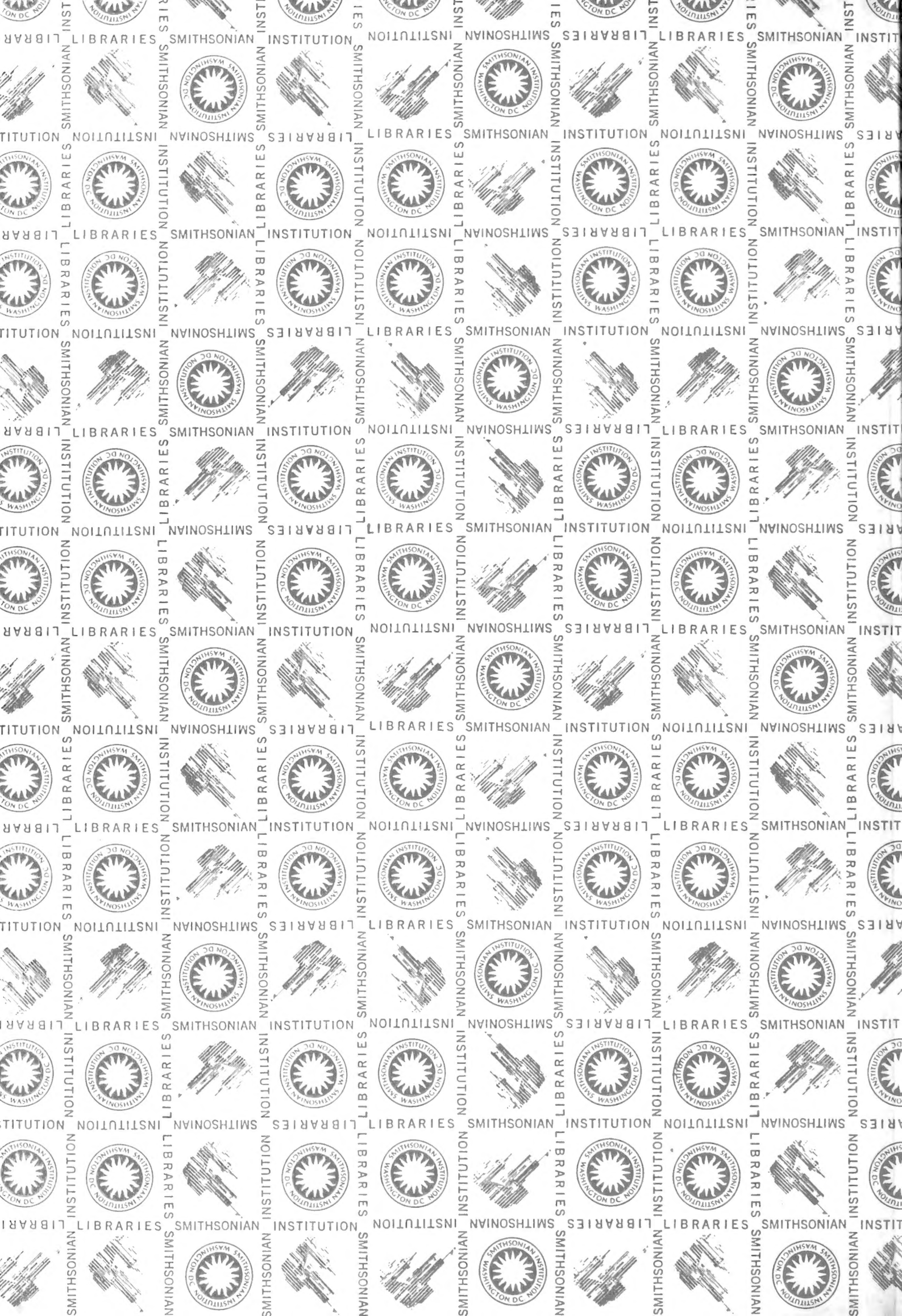
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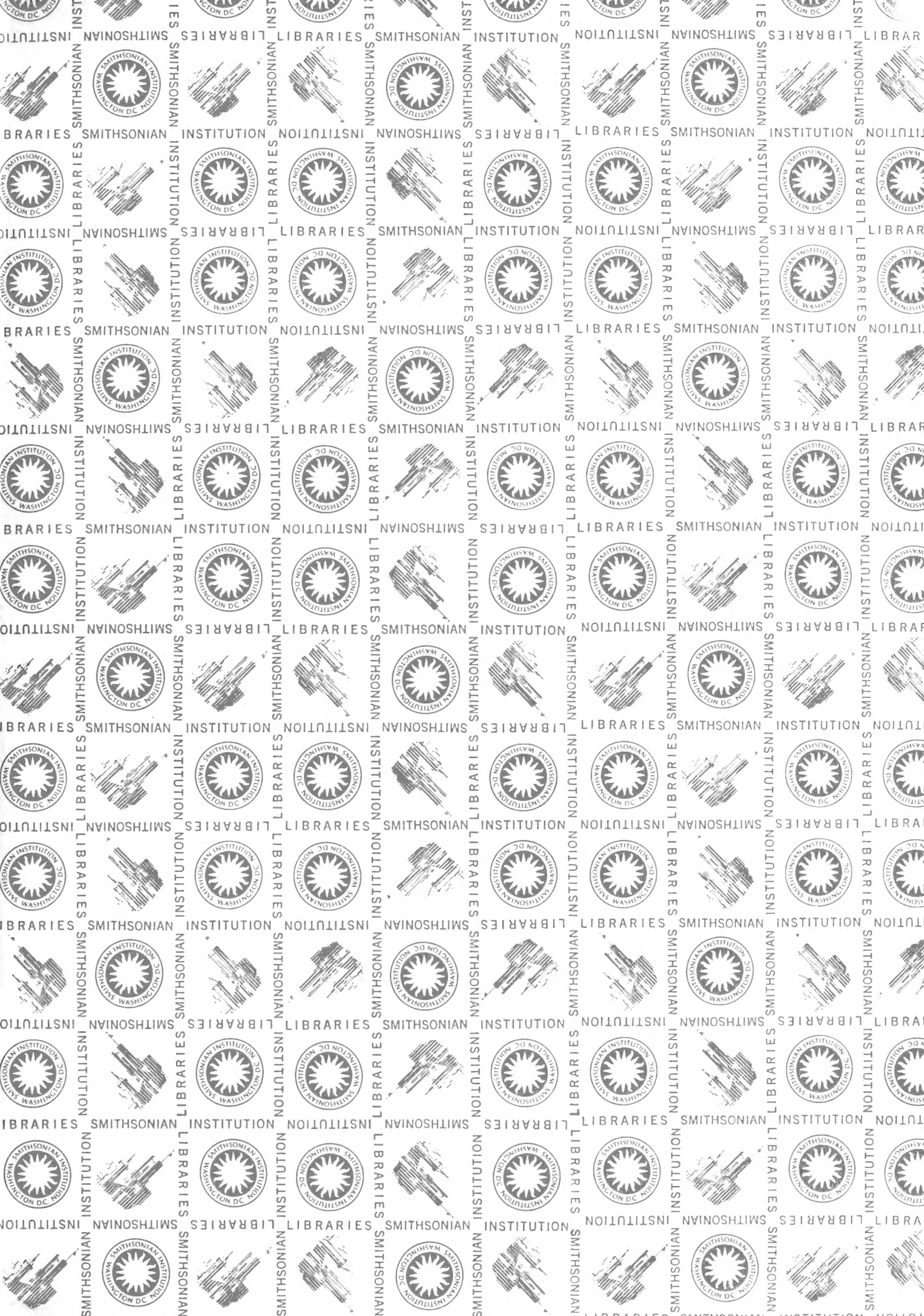
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RÉSULTATS DES EXPLORATIONS
ZOOLOGIQUES, BOTANIQUES, OCÉANOGRAPHIQUES ET GÉOLOGIQUES
ENTREPRISES AUX
INDES NÉERLANDAISES ORIENTALES en 1899—1900,
à bord du SIBOGA
SOUS LE COMMANDEMENT DE
G. F. TYDEMAN
PUBLIÉS PAR
MAX WEBER
Chef de l'expédition.

Siboga-Expeditie

THE CIRRIPEDIA OF THE SIBOGA EXPEDITION

BY

P. P. C. HOEK

A. CIRRIPEDIA PEDUNCULATA

With 10 plates

Monographie XXXI*a* of:

UITKOMSTEN OP ZOOLOGISCH, BOTANISCH, OCEANOGRAPHISCH EN GEOLOGISCH GEBIED

verzameld in Nederlandsch Oost-Indië 1899—1900

aan boord H. M. Siboga onder commando van
Luitenant ter zee 1e kl. G. F. TYDEMAN

UITGEGEVEN DOOR

Dr. MAX WEBER
Prof. in Amsterdam, Leider der Expeditie

(met medewerking van de Maatschappij ter bevordering van het Natuurkundig Onderzoek der Nederlandsche Koloniën)

BOEKHANDEL EN DRUKKERIJ
VOORHEEN
E. J. BRILL
LEIDEN

Publié Octobre 1907

* Les numéros avec un astérique ont déjà paru; ceux marqués 1) seulement en partie

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De Maatschappij ter bevordering van het Natuurkundig Onderzoek der Nederlandsche Koloniën.

Het Ministerie van Koloniën.

Het Ministerie van Binnenlandsche Zaken.

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De »Oostersche Handel en Reederij" te Amsterdam.

De Heer B. H DE WAAL Oud-Consul-Generaal der Nederlanden te Kaapstad.

M. B. te Amsterdam.

SIBOGA-EXPEDITIE.

Siboga-Expeditie

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A. CIRRIPEDIA PEDUNCULATA

Genus **Lepas** Linnaeus

Of the species forming this genus six were already known to DARWIN[1] (1851) and two only have been added since the appearance of the "Monograph": one *(Lepas testudinata)* by AURIVILLIUS[2] in 1892 and one *(Lepas denticulata)* by GRUVEL[3] in 1901.

Most of the species of this genus have "enormous ranges", as DARWIN (l. c.) remarked, yet the number of species hitherto observed with certainty in the East Indian Archipelago amounts to only four, viz.

Lepas anatifera Linn. Philippine Archipelago, according to DARWIN.
Lepas anserifera Linn. East Indian Archipelago (DARWIN); Java Sea, Moluccan Sea ("Challenger"); Sumatra, Ambon, Ternate etc. (WELTNER).
Lepas fascicularis Ellis & Solander. East Indian Archipelago, off Borneo and Celebes (DARWIN).
Lepas denticulata A. Gruvel. Honda Bay (Philippines).

(*Lepas Hilli* (Leach) which was collected by A. MENZIES in the "South Seas" and was found at Port Stephen, Australia (DARWIN), *Lepas pectinata* Spengler, which, according to DARWIN, is common under the tropics and *Lepas australis* Darwin, which DARWIN believed to be confined to the Southern Ocean, have not hitherto been observed in the East Indian Archipelago; nor has *Lepas testudinata* Aurivillius, known only from the neighbourhood of the Cape of Good Hope).

All the species of this genus live attached to floating objects and therefore seem to be inhabitants only of the surface-layers of the sea.

The specimens of the genus *Lepas* collected by H. M. S. "Siboga" belong to two species only: *L. anserifera* Linn. and *L. fascicularis* Ellis and Solander.

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[1] DARWIN, C., A monograph of the sub-class Cirripedia. The Lepadidae or Pedunculated Cirripedes. London, 1851.

[2] AURIVILLIUS, C. W., Neue Cirripeden aus dem Atlantischen, Indischen und Stillen Ocean. Öfversigt af K. Svensk. Vet. Akad. Förh. 1892, N° 3.

[3] GRUVEL, A., Étude d'une espèce nouvelle de Lépadides. Trans. Linn. Soc. (2), VIII, 5, 1901.

1. *Lepas anserifera* Linn.

This seems to be by far the commonest species in the part of the tropics explored by H. M. S. "Siboga"; it was not only collected at numerous places during the cruise, it was also several times found attached to the ship itself after being cleaned in the dock of Surabaja.

The places and stations where the species was taken are:

Stat. 19. Bay of Labuan Tring (Lombok), March 20, 1899. Fine set of specimens attached to a piece of wood. Surface. Another set of smaller specimens with a barbed carina attached to a piece of pumice-stone.

Lighthouse "De Bril" near Macassar. No date. Very small specimens attached to *Spirula*, the largest specimen has a capitulum of 6 mm. They belong to the var. *dilatata*: scuta broad, carina barbed.

Stat. 110. July 6, 1899. Lat. 4° 34′ N., Long. 122° E.; South of Sulu Archipelago. Surface. Two specimens; length of the capitulum of the larger, 25 mm.

Stat. 165. Daram Island (East Coast of Misool), August 22, 1899. Attached to a piece of gulf-weed. Small specimens of 6 mm. and smaller: var. *dilatata*. Associated with *L. fascicularis* Ellis & Solander.

Buton Strait, September 21, 1899. Surface, between Algae. Very small specimens attached to *Spirula*. Var. *dilatata* with barbed carina.

Stat. 214. October 27, 1899. Lat. 6° 30′ N., Long. 121° 55′ E. Surface, attached to *Spirula*. Very small specimens: var. *dilatata*.

Stat. 228. November 14, 1899. Lat. 4° 32′.5 S., Long. 128° 30′.5 E. Surface. Small specimens attached to a species of Fuci. [The largest specimen has a capitulum of 7,5 mm.].

No place, no date. Attached to the keel of H. M. S. "Siboga". One specimen. Length of the capitulum 20 mm.

July 10, 1899. Attached to the keel of H. M. S. "Siboga", 40 days after having been docked in Surabaja. Size of largest specimen: capitulum 21 mm. The larger individuals are furnished with ovigerous lamellae.

October 15, 1899. Attached to the keel of H. M. S. "Siboga", 107 days after the ship was cleaned in the dock of Surabaja. Several specimens; length of the capitulum of the largest individual, 25 mm.

Remarks. The specimens collected in the Bay of Labuan Tring (Lombok) caused me some difficulty as they differed from the usual appearance of *L. anserifera* in one of its most distinctive characters, viz. in the occludent margin of the scutum not being arched or protuberant. Further, the internal umbonal tooth of the right-hand scutum in these specimens is hardly stronger than that of the left-hand scutum. But as these characters vary even within the specimens of this locality, the form of the scutum in some of them approaching more to the typical form than is the case in others; there existing, moreover, a close resemblance in other regards between this and the typical form, no doubt was left as to the importance of this difference. Several specimens from this locality show the straight line of small quadrilateral depressions of a dirty brownish colour in the scutum, running diagonally across the capitulum, which are very common in *L. anatifera*. Darwin (l. c. p. 78) observed a trace of a diagonal line of such marks in a single specimen of *L. Hilli* — but they have not been observed before in *L. anserifera*, so far as I know.

2. *Lepas fascicularis* Ellis & Solander.

This species which is rather common in tropical seas was observed once only during the cruise of the "Siboga", viz. on Aug. 22, 1899 (Station 165), anchorage on north-east side of Daram Island (False Pisangs), East Coast of Misool.

There are medium-sized and small specimens; the larger ones have the capitulum 20 mm. long.

The valves stand at a certain distance from each other and have very distinctly brown-coloured margins. The shape of the carina nearly approaches that of the typical form; the lower part however does not expand in such a broad disc as figured by DARWIN.

Some of the specimens are attached to fuci associated with young specimens of *L. anserifera*; others form a group which is attached to a small brown ball of vegetable origin.

Genus **Poecilasma** Darwin

When proposing the new genus *Poecilasma*, DARWIN (1851) knew five species belonging to it; he thought it probable, however, that several more would be discovered later.

This prediction of DARWIN can be said to have been fully realised: I am not quite sure that all descriptions of new forms have become known to me, but certainly eleven new species have come to my notice up to date, viz.:

HOEK, Cirripedia "Challenger", 1883, ... 2 species.
AURIVILLIUS, Studien über Cirripedien, 1894, ... 4 species.
AURIVILLIUS, Cirripèdes "Princesse-Alice", 1898, . . . 1 species.
GRUVEL, Lépadides nouveaux British Museum, 1902, 1 species.
HOEK, Cirripedia "Siboga", 1907, ... 3 species.

Of some of these species it is questionable, whether they are really "good" species: for example, as *P. aurantium* Darwin is considered by GRUVEL[1] to be a variety of *P. Kaempferi*; I think also, that it is doubtful whether *P. amygdalum* Auriv. and *P. lenticula* Auriv. are really different from one another and from DARWIN's *P. fissum*. But even then 9 new forms would remain: a not unimportant increase to the number known to DARWIN.

The mutual affinities of the species of *Poecilasma* are not easily understood. *P. Kaempferi* Darwin (with *aurantium* Darwin), *P. dubium* n. sp., *P. carinatum* Hoek and *P. gracile* Hoek seem to form a natural group of true *Poecilasmas*, mainly differing from one another in the shape and size of the carina. The species with the scutum composed of two segments form a second apparently natural group: they are *P. fissum* Darwin (with *amygdalum* Auriv. and *lenticula* Auriv.), *P. excavatum* n. sp., *P. minutum* Gruvel, *P. tridens* Auriv. and *P. vagans* Aurivillius. Of these species *P. excavatum* n. sp. and *P. minutum* Gruvel may turn out to be much more nearly related than the others. The remaining species: *P. crassum* Gray (with *P. unguiculus* Auriv.), *P. obliquum* n. sp. *P. eburneum* Hinds might be considered to form a

[1] GRUVEL, A., Cirripèdes. Expéditions du Travailleur et du Talisman. Paris, 1902.

third natural group: the first with small, the second with rudimentary, the third without terga. For the sake of convenience, such a classification may be used; but studying a few of the species more carefully one soon discovers, that the affinities between the different species cannot be made out by the shape or size or the greater or less development of parts of the capitulum only. To show how complicated the relations are I need only refer to the new species *P. obliquum* found by the "Siboga" and to be described later. With its miniature terga it seems very naturally to bridge over the gap between *P. crassum* with small and *P. eburneum* without terga; yet the arrangement of the spines on the cirri in *P. obliquum* is quite different from what it is in *P. eburneum* and shows that it is perfectly impossible to consider them as nearly related. In this regard *P. obliquum* seems to be nearly allied to *P. fissum*; in the presence, however, of a distinct line running from the umbo to the upper end of the scutum *P. eburneum* approaches to *P. fissum* much more than *P. obliquum* does.

The geographical distribution of the species of *Poecilasma* is only imperfectly known as yet. Two species have been observed in the Atlantic and also in the Pacific; a very large proportion of the known species inhabit the Malay Archipelago, as may be seen from the following list:

Poecilasma Kaempferi Darwin (with *P. aurantium* Darwin), Japan, Madeira, 350 à 400 m. (Gruvel), Gulf of Manaar, 775 m. (Annandale).
Poecilasma dubium n. sp., Malay Archipelago, 204 to 304 m.
Poecilasma carinatum Hoek, West Indies, Atlantic, Malay Archipelago, 600 to 1633 m.
Poecilasma gracile Hoek, Australia, Malay Archipelago, 521—750 m.
Poecilasma fissum Darwin (with *P. amygdalum* Auriv. and *P. lenticula* Auriv.), Malay Archipelago, Philippines, Australia (Weltner [1]), Andamans (Annandale [2]). Low water.
Poecilasma excavatum n. sp., Malay Archipelago, 289—304 m.
Poecilasma minutum Gruvel?
Poecilasma tridens Auriv., Philippines. Depth?
Poecilasma vagans Auriv., probably East India. Pelagic?
Poecilasma crassum J. E. Gray, Madeira (Darwin), Azores (Gruvel). Depth?
Poecilasma unguiculus Auriv., Azores, 880 m.
Poecilasma obliquum n. sp., Malay Archipelago, 204—304 m.
Poecilasma eburneum Hinds, Malay Archipelago, ? Red Sea (Weltner [3]), 40—90 m.

Poecilasma Kaempferi (with *P. aurantium*) and *P. carinatum* are so far as at present known the only species inhabiting both the Atlantic and the Indian Ocean. Gruvel [4] says that *P. crassum* [from Madeira (Darwin)] and the Azores occurs also in the Philippine Archipelago, Island of Bohol, but I suspect that this is an error; I do not know at any rate, on whose authority this is stated.

