the islands of the series.

Before proceeding it may be well to say a few words as to the distribution of life in the lagoon and passes, though for obvious reasons it was impossible to make complete collections of the marine as well as of the land-fauna. Collections were made of the more sedentary forms, and for details the reader must be referred to the papers by the specialists who have kindly consented to work them out. In general, it may be stated that the lagoon was extremely barren, a fact which is undoubtedly explained by the universal presence of mud in the water. The swamps themselves were excessively foul, and consequently no surprise was felt that the fauna was so limited.

Live corals in the lagoon were almost limited to the regions of the passes, though a few colonies of *Porites* were found along the various channels. In the neighbourhood of Grande Passe is a definite flourishing reef, which is almost dry at low spring tides. It is divided by numerous channels leading up to the pass, but does not seem to have the power to encroach on them. The reef itself contained a uniformly varied assortment of corals, although *Madrepora* of a branching *facies* in places formed definite fields to the exclusion of other forms. As compared with other reefs visited *Tubipora* was unusually common. Corals from this reef included species of *Millepora*, *Tubipora*, *Heliopora*,

Stylopora, *Pocillopora*, *Seriatopora*, *Cœloria*, *Hydnopora*, *Galaxea*, *Prionastrea*, *Acanthastrea*, *Favia*, various *Fungida*, *Dendrophyllia*, *Madrepora*, *Montipora*, *Astreopora* and *Porites*. Towards the mouth of the pass itself the corals became stunted and often encrusted with lithothamnia* and finally ceased, with the exception of the hydrocoralline *Millepora*, which was very abundant in the channels and took on a branching *facies*. The reef by the side of the pass itself was covered with fragments of coral encrusted with lithothamnia, which appeared to flourish exceedingly in the strong current, to the dirt carried by which was attributed the scarcity of reef corals.

The Passe Houareau reef in most respects resembled that near Grande Passe, but was small and showed a tendency to block the channel somewhat; the corals were mainly of a massive type, though *Seriatopora*, scarce at Grande Passe, was quite common. In the mouth of the pass itself *Millepora* and lithothamnia were again abundant. Near Passe Johnny is a small and unimportant reef and in the channel itself few corals were noted except *Dendrophyllia*, which elsewhere seemed to frequent deeper water.

A large area between Esprit Island and the western channels was scattered diffusely with coral colonies, massive forms being scarce and the prevalent type a *Madrepora* of a slender, horizontally branching *facies*.

The sandy portions of the lagoon were searched at low tide but were disappointing; various holothurians were very common and no doubt play an important part in triturating and reducing the sand. *Amphioxus* was absent, but in the sand itself were found a few specimens of an enteropneust which Professor Spengel kindly informs me belong to the genus *Spengelia* or *Willeyia*; various polychæts, molluscs, burrowing echinoderms and gephyreans were also obtained, but on the whole the impression was one of great barrenness and absence of life.

The swamps were even worse in this respect; in the mud a small polychæt, a glycerid, was common, and a large sipunculid not infrequent. On the surface of the mud a large mollusc with a spiral shell was usually present and a few crabs (*Sesarma quadratum*, Fabr.) climbed about the roots of the mangroves. At high tide numerous free living forms were naturally washed up the creeks but the endemic swamp fauna was small, a fact which Mr Cyril Crossland tells me he also noted in the swamps near Zanzibar. Boring animals, chiefly sipunculids, were obtained from the rock near the shore, but they were very scarce as compared with the number found in the rock of the sea cliffs.

Fish were numerous in the lagoon at high tide: they all appeared to be widely distributed marine forms which drifted in with the tide, and no endemic species were obtained.

Further reference to this subject is however unnecessary, as subsequent reports will speak for themselves.

* Lithothamnia is throughout used collectively for the calcareous algæ, often erroneously termed nullipores in coral-reef literature. (*Vide* Foslie, Trans. Linn. Soc., Ser. 2, Zool. Vol. xii. pp. 177—192.)

IV. ALDABRA. FRINGING REEF—REEF FAUNA.

The fringing reef outside the islands of the atoll-rim varies in width, at its widest measuring about 500 yards, though near Point Vaquois it is hardly 200 yards between the cliffs and the breaking edge. In the composition of its surface there are two extremes (though with every intermediate grade) found respectively on the north and south coasts. To simplify description I give the chief characters of the reef in two places, first near the northern section across the land-rim, and secondly in the south near the Takamaka section. The reef to the north, bounded by the cliffs previously described, may be divided into four somewhat ill-defined zones. The first consists of a narrow depression in the rock at the foot of the cliffs: it is usually 5 or 6 yards wide and 6 feet deep, and owes its origin to the backwash from the waves which at high tide beat with great violence against the cliffs.

Outside this zone is the reef-flat, a broad flat zone with a surface consisting of a coarse rubble of broken coral fragments, all much encrusted with lithothamnia; in places are small accumulations of sand, which usually support a vigorous growth of the cotyledonous plant, *Cymodocea*. To seaward of the flat, which forms the greater part of the reef, is a narrow boulder zone, 20—30 yards wide, the boulders consisting of broken coral colonies rarely more than a foot high and hardly deserving the name "boulder"; they always become encrusted with lithothamnia, Squamariaceæ, and rarely *Polytrema*. Outside the boulder-zone is a rather indefinite buttress-zone, the buttresses being composed of coral rubble, while the intervening channels contain scattered and sickly coral colonies, mostly of the genus *Pocillopora*. Outside the breaking edge I was only able to make scattered observations, but the slope appeared to be steep and to support scattered colonies of massive corals. I append sections kindly taken for me by Captain Parcou, F.R.G.S., on the outer slopes of Assumption and Astove, which reefs appeared to have similar slopes to that of Aldabra. (Plate **29**.)

The reef to the south of Takamaka differs from the reef of the north of the atoll in being very completely covered with sand, which is usually bound down by extensive beds of *Cymodocea*: areas covered with the usual coral rubble are scarce. The boulder-zone is almost absent, and the buttress-zone ill-defined, though it was interesting in that the buttresses were composed of sand held together by *Cymodocea*, the rhizomes of which were coated with lithothamnia and in a few cases with an encrusting form of *Millepora*, the sand being thus bound together by calcareous ropes. Live coral was naturally almost absent.

The outer slope seemed to be gradual and to be covered with sand, with here and there a coral colony or large mass of some colonial alcyonarian. Again I would call attention to the outer slopes to the south-east of Astove and Assumption which are probably similar.

These two types of reef cover almost all that are found round Aldabra, though intermediate stages are frequent. The reef on the north coast as far east as Point Hodoul is of the first type, while southwards it becomes more sandy as far as Dunes Jean Louis and Dunes de Maistre. After this it becomes less sandy round the west of Main Island

and rather more so near Picard Island, though much of the sand in the west disappears in the calm season and collects again in the south-east trade season. Under these conditions the forms of life usually found on a coral reef were naturally scarce: at low tide the most conspicuous animal was an eel (*Muræna mudivomer* sp.?) which crawled about with its mouth wide open, biting with great ferocity at whatever came in its way. A second eel (*Muræna chilospilus*) burrowed in the sand with astonishing rapidity, and it was noted that it could burrow backwards as well as forwards. On one occasion a sea-snake was seen but not captured. In the sand were found various polychæts, gephyreans, burrowing crustacea and, where coral rubble was overlaid by a layer of sand, there lived a large species of *Balanoglossus* (9 inches long), which gave out the characteristic smell of iodoform to a marked degree; owing to the fact that it lived in the rubble rather than in the sand it was most difficult to obtain unbroken. The cliffs formed the haunt of a large number of molluscs among which a chiton was prominent, while a small fish (*Periophthalmus* sp.?) frequented the rock pools, often lying outside on the bare rock and jumping from pool to pool with great agility when pursued. In the cliff face boring animals were not uncommon, a small sipunculid being sufficiently numerous to assist the sea materially in its work of destruction.

As a whole, however, the fringing reef was disappointing in comparison with the reefs I had visited in the Seychelles in company with Professor Stanley Gardiner, and the reason is probably to be ascribed to the presence of such large quantities of sand, while the mud of the lagoon must also contaminate the waters round the atoll to some extent.

The characters of the Aldabra fringing reef at first found no explanation, but the reefs on the sides of Grande Passe and Passe Houareau yielded a clue. Before I left I was quite satisfied that the fringing reef was merely a ledge of the elevated coral rock, piled with rubble, and protected to seaward by lithothamnia and corals. As in the case of the reef by the sides of the passes the rock below low water-mark is protected from speedy erosion, while that above is continually washed away. The fringing reef therefore is not a sign of the growth of the atoll seawards but of the amount of its loss of land due to erosion. Whether the outer edge of the reef is holding its own or slowly receding is impossible to say, but I am inclined to believe the latter, from the fact that it follows the present conformation of the coast line so closely.

A final problem to be dealt with is the presence of so much sand on the south coast. The destruction of rock round the whole coast has already been pointed out: the result of this disintegration is the production of sand. Owing to the fact that the current flows from east to west, and the prevalent winds are south-east, this destruction of land is greatest in the east of the atoll, and indeed it seems very probable that the shallow bank to the south-east is the site of lost land. The sand produced in this process is driven along the reef by the current and on the north coast the greater part is washed away: on the south coast, however, the south-east winds drive it inshore and pile it on the reef and against the cliffs, which in the region of the dunes are low and become almost covered up, the beach being sandy and sloping gradually up to a height of 60 ft. In other places it has formed numerous small sand "lances," and in the west of Picard has been heaped up

to form the sandy area on which the settlement stands*. This sand piling is comparatively unimportant at present, but in future times, as the atoll of Cosmoledo will show, it may be the cause of the existence of land on the atoll.

I have now dealt with the main physical features of Aldabra, and in summary I would emphasise that the atoll is losing on every side in its fight with sea and weather; the sea coast is being eaten away; the lagoon is getting larger; the rain is dissolving away the surface of the land and, to balance all, there is only a slight piling of sand.

V. ALDABRA. THE LAND FLORA AND FAUNA.

In this section it is intended to give a short account of the land flora and fauna of Aldabra, dealing rather with those groups which will not be the subjects of subsequent reports.

Flora. A collection was made containing specimens of the majority of the plants of the atoll, though a few trees were never found in flower and so perhaps cannot be identified. The flowering plants will be reported on at Kew, while a small collection of algæ are in the hands of Mr. and Mrs. Gepp.

A certain number of plants were such as could easily be recognised, but the majority, and perhaps the most interesting, were entirely unfamiliar. It is impossible therefore to do more than broadly indicate the œcology of the atoll flora, leaving a complete list to the Kew report. The floral seasons naturally coincide with the climatic, which were indicated in the Introduction. The season of south-east trades is generally a season of drought and rest and, many of the trees being leafless, all forms of bush have then an extremely barren and dead appearance.

At the end of October signs of renewed life are visible, and after the first rains in November many plants begin to flower often before their leaves have appeared. In December and January the remainder of the plants are in flower, with the exception of a few, which by their condition suggest that they flowered quite at the end of the calm season (March).

There are roughly four types of vegetation corresponding to four different classes of situation. These are:

1. Mangrove Swamp.
2. *Pemphis* Bush.
3. Varied or Open Bush.
4. Shore Zone.

1. The mangrove swamp fringes the lagoon, but is also found on the seaward coast of the atoll at Camp Frigate and on Magnan Island (in the western channels), where it is protected from the direct force of the waves. It is composed mainly of true mangroves (Rhizophoraceæ), the genera observed being *Rhizophora*, *Bruguiera*, and *Ceriops*. The

* See Geographical Journal, September 1910.

genus *Rhizophora** is uniformly scattered through almost every part of the swamp and also forms forests in one or two places, notably Picard and Camp Frigate, which contain but few trees of other species. In habit it prefers a deep mud and an abundant supply of water. The genus *Bruguiera* is represented by two species, *B. gymnorhiza* and another not yet determined, which together form a large proportion of the forest along Malabar and Main Islands and especially to the south of Michel Island. It is the largest tree on Aldabra and reaches a height of 60—70 ft. When old, the trunk is usually straight without any branches on the lower portions, and is consequently much used for timber.

Of the genus *Ceriops* there are apparently three species, *C. Candolleana* and two others. On Aldabra it is an uncommon genus and is most prevalent at "Lance Cavallier," south of Esprit Island, on Esprit itself, and on Main Island north-east of Michel. One species, known in Creôle as "manglier xerophé," forms a very straight trunk and is much used for poles and posts.

Both the last two genera do not require much mud, and are tolerant of a rocky situation, and one which the tide reaches for but a short period. *Rhizophora* and *Bruguiera* are both cut for the bark, which contains a high percentage of tannin and forms the chief export of the atoll.

Of other mangrove-swamp trees there are five genera, the most prevalent being *Avicennia* (*A. officinalis*) which is found all round the lagoon between tide marks, especially in sandy places; it also forms a large forest in the extreme east of the atoll, where the trees attain a large size.

Sonneratia acida, the second pseudo-mangrove, is decidedly scarce and occurs only on Esprit and on Picard Islands. It is known as "manglier fleurs" for its large and conspicuous flowers.

Carapa obovata and *moluccensis* are both found on Esprit Island, and the latter on Picard and on one of the islands in the western channels. At Esprit a small forest is formed by *C. moluccensis* between the ridge of rock, previously described, and the true mangrove swamp.

A comparison with other mangrove swamps is difficult, as the writer has had little further personal experience of them. It may however be mentioned that the Seychelles swamps compared with those on Aldabra were scattered and the trees small, while the latter, when compared with those further East, appear to be formed more entirely of true mangroves and to contain less undergrowth, the palm (*Nipa fruticans*) being absent.

2. *Pemphis* Bush. This type of bush is composed almost entirely of *Pemphis acidula* and is found in conjunction with the metamorphosed limestone. The habit of growth of the species has already been dealt with; it may be mentioned in addition that dead small branches do not always drop off but season in position, forming hard skewer-like spikes. The wood is extremely hard and speedily turns the edge of an axe, while it is hardly touched by insects, though occasionally a tree will be found to contain a nest of large ants.

* *Rhizophora mucronata.*

It covers the greater part of Aldabra, and in conjunction with the "champignon" rock forms the great obstacle to exploration. It is quite useless, for the timber is too small, and the bark, though reputed rich in tannin, would not pay removing.

3. Open bush is found in the neighbourhood of Takamaka and extends round the atoll eastward as far as a line drawn from Michel Island to Hodoul point; to the westward it extends nearly to Dunes Jean Louis, but in this direction is much reduced in size by the shore-zone passing far inland. Plain Cabris on Picard Island also supports the same type of vegetation. It is always coincident with "platin" rock which is such that a little soil (largely formed of guano) can collect on its surface. The vegetation is mostly formed by low trees and bushes. Herbaceous plants are scarce and are only found in the wet season, when a few sedges and grasses occur in places. The bushes and trees are usually leafless, or partially so, in the dry season and flower at the commencement of the rains, often before the leaves appear.

Almost all the Aldabra plants are to be found in this type of country. A few that are easily recognised are *Euphorbia Abbotti*, various species of *Ficus*, two species of *Grewia*, several papilionaceous plants (*Mimosa*?, *Cæsalpinia*, *Cassia*). A thorny (rosaceous?) bush is not uncommon, and large clumps of *Pandanus Vandermeeschii* are very frequent. The majority of the plants in this country, however, were not identified in the field.

4. The shore-zone extends all round the atoll varying much in size. It owes its existence to a little soil formed of sand blown up from the reef and is naturally therefore widest on the south-east coast. Characteristic plants are *Scævola Kœnigii*, *Tournefortia argentea*, and in places *Cordia subcordata*. At intervals large clumps of *Pandanus* exist, and very stunted bushes of *Pemphis acidula* are found on the south coast.

A few exceptional patches of vegetation, almost jungle, occur, the chief being on Esprit Island, which contains several plants scarce elsewhere. Picard Island has a peculiar bush, which, though very dense, is formed of the same plants as ordinarily form the "open country." Couroupa, which has a deep sandy soil, supports a mixed vegetation, partly of "open country" plants but mainly of "shore-zone" forms.

*Casuarina** has established itself at Picard and Michel Islands, and on each side of Grande Passe and Passe Houareau; other introduced plants are found to some extent on Picard but the conditions are such that few fresh plants can obtain a foothold.

Fauna. (*a*) *Mammalia.* The only indigenous mammals belong to the order Chiroptera; the most interesting being a peculiar species of Fruit-eating Bat (*Pteropus aldabrensis*, True †). It is a rather small species and is peculiar in having the bony orbit complete, a feature which it shares with *Pteropus nicobaricus*. Its food consists of the fruit of the banyan (*Ficus* sp.?) and when obtainable of the "takamaka" (*Calophyllum inophyllum*), while coconut flowers are also much sought after. The species is often observed flying by day as well as night, though it was most active in the bright moonlight. It never forms large gatherings on a tree during the daytime, as is the case with the Seychelles flying fox (*Pteropus edwardsii*).

* *Casuarina equisetifolia.* [Of course introduced.]

† Proc. U.S.A. Mus. 1893, Vol. 16, p. 533.

Two insectivorous bats were noted; one, *Taphozous mauritianus*, was seen but was scarce, while a second, *Triænops furcula*, Trouessart, was not uncommon on Picard near the settlement. A specimen of the latter species was sent to M. Trouessart, who has kindly compared it with his type and confirms my identification.

Of introduced mammals there are rats (*Mus rattus*), mice (*Mus musculus*), cats and goats. Of these the rats alone deserve further mention, for they have spread over the whole atoll, extending even to the small lagoon islands where they catch and eat the land crabs (*Cardiosoma*, etc.) for want of other food. These must form serious antagonists to the land birds, and perhaps to the giant tortoise also, as they are reputed to eat its eggs. The cats*, which only exist at Takamaka, are, I think, decreasing, and consequently cannot be expected to keep down the rats, which will probably continue to increase until want of food sets a definite limit to their numbers.

(*b*) *Aves.* The resident land birds have been described by Ridgeway †. They are of interest in being almost all peculiar to the atoll. It is however noticeable that all are very closely related to Malagasy forms and doubtless their origin is thus indicated. Full descriptions need not be given here, but a few notes as to their natural history, which does not seem to be anywhere recorded, may be of interest.

Most conspicuous and typical of the atoll is undoubtedly the ibis (*Ibis abbotti*), which resembles the sacred ibis and is closely related to *Ibis bernieri* of Madagascar. It formerly was abundant, but now is absent from Picard Island and uncommon over the north of the atoll, though it is still fairly distributed along Main Island, in the east of which it is, indeed, common. In habit it is a shore bird, feeding along the edge of the lagoon in the mangrove swamp when the tide is low, and at high tide flighting inland, where it is to be found round the freshwater springs of Takamaka and the brackish pools which abound everywhere. Its food consists of small crabs and other marine creatures, but a few birds were always to be found picking through the rubbish from Michel Island camp and generally playing the part of scavengers. Night is spent roosting on a tree, the large *Calophyllum* trees round the wells being especially haunted. Its cry is a harsh wheeze. In flight the ibis is heavy and laboured, though its broad wings allow it to soar so that it occasionally circles round for some time on outstretched pinions when it is choosing a site on which to perch. In character it is tame and inquisitive, while owing to its peculiar form, colouration and a habit of continually twisting its head about, it has always a rather ludicrous appearance, and this is especially the case when it is draggled or soaked with rain.

The ibis nest in colonies in the trees, choosing especially those in the depths of the mangrove forests. Only one nesting tree was found tenanted. It was a small *Ceriops*, the top of which had been so trampled down as to be flat. The nests, seventeen in all, were composed of a few sticks and resembled those of the gannet (*Sula leucogaster*). Two chalky-shelled eggs of a greyish-white colour were the maximum found in one nest. If the following habit is general but a small percentage can reach maturity. Before the birds have commenced incubation, they leave *en masse* when the tide is low to feed, but

* If numerous they would completely kill out the rails and possibly other endemic species.

† Proceedings of the U.S. National Museum, Vol. xvi., p. 597.

return singly, and each bird reaches its nest by partly flying and partly running over the flat top of the tree, the result being that most of the eggs in the path of a returning bird are either broken or rolled off the nest into the water below. Out of eighteen eggs counted when the birds were away, but two remained whole after they had all returned. If this manœuvre is often repeated, it is difficult to understand how the birds are as numerous as they are.

Next perhaps to the ibis in point of interest is a small rail, *Dryolimnas aldabranus*, closely allied to *D. cuvieri* of Madagascar and Mauritius. It is a pretty bird, olive green above, and underneath a rich chestnut with white chin and neck. It is generally distributed over the atoll, though it is scarce on Picard, and has apparently been exterminated in the neighbourhood of Takamaka by the cats. It is extremely tame, and at Esprit Island would often come inside the hut, where several attempts were made to photograph it, but owing to its preference for dark places and its quick jerky movements, these always resulted in failure. Its most marked peculiarity is the astounding variety of noises which it can utter, the most curious being like a stroke on a native drum, which is usually followed by a long whistle, often an exact reproduction of a curlew's call: when the bird is excited it makes such a remarkable series of grunts and shrieks that Nicoll (*Three Voyages of a Naturalist*) has likened them to the noise produced by a drove of pigs. All these cries are produced with the head pointing upwards and the throat much distended, and are very loud for the size of the bird, which is smaller than that of a water-rail (*R. aquaticus*). Flight is but rarely indulged in, though the birds can flutter along, and are certainly not flightless as stated by Abbott. They are the only bird which inhabits the dense *Pemphis* bush, and are often to be found at low tide in the rocky pits, which abound in the "champignon." Their food consists of insects and small crustaceans. No nest was found or young birds seen, and it is probable that they do not breed until February or March.

Another interesting bird is the Aldabra cuckoo (*Centropus aldabranus*), which resembles the Madagascar *C. toulou* and is known locally as "toulouse." It inhabits chiefly the open country in the south-east of Main and Picard Islands. In character it is very terrestrial and is often found on the rock underneath the bushes, though, when disturbed, it climbs about among the trees and shrubs with actions like those of a parrot. Towards sunset the male flies to the top of a tree and utters repeatedly a peculiar and melodious call consisting of a series of notes (semitones) descending the scale for three or four tones: the birds do not all have the same range of notes, and it was not uncommon for two birds to call together producing a series of chords down the scale. The cry carries a long distance and can be heard at least a mile away: it forms one of the lasting impressions in connection with evening on Aldabra. Only one nest was seen, and this consisted of a large mass of sticks low down in a bush: it had no eggs in it.