[1] Weltner, W., Cirripedien einer Reise nach dem Pacific. Zoolog. Jahrbücher. Abt. für Systematik, XII, 1899.
[2] Annandale, N., Malaysian Barnacles in the Indian Museum. Memoirs of the Asiatic Society of Bengal, I, 5, 1905.
[3] Weltner, W., Verzeichnis der bisher beschriebenen recenten Cirripedienarten. Archiv f. Naturgeschichte, 1897, Bd I, H. 3.
[4] Gruvel, A., Monographie des Cirrhipèdes. Paris, 1905, p. 116.

The bathymetrical distribution is not known for all the species. *P. vagans* was found attached to a *Nautilus* and may be considered as a pelagic species, *P. fissum* lives on crabs, one of which was found under a stone at low water (DARWIN), another (a *Palinurus*-species) was thrown on the shore (AURIVILLIUS): it is, no doubt, a true littoral form. *P. eburneum* was taken by the "Siboga" at depths from 40—90 m. and seems to be a shallow-water form. *P. dubium*, *P. excavatum* and *P. obliquum* were found at depths varying from 200 to 300 m. *P. Kaempferi*, *P. carinatum*, *P. gracile* and *P. unguiculus* go down to 500—900 m., *P. carinatum* being the only one taken at so great a depth as 1633 m.

1. *Poecilasma carinatum* Hoek. Pl. I, fig. 1.

1883. HOEK, Cirripedia of the Challenger. p. 44, pl. I, fig. 8—10; pl. II, fig. 1; pl. VII, fig. 6—7.

This species was taken during the cruise of the "Siboga" at

Stat. 177. Sept. 1, 1899. Lat. 2° 24'.5 S., Long. 129° 38'.5 E. Depth, 1633 m. Bottom: dead coral and stones, covered with manganese. (About half-way between Misool and Ceram).

and at

Stat. 284. January 18, 1900. Lat. 8° 43'.1 S., Long. 127° 16'.7 E. Depth, 828 m. Bottom: grey mud. Attached to a small stem of *Chrysogorgia flexilis* (Wr. & St.). One specimen.

Only one group of 3 specimens and one single specimen were taken. As my figure of this species reproduced on Pl. I of the Report on the "Challenger" Cirripedia is not quite satisfactory, I have made a new drawing from the group of specimens collected by the "Siboga" at Station 177.

This species affords a striking example of the world-wide distribution of some deep-sea species; whereas the "Challenger" collected it off Culebra Island (West Indies) at a depth of 713 m. and off Ascension Island (Atlantic Ocean) at a depth of 768 m. it was taken by the "Siboga" in the East Indian Archipelago at a depth of more than 1600 m. and again at a depth of 828 m. According to GRUVEL[1] it is also found at the coast of Cuba at depths varying between 600 and 900 m.

2. *Poecilasma gracile* Hoek.

1883. HOEK, Cirripedia of the Challenger. p. 46, pl. II, fig. 2—4.

This species was collected by the "Siboga" at

Stat. 38. April 1, 1899. Lat. 7° 35'.4 S., Long. 117° 28'.6 E. Depth 521 m. Bottom: coral. (North of Sumbawa).

The "Challenger" took one specimen off Sydney (Australia) at a somewhat greater depth, viz. 750 m. In the collection of the "Siboga" it is represented by three specimens. Two of them are attached to the spine of an echinid, the third to a much thinner spine — perhaps of an echinid also. The largest specimen measures with the peduncle 11,5 mm., the capitulum alone having a length of 9 mm. The specimen collected by the "Challenger" was smaller, viz. 8 mm. entire length, its capitulum measuring nearly 7 mm.

[1] GRUVEL, A., Monographie des Cirrhipèdes. Paris, 1905, p. 115.

3. *Poecilasma dubium* n. sp. Pl. I, fig. 2—4; Pl. X, fig. 1*a*—1*d*.

Capitulum distinctly swollen about the middle, compressed towards the apex. Scuta oval, basal margin short. Terga with the basal point obliquely truncated. Carina narrow, its keel flattened near the inferior extremity. Basis of the carina truncated, indistinctly forked. Peduncle $^1/_3$ the length of the capitulum. No thicker spines in the notch of the maxillae under the three upper stronger spines.

General appearance (Pl. I, fig. 2). Much like *P. Kaempferi* Darwin but with a shorter peduncle and a somewhat different carina. Valves quite white, the scutum distinctly striated.

Scutum distinctly striated. Apex pointed, a distinct ridge runs from the apex to the umbo, the part between this ridge and the occludent margin being broader than in *P. Kaempferi*. Basal margin and carinal margin together forming an almost continuous curved line. Interiorly the basal margin is furnished with a strong rim and a tooth at the occludent, basal corner.

Tergum small in proportion to the scutum with the basal end obliquely truncated, apex pointed. Delicately striated.

Carina (Pl. I, fig. 3) extremely narrow, its width only slightly increasing towards the base. Its base truncated, miniature excrescences at both sides representing the prongs of the fork of other species (Pl. I, fig. 3*a*).

Peduncle cylindrical, short, less than one third the length of the capitulum, distinctly ringed.

Size. The largest specimen has a capitulum of 10,5 mm. length.

Mouth: Labrum with about 28 small bead-like teeth placed at a little distance from one another; Palpi with rather numerous, slender, not very long hairs.

Mandibles with four teeth and the inferior angle bifid; most of the hairs on the surface are placed in little groups of two or three together.

Maxillae (Pl. I, fig. 4) with three stronger spines above the notch, a very short spine near the third of these three at the beginning of the notch, no spines in the notch and four short and slender ones at the other slope of the notch; a number of about 12 stronger as well as smaller spines on the inferior, upraised part. Hairs on the surface of the maxilla not very dense, in groups of two or three.

Outer maxillae almost quadrangular, with the outer edge rounded; the surface and the outer margin with numerous hairs, those of the margin curved for the most part.

Cirri. First pair standing far from the second, with nearly equal rami: the one divided in six, the other in seven segments, the first segment of both being indistinctly divided into two. Surface of each segment with a dense tuft of long hairs.

Second cirrus about three times as long as the first; the longest (posterior) ramus has 13, the anterior ramus 11 segments.

Third cirrus with rami of 15 and 14 segments. Most segments are furnished on the inner side with four pairs of spines: the first and the second pair very long, the third shorter, the fourth very short and delicate, nearly rudimentary; sometimes a fifth pair of extremely delicate hairs is present; as a rule a slender spine is implanted between the two of each pair.

The cirri of the fourth-sixth pairs have about the same structure. The sixth cirrus has rami of 18 segments; each segment bears four pairs of spines as on the third cirrus.

Caudal appendages extremely short with a tuft of hairs at the extremity.

Penis rather thick, slightly swollen at the extremity, where it bears a dense tuft of hairs.

H. M. S. "Siboga" collected this species on two different occasions:

Stat. 251. December 8, 1899. Lat. 5° 28′.4 S., Long. 132° 0′.2 E. Depth 204 m. Bottom: hard coral sand. Two specimens and four with abnormal capitula.

Stat. 253. December 10, 1899. Lat. 5° 48′.2 S., Long. 132° 13′ E. Depth 304 m. Bottom: gray clay, hard and crumbly. Four specimens.

General Remark. This species comes near to *P. Kaempferi* Darwin in some regards, in others it seems to approach *P. aurantium* Darwin. Gruvel who investigated numerous specimens of *P. Kaempferi* from Cape Bojador thinks that *P. aurantium* is a variety of *P. Kaempferi.* He gave a new figure of this form — it leaves no doubt, I think, that the specimens collected by the "Siboga" are really distinct from it. But the three forms: *Kaempferi*, *aurantium* and *dubium* are certainly nearly related and belong to one and the same group of species.

Observation. The capitulum of four of the specimens collected at Station 251 is more or less abnormal. They are small specimens and differ considerably from one another. From the figures 1, *a*—*d*, of Pl. X these differences may be judged.

Fig. 1*a* represents the least abnormal one. It is a small specimen, the greatest diameter of the capitulum measuring 5 mm., the whole animal 6,5 mm. only. It is slightly more swollen transversely than the normal specimens, the occludent margin of the scutum being more strongly convex. The principal difference, however, is in the tergum being distinctly divided into two parts by a line running nearly parallel with the scutal margin.

Fig. 1*b* gives the next stage of abnormality. The specimen has about the same size as the foregoing: capitulum 5 mm., total length 6 mm. The division of the tergum into two pieces is in this specimen more pronounced, the superior part being rounded off and overlapping the inferior, especially towards the occludent side of the valve. In this specimen, moreover, the carina is broken up into three parts: the largest being the inferior one, two smaller, narrower parts lying between the inferior piece and the obliquely truncated basal end of the tergum.

Fig. 1*c* represents a still more advanced stage of abnormality. The original shape of the tergum is quite lost, an elongate oval, calcareous plate occupying its place, the apical part of which reaches relatively far beyond the occludent margin of the capitulum. The superior part of the carina is divided into different little pieces of shell, one lying immediately between the carina and the abnormal tergum, of which it might be difficult to say whether it belongs to the carina or the tergum. The shape of the capitulum of this specimen is broader, the occludent margin of the scutum still more strongly convex than in the other specimens. The part of the capitulum occupied by the scutum is considerably larger in consequence. The size of this specimen, i. e. the length of the whole animal was 5,5 mm., 4,75 being the length of the capitulum.

Fig. 1*d* was drawn from the largest of the four specimens; it differs from the normal form in other regards than the foregoing ones. In this specimen the whole shape of the capitulum is

so different, that I would hardly have taken the animal for an abnormal *P. dubium*, if I had received it from a quite different Station. Comparing the different valves with those of a normal *P. dubium*, the tergum in the first place is larger, its apex is slightly recurved and its basal angle is not truncated but rounded. In the second place, the scutum is broader and its tergal margin is much longer than in the typical specimens. Finally, the carina is not simply and regularly bowed, but its upper part is recurved, and there is further a small isolated piece of valve, which I think belongs to the carina, and which is placed between the tip of the remaining part of that valve and the inferior angle of the tergum. In this specimen, moreover, the peduncle is longer than in the other specimens, its length being about $^2/_5$ of the length of the capitulum. The total length of this specimen was 7,2 mm., that of its capitulum about 5 mm.

I do not know what circumstances or causes made these four specimens develop in such an abormal way. They were most probably dead, when they were taken by the "Siboga". I conclude this in the first place from the fact that the animals were hanging out of the capitulum in a more or less deteriorated condition, in the second place from the circumstance that numerous stalked Infusoriae are attached to the surface of the capitulum in all. As DARWIN already observed more than half a century ago, there is often very considerable variation in the exact shape of the valves, more especially of the terga (l. c. p. 29). In the present instance it is, however, not so much variation in shape as that in three of the four specimens, at least, there is abnormality in the process of calcification or shell-building. Under *P. excavatum* I describe another case of such abnormality — without trying to explain its origin. This will be the task of future investigators who study these animals in the fresh condition and at the place where they occur.

4. *Poecilasma fissum* Darwin. Pl. X, fig. 2—5.

Poecilasma fissa Darwin. Monograph, Lepadidae, 1851, p. 109, pl. II, fig. 4.

DARWIN founded this species for a single specimen of *Poecilasma* which he took from a spinose crab found under a stone at low water in the Island of Bohol, Philippine Archipelago.

Numerous specimens were taken from a *Palinurus*, collected at Ternate during the cruise of H. M. S. "Siboga". There are about six larger and about fifty smaller specimens. The larger ones measure about 8 mm., 4,5 to 5 mm. coming on the capitulum, 3,5 to 3 on the peduncle.

DARWIN says that the capitulum of his specimen was nearly a quarter of an inch long and that its shape was gibbous, broadly oval. The description he gives of the capitulum, the valves etc. applies so well to the specimens from Ternate that there remained for me no doubt as to these specimens really belonging to DARWIN's *Poecilasma fissa*. There are little differences, however, in the structure of the parts of the mouth, the cirri etc. DARWIN's description was founded on a single specimen which moreover "had long been kept dry" and little differences may occur within the limits of a species. I would hardly insist on these differences, had they not caused what I suppose to be the same species to be described by AURIVILLIUS as a new one under the name of *P. amygdalum*[1]. For this reason especially, the following details of the animals structure may be of interest.

[1] AURIVILLIUS, C. W., Studien über Cirripedien. K. Svensk. Vetensk.-Akad. Handl. XXVI, N° 7, 1894, p. 10.

Labrum with a row of about 24 small teeth, standing close together; at each side the 5 or six outer ones are sharply pointed, the dozen in the middle being rather blunt. Palpi small, conical, with about five longer hairs at the tip and a few smaller ones along its inner side.

According to DARWIN the fourth tooth of the mandible is pectinated. I found a small tooth on the inner edges of the second and third teeth, one on the outer edge of the fourth tooth and also one on the edge of the inferior angle.

The maxillae were unknown to DARWIN. The upper part (Pl. X, fig. 2 and 2*a*) is furnished with three spines: two claw-like and the third rather straight and more delicate; of the two claw-like spines the first is one and a half times as broad and long as the second. Under the upper part there is a deep notch, on the inferior margin of which two minute hairs are planted. The inferior part of the edge of the maxilla is much produced and bears about ten unequally stout spines. Of these the one placed about the middle is by far the strongest.

The second maxilla (Pl. X, fig. 3) has the outline not truncated, but rounded; hairs over the inner surface of unequal length, rather delicate and not very numerous. Near the outer margin the surface shows, moreover, numerous rounded spots of peculiar aspect, which I have not observed in other species, so far as I can remember.

Cirri of the first pair were lost in DARWIN's specimen. They have unequal rami of respectively 6 and 9 segments. These segments are broad, short, quadrangular, bearing at the extremity a transverse row of numerous spines, which are longer than the segments themselves.

Cirri of the second to sixth pair much as described by DARWIN. Concerning those of the 6th pair the following may be pointed out: they have rather short pedicels and also short rami of 11 and 12 segments. Their lower segments are as long as broad, the more distal grow slightly longer, to about twice as long as broad, being slightly broader at the distal extremity; the terminal segments of both rami are short and narrow. The spines form two groups or tufts near the extremity of each segment (Pl. X, fig. 4): a dorsal and an anterior tuft, all of them arranged in a transverse line. DARWIN says that they are arranged in a circle, interrupted widely on the two sides and, of course, it may be expressed in that way. But what is especially characteristic for this species is, that the pairs of spines which as a rule in other Cirripeds are seen at the anterior faces of the segments of the cirri are totally wanting.

Caudal appendages (Pl. X, fig. 5) elongate, slightly broader in the middle, narrow at the extremity, where they bear a tuft of long slender hairs, like a kind of pencil. They reach to about the middle of the second segment of the pedicel of the 6th cirrus.

Penis long, pointed at the extremity, where it bears a tuft of delicate hairs.

General Remark. AURIVILLIUS (l. c. p. 12) points out himself that there is a close affinity between his new species *(P. amygdalum)* and DARWIN's *P. fissum*. Yet he thinks they are different, and to prove it he lays particular stress on the general form of the capitulum — more oval, with a broader basis in *P. fissum*, more elliptical with a narrow basis in his *P. amygdalum*. As I have said already, DARWIN used for his description a specimen which had long been kept dry and further, to judge from the material collected by the "Siboga", individual differences occur in this species with regard to the shape of the capitulum. One might consider some of the Ternate specimens as approaching more to AURIVILLIUS' and others more to DARWIN's

form. That the very peculiar arrangement of the spines on the cirri, which DARWIN called most abnormal, occurs in AURIVILLIUS' *nova species* also ("die eigentümliche Anordnung der Cirrenbörstchen des *P. fissum* findet sich bei dieser Art wieder"), is by all means a circumstance strongly in favour of my view that they are really one and the same species.

AURIVILLIUS took still another species of *Poecilasma* from the same specimen of *Palinurus*, thrown on the shore of the Island "Noordwachter", one of the "Duizendeilanden" in the Java Sea. He emphasizes that the main difference between this species and *P. amygdalum* is in the structure of the cirri; these show according to him quite different characters, especially with regard to the arrangement of the spines. In this second new species *(P. lenticula)* from *Palinurus*, the cirri bear two long spines on the anterior face and also two short ones distally from the middle of each segment; on the dorsal face, spines are only seen in the sutures. AURIVILLIUS gives a figure (l. c. Taf. VIII, fig. 28) to illustrate this detail of his *P. lenticula* — but this figure shows only spines in the sutures, on the anterior as well as on the dorsal side! Some confusion either in the figures or in the descriptions given by AURIVILLIUS must have taken place — but as he points out that the difference in the arrangement of the spines is the most essential, one cannot help thinking that after all the reason for separating two forms of *Poecilasma* as different species, which closely resemble one another in other regards and live together on the carapace of the same specimen of *Palinurus*, is not a very strong one.

According to DARWIN *Poecilasma fissum* occurs at the Philippines; according to WELTNER [1] it has been collected by FISCHER at New Caledonia, by WHITELEGGE at Port Jackson, by himself at Jaluit (on *Palinurus*) and by SCHAUINSLAND at Honolulu.

The label accompanying the "Siboga" specimens only says that they were found on a *Palinurus* at Ternate.

5. *Poecilasma excavatum* n. sp. Pl. I, fig. 5—10.

Capitulum with seven valves, the scutum being divided into two segments by a fissure nearly parallel to the occludent margin. Tergum with an excavation in the scutal margin near the occludent margin to receive the tip of the occludent segment of the scutum. Carina narrow, keeled near the inferior extremity, terminating in a disc.

General appearance. Capitulum oval, less than twice as long as broad, with the apex pointed, rather thick, swollen. Valves united without chitinous interspaces, peduncle cylindrical, narrow where it is attached to the capitulum (Pl. I, fig. 5).

Scutum. The larger segment strongly bowed, with a short basal margin and pointed apex. There is a trace of an internal basal rim, but no tooth at the rostral angle is present. Like the other valves the scutum is very delicately striated. The smaller segment is also distinctly bowed, it terminates in a point at the base and has the tergal margin rounded so as to fit exactly into the excavation of the tergum.

Tergum triangular with a very characteristic excavation at the scutal margin near the occludent margin (Pl. I, fig. 6).

[1] WELTNER, W., Ergebnisse einer Reise nach dem Pacific (SCHAUINSLAND 1896—97). Cirripedien. Zoologische Jahrbücher. Abteil. für Systematik u. s. w. II, 1899, p. 441—447.

Carina narrow, broader at the lower part which is distinctly carinated, terminating in a spatula-shaped disc which is embedded between capitulum and peduncle (Pl. I, fig. 7 and 7*a*).

Peduncle short, about half the length of the capitulum, cylindrical; narrow near the place of its attachment to the capitulum, swollen about the middle of its length. Surface with narrow rings indicated by darker chitinous transverse rings.

Size. The capitulum of the largest specimen collected was 11,6 mm. in length. The other specimens are however considerably smaller.

The study of the animal contained within the capitulum has yielded the following results:

Mouth. In general as in the other species of the genus, for example, as in *P. dubium*. Mandibles with a relatively greater distance between the first and second teeth, second, third and fourth nearer to one another on the other hand. Maxillae with no larger spines in the notch beneath the three great upper spines, with five or six slender spines on the slope at the other side of the notch. The spines on the inferior upraised part of the maxilla slightly smaller and less numerous (about 10) than in *P. dubium*.

Cirri. First pair at a distance from the second, with nearly equal rami each divided into five segments. Outer surface of the segments with numerous and long hairs, a transverse row of rather strong hairs or spines near the end of the third and fourth segments and terminally on the fifth segment also.

The other cirri as in the other species of the genus. The number of spines on the front side of the segments of the cirri N^{0} II—VI is as a rule four pairs, a fifth pair being often indicated by a couple of extremely short hairs. The number of spines on the last segments is smaller. The number of the segments in the cirri II—III is 10 and 11, in the cirri IV—VI 11 and 12.

The caudal appendages are slender, about as long as the first segment of the pedicel of the sixth cirrus. They bear a dense tuft of very long hairs along the outer side in the last third part of their length (Pl. I, fig. 8).

Penis thick, ringed especially about the middle of its length, terminating in a much narrower and curved part. Extremely delicate and sparse hairs on the surface, a tuft of slightly stronger hairs at the extremity.

H. M. S. "Siboga" collected this species twice, viz. once five specimens at:

> Stat. 253. December 10, 1899. Lat. 5°48.2 S., Long. 132°13′ E. Depth 304 m. Bottom: gray clay, hard and crumbly.

and half a dozen specimens at:

> Stat. 12. March 14, 1899. Lat. 7°15′ S., Long. 115°15′.6 E. Depth 289 m. Bottom: coarse sand with broken shells.

Of the latter specimens one was attached to a small piece of the scale of a Crustacean.

General Remark. This species belongs to the same section of the genus as Darwin's *P. fissum* and the species *P. amygdalum*, *P. lenticula*, *tridens* and *vagans* of Aurivillius: all species with 7 valves, the scutum in each being formed of two closely approximate segments. The very characteristic excavation of the scutal margin of the tergum and the spatula-shaped

basal end of the carina render it easy enough to distinguish this species from those it shows affinity to in other regards.

Together with *Poecilasma excavatum*, *P. dubium* and *P. obliquum*, a form of *Poecilasma* was collected, about the nature of which I dare not pronounce an opinion with certainty. This form is represented by a single specimen. The length of its capitulum is 7 mm., the peduncle is about as long as the capitulum, cylindrical, distinctly ringed. It has the scutum divided into two segments and, what has never been observed in any species of this genus, the tergum also divided in two segments. The fissure runs in continuation to the fissure of the scutum and has the same character in the terga of both sides. The terga do not look quite normal, however, as they are only partly calcified: a relatively large part of the surface of the tergum being occupied by chitinous substance.

In fig. 9, Pl. I I give a drawing of the outlines of this curious form, magnified slightly over 5 diameters; in fig. 10 the apex of the scutum is represented with the division of the tergum magnified 36 diameters. I feel at a loss to decide whether this form is normal, in which case it would represent a very interesting section of the genus *Poecilasma*, or what seems more probable provisionally, a pathological abnormality being caused by mutilation and regeneration of the parts that have been broken off. . . .

N.B. This form has been labelled *P. excavatum*, varietas.

At the same Station (253) still another form of *Poecilasma* was collected. It is represented by a single specimen only; like *P. fissum*, *P. excavatum* etc. it has the capitulum composed of seven valves and it is also nearly related to these species in other regards. Its peduncle seems to be broken off, but the surface of the part remaining bears numerous microscopic spines. The smaller segment of the scutum terminates at its tergal extremity in a point, so that no real tergal margin is formed: in this regard this form resembles *P. fissum* more than *P. excavatum*. It differs from both species in the smallness of its terga, its carina being a little longer than in these species.

The length of the capitulum of this form is 5 mm., that of the part of the peduncle found attached to the capitulum about 2 mm. It was collected at a depth of 304 m. As the specimen does not seem to be quite complete I think it better not to introduce it into the system under a specific name.

6. *Poecilasma obliquum* n. sp. Pl. I, fig. 11—22.

Capitulum slightly unsymmetrical, tergum rudimentary and concealed in the membrane between the two scuta; carina with a prominent heel, terminating in a small imbedded fork. Cirri short, partly rudimentary.

General appearance (Pl. I, fig. 11 and 12). Capitulum of oblique lenticular shape, placed in such a way to the peduncle, that its base is covered at the right side more than at the left. Scuta in the larger specimens distinctly furrowed.

Scutum. Seen externally the basal margin can hardly be separated from the carinal margin, but an internal basal rim shows how far the basal margin extends (Pl. I, fig. 13). Occludent margin curved, near the basal angle slightly turned inward. A triangular tooth is placed internally near the basal angle. The occludent margin meets the tergal margin almost without forming an upper angle. Carinal and tergal margins blend into one another quite gradually. The two valves, of right and left side, are equally convex. Seen externally the surface of the scutum in the larger specimens is not smooth but furnished with a very distinct series of furrows parallel to the carino-tergal margin.

Tergum (Pl. I, fig. 13 and 14). Quite rudimentary, triangular. The basal angle is not pointed but obliquely truncated.

Carina (fig. 15*a* and 15*b*). Little over half as long as the carinal margin of the scutum, narrow and internally convex. The exterior surface is carinated and has a prominent heel, in front of which the little fork which is imbedded between the capitulum and the peduncle is attached.

Peduncle cylindrical, narrow and extremely short, in the largest specimen covered at the right side for a great part by the overhanging scutum.

Size. The largest specimen has a capitulum of 7 mm., the whole length being slightly over 7,5 mm.

Mouth. Labrum (fig. 16 and 16*a*) bullate, the front part overhanging and triangular. Crest hairy and pectinated, i. e. furnished with a row of smaller and larger, sharp triangular teeth placed close together. Palpi small, triangular, hairs neither very numerous nor very long. Mandibles (fig. 17) with four teeth and a rudimentary inferior angle, produced into a fine point. The teeth are nearly equidistant, tooth 1, 2 and 3 finely pectinated on the inferior side. Mandibles on the front part more densely hairy than in the other species of the genus. Maxillae (fig. 18) with a notch beneath the three upper spines, hairs in the notch delicate; the not very numerous (6—8) spines beneath the notch relatively delicate also; covered with dense hairs. Outer maxillae (Pl. I, fig. 19) quadrangular, rounded at the corners, hairs not very dense nor very long.

Cirri, short, very unequal, more or less rudimentary. The cirri of the right side as a rule smaller than those of the left side. The first pair is not far from the second pair. Both cirri of the first pair have unequal rami, but each ramus is composed of 7 segments. The 1st cirrus of the right side has the shorter ramus about half as long as the longer, in that of the left side the difference is not so great. Each segment bears a transverse row of strong spines at the extremity and these grow stronger and become more numerous distally. The top of the last segment bears five or six spines. The concave side of each ramus has a group of spines at the extremity of each segment, the convex side is furnished with a row of very delicate hairs.

The second cirrus of the right side has unequal rami both composed of eight segments; that of the left side has the posterior longer ramus composed of 10, the anterior ramus of 8 segments. The segments are, as in the first cirrus, short, quadrangular or even broader than long. Each segment has a transverse row of spines at the outer side near the extremity, more strongly developed in the terminal segments and towards the dorsal side of each ramus.

The inner side of each segment has a transverse row of more delicate spines or hairs and these form tufts of hairs at the concave side, especially of the lower segments.

Third cirrus of the right side with both rami much shorter than those of the left side. The rami of the third cirrus of the left side have 11 and 9 segments; form of the segments and distribution of the spines much like in the second cirrus.

Fourth cirrus of the right side quite rudimentary, rami very unequal, both composed of five segments, with small groups of hairs at the extremity of the segments. On the left side the cirrus is composed of two nearly equal rami composed of 11 segments. The fourth left cirrus has the same structure as the left one of the fifth pair (Pl. I, fig. 20): the groups of spines on the dorsal side of the rami at the extremity of the segments and growing stronger in the terminal segments are very characteristic for both cirri.

The right-hand cirrus of the fifth pair is extremely small, rudimentary (Pl. I, fig. 21). It differs from that of the fourth pair in having quite equal rami. They are composed of five segments.

Both cirri of the sixth pair have a stronger ramus of 12 broader segments and a more slender ramus of 11 segments. They bear, at the extremity of the segments towards the dorsal side, the same groups of stronger spines as in the left-hand cirrus of the 4th and 5th pair; at the anterior or concave side, each segment bears as a rule one pair of spines or a larger spine accompanied by two or three more slender ones.

Caudal appendages (Pl. I, fig. 22) shorter than the first segment of the pedicel of the sixth cirrus, slender with a dense tuft of hairs near the extremity and a few hairs along the sides.

Penis cylindrical, growing thinner towards the extremity, with very numerous and very delicate curved hairs scattered over its surface; a tuft of such hairs at the extremity.

Eggs numerous, long oval. Longest axis 0,2 to 0,22 mm., shortest axis 0,08 mm.

This species was taken in half a dozen specimens, only two of which seem to be full-grown, at:

Stat. 253. December 10, 1899. Lat. 5°48′.2 S., Long. 132°13′ E. Depth 304 m. Bottom: gray clay, hard and crumbly.

Stat. 251. December 8, 1899. Lat. 5°28′.4 S., Long. 132°0′.2 E. Depth 204 m. Bottom: hard coral sand. One small specimen.

General Remark. This is a very remarkable species. Were it not for DARWIN's (HINDS') *P. eburneum*, I would have felt greatly inclined to consider it as representing a new genus. As already observed by HINDS (who therefore proposed the name *Trilasmis* for this Cirriped) and as described in detail by DARWIN, the terga are "entirely" absent in *P. eburneum* and at first I did not find them in *P. obliquum* either. Yet on studying the capitulum more carefully, I discovered the terga as extremely minute triangular pieces, hidden in the folds of the membrane uniting the two scuta over the upper end of the carina. In this regard the new species *obliquum* with its quite rudimentary terga bridges the cleft which separates *P. crassum* with small (DARWIN says "rudimentary" terga — but they are well-developed and even large in comparison with those of *P. obliquum*) terga and *P. eburneum* with no terga whatever. The structure of the parts composing the mouth in *P. obliquum* differs in several regards

from what it is in other species of the genus, yet these differences are perhaps not so great as they give one the impression of being at first sight. In *P. obliquum* the teeth of the labrum are triangular, approximated and of unequal size, whereas in the other species of the genus they are bead-like and removed from one another. In *P. eburneum*, however, I found the teeth on the lateral parts of the labrum sharply pointed, triangular, and in *P. fissum* the same is the case. In *P. obliquum* the first-third teeth of the mandibles are finely pectinated; traces of such a pectination are, however, observed in *P. fissum* also. In *P. obliquum* the somewhat rudimentary cirri have short quadrangular segments and transverse rows of spines, the pairs on the anterior faces being represented by a single pair only. In this regard this species comes nearest to *P. fissum* — the difference being that the spines in the latter species consist of two tufts, an anterior and a dorsal, whereas they form a more continuous row on the cirri of *P. obliquum*.

So far as the shape and structure of the valves are concerned, *P. eburneum* of known species of *Poecilasma* is the nearest relative of *P. obliquum*; with regard to the structure of the body *P. fissum* has no doubt greater affinity to *P. obliquum* than any of the other species.

7. *Poecilasma eburneum* (Hinds). Pl. X, Fig. 6—7.

Trilasmis eburnea Hinds, Voyage of Sulphur. I. Mollusca, 1844, Pl. XXI, fig. 5.
Poecilasma eburnea (Hinds), Darwin, Monograph, Lepadidae, 1851, p. 112, pl. II, fig. 5.

H. M. S. "Siboga" collected specimens of this interesting species on several occasions.

Darwin's descriptions of the species of Cirripedia are as a rule so good that hardly anything need be added. Having made acquaintance with the curious species *P. obliquum* and having discovered its miniature terga, I was anxious, however, to investigate Hinds species a-new and to compare its structure with that of my new species.

With regard to the capitulum I found Darwin's description exact: the terga are entirely wanting, the shape of the scuta and carina, the way in which the capitulum is placed with respect to the peduncle etc. are entirely as Darwin has them. As to the structure of the parts of the mouth, the cirri etc. little differences, however, were found and a few observations may therefore be permitted here.

The labrum has small teeth along its crest, those in the middle are bead-like; at each side, however, half a dozen are sharply pointed and slightly distant from one another. The hairs on the tip of the palpi are rather long, so long as to touch when the two palpi are turned towards one another. The inferior angle of the mandible is spine-like, the side directed towards the fourth tooth bears an extremely minute tooth near the extremity — whence the angle is bifid, as Darwin says. Maxillae with two larger and a third somewhat smaller upper spine, a couple of rather delicate and short spines at each side of the main notch; the inferior upraised part is not straight, but forms steps, the excavations being indicated by Darwin as minute notches. Second maxillae (Pl. X, fig. 6) truncated, broad, nearly quadrangular with rounded corners; hairs at the tip and along the inner surface rather numerous and not very long.

With regard to the structure of the cirri the main difference between DARWIN's description and what I have found is, that I think the unequality of the rami almost unimportant, and further, that the segments of the rami of the 2nd and 3rd cirri are distinctly protuberant. Altogether the cirri are short, the segments of the rami being but little longer than broad and not very numerous; the last pair has rami of 13 and 14 segments in one of the specimens I investigated. These segments have the ordinary 3 or 4 pairs of spines on the anterior face, but as the segments are rather short these pairs stand close together and form groups of spines, a "brush" as DARWIN says, with the more or less numerous lateral marginal spines. The dorsal side of each segment bears the ordinary dorsal tuft near the extremity (Pl. X, fig. 7).

The caudal appendages are short, less than half the length of the lower segment of the pedicel of the sixth cirrus; they are slightly swollen about the middle, the rounded extremity being distinctly narrower. The distal third part is thickly clothed with delicate bristles, standing out in all directions.

During the cruise of the "Siboga" this species was collected at:

About Stat. 51: in Street Molo. Depth 54—90 m. 1 small specimen.
Stat. 79. June 12, 1899. Lat. 2°43′ S., Long. 117°44′ E. Depth 41—54 m. Bottom: fine coral sand [Borneo Bank]. Attached to the spines of a *Cidaris bispinosa* Lam. 8 specimens, most of them small, three larger. The greatest diameter of the largest is about 7 mm.
Stat. 79a. June 12, 1899. Lat. 2°38′.5 S., Long. 117°46′ E. Depth 54 m. Bottom: fine coral sand [Borneo Bank: 5 miles N.N.E. from Station 79]. 4 specimens, greatest diameter of largest 7 mm.
Stat. 80. June 13, 1899. Lat. 2°25′ S., Long. 117°43′ E. Depth 40—50 m. Bottom: fine coral-sand. 4 specimens, largest not quite 5 mm.

General Remark. This species, which was known to DARWIN from specimens from New Guinea only, may now be considered to occur at different places in the Malay Archipelago. It lives attached to the spines of *Echinus*, *Cidaris* and perhaps other forms of Echinidae and seems to go down to depths of over 50 m. According to WELTNER[1] the Berlin Museum possesses specimens of this species collected in the Red Sea (by LEPSIUS?).

Genus **Dichelaspis** Darwin

DARWIN (1851) instituted the genus *Dichelaspis* for those Lepadidae which have 5 valves, generally appearing like 7 from each scutum being divided into two distinct segments united at the rostral angle; he distinguished five species of the genus. When my report on the "Challenger" Cirripedia was published (1883) the number of known species had increased to nine. Since that time the number has increased considerably; WELTNER, publishing a list in 1897[2] of the then known species of Cirripedia, was able to count 18 species, or even 19, as by a slight omission one of the 8 new species introduced into science by AURIVILLIUS[3] was left out by WELTNER. WELTNER also mentioned two new species which STEBBING[4] described in 1894;

[1] WELTNER, W., Verzeichnis etc. Archiv f. Naturg. 1897, Bd I, H. 3, p. 243.
[2] WELTNER, W., Ibidem, p. 241.
[3] AURIVILLIUS, C. W., Studien etc. 1894, p. 15—28.
[4] STEBBING, T. R. R., Notes on Crustacea. Ann. & Mag. Nat. Hist. (6) XV, 1894, p. 18—19.

but, of course, five other new species the descriptions of which have been published in 1900 by GRUVEL [1], two described by LANCHESTER [2] in 1902 and one by ANNANDALE in 1906 [3], could not figure in his list. Thus 25 species in all of this genus are now known: in GRUVEL's latest publication [4] a synoptical table is given for the determination of these species. He even enumerates (without ANNANDALE's species of 1906) 25 species, as he also reckons to this genus a Lepadid considered by STEBBING [5] to belong to another (and new) genus for which the name *Trichelaspis* had been proposed by that carcinologist.

The cruise of the Dutch gunboat "Siboga" has supplied us with several forms belonging to this genus and I find that most of them must be considered as *novae species*. But before entering on the description of these forms, I consider it useful to give a summary of the descriptions of the known species in order to be able to judge of their relations and to understand the difficulties of the classification.

AURIVILLIUS (l. c. p. 20—26) was the first who discovered a species of *Dichelaspis*, and even five of them, without terga; in one of these species the carina is also wanting. I was at first inclined to separate these species from the genus *Dichelaspis*. It would perhaps be more in accordance with DARWIN's original views, when only such forms were accepted as species of this genus which had five valves and a scutum divided into two segments. This at least is the original diagnosis of the genus. STEBBING therefore pointed out, that it would be difficult to maintain the species of AURIVILLIUS as species of the present genus. Yet looking at the question again I finally embraced the opinion of AURIVILLIUS in this matter. The structure of the body of these problematic *Dichelaspis*-species corresponds essentially with that of the typical, the genuine, species of the genus, and in one of these species *(D. cor)* not only are the scuta very typical *Dichelaspis*-scuta, divided into two segments and with the primordial valves at the rostral angle, but the capitulum has the position of the tergum distinctly indicated, as it is limited by a chitinous cushion, towards the margin of the scutum as well as towards that of the carina. Thus it would be extremely difficult and even unnatural not to consider that species as a *Dichelaspis*, and once this is agreed upon, the other species are to be accepted also, as they represent further stages in the degeneration of the valves of the capitulum in the same direction as shown by *D. cor*, the last stage — so far as known at present — being occupied by *D. bullata* Aurivillius, which species has no terga and no carina.

GRUVEL's new species *D. Maindroni* and *D. Coutierei* much resemble the form called *D. cor* by AURIVILLIUS and these belong by all means to the same section of the genus, which section now counts seven species: five of AURIVILLIUS and two of GRUVEL. These seven species most likely have another point of agreement, in that they are all living in a semi-parasitic way in the branchial cavity or even attached to the branchiae of large brachyurous or macrurous crustaceans. Four of the species of AURIVILLIUS were even taken from the same *Palinurus*, not species only but specimen, found stranded on the coast of one of the Thousand Islands, Java.

[1] GRUVEL, A., Bulletin du Muséum d'histoire naturelle, 1900, n° 3, p. 109.
[2] LANCHESTER, W., Crustacea of the Skeat Expedition. Proceed. Zool. Soc. London, II, 1902.
[3] ANNANDALE, N., Stalked Barnacles in the Colombo Museum. Spolia Zeylanica, III, Part XI, 1906.
[4] GRUVEL, A., Monographie etc. 1905, p. 140—141.
[5] STEBBING, T. R. R., A new Pedunculate Cirripede. Ann. & Mag. Nat. Hist. (6), XIII, 1894, p. 443.

It is not my task to discuss the good standing of these seven species, some of which on closer examination might probably be found to be identical; but I wish only to point out that there is, no doubt, sufficient reason to admit a causal nexus between the simplified structure of the capitulum and the mode of life of these forms.

Considering these seven species as a group of more or less degenerated forms, 18 (19) species of typical *Dichelaspis* remain. Of the latter those species in which the valves have the most complete development and show the greatest resemblance to the valves of the nearly related genera *Poecilasma* and *Lepas*, are most likely to represent the more original form. In this regard the species described by me as *D. sessilis*, by ANNANDALE as *D. tenuivalvata* and by LANCHESTER as *D. occlusa* are the first to be named: their scutum is rather broad, their tergum has the triangular shape of the species of *Lepas* and their carina is likewise broad. Next come the species *D. Warwicki* Gray and those which are nearly related to it: *D. Hoeki* Stebbing, *D. antiguae* Stebbing, *D. alata* Auriv., *D. Aurivillii* Gruvel and *D. equina* Lanchester. In all these species the scutum is composed of a narrow occludent segment and a much wider basal segment which, as a rule, has a triangular shape. With the more or less developed and broad tergum these valves cover a good deal of the surface of the capitulum. The carina of these species terminates in a rectangularly inflected disc [1] extending over a good deal of the base of the capitulum. These five species (with *D. Forresti* (Stebbing), six [2]) form together another very natural group of species in the genus *Dichelaspis*. It is quite another question whether all these forms are really distinct species — but this can only be made out by comparative study of all the original specimens, which study is not for me to undertake.

Which species should come next? To judge from the form of the carina *D. pellucida* Darwin would be nearly related to *D. Warwicki* Gray; to judge from the form of the tergum *D. orthogonia* would be the nearest relative of the latter species and I think it would be very difficult to decide which characteristic is the more important. There remain 12 species, all of them with rather narrow valves leaving a great deal of the capitulum uncovered. These can easily be divided into three natural and distinct groups. *D. orthogonia* Darwin forms a group of its own amongst the hitherto known species: it has a triangular tergum with three (four) prominent ridges and the carina terminates downwards in a small crescent-shaped cup: it is to this group of the genus that two of the forms collected by H. M. S. "Siboga" in the Malay Archipelago and to be described later belong. *D. pellucida*, which has the carina much like that of *D. Warwicki*, has the tergum of quite a different shape: like a battle-axe as DARWIN describes it; not only *D. Grayi* Darwin but also *D. lepadiformis* Gruvel come very close to *D. pellucida* and if they are indeed distinct species they really form together an extremely natural group.