Of doves there are two:—*Alectrocœnas aldabranus* or "pigeon hollandais" and *Turtur aldabranus* (*saturatus*?). The latter, which resembles a small *T. picturatus*, was not uncommon near the settlement and also at Michel Island, while the former inhabits the less frequented parts of the atoll and was common at Takamaka. Both birds seem to have a definite time of flight in the evening.

A drongo (*Buchanga aldabrana*) is not uncommon, especially on Main Island. It is a glossy black bird, the size of a thrush, with a powerful beak and long forked tail: it is very pugnacious and attacks any frigate or crow (*Corvus scapularis*) which approaches near its perch.

A cardinal (*Foudia aldabrana*) is common round the settlement: it differs from *F. madagascar* in being larger and of a brighter red.

A beautiful species of sun-bird (*Cinnyris aldabrensis*) haunts the edge of the mangrove swamp: the male is velvet black, with a wonderful green iridescent gorget and, when hovering in the sun, is a most striking sight.

The remaining land birds consist of a "white-eye" (*Zosterops aldabrensis*), a little green bird with habits like a warbler, a bulbul [*Ixocincla* (*Hysipetes*) *rostrata*], a small kestrel (*Tinnunculus newtoni*), and a small goat-sucker (*Caprimulgus parvulus*, sp. ?), the last being very scarce.

Considering the land birds as a whole it will be seen that no land connection is necessary to explain their presence on Aldabra, for even the most flightless, the rail, can still fly and no doubt was once easily able to establish itself over the whole Madagascar region. The birds are all closely related to Malagasy forms and their origin is thus doubtless indicated, for isolation and new conditions will amply account for the slight differences which exist.

It is impossible to give any complete account of the littoral and marine birds. A few of the more important may be mentioned, most striking of which are undoubtedly the frigate birds, *Frigata aquila* and *F. minor*. These birds are present in countless numbers all the year round. Camp Frigate takes its name from the enormous breeding place (of both species) situated there, while another exists on Picard. The whole coast of Malabar Island is often patrolled by a long line of frigates, and there is no part of Aldabra in which these birds are not always in sight. They live almost entirely as parasites on the gannets (chiefly *S. leucogaster*), which also exist on the atoll in very great numbers. Each gannet on returning from fishing has to run the gauntlet of two or three frigates, which are usually successful in bullying it into disgorging its last meal. Considering this perpetual enmity it is curious that the two birds should frequently nest side by side. In addition to the fish looted from the gannets, frigates are very fond of young turtles newly hatched, and the damage caused by this propensity is very large; they were rarely seen to fish for themselves and never to plunge into the water. Towards evening there is a considerable flight back to Aldabra of the birds, which have followed the gannets to sea. They roost along the lagoon fringe of the mangrove swamp, their position when asleep being very curious, for their heads are allowed to fall loosely on their breasts.

The flight of the frigate is marvellous, and a sight never to be forgotten is that of a column of the birds wheeling round on motionless wings, the lowest individuals within shot and the highest only to be discovered by the aid of glasses. This however is a subject which has often been written on, and the other habits of the frigate have only been set forth at some length as they appear to differ somewhat from those previously recorded (cf. *Camb. Nat. Hist. Birds*).

Of other resident aquatic birds the flamingoes (*Phœniconaias minor*) with their brilliant plumage and goose-like cry are sure to strike the attention of an observer.

Gannets are everywhere extremely abundant: the usual species is the red-footed *Sula leucogaster*, but *Sula piscator* (*cyanops*?) and *Sula capucina* also occur.

Of migratory birds a fair variety of waders were noticed. Curlews and whimbrels (*Numenius arquatus*, *N. phæopus*) were very abundant in the swamps until January, when they commenced to leave. Turnstones (*Strepsilas interpres*) were abundant along the beach and had not diminished at all in number when I left the atoll in January. It is presumed that all these birds go north to breed and therefore their winter wanderings must be extremely wide.

(*c*) *Reptilia.* Undoubtedly the most interesting animal on the atoll is the giant land tortoise (*Testudo elephantina*). It still occurs in fair numbers on the extreme east of Main Island and is scattered in small numbers in the rest of the island. It is also found on Malabar and Picard Islands, but it is stated to have been reintroduced. This is certainly the case in regard to Picard, but there is no evidence as regards Malabar.

The species obtained on Main Island is *Testudo elephantina*, and a further species, *T. daudinii**, is supposed by Voeltzkow and others to have inhabited Malabar Island and to have given rise to those at present existing on the Seychelles. Only two tortoises were found on Malabar, both young specimens, and these were indistinguishable from the Main Island tortoises.

The question as to the number of species is further complicated by the fact that *T. elephantina* has been divided into several species. It seems probable, however, that these animals, free from enemies, would be able to vary somewhat without harm to themselves, and that the species into which *T. elephantina* was divided were based on such minor variations. No evidence was obtained indicative of more than one species.

The most interesting point in connection with the land tortoises is undoubtedly their distribution. It is generally supposed either (1) that Aldabra had a previous land connection, or (2) that the tortoises were placed there by man. It has already been shown that the first alternative is not possible, and it remains to deal with the second. If it were possible to consider Aldabra alone human transportation might give a natural explanation. It is necessary, however, to consider the other islands on which giant land tortoises have occurred†. These are (1) the Seychelles Group, (2) the Mascarenes, (3) Madagascar, (4) the Galapagos, (5) Cosmoledo, (6) Assumption, and probably (7) St Pierre, the last three being added in the course of the expedition here described. A previous land connection may explain the existence of tortoises in the localities Nos. 2, 3, 4, and with the exception of Bird and Dennis Islands of No. 1 also. It is totally inapplicable however to Cosmoledo, Assumption, St Pierre and Bird and Dennis Islands, all of which are of purely oceanic origin. As regards Dennis Island a certain amount of history exists: it was discovered in 1773‡ and was described as being covered with land tortoises and sea turtles, a clear distinction being made between land and marine tortoises. Bird Island was also described in much the same terms. Both Bird and Dennis were visited by the author§ and they are merely sand cays built up by the waves. On Cosmoledo

* It may be stated, as a personal opinion, that the modern Seychelles tortoises are very probably true descendants of the original tortoises which occurred in the Archipelago when it was discovered.

† In recent times. ‡ Geographical Journal, 1907, p. 154.

§ Trans. Linn. Soc. Ser. 2, Vol. xiv. p. 15 (Percy Sladen Trust Expedition, Vol. iii., p. 15).

the eggs were found sub-fossil in the phosphatic rock underneath the guano. At Assumption bones of several specimens were found in the pits in the rock, and they also seem of great age. The bones in the rock of Aldabra are deeply imbedded and cannot have been fossilised very lately, and consequently if human transportation is to account for the distribution of the tortoises it must have taken place in very early times.

The difficulty then arises that we know of no nation which could have sailed the Southern Indian Ocean in such early times and have acclimatised land tortoises on the majority of its islands. There is therefore this extraordinary problem to be solved, viz. that most of the islands of the South Indian Ocean, whether of coral or not, were inhabited by giant land tortoises which, to quote Dr Gadow (*Camb. Nat. Hist. Reptiles*), "are so absolutely terrestrial that wherever we find them, unless they have been brought artificially by man, these tortoises must have arrived by land." It has been shown that neither of Dr Gadow's alternatives will satisfactorily account for the facts. Tortoises are not the kind of animal to be distributed by drifting on logs, unless they belong to a small species. If the "giants" are derived from a small species distributed in this way then they show a wonderful case of parallel evolution, and further, if this is so, small tortoises must have been drifting about the Indian Ocean in considerable numbers to account for the colonisation of so many islands. Finally, it is generally held as impossible that land tortoises could have had aquatic ancestors*. All means of escape from the problem are therefore withdrawn and any explanation must be liable to great objections. Nothing further can therefore be said, and it remains to conclude with a short account of the natural history of the tortoise.

The day is spent in the midst of the densest jungle or in a large clump of *Pandanus*, a very favourite haunt being a clump of this tree near a brackish pool. At night they become active and move about in search of food, which in the wet season consists of grass and leaves, and in the dry of bark, if nothing else can be obtained: as a rule their movements are very slow and deliberate, but at times, perhaps when moving to fresh feeding grounds, they crash straight through the jungle at a pace which is astonishing for so clumsy an animal.

The breeding of the tortoises takes place about March, and the hard-shelled eggs are buried in small guano-filled concavities in the rock. As the atoll was left at the end of January only one nesting-place was found, and this contained no eggs, though the guano had been obviously disturbed. Tortoises are never found far within the *Pemphis* bush and as the latter appears to be increasing at the expense of the more open country it may in time seriously restrict them. Possibly the present greatest enemy of the tortoise is the rat, which is reputed to destroy the eggs. Frigate birds and herons would undoubtedly devour the young ones if accessible, but the thick bush affords abundant protection. There has recently been a suggestion put forward to remove the tortoises to some Seychelles island for safety: it is, however, quite unnecessary, for tortoises are already plentiful in the Seychelles and there does not appear to be any danger of their extinction on Aldabra unless hunted by man.

Of other chelonians the green turtle (*Chelone mydas*), the hawksbill (*Chelone*

* *Vide* Geographical Journal, Sept. 1910, Discussion on the "South-West Indian Ocean."

imbricata), and probably the logger-head (*Thalassochelys caretta*) occur; and, though these can hardly be considered land animals, it is most convenient to consider them in conjunction with their relative, the land tortoise. The green turtle occurs in enormous numbers, which are perhaps only equalled in Assumption. There are two divisions, marked by the season at which they lay their eggs. In the season of S.E. Trades only a small number of turtles stay round the coast and breed, while in December, at the beginning of the N.W. Monsoon, an enormous horde of turtles arrives off the atoll and remains until May. The origin of this migratory horde is open to some doubt, for, since turtles only frequent shallow water where they can get food, they must either live near the shore or on a shallow bank: they have not been recorded from the latter and therefore it must be supposed that they come either from Madagascar or the coast of Africa. Presumably the number of suitable islands for breeding is now small on account of the fact that most have been long settled. Assumption, however, was only colonised in 1908, and Aldabra is so large that until recently the people of the settlement have not disturbed much of the coast. Turtles are now being killed so rapidly and the waste is such at both Assumption and Aldabra that their numbers are already markedly on the decrease.

The turtles on arrival extend round the shore and pair, during which process great fights take place among the males for the females. The latter ascend at night the small sand beaches, which occur at intervals along the coast, and dig deep holes in the sand, the fore-flippers being chiefly used for the task. The holes may be only a few feet above high-tide mark, or at some distance from the shore, as in the case of one found on the top of Dunes Jean Louis (60 ft. high). The number of eggs laid is about 200 and the females are supposed to come up the beach twice in each season. They always ascend with one flowing tide and go to sea again on the next; consequently a night with the tide becoming high at sunset is the most favourable.

The young turtles hatch in 40 days and go straight down the beach to the sea. The hatching of all the eggs in a nest takes place almost simultaneously, and the young turtles dig their way up out of the sand as fast as they can be counted and crawl down to the sea in a long procession. By what sense they find the right direction was not discovered; their eyes are not open but even if placed on a flat surface they know their way to the sea. The hatching of the whole nest only takes about 10 minutes and forms a remarkable and pretty sight. The mature turtles are either speared from a boat or are turned on the beach, the latter method being very destructive, for only females are caught and this occurs as a rule before they have time to lay their eggs. Steps will have to be taken to preserve the eggs, if the green turtle is to continue to exist.

The hawksbill turtle (*Chelone imbricata*) is much scarcer than the green turtle. It ascends the beach in the day to lay its eggs, which are said to take 60 days to hatch, and the female is supposed to come at least twice, at an interval of a fortnight, to lay in the same place. Those turtles, which have lived long in the lagoon, are always coated with a layer of mud, and this prevents the "tortoise shell" from developing dark markings, the absence of which adds considerably to its market value. Their natural food has been said to consist of fish, but this did not seem to be the case on Aldabra, as a fisherman, who had spent twenty years on the atoll fishing hawksbill, said he had never found fish in

those he caught but always "mousse," *i.e.* algæ. It was also an undoubted fact that certain beds of algæ in the lagoon were always the favourite haunts of hawksbill, which visited them with every high tide. It seems therefore that the evidence is in favour of the hawksbill, like the green turtle, being mainly a vegetarian.

The remaining turtle found on Aldabra is probably the logger-head (*Thalassochelys caretta*). It is scarce, and one was not obtained to make identification certain. The fisherman above mentioned said that this turtle came into the lagoon to eat a small kind of mussel: he had never found algæ inside it and did not know where it bred, for it never came up the Aldabra beach to lay its eggs. It appears to be commoner at Cosmoledo than at Aldabra.

Besides chelonians there are only three other reptiles (two geckoes and one skink) found on Aldabra; these are

Hemidactylus gardineri, Boul.,
Phelsuma madagascarensis, var. *abbotti*,
Ablepharus boutonii, var. *peronii*,

all of which were kindly identified for me by Mr Boulenger.

Amphibians were not present on the atoll, which is indeed quite unsuited to them.

(*d*) *Crustacea.* All species of land crabs were carefully collected for comparison with those of other coral islands, a comparison which has proved of great interest, as will be seen from the paper by Mr Borrodaile, who was kind enough to take over my collection. The most common form was *Cardiosoma*, which lives in holes in the rock and appears to act as general scavenger. It was particularly objectionable from its habit of digging holes in the mud which had collected round the wells, which were thus so filled with dirt as to make the water undrinkable.

Birgus latro, the robber crab, was also very numerous, especially at Takamaka, where it was a great nuisance, for it carried off anything left out at night and also got into the house, unless it was securely closed, and, once inside, occupied itself in pulling everything to pieces in search of food. Eighty were killed on the first three nights, but their numbers did not seem much reduced, though afterwards the camp was left more in peace.

Their great chelæ have immense strength, as is instanced by the fact that a turtle turned on the beach one night had its tail completely hacked off before the morning and was quite dead.

Two species of land hermit crabs were exceedingly common and showed distinct signs of migration on Esprit Island, a swarm coming down to the sea in December, the females in all cases with eggs. It was most difficult to force the members of this migratory horde to alter their direction: all obstacles were surmounted instead of being avoided. My hut lay directly on the line of migration, but I was quite unable to turn them aside, and during my visit numberless crabs entered and crossed the hut on their way to the sea.

(*e*) *Insecta.* The insects of the atoll were collected as thoroughly as possible, as it was felt that this group would be large enough to compare both with the insect fauna of other islands and of neighbouring continental lands. The collections have been distributed to specialists on the various orders, whose papers will speak for themselves. It may be

mentioned that the majority of the insects belong either to Madagascar or East African forms, this being especially the case with the Lepidoptera. Dr Neils Holmgren, however, records the three species of termites obtained as belonging to East Indian forms (though two of the species are new). When it is remembered that termites are distributed by the sea on floating logs and that the current runs from east to west, this result is precisely the one which would be expected. In general it is probable that those insects which are distributed by flying will on Aldabra belong to Madagascar or African forms, while on the other hand those that are sea-distributed will be Oriental in origin.

(*f*) *Myriapoda.* One small species was very common among dead leaves in the jungle. It seemed to play the same part in reducing the vegetable débris to humus as is usually done by earthworms, which are extremely local and scarce in Aldabra.

Three different forms of Chilopoda were obtained, the largest about 3 inches long. All were found under stones, dead leaves, etc., but only one, the largest, was at all common.

(*g*) *Arachnida.* One species of scorpion is common, especially near the settlement. A large variety of spiders await determination. Phalangids were altogether absent. Chetifers (Chemeidæ) were represented by three kinds, all apparently of different genera. One was conspicuous for the large amount of silky web which it spins under stones in crevices in the rock.

(*h*) *Mollusca.* Especial attention was paid to the land mollusca. *Bulimnus aldabræ* was found to be well distributed over the whole atoll, though most plentiful at Couroupa. The dry season is spent on the branches of bushes and trees, when the shell is always covered with a coat of what appears to be mud; but, from the fact that the latter is not obtainable in the dry season, it is more probable that the mollusc covers itself with mucus to which small particles of guano adhere. In the wet season it is hard to find, as it is completely hidden by the foliage. A fresh species of land shell, a Helicinid, was found on Esprit Island, but it did not seem to occur on any other part of the atoll.

About five species of minute land shells occurred in rotting trees (especially mangroves), and in the wet season in holes in rocks.

(*i*) *Oligochæta.* Worms were represented by one earth form which was scarce in drift rubbish on Esprit Island, and more common in the small area of sandy land on Picard. It occurred nowhere else on the atoll, and was not found at all in the dry season.

Malaria. In conclusion it may be of interest to mention a curious outbreak of malaria which occurred. Previous to May 1908 malaria was unknown on the atoll. At the end of April 1908 a steamer arrived viâ the Seychelles, bringing a number of labourers, among whom were several men from Nossi Bé, Madagascar. A little over a fortnight after their arrival several cases of malaria occurred, and during the dry season the number increased, the maximum being reached when the disease had as victims two-thirds of the entire population of the atoll, which at the time numbered 150.

During August the number of fresh cases decreased, and none were recorded after September, though many still suffered from the disease. It was at first thought that the epidemic could not be malaria, though showing every symptom of tertian fever. Men

suffering were conveyed to the Seychelles, where Drs Addison* and Power† made blood preparations (films) which showed sporulating plasmodia, seeming to prove the nature of the disease conclusively.

A search was then made by the author personally for *Anopheles*, both by observing the imagos and larvæ, but this was absolutely without success and never during the entire visit was an *Anopheles* found.

There are therefore two alternatives: the first is that *Anopheles* arrived in April 1908, propagated themselves so rapidly as to be able to infect over 100 people, and then died out, also with such speed as to be extinct in September. It is conceivable that *Anopheles* might not be able to persist at all in Aldabra, or that it might live for a short time and then gradually die out, but that it should do so with such suddenness seems highly improbable. This alternative therefore is not a likely one.

The second is that *Stegomyia* can be capable of a modified transmission of malaria. It is almost certain that no sexual processes of the plasmodium can take place in *Stegomyia*. It seems just possible however that this insect may act as a passive transmissor: it is present in such numbers even in the dry season that there is seldom a moment, night or day, when the inhabitants of Aldabra are not being bitten, and a transmission of blood is quite probable. Supposing this occurred when the plasmodia were about to sporulate, or even just after, it seems possible that a fresh patient might be affected. However, in the absence of sexual processes the stock of the protozoan would probably become senescent, and ultimately die out. This is exactly what occurred, for at the date of departure (end of January) there was not a single malarial patient in the atoll. Supposing that this explanation could be proved correct it would explain the occasional malarial epidemics which occur in other islands in which *Anopheles* is apparently unknown.

A few scattered notes have now been given concerning the fauna of Aldabra: as however these could not be put in a very explicit form, it may be permitted to make a short summary:—In the littoral fauna Aldabra resembles, or is perhaps somewhat poorer, than any of the coral islands in the same region. The land fauna, probably on account of the greater extent and age of the land, and also because of its more varied vegetation, is larger than that of any of the neighbouring coral islands. It is composed mainly of peculiar forms, but most of these are closely allied to Malagasy animals and are such, with the exception of the land tortoise, as might easily have arrived by sea, and then have altered somewhat under the fresh conditions found in an isolated land.

* Chief Medical Officer. † Assistant Medical Officer and visiting Magistrate to the outlying islands.

VI. ASTOVE.

Astove is situated in latitude 10° 6′ S. and longitude 47° 45′ E.; the chart shows it to be 2 miles long by $1\frac{1}{5}$ miles broad, but the survey appears inaccurate and the island is probably longer.

In form it is an atoll with an extremely perfect land-rim encircling a large though very shallow lagoon, which is in connection with the sea by one pass situate in the south-east. The atoll is surrounded by a fringing reef which I was only able to investigate near the pass where it is very narrow (about 200 yards). The long axis of the island runs nearly north and south dividing it into an eastern and western portion of which I only had time to visit the latter.

The land-rim in the west measures from $\frac{1}{4}$ to $\frac{1}{2}$ a mile in breadth and is slightly curved on the seaward side, thus enclosing an open bay, the shores of which are sandy, though at intervals coral rock cliffs intervene for short distances and also occupy the

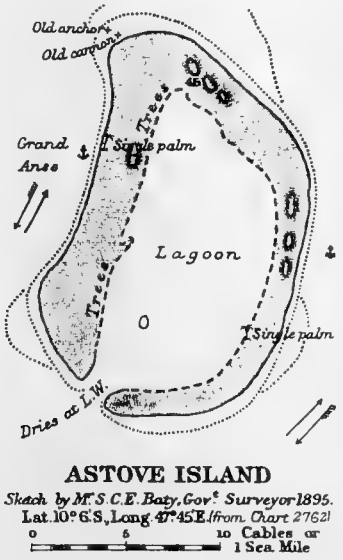

Fig. 1. From the Admiralty Chart of Astove.

coast for half a mile to the north of the pass. Cliffs again form the north-western point but give way to a sandy beach on the north (north-east) coast of the atoll; here, as everywhere throughout the region, cliffs are always much overhanging and are evidently rapidly crumbling away.

Immediately inside the beach in the western "bay" there is a narrow (100 yards) sandy stretch somewhat resembling that on Picard Island, Aldabra; it is covered with a sparse scrub of common shore-zone plants, and may perhaps have an elevation of 18 feet above high tide mark. Rising somewhat abruptly from the sandy zone, and perhaps 4 feet higher, is a stretch of coral rock passing to the lagoon shores, which in the north-west are sandy but to the south-west are formed by low overhanging cliffs exactly like the lagoon cliffs of Aldabra. In the north-west, near the lagoon, the wind has covered the rock with low dunes, the sand being derived from the lagoon shore; further south

however it is either bare or (near the lagoon) is covered by a thick layer of dark brown guano. The surface of the rock is almost as rough as the "champignon" of Aldabra but, unlike it, was obviously composed of coral, which differed from anything I saw elsewhere in the region by forming fields of unbroken colonies all in position of growth, even the short spike-like form of *Madrepora* projecting from the surface as if still on a growing reef. At Aldabra corals in position of growth were abundant on the cliffs and cliff faces but never were they found seated on the surface of the ground as if elevated but yesterday. There is no doubt therefore that Astove is an elevated atoll, and in addition I deduced that no great rain-water denudation had occurred; but Professor Gardiner considers that the corals might still project undamaged on the surface even after the island had been much reduced in level by denudation, a supposition which is upheld by the fact that Aldabra, Assumption and Cosmoledo must all have suffered greatly from this cause, and it is almost inconceivable that an island distant less than a hundred miles should have escaped.