The same holds good for *D. Lowei* Darwin, *D. Darwini* Filippi, *D. neptuni* Macdonald,

[1] According to AURIVILLIUS the carina of his species *D. alata* terminates in a fork. Should this really be the case, this species would form a serious exception. But A. had at his disposal one specimen only and this specimen most probably has not been dissected for the study of the carina. But without doing so, I think it is hardly possible to make out the shape of the terminal part of the carina..... Perhaps he only had the impression that the terminal part was a fork, its two teeth being really united by a disc-like plate?

[2] I think GRUVEL is right in considering STEBBING's *Trichelaspis Forresti* to be a *Dichelaspis*. I think it belongs to the same section of the genus as *D. Warwicki*.

D. Aymonini Lessona et Tapparone Canefri, *D. sinuata* Aurivillius, *D. trigona* Aurivillius and *D. Vaillanti* Gruvel. All these species agree in so far as they have rather narrow valves leaving a great deal of the capitulum uncovered, and also in that the carina terminates downwards in a fork. But here I wish again to emphasize, that though we must accept all these species for the present I am not convinced that they really are so many or so distinct.

The forms of *Dichelaspis* collected during the cruise of the "Siboga" belong to five different species: *D. Weberi* n. sp., *D. Nierstraszi* n. sp., *D. Tydemani* n. sp., *D. Versluysi* n. sp. and *D. orthogonia* Darwin. The four new species are named after those who have the merit of having done the scientific work on board the ship during the cruise. Of the new species *D. Nierstraszi* and *D. Tydemani* are both nearly related to *D. Warwicki* Darwin and doubtless belong to the same section of the genus; *D. Weberi* and *D. Versluysi* show — the latter more than the first — a well-marked affinity to DARWIN's *D. orthogonia*.

Thus we would now have 32 species of *Dichelaspis*, which might be classified according to their mutual affinities in the following way:

I. Species, in which the valves show the highest development, covering a great deal of the surface of the capitulum.
D. sessilis (type-species), *D. tenuivalvata* and *D. occlusa* (3 known species).

II. Species, in which the valves show a somewhat less development, with a relatively broad scutum and the carina terminating in a rectangularly inflected disc.
D. Warwicki (type-species), *alata*, *antiguae*, *equina*, *Aurivillii*, *(Forresti)*, *Hocki*, *Nierstraszi*, *Tydemani* (9 known species).

III. Species, in which the valves are considerably less developed than is the case in the species of group II, in which however the carina has the same form as in the species of that group.
D. pellucida (type-species), *Grayi*, *lepadiformis* (3 known species).

IV. Species having the same development of the valves as those of group III, but with a tergum corresponding in form to that of the species of group II.
D. orthogonia (type-species), *Weberi*, *Versluysi* (3 known species).

V. Species with five valves, the narrowness of which causes a great part of the capitulum to be uncovered.
D. Lowei (type-species), *Aymonini*, *Darwini*, *neptuni*, *sinuata*, *trigona*, *Vaillanti* (7 known species).

VI. Species with three valves only, terga wanting.
D. cor (type-species), *angulata*, *aperta*, *Coutierei*, *cuneata*, *Maindroni* (6 known species).

VII. Species with two valves only (terga and carina wanting).
D. bullata (type-species), 1 known species.

Of these 32 species about one half (14, 15 or 16) have been observed in the Malay Archipelago, viz.

D. occlusa, East coast of Malay Peninsula: Tungganu (LANCHESTER).
D. Warwicki, off Borneo (DARWIN), Java Sea, near Batavia (AURIVILLIUS).

D. alata, Java Sea: Thousand Islands (AURIVILLIUS).
D. equina, East coast of Malay Peninsula: Trengganu (LANCHESTER).
D. Nierstraszi, Malay Archipelago, different Stations, see later!
D. Tydemani, near Saleyer, see later!
? *D. pellucida*, Indian Ocean (DARWIN), Oriental species with fairly extensive distribution (ANNANDALE).
? *D. Grayi*, Tropical, Indian or Pacific Oceans (DARWIN).
D. Weberi, Off Great Kei Island, see later!
D. Versluysi, Malay Archipelago, different Stations, see later!
D. orthogonia, Malay Archipelago, different Stations, see later!
D. sinuata, Java Sea: Thousand Islands (AURIVILLIUS).
D. trigona, Java Sea: Thousand Islands (AURIVILLIUS).
D. angulata, Java Sea: Thousand Islands (AURIVILLIUS).
D. aperta, Java Sea: Thousand Islands (AURIVILLIUS).
D. cuneata, Java Sea: Thousand Islands (AURIVILLIUS).
D. Maindroni, Sumatra (GRUVEL).
D. bullata, Java Sea: Thousand Islands (AURIVILLIUS).

The seven species of AURIVILLIUS enumerated in the above list were all of them taken from one and the same stranded specimen of a *Palinurus* spec. They were found attached to the branchiae or to the interior wall of the branchial cavity of that crayfish. The name of the species of *Palinurus* is not given, but it is no doubt permitted to suppose that it was a littoral form — no deep-sea species. *Dichelaspis Maindroni*, the species described by GRUVEL, was also found attached to a *Palinurus* (whether all of them, or only those collected by Mr. MAINDRON is not distinctly indicated by GRUVEL) and also seems to be a littoral form. For *D. Warwicki*, *pellucida* and *Grayi* no definite data with regard to their bathymetrical distribution could be given by DARWIN. They are most probably all of them littoral forms: *D. Warwicki* was found attached to a crab, *Grayi* to the skin of a sea-snake, and *pellucida* also to a sea-snake — they are most probably forms which live at the surface of the sea. *D. equina* lives on shallow-water crabs and likewise *D. occlusa*.

The species collected by H. M. S. "Siboga" were found at different depths:

Dichelaspis Tydemani n. sp. at a depth of 10—25 m.
Dichelaspis Versluysi n. sp. at a depth of 22—32 m.
Dichelaspis Nierstraszi n. sp. at a depth of 27—59 m.
Dichelaspis orthogonia Darwin at a depth of 88—112 m.
Dichelaspis Weberi n. sp. at a depth of 560 m.

The last-named is thus the only true deep-sea species of the collection, and as will be seen from the description it is the largest of the known species. This is a peculiarity which also holds good for many other deep-sea species of Cirripedia (e. g. *Scalpellum*- and *Verruca*-species).

The other known deep-sea species of this genus *(D. sessilis)* was collected by the Challenger near the Azores at a depth of about 1800 m. All the other species are littoral forms, living at the surface or going down to depths of 30, 50, 100 m. at most. In accordance with this

all the species, so far at least as our present knowledge goes, have a limited geographical distribution. We need not forget, however, that our knowledge is rather imperfect as yet. In one of the last papers published on Cirripedia (that in which ANNANDALE describes the stalked Cirripeds of the Colombo Museum) we find in this regard as new facts that *D. equina* Lanchester from the east coast of the Malay Peninsula is common on the east coast of British India and that *D. pellucida* Darwin is an Oriental species which probably has a fairly extensive distribution. The latter, which has only been taken on sea-snakes, has not been collected during the cruise of the "Siboga".

1. *Dichelaspis Nierstraszi* n. sp. Pl. II, fig. 1—7.

Capitulum much compressed, with the apex produced. Scuta with the basal segment about as wide as the occludent segment, its carinal margin being very much hollowed out; terga with three unequal marginal projections the longest of which is nearly as wide as the occludent segment of the scuta. Carina terminating in a disc.

General appearance (Pl. II, fig. 1 and 2). Capitulum compressed, flat, slightly convex in the middle, with the apex produced. The valves are covered by a membrane which is thick and hairy especially in old specimens. In very young specimens the membrane also bears chitinous hairs. The carina is separated by a wide space from the scuta. Peduncle cylindrical, shorter than the capitulum.

The valves cover a large part of the surface in very small specimens (Pl. II, fig. 2*a*). In these the shape of the valves is also different.

Scutum (fig. 4*a*). It is formed of two slightly divergent and about equally broad parts, hanging together by means of a very narrow bridge. The occludent segment one fourth longer than the part representing the basal segment; both segments with the upper part the broader.

In some old specimens from the Tual anchorage, Kei Islands, the occludent segment of the scutum is considerably wider than the basal segment.

In very young specimens (fig. 2*a*) both segments of the scutum are relatively broader; this is especially the case with the basal segment, the shape of which is nearly triangular, with the carinal margin hollowed out. Fig. 3*a* represents the scutum of a middle-sized specimen, remarkable for having the upper part of the occludent segment rather narrow.

Tergum (fig. 4*b*). It has the lower part of about the same width as the occludent segment of the scutum; a narrow occludent segment forms a second projection which is separated by a deep notch from the carinal segment; the apex of the occludent segment of the scutum extends in the direction of this notch. A third and very short prominence is placed high up on the carinal margin just above the apex of the carina.

In very young specimens (fig. 2*a*) the three prominences of the tergum are not so well developed as yet; the middle one, the longest of the three, is the only one distinct. In middle-sized specimens (fig. 3*b*) the tergum has about the shape as the full-grown individuals.

Carina (fig. 5 and 5*a*). Much bowed, narrow, deeply concave within, extending up between the terga for $^{2}/_{3}^{\text{rds}}$ of their length, with a very characteristic curvature directed inwards just above the basal part. Downwards it terminates in a rectangularly inflected, deeply imbedded

disc, growing slightly wider towards its extremity, which terminally is not very deeply notched. This disc (fig. 5*a*) is not flat but hollowed out in the middle; it extends across over more than two-thirds of the base of the capitulum, beyond the middle of the basal segment of the scutum.

Peduncle cylindrical, as a rule slightly longer than half the length of the capitulum, about $^{2}/_{3}^{rds}$ of that length, or as long as the capitulum in specimens sitting crowded together; rather long also in the old specimens, collected at Tual anchorage, Kei Islands, one of which is figured Pl. II, fig. 1. The peduncle is distinctly ringed at the surface; the chitinous covering is studded with blunt beads of chitin externally and shows, in old specimens, scale-like excrescences with grooves between them. Delicate hairs are planted on the blunt beads of the surface; they are, however, more conspicuous in young specimens than in the full-grown. In the very old specimens from the Kei Islands the surface of the peduncle, like that of the capitulum, has a hairy felt-like coating.

Size. The largest specimen had a capitulum of 7,5 mm., most individuals however, are no longer than 4 mm. and a good many of the specimens are still smaller. The capitulum of the one figured, fig. 2*a*, only measured 2 mm., that of fig. 1, 6 mm.

Mouth. Labrum bullate, with small palpi bearing numerous bristles, some of them very long, at the apex. Teeth about 18, bead-like distally, triangular and close to one another in the middle.

Mandibles (fig. 6) narrow, with four teeth and the inferior angle formed by a group of very small teeth; teeth 2, 3 and 4 bearing an additional tooth near the extremity.

Maxillae (fig. 7) with a notch beneath the three upper spines, one of which is much stronger and one much shorter than the third. In the notch which is wide but not very deep four slender spines are planted, and the projecting part beneath the notch bears about seven moderately strong spines and a few hairs.

Cirri. First pair much shorter than and far removed from the second pair; seven segments in the longer and six in the shorter ramus. The shape of the segments is nearly quadrilateral, with the exception of the first segment which is of an elongated quadrangular form. Nearly the whole surface of the segments is clothed with spines, which grow longer and stronger towards the terminal segments. The second-sixth pair of cirri have both rami of equal length. The segments are rather long and bear as a rule four or five pair of spines on the anterior side and a tuft of small spines on the posterior near the junction of two segments. A few very delicate spines are scattered over the surface of each segment.

Caudal appendages narrow, thin, more than half as long as the pedicels of the sixth cirrus; a tuft of bristles, two or three of which are much longer than the others, is placed on the summit; no bristles or one isolated bristle on the sides.

Penis short, thick, terminating in a conical part bearing a tuft of extremely delicate hairs at its extremity.

General remarks. This species shows a certain resemblance to *D. Warwicki*; the differences, however, being numerous and, so far as I could make out, constant, there can be little doubt but that they represent different species. As in *D. Warwicki* the scutum and tergum of young specimens are different from the same valves in older specimens: the shape of these

valves in young specimens (fig. 2*a*) comes near to that of the same parts in *D. Hocki* as figured by STEBBING. It is undoubtedly the most common form of *Dichelaspis* occurring in the Malay Archipelago; it was collected during the cruise of H. M. S. "Siboga" at about 20 different stations at depths varying from 9 to 112 m. They seem to be most numerous at depths not exceeding 55 à 60 m. and are found attached to different objects: stems and small branches of horny corallines, algae etc.

The specimens from different localities and depths show considerable variety in their general outline, size, shape of the valves, hairiness, the more or less complete calcification of the valves etc.: no doubt the species would present a very valuable material for the study of variation of a wild animal living under different conditions.

The following is a list of the stations where specimens of this species were collected.

Stat. 47. April 8—12, 1899. Bay of Bima (north coast of Sumbawa). Depth 55 m. Numerous specimens attached, with *Scalpellum rostratum* Darwin, to different small stems.
Stat. 60. April 27—28, 1899. Haingsisi, Samau Island, Timor. Depth 23 m. Numerous small specimens.
Stat. 65. May 6, 1899. Lat. 7° 0 S., Long. 120° 34'.5 E. Depth 120 m. at least; coral bottom. One specimen.
Stat. 71. May 10—June 7, 1899. Makassar and neighbourhood. Depth up to 32 m. 8 specimens.
Stat. 77. June 10, 1899. Lat. 3° 27' S., Long. 117° 36' E. Depth 59 m. Fine grey coral sand. One fairly large specimen.
Stat. 80. June 13, 1899. Lat. 2° 25' S., Long. 117° 43' E. Depth from 50—40 m. Bottom: fine coral sand. One large, three smaller specimens attached to a piece of coral.
Stat. 99. June 28—30, 1899. Lat. 6° 7'.5 N., Long. 120° 26' E. Depth from 16—23 m. Lithothamnion-bottom. 3 specimens, one attached to a small Lamellibranchiate Mollusc.
Stat. 125. July 18—19, 1899. Anchorage off Sawan, Siau Island. Depth 27 m. Bottom: stone and some Lithothamnion. 3 specimens, with very short peduncles and very hairy.
Stat. 133. July 25—27, 1899. Anchorage off Lirung, Salibabu Island. Depth up to 36 m. Bottom: mud and hard sand. 4 specimens.
Stat. 144. Aug. 7—9, 1899. Anchorage north of Salomakië (Damar) Island. Depth 45 m. 2 specimens.
Stat. 164. Aug. 20, 1899. Lat. 1° 42'.5 S., Long. 130° 47'.5 E. Depth 32 m. Bottom: sand, small stones and shells. Numerous small and larger specimens.
Stat. 172. Aug. 26—28, 1899. Gisser; anchorage between this island and Ceram-Laut. Depth 18 m. Coral- and Lithothamnion-bottom. A dozen specimens with perfectly calcified valves.
Stat. 213. Sept. 26—Oct. 26, 1899. Saleyer anchorage and neighbourhood. Depth up to 36 m. Extremely numerous specimens attached to threads of corals, to one another etc.
Stat. 257. Dec. 11, 1899. Kei Islands, Du-roa Strait. Depth to 52 m. Bottom: coral. 3 specimens.
Stat. 258. Dec. 12—16, 1899. Kei Islands, Tual anchorage. Depth 22 m. Bottom: Lithothamnion, sand and coral. Several specimens, some of them very large.
Stat. 274. Dec. 26, 1899. Lat. 5° 28'.2 S., Long. 134° 53'.9 E. Depth 57 m. Bottom: sand and shells; stones. Numerous specimens, together with small barnacles (*Balanus* spec.).
Stat. 282. January 15—17, 1900. Lat. 8° 25'.2 S., Long. 127° 18'.4 E. Depth 27—54 m. Bottom: sand, coral and Lithothamnion. Numerous specimens attached to polyps etc.
Stat. 289. Januari, 20, 1900. Lat. 9° 0'.3 S., Long. 126° 24'.5 E. Depth 112 m. Bottom: mud, sand and shells. Two specimens.
Stat. 315. February 17—18, 1900. Anchorage East of Sailus Besar, Paternoster Islands. Depth up to 36 m. Bottom: mud and sand. Three specimens.

I have pleasure in naming this beautiful and interesting species after Dr. H. F. NIERSTRASZ, one of the Zoologists on board H. M. S. "Siboga".

2. *Dichelaspis Tydemani* n. sp. Pl. II, fig. 8—13.

Capitulum much compressed with the apex highly produced. Scuta with the basal segment triangular and the occludent segment broad, having the shape of a scalpel; terga with the lower part about as wide as the occludent segment of the scuta; carina much bowed, terminating in a disc, notched at its extremity.

General appearance (Pl. II, fig. 8). Capitulum compressed, flat. Valves not very close together. Valves thin and translucent, carina perfectly, other valves very imperfectly calcified. The membrane covering the valves with rather long hairs.

Scuta (fig. 9). The occludent segment is long, flat, pointed at its extremity; its occludent margin is straight, the carinal margin convex, whence the shape of the segment is that of a scalpel. The basal segment is triangular, small; only a small part of the valve is calcified: it stretches from the lower point of the occludent segment to one fourth of its length; what might be called the junction of the two segments is calcified, but no calcification is seen in the basal segment itself.

Terga (fig. 10). Scutal margin excised at a point vis à vis the apex of the scutum; the excision separates a smaller occludent projection from a larger carinal projection or lower part. Occludent margin simply and slightly curved. Incipient calcification at the umbo, where the valve shows an indistinct third prominence.

Carina (fig. 11). Much bowed, narrow, long. The basal end is rectangularly inflected and stretches internally to about the half of the diameter of the peduncle. The whole valve is calcified; the basal portion is slightly wider than the upper part and is excised at its extremity.

Peduncle narrow, especially close under the capitulum; about $^{2}/_{3}^{\text{rds}}$ the length of the capitulum.

Size. Very small, the capitulum measuring not quite 2 mm. in length.

Mouth. Labrum bullate. Mandibles (fig. 12) with four teeth and the inferior angle tooth-like and acuminated. Maxillae (fig. 13), with three larger spines at the upper angle, beneath which there is a triangular incision or notch, bearing two slender hairs. The edge beneath this notch is straight and projecting, and bears six or seven unequal but rather large spines.

Cirri. First pair short with the rami very unequal: the longest has five, the shortest four segments; the segments are nearly quadrangular with the exception of the first which is elongated; terminal segments small and blunt. Segments not thickly clothed with hairs or bristles; these are placed somewhat irregularly.

The other cirri have very long and slender segments, bearing three pairs of spines as a rule.

The caudal appendages are extremely slender but not longer than half the length of the pedicels of the sixth cirrus. They bear a few (about four) very delicate hairs at their ends.

The specimens are attached to long, yellowish-brown hairs or spines, which are hollow and bear triangular pointed teeth placed in irregular rows. They were taken, October 1899, near Saleyer anchorage, at a depth of 10—25 m.

Remarks. I am not quite sure that the specimens I have examined represent the full-grown form. Yet the shape of the valves and of the capitulum as a whole are so characteristic that it may be described as a distinct animal. In some regards it approaches *D. Warwicki* — but the much produced form of the capitulum makes it at once look very different, the shape of the scutum being moreover very peculiar.

The species is named in compliment to Captain now Commander G. F. TYDEMAN, the distinguished commander of H. M. S. "Siboga" during its cruise in the Malay Archipelago.

3. *Dichelaspis orthogonia* Darwin. Pl. II, fig. 14—18. Pl. III, fig. 1, 1A, 1B and 10*b*.

1851. DARWIN, Monograph, Lepadidae, p. 130, pl. II, fig. 10.

Since DARWIN published his Monograph, this species has not been observed so far as I know. DARWIN described it from British Museum specimens, habitat unknown. The "Siboga" collected a few specimens, south of Timor, at a depth of 112 m., and again at two other stations, 80 and 77, in the Archipelago: I think it very probable that the specimens studied by DARWIN had also been collected in the Malay archipelago.

I had at my disposal a few large and smaller specimens of this species. The largest has been drawn by me, magnified about 10 times, and is figured Pl. II, fig. 14. The capitulum of this specimen measures 6,6 mm., whereas DARWIN says that the length of the capitulum is above $^{2}/_{10}^{\text{ths}}$ of an inch, 5,1 mm. The other specimens of the "Siboga" are about that size, or still smaller.

The shape of the valves is much like DARWIN's description: I have prepared these valves from a 5 mm. specimen and figured them separately (fig. 15, *a*, *b*, *c*).

The scutum (fig. 15*a*) corresponds well with DARWIN's description; in the largest specimen however, the occludent segment is less than twice as long as the basal segment.

The tergum (fig. 15*b*) shows the four prominences in which the four ridges proceeding from the umbo end. The projection at the occludent margin of the valve is extremely small, smaller perhaps than in the figure given by DARWIN.

The carina (fig. 15*c* and fig. 16) terminates in a heart-shaped disc (fig. 16) with a slight excavation in the middle. This excavation in the specimen the valves of which I prepared was neither so deep nor so distinct as DARWIN has it in his description. The whole shape of the valve, however, so much resembles D.'s description and figures, that no uncertainty as to its identity could remain.

DARWIN's specimens were in a bad condition; of the peduncle he said that it was unknown, probably short. The "Siboga" specimens all have a peduncle: it is cylindrical and has about one third the length of the capitulum.

The different parts of the mouth correspond well with DARWIN's description. I give a figure of the maxilla (fig. 17) showing the notch (bearing one spine) beneath the three large, upper, unequal spines, and the highly projecting inferior part bearing eight spines in all, one of which (the third) is larger than the other ones. DARWIN says that this inferior part is, itself, obscurely divided into two steps — the maxillae of the specimen I dissected did not show this peculiarity.

Five specimens in all were taken; some of them were attached to cylindrical stems of a coralline organism most probably. The length of the capitulum of the largest specimen taken by the "Siboga" is 6,6 mm., that of its peduncle is about 1,6 mm. A young specimen is attached to the peduncle near its extremity.

The "Siboga" took these specimens at three different Stations:

Stat. 77. June 10, 1899. Lat. 3° 27′ S., Long. 117° 36′ E. Depth 59 m. Bottom: fine grey coral-sand. 1 specimen.

Stat. 80. June 13, 1899. Borneo Bank. Depth 50—40 m. Bottom: fine coral-sand. 1 specimen.

Stat. 289. January 20, 1900. Lat. 9° 0′.3 S., Long. 126° 24′.5 E. Depth 112 m. Bottom: mud, sand and shells. 3 specimens.

Formae dubiae. Though I have long been in doubt on the matter, I consider a few specimens (two large, two smaller and a few very small specimens) as belonging also to this species, which were collected by H. M. S. "Siboga" at Station 318 at a depth of 88 m., as also two small specimens taken at Station 294. Their shape is slightly different, being much flatter and the peduncle is shorter. The largest specimen has a capitulum over 7 mm. long and may be considered a full-grown specimen as it is furnished with well-developed egg-sacks. This animal is figured on Pl. II, fig. 18. In this specimen the proportion of the two segments of the scutum is different from what it is in the individual represented in fig. 14 of the same plate. Other differences are shown by the figures and are perhaps not important enough for minute description. Of one of the specimens of Station 318 I have prepared the valves and made with their aid the drawing fig. 1, Pl. III. I have made a drawing further of the smallest specimen of all (Pl. III, fig. 1 A), taken also at Station 318 and of one of the slightly larger ones (Pl. III, fig. 1 B) of Station 294. In that of Station 318 the shape of the shells is still quite different from that in the full-grown and those of Station 294, having a capitulum of 1,8 mm. in length, may be considered as forming the transition between the very small one with a capitulum of 1,25 mm. and the full-grown form.

The position of the stations where these forms were taken was as follows:

Stat. 294. January 23, 1900. Lat. 10° 12′.2 S., Long. 124° 27′.3 E. Depth 73 m. Bottom: soft mud with very fine sand. Two small specimens.

Stat. 318. February 22, 1900. Lat. 6° 36′.5 S., Long. 114° 55′.5 E. Depth 88 m. Bottom: fine yellowish grey mud. Several large and smaller specimens.

4. *Dichelaspis Weberi* n. sp. Pl. III, fig. 2—7.

Capitulum much compressed with the apex slightly produced. Scuta with the basal segment narrower than the occludent segment and not quite half as long. Terga with three unequal marginal projections on the scutal margin of the valve. Carina much bowed, internally very concave, terminating downwards in a small spatula-like disc.

General appearance. Capitulum compressed, flat. Valves relatively small, narrow, a large interspace between the carina and the other valves. Valves covered by a thin transparent membrane only. Peduncle cylindrical, much shorter than the capitulum (Pl. III, fig. 2).

Scutum (fig. 3*a*) consisting of two bars placed at right angles to each other, with the point of junction fully as wide as any part of the basal segment and perfectly calcified. The basal segment slightly tapering to the carinal extremity, the occludent segment widening considerably to the apex, which is obliquely truncated. The length of the occludent segment is slightly more than twice that of the basal segment.

Tergum (fig. 3*b*) of a triangular shape, with three ridges, terminating in three prominences of unequal length. The longest forms the basal point; of the two others that at the occludent margin is the shortest. In the angle between the latter two prominences the apex of the scutum in younger specimens fits exactly. In older specimens, like that figured in fig. 2, there is a distinct interspace between the apex of the scutum and the tergum. The valve is rounded at the umbo and shows a trace of a fourth prominence on the carinal margin just above the apex of the carina.

Carina (fig. 3*c* and 4). Much bowed, rather narrow, long; externally the central ridge is flattened towards the apex; internally the valve is concave, the concavity nearly reaching to the disc-like basal portion. The width of the carina remains almost the same over its whole length, with the exception of the basal portion which widens and forms a spatula, as figured in fig. 4.

Peduncle short, cylindrical, one third the length of the capitulum at most.

Size. The capitulum, in the largest specimen, is more than 10 mm. when measured along the occludent margin and about 12 mm. when measured from the apex of the tergum to the base of the carina. It is the largest of the known species of the genus.

Mouth. Labrum with the upper part bullate as in the other species of the genus; crest with a row of small triangular teeth. Palpi small, conical, moderately clothed with bristles.

Mandibles (fig. 5). Much like those of the other species of the genus: rather narrow, distance between the tips of the first and second teeth slightly shorter than that between the second tooth and the inferior angle. The inferior angle produced into an indistinct double spine.

Maxillae (fig. 6). Three large upper unequal spines and a fourth delicate one attached to the base of the third. Notch neither very wide nor very distinct, bearing two pairs of slender spines and a much stronger one half way to the beginning of the projecting inferior part. The latter bears nine or ten spines of unequal length and strength.

Outer maxillae (fig. 7) rather broad, general shape rounded-quadrangular. Covered with long bristles which moreover form a dense tuft all over the outer margin.

Cirri. First cirrus separated by a wide interval from the second pair; short, with the two rami unequal in length, though both consisting of seven segments. The segments are broad, quadrangular and thickly paved with long and slender spines. The other cirri have very long rami as well as pedicels.

Caudal appendages small and narrow with a few long spines at their ends.

H. M. S. "Siboga" took this fine species at:

Stat. 262. December 18, 1899. Lat. 5° 53′.8 S., Long. 132° 48′.8 E. Depth 560 m. Bottom: solid bluish-grey mud, upper layer softer and brown mud. In all 9 specimens.

I have great pleasure in naming this fine and characteristic deep-sea species after the leader of the "Siboga" expedition, Professor MAX WEBER. It was taken at a depth of 560 m., and thus may really be considered a deep-sea species.

It is a well-marked species: it shows a certain resemblance to *D. orthogonia* and belongs to the same section of the genus, but it differs from it by its size, as well as by the shape of the tergum and of the disc forming the base of the carina.

The present species and *D. sessilis* Hoek, dredged by the "Challenger" in the Atlantic, near the Azores, at a depth of 1000 fathoms, are the only known species of the genus *Dichelaspis* living at considerable depths.

5. *Dichelaspis Versluysi* n. sp. Pl. III, fig. 8—13.

Capitulum compressed, apex produced. Scuta with the basal segment much narrower than the occludent segment and more than half as long. Terga with three distinct marginal projections and a fourth one very small. Carina terminating downwards in an oval disc-like cup.

General appearance. Capitulum flat; valves small, a large part of the surface of the capitulum remaining uncovered. Valves covered by membrane so as not to be seen distinctly without isolating them. Peduncle cylindrical not quite half the length of the capitulum (Pl. III, fig. 8).

Scutum (fig. 9*a*). It consists of two bars placed in most of the specimens at right angles to each other, in one of the specimens (figured in fig. 9) at an angle of more than 90°. The point of junction is perfectly calcified. The basal segment uniformly narrow, the occludent segment, which is less than twice as long as the basal segment, grows much wider towards the apex. It is flat with the apex obliquely truncated.

Tergum (fig. 9*b*) of a triangular shape, with three ridges terminating in three prominences of unequal length. Seen from the outer side the three divisions are separated from one another by distinct, even deep furrows. The fourth ridge or prominence is extremely small and situated at the carinal side just above the apex of the carina.

Carina (fig. 9*c*). Much bowed, even slightly more than is the case in *D. Weberi*, long, not very narrow, keel-shaped in its basal part and with a flattened central ridge above the middle to as far as the apex. Internally the valve is concave. The basal portion is embedded and forms a cup of a very peculiar shape: it is oval with at each side a small wing, like the small handles of a bowl (Pl. II, fig. 10*a*, while fig. 10*b* shows the cup-shaped basal portion of a specimen of *D. orthogonia* with the same enlargement, seen from the same side).

Peduncle short, cylindrical; length about one third that of the capitulum. In most of the specimens the chitinous outer wall is transparent and surrounds the muscular part like a wide sack.

Size. Length of the capitulum in one of the larger specimens 6,3 mm. when measured from the tip of the tergum to the base of the carina. Several specimens, however, are considerably smaller. The largest specimen is over 7 mm.

The mouth and its parts in general resemble greatly the same parts in *D. orthogonia*: crest of the labrum with a row of small bead-like teeth; palpi with the two sides parallel, bearing towards the one side numerous very long bristles.

Mandibles (fig. 11, *a*, *b* and *c*) narrow with four teeth and the inferior angle produced either in a single tooth or in two smaller teeth: in two specimens the right mandible had the inferior angle terminating in two, the left in one larger tooth.

Maxillae having the three larger upper unequal spines and the notch beneath these as in *D. orthogonia*. In the notch two delicate spines are planted as a rule and the inferior slightly projecting part is indistinctly divided into an upper step with three and an under step with five or six spines. (In fig. 12 of Pl. III one of the maxilla of a specimen of this species is represented with only two large upper spines; the other maxilla of the same specimen had the normal number of three spines above the notch).

Outer maxillae, outline semi-elliptical rather than hemispherical; not sparingly covered with bristles. The longest bristles are planted near the middle of the outer margin of the maxilla.

Cirri. Pedicels and rami of the five posterior pairs are very long; segments much elongated, each bearing four pairs of very long spines and a fifth pair much shorter. Between each pair there is an excessively minute spine — as described by DARWIN for *D. orthogonia*.

Of the first pair, which is separated by an interval from the second pair, both rami are short and only slightly unequal in length; the number of segments is 6 in the shortest and 7 in the longest ramus. Both are paved moderately thickly with spines as in *D. orthogonia*.

Caudal appendages long and narrow, distinctly two jointed, with a number of long hairs or delicate spines at their ends and a few hairs planted here and there (Pl. III, fig. 13).

Penis short, thick; terminating in a narrower and curved part bearing a tuft of very delicate hairs.

This species was taken at:

Stat. 164. August 20, 1899. Lat. 1°42′.5 S., Long. 130°47′.5 E. Depth 32 m. Bottom: sand, small stones and shells. About 12 specimens.

General Remarks. I have some doubt as to whether I am right in considering this as a species; but as there are full-grown specimens with egg-lamellae in the collection and as these differ in the shape of the valves from *D. orthogonia*, to which this form in other regards shows great resemblance, I have thought it useful to give a description of it and to consider it as a separate species. I have the impression that several species in this genus have rather fluctuating characters, but it is quite impossible to make out how far the variation or the fluctuation of these characters goes without a very large material of specimens from the same locality as well as from different places.

The species is named after Dr. J. VERSLUYS, one of the Zoologists of the scientific staff of H. M. S. "Siboga".

Forma dubia. I have figured on Pl. III (in fig. 14) another form of *Dichelaspis*, which is represented by one specimen only. It belongs, no doubt, to the same group of species as *D. orthogonia*, *Weberi* and *Versluysi* and it shows in many regards great resemblance to *D. Versluysi* in particular: it has almost the same form — but, as it is at the same time

different in several more or less important details, I consider it as a variety of the last described species. Comparing the capitulum we see that the occludent segment of the scutum of this specimen is more than twice as long as the basal segment, and that it does not grow wider towards the apex but has about the same width throughout its length. The tergum of this specimen, though deeply furrowed like the same valves in *D. Versluysi*, does not show the fourth prominence just above the apex of the carina. The carina itself not only has almost the same general shape, but its basal portion has exactly the particular form which is so characteristic of *D. Versluysi*.

Only one specimen represents this form and this specimen, the length of the capitulum in which is about 6 mm., has been dissected to prepare the valves and to make out its identity: so that the "type" of this form no longer exists and this alone would be a reason for not introducing it into science as a new species. As, further, its relation to *D. Versluysi* is very close I think it right to indicate it as *D. Versluysi* Var. The single specimen was taken at:

Stat. 258. Dec. 12—16, 1899. Tual anchorage, Kei Islands. Depth 22 m. Bottom: Lithothamnion, sand and coral.

Genus **Megalasma** Hoek

HOEK, Cirripedia of the "Challenger", 1883, p. 50.

This genus was founded (1883) for a very characteristic Cirriped dredged during the cruise of the "Challenger". It belongs to the same natural group of genera as *Poecilasma*, *Dichelaspis* and *Lepas* and is nearly related to the first of these three.

In 1894 WELTNER[1] described a second species of this genus and gave it the name of *M. carino-dentatum*. A third was collected by H. M. S. "Siboga" in 1899.

The diagnosis given for this genus in the "Challenger" Report holds good for the forms discovered later, with one exception; the triangular form of the scutum which was so very striking in *M. striatum* is, strictly speaking, gone in *M. lineatum* (and so far as can be judged from the sketches of WELTNER, the same is the case in *M. carino-dentatum*), there being a distinct though short basal margin. Hence, I propose to have the diagnosis changed so far that the scuta are not called triangular but approaching more or less to a triangular form.

For the determination of the species known at present, the following table may be of use:

Megalasma

A. Dorsal margin of the carina developed into a broad flattened part forming the continuation of the downwards inclined portions of the tergum along their carinal margin . . . . . *M. striatum.*

B. Dorsal margin of the carina not forming a broad flattened part.

a. Dorsal margin of the carina having a tooth-like excrescence. . *M. carino-dentatum.*

b. Dorsal margin of the carina without a tooth-like excrescence. . *M. lineatum.*

[1] WELTNER, W., Zwei neue Cirripedien aus dem Indischen Ocean. Sitz. Ber. Ges. Naturf. Freunde zu Berlin, 1894, p. 80.

M. striatum which was taken by the "Challenger" in the Philippine Archipelago at depths of 180 and 207 m. was collected by H. M. S. "Siboga" at different places in the Malay Archipelago at depths from 204 to 984 m. *M. carino-dentatum* was found on the stem of a *Hyalonema* from the Gulf of Bengal, dredged at 3200 m. *M. lineatum* was dredged in the Malay Archipelago from a depth of 450 m. So all the species may be considered as deep-sea forms, the range of depth over which they spread being very large. Hitherto, the genus has only been found in Asiatic Indian Waters.

1. *Megalasma striatum* Hoek.

1883. Hoek, Cirripedia of the "Challenger". p. 51, pl. II, fig. 5—9, pl. VII, fig. 8—9.

The "Challenger" collected this beautiful species in the Philippine Archipelago at a depth of 100 à 115 fathoms, about 180 à 207 meters, in November 1874.

It has not been observed, so far as I know, from that date until H. M. S. "Siboga" dredged some specimens in 1899 at different stations, viz.

Stat. 251. December 8, 1899. Lat. 5° 28′.4 S., Long. 132° 0′.2 E. Depth 204 m. Bottom: hard coral sand. Numerous specimens attached to the spines of an Echinus. The largest specimen measures 10,5 mm.

Stat. 253. December 10, 1899. Lat. 5° 48′.2 S., Long. 132° 13′ E. Depth 304 m. Bottom: grey clay, hard and crumbly. One small specimen attached to the spine of an Echinus.

Stat. 267. December 20, 1899. Lat. 5° 54′ S., Long. 132° 56′.7 E. Depth 984 m. Bottom: grey mud with a brown upper layer. One specimen attached to the silicious skeleton of a sponge.

The range of depth of this species is now found to be much greater than could be judged from the results of the Challenger: we are now permitted to say that this species is one of those capable of existing at a considerable variety of depth.

At the same Stations where this species was collected, other Cirripedia were also brought up with the dredge; thus, at Station 251: two species of *Poecilasma*, four species of *Scalpellum*, one of *Balanus* etc.; at Station 253: three species of *Poecilasma* etc. The conditions must be particularly favourable for the development of Cirripedia at these Stations! With reference to this, see my Report on the Cirripedia of the "Challenger", p. 25.

2. *Megalasma lineatum* n. sp. Pl. IV, fig. 1—8.

Scutum with the carinal margin bowed, considerably longer than the straight tergal margin and with a distinct though short basal margin. Tergum triangular, small. Carina with the lower end truncate and very wide, the upper end narrow and elongated. Peduncle extremely short.

General appearance. Pl. IV, fig. 1 and 2. Capitulum elongated, about twice as long as broad, swollen in the middle. The short peduncle extends from underneath the capitulum. The short basal margin of the scutum forms the continuation of the truncate basal margin of the carina. The valves are delicately striated; strips of membrane run over the lines separating the valves.

Scutum (fig. 1 and 3*a*) elongated, not exactly triangular, there being a short basal

margin, which in the larger specimen is more distinct than in the smaller. The carinal margin bowed and longer than the tergal margin; where these margins meet an obtuse angle is formed and from this angle a not very prominent ridge runs to the occludent margin. This is the only ridge on the outer surface of the scutum. Internally a not very prominent ridge runs along the lower half of the occludent margin, whereas a much more prominent and bowed ridge separates a small basal portion from the rest of the valve. Where these two ridges meet, near the occludent margin, a relatively strong tooth having the shape of a little nail, is formed.

Tergum (fig. 1 and 3*b*) triangular, relatively small. Carinal margin and scutal margin have about the same length; the former does not show the flattened border which is so characteristic for *M. striatum.*

Carina (fig. 2, 3*c* and 4) broad towards its basal end, much bowed, terminating upwards in a narrow flat part which runs up to the basal ends of the terga. The flattened dorsal margin is narrow and has about the same breadth throughout its length. The base is abruptly truncated. The scutal margin at one third of its length from the base shows a small tooth or excrescence which fits into an indistinct excavation in the carinal margin of the scutum. This detail of the structure seems more strongly developed in younger specimens — it cannot at any rate be made out so sharply in full-grown specimens without isolating the valves.

Peduncle very short, slightly extending from underneath the capitulum.

Size. The largest specimen has a capitulum of 1 cm. in length.

Mouth. Labrum (fig. 5) bullate; crest with a row of numerous (± 40) small triangular teeth; Palps small, hairs numerous at the tip and along the interior margin.

Mandibles (fig. 6) with four teeth, the inferior angle terminating in a single delicate spine. The distance between the tips of the first and second teeth one and a half times as great as that between the tips of the second and third.

Maxillae (fig. 7) with three spines at the upper angle, the notch beneath the upper spines relatively large and the inferior raised part rather narrow. There are three delicate hairs or spines planted in the notch, and about ten larger ones on the part beneath the notch.

Outer maxillae of a quadrangular shape with rounded edges. Numerous, delicate hairs planted on the outer surface, the largest along the outer margin.

Cirri. First pair far removed from the second pair with very short rami. Rami not so much differing in thickness, much more so in length. The longest ramus has ten, the shortest nine segments. Spines planted over a great part of the surface of each segment. The second cirrus has about the same shape and structure as those following: each ramus consists of long and narrow segments; two stronger and a third much more delicate spine are planted at the convex side near the extremity of each segment; the concave side having as a rule three stronger pairs of spines and a fourth very delicate pair. An extremely delicate spine is inserted in the angle formed by each pair of stronger spines.