Metamorphosed rock is scarce, but a little was discovered near the lagoon to the south and as usual contains phosphatic inclusions.

The eastern part of the land-rim was not visited but it was obviously narrow and much heaped with sand.

The lagoon is extremely shallow and is hardly more than a foot deep at low tide; the bottom is covered with a very fine white sand or mud, which on windy days is so churned up that the whole lagoon looks white and the shores are covered with white foam. As the tide descends all suspended material is swept to sea and the loss is thus very large. Judging by this fact and by the form of the lagoon cliffs (where existing) it is evident that the lagoon is increasing both in size and depth. Considering its extreme shallowness and the absence of small islands and rocks, I am inclined to think that the Astove lagoon is a primary lagoon the greater part of which existed at the time of elevation.

The single pass is narrow (150 yards), and even shallower than the lagoon, being almost dry at low tide: the bottom is of coral rock, apparently metamorphosed, and practically devoid of any living corals or débris, though the east shore of the pass is somewhat piled with rounded lumps of coral rock. This pass is obviously of recent formation and there is no doubt that a little time ago the lagoon was absolutely enclosed except for subterranean connections, of which I remarked one in the north of the lagoon. In future, more passes will undoubtedly form, the land-rim in places on the north and east being very narrow. The reef outside the pass is obviously not a reef which has grown up *in situ* but a ledge of elevated coral rock cut down to low water-mark; owing to the rush of water from the pass, it has not been covered either with coral or débris, though it is somewhat encrusted with lithothamnia. There is a marked tendency to form a series of descending terraces, down which the water from the lagoon rushes on its way to the sea. The remainder of the atoll fringing reef is doubtless of the same character, though it has been piled with coral débris and sand much in the same way as the Aldabra reef.

The time I spent on Astove was insufficient to properly investigate its structure

and therefore the flora and fauna were quite neglected. Birds seemed scarce, but I noticed a *Cinnyris* and a rail (*Dryolimnus abbotti*?) which seemed to be the Assumption species. No remains of land tortoises were obtained, but I shall not be surprised to hear of their being found when the guano is dug*.

Insects were very numerous and it was a matter of great regret that few could be taken; butterflies were more common than on any other island and comprised one species, the beautiful *Precis rhadama*, not noted elsewhere. The bush in places resembles Aldabra *Pemphis* scrub and in others the open country of Assumption: it was very bare and dead during my visit and hardly a score of plants were obtained in flower, though during the dry season it is supposed to be the most luxuriant of all the Aldabra series. I had intended to revisit Astove to complete my investigation and take photographs on the homeward voyage; unfortunately during a dead calm the strong current carried the schooner altogether out of her course and it was impossible to put back.

VII. COSMOLEDO.

Cosmoledo is a large atoll about 9 miles long by 7 miles broad, situated in lat. 9° 41′ 20″ S. and long. 47° 32′ 12″ E. Contrasted with the other two atolls visited it is remarkable in having less than 10 miles of its 24 miles of circumference capped with land. The latter is divided into eight main islands, of which Menai and Wizard Islands are the most important.

The islands in all cases are fundamentally of coral rock, though sand has been blown on from all sides and in some cases has completely hidden the rock under large sand dunes and ridges. The rock is elevated coral rock, which in most places has been much metamorphosed, and which always contains varying amounts of phosphate. "Platin" rock was not found, and corals in position of growth were only occasionally observed. It was obvious that the islands were once larger and there is evidence in the form of small islets and rocks to show that the land-rim was formerly almost perfect. Erosion is still progressing rapidly in many parts of the atoll, an actual measurement being obtained at a point on the lagoon side of Wizard Island, which showed the loss of 15 yards in fifteen years (1893—1908).

The nature of the islands visited is as follows: the North-East Islands and Goëlette Island are almost entirely rocky†; the shores to seaward and towards the lagoon are formed by overhanging cliffs as at Aldabra. Extensive phosphate deposits have existed on all, and on West North-East Island is a certain amount of a phosphate rock, which appears to be composed of sand and rubble cemented together by phosphoric acid. It was interesting to find eggs of a giant land tortoise embedded in this rock, thus proving that once these reptiles lived on Cosmoledo.

Menai Island is rocky, but is also considerably overlaid with sand, which has been blown up from the lagoon. The shore is formed partly by cliffs and partly by sand:

* A letter from Capt. Parcou just received informs me of the find of large bones cemented into a rocky pinnacle. I have every confidence that these will be found to be those of giant tortoises.

† There is a small dune on the lagoon side of Great North-East Island.

on the lagoon side is a small mangrove swamp, which appeared to be decreasing in size owing to insufficient protection from the waves. It is perhaps the last remains of a mangrove swamp, which once extended completely round the lagoon.

Wizard Island is sandy, and coral rock hardly occurs on the surface, though it can be found by digging. Beach sand-stone is common round the shore. It appears likely that the island will soon be divided into two. Of all islands in this region Wizard was most like such a sand cay as Bird Island, Seychelles*, for it seems to have lost most of the peculiarities of such rocky atolls as Aldabra or Astove.

The reef was only visited at a point south-east of Moustique Island where it measured half a mile from lagoon to open sea. The seaward edge is conspicuous for

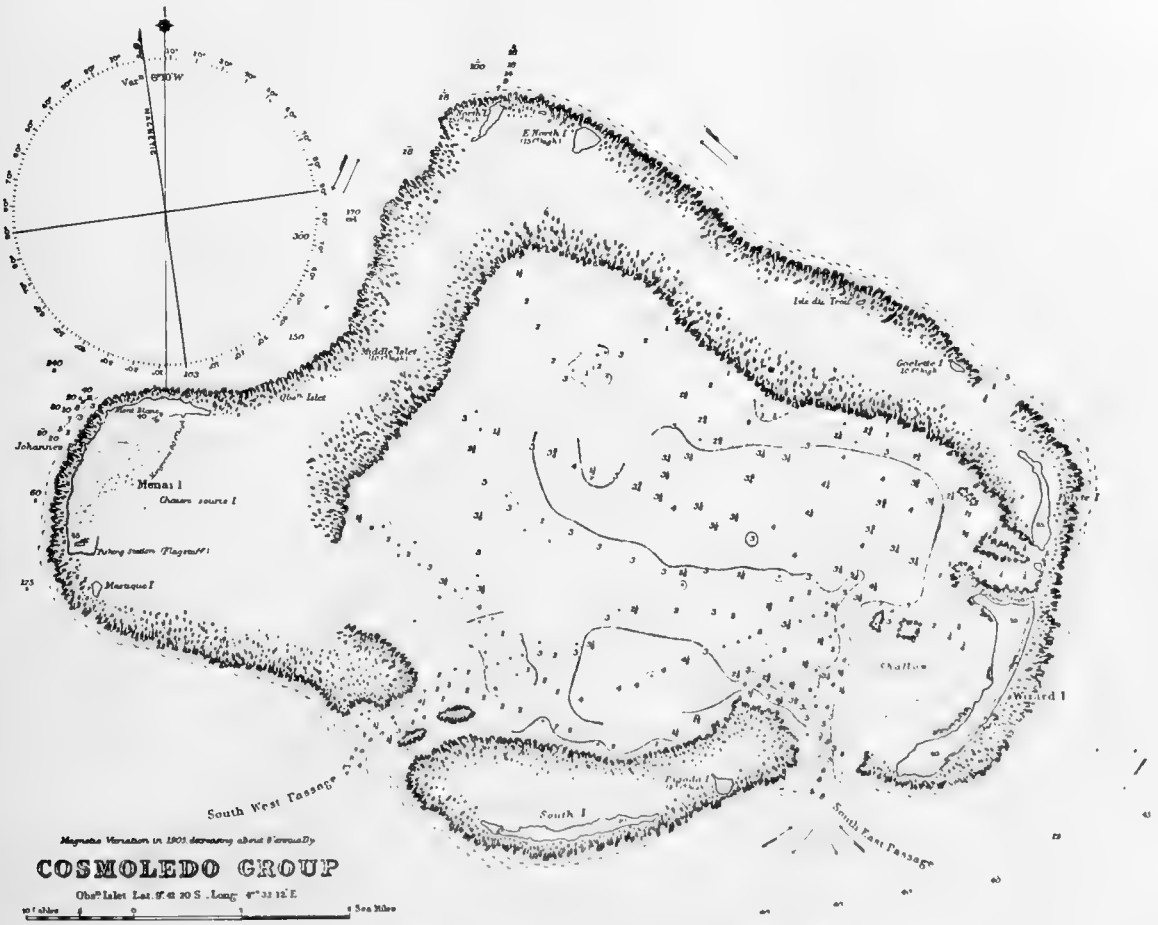

Fig. 2. From the Admiralty Chart of Cosmoledo.

vigorous massive lithothamnia, but no live coral was noted. Inside the edge lithothamnia is still abundant but consists chiefly of encrusting forms found on broken pieces of coral thrown up on the reef. Sloping towards the lagoon is a sort of buttress-zone with channels and pools containing some live coral, the whole resembling the seaward edge of an atoll reef. The lagoon at this point is largely choked with sand, and partially dry at low tide. In places are large beds of *Cymodocea*. There was no sign of any large blocks (negro-heads) thrown on the reef edge.

* Trans. Linn. Soc., Ser. 2, Zool. Vol. xiv., pp. 15—17, 1911.

The lagoon as a whole is not deep (2—3 fathoms); the bottom is sandy as far as can be seen and living coral colonies are scarce. There are two true passes through the reef, both to the south of the atoll, and there seems to be a tendency to form a deep basin in the south of the lagoon between the passes.

As Cosmoledo is important theoretically a summary of its chief structural points may be given:

(1) Cosmoledo is an elevated atoll.

(2) The land-rim was once almost perfect but has been broken up by erosion: the rock islands left are in process of disappearance from the same cause.

(3) The reef dividing the islands is in just such a condition as should be required for the formation of land by wave-piling: there is, however, no sign of this.

(4) Great quantities of sand are everywhere present, and much is being piled up on the islands.

There is no evidence as to the height of elevation of the atoll; the summit of the rock is now about 10 feet above high spring tides, and the elevation cannot have been less than 20 feet, and was probably more. If Aldabra and Cosmoledo were elevated simultaneously, the interior of the latter atoll must have been much more cavernous to account for the more rapid disintegration of land.

Of the flora and fauna little can be said, as the few days of my visit were all occupied in examining the formation of the atoll. The sandy islands, *e.g.* Wizard and Polyte, are clothed solely with coral-sand plants, the type of vegetation such as was found on Aldabra being quite absent. Menai Island, where sandy, resembled Wizard, but in the centre is a small piece of almost typical *Pemphis* bush, a form of vegetation which apparently clothed South Island on which I was unable to land. The North-East Islands had been too much disturbed by guano digging to determine their original state, but Goëlette was thickly covered with *Plumbago aphylla*, a herb which produces leaves at the beginning of the wet season but like the broom (*Spartium scoparium*) speedily loses them, and for the majority of the year assimilates by means of the chlorophyl in its stems. The fauna seemed rather poor, though a lizard, *Zonosaurus madagascarensis*, found on the North-East Islands was not observed elsewhere in the Aldabra region*. A rail (*Dryolimnas abbotti*?) still exists on South Island, and a *Cinnyris* perhaps forms a local race, but land birds were scarce on Cosmoledo, which as a whole seemed too broken into small islands to be suitable for a land fauna.

* The skink *Ablepharus boutonii var. peronii* and the gecko *Hemidactylus gardineri* were also obtained. *Vide* G. A. Boulenger, Report XVII. of this Volume.

VIII. ASSUMPTION. (Plates 28 and 29.)

Assumption Island is situated in lat. 9° 46′ 20″ S. and long. 46° 30′ 30″ E., and unlike the islands previously noted is not an atoll. It is crescent-shaped, about $3\frac{3}{4}$ miles long, and varies from 1 mile to about a third of a mile in width. In composition it is undoubtedly an elevated reef, corals in position of growth being abundantly seen, especially along the cliffs of the east coast and on the sides of large pits in the rock, which are extremely common. Much metamorphosis has occurred in places in the interior of the island, and as usual phosphatic inclusions are always present, and give

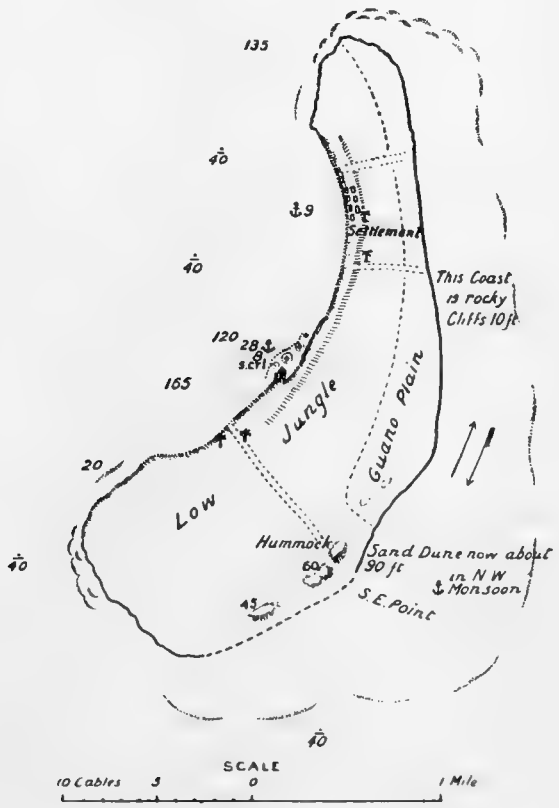

Fig. 3. Assumption Island.

evidence of the quantity of guano which was deposited on it. There is still a fair quantity of this substance in hollows in the rock and also along the east coast, where it forms a covering over the rock about 6 inches deep.

A conglomerate somewhat resembling the Aldabra "platin" is generally distributed, but from the nature of the component corals it appears probable that this limestone is the result of great denudation acting on a rock composed of corals in position of growth: it is in the nature of a superficial layer and does not extend downwards for many feet. Underneath it the corals in the rock are almost all in the position of growth.

Variations in level over the island were, owing to a thick bush, difficult to estimate, but judging from three tracks cut from the east coast to the west coast, there is a slight

ridge running from the north to the south near the west shore measuring some 18—20 feet above sea level, assuming that the rest of the island is about 12 feet (above sea level). In the south-west this ridge sinks gradually, but in the north-west the slope is steep and even forms low cliffs, leaving a sort of terrace or flat near the shore, which is piled with blown sand.

The pits, before referred to, are most common in the interior of the island, but also occur within a few yards of the sea. As at Aldabra they probably owe their origin to the imperfect consolidation of the reef before elevation. The pits vary exceedingly both in area, depth and contents; the largest measured 18 yards by 14 yards wide and 9 feet deep; the deepest was 45 feet. A considerable number contained water always salt and fluctuating tidally; others contained guano and mud, but even in these salt water could be reached within a few feet of the surface and usually showed tidal fluctuations; as at Aldabra therefore sea water can penetrate completely through the island.

The sides of the pits were always much overhanging and erosion was everywhere obvious in those which contained water, though even in the dry pits weathering seemed to cause an increase in size. The pits are gradually connecting, and will eventually divide the island into a number of islets or rocks, which will of course be rapidly removed by wave abrasion. It is important to notice that, if the reef had been basin-shaped before elevation, then the pits in the interior would naturally have connected before those near the outside, and thus a lagoon would have been formed and the island would have been an atoll.

Large sand dunes (90 feet high) occur in the south-east of the island; the soundings taken by Captain Parcou, previously mentioned, demonstrate much loss of land in the south-east and the sand resulting from the process of erosion is driven on to the coasts and forms the material from which the wind has built up these large dunes. The shore of the island is chiefly rocky, though there is a long stretch of sand in the west, and small sand "lances" are not uncommon elsewhere. Erosion is everywhere obvious.

Owing to the visit occurring during the neap tides the reef was imperfectly examined. It seemed to have a very ill-defined edge, to be very sandy and indeed hardly existant to the south-east. It is probably of the same nature as the Astove and Aldabra fringing reefs, but is less definite on account of the sand acting as a check to reef-building organisms.

The two chief points of theoretical interest in connection with Assumption are:

(1) The fact that it is not an atoll, and

(2) The bad consolidation of the rock as a whole.

Both are probably due to the same cause. The base on which the island is built has probably a narrow summit, and the reef was enabled to build vertically more quickly than it could form a talus slope on which to extend horizontally. Supposing it was elevated when it became nearly awash it presumably had not had sufficient time to form a reef of large area or of solid composition; there is therefore but little difference in primary rock structure throughout the island. Secondary rock changes again show the importance of phosphate in metamorphosis, and give evidence of great denudation. The

height to which it was elevated was probably the same as was Aldabra though we have no definite evidence as in the latter case.

The vegetation over the majority of the island consists of a tangled network of *Plumbago* (*P. aphylla* sp. ?), *Astephanus* (*A. arenarius* sp. ?) with numerous low bushes not identified. Small trees such as *Euphorbia Abbotti*, banyan (*Ficus* sp. ?) were not uncommon, while *Dracœna* (*D. reflexa* sp. ?) occurred in guano-filled pits. A few trees of *Pemphis acidula* occur near the west coast but do not unite to form bush.

The birds of the island include a *Cinnyris* (*C. abbotti*), the Aldabra cuckoo (*Centropus insularis*), rail (*Dryolimnus abbotti*), a brown turtle dove (*Turtur assumptionis*) resembling the Aldabra dove (*Turtur aldabranus*) and a gannet (*Sula abbotti*) which is peculiar to Assumption and Christmas Island (Indian Ocean). On Assumption it inhabits the large dune, never descending to low parts of the island, and only going a few miles to sea to fish; it was never seen on Aldabra*. Its distribution seems quite inexplicable. The giant land tortoise formerly occurred on the island, for I found the remains of several specimens in the pits in the rock. They do not seem to differ specifically from *Testudo elephantina* of Aldabra. Living reptiles consist of the skink (*Ablepharus boutonii var. peronii*) and the gecko (*Phelsuma madagascarensis var. abbotti*).

In one of the pits in the rock, which was at least 8 feet deep and about 10 feet square and contained salt water, I obtained an eel, for which Mr Tate Regan tells me a new family will have to be made. I could see no open connection between the pit and the sea, but presume one must exist, as the sides are overhanging and the water never reaches within 4 feet of the surface. Invertebrates are not numerous; Mr Dupont has since visited the island and has very kindly made a collection, which contained a series of several species, of which I only obtained single specimens and one or two I had failed to observe at all.

IX. FARQUHAR, PROVIDENCE AND ST PIERRE.

A page must here be devoted to summarising the peculiarities of the remaining islands of the Aldabra series though the reader will find full accounts with illustrations and charts on pp. 142—149 of the first volume of Percy Sladen Trust Expedition to the Indian Ocean (Trans. Linn. Soc. Ser. 2, Zool. Vol. xii. pp. 141—9).

Farquhar is an atoll 11 miles by 4 situated in lat. 18° 6′ 45″ S. and long. 51° 10′ 3″ E. The points to which I would call attention are as follows:

(*a*) The atoll has a very imperfect land-rim.

(*b*) The land is mainly in the form of sand islands formed by wind and wave piling, though a few minute islands of elevated coral rock still remain to show that the atoll is elevated and resembles Cosmoledo, except that the process of erosion has been carried further.

* This species is also recorded on Christmas Island. I have not compared my specimens with those from this island but if identical the distribution becomes even more curious.

(*c*) The reef is undoubtedly holding its own and may quite probably be gaining by means of the vigorous growth of lithothamnia. This reef, if, as seems probable, it resembles that of Cosmoledo, is really elevated coral rock cut down below low tide mark and now protected from further loss.

(*d*) The lagoon is shallow but shows a tendency to form basins which are deeper (6 fathoms, 9 fathoms) than the basin forming on Cosmoledo (3—4 fathoms).

(*e*) The vegetation consists of coral sand plants.

In the concluding section I shall show that Farquhar accurately represents the future condition of any of the three atolls visited.

Providence, which lies 40 miles north of Farquhar, is uninteresting, being a sand cay without evidence of coral rock. A dredging taken to the west of the island in 744 fathoms obtained coral rock coated with manganese and nodules of volcanic mud, also similarly coated. These are of great interest as tending to show that the Providence bank is based on a volcanic mound.

St Pierre, 17 miles west of Providence Bank, apparently resembles Assumption in most respects, being an elevated coral rock island with overhanging cliffs. It differs in containing a dry primary lagoon which however has been elevated to such an extent that it is improbable that St Pierre can ever form an atoll.

The vegetation rather resembles that of Assumption than that of a sand island, for numerous *Pemphis* and *Euphorbia* trees are recorded.

The present lessees of the island, the Mahé Syndicate, are exporting guano and, while on the Seychelles, I was shown by Mr Stephens, a member of the firm, an egg obtained in the guano, apparently that of a giant land tortoise.

Before proceeding it may be well to add a word of warning as to the heights and measurements given. No surveying instruments were taken and estimations of height were made very roughly and indeed could often be only guessed at. Professor Stanley Gardiner records the cliffs of St Pierre as varying up to 30 feet and I feel it quite possible that many of my elevations are underestimated. On the other hand I have every confidence that the various measurements are correct in relation to each other and for purposes of theorisation may be entirely relied on.

X. THE FORMATION AND FUTURE OF THE ISLANDS.

In this, the concluding chapter, I wish to consider from a wider point of view, first, the formation of the Aldabra series of islands, and secondly, their future, basing the various deductions on the processes which can be seen taking place at the present day. A certain amount of repetition is unavoidable, but is perhaps excusable as this section may be regarded as in part a summary of the results of the whole work.

Before a reef can be built up underneath the sea by the active growth of corals, it is first necessary for there to be some base rising to within at least 40 fathoms of the surface, since reef-building corals, which feed largely by means of symbiotic algæ, cannot flourish at greater depths. Of this base in the case of the various members of the

Aldabra series we have no actual knowledge; but, as there are only a limited number of methods by which such a base could be obtained, the matter can be carried somewhat further. By the most famous theory of coral islands, that of Darwin, it would be supposed that, as the Indo-African bridge disappeared, mountain-tops were left projecting above the sea and in tropical regions would naturally be surrounded by a fringing reef. As the mountains continued to sink, the fringing reef would become a barrier-reef and the barrier-reef an atoll, which by active growth and wave piling could remain at the surface in spite of the subsidence. We have seen however that all evidence gained on Aldabra and its neighbours points to a method of formation by elevation and not by subsidence, and Darwin's theory is therefore untenable.

In the case of the Maldives, Gardiner showed that the base on which this archipelago is built, is probably the higher part of the Indo-African bridge, cut down below the surface of the sea by current erosion, and at first it was felt probable that the same explanation might apply to the Aldabra series, but, on learning that its members arise abruptly from a depth of 1000 fathoms, this supposition seemed unlikely*. There remains but one alternative. It is known that during submarine volcanic action mounds of ashes and mud are produced, which can even form islands, as in the case of Graham's Island†, and these mounds arise abruptly from the sea-bottom as appears to be the case with the members of the Aldabra series. In addition we know of an active volcano in the Comoros, of volcanoes but recently extinct in Madagascar, and the "Sealark" dredged undoubted volcanic mud from off the slope of Providence, and therefore the whole area of the South-West Indian Ocean appears to be liable to volcanic action and it does not seem too rash a theory to suppose that the bases in the case of the Aldabra series are volcanic mounds.

These mounds may have reached to within 40 fathoms of the surface when formed; may have been volcanic islands, which were cut down to that depth by the sea or may have been built up from great depths by the gradual deposition of animal remains from the surface; these are problems which we cannot decide, but it is quite certain that in the case of each island or atoll some base reached to within 40 fathoms and was colonised by reef-building corals.

Up to this point I have referred to the members of the series collectively, but henceforward I shall take Aldabra as my type on account of the superior historical evidence it contains. The shape of the Aldabra reef before elevation has already been dealt with in relation to the "platin" and phosphatic rocks‡, and without further discussion it will suffice to say that it is supposed to have been that of a shallow basin with the outer edge formed by flourishing corals and perhaps lithothamnia, while the inner portions were covered with rubble and sand with here and there a live colony of corals and in parts extensive mollusc beds. From the facies of the fossil corals we know that this reef had nearly reached the surface (within 10 fathoms) but its exact depth is naturally indeterminable.

* It is of course just possible that low peaks of the submerged bridge have been built up by deposition of material from the surface, but Gardiner's proof of the existence of deep currents in the South Indian Ocean makes this unlikely.

† *Vide* Lyell, Principles of Geology, Vol. ii., p. 59.

‡ *Ante* p. 405.

The reefs of Cosmoledo, Farquhar and perhaps St Pierre, when under the sea, presumably resembled that of Aldabra, though it is not assumed that they had all reached the same distance from the surface. Astove differs from the above in that its whole reef seems to have been in a flourishing condition, while Assumption, perhaps because the base on which it is built is elongated and narrow, had no primary lagoon.

The next stage in the history of our atoll was its "elevation" in relation to the surface of the sea and here again we can only guess at the means by which it took place. The natural method would have been for a slight local elevation of the ocean-floor to have placed all the reefs near the surface out of water, but in this connection it must be pointed out that numerous points throughout the whole south-western Indian Ocean show a simultaneous elevation of about an equal amount; thus Mauritius has coral rock at 65 feet, the Aldabra series formerly at 50 feet. Zanzibar has been slightly elevated (coral rock at 200 feet) as also the Seychelles (30 feet), while the Maldives were probably elevated to something under 100 feet. I am not aware of any similar elevation being recorded on either Ceylon or Madagascar, but it must be remembered that, owing to its small extent, its effects are so slight that they might easily be removed by nature or neglected by observers. However this may be, there is no doubt that an area approximately between lat. 9° N.—9° S. (without including Mauritius), and long. 40° E.—75° E., has been "elevated" through at most 100 feet, and it seems most improbable that there should occur an elevation of the earth's crust which should be so very regular even in extent over such a large area. The only alternative is a change in the level of the sea and it may be well to point out the possibilities of such a theory in order to obtain, if possible, more information on the subject. It has been shown that the level of the sea at Karachi is 300 feet higher than the level of the sea near Ceylon, this being due to a banking of the water in the north owing to the attraction of the large mass of the Himalayas. Again observations show that there is an even greater difference of level between the centre of the Pacific and that near the South American coast, a phenomenon attributed to the attraction of the large land mass of South America and the Andes. It is possible therefore that during the last great land changes (late miocene) an alteration occurred in the level of the sea, sufficient to elevate the land in the Indian Ocean, though it remains for the geologist to say whether this suggestion is reasonable.

A further, but to me less probable explanation, of a change in ocean level is that water has been accumulating as ice in Antarctic regions for a long period and that this is sufficient to account for a considerable drop. Against such an explanation applying to the Indian Ocean islands I would urge first that the effect so produced would be world-wide, and secondly that such a movement would have been too slow to have formed such an island as Aldabra which would have had to be cut down by the sea more quickly than it was being raised in relation to the sea level.

After the elevation of our reef and the formation of an island a series of retrograde processes commences and the senescence of the reef, if such an expression is permissible, dates from this period.

At first Aldabra was not a true atoll, for the primary lagoon was elevated to such an extent that it became dry, a statement which is also true of St Pierre and probably of Cosmoledo and Farquhar. Astove is different, for the lagoon of this atoll is probably

to a large extent the primary lagoon of the reef when under the sea; from the luxuriance and distribution of the fossil corals it is probable that it was not so near the surface before elevation as that of Aldabra, and consequently did not rise to such a height.

The next event of importance which happened to Aldabra (and also to the neighbouring islands) was the deposition of a large quantity of guano, and though we do not know exactly when this took place, yet it is fairly certain that it occurred before the secondary lagoon was formed. The guano was deposited solely by marine birds, which at the present day, though very plentiful in the Indian Ocean, do not exist in sufficient numbers to form guano at all rapidly on more than one or two islands (cp. Bird Island, Seychelles *, Cargados Carajos †). So great is the quantity of guano on the various islands of the South Indian Ocean, that it probably amounts even now to over a million tons, and it is a matter of interest as to why there were formerly such vast numbers of birds where now there are relatively few. Two explanations have been offered; firstly, that the birds were driven from their breeding places by man, and secondly, that the increasing vegetation gradually reduced and obliterated the open spaces necessary for ground-breeding birds. Against the former is the fact that many of the guano islands have only just been colonised and have never been known to be "bird islands," while against the latter I might mention that on Bird Island, Seychelles, on which I spent a fortnight, the birds are quite capable of preventing the continuous growth of any form of vegetation on their breeding places by means of fresh guano, which is quite unsuitable to plant life. To provide an alternative theory I would question the effects of the last glacial period (post-pliocene) on the bird-life of the northern hemisphere. The birds must have been driven south, and marine birds would find it necessary to breed on oceanic islands, for the shores of continental lands for many reasons could not be suitable. A temporary congestion might thus have been produced which, with the retreat of the ice in the north, would have been relieved by a return wave of migration.

Whatever may be the true explanation of this enormous quantity of guano, there is no doubt that the derived phosphoric acid has played a most important part in the post-elevation history of the Aldabra series; its universal inclusion in the metamorphosed limestones has already been mentioned; in addition it shows that the reef when first elevated must have been very porous and slightly consolidated, for the guano has been washed into the greater part of the rock on the atoll. At the present day we know that the land-rim can be completely penetrated by salt water, and from the phosphatic inclusions it appears certain that at first the island was equally, if not more, porous; from the beginning therefore sea water could penetrate far into the land, enlarging caverns and crevices by solution and erosion, though at the same time, this process, by allowing concavities to collapse, must have resulted ultimately in better consolidation at the expense of a reduction in surface level. Rain water denudation has probably been an even more potent factor in reducing the level of the land from its original 50 feet or more above sea level to its present average of about 12 feet. This gradual surface sinkage was apparently more or less equal over the whole island and thus the primary

* Percy Sladen Trust Expedition, Vol. xiv., p. 15 (Trans. Linn. Soc.).

† *Op. cit.*, Vol. i., p. 125.

lagoon continued to be the lowest area. When it had decreased to some 20 feet or less above sea level, the formation of the secondary lagoon could begin, and this is supposed to have taken place as follows. The pits in the rock both at Aldabra and Assumption have been mentioned as also the fact that they are usually filled with tidal water and are continually increasing in size owing to erosion. On Assumption it was also easy to see that they had been underground caverns, which owing to erosion and denudation had become open to the surface, while in several cases pits were seen which had evidently been formed by the interconnection of two or more smaller concavities. It is supposed that at some point in the primary lagoon of Aldabra several such pits by coalescing formed a small secondary lagoon, filled with salt water and in subterranean connection with the sea. Gradually this increased in size by erosion and ultimately obtained a free channel to the sea probably on the site of Grande Passe (the oldest pass). Continued decrease in level by denudation made the centre of the atoll progressively more subject to erosion and in time a second opening to the exterior was gained in the neighbourhood of Passe Houareau. There was thus formed a small lagoon with two openings to the exterior. From this point onward it is easy to imagine a gradual increase in the area of the lagoon, the formation of more passes and a decrease in level of the land until the present stage is reached.

A similar history perhaps applies to Cosmoledo and Farquhar; Astove however, if my deductions are correct, always had a lagoon (the primary lagoon) though it is only recently that it has obtained a free channel to the sea. St Pierre is very small and the primary lagoon is not deep enough to convert it into an atoll, while Assumption has no marked depression in the centre, but on account of the interconnection of pits is gradually being split up into a number of rocks.

Sea erosion appears to have been of small importance when compared with lagoon erosion, but it must not be forgotten that it is responsible for the fringing reef, and in connection with the ocean current for the shallow area, the site of lost land, which occurs to the east and south-east of Aldabra and Assumption.

Enough has now been said to indicate the early history, which is supposed to be common to the atolls and islands of the Aldabra series, and it remains to point out their probable future which is more easy than the discovery of their past, for various members of the series illustrate each probable stage. These may be briefly tabulated as follows, though the atolls for convenience are considered apart from the islands without lagoons.

Stage 1. This is represented by two atolls, Aldabra and Astove. They are characterised by a very perfect land-rim, which is composed almost entirely of coral rock, though a tendency to sand piling is noticeable, locally, on each. In both sea erosion has formed a fringing reef, which is very barren and is not extending seawards, while lagoon erosion is forming new passes and reducing the area of land. The lagoon, very shallow in both atolls, is increasing in depth and Aldabra, with the greatest number of passes, has the deepest lagoon. The latter atoll is also somewhat in advance of Astove in that process of subdivision of the islands by stretches of reef is already noticeable in the formation of the reefs by the sides of Grande Passe and Passe Houareau.

The lagoon of Astove is a primary lagoon, and that of Aldabra is secondary and therefore the two atolls should perhaps be placed in different classes, though they are in much the same stage.

The vegetation on each is of a varied type.

Stage 2. Cosmoledo Atoll is characterised by an imperfect land-rim, less than half of its circumference being capped with land. The atoll circumference between the islands is formed by a reef awash which consists of rubble and débris piled on elevated coral rock, but in places the edge of this reef is covered with flourishing lithothamnia and is perhaps beginning to grow seawards.

The land, which once almost encircled the atoll, has been cut up by lagoon erosion into the islands which exist at present. The latter consist of elevated coral rock, which may be uncovered as at Aldabra—and in this case are obviously suffering great erosion on both faces—or may be so piled with sand as to be almost hidden, in which case gain or loss are difficult to determine*.

The lagoon is deeper than those of atolls in Stage 1, but contains little coral growth. The true passes (with channels) are not more numerous than at Aldabra, for after they reach a certain size a balance is struck between the power of growth of the calcareous organisms on the sides of the pass, and the speed of the tidal current (which broadly speaking determines both its erosive power and its power of preventing coral growth).

The vegetation on rock is varied, but on the sand is typical of any sand cay.

Stage 3. This stage is shown by Farquhar Atoll, which has little land on its circumference, and this land is mainly in the form of sand cays, though enough elevated coral rock is found to make it not improbable that Farquhar once had an almost complete rocky land-rim. The reef between the islands is more flourishing than at Cosmoledo and definitely shows signs of growth seawards. The lagoon is somewhat deeper than those of the previous atolls, and is perhaps becoming more so. The vegetation is almost entirely of a coral sand type.

Among the non-atolls the series is not so complete, but Assumption and St Pierre are an early state of Stage 1, while Providence corresponds to the sandy Stage 3.

Considering the important features of the three stages, it does not seem to be straining the imagination to predict in the case of Aldabra or Astove a gradual reduction of the land-rim into small islands, which will be divided at first by stretches of barren reef. The islands, as they are reduced in size, will become more sandy, until elevated coral rock may appear quite absent, and at this period the vegetation will consist of the regular coral sand plants. The lagoon will continue to grow deeper, and the "Farquhar" stage will be the result. Beyond this it is impossible to foresee, for the ultimate fate of the atoll depends on various conditions of which we have no data, though without further elevation we can feel sure that no coral rock land will continue to exist. The atoll may continue for ever with its reef awash and bearing a few sand islands, or on the other hand it may be cut down fathoms beneath the sea to form the base on which corals can build a fresh reef.

* Loss is shown on Wizard Island by the presence of beach sand-stone.

The Aldabra series thus provides an interesting comparison between the various phases in the life-history of an atoll, and it might perhaps be asked as to how it is that several atolls, if they came into existence simultaneously, can have reached such different stages in the same time, and in this connection it may be pointed out that the rapidity of the various retrograde processes will depend (1) on the height to which the atoll was elevated, (2) on the depth of the primary lagoon, (3) on the width and perfection of the land-rim, of all of which we know little in the case of atolls in an advanced stage, such as Cosmoledo and Farquhar.

Further speculation would suggest the questions as to whether the Chagos and Amirantes were once completely formed of coral rock, and whether the Saya de Malha and Nazareth Banks represent the site of former coral rock islands, or whether they are new formations. The data to determine such points however no longer exist, and speculation without the necessary basis of facts is unsatisfactory, and indeed useless.

In conclusion I desire to place on record my indebtedness to the Master and Fellows of Gonville and Caius College for electing me Shuttleworth Research Student of the College, to His Excellency W. E. Davidson, Governor of the Seychelles, and to the many gentlemen, who by their advice and kindness materially assisted me in my work.

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DESCRIPTION OF PLATES.

Plate 22.

Map of Aldabra Island. (Reproduced by permission of the Cambridge Philosophical Society.)

Plate 23. Aldabra.

Fig. 1. Sea cliffs and reef on the north coast near Passe Houareau. Note overhanging cliffs and large fallen mass of rock due to sea erosion. On the top of the cliffs is a *Casuarina* tree and a belt of *Pemphis* and *Scœvola*.

Fig. 2. Portion of the cliff-face (to seaward) of Malabar Island to show fossil corals in position of growth. The cliff at this point measures 12 feet in height. On the top of the cliffs is the beginning of the *Pemphis* bush.

Plate 24. Aldabra.

Fig. 1. Sea cliffs to the south of Main Island (the end of the Takamaka section). Note the sloping buttressed cliffs and the "shore zone" piled with sand and carrying a short dune grass.

Fig. 2. Portion of the sea cliff of Picard Island to show the composition of the rock. The coral colonies are all in same relative positions as when alive.

Plate 25. Aldabra.

Fig. 1. "Champignon country" on Picard Island. The rock is metamorphosed coral limestone pitted and denuded by rain-water. In the distance is the edge of the bush.

Fig. 2. "Platin country" on Picard Island. The rock consists of a conglomerate of worn coral fragments and reef débris. The shallow depressions are caused by rain-water denudation.

Fig. 3. A typical example of a small island or large rock in the lagoon. The birds on the rock are Noddy Terns (*Anous leucocapillus*).

Fig. 4. View in Lagoon showing island masses off the shore of the land-rim of the atoll.

Plate 26. Aldabra.

Fig. 1. A natural pit in the rock on Picard Island. It is in subterranean connection with the lagoon (distant ¼ mile) and is filled with tidally fluctuating water. The pit is rapidly becoming larger owing to erosion.

Fig. 2. "Basin Cabris" on Picard Island. It forms a small lake with a subterranean connection to the lagoon, its waters being tidal.

Fig. 3. Camp Frigate on Malabar Island. The mangrove swamp has penetrated through the land-rim and is here seen arriving at the sea. After the lagoon has washed away a little more land a tidal current will be enabled to sweep through and cut a fresh pass.

Fig. 4. One of the Western Channels (from the lagoon looking seawards). The lagoon has cut a passage through the land-rim to the sea but has not yet removed two small islands. These are being cut away by current erosion (as is shown by their overhanging cliffs) and in time an open pass will be formed.

Plate 27. Aldabra.

Fig. 1. Esprit Island, showing its wall of shell rock (see pp. 401, 402) with a Banyan tree (*Ficus* sp.?) to the left.

Fig. 2. Esprit Island: cliffs of south shore showing pinnacles of shell rock with phosphatic rock below.

PLATE 28. Assumption.

Fig. 1. A typical scene in the interior of the island. The surface of the land is fairly rough, and jagged pinnacles, the result of rain-water denudation, are not uncommon.

The vegetation consists of low trees and shrubs separated by stretches of rock covered with tangled herbaceous plants among which *Plumbago aphylla* is conspicuous. The tree in the foreground is *Euphorbia Abbotti.*

Fig. 2. A stretch along the east coast of the island is covered with guano. The illustration shows an area from which the guano has been cleared while in the distance on the cliffs are trees of *Pemphis acidula.*

PLATE 29. Sectional Diagrams.

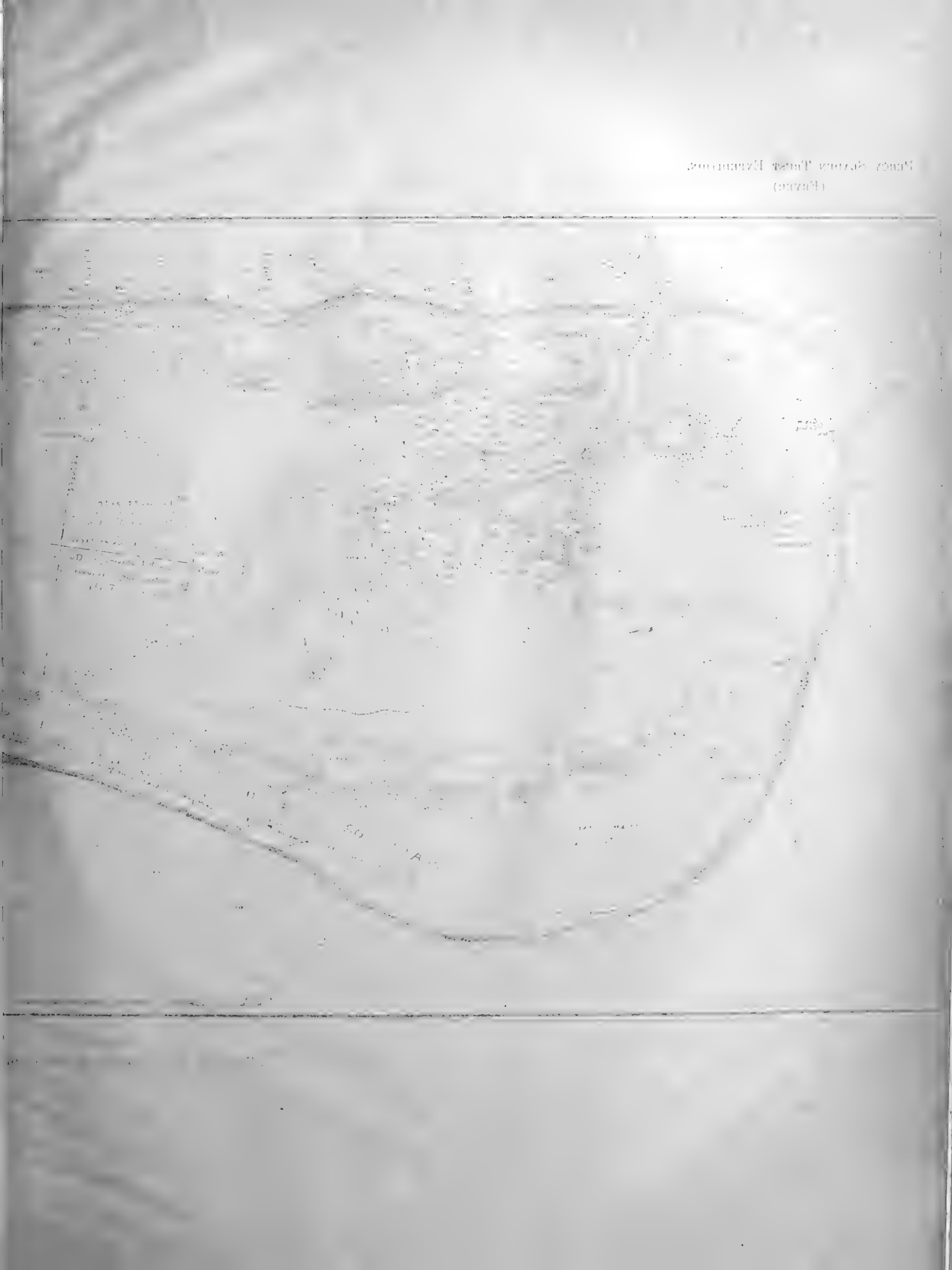
Fig. 1. Assumption.