Caudal appendages (fig. 8). Very short, terminating abruptly and broad, and bearing a not very large number of fairly strong hairs at its truncated extremity.

Penis in the specimen that was dissected broken off; the part attached to the body cylindrical with hairs here and there.

This species was taken at:

Stat. 74. June 8, 1899. Lat. 5° 3'.5 S., Long. 119° 0' E. Depth 450 m. Bottom: Globigerina ooze (obviously a thin layer). Two specimens, which, according to the label, were attached to a spine of *Goniocidaris florigera*.

General Remarks. Long after the above description was written, I found in ANNANDALE's "Preliminary Report on the Indian stalked Barnacles" (published April 1906)[1], that a form of *Megalasma* occurs in the Andaman Sea at a depth of 290—775 m. which "agrees in every respect with HOEK's *striatum* from the Philippines, except that the semicircular ridge on the lower part of the capitulum, which forms a conspicuous feature in the latter, is quite absent". ANNANDALE has called this form a subspecies (*M. striatum*, subsp. *minus* nov.), not a variety, "because it seems to represent a well-defined local race, differing only slightly from the typical form, but with a constant difference".

This is the only information at hand regarding this "subspecies" — no figure is given. I would not be astonished, however, if this form and my new species *M. lineatum* proved to be identical[2].

Genus **Alepas** Sander Rang

DARWIN (1851) enumerated four species of the genus *Alepas*: two of these he saw and investigated himself (*A. minuta* Philippi and *A. cornuta* Darwin), the two others (*A. parasita* Sander Rang and *A. tubulosa* Quoy et Gaim.) were known to him only from figures and descriptions published by QUOY & GAIMARD, SANDER RANG and LESSON. The "Challenger" collected a fifth species of this genus which was described by me in 1883 as *A. pedunculata*. Six other species have since then been added to the list, viz. two by AURIVILLIUS[3] (*A. quadrata* and *A. japonica*) and four by GRUVEL[4] (*A. Belli*, *A. indica*, *A. microstoma* and *A. Lankesteri*). The latter author in his "Monographie" (1905), p. 164, has given a synoptical table for the determination of the 11 species of this genus known to him.

Since then, ANNANDALE[5] has described three more species of this genus, viz. two (1905): *A. gigas* collected in Bali Straits and *A. malaysiana* dredged in Gaspar Straits, and one (1906): *A. xenophorae* found off the S. W. coast of (English) India.

To this number of 14 species come those dredged by the "Siboga" on different occasions in the Malay Archipelago. They represent in all five different forms, which I think must all be considered as new species. Two of the new forms are however represented by one specimen only and as it is impossible to describe these without dissection, I shall only give a figure with a short description of the outward shape: they have been named *A. ovalis* (taken W. from the Key Islands at a depth of 984 m.) and *A. tenuis* (S. of Ceram at 204 m. depth).

The other three new species are represented by numerous specimens. I propose to name

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[1] Annals and Magazine of Natural History. (7), XVII, April 1906, p. 399.

[2] A good figure is given in the "Illustrations of the Zoology of the R. I. M. S. S. Investigator" Calcutta, 1907. ANNANDALE's subspecies and my new species are identical. (Note added during press).

[3] AURIVILLIUS, C. W., Studien über Cirripedien. K. Svensk. Vetensk.-Akad. Handl. XXVI, N° 7, 1894, p. 28—32.

[4] GRUVEL, A., Sur quelques Lépadides nouveaux de la collection du British Museum Trans. Linn. Soc. VIII, 8, London, 1902.

[5] ANNANDALE, N., Malaysian Barnacles in the Indian Museum. Memoirs of the Asiatic Society of Bengal, I, 1905, p. 80—81. —— Preliminary Report on the Indian Stalked Barnacles. Ann. and Mag. Nat. Hist. (7), XVII, April 1906, p. 399.

them *A. morula*, *A. intermedia* and *A. lithotryae*. The first was collected between Borneo and Lombok at a depth of 538 m., the second N. W. from the Key Islands at 90 m. depth, the third near South Lucipara Island at a depth of 894 m. attached to the valves of *Lithotrya nicobarica*. The last species has, not unlike *A. quadrata* Auriv., horny, nearly quite hidden scuta; *A. morula* can be recognised at once by the very peculiar structure of the capitulum; and *A. intermedia* stands so far as the structure of the 5th and 6th cirrus is concerned between the species with quite normal rami and those in which the inner ramus is quite rudimentary.

Including the 5 species from the "Siboga" we now have 19 species of *Alepas* in all. The absence of calcareous parts or valves which facilitate the separation of the species in other genera (in *Scalpellum* e. g.) makes this distinction a troublesome one in *Alepas*. The outward shape of the capitulum, the length and proportions of the peduncle are liable to change with the age, under the influence of the fluid used for the conservation etc. The question whether all the species described are really good species in the case of *Alepas* is more difficult to answer than for the other genera. Yet, considering the circumstances under which they were taken (different objects or animals to which they were found attached, different depths, geographical distribution) there can be no doubt, I think, but that most of the species are really different forms.

The following table enumerates all the species at present known, arranged according to their bathymetric occurrence with indication of their geographical distribution. The species found in the Malay Archipelago are marked with an asterisk.

Alepas Lankesteri Gruvel. 1465 m. Mona Channel, West Indies.
**Alepas ovalis* n. sp. 984 m. W. from the Key Islands.
Alepas pedunculata Hoek. 740 m. Off New South Wales.
**Alepas morula* n. sp. 538 m. Between Borneo and Lombok.
Alepas minuta Philippi. 355—250—100 m. Mediterranean, Atlantic Ocean.
Alepas xenophorae Annandale. 333 m. S. W. Coast of (English) India.
**Alepas gigas* Annandale. 290 m. Bali Straits.
**Alepas tenuis* n. sp. 204 m. South of Ceram.
**Alepas intermedia* n. sp. 90 m. N.W. from Key Islands.
Alepas japonica Aurivillius. 80 m. Japan Sea, Hirado Street.
**Alepas malaysiana* Annandale. 55 m. Gaspar Straits.
**Alepas lithotryae* n. sp. Reef. Near South Lucipara Island.
Alepas tubulosa Quoy & Gaimard. On *Palinurus* (Coast?). New Zealand.
**Alepas quadrata* Aurivillius. On *Palinurus* (Coast?). Thousand Islands (Java).
Alepas cornuta Darwin. ? West Indies: St. Vincent.
Alepas parasita Sander Rang. Surface (on *Medusae*). Mediterranean, Atlantic Ocean.
Alepas Belli Gruvel. ? Cuba.
Alepas microstoma Gruvel. ? Madeira.
**Alepas indica* Gruvel. Surface (on floating wood). Singapore and Nicobars.

Thus, we see that of the 19 species described in the literature 9 or about the half have been observed in the Malay Archipelago; in this region, the genus may indeed be called prolific.

As most of the species of this genus — with but very few exceptions — have been observed only once as yet, no conclusions can be drawn with regard to the bathymetric range in relation to the geographical distribution.

1. *Alepas morula* n. sp. Pl. IV, fig. 9—12.

Capitulum globular, its surface with numerous tubercles. No scuta. Orifice small, not protuberant. Peduncle more than half as long as the capitulum. Inner rami of the 5th and 6th cirrus as strongly developed as the outer rami.

Capitulum (Pl. IV, fig. 9) globular, with the carinal edge somewhat projecting like a crest, entirely destitute of valves, but with the thick chitinous envelope showing large tubercles all over its surface, giving the animal a certain resemblance to the fruit of the mulberry. The colour of the specimens conserved in alcohol is a greyish yellow, the peduncle being brownish. Indistinct brown or reddish transverse lines run over the surface of the capitulum. Orifice small, hardly protuberant, its edges sinuous.

Peduncle rather long, narrower than the capitulum, into which it insensibly blends; its surface very uneven, partly from being wrinkled, partly in consequence of the chitinous envelope bearing tubercles, which are however smaller than those of the capitulum. Surface of attachment not very wide.

Size. The length of the capitulum and the peduncle together is 10,5 mm. in one of the larger specimens, the capitulum alone measuring 6,5, the peduncle 4 mm.

Mouth. The labrum (fig. 10) has on its free margin a continuous row of 24 short, strong and blunt chitinous teeth. This row of teeth describes an arch, 14 of the teeth form the middle part and 5 are planted on each side. Numerous minute hairs or bristles are scattered over the teeth, larger and stronger hairs outside the teeth, especially beyond the attachment of the palpi.

The palpi are triangular, elongated. Their tips are at considerable distances from each other: even the bristles planted at the extremity do not touch each other. These bristles are strong and doubly serrated.

The mandibles (fig. 11 and 11*a*) have three teeth and the inferior angle, which by some authors is considered a fourth tooth, ends in the specimen I dissected in a single sharp spine at the right side (fig. 11*a*), in two distinct teeth at the left side (fig. 11). First tooth not so far from the second as the latter is from the inferior angle. The second and third teeth pectinated.

The maxillae (fig. 12) have a notch beneath the three upper spines. Of these one is considerably larger than the other two. In the notch are several spines, three or four of which are stronger than the others. The edge beneath the notch bears numerous strong and smaller spines and is indistinctly divided into two steps.

Outer maxillae quadrangular with rounded edges; a dense tuft of serrated bristles is directed towards the mouth opening, a less dense group of smooth hairs or bristles is directed towards the base of the maxillae.

Cirri long, with short and numerous segments, with the exception of those of the first pair which are rather short and broad.

First cirrus placed far from the second; its pedicel is relatively long, its rami short, slightly unequal, the longest has also the broadest segments; both rami have eight segments, the last being very minute. The segments on both rami bear strong bristles placed in a row near the anterior extremity of each segment. The segments of the strongest ramus have further a dense clothing of bristles on the side which is directed towards the more slender ramus. Whereas the small terminal segment of the more slender ramus bears three strong spines, the same segment of the stronger ramus has one slender spine only; further a number of extremely small hairs are placed at its extremity. In the row of bristles at the extremity of the sixth and seventh segments of the stronger ramus two or three bristles are wanting; minute scales are present at the places left open. Beneath the basal articulation of the first cirrus a long filamentary appendage is situated.

Second to sixth cirrus much resembling each other, their length and the number of the segments slightly increasing from the second to the sixth; in the second each ramus has 13 à 14, in the sixth 16 à 17 segments. The pedicels and the lowermost segments of the rami of the second and third cirri are much more densely clothed with hairs than the same parts of the fourth—sixth cirri. As a rule each segment of each ramus bears a row of bristles near its extremity, two very strong bristles on the dorsal face of each segment near the articulation of the following segment and a group of bristles on the ventral face, also near the extremity of the segment. The ventral face of most segments shows a row of very short stiff hairs, giving it the appearance of being serrated.

The rami of the 5th and 6th cirri are slightly unequal; the outer ramus has 17, the inner only 15 segments.

Caudal appendages long, reaching as far as the end of the fifth segment of the rami of the sixth cirrus, composed of 14 very slender segments each with a number of very delicate bristles or hairs on its summit.

Penis indistinctly ringed or segmented, tapering towards the extremity; numerous delicate hairs scattered over its surface and a dense tuft of slightly stronger hairs at its extremity.

One of the specimens I investigated was furnished with eggs which were united in one egg-mass. The eggs were extremely numerous and very small. Most of them contained Nauplii and many seemed to have come out before the animal was caught and put into the preserving fluid. The form of the eggs was long-oval, their length was 0,3, the greatest breadth 0,13 mm. Larvae without eyes or without black pigment in the eyes.

This species was taken at:

Stat. 316. February 19, 1900. Lat. 7° 19'.4 S., Long. 116° 49'.5 E. Depth 538 m. Bottom: fine, dark brown sandy mud.

The specimens were found attached to the spines of *Porocidaris elegans*, a sea-urchin which was caught with the trawl. There are in all a dozen large and about as many smaller specimens. Often one or two large and a few smaller specimens form a group, being attached near one another to the same spine.

2. *Alepas intermedia* n. sp. Pl. IV, fig. 13—16.

Capitulum oval, surface smooth, no scuta. Orifice narrow, not projecting. Peduncle stout, nearly as long as the capitulum. Inner rami of the 5th and 6th cirri slightly shorter than the outer rami.

Capitulum of an oval shape (fig. 13), apex bluntly pointed, carinal margin strongly bowed, rostral margin also bowed but less strongly. Orifice a narrow slit, which from being exactly in the longitudinal axis is hardly visible, when the animal is seen laterally. The capitulum is entirely devoid of scales or valves; its surface is smooth, one or more indistinct furrows excepted, which start from the rostral edge and describe curves over the surface. The capitulum blends insensibly into the long and strongly developed peduncle, the surface of which is either nearly quite smooth, or indistinctly ringed transversely.

The peduncle is somewhat compressed laterally: the shape of a transverse section is oval, not circular.

Size. The figure 13 represents one of the larger specimens. It has a capitulum about 1 cm. and a peduncle about 0,8 cm. long.

The body and its appendages are in general as in the other species of the genus. I wish to point out only the following characteristic features.

Mouth. Of the labrum (fig. 14) not only the middle part of the crest is furnished with a row of teeth, but also each lateral part. Those of the middle part are blunt, shorter in the middle than at the sides, whereas those of the lateral parts are sharp, hook-like. The middle part has about 20 teeth, each lateral part 8—10.

The palpi are perhaps not quite so long and narrow as in the other species of the genus; they have a dense row of rather long and strong bristles on the outer border and these bristles are doubly serrated.

The mandibles (fig. 15) have three teeth and the inferior angle. The latter ends in a single sharp spine. The distance between the first and second teeth corresponds exactly with that between the spine of the inferior angle and the second tooth. The lower edges of the first, second and third teeth of the mandible appear pectinated, owing to the presence of short strong spines projecting from the sides of the teeth.

The maxillae (fig. 16) have a triangular shape, with the edge rather long; the notch beneath the three larger upper spines and two other shallow notches about the middle of the edge give it an irregular appearance. The spines are very unequal in strength and size: a few are large and strong, the smaller ones are more numerous. The apodeme is rather long.

The outer maxillae are square in shape, broad with the angles rounded. The bristles form thee distinct groups: some rather long are planted round the free outline and cover the superior part of the dorsal face of the maxilla. A second group consists of short and rather stiff bristles planted close to the margin at which the two maxillae touch one another. The bristles on the basal part of the maxilla are long and delicate and form a third and much less dense group near the so-called olfactory orifice.

The cirri are but slightly curled; though the pedicels are rather long the shortness

of the rami causes the whole cirrus to be short. The first pair is placed near the mouth and at some distance from the second. Its rami are nearly equal and composed of five segments only. The first segment is very long, longer than the other four segments together and not quite distinctly composed of four or five short and broad segments soldered together. Segments 2—4 are of a very characteristic pentagonal shape, segment 5 is short, small, quadrangular. The slightly shorter ramus is at the same time a little narrower. It can be said to have one segment more than the longer ramus, as the last segment of those which are soldered together to form the first segment of the longer ramus has remained free in the shorter one. Each segment bears a broad group of long bristles on its outer surface; the first segment shows 4 or 5 such groups of bristles. The last segment has the bristles planted close to its extremity. On the inner surface the bristles are less numerous and not placed so regularly, on the outer segments they form a row near the extremity. Along the dorsal margin, each segment bears a long bristle planted slightly above the middle of its length.

The pedicel of the first cirrus is much shorter than that of the other cirri. The filamentary appendage is seated beneath the basal articulation of the first cirrus; it is long, conical and pointed at its extremity.

The 2nd cirrus has ten segments in both rami, the 3rd 11 in the shorter and 13 in the longer ramus; the 4th has 12 and 13 segments, the 5th and 6th 13 and 15 — at least these were the numbers in the specimen I investigated more carefully. The pedicels are long, the segments short, slightly longer only than broad. Each segment is protuberant at the anterior face, a little beneath the articulation with the following segment. On this protuberance is planted a dense brush of bristles; a transverse row of bristles is also inserted on the outer side near the extremity of each segment. In the upper segments these bristles have the character of thick and claw-like spines. On the inner side the bristles are less strong and also less numerous. They form distinct rows only on the upper segments.

The basal segment of each ramus is in most cirri indistinctly divided into two segments. Thus the 6th cirrus might as well be said to have 13 and 15 as 12 and 14 segments.

The caudal appendages are rather long and delicate. In one of the specimens I dissected the one consisted of 8, the other of 10 joints. In length they equal the pedicels of the 6th cirrus, the 10-jointed one being slightly longer. The basal segments are short and broad, the middle long and narrow, the upper very narrow, but not so long as the middle ones. The short and thin bristles are planted on the extremity of each segment, the terminal segment being furnished with a tuft of bristles.

The penis is thick and long, curled together in a curious way, tapering towards the extremity, where its end is indistinctly bilobed. The articulations are not very plain, yet the basal as well as the terminal portion can be said to be ringed, there being an intermediate part where the rings can hardly be distinguished. Very long and delicate hairs are scattered over the surface, forming a somewhat irregular tuft at the extremity in the little furrow between the two points or lobes.

The eggs are small and very numerous. I found a single lamella only. The eggs in the specimen I have investigated were far advanced in development: most of them contained

the Nauplii ready for hatching; these larvae showed no trace of pigment in the eyes. The greatest diameter of the egg is 0,22 mm.

The specimens taken by the "Siboga" were attached to stones and shells.

This species was collected at:

Stat. 260. December, 16 and 18, 1899. Lat. 5° 36'.5 S., Long. 132° 55'.2 E. Depth 90 m. Bottom: sand, coral and shells. [2,3 miles N. 63° W. from the north point of Nuhu Jaan, Key Islands].

General Remarks. This is an interesting species, forming a link between the species with quite normal rami in the 5th and 6th cirri and those in which the inner ramus of these cirri is quite rudimentary. The "Siboga" took four large and several smaller specimens of this species. I think it worth while to note, that the orifice of the capitulum, which is a narrow slit in the full-grown specimens, is broad and nearly circular in the small. In some regards this species seems to resemble *A. xenophorae* Annandale — a figure of that species might at once settle this question [1].

3. *Alepas lithotryae* n. sp. Pl. IX, fig. 5—8'.

Capitulum hardly distinct from peduncle, globular, with low and indistinct carinal crest. Orifice not protuberant, short and narrow. No scuta; the place these should occupy indicated as smooth patches of oval shape. The cirri of the 5th and 6th pair shorter than the foregoing ones. Inner ramus of the cirri of the 5th and 6th pair slightly shorter than the outer rami.

The capitulum of this species in some of the specimens almost insensibly slopes into the peduncle (Pl. IX, fig. 5), in others it is distinctly separated from the peduncle by a contraction. Its shape is globular, with the carinal margin strongly bowed; the orifice is narrow and relatively short, and is straight seen from the side; the occludent border beneath or behind the orifice is slightly convex. Along the carinal margin is seen a very low crest which continues along the peduncle. There is a reticulation of delicate striae all over the surface and deeper wrinkles occur near the orifice, being placed at right angles to its main axis. Neither striae nor wrinkles occur at a place of oval shape under or in front of the orifice, on both sides of the capitulum: these smooth places or patches probably represent the so-called horny scuta of some of the other species.

The peduncle is very short, its general shape is cylindrical. The surface is indistinctly ringed; on the one side (in the specimen figured, the left) the base of the peduncle forms a chitinous expansion with which the little body is attached to the surface of one of the valves of the *Lithotrya*.

Size. The length of the capitulum and the peduncle together is, in the largest specimen, about 4,5 mm., the length of the peduncle being about 1 mm. The other specimens are considerably smaller; the largest has been used for the description of the shape of the capitulum, as well as of the structure of the animal's body. It was not furnished with egg-lamellae, but to judge from the state of development of the ovary, it was full-grown, mature or nearly so.

[1] A figure is given in "Illustrations of the Zoology of the R. I. M. S. S. Investigator", Calcutta, 1907. I think ANNANDALE's *A. xenophorae* and my *A. intermedia* are different species. (Note added during press).

The study of the structure of the animal contained within the capitulum has yielded the following results:

Mouth. Labrum distinctly bowed with a row of about 30 rounded chitinous knobs at the place of the teeth and with a series of delicate hairs inserted in front of the knobs. Palpi short, broad at the base, conical with several bristles along the outer margin and a tuft of such bristles at the tip.

Mandibles (fig. 6) with three teeth and the inferior angle. The second and third tooth and the third tooth and the inferior angle at nearly equal distances from another, the first and second tooth at twice the distance of the other teeth. The inferior angle is slightly raised at its extremity and terminates in a not very pointed tooth, much ressembling the other three teeth. Very small, sharp spines occur along the upper edges of tooth 2 and 3, as also along the upper edge and along the under edge near the extremity of the inferior angle. Near the outer edge the surface of the mandible is furnished with numerous hairs which are placed in groups of two or three; some hairs reach over the free edge, numerous others are planted along the inferior margin.

Maxillae (fig. 7) with three strong spines above a rather broad notch and the part beneath the notch slightly produced. Between the three upper spines, of which the first is by far the strongest, a few delicate hairs are planted, one of which is distinctly serrated. In the notch are a few short hairs and about 10 rather strong spines, arranged in a double row along the lower part. Hairs in groups of two or three on the surface near the free edge; a row of stronger hairs along the inferior margin and a few hairs forming a group at the upper margin near the insertion of the upper spine. Apodeme rather long.

Outer maxillae short, rounded at the extremity with a dense tuft of spines near that extremity and along the inner side. Between the longer spines are inserted numerous very delicate hairs.

Cirri short and nearly straight, hardly curved. First pair very short, 2nd.—4th pair longer than the others, 5th and 6th pair considerably shorter than the foregoing ones.

First pair placed close to the mouth, at a little distance from the second, with short and rather unequal rami of 5 and 6 segments. The shorter ramus has the first segment indistinctly divided into two segments and the four following ones decreasing in dimension. Hairs on the segments numerous, increasing in strength from the first to the fifth segment; about the middle of its length each segment has a distinct transverse row of longer hairs. The last segment bears two claw-like spines at the tip. The longer ramus is considerably broader; it has six distinctly separated segments, decreasing in dimension from the 1st to the 6th. The lower are densely covered with hairs, the distal in a less degree. The last segment has four strong spines at the tip; these are not quite so strong and a little less curved than those at the tip of the shorter ramus.

The 2nd to 4th cirrus has nearly equal rami of 9 to 10 segments. The shape of the segments is almost quadrangular, with the exception of the first segment of each ramus, which is from 2 to 3 times as long as broad and of the last segment, which is small and rounded at the tip. The bristles form transverse rows near the extremity of each segment and a tuft

of more delicate bristles are placed about the middle of the slightly swollen, anterior margin of each segment. Of those arranged in a transverse row, to begin with the 4th or 5th segment, two or three are much thicker and stronger and have the shape of claw-like spines.

The 5th and 6th cirri are shorter than the foregoing ones, the 6th being not inconsiderably shorter than the 5th, the latter equalling about $^2/_3$rds the length of the cirrus of the 4th pair. The rami of the 6th pair (fig. 8) are slightly unequal and have respectively 7 and 9 segments. On the posterior margin of each segment, near the extremity, a group of spines are planted which correspond with the stronger ones of the transverse rows of spines of the segments of the 2nd—4th cirrus. From the 4th to the 8th segment two of these spines are claw-like and strong, the one, however, more so than the other. The last segment bears two claw-like spines at the tip.

Caudal appendages (fig. 8) thin, having five tapering segments, and being a little longer than the pedicels of the sixth cirrus. Delicate hairs are planted on the extremity of each segment, the last segment bearing on its summit a tuft of slightly longer hairs, the longest of which is nearly equal to the length of the segment itself.

Penis (fig. 8) rather thick, with the terminal part narrow and conical towards the extremity. The middle part is distinctly ringed. A few delicate hairs are scattered over its surface, a tuft of such hairs being planted close by the tip. On each ring of the annulated middle part a transverse row (fig. 8′) of short, broad spines of very peculiar shape is planted. They look like little hands with extremely short and pointed fingers. The number of these peculiar appendages is largest on the broadest segments, their maximum number upon one segment being 15.

The specimens of this species were found attached to the valves, partly to the outer, partly to the inner side of *Lithotrya nicobarica*. I observed from 2 to 7 specimens — most of them very small ones — attached to one *Lithotrya*. They must be a nuisance to the animal, especially when they are attached to the inner side of the valves; they feed, in all probability, on the same planktonic matter which the *Lithotrya* is trying to get hold of.

The *Lithotrya nicobarica* was collected at:

Stat. 225c. November 8, 1899. 2700 m. N. 185° E. from Southpoint of South Lucipara Island. Reef-exploration. Bottom: stone.

A small specimen of the same species was found attached to a specimen of *Lithotrya conica* n. sp. collected during the "Siboga" expedition at "Kur-Reef", a very small one to one of the specimens of *L. truncata*, collected at Haingsisi, Samau Island, Timor.

Observation. I think that this species comes close to *Alepas quadrata* Aurivillius. I consider and describe it as different, partly because the general shape is quite different, partly because it seems to live under quite different conditions, partly because the structure of the appendages of the animal's body does not agree with that of the species of Aurivillius. The short and straight cirri composed of 8—10 segments only are peculiar to the present species. The interesting small spines which cover the surface of the penis occur most probably also in *A. quadrata*. Aurivillius says (l. c. p. 32) that this organ is "hie und da mit rückwärts gerichteten Börstchen versehen". Perhaps there exists a certain relation between the one or both species and *Alepas malaysiana* described of late by Annandale.

4. *Alepas ovalis* n. sp. Pl. IV, fig. 17 and 18.

A single specimen of a species of the genus *Alepas* different from the known species was taken by H. M. S. "Siboga" at Station 267. According to the label the specimen was found attached to the spines of *Porocidaris elegans*, on which the specimens of *A. morula* were also found. It differs from that species at first sight 1^0 by its form which is more regularly rounded oval; 2^0 by the absence of the tubercles on the surface; 3^0 by the somewhat larger orifice of the capitulum; and 4^0 by the shorter and more cylindrical peduncle. When I received it, the specimen was no longer attached to the Echinid-spine (as was the case with the specimens of *A. morula*); so that the peduncle may have been longer in reality.....

The shape of the capitulum, the not very distinct crest at its carinal edge, the way in which the capitulum is separated from the peduncle can be best judged, I think, from the figures 17 and 18 of Pl. IV. The length of the capitulum and the peduncle together is nearly 11 mm., the capitulum alone measuring about 8 mm. Scuta absent or entirely hidden under the chitinous membrane.

The species to which this specimen belongs has no doubt a certain resemblance to *A. japonica* Auriv., but I do not believe it can be identical with it. Only dissection and full investigation of the parts of the mouth, the legs etc. might settle this — but I feel unable to do so without destroying the specimen.

The specimen was taken at:

Stat. 267. December 20, 1899. Lat. 5° 54′ S., Long. 132° 56′.7 E. Depth 984 m. Bottom: grey mud with a brown upper layer.

As I have pointed out already in the introduction to the genus *Alepas*, of all the known species this form, next to *A. Lankesteri*, inhabits the greatest depth. This is also one reason why I think identity with *A. japonica* highly improbable.

4. *Alepas tenuis* n. sp. Pl. IV, fig. 19.

Still another species of the genus *Alepas* is represented in the collection of H. M. S. "Siboga". There is again only one specimen and it is very small — whether full-grown or not I am unable to decide. It resembles *Alepas Lankesteri* Gruvel to a certain extent — yet it is much smaller and the resemblance might on closer examination turn out to be superficial only.

Like *Alepas Lankesteri* the capitulum is devoid of scuta and furnished with a continuous ridge extending from the orifice to the peduncle. I have figured the little animal (Pl. IV, fig. 19), the total length of which is 6,4 mm.; the figure will, I hope, enable this form to be recognised, should it again be found.

It was taken at:

Stat. 251. December 8, 1899. Lat. 5° 28′.4 S., Long. 132° 0′.2 E. Depth 204 m. Bottom: hard coral sand.

General Remark. I do not think it a good custom in general to describe such forms as novae species, of which it is impossible to give a full description for want of material. When discussing the geographical distribution and the bathymetric range of the known species of the

genus, for the sake of convenience names were also given to the two last mentioned forms. The number of known species of the genus *Alepas* not being very large and the species more or less recognisable from their outward shape, no confusion will arise I hope from my naming these two forms, deviating in so doing from what I consider a very good rule in general.

Genus **Microlepas** n. gen.

Capitulum without valves, with rather large and prominent aperture. Mandibles and maxillae foliaceous without teeth or stronger spines. Cirri of the first pair one-jointed without rami, those of the 2nd—6th pair with uniarticulate rami of very unequal size.

This cirripede resembles at first sight a species of *Alepas*; it cannot be considered as belonging to that genus, however, owing to the structure of its mouth-parts and cirri. Only one species of the genus is known; to give a more detailed description of the genus is useless and even dangerous, as it is quite impossible to decide what characters have generic and what specific value only. The only specimen of the species of this genus which is at my disposal was found by Prof. Max Weber attached to one of the spines of *Diadema saxatile* (Linn.) at Station 53. I propose to call the species:

1. *Microlepas diademae* n. gen., n. spec. Pl. X, Fig. 8—16.

Capitulum blending insensibly into the short peduncle, aperture oval, large, situated at some distance from the slightly produced summit. Peduncle indistinctly wrinkled.

Capitulum elongate-oval, moderately flattened (Pl. X, fig. 8); its summit bluntly pointed, forming a small conical excrescence in front of the orifice. The membrane composing the capitulum is thin, flexible, smooth on the left, longitudinally wrinkled on the right side. Orifice large, broadly oval with darker, brownish coloured margin. Peduncle short, blending insensibly into, but a little narrower than the capitulum; surface with an indication of transverse wrinkles.

The colour of the capitulum is light greyish-brown, but it has been in spirit for several years. The size is, including the peduncle, 5,6 mm.

The little animal's body was hanging out of the orifice of the capitulum, it was distorted and in a somewhat deteriorated condition. A piece of the sack or mantle was loosened from the inner side of the capitulum and also forced out of the orifice and a cluster of eggs was attached to this piece of mantle. The body was to some extent covered by these parts, so that I only succeeded in making out its structure by loosening it from the capitulum.

I found the mouth not very prominent and placed at a little distance from the first pair of cirri. The prosoma was well-developed, its muscles rather strong, the part of the body representing the thorax small, rather rudimentary.

Of the parts of the mouth, I found the labrum not distinctly bullate or swollen with a straight crest without distinct teeth and with small triangular palpi. The mandibles and the maxillae were relatively large, and extended beyond the labrum and the outer maxillae; they were of a very peculiar shape.

The mandibles (fig. 9) have no teeth but a smooth and rounded edge, along which are numerous very delicate hairs in several rows. Its inferior angle is acuminated and ends in a slightly stronger bristle, which however can hardly be called a spine.

The maxillae (fig. 10) have the edge also rounded, without steps separate from one another by notches and without stronger spines at the upper corner. Along the rounded edge numerous delicate hairs are inserted in several rows; the lowest corner has two slightly stronger bristles and another is seen at a little distance from it. A rather stout and not very long apodeme is attached to the maxilla. Both maxilla and mandible are thin and delicate, their extremities reaching beyond the tip of the mouth on the whole.

Outer maxillae (fig. 11) represented by very small rounded structures with delicate hairs along their inner surface and at the tip. A group of apparently stronger hairs on a little rounded excrescence near the summit — these hairs, however, were all broken off.

First pair of cirri (fig. 12) quite rudimentary, represented by a one-jointed conical limb with a few short hairs at the tip.

Second-sixth cirrus (fig. 13—15) of about the same structure: each consisting of a two-jointed pedicel and two rami, each of which is represented by a single segment only, the one however about twice as long and more than twice as broad as the other. The cirrus of the second pair has the lower segment of the pedicel shorter and the upper longer, the third cirrus has about the same structure; in the 4^{th}—6^{th} cirrus, however, the two segments of the pedicel are of about the same length. In all the cirri a number (4—6) of stronger hairs are planted on the pedicel at the base of the segment which represents the stronger ramus, and another group of even longer and stouter hairs at the base of the more rudimentary ramus. Both rami bear at their rather broad, truncated extremity a dense tuft of very thin and delicate hairs which are irregularly curled, of very unequal length but altogether rather long. As a rule a separate group of hairs is inserted at or near the extremity of the stronger ramus, near its extremity. Such a separate tuft of slender hairs is also observed on the inner side near the extremity of the segment representing the smaller ramus.

The cellular (plasmatic) contents with muscles and nerves have shrunk from the chitinous surface of the legs of the animal, due probably to the alcohol in which it was kept. The hairs are seen through the chitinous covering standing with their plasmatic contents in communication with the contents of the leg itself. The contents are distinctly denser and darker coloured near the extremity where the hairs seem to take their origin.

Caudal appendages not observed, most probably wanting.

Penis (fig. 15) rather broad, short, not extending beyond the extremity of the cirri of the 6^{th} pair, truncated at the extremity where it bears a tuft of short hairs. Numerous very short hairs scattered over its surface.

The little animal was sexually well-developed and provided with ovigerous lamellae, which, however, had not the shape of leaves but rather of clusters of irregular shape in which the eggs formed several layers. As I described above, one of these clusters had been forced out of the sack of the animal, the other being still seen in the cavity. The eggs are numerous and small. They have an elongated form, at least in the highly developed

condition I observed them in (fig. 16). Their size was: long 0,26—0,28 mm., shortest diameter about 0,1 mm.

This species is represented by one specimen only. It was found attached to the extremity of spine of *Diadema saxatile* (Linn.) collected by H. M. S. "Siboga" at:

Stat. 53. April 21—22. Depth up to 36 m. Bay of Nangamessi, Sumba.

I was at the end of the description of the pedunculate Cirripedia collected by H. M. S. "Siboga" when I received this small and very curious form. I consider it so very interesting, that, though it is represented by one specimen only, I describe it as a new species. This compels me, however, to create for it a new genus also, as it is perfectly impossible to range the species under one of the existing genera. I am sorry to say that in consequence of its being represented by only one specimen, which is moreover slightly deteriorated, it has not been possible to study this new form in such detail as could have been desirable. Having dissected numerous and very small forms of Crrripedia, I think it hardly possible that I should mistake another part for a mandible or should overlook a pair of cirri, but the very peculiar shape of these parts in the present animal have, I must confess, given me great trouble. I should have prefered, before publishing a description, to control the details of its structure with the aid of a richer material — I have tried in vain, however, to procure such.

The outer shape of the capitulum of this new form is much like that of *Alepas*. I could not study the muscles of the peduncle in order to see whether they run up from the peduncle and surround the capitulum — as is the case in *Alepas* — without quite destroying the type. But I think it probable that there is correspondence in this regard also between the two genera. In *Alepas cornuta* the inner rami of the 5th and 6th cirri are rudimentary, as was discovered by Darwin, and in some other species of the same genus a similar inequality has been observed. Gruvel calls this the atrophy of one of the rami: the cirri of *Microlepas diademae* show this atrophy in both rami and to a much greater extent! The cirri of *Anelasma* have, according to Darwin, a shapeless and rudimentary appearance, being quite spineless, and not articulated. Yet their anterior faces are more or less distinctly lobed, so that prominent steps can "be counted, manifestly representing so many segments", as Darwin says. Though the cirri of *Microlepas diadema* are furnished with long hairy bristles, they are in a much more rudimentary condition than those of *Anelasma*. In the genus *Gymnolepas*, as described by Aurivillius, all the cirri have the rami of the same length, composed of 7 segments only; these rami in all the cirri are almost of the same length as their pedicels — whereas those of the 2nd—6th pair in all other Lepadids are longer than those of the first pair and as a rule twice as long as their pedicels or even longer. Aurivillius compares his new genus with *Anelasma* and says that a reduction of all the cirri has occurred in these two genera. There can be no doubt, I think, that a much more considerable reduction has occurred in *Microlepas diademae*!

The parts of the mouth show an analogous reduction. So far as I know, all pedunculate Cirripedia have mandibles with at least two, as a rule three or four, in some genera more

(to ten), strong teeth in a single row; they are always by far the strongest pair of parts in the mouth, being generally about double the size of the maxillae. Now the mandibles of *Microlepas diademae* have no teeth whatever, the inferior angle only being furnished with a somewhat stronger spine than those which are planted along the free edge; further, the mandible of this Cirriped can hardly be said to be larger than the maxilla. The latter in all other Cirripedia has larger spines at the upper corner and numerous more or less strong spines along the edge: in *Microlepas diademae* it has the edge regularly curved and furnished with several rows of extremely delicate hairs — its inferior angle showing a slightly stronger spine-like hair, another being inserted at a little distance from that angle.

The extremely rudimentary condition of the first pair of cirri and the fact that caudal appendages are wanting complete the description of a pedunculate Cirriped, which so far as the structure of the body with its articulate limbs is concerned, must be considered as one of the most reduced at present known. This reduction concerns the body of the little animal only — the capitulum gives at least the impression of being that of an ordinary *Alepas*. It is of course very difficult to understand how such an exceptional reduction has taken place and the circumstance that I am quite ignorant of the mode of life of *Diadema saxatile* makes it perfectly hopeless to seek for an explanation. I do not know, for instance, what position the club-shaped spine, at the tip of which our *Microlepas* was placed, occupies on the body of the Echinid, whether this spine is highly moveable etc. There is every reason to think, that the reduction of the limbs, parts of the mouth and cirri, is in accordance with the nature of the food and the way in which this is grasped by the little animal — I do not know, however, what difference there is between its prey and that of other Cirripedia. We are therefore unable to explain the physiological side of the phenomenon; its morphological importance lies in the high degree of reduction and in the fact, that — so far at least as our present knowledge goes — no real intermediate forms can be said to occur which could bridge over the gap between an ordinary *Alepas* and this cripple-like form.

Genus **Ibla** Leach

The Cirripeds of the genus *Ibla* are characterized by the absence of calcareous matter in the valves and spines of the peduncle, by the presence of four valves (two scuta and two terga), as also by the fact that (in the one of the known species) the sexes are separated, or that (in the other species) the "masculine efficiency is aided by one or two complemental males" (Darwin).

Of this genus two species were known to Darwin in 1851. Since that year no new species have been described, nor have the original species of Darwin been often met with. In his list of 1897 Weltner[1] mentions the occurrence of *Ibla Cumingi* Darwin in the Red Sea, in the neighbourhood of the Philippines and at Zamboanga (also Philippines), and of *Ibla quadrivalvis* (Cuvier) at Van Diemensland. Of the latter species Gruvel[2] found numerous specimens

[1] Weltner, W., Verzeichnis u. s. w. Archiv f. Naturg. 1897, Bd I.

[2] Gruvel, A., Révision des Cirripèdes appartenant à la collection du Muséum d'histoire naturelle. Nouv. archiv. du Muséum (4), IV, 1903.

(full-grown and young) in the collection of the Paris Natural History Museum: they were from "Port du Roi Georges" (King George Sound, West-Australia?), from Djibouti, from the east-coast of Madagascar and from Mascatte. In both papers published by GRUVEL [1] he treats the genus *Ibla* rather extensively, but any newer literature on this genus seems not to be known to him either.

During the cruise of H. M. S. "Siboga" specimens of *Ibla*-species were collected at different places in the Malay Archipelago. They belong to two different species: *I. Cumingi* and another which is different from the two known from DARWIN's Monograph. It comes near to *I. Cumingi* and is unisexual like that species; like both hitherto known species it is a true littoral form. All the specimens collected by the "Siboga" were met with during reef- or shore-exploration.

To distinguish the species I give the following table:

Ibla

1. Hermaphrodite with complemental male (or males). . . . . *I. quadrivalvis* (Cuvier).
2. Unisexual with dwarfed males.
   a. Valves of the female coloured blue along the lateral margins and on the upper interior surface. . . . . *I. Cumingi* Darwin.
   b. Valves without blue margins . . . . . *I. sibogae* n. sp.

1. *Ibla Cumingi* Darwin.

DARWIN found the specimens of this species "invariably attached to the peduncle of *Pollicipes mitella*, in groups of two or three together". The "Siboga" collected *Pollicipes mitella* on two different occasions: at Labuan Badjo (Flores) and in the southern part of Molo Strait. *Ibla Cumingi* was found attached to two of the specimens from the latter place.

The specimens are not very numerous, nor are they very large. They not only show the blue margins of the valves, but the structure of the body, of the parts of the mouth, the cirri and the caudal appendages corresponds with DARWIN's description.

In the collections made during the "Siboga's" cruise there is another group of specimens which I consider belong also to this species. They were taken however from the reef in Palos-Bay, Celebes, and were not found attached to the peduncle of *Pollicipes mitella*. Their valves have blue margins and the structure of the parts of the mouth and of the limbs is much the same as in the specimens found at Labuan Badjo.