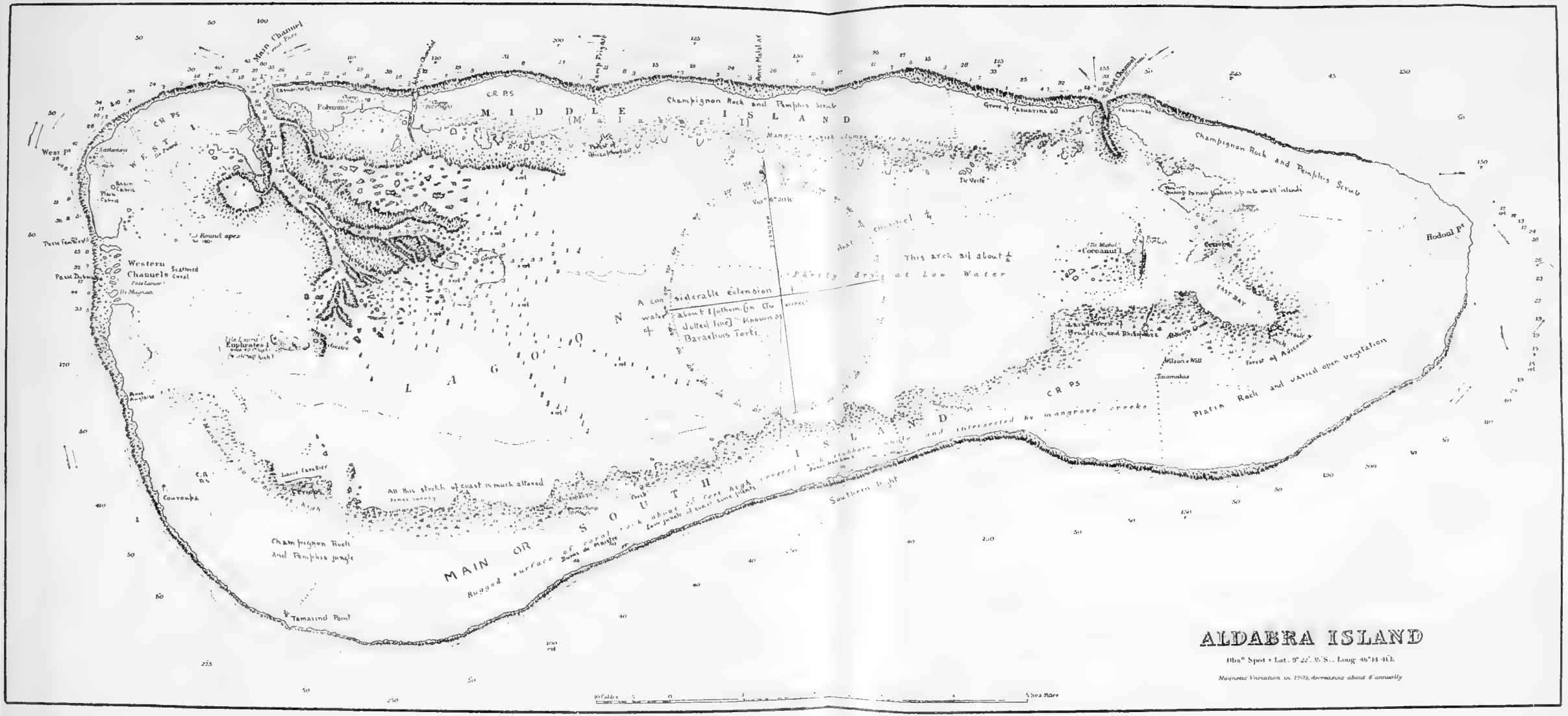
Fig. 2. Astove.

These sections are drawn up from soundings kindly made for me by Captain R. Parcou. I would call attention to the steep slope to the west and the long gradual slope to the east or windward. It is believed that the latter has been caused partly by the loss of land due to sea erosion and partly by the piling of sand (foraminiferal) by the sea.

In order to bring the diagrams within reasonable dimensions it was necessary to greatly magnify the vertical scale in relation to the horizontal. The heights are in feet and the depths in fathoms.

The seaward slope to the west is in each section inset in natural scale.





ALDABRA ATOLL

(From the Admiralty Chart with additions by J. C. F. Fryer)

Fig. 1. **Cliffs near Passe Houareau.**

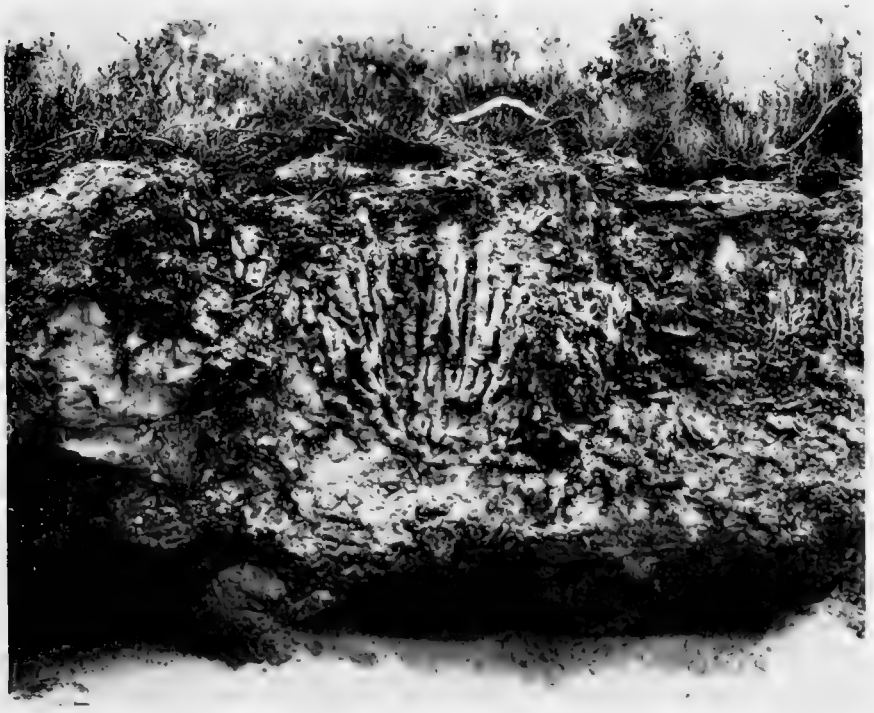


Fig. 2. **Cliff-face of Malabar Island.**

Fig. 1. South shore of Main Island.

Fig. 2. Corals in cliff of Picard Island.

FIG. 1. "Champignon" of Picard Island.

FIG. 2. "Platin" of Picard Island.

FIG. 3. Lagoon Rock.

FIG. 4. View in Lagoon.

FIG. 1. Pit on Picard Island.

FIG. 2. "Basin Cabris" on Picard Island.

FIG. 3. Camp Frigate on Malabar Island.

FIG. 4. One of the Western Channels.

FIG. 1. **Esprit Island: wall of shell rock.**

FIG. 2. **Esprit Island: cliffs of South shore.**

Fig. 1. Scene in the island.

Fig. 2. A Stretch of guano.

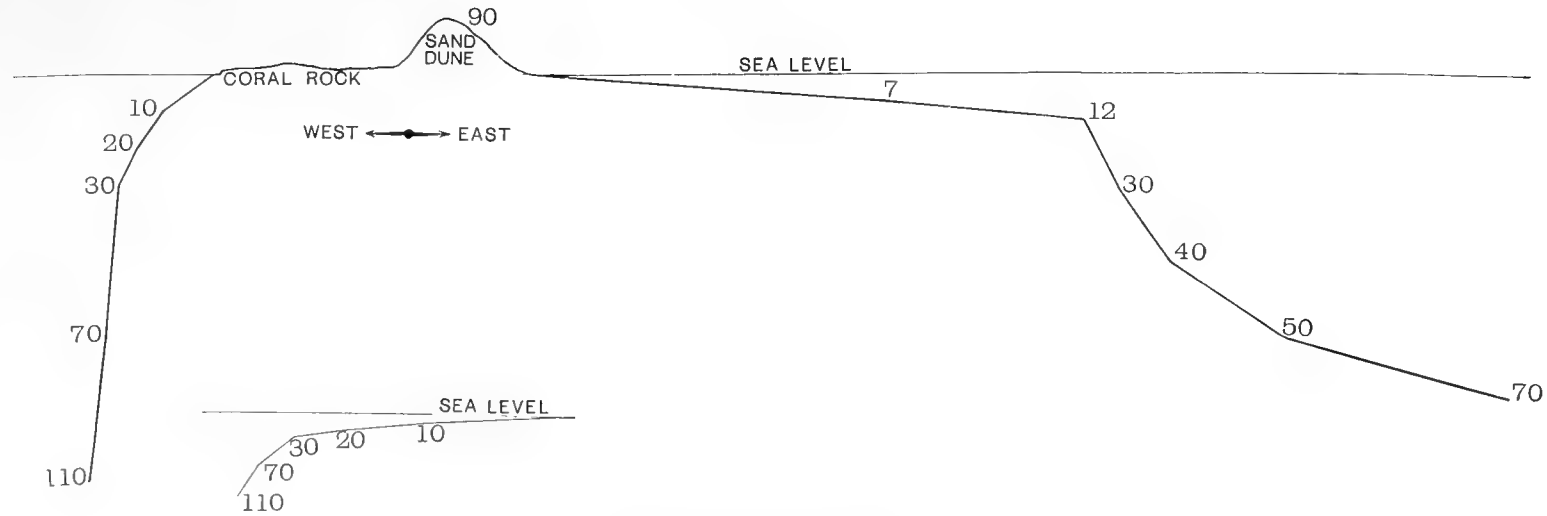


FIG. 1. **Assumption.**

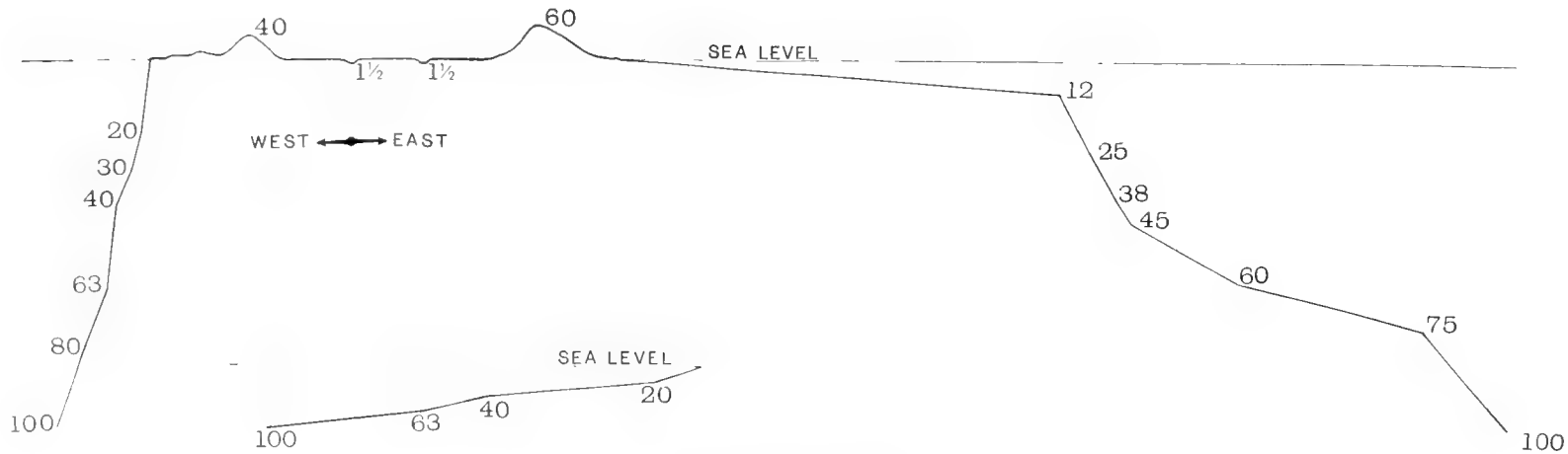


FIG. 2. **Astove.**

SECTIONS ACROSS ASSUMPTION AND ASTOVE

No. XX.—ON *POLYTREMA* AND SOME ALLIED GENERA. A STUDY OF SOME SEDENTARY FORAMINIFERA BASED MAINLY ON A COLLECTION MADE BY PROF. STANLEY GARDINER IN THE INDIAN OCEAN.

By Sydney J. Hickson, F.R.S., *Professor of Zoology in the University of Manchester.*

(Communicated by Prof. J. Stanley Gardiner, M.A., F.R.S., F.L.S.)

Read 4th May, 1911.

(Plates **30—32** and one Text-Figure.)

I. INTRODUCTION.

Some years ago Professor Stanley Gardiner sent to me a small collection of Stylasterina from the Indian Ocean for investigation and description; but I found included in the consignment some purple and yellow corals which, having a superficial resemblance to some varieties of *Distichopora*, might easily be mistaken for Stylasterina in the process of sorting out the specimens of such a large collection as Prof. Gardiner made in the course of his expedition. Having no special knowledge of the Foraminifera it did not occur to me at once that these large dark red and yellow corals could have any relation to the well-known genus *Polytrema*, but further investigation convinced me that the specimens were identical with or closely allied to the specimens collected in the Gulf of Manaar by Captain Warren and described by Carter (5) as *Polytrema cylindricum*.

Carter's description of his new species was very brief and I found it very difficult to understand the reason for including it in the genus *Polytrema*, as there are many characters, apart from its great size and its colour, in which it differs from the *Polytrema miniaceum* that is found in the Mediterranean Sea and elsewhere and is so well known to zoologists by the researches of many investigators. I endeavoured, therefore, in the first place to clear my mind as to the essential characters of the genus *Polytrema*; but, on reference to the literature, I came across a great difficulty which it took me some time to unravel.

The accounts given of the structure of *Polytrema* by different authors of repute are not consistent, and the inconsistencies cannot be accounted for by any supposition that they are due to gross inaccuracy of observation and description.

Fortunately there is in the Manchester Museum the large and valuable collection of Foraminifera made by Mr E. Halkyard and included in this collection are several specimens of Foraminifera labelled *Polytrema miniaceum*. On making a careful examination of one series of specimens in this collection from the West Indies I found that the structure of the surface corresponds very closely with the description given by Carpenter and is totally different to that given by Max Schultze, Merkel and Lister, but on the other hand the descriptions given by Max Schultze, Merkel and Lister agree quite accurately with the structure I was able to observe on the specimens collected at Nice and from a locality off the Kermadecs in the S. Seas.

This led me to test the provisional hypothesis that the specimens examined by Carpenter and those examined by some of the other observers belong to quite distinct genera. I therefore searched through all the many bottles of Corals, Alcyonaria and other specimens of marine fauna in the laboratory and examined any red patches I could find that had the least resemblance to a *Polytrema*; and I also examined a large number of specimens of the genus in the collections at the British Museum.

The result was to prove conclusively that there are at least two distinct genera of Foraminifera included in the group of specimens which are usually labelled in Museums "*Polytrema miniaceum*" and that these two genera differ from one another by constant and well defined characters. For the form that is certainly common in the Mediterranean Sea but is also widely distributed in other parts of the world I propose to retain the generic name *Polytrema*, for the other genus which does not, so far as my information goes at present, occur in the Mediterranean Sea at all, I propose the new generic name *Homotrema*.

But to return to the specimens identified as *Polytrema cylindricum*. A critical examination of my own specimens proved that their structure was in many respects quite distinct from that of either *Polytrema* or *Homotrema*, and having convinced myself that they are not gross, overgrown or hypertrophied specimens of either of these two genera I propose now to constitute for them a new generic name *Sporadotrema*.

I wish to acknowledge the assistance I have received in the course of this investigation from Mr H. Sidebottom, a well-known authority on the Foraminifera, and from Professor Burrows of the Manchester University whose advice I have followed in the construction of the new generic names.

I am also indebted to the authorities of the Free Public Museum at Liverpool for the loan of the type specimens of *Sporadotrema cylindricum* and to Mr Kirkpatrick for his assistance in my study of the specimens of *Polytrema* in the British Museum.

The very fine set of specimens and preparations of the genus *Polytrema* made by Mr E. Halkyard which was recently presented to the Manchester Museum with the rest of his rich collection of Foraminifera has been of invaluable assistance to me in the study of the genus.

II. DIAGNOSES OF THE THREE GENERA.

1. Polytrema.

The original description of this genus given by Pallas (14) is as follows:

Millepora miniacea—M. pumila subramosa rubra, punctis crebris impressis minutis. Maris Mediterranei, Americani, Indicique Corallia.

Tournefort* committed himself to the view that this coral was the beginning of the true red coral, i.e. *Corallium*. It was Risso, in 1826, who separated it from the genus *Millepora*, but Dujardin, in 1841, first placed it tentatively among the Rhizopoda.

Coming down to more recent times the more important papers on the genus are by Max Schultze (15), Möbius (13), Carter (3) and Merkel (12).

* Mem. Acad. Sci. 1700, p. 35.

The coral may be in the form of small flat encrusting disks on corals, shells and rocks, or in the form of short branching coralline structures rising from a flat and sometimes spreading base. The usual size of the branching forms from the Mediterranean Sea is about 3—4 mm. in height and 4—5 mm. in diameter at the base. The flat encrusting forms are very variable in shape and size, the largest patch from the Mediterranean I have seen is 6 mm. in length but of irregular shape. The specimens from other parts of the world do not seem to grow much larger than the Mediterranean specimens. The greatest height attained by the branched specimens in Möbius' large collection off Mauritius was only 3·5 mm. The finest specimen I have seen came from the Ki Islands in the Malay Archipelago (Plate **30**, fig. 1, Plate **31**, fig. 8), Siboga station 250, 90 metres. It is 7 mm. in height and one branch alone is 6 mm. in length.

The colour is usually pale red, of a tint that has variously been described as "cinnabar," "carmine" or "peach colour," but pale pink and white varieties are known.

There can be no doubt that the genus has a very wide distribution in the tropical and temperate seas. It certainly occurs in the Mediterranean Sea, the Indian Ocean, the Malay Archipelago and the S. Pacific Ocean (Kermadecs, Funafuti, etc.) but I have not yet found any specimens from the W. Indies or from the shores of the American continent.

It is not necessary to describe the structure of *Polytrema* in detail but it may be useful for purposes of comparison with the two allied genera (cf. pp. 447 and 450) to state the principal characters that can be used for distinguishing the genus.

The surface is perforated by two kinds of pores, the larger or pillar pores ("Pfeilerporen" of Merkel) gradually shelving from a diameter of 0·08 mm. to a diameter of 0·03 mm. and the smaller and far more numerous pores or foramina opening abruptly with a diameter of about 0·005 mm. (Plate **32**, fig. 23). Below the surface there is a series of laminae perforated by foramina similar to those of the surface lamina and these laminae are connected together and supported by the hollow pillars (Pfeiler) (Plate **32**, figs. 18 and 27). The walls of the pillars are not perforated by foramina but there may be one or more than one passage ("Lochern" of Merkel) by which the cavities of the pillars are connected with the intralaminar spaces.

2. Homotrema.

It is difficult to determine whether the original specimens described under the names *Millepora miniaceum*, *Polytrema corallina* and *Polytrema miniaceum* by Pallas, Risso and Dujardin belong to this new genus *Homotrema* or to the genus *Polytrema*. Lamarck (10) described his specimens of *Millepora rubra*, some of which came from the "American ocean," as "*sublobata*, poris crebris minutis punctata." I believe these specimens belong to the new genus *Homotrema*. The specimens described by Max Schultze (15) clearly belong to the genus *Polytrema* and it is evident that the specimens described by Carpenter (2) belong to the genus *Homotrema*. Max Schultze's specimens came from the Mediterranean and he states that he examined Carpenter's specimens which came from the South Sea, and although they showed more variation than his, he had no doubt they were the same specific form. Schultze's opinion that the specimens from the two localities are undoubtedly the

same species is difficult to understand when the descriptions given by the two authors are compared.

Carpenter for instance lays stress on the fact that "the surface is always areolated" and "the areolæ are porous while their boundaries are composed of solid shell substance." In describing the internal structure he says that the chambers communicate by large circular pores and smaller orifices. It is noteworthy that he does not state that the walls of the chambers are perforated by foramina nor in the figure does he show any foramina except those at the surface. Carpenter's statement moreover that "sometimes its stalk, instead of branching swells into a globular protuberance" is quite consistent with the view that the form he described was a *Homotrema*. I have not seen any specimens of *Polytrema* for which this statement of the shape could be considered accurate*.

If Max Schultze's account of *Polytrema* be compared with that of Carpenter it will be noticed that on all these important points the two authors are at variance.

Carter (3) evidently examined a large number of specimens which he considered to be *Polytrema miniaceum* from the Mediterranean Sea and from other parts of the world.

His figure 6 of the species appears to me a composite production, the upper part being taken from a true *Polytrema* and the lower part from a *Homotrema*. I have never seen any such combination of the characters of the two genera in any one specimen. Both his figures and his description appear to have been composed from notes taken from the examination of a number of specimens of a mixed collection of the two genera.

The very careful and accurate description of *Polytrema* by Merkel gives absolutely no support to Carter's views.

The coral may be in the form of flat encrusting disks, or of a short erect coralline structure rising from a flat and sometimes spreading base and showing an expanded crown springing from a constricted stalk terminating in a number of short arms or verrucæ (Plate **30**, fig. 2, Plate **31**, fig. 9). The size of the erect forms in my collection is from 5—6·5 mm. in height, 4—6 mm. in diameter across the crown, and 2—3 mm. in diameter across the stalk. The specimens of flat encrusting forms that I have seen are (1) from S. America 12 × 7 mm. and 8 × 8 mm.; (2) from Coin, Peros Banhos Atoll 6 × 8 mm. and 6 × 6 mm. The colour is nearly always red, but the tone of colour is darker and more purplish than is usually the case in *Polytrema*†.

One series of specimens from Coin, Peros Banhos Atoll, was pink, and I have seen

* Pallas, p. 252, wrote "Americana varietas plerumque verrucæ magnæ inæqualis speciem habet, quæ superficie sparsos ramulos exserit." This is remarkable because it would apply admirably to many specimens of *Homotrema* in my collection but not to any specimens of *Polytrema*, and at present there is not any evidence that the genus *Polytrema* occurs on the American coast although *Homotrema* is common.

† Note on colour. As it is very difficult to express in words the exact difference in colour between these "red" corals I have consulted Mr H. Cadness of the Manchester Municipal School of Art and the suggestion he makes is that the term "apricot red" might apply to the specimens of *Polytrema* from the Mediterranean Sea and "salmon-colour" to the specimens from the West Indies. It is of considerable interest, in this connection, to note that Pallas in his description of *Millepora miniacea* records his observation of a difference in colour between his specimens from the Mediterranean and those from the American sea, the former being in all probability specimens of *Polytrema* and the latter of *Homotrema*. His words are, "Color hujus elegantissimi Corallioli ex Mari Mediterraneo allati, pallide roseus solet, interdum saturatior. Quod in Coralliis Indicis reperitur pulchre cinnabarinum colorem exhibet, saturatissimum vero specimina in Coralliis testisque exesis Maris Americani reperiunda."

some white specimens, but it is probable that all of these were technically dead. The distribution of *Homotrema* is still imperfectly known, but I have seen specimens from the Ki Islands 129 fms. and from Celebes in the Malay Archipelago, from various localities in the Indian Ocean, from the West Indies, and from the Coast of S. America.

In both *Homotrema* and *Polytrema*, as in other sedentary coralline structures, the form of the full grown skeleton is very variable, but the study of a large number of specimens shows that in *Polytrema* the ramification is more complete and the branches longer and more slender than in *Homotrema*. This difference between the genera is not only indicated by Pallas (p. 446 footnote), but also by Lamarck, who by the use of the word "sublobata" instead of "subramosa" suggests that his own specimens of *Millepora rubra* did not branch. In *Homotrema* the larger specimens often assume a mushroom shape, the free end being considerably expanded and giving off short blunt processes, whereas the proximal end is contracted into a relatively slender stalk.

The combination of the two characters of colour and form are frequently sufficient to determine a specimen without the use of any magnifying glass at all. But of course no specimen can be determined with certainty to be a *Polytrema* or a *Homotrema* until its surface characters have been examined by at least a half-inch microscope objective.

The description of the structure of *Homotrema* for comparison with that given for *Polytrema* on p. 445 is as follows.

The surface is marked by clearly defined areolae about 0·1 mm. in diameter perforated by a large number of small foramina, ·001 mm. in diameter. The boundaries of the areolae are solid, and there are no pillar pores. Below the surface there may be seen a number of chambers communicating with one another by large open passages and bounded by solid walls. There are no hollow pillars and no foramina except those on the outer walls of the superficial chambers (Plate **32**, figs. 19, 22, 28).

3. Sporadotrema.

The specimens of this genus that were first discovered were found by Captain Warren in the Gulf of Manaar and described by Carter (5) under the name *Polytrema cylindricum*. By the kindness of the authorities of the Public Museum at Liverpool I have been able to examine the type and co-type specimens. They belong to the "Amirante" facies* of *Sporadotrema* but are very small specimens. The type specimen is 6 mm. in height and 2 mm. in diameter. The illustration of *Polytrema miniaceum* in Brady's Plate CI, fig. 5, of the Challenger "Foraminifera" represents a *Sporadotrema*. There is a specimen of *Sporadotrema* similar in general structure to the "Amirante" facies in the British Museum from the Macclesfield Bank and there is also in the same institution a pink specimen resembling the "Saya de Malha" facies. I have examined the type specimen of Carter's *Polytrema mesentericum* in the British Museum and found that it belongs also to the genus *Sporadotrema*, but it is a distinct species. The type specimen is very much water-worn and the locality from which it came is unknown, but I have found a number of fine specimens in a collection of Alcyonaria made by Professor Haddon in Torres Straits.

* For an explanation of the use of this term see p. 451.

The type species has always the form of branching coralline structures but the degree of ramification varies considerably in the different varieties, the details of which will be related later. Flat encrusting varieties have not been found at present.

One of the chief characters of the genus is undoubtedly the great size which it attains. The largest specimen in the collection is from 70 fathoms of water off Providence Island (Plate **30**, fig. 3)*. It is no less than 27 mm. in height and 28 mm. in expanse. It rises from a base 7 × 5 mm. and the diameter of the short stumpy arms is 5—6 mm. This is truly a giant foraminifer. Selecting three fine specimens of other facies of the genus in Prof. Gardiner's collection I find that a specimen of the "Amirante" facies from 32 fathoms is 10 mm. in height with an expanse of 13 mm., that a specimen of the "Saya de Malha" facies from 29 fathoms is 11 mm. in height with an expanse of 15 mm. and that an orange coloured variety from Cargados is 16 mm. in height with an expanse of 18 mm. All of these specimens are many times larger than the largest known specimens of either *Polytrema* or *Homotrema* and a great deal larger than the type specimen discovered by Capt. Warren. Another very well marked character of the genus is the colour variety. The type specimen from the Gulf of Manaar and the specimens from the Indian Ocean which for convenience sake I call the "Amirante" facies are dark purplish red in colour (Plate **30**, fig. 6). It is darker and more pronounced, "saturatior" as Pallas would have said, than the colour of *Homotrema* and *Polytrema*, but still it is a red colour. The "Saya de Malha" facies is a pale purplish pink (Plate **30**, fig. 4) very different in tone to the pale pink varieties of *Polytrema*, but the specimens of the "Providence" variety are yellow (Plate **30**, fig. 3) and a specimen from Cargados is deep orange, colours which so far as my knowledge goes are quite unknown among the varieties of the other two genera.

But size and colour, although useful as easy guides to identification and valuable as supplementary characters are not by themselves trustworthy characters upon which to base a generic distinction.

A careful examination of the structure of the specimens proves that these specimens possess other and more fundamental characters which justify the conclusion that they constitute a distinct genus.

When the surface of the stem of a *Sporadotrema cylindricum* is examined it is found to be smooth and often porcellanous in texture but perforated by a number of relatively large and scattered foramina (Plate **32**, fig. 21). There are no honeycomb markings nor defined areas of any kind. The foramina are all of the same kind and there is no trace of anything corresponding with the pillar pores of *Polytrema*. The foramina at the surface are very much larger than those of either of the other two genera. In the specimens from Providence island the average size of these apertures is 0·057 mm. in diameter. In *Polytrema* the average size of the external openings of the foramina is 0·005 mm. and in *Homotrema* about 0·001 mm.

When the branches of *Sporadotrema* are examined, the surface may be found to be marked by a pattern of grooves bounding convex areas which correspond with the subjacent chambers (Plate **31**, fig. 15 and Plate **32**, fig. 24). The foramina on

* The specimen drawn in Plate **30**, fig. 3, and photographed in Plate **31**, fig. 10, is smaller than the largest specimen in the collection.

these areas are smaller and more numerous than the foramina on the stalk. At the extremity of an unbroken branch the outlines of the chambers may be even more clearly traced. The terminal chambers seem to be inserted on the edge of the branch like a series of biconvex or irregularly spherical bricks on the top of a chimney. The outer wall is perforated by foramina, the inner wall turned towards the axis of the branch shows two or three large spout-like apertures by which the protoplasm in the cavity of the chamber communicated with the exterior (Plate **31**, fig. 16 and Plate **32**, fig. 24). At the free edge of some of the chambers there is a cock's comb of short tubercles. The axis of the branch sometimes terminates in a veritable forest of siliceous sponge spicules.

The extent to which the outlines of the chambers can be seen on the branches varies a good deal. In the "Providence" facies they can be seen only at the extremities of the branches. In the "Amirante" and "Saya de Malha" facies they may be seen along the whole length of the branches and in some cases on the upper part of the stalk as well (cf. Plate **30**, figs. 3, 4, 6, 7).

When the internal structure of *Sporadotrema* is examined, several points of great interest can be discovered. As in *Homotrema* it is only the outer walls of the chambers that are perforated by foramina, the walls of the chambers turned towards the axis are not perforated by foramina. In some of the larger branches and stems the axis is occupied by almost solid skeleton around which the chambers are arranged, but usually the axis exhibits a number of cavities and irregular spaces communicating with one another by large apertures but bounded by very thick and solid* walls (Plate **32**, fig. 20).

The size of the chambers varies a great deal with the size of the specimen examined and varies also within wide limits in every individual. An average diameter for the chamber of *Sporadotrema* cannot be given in this paper with any approach to mathematical accuracy, but roughly speaking the average diameter of the chambers of the "Providence" facies of *Sporadotrema* is ten times as great as that of the chambers of *Homotrema*.

Another very striking feature of *Sporadotrema* is the thickness of the outer wall on the stem and larger branches. In some of the specimens from Providence the distance between the outer wall of the chambers and the surface of the coral is no less than 2 mm. (Plate **31**, fig. 14). It is this thickness of the outer wall that is responsible in some measure for the smoothness of the surface of the stem and main branches. At the free extremities of the branches where the outer wall is thin the outlines of the chambers can be readily distinguished on the surface, but on the older parts where the wall is thicker all traces of these outlines are lost.

The initial chambers of one megalospheric form of *Sporadotrema* have been discovered. Three of these chambers can be seen in the section (Plate **32**, fig. 29 *ic.*) distinguished from the other chambers of the specimen by their regular shape and by the fact that, although buried in the base of the stalk, their outer walls are clearly perforated by true foramina.

The size of the central chamber is perhaps an important point in the general argument that *Sporadotrema* is distinct from *Polytrema*. At first I was inclined to believe that

* The term "solid" is used only in a relative sense, the whole skeleton is undoubtedly perforated by fine canaliculi as is the skeleton of *Polytrema* according to the researches of Merkel.

these large specimens from the Indian Ocean are merely large or hypertrophied specimens of *Polytrema*, and even after observing the difference in structure between them and *Polytrema* I considered the possibility that they may have passed through either a *Polytrema*-stage or a *Homotrema*-stage.

Two facts seem to render any such view quite untenable. There is a small branch of some dead coral in the collection to which are attached in close proximity a specimen of *Homotrema* 5·25 mm. in height and 5 mm. in diameter at the crown, and a young specimen of *Sporadotrema* 3·25 mm. in height and 1·75 mm. in diameter. Both of these specimens show the surface characters of their respective genera with great distinctness, although the *Sporadotrema* is actually smaller than the *Homotrema*.

In the section of the initial chambers of the specimen of *Sporadotrema* from Providence the central chamber is 0·33 mm. × 0·48 mm. in measurement. In *Polytrema miniaceum* the average diameter of the central chamber of ten specimens is 0·051 mm. according to Lister (11), but the average diameter of eleven specimens in the Halkyard collection I have found to be about 0·075 mm.

The description of the structure of *Sporadotrema* for comparison with that of *Homotrema* and *Polytrema* on pp. 445 and 447 is as follows.

The surface of the stem and, in many cases, of the proximal parts of the branches as well are not marked by areolae at all. The foramina are scattered irregularly on the surface and are of relatively large size. There are no pillar pores. Below the surface there may be seen a number of chambers communicating with one another by large open passages and bounded by solid walls. There are no hollow pillars and no foramina except those on the outer walls of the superficial chambers (Plate **32**, figs. 20, 21 and 26).

III. ON THE GENERIC AND SPECIFIC NAMES.

There can be no doubt that Pallas, one of the earliest writers on these corals, examined specimens of both the genera *Polytrema* and *Homotrema*. The distinction he draws between the colour of his Mediterranean specimens and the colour of those from the American sea, together with his special description of the form of the American variety, indicate this with sufficient clearness. It is therefore a matter of choice, governed by no special rule of nomenclature, which genus shall retain the original name. It will be doubtless the more convenient plan to assign to the very common Mediterranean foraminifer which has been so well described by Max Schultze and Merkel the generic name *Polytrema*.

In selecting a name for the specimens from the American seas and elsewhere which I have shown to be distinct I have chosen the generic name *Homotrema*, signifying "pores together" (cf. ὁμόσπορος = sown together) with reference to the character that the foramina are confined to defined areas on the surface. For the third genus which is characterised by the fact that the foramina on the surface are relatively few in number and are scattered without reference to any defined areas I propose the generic name *Sporadotrema*.

The questions of the specific names present some difficulties. It is clear that the

name of the Mediterranean form must be *Polytrema miniaceum*, it is also necessary to retain the specific name *cylindricum* for the type specimens of *Sporadotrema* from the Gulf of Manaar originally described by Carter (5) under the name *Polytrema cylindricum*. The specific name of the only species of the genus *Homotrema* should be "*rubrum*" (Lamarck).

But when it comes to a question of subdividing the three genera into a number of specific groups a much more debateable ground is reached.

The three genera described in this paper are sedentary animals and have, in all probability, a very wide geographical distribution. Beginning their lives as free floating organisms they settle down casually on some hard substance at the bottom of the sea and gradually assume a coralline form. The actual environmental conditions to which the individuals are subject during the remainder of their lives vary enormously according to the locality, depth, condition of the tides and the neighbouring benthos of the spot on which they have happened to settle, and these varying conditions undoubtedly exercise a considerable influence in the determination of the actual size, shape and ramification of the full grown individual. It cannot be assumed that the form of a full grown individual is entirely a matter of environmental influence. A comparison of a large number of specimens of *Homotrema* and *Polytrema* must convince any one that there is an underlying hereditary influence controlling to some extent the growth of the individual. It is impossible to determine in any particular example, with any pretence to scientific accuracy, the part played by the environment and the part played by heredity in the determination of shape, and it becomes therefore a matter of judgment, based upon a knowledge of a large number of specimens of each genus, whether a particular specimen or group of specimens should be separated from the others as a distinct species.

In many cases among sedentary animals, a particular form of growth seems to be associated with some particular conditions of the environment such as we see for example in many forms of corals such as *Millepora* and *Madrepora*, and the specimens may be arranged in groups, which are practically discontinuous groups, according to their shape. Detailed examination of the structure of the members of these groups may show no differences of importance correlated with the differences in shape, and it appears to me that to regard such groups as separate species is unsound. Nevertheless it is of importance to be able to give to them group names, in order to be able to record briefly the general influence of the environment on the specimens from a particular locality or depth, and such group names I have in a previous paper (8) called "facies." As regards the two genera *Polytrema* and *Homotrema* I do not consider that we are in a position to subdivide the two species. I believe that a more detailed comparison of the structure of the S. Pacific, Indian Ocean and Mediterranean forms of *Polytrema* may necessitate the constitution of two or three new species. There are some differences to be observed between the *Polytremas* from the Mediterranean and those from the Indian Ocean, but I am not in a position to state that these differences are constant.

For the present I consider that there is only one species of *Polytrema* (*P. miniaceum* Pallas) and it is convenient to recognise in this species two "facies," the flat plate-like

forms (*repens*) and the branching forms (*ramosum*). The same remarks apply to the genus *Homotrema*. I can recognise in this genus only one species *H. rubrum* and two facies *repens* and *ramosum*.

The question of colour is an important but difficult one. The colour of *Polytrema miniaceum* and the colour of *Homotrema rubrum* are remarkably constant (cf. p. 446). In these species neither yellow nor orange coloured varieties have been observed. White varieties have been recorded by Carter, Brady, etc. I have also met with many white specimens from many different localities, but it appears to me that the white specimens are in all cases "dead" corals and that the whiteness is due to post-mortem discolouration. In the genus *Sporadotrema* on the other hand there is a great range of colour. Yellow, orange, pale pink, red and deep red specimens being known. My own view is that differences in colour, unless associated with differences in form or structure are untrustworthy guides for the separation either of species or facies.

The well known example of *Melitodes chamæleon* should serve as a warning to those inclined to put their trust in colour. But when colour is associated with form and structure it may be used as a valuable supplementary character.

Of the genus *Sporadotrema* I recognise two species, *S. cylindricum* (Carter) which is fully dealt with in this paper and *S. mesentericum* (Carter).

Sporadotrema cylindricum may be conveniently divided into three facies.

Facies Providentiæ. This is a very robust form of great size, the largest specimens being 27 mm. in height, with short branches, yellow to orange in colour, with a very thick outer wall on the stalk and with the chamber outlines obliterated except at the extremities of the branches (Plate **30**, fig. 3).

Facies Amirantiæ. This is a more delicate form, with longer branches than in "Providentiæ," red or orange in colour with the outlines of the chambers well marked on the branches and sometimes on the upper part of the stalk (Plate **30**, figs. 6, 7).

Facies Saya de Malhensis. This is a more delicate form even than "Amirantiæ" with longer and more cylindrical branches, pale pink in colour with the outlines of the chambers usually well marked on the branches, but with the stalk usually remarkably smooth and almost porcellanous in texture (Plate **30**, fig. 4).

There can be no doubt that intermediate forms will be found between these facies but at present the facies Providentiæ is very well defined, the other two being more difficult to distinguish.

Sporadotrema mesentericum (Carter), Plate **30**, fig. 5, Plate **31**, figs. 11 and 12. Syn. *Polytrema mesentericum* Carter (5).

This species was described from a single water-worn specimen now in the British Museum. Carter remarked at the end of his description that "when perfect" it "probably resembled *Polytrema cylindricum*."

Having found in a collection of Alcyonaria made by Professor Haddon in Torres Straits several perfect specimens of this species preserved in spirit, I can confirm Carter's opinion in so far as to include it with his species *P. cylindricum* in the new genus

Sporadotrema, but I believe that the resemblance between the two species is not so close as he anticipated from the examination of his worn specimen.

The description of the species may be amended as follows:

Test composed of more or less erect sinuous laminæ arising from a spreading encrusting base. The free margin is thick and crenated.

Colour, salmon-red.

The surface of the vertical sides is perforated by foramina and exhibits a pattern of lenticular convexities corresponding with the subjacent series of chambers (Plate **31**, fig. 12). In the larger specimens the convexities are obscured in the lower or basal parts of the surface. The internal structure of the laminæ consists of two parallel series of chambers whose outer walls are pierced by foramina. The chambers communicate with each other by wide cylindrical passages. Between the two series of chambers interlocular spaces occur at the free edges but these spaces become closed up with growth of the chamber walls, so that, at and near the base of the lamina there are no interlocular spaces (Plate **32**, fig. 25).

At the edge of the laminæ the upper portions of the chambers are free and exhibit a cock's comb row of short tubes as in *S. cylindricum*.

The larger laminæ in my collection are from 15—20 mm. in length, from 7—8 mm. in height and from 1·5—2 mm. in thickness.

The species differs very noticeably from *S. cylindricum* in shape. The large and perfect specimens in my collection show that it does not break up into branches comparable with the branches of *S. cylindricum*. In some of the larger specimens several laminæ arise from a common spreading base and are united together to form a plexus or labyrinth. I have not, at present, been able to determine whether this is due to concrescence or irregular ramification. Carter's expression that the laminæ are "united mesenterically" is not very clear to me, but it may be intended to signify that the edges of some laminæ are united with the vertical sides of others in the formation of the labyrinth.

Carter correctly describes the colour of his specimen as pinkish red. It was, as already stated, very much water-worn and probably dead when dredged up. The colour may have been as dark in tone as my specimens when it was alive. In the older parts of the laminæ where the outlines of the chambers can no longer be recognised in the surface view, the foramina are 0·7 mm. in length and 0·03 mm. in diameter and are distinctly tabulate (Plate **32**, fig. 25). The chambers vary a good deal in size but are approximately 0·7 mm. in horizontal length and 0·5 mm. in depth.

IV. DISTRIBUTION.

Polytrema miniaceum (Pallas).

Syn. *Millepora miniacea* Pallas 1776.
Polytrema corallina Risso 1826.

The only specimens of this species that I have found in Professor Stanley Gardiner's collection are from Providence (D. 8) 125 fathoms and Coetivy.

The species has a wide distribution in the warm and tropical seas. It certainly occurs in the Mediterranean Sea, the Indian Ocean including the coast of Ceylon, the Malay Archipelago and the South Pacific Ocean. I have no record of it however from the West Indies or from the American coast.

The following species have also been described but subsequently assigned to other genera.

P. balaniforme (Carter 1876) = (*Carpenteria balaniformis* Carter 1877).
P. planum (Carter 1876) = (*Gypsina melobesioides* Carter 1880).
P. utriculare (Carter 1876) = (*Carpenteria utricularis* Carter 1880).
P. cylindricum (Carter 1880) = (*Sporadotrema cylindricum* Hickson).
P. mesentericum (Carter 1880) = (*Sporadotrema mesentericum* Hickson).
Homotrema rubrum. (Lamarck.) New Generic name.

Syn. (*Millepora miniacea* Maris Americani Pallas 1776.)
Millepora rubra Lamarck 1816.
Polytrema rubra Carpenter 1862.

Specimens of this species were found in Professor Stanley Gardiner's collection from the following localities:

Amirante (E. 9) 34 fathoms.
Amirante (E. 12) 32 fathoms.
Providence (D. 4) 50—78 fathoms (Plate **30**, fig. 2).
Providence (D. 4) 78 fathoms.
Providence (D. 11) 50 fathoms.
Coin, Peros Banhos, Surface Reef.

All these specimens with the exception of those from Coin, Peros Banhos, form small coralline growths 3—7 mm. in height, with a spreading knob-like crown 5—6 mm. in greatest diameter, covered with short wart-like protuberances. The stalk and base of attachment are usually but not invariably constricted. Other specimens I have examined belonging to the same genus and probably the same species are from:

The West Indies, Halkyard collection.
Coast of South America, Manchester Museum.
Antigua, Author's collection.
Celebes, Author's collection.
Ki Islands, 129 fathoms, Challenger, British Museum.
Unknown locality, British Museum, 40, 10, 23, 95, 6.
Korean Strait, 40 fathoms, Capt. St John, British Museum.

The specimen described as *Polytrema* by Dakin (6) from Ceylon may be a *Homotrema.* I have at present seen no specimens of the genus from the Mediterranean sea.

Sporadotrema cylindricum (Carter). New Generic name.

Syn. *Polytrema cylindricum* Carter 1880.

It is convenient to divide this species into three "facies."

S. cylindricum, facies Providentiæ.

Providence (D. 7) 70 fathoms. Several large specimens (Plate **30**, fig. 3).

S. cylindricum, facies Amirantiæ.

Amirante (E 1) 29 fathoms, 2 specimens.
Amirante (E 2) 29 fathoms.
Amirante (E 9) 34 fathoms (Plate **30**, fig. 6).
Amirante (E 12) 32 fathoms.
Amirante (E 13) 20—22 fathoms.

All the above are salmon colour.

Saya de Malha (C 1) 150 fathoms.
Saya de Malha (C 16) 26 fathoms, 2 small specimens (Plate **30**, fig. 7).
Providence (D. 4. 10. 05) 50—78 fathoms.
Cargados Carajos (B 9) 30 fathoms.

The above are orange coloured.

The type of the species is red in colour and belongs to the "Amirante" facies. It came from the Gulf of Manaar. In the British Museum there is an orange coloured specimen of the Amirante facies from the Macclesfield bank.

S. cylindricum, facies Saya de Malhensis.

Saya de Malha (C 16) 26 fathoms.
Saya de Malha (C 19) 29 fathoms (Plate **30**, fig. 4).
Providence (D. 4) 78 fathoms.

In the British Museum there is a specimen of this facies, locality unknown.

Sporadotrema mesentericum (Carter).

This species is found in Torres Straits (Plate **30**, fig. 5).

V. SOME NOTES ON STRUCTURE.

The siliceous spicules. All the specimens of the three genera I have examined have the habit of picking up and incorporating the siliceous spicules of sponges. This habit is not peculiar to these genera but occurs in other genera, such as *Carpenteria*; and it is probably comparable with the habit of picking up sand grains and other foreign bodies by the arenaceous Foraminifera, as in some cases I have found grains of sand and the frustules of Diatoms (*Coscinodiscus*, etc.) enclosed in the chambers. Lister (11) speaks of the sponge spicules taken up by *Polytrema* as "a temporary scaffolding for the support of the extended pseudopodia, in advance of the proper wall." The number of sponge spicules seen in different specimens varies very considerably. In many specimens of *Sporadotrema* the spicules are so numerous that the free edges may be said to bristle with them, in others only a few scattered spicules may be observed. (Some of the spicules may be faintly seen in Plate **31**, fig. 16.) In the chambers broken fragments of siliceous spicules are invariably found but in the solid calcareous walls of the chambers and particularly in the central hard core of the larger specimens of *Sporadotrema* very few spicules can be found. It is difficult to

believe that any of the spicules that are seen at the free edges are cast off when they have served the purpose of a "temporary support for the extended pseudopodia" because the greater number of them are firmly fixed into the solid calcareous skeleton and cannot be withdrawn by pulling hard with a pair of forceps. Nevertheless there are far fewer spicules in the calcareous substance, at a little distance from the free edges, than one would expect to find if it is a fact that they remain unchanged as a matrix for the deposit of the calcium carbonate. I am forced to the conclusion that in the process of the deposition of the calcareous skeleton many of these siliceous spicules are dissolved. If there is not some solution of the silex it is very difficult to account for the numerous fragments of spicules that occur in the intralocular protoplasm. The spicules are taken up whole at the ends of the branches and so far as I can observe at the ends of the branches only. No spicules or fragments of spicules can be seen in the foramina that perforate the sides of the main stem, base or branches. The fragments of spicules in the chambers therefore must be derived from spicules taken up when those chambers were first formed and at the growing points, or possibly passed down to them with the flow of protoplasm from other chambers at the growing points. At the growing points however all the spicules seem to be perfect, at least they are much longer than the diameter of the chambers and very much longer than most of the fragments of spicules found in the older chambers. The sponge spicules must therefore either be forcibly broken or partly dissolved after they are incorporated into the substance of the organism and it seems to me that the view that they are partly dissolved is the more reasonable of the two.

It is difficult to account for the presence of the spicules in these Foraminifera. They are quite constant in their occurrence and consequently it seems probable that they play some essential part in the physiological processes of the species. The regularity of their arrangement and the fact that, usually, very few other foreign bodies than the monaxon siliceous spicules of sponges are found, show that they are not picked up at random but selected from the mud in the neighbourhood and deliberately placed in position.

That they are of foreign origin there can be no reasonable doubt. The sponges from which they collect their spicules must live in the neighbourhood of the Polytremids, or the Polytremids must live in a region where sponge spicules play an important part in the formation of the sand or mud. Not infrequently the sponges cover a part of the Foraminifer or, in some cases, completely overwhelm it. This is a special danger to which the Polytremidæ and some other calcareous organisms are exposed. Forty years ago there was an interesting discussion on the origin of the siliceous spicules in these Foraminifera. Gray (7) and Carpenter (2) maintained that both the siliceous spicules and the calcareous skeleton are the products of the same organism, Max Schultze (15) and Carter (3) on the other hand strongly opposed these views and maintained that the siliceous spicules are of foreign origin. The controversy would be of little more than academic interest in these days were it not for the fact that in a recent paper Kirkpatrick (9) has suggested that *Merlia*, which he considers to be a sponge, does actually secrete siliceous spicules and a calcareous chambered shell. Having had an opportunity of examining the structure of specimens of *Merlia* and arrived at different conclusions to those of Kirkpatrick I will postpone the discussion of this question to a subsequent paper.

The structure of the shell. In comparing the three genera, attention may be called to the relative hardness and density of the skeleton. In *Sporadotrema* and particularly in the "Providentiæ" facies of the genus and in *S. mesentericum* the skeleton as a whole is very hard and rigid. This hardness of the skeleton may be expressed by the use of Carter's words "Consistence stony." In *Polytrema* on the other hand the consistence of the skeleton is very brittle. It may be easily crushed into fragments between the finger and thumb. In *Homotrema* the consistence of the skeleton is intermediate between that of *Sporadotrema* and *Polytrema*.

This difference in consistence is due to the difference in structure of the three genera. The structure of the branches of *Polytrema* is very difficult to understand when taken by itself. The structure of the branches of *Homotrema* and *Sporadotrema* seem to me to throw light upon it and render its understanding more easy. If the growing end of a branch of a *Sporadotrema* is examined it will be found to consist of a circle of more or less biconvex or almost spherical chambers arranged on edge at the tip of the branch. The convex surface facing outwards of each of these chambers is perforated by foramina, the convex surface facing inwards is not perforated by foramina (Text-fig. A). The free edge of each chamber is produced into three or four tubular processes sometimes arranged like the points of a cock's comb (Plate **31**, figs. 15 and 16). In well-preserved specimens one or more of these tubes has a trumpet-shaped mouth the lips of which are the beginnings of a new chamber. Tubular processes similar to those at the edge are sometimes situated on the inner convex surface. Surrounded by these terminal chambers there is an interlocular space (Text-fig. A *i*).

The structure of the branches of *Polytrema* is far more difficult to understand, and the descriptions given of it by Schultze, Möbius and Merkel are not consistent. After careful observation of several specimens from different parts of the world I am quite convinced that there is a wide range of structure of these parts and that a new series of investigations based on the study of a large number of specimens is very desirable. There can be no doubt that zoologists who have given their attention to the Foraminifera have been inclined to "lump" all the Polytremidæ into one species. I believe that when the detailed structure is more carefully examined there will be a swing of the pendulum and the genus *Polytrema* will be split into a large number of species.

However, I will in this statement refer only to one or two points upon which there is inconsistency of statement in the descriptions of previous writers and then describe what I believe to be the structure of the growing point of specimens of *Polytrema miniaceum* from the Mediterranean.

Möbius describes in the branches of specimens of *Polytrema* he obtained in Mauritius a central canal (eine centrale Kammer) around which the chambers are arranged spirally or in circles. Merkel denies the existence of a true central canal but describes excentric canals and spaces opening to the exterior with imperforate walls (Scheidewände) formed by the fusion of the pillar walls. Lister writes of "axial spaces" which open widely at the ends of the branches.

The spaces with imperforate walls, sometimes opening to the exterior at the end of the branches, can be clearly distinguished in some specimens (Text-fig. B *i*); but in a very

large number of specimens they do not occur at all and the presence of centric or excentric canals is certainly not an essential feature of the structure of the branches of the genus *Polytrema* or of its species *P. miniaceum*. The statement that the branches of *Polytrema* consist of 3—4 joints (gliederartigen Abschnitten) made by Merkel and confirmed by a good figure, is not of general application. I have examined a very large number of specimens from the Mediterranean Sea and from other localities and I have not yet been fortunate enough to discover a single one that corresponds with this description. The chambers of the arm of a *Polytrema* are very variable in shape and size and they communicate freely with their neighbours of the same row or stratum. Their outlines are indicated only by the pillars (Text-fig. B *P*). At the free end of a branch there may be seen a variable number of openings. In the diagrammatic text-illustration B, I have shown four such openings. Of these three may be regarded as homologous with the

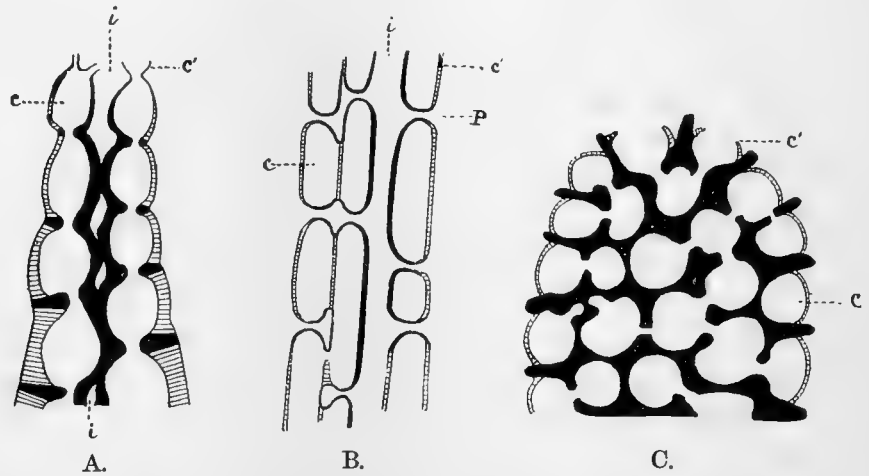


Fig. 1. Diagrams to illustrate the structure of the growing points of A. *Sporadotrema*, B. *Polytrema*, C. *Homotrema*, *c'* incomplete chambers, *c* completed chambers, *i* interlocular spaces, *P* pillar pores of *Polytrema*.

openings of incompleted chambers and the fourth (*i*) as the opening of an interlocular canal or space. The incompleted chambers have walls perforated by foramina on the sides that are free and external as in *Sporadotrema*, but unlike *Sporadotrema* the walls separating one chamber from another that lies internal to it are also perforated by foramina.

The wall of a chamber that separates it from an interlocular space is imperforate.

At the growing point of a *Sporadotrema* (text-illustration A) there is, as a rule, only one circle of chambers enclosing an irregular interlocular space. In *Polytrema* on the other hand there may be a cluster of chambers, two, three or more deep on one side, and one or two deep on the other, enclosing an excentric or possibly in some cases a centric interlocular space. The pillars *P* represent the distal and proximal sides of chambers of a row and their cavities are really interlocular spaces which may be continuous with the walls of the deep seated interlocular canals.

The characteristic feature of the branch of a *Polytrema* is that the chambers appear to be very irregular in outline and this is due to fusion of neighbouring chambers which

may be explained as an expansion of the communicating passages which are seen in *Sporadotrema* and *Homotrema*.

In *Homotrema* (text-illustration C) there are apparently no interlocular spaces. In a vertical section through one of the verrucæ a cluster of chambers may be seen, communicating with one another by large irregular passages. All these chambers, except those at the surface, have solid walls which are not perforated by foramina. The chambers at the surface exhibit a convex outer wall perforated by foramina. At the apex of each verruca a few chambers, with incomplete outer walls, can always be seen.

The foramina. When a specimen of *Sporadotrema* is decalcified and stained, one of the most noteworthy features to be seen is a series of approximately parallel moniliform tubes which break up into branches at the inner end before terminating in a perforated membrane on the outer wall of a chamber and open by a single large aperture at the surface (Plate **32**, fig. 32).

These tubes line the foramina, as can be seen in a stained section of hard and soft parts together, and they are of a chitinous texture. Similar chitinous tubes have been described and figured for *Polytrema* by Merkel and Möbius, but whereas in *Sporadotrema* the tubes may be as much as 2 mm. in length, in *Polytrema* they are rarely more than ·02 mm. in length. In *Polytrema* the tubes are usually simple, but as Merkel has correctly pointed out they sometimes divide at their inner ends. In *Sporadotrema* they are simple only in the region of the terminal chambers; but, on the branches and stems they always divide into a considerable number of smaller tubes which terminate in the chambers. In the figures I have drawn only three or four of these secondary tubes—that is the number that can be seen in a thin vertical section—but there must be actually nine or ten branches springing from each of the main foraminal tubes.

In many of the tubes there may be seen a few or in some cases several chitinous plates stretching transversely across the tubes and these plates have all the appearance of the tabulæ of a tabulate coral except in texture. In the specimen of *Sporadotrema mesentericum* that I have examined these tabulæ seem to be more pronounced than in the other species and, as shown in Plate **32**, fig. 25, the foraminal tubes in this species have the appearance of being regularly tabulate.

Two important questions naturally arise concerning these tabulæ: (1) Are they complete tabulæ, that is to say, do they completely occlude the foramen? (2) Are they supported in any way by calcareous tabulæ?

To the first of these questions it is difficult to give a definite answer. In nearly all the good sections I have examined of decalcified sections and of ground sections of the hard parts they seem to be perforated, but it is still quite possible that in some cases they do completely close the passage. With such delicate structures as these are, it is always difficult to determine the extent of the damage done either by the process of decalcification or of grinding.

To the second question the answer is that in *Sporadotrema mesentericum* there are certainly narrow projecting shelves of calcareous substance supporting the chitinous tabulæ (Plate **32**, fig. 33), and it is probable that they also occur in some of the older foramina in *S. cylindricum* as well.

In *Carpenteria* the chitinous tubes were shown by Möbius (13) to be marked by transverse lines, and these lines probably represent ring-shaped thickenings of the chitin.

In *Polytrema* they are shown to be marked by a series of rings (see Plate **32**, fig. 31, copied from Merkel (12)).

In *Sporadotrema* (fig. 32) they are usually moniliform and frequently marked by a series of ring thickenings. These facts alone, which are easily demonstrable, point to the conclusion that the growth in thickness of the outer wall is not continuous but marked by a series of intermittent stages of activity, and it is at each of these stages of activity that the narrow calcareous shelves are or may be formed.

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EXPLANATION OF THE PLATES.

Plate 30.

Fig. 1. *Polytrema miniaceum.* A specimen from 90 metres off Ki Islands × 4½ diameters, showing the characteristic pale pink (or apricot red) colour.

Fig. 2. *Homotrema rubrum* from Providence 50—78 fathoms × 4½ diameters, showing a darker (salmon colour) red tint.

Fig. 3. *Sporadotrema cylindricum*, fac. Providentiæ; from Providence 70 fathoms × 2 diameters, showing the characteristic orange yellow colour.

Fig. 4. *Sporadotrema cylindricum*, fac. Saya de Malhensis. Saya de Malha 29 fathoms × 2 diameters, showing the pale pink colour.

Fig. 5. *Sporadotrema mesentericum* from Torres Straits × 2 diameters, showing the characteristic dark red colour.

Fig. 6. *Sporadotrema cylindricum*, fac. Amirantiæ. Amirante 34 fathoms × 2 diameters, showing a darker red colour than (in Fig. 4) fac. Saya de Malhensis.

Fig. 7. *Sporadotrema cylindricum*, fac. Amirantiæ. Saya de Malha 26 fathoms × 1½ diameters. This is an orange coloured variety of the facies.

Plate 31.

Fig. 8. *Polytrema miniaceum.* A specimen from 90 metres off Ki Islands (Siboga Expedition) × 4½ diameters, showing the branching method of growth.

Fig. 9. *Homotrema rubrum* from Providence 50—78 fathoms × 4½ diameters, showing the characteristic solid and tuberculate method of growth.

Fig. 10. *Sporadotrema cylindricum*, fac. Providentiæ; from Providence 70 fathoms × 2 diameters. Note that the magnification of this is much less than that of Figs. 8 and 9.

Fig. 11. *Sporadotrema mesentericum* (Carter) from Torres Straits (Haddon coll.) × 2 diameters.

Fig. 12. *Sporadotrema mesentericum* from Torres Straits × 2 diameters. Side view showing the convex surfaces marking the outlines of the chambers.

Fig. 13. *Sporadotrema cylindricum*, fac. Saya de Malhensis. Saya de Malha 29 fathoms × 2 dia meters.

Fig. 14. Transverse section through a stem of *Sporadotrema cylindricum*, fac. Providentiæ × 5 dia meters, showing the thick outer wall perforated by the foramina, and the ring of chambers surrou nding a more solid core. Pl. **32**, fig. 20.

Fig. 15. *Sporadotrema cylindricum*, fac. Saya de Malhensis. A terminal branch × 9 diamete rs. To show the outlines of the chambers clearly marked at the extremity where they are superimposed, becoming less clearly marked as the walls thickened and quite obliterated at the base of the branches and below.

Fig. 16. *Sporadotrema cylindricum.* View of the same specimen as in fig. 15, to show the free edge. The spout-like openings of the terminal chambers may be seen and also the scaffolding of spicules which support the growth of the terminal chambers.

Fig. 17. Vertical section through *Polytrema cylindricum*, fac. Providentiæ × 6⅔ diame ters, showing the arrangement of the chambers in the stem and in one of the branches.

Plate 32.

Fig. 18. Transverse section of a thick branch of a *Polytrema*, showing four concentric circles of chambers. × 100 diameters. *p.* pillar pores.

Fig. 19. Transverse section of one of the verrucose processes of a *Homotrema*, showing that the outer wall (*O*) of the outer circle of chambers alone are foraminate. The other chambers composing the process are not arranged in definite circles, have imperforate walls but communicate with one another by large open passages. × 100 diameters.

Fig. 20. Transverse section through the base of a branch of *Sporadotrema*, showing a single circle of chambers with very thick and continuous outer walls perforated by foramina (*f*). Within the circle of chambers there is a core of calcium carbonate perforated by interlocular passages (*i*). × 6 diameters. Compare this drawing with the photographs on Plate **31**, figs. 14 and 17.

Fig. 21. Surface view of a portion of a stem of *Sporadotrema*, showing the irregular arrangement of the foramina (*cc*). × 50 diameters.

Fig. 22. Surface view of a portion of a *Homotrema*, showing the areolæ (*A*) perforated by foramina and bounded by solid walls. × 50 diameters.

Fig. 23. Surface view of a portion of a *Polytrema*, showing the pillar pores (*P*) and the foramina perforating all the other parts of the surface (*f*). × 50 diameters.

Fig. 24. Drawing of a growing point of a specimen of *Sporadotrema cylindricum*, fac. Amirantiæ, showing the young chambers (*cc*) at the edge with a cock's comb row of short tubes (*T*) opening freely on the distal margin. × circa 9 diameters. Compare this drawing with the photographs on Plate **31**, figs. 15 and 16.

Fig. 25. Vertical section through a lamina of *Sporadotrema mesentericum* to show the tabulæ in the foramina (*f*). These tabulæ are probably never quite complete but perforated in the centre by a pore (compare fig. 33). × 20 diameters.

Fig. 26. Transverse section of a part of a branch of *Sporadotrema* to show the relation of the foramina to the chambers (*c*, *c*). × circa 18 diameters.

Fig. 27. Transverse section of a part of a branch of *Polytrema* to show the relation of the pillar pores (*P*) to the chambers (*c*) and the interlocular spaces (*i*). × circa 200 diameters.

Fig. 28. Transverse section of a part of a branch of *Homotrema* to show the perforated outer walls of the external chambers and the passages which establish communication between the chambers. × circa 200 diameters.

Fig. 29. Vertical section through the base of the stem of *Sporadotrema cylindricum*, fac. Amirantiæ, showing three of the initial chambers (*i.c*). These chambers can be recognised by their regular oval shape and by the foramina which perforate their walls. Camera drawing × 10 diameters.

Fig. 30. Chitinous tubes lining the foramina of *Carpenteria raphidodendron*. Copied from Möbius (13). Plate VI, fig. 3. × 150 diameters.

Fig. 31. Chitinous tubes lining the foramina of *Polytrema miniaceum*. Copied from Merkel (12). × 580 diameters.

Fig. 32. Chitinous tubes lining the foramina of *Sporadotrema*. × 150 diameters.

Fig. 33. One of the joints in a foramen of *Sporadotrema*, very much enlarged, to show the narrow shelf-like tabula.


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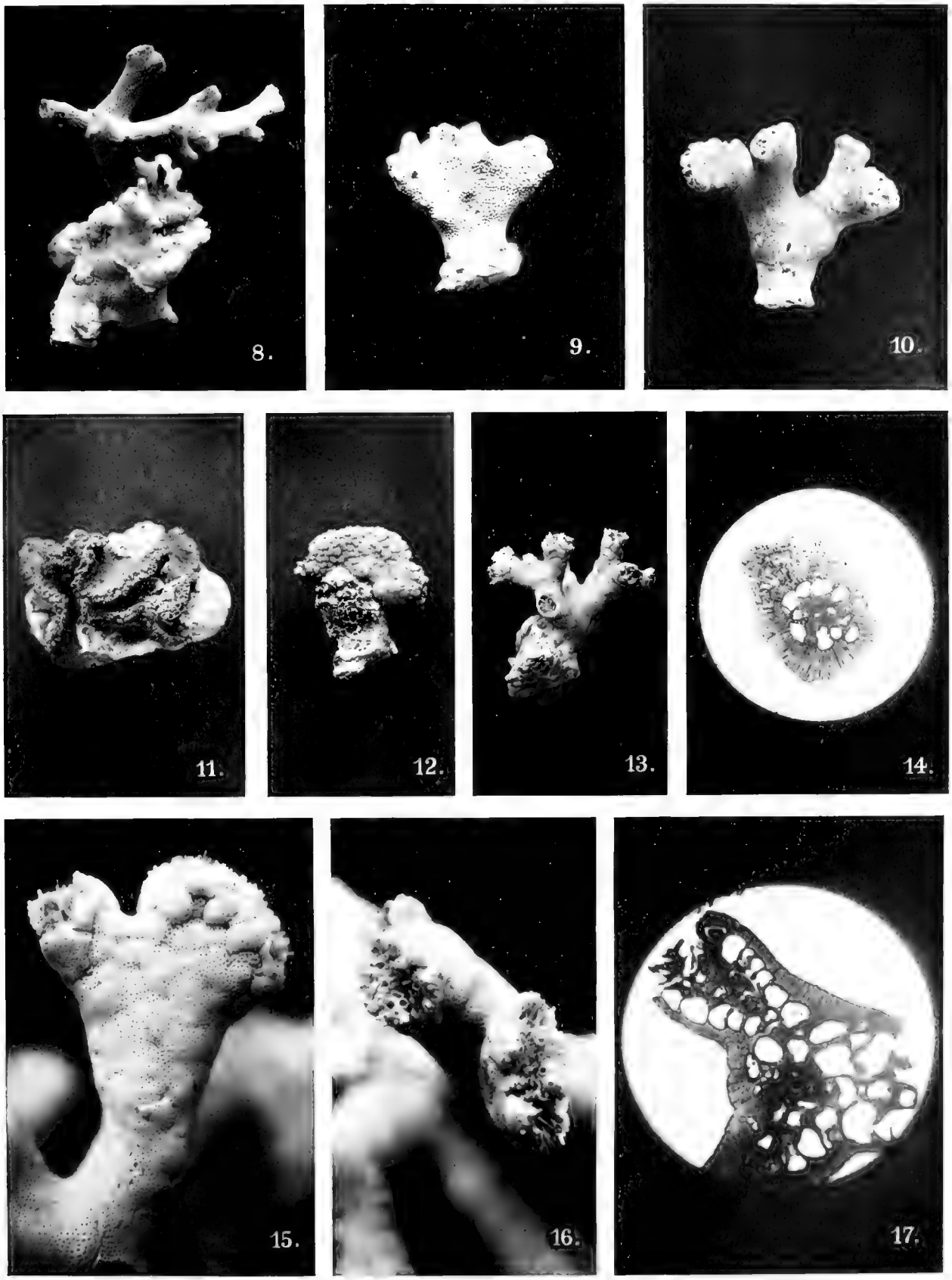

8. Polytrema × $4\frac{1}{2}$. 9. Homotrema × $4\frac{1}{2}$. 10. Sporadotrema × 2
11—17. Sporadotrema, various magnifications.

POLYTREMA FROM THE INDIAN OCEAN

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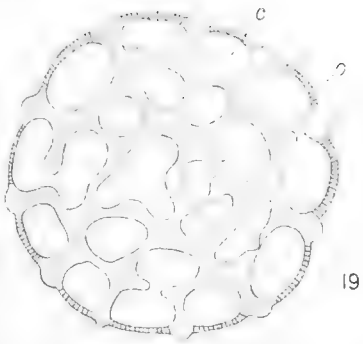

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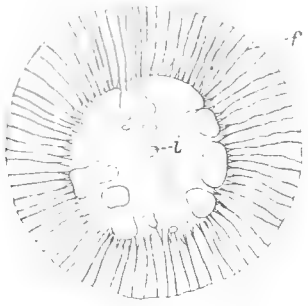

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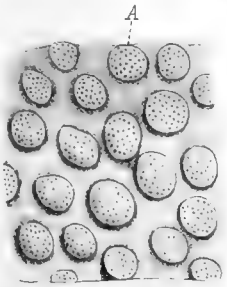

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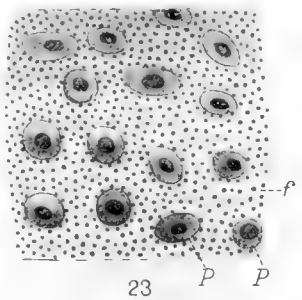

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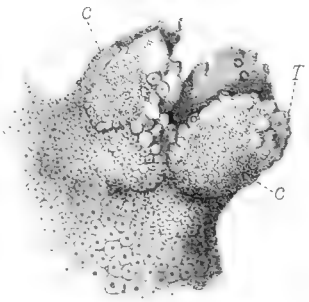

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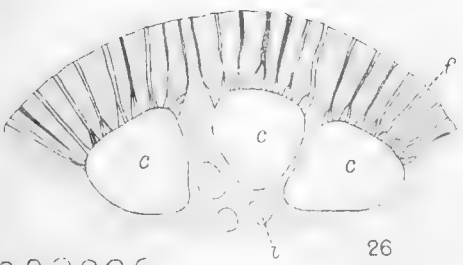

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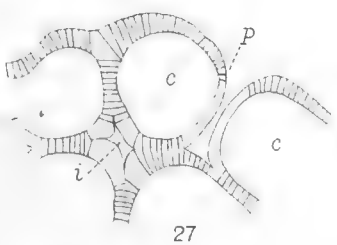

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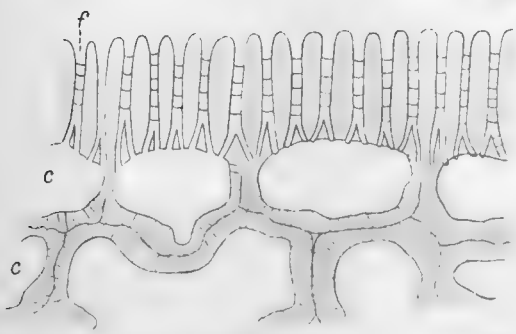

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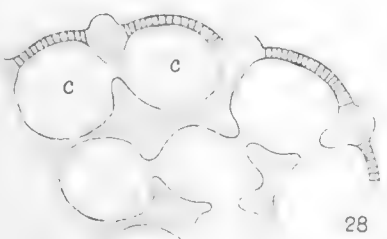

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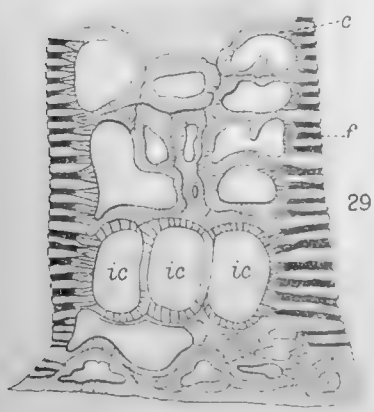

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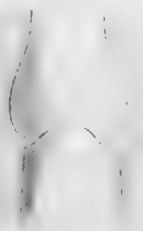

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FORAMINIFERA FROM THE INDIAN OCEAN

INDEX.

[Note.—Synonyms and Native Names are printed in *italics*. A star is added to names which appear to be used for the first time.]

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THE

TRANSACTIONS

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Second Series.—Zoology.

Volume		When Published	Price to the Public £	*s.*	*d.*	Price to Fellows £	*s.*	*d.*
I.	Parts I.–VIII.	1875–79	8	10	0	6	7	6
II.	Parts I. XVIII.	1879–88	7	17	0	5	18	5
III.	Parts I. VI.	1884–88	5	18	0	4	8	6
	Parts I.–III.	1886–88	3	8	0	2	11	0
V.	Parts I.–XI.	1888–94	6	10	6	4	17	9
VI.	Part I.	1894	2	0	0	1	10	0
	Part II.	1894	1	11	0	1	3	3
	Part III.	1894	0	10	0	0	7	6
	Part IV.	1896	1	4	0	0	18	0
	Part V.	1896	0	10	0	0	7	6
	Part VI.	1896	0	8	0	0	6	0
	Part VII.	1896	0	12	0	0	9	0
	Part VIII.	1897	0	2	6	0	2	0
VII.	Part I.	1896	0	10	0	0	7	6
	Part II.	1897	0	12	0	0	9	0
	Part III.	1897	0	6	0	0	4	6
	Part IV.	1898	0	10	0	0	7	6
	Part V.	1898	0	18	0	0	13	6
	Part VI.	1898	0	13	0	0	9	9
	Part VII.	1899	0	18	0	0	13	6
	Part VIII.	1899	0	12	0	0	9	0
	Part IX.	1899	1	0	0	0	15	0
	Part X.	1900	0	6	0	0	4	6
	Part XI.	1900	0	2	9	0	2	0
VIII.	Part I.	1900	0	10	0	0	7	6
	Part II.	1900	0	10	0	0	7	6
	Part III.	1900	0	10	0	0	7	6
	Part IV.	1901	0	14	0	0	10	6
	Part V.	1901	0	5	0	0	3	9
	Part VI.	1901	0	10	0	0	7	6
	Part VII.	1901	1	8	0	1	1	0
	Part VIII.	1902	0	4	0	0	3	0
	Part IX.	1902	0	5	0	0	3	9
	Part X.	1903	1	0	0	0	15	0
	Part XI.	1903	0	6	0	0	4	6
	Part XII.	1903	0	10	0	0	7	6
	Part XIII. Index		0	2	9	0	2	3

Second Series.—Zoology (*continued*).

Volume		When Published	Price to the Public £	*s.*	*d.*	Price to Fellows £	*s.*	*d.*
IX.	Part I.	1903	0	9	0	0	6	9
	Part II.	1903	0	8	0	0	6	0
	Part III.	1903	1	4	0	0	18	0
	Part IV.	1904	0	6	0	0	4	6
	Part V.	1904	0	6	0	0	4	6
	Part VI.	1904	0	6	0	0	4	6
	Part VII.	1904	0	6	0	0	4	6
	Part VIII.	1904	0	10	0	0	7	6
	Part IX.	1905	0	6	0	0	4	6
	Part X.	1906	0	12	0	0	9	0
	Part XI.	1907	0	12	0	0	9	0
	Part XII.	1907	0	3	0	0	2	3
	Part XIII.	1907	0	6	0	0	4	6
	Part XIV. Index	1907	0	3	0	0	2	3
X.	Part I.	1904	0	3	0	0	2	3
	Part II.	1904	0	8	0	0	6	0
	Part III.	1905	0	9	0	0	6	9
	Part IV.	1905	0	10	0	0	7	6
	Part V.	1906	0	7	6	0	5	3
	Part VI.	1906	0	3	0	0	2	3
	Part VII.	1907	0	3	0	0	2	3
	Part VIII.	1907	0	4	0	0	3	0
	Part IX.	1909	1	1	0	0	15	9
	(In progress.)							
XI.	Part I.	1908	0	4	0	0	3	0
	Part II.	1909	0	8	0	0	6	0
	Part III.	1909	0	6	0	0	4	6
	Part IV.	1909	0	12	0	0	9	0
	Part V.	1909	0	2	0	0	1	6
	(In progress.)							
XII.	Part I.	1907	1	8	0	1	1	0
	Part II.	1907	1	4	0	0	18	0
	Part III.	1908	0	16	0	0	12	0
	Part IV.	1909	1	10	0	1	2	6
	Part V. Index	1909	0	5	0	0	3	9
XIII.	Part I.	1909	1	4	0	0	18	0
	Part II.	1910	2	3	0	1	12	3
	Part III.	1910	0	16	0	0	12	0
	Part IV. Index	1910	0	5	0	0	3	9
XIV.	Part I.	1910	1	18	0	1	8	6

THE

TRANSACTIONS

OF

THE LINNEAN SOCIETY OF LONDON.

THE PERCY SLADEN TRUST EXPEDITION

TO

THE INDIAN OCEAN IN 1905.

UNDER THE LEADERSHIP OF

MR J. STANLEY GARDINER.

VOLUME III.

REPORTS Nos. 11 and 12 of this volume; Nos. 49 and 50 of the whole series.

LONDON:

PRINTED FOR THE LINNEAN SOCIETY

BY JOHN CLAY, M.A. AT THE UNIVERSITY PRESS, CAMBRIDGE.

SOLD AT THE SOCIETY'S APARTMENTS, BURLINGTON-HOUSE, PICCADILLY, W.,

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July 1911.

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The Second Series of the Transactions is divided into Zoological and Botanical sections. The prices of the Zoological parts of those which have been published are as undermentioned:—

Second Series.—Zoology.

Volume		When Published	Price to the Public £	*s.*	*d.*	Price to Fellows £	*s.*	*d.*
I.	Parts I.–VIII.	1875–79	8	10	0	6	7	6
II.	Parts I. XVIII.	1879–88	7	17	0	5	18	5
III.	Parts I. VI.	1884–88	5	18	0	4	8	6
IV.	Parts I.–III.	1886–88	3	8	0	2	11	0
V.	Parts I.–XI.	1888–94	6	10	6	4	17	9
VI.	Part I.	1894	2	0	0	1	10	0
	Part II.	1894	1	11	0	1	3	3
	Part III.	1894	0	10	0	0	7	6
	Part IV.	1896	1	4	0	0	18	0
	Part V.	1896	0	10	0	0	7	6
	Part VI.	1896	0	8	0	0	6	0
	Part VII.	1896	0	12	0	0	9	0
	Part VIII.	1897	0	2	6	0	2	0
VII.	Part I.	1896	0	10	0	0	7	6
	Part II.	1897	0	12	0	0	9	0
	Part III.	1897	0	6	0	0	4	6
	Part IV.	1898	0	10	0	0	7	6
	Part V.	1898	0	18	0	0	13	6
	Part VI.	1898	0	13	0	0	9	9
	Part VII.	1899	0	18	0	0	13	6
	Part VIII.	1899	0	12	0	0	9	0
	Part IX.	1899	1	0	0	0	15	0
	Part X.	1900	0	6	0	0	4	6
	Part XI.	1900	0	2	9	0	2	0
VIII.	Part I.	1900	0	10	0	0	7	6
	Part II.	1900	0	10	0	0	7	6
	Part III.	1900	0	10	0	0	7	6
	Part IV.	1901	0	14	0	0	10	6
	Part V.	1901	0	5	0	0	3	9
	Part VI.	1901	0	10	0	0	7	6
	Part VII.	1901	1	8	0	1	1	0
	Part VIII.	1902	0	4	0	0	3	0
	Part IX.	1902	0	5	0	0	3	9
	Part X.	1903	1	0	0	0	15	0
	Part XI.	1903	0	6	0	0	4	6
	Part XII.	1903	0	10	0	0	7	6
	Part XIII. Index		0	2	9	0	2	3

Second Series.—Zoology (*continued*).

Volume		When Published	Price to the Public £	*s.*	*d.*	Price to Fellows £	*s.*	*d.*
IX.	Part I.	1903	0	9	0	0	6	9
	Part II.	1903	0	8	0	0	6	0
	Part III.	1903	1	4	0	0	18	0
	Part IV.	1904	0	6	0	0	4	6
	Part V.	1904	0	6	0	0	4	6
	Part VI.	1904	0	6	0	0	4	6
	Part VII.	1904	0	6	0	0	4	6
	Part VIII.	1904	0	10	0	0	7	6
	Part IX.	1905	0	6	0	0	4	6
	Part X.	1906	0	12	0	0	9	0
	Part XI.	1907	0	12	0	0	9	0
	Part XII.	1907	0	3	0	0	2	3
	Part XIII.	1907	0	6	0	0	4	6
	Part XIV. Index	1907	0	3	0	0	2	3
X.	Part I.	1904	0	3	0	0	2	3
	Part II.	1904	0	8	0	0	6	0
	Part III.	1905	0	9	0	0	6	9
	Part IV.	1905	0	10	0	0	7	6
	Part V.	1906	0	7	6	0	5	3
	Part VI.	1906	0	3	0	0	2	3
	Part VII.	1907	0	3	0	0	2	3
	Part VIII.	1907	0	4	0	0	3	0
	Part IX. (In progress.)	1909	1	1	0	0	15	9
XI.	Part I.	1908	0	4	0	0	3	0
	Part II.	1909	0	8	0	0	6	0
	Part III.	1909	0	6	0	0	4	6
	Part IV.	1909	0	12	0	0	9	0
	Part V. (In progress.)	1909	0	2	0	0	1	6
XII.	Part I.	1907	1	8	0	1	1	0
	Part II.	1907	1	4	0	0	18	0
	Part III.	1908	0	16	0	0	12	0
	Part IV.	1909	1	10	0	1	2	6
	Part V. Index	1909	0	5	0	0	3	9
XIII.	Part I.	1909	1	4	0	0	18	0
	Part II.	1910	2	3	0	1	12	3
	Part III.	1910	0	16	0	0	12	0
	Part IV. Index	1910	0	5	0	0	3	9
XIV.	Part I.	1910	1	18	0	1	8	6
	Part II.	1911	1	0	0	0	15	0

2nd Ser. ZOOLOGY.] [VOL. XIV. PART 3.

THE

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TO

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VOLUME III.

REPORTS Nos. 13—20 of this volume; Nos. 51—58 of the whole series.

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SECOND SERIES.—ZOOLOGY.

Volume		When Published	Price to the Public £	*s.*	*d.*	Price to Fellows £	*s.*	*d.*
I.	Parts I.–VIII.	1875–79	8	10	0	6	7	6
II.	Parts I. XVIII.	1879–88	7	17	0	5	18	5
III.	Parts I. VI.	1884–88	5	18	0	4	8	6
IV.	Parts I.–III.	1886–88	3	8	0	2	11	0
V.	Parts I.–XI.	1888–94	6	10	6	4	17	9
VI.	Part I.	1894	2	0	0	1	10	0
	Part II.	1894	1	11	0	1	3	3
	Part III.	1894	0	10	0	0	7	6
	Part IV.	1896	1	4	0	0	18	0
	Part V.	1896	0	10	0	0	7	6
	Part VI.	1896	0	8	0	0	6	0
	Part VII.	1896	0	12	0	0	9	0
	Part VIII.	1897	0	2	6	0	2	0
VII.	Part I.	1896	0	10	0	0	7	6
	Part II.	1897	0	12	0	0	9	0
	Part III.	1897	0	6	0	0	4	6
	Part IV.	1898	0	10	0	0	7	6
	Part V.	1898	0	18	0	0	13	6
	Part VI.	1898	0	13	0	0	9	9
	Part VII.	1899	0	18	0	0	13	6
	Part VIII.	1899	0	12	0	0	9	0
	Part IX.	1899	1	0	0	0	15	0
	Part X.	1900	0	6	0	0	4	6
	Part XI.	1900	0	2	9	0	2	0
VIII.	Part I.	1900	0	10	0	0	7	6
	Part II.	1900	0	10	0	0	7	6
	Part III.	1900	0	10	0	0	7	6
	Part IV.	1901	0	14	0	0	10	6
	Part V.	1901	0	5	0	0	3	9
	Part VI.	1901	0	10	0	0	7	6
	Part VII.	1901	1	8	0	1	1	0
	Part VIII.	1902	0	4	0	0	3	0
	Part IX.	1902	0	5	0	0	3	9
	Part X.	1903	1	0	0	0	15	0
	Part XI.	1903	0	6	0	0	4	6
	Part XII.	1903	0	10	0	0	7	6
	Part XIII. Index		0	2	9	0	2	3
IX.	Part I.	1903	0	9	0	0	6	9
	Part II.	1903	0	8	0	0	6	0

SECOND SERIES.—ZOOLOGY (*continued*).

Volume		When Published	Price to the Public £	*s.*	*d.*	Price to Fellows £	*s.*	*d.*
	Part III.	1903	1	4	0	0	18	0
	Part IV.	1904	0	6	0	0	4	6
	Part V.	1904	0	6	0	0	4	6
	Part VI.	1904	0	6	0	0	4	6
	Part VII.	1904	0	6	0	0	4	6
	Part VIII.	1904	0	10	0	0	7	6
	Part IX.	1905	0	6	0	0	4	6
	Part X.	1906	0	12	0	0	9	0
	Part XI.	1907	0	12	0	0	9	0
	Part XII.	1907	0	3	0	0	2	3
	Part XIII.	1907	0	6	0	0	4	6
	Part XIV. Index	1907	0	3	0	0	2	3
X.	Part I.	1904	0	3	0	0	2	3
	Part II.	1904	0	8	0	0	6	0
	Part III.	1905	0	9	0	0	6	9
	Part IV.	1905	0	10	0	0	7	6
	Part V.	1906	0	7	6	0	5	3
	Part VI.	1906	0	3	0	0	2	3
	Part VII.	1907	0	3	0	0	2	3
	Part VIII.	1907	0	4	0	0	3	0
	Part IX.	1909	1	1	0	0	15	9
	Part X. (In progress.)	1911	0	4	0	0	3	0
XI.	Part I.	1908	0	4	0	0	3	0
	Part II.	1909	0	8	0	0	6	0
	Part III.	1909	0	6	0	0	4	6
	Part IV.	1909	0	12	0	0	9	0
	Part V.	1909	0	2	0	0	1	6
	Part VI.	1910	0	11	0	0	8	3
	Part VII. (In progress.)	1910	0	5	0	0	3	9
XII.	Part I.	1907	1	8	0	1	1	0
	Part II.	1907	1	4	0	0	18	0
	Part III.	1908	0	16	0	0	12	0
	Part IV.	1909	1	10	0	1	2	6
	Part V. Index	1909	0	5	0	0	3	9
XIII.	Part I.	1909	1	4	0	0	18	0
	Part II.	1910	2	3	0	1	12	3
	Part III.	1910	0	16	0	0	12	0
	Part IV. Index	1910	0	5	0	0	3	9
XIV.	Part I.	1910	1	18	0	1	8	6
	Part II.	1911	1	0	0	0	15	0
	Part III.	1911	1	8	0	1	1	0

THE

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TITLEPAGE, CONTENTS, AND INDEX.

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III.	Parts I. VI.	1884–88	5	18	0	4	8	6
IV.	Parts I.–III.	1886–88	3	8	0	2	11	0
V.	Parts I.–XI.	1888–94	6	10	6	4	17	9
VI.	Parts I.–VIII.	1894–99	6	17	6	5	3	3
VII.	Parts I.–XI.	1896–1900	6	7	9	4	15	9
VIII.	Part I.	1900	0	10	0	0	7	6
	Part II.	1900	0	10	0	0	7	6
	Part III.	1900	0	10	0	0	7	6
	Part IV.	1901	0	14	0	0	10	6
	Part V.	1901	0	5	0	0	3	9
	Part VI.	1901	0	10	0	0	7	6
	Part VII.	1901	1	8	0	1	1	0
	Part VIII.	1902	0	4	0	0	3	0
	Part IX.	1902	0	5	0	0	3	9
	Part X.	1903	1	0	0	0	15	0
	Part XI.	1903	0	6	0	0	4	6
	Part XII.	1903	0	10	0	0	7	6
	Part XIII. Index		0	2	9	0	2	3
IX.	Part I.	1903	0	9	0	0	6	9
	Part II.	1903	0	8	0	0	6	0
	Part III.	1903	1	4	0	0	18	0
	Part IV.	1904	0	6	0	0	4	6
	Part V.	1904	0	6	0	0	4	6
	Part VI.	1904	0	6	0	0	4	6
	Part VII.	1904	0	6	0	0	4	6
	Part VIII.	1904	0	10	0	0	7	6
	Part IX.	1905	0	6	0	0	4	6
	Part X.	1906	0	12	0	0	9	0
	Part XI.	1907	0	12	0	0	9	0
	Part XII.	1907	0	3	0	0	2	3
	Part XIII.	1907	0	6	0	0	4	6
	Part XIV. Index	1907	0	3	0	0	2	3

SECOND SERIES.—ZOOLOGY (*continued*).

Volume		When Published	Price to the Public £	s.	d.	Price to Fellows £	s.	d.
X.	Part I.	1904	0	3	0	0	2	3
	Part II.	1904	0	8	0	0	6	0
	Part III.	1905	0	9	0	0	6	9
	Part IV.	1905	0	10	0	0	7	6
	Part V.	1906	0	7	6	0	5	3
	Part VI.	1906	0	3	0	0	2	3
	Part VII.	1907	0	3	0	0	2	3
	Part VIII.	1907	0	4	0	0	3	0
	Part IX.	1909	1	1	0	0	15	9
	Part X.	1911	0	4	0	0	3	0
	(In progress.)							
XI.	Part I.	1908	0	4	0	0	3	0
	Part II.	1909	0	8	0	0	6	0
	Part III.	1909	0	6	0	0	4	6
	Part IV.	1909	0	12	0	0	9	0
	Part V.	1909	0	2	0	0	1	6
	Part VI.	1910	0	11	0	0	8	3
	Part VII.	1910	0	5	0	0	3	9
	Part VIII.	1911	0	4	0	0	3	0
	Part IX.	1911	0	2	6	0	2	0
	Part X.	1911	0	2	6	0	2	0
	(In progress.)							
XII.	Part I.	1907	1	8	0	1	1	0
	Part II.	1907	1	4	0	0	18	0
	Part III.	1908	0	16	0	0	12	0
	Part IV.	1909	1	10	0	1	2	6
	Part V. Index	1909	0	5	0	0	3	9
XIII.	Part I.	1909	1	4	0	0	18	0
	Part II.	1910	2	3	0	1	12	3
	Part III.	1910	0	16	0	0	12	0
	Part IV. Index	1910	0	5	0	0	3	9
XIV.	Part I.	1910	1	18	0	1	8	6
	Part II.	1911	1	0	0	0	15	0
	Part III.	1911	1	8	0	1	1	0
	Part IV. Index	1912	0	5	0	0	3	9