(WELTNER (l. c.) mentions the occurrence of this species in the Red Sea; as *Pollicipes mitella* is not known to occur there, this seems to be another instance of this species not living "invariably" attached to the other Cirriped.)

In all the specimens I dissected I found, at the place indicated by DARWIN, a little male. DARWIN's description of these males is detailed and on the whole correct so I need not repeat it here. A full description of the (complemental) males of *Ibla quadrivalvis* is given moreover

[1] GRUVEL, A., Cirripèdes des expéditions scientifiques du "Travailleur" et du "Talisman". Paris, 1902.

by GRUVEL[1] and in most regards this holds good also for the male of *Ibla Cumingi*. There is however one detail which I found different from DARWIN's description. DARWIN speaks of an imbedded portion of the peduncle of the little male passing obliquely through the chitine membrane and corium lining the sack of the female, and running along amidst the underlying muscles and inosculating fibrous tissue, attached to them by cement at the extremity. I have always found the little male attached to the wall of the sack by means of a disc of cement, but I could not observe that it passed through that wall. I think that the description given by GRUVEL, where he says (for *Ibla quadrivalvis*) that the mantle (DARWIN's "sack") sometimes forms a proliferation, through the centre of which passes the extremity of the peduncle of the male, explains what has been observed by DARWIN. According to GRUVEL the tubular part of the male "s'enfonce dans le manteau de l'hôte". This means, I think, that the mantle forms an invagination to receive the extremity of the tubular part, not that this passes through it to meet with the muscles of the female's or hermaphrodite's peduncle.

This species was collected at the following places:

Stat. 51. April 19, 1899. Shore-exploration in Madura Bay and other localities in the southern part of Molo Strait. A few small specimens attached to *Pollicipes mitella*.

Stat. 86. June 18—19, 1899. Reef-exploration Dongala, Palos Bay, Celebes. Specimens loose, i. e. not attached to *Pollicipes mitella*. (N.B. No specimens of *Pollicipes* were collected at Station 86).

2. *Ibla sibogae* n. sp. Pl. IV, fig. 20—22. Pl. V, fig. 1—8.

Female. Valves of a uniform dirty brown or red brown colour — no blue, neither along the lateral margins nor on the upper interior surface. Spines on the peduncle without blueish brown rings. Caudal appendages only slightly longer than the pedicels of the sixth cirrus; rami of the first cirrus unequal by 2—5 (as a rule 4) segments.

Male. Closely resembling that of *I. Cumingi* Darwin.

This species is unisexual like *I. Cumingi* Darwin, which it also resembles in many other regards. The absence of the blue colour, together with a few slight differences I perceived in the structure of the parts of the mouth, the cirri and caudal appendages, as also the circumstance that *I. Cumingi* lives attached to *Pollicipes mitella* as a rule, made it necessary to consider the present form as a different species. Later investigation of a richer and if possible quite fresh or living material of both forms may show however that they are not specifically different but only represent two varieties of one species.

Female

The animals are somewhat variable in shape, that part of the peduncle to which the capitulum is attached and which as a rule is considerably broader than the inferior part, sometimes forming an abrupt swelling and sometimes quite insensibly sloping into the inferior part. In other specimens there is a distinct constriction beneath the broader part, almost in the middle of the

[1] GRUVEL, A., Cirripèdes des expéditions scientifiques du "Travailleur" et du "Talisman". Paris, 1902.

peduncle. In a few · probably younger — specimens the peduncle is nearly cylindrical or compressed cylindrical.

The colour of the animals is sometimes red-brown (e. g. in specimens from the Bay of Bima) sometimes dirty brown (specimens from Kwadang Bay, Pajunga Island, for example). The swollen part of the peduncle is as a rule darker coloured than the inferior part, and darker also than the valves. In some of the specimens the valves have slightly darker margins, the dark colour having however a blackish-brown, not a blueish tinge.

The spines or horns of chitin which thickly clothe the superior part of the peduncle are "nearly cylindrical, irregularly curled, and nodose or slightly enlarged at intervals: the apex smooth and pointed; the exterior surface longitudinally and finely ribbed" — exactly as DARWIN says they are in *I. Cumingi*. But whereas he says, that those of the latter species are "ringed with pale and dark blueish brown, which on pressure becomes slightly opalescent with pale blue and fiery red", those of *I. sibogae* never show a trace of blue and are always yellow- or brownish-yellow coloured.

The shape of the valves corresponds in general with the description given by DARWIN of the valves of *I. Cumingi*. The tips of the valves, of the terga especially, are often broken off and their exact shape is difficult to make out in consequence. The scuta have the outer surface much more plainly marked by zones of growth than the terga. The valves are longitudinally ribbed, the delicate ribs seem to correspond to those of the horns on the surface of the peduncle in distance from one another as well as in delicacy.

Fig. 21, A and B of Pl. IV show the internal surfaces of the valves after being cleaned with caustic potash. When not separated the scutum (A) at the outer side overlaps a portion of the tergum B, so that the scutal margin of the tergum (from *c* to *d* in the figure) reaches as far as the pointed line to the left side of A. What DARWIN calls the growing or corium-covered surfaces of the valves, the parts covered with epithelium, are easily to be distinguished from the free horn-like portions. In the scutum this part is triangular but it is not of the same length as the horn-like portion, as DARWIN says it is in the scutum of *I. Cumingi*, but considerably shorter. In the tergum the growing part is of an irregular diamond shape. The chitinous structure of both valves is very characteristic: the figures 21 A and B try to give an idea of it. The crest running from the summit of the triangular portion to the tip of the scutum, with the short lateral branches directed towards the occludent margin of the valve, seems slightly more developed in *I. sibogae* than in *I. Cumingi*.

The shape of the body and the structure of the limbs in general is the same as with *I. Cumingi*. As in that species the chitinous covering of the prosoma bears very delicate, pointed hairs. I wish to point out the following, perhaps not very important differences for the parts of the mouth and the other limbs.

Mouth. The labrum has from 3—7 small nob-like teeth: in younger specimens 3 or 4 only, in one of the older ones 6, in another 7. Between these nobs short and extremely delicate hairs are planted. DARWIN says that there are no teeth on the crest of the labrum in *I. Cumingi* and that the same part in *I. quadrivalvis* is "a little roughened with minute points". Now the teeth of the labrum of *I. sibogae* are hardly more than minute points; I may add

that I observed them also on the crest of the labrum in one of the specimens of *I. Cumingi* from Station 86 (Pl. IV, fig. 22).

The palpi of the labrum are small, rounded at their ends; the hairs on the palpi form a not very dense tuft at the extremity, those on the palpi of both sides hardly touching one another when in the natural position. The outer margin bears a row of extremely minute hairs.

Mandibles. In one of the specimens from Station 47 the upper edge of the second tooth was not pectinated. The inferior angle is only slightly produced in all the mandibles I investigated; it is pectinated as figured (fig. 22*a*).

Maxillae (Pl. V, fig. 1). Edge very indistinctly indented; it supports, besides the three upper large spines, a number of moderately strong spines, which can hardly be divided into stronger and more delicate ones. Maxillae small, apodeme short.

The shape of the outer maxillae (fig. 2), of the conical prominence clothed with bristles and coloured purple lying over the infra-oesophageal ganglion between the bases of the first pair of cirri, corresponds exactly with DARWIN's description of the same parts in *I. Cumingi*.

Cirri. The first cirrus has the rami unequal in length by from 2 to 5 segments, by about two segments in *I. Cumingi*, according to DARWIN. I dissected in all six specimens of *I. sibogae* and I found the following numbers of segments for the first cirrus: 21—17, 20—16, 17—14, 17—13, 17—12 and 14—12. These numbers show greater variety than is the case in most other Lepadids.

(In a specimen of *I. Cumingi* I found a difference of 5 segments in the first pair of cirri, in another of 3 segments).

The other cirri conform in general to DARWIN's description of *I. Cumingi*. Investigating carefully the arrangement of the bristles on the segments of the sixth cirrus, I found very often on the anterior surface not three pairs of spines, the lowest pair being minute, but four pairs, three of which were stronger, the fourth very delicate. A number of segments showed this arrangement, others on the same cirrus the three pairs as described by DARWIN for *I. Cumingi*. (On the 6th cirrus of a specimen of *I. Cumingi* collected at Station 86 I also found four pairs of bristles on some of the segments — however, the number of segments showing this arrangement was very small).

The caudal appendages have from 17 to 13 segments. The upper segments which in *I. Cumingi* "are slightly constricted round the middle, so that they resemble in a small degree an hour-glass" (DARWIN), in *I. sibogae* do not show the hour-glass shape as a rule. In some specimens the two last joints show a trace of that peculiar shape, which I found distinctly developed in the last six segments of the caudal appendages of specimens of *I. Cumingi*. As in this species the caudal appendages of *I. sibogae* are as long as or slightly longer than the pedicels of the sixth cirrus.

The egg-lamellae are not very large, nor is the number of eggs in each lamella: a lamella contains one layer of eggs only, in that of a medium-sized specimen from Station 61 I counted about 240 eggs. In each lamella the eggs are kept together by an extremely delicate and clear membrane, which surrounds each egg as a capsule. At one place the margin of

the membrane forms an irregularly folded thickening by means of which the lamella is attached to the wall of the sack and which therefore represents DARWIN's "ovigerous frenum".

The eggs are not spherical (as those of *I. quadrivalvis*, according to DARWIN) but oval, the proportion of the longest to the shortest diameter being in one case as 40 to 34, in another as 40 to 30. The size of the eggs was found to be different in different specimens: the larger females probably producing larger eggs. The eggs of a small female from Labuan Badjo (West coast of Flores) measured 0,14 × 0,1 mm.; development was only beginning. A larger female taken from the corals of the island of Billiton contained eggs of 0,21 × 0,16 mm.; these eggs showed the larva nearly quite developed, with the black Nauplius-eye, the three pairs of legs etc.

(DARWIN does not give the size of the eggs for *I. Cumingi*; one of the specimens of that species collected in Molo Strait was furnished with egg-lamellae. The eggs had the same shape as those of *I. sibogae*. Their greatest and shortest diameters measured 0,18 and 0,13 mm.)

The size of the specimens is as variable as their shape. The larger specimens from the different Stations have a length from 17,5—10 mm. The longest specimens are rather narrow: thus the specimen of 17,5 mm. in length is nowhere broader than 4 mm. and its breadth measures 2,3 mm. where narrowest. The stoutest specimen of all had a length of about 14 mm., its breadth being 6,5 to 7 mm. in the upper part and in the inferior part of the peduncle it was nowhere narrower than 5 mm.

A few of the specimens are attached to little pieces of stone, in one case two, in another four being situated on different sides of one stone. A few were found attached to a piece of broken shell of a Balanid. Most of them, however, are quite loose. The inferior extremity of the peduncle forms a flat disc in numerous specimens, and it is with this disc that the animal is cemented to the stones or other objects on the bottom of the sea.

Males

I opened a dozen specimens of the females of *I. sibogae* and found with a few exceptions only one or two males attached to the wall of the sack. They were of very different size and development: as a rule they were small and immature, in two cases I found them relatively large and undoubtedly full-grown. But even in the latter cases I found a considerable difference in size between the two males attached to the same female. The figure 20 of Pl. IV shows two larger males as they were found *in situ*; whereas the larger has a length of about 3,5 mm., the other measures only 2,5 mm. The other full-grown couple of specimens showed about the same proportions and dimensions.

The immature or not quite mature specimens varied in size from 1,1 to 1,4 mm., one of them measuring only 1,8 mm. The latter showed the testes in nearly quite developed condition. Males of 1,4 mm. were in several cases found attached to the sack of a female which was provided with ovigerous lamellae.

The number of males attached to a female is as a rule two; they are found attached to different parts of the interior wall of the sack, but seldom at the place where DARWIN found the little male of *I. Cumingi*, viz. "in a nearly central line, at the rostral end". I found them

as a rule more to the left and at the bottom of the sack. When two were present (Pl. IV, fig. 20) they were so placed that the anterior portion of the one touched the posterior end of the other. I never observed that a much constricted part of the males passed through the skin (sack or mantle) of the female; there is as a rule a thickening of cement round about the base of the peduncle. The extremity of the peduncle with its cement-ducts passes through this cushion of cement, but I never observed that it also went through the wall of the sack (or mantle).

The figures 3—8 of Pl. V are drawn from a male of 3,5 mm. DARWIN calls the part in front of the oblique fold the thorax, the rest the peduncle of the animal. The thorax supports two pairs of rudimentary cirri and, more to the so-called ventral side, the parts of the mouth. The labrum is very broad with a nearly straight edge and small palpi. The latter have a few short bristles or hairs at their pointed extremity. The mandibles have three teeth, more diverging than in the females; the inferior edge is quite undeveloped: a mere nob with a rudimentary point or spine at the extremity. The maxillae show the three upper spines and two more spines at the inferior end of the edge separated by a notch from the upper spines. The two stand at a little distance from one another and are considerably shorter than the upper spines, two of which are again stronger than the third which is planted between the two. The outer maxillae are relatively large; they show a row of small bristles along the curved outer side, they have the so-called olfactory orifices at the end of flat tubular processes, exactly as in the female and just as already described by DARWIN.

The two pairs of limbs which represent the cirri have one ramus only. DARWIN concluded from the position of the excretory orifices (genital porus and anus) that these cirri answer to the fifth and sixth pair in other Cirripedes — but this view is not supported by the circumstance, that I observed a rudimentary capsule in the basal segment of the first pair (in a small specimen of 1,4 mm.), much resembling the so-called auditory sack. Hence I would conclude that the first leg represented the first cirrus of an ordinary Cirriped.

These legs vary much in size and are often represented by one- or two-jointed rudiments only, either on one or on both sides of the same individual. I found them relatively large, the first pair composed of 5, the second of 6 segments, in the 2,5 mm. long specimen which accompanied the 3,5 mm. male of figure 3. In the largest of the two (the front part of which is figured Pl. V, fig. 4) the basal segment which according to DARWIN represents the pedicel of the cirrus, and which is beautifully pigmented with brownish purple, was very large in the one cirrus as well as in the other. The anterior cirrus which was smaller than the posterior and planted a little lower down on the thorax had four segments besides the basal one; the posterior cirrus or leg had the same number, the terminal segment being moreover indistinctly divided into two segments. Little brushes of spines are planted on the edges of the segments, slightly more prominent towards the dorsal side.

In the fig. 4 of Pl. V I have indicated the free edge of the thorax as seen through the basal segment of the last cirrus. Following that edge behind the last pair of cirri we see that it forms a round excrescence: a rather stout papillus, which projects freely at the so-called dorsal side of the body. This papillus most probably represents the penis — I would say so with greater emphasis, if I had been successful in discovering the genital porus at its surface

or free extremity — but this is not the case. In the other larger (nearly full-grown) specimen I have investigated, I did not observe this papilla or, better perhaps, excrescence. In two of them I observed the two closely approximate, flattened points mentioned by DARWIN as being present between the bases of the last cirrus. These are considered by DARWIN as the caudal appendages in an extremely rudimentary condition; close outside these rudimentary points on a slight swelling is the anus, according to DARWIN. I need hardly point out that the excrescence as figured by me would not be called a slight swelling by DARWIN. I may add that I could distinguish a small porus behind this excrescence, between it and the free projecting part of the oblique fold — whether this porus really represents the anus I have not been able to make out.

It is not the place here to enter into more details with regard to the anatomy of this little male. With the material at my disposal it would hardly have been possible to penetrate much farther into the mysteries of its structure than DARWIN did by dissection and GRUVEL (l. c.) by applying the more modern method of cutting sections. There are several points of great interest connected with these males — I think they will offer a very fruitful subject of research to the zoologist who studies their anatomy as well as their biology at the place where he finds them on the coral-reefs.

An important point yet to be made out is their metamorphosis. They pass no doubt through a Cypris-stage; but the youngest stage observed by GRUVEL in all essential points — but for its immatureness — resembles the grown-up male. DARWIN observed the larvae of *I. quadrivalvis* in this stage and distinctly saw "all the essential points of structure in the larvae of other Cirripedes at this stage" but he did not observe the metamorphosis itself.

Another essential point would be to determine whether or not these little males feed independently. DARWIN supposes that the male *Ibla* seizes its prey with its mouth through the movement of its long flexible body and I cannot understand how it would do otherwise! But GRUVEL seems to admit that the male lives parasitically on the female: derives its nutriment from the much bigger female. He came to that conclusion from the fact that the wall of the stomach is not furnished with calyciform cells, that he could not find a trace of digestive glands and that the stomach of the specimens he investigated did not contain food. But taking into consideration the perfectly well-developed mouth parts, the long oesophagus, the rather large stomach I think it difficult to share GRUVEL's opinion in this regard. How could they take nutriment, if not with their mouth or digest it if not with their alimentary canal? The body and all its appendages are covered with chitin; the only direct attachment to the wall of the female is originally by means of the prehensile antennae, the cement glands situated in the undermost part of the peduncle afterwards secreting quite a cushion or ball of cement which imbeds these antennae. I need hardly say that from that side no food can enter the body of the male.

I found the structure of the cement-glands, -ducts etc., as also that of the male genital organs, the more or less compact globular balls composing the testicles and the double pear-shaped vesiculae seminales in accordance with DARWIN's and GRUVEL's descriptions — these parts may be considered as well known. Perhaps the nervous system is not so well known as yet. GRUVEL describes two ganglionic masses, the one lying dorsally from the alimentary canal and representing the cerebral (supra-oesophageal) ganglion; the other lying ventrally from the

rectum between the two ductus ejaculatorii. He could not make out the chords ("connectifs") uniting the one ganglion with the other, but he admits that such nervous chords exist. I did not observe them either, but I found that a rather large ganglion is situated between the eye and the wall of the stomach, so that the eye nearly rests on or against this ganglion. From this ganglion (the optic ganglion?), which seen laterally as in fig. 3 of Pl. V is oval, but which is broadly heart-shaped when seen from above, two very distinct nerves run, as may be supposed but could not be made out, to the cerebral ganglion.

The "Siboga" collected this species at the following places and stations:

Stat. 19. March 19—21, 1899. Bay of Labuan Tring, west coast of Lombok. On shore.
Stat. 47. April 8—12, 1899. Bay of Bima. On shore.
Stat. 50. April 16—18, 1899. Bay of Labuan Badjo, West coast of Flores. On shore.
Stat. 115. July 9—11, 1899. East Side of Pajunga Island. Kwandang Bay. On the reef.

[N.B. Dr. C. Ph. Sluiter sent me, about 1884, specimens of an *Ibla* found by him at Tandjong Pandan (Billiton) on corals which belong undoubtedly to this species.]

Genus **Scalpellum** Leach

Of all the known genera of Cirripedia this is the richest in species. In his Monographie des Cirrhipèdes of 1905 Gruvel distinguishes in all 93 species of *Scalpellum* — that this number by no means includes all the existing forms is proved by the collection of the "Siboga". It contains 38 species of this genus and 32 of these have not been described before.

This augmentation seems especially considerable, if we take into consideration the relatively small area that has been explored by the Dutch man-of-war: all these new species were collected within the Malay Archipelago.

The number of species of the present genus hitherto known with certainty as occurring in that archipelago was sixteen, viz.:

Sc. villosum Leach. Eastern Seas (Darwin) (? India, Timor, New Holland).
Sc. trispinosum Hoek. Philippine Archipelago.
Sc. rostratum Darwin. Philippine Archipelago.
Sc. compressum Hoek. Between Celebes and Sangir Islands.
Sc. album Hoek. North of Karakelang, Talaut Islands.
Sc. hirsutum Hoek. West of Batjan, East of Celebes.
Sc. rubrum Hoek. Philippine Archipelago.
Sc. truncatum Hoek. Between New Guinea and Australia, East of Cook Peninsula.
Sc. moluccanum Hoek. South of Ceram.
Sc. australicum Hoek. Between New Guinea and Australia, East of Cook Peninsula.
Sc. distinctum Hoek. North of New Guinea, eastern half.
Sc. indicum Hoek. Kei Islands.
Sc. dubium Hoek. Between New Guinea and Australia, East of Cook Peninsula.
Sc. balanoides Hoek. Kei Islands.
Sc. marginatum Hoek. } North of New Guinea, western half.
Sc. ovatum Hoek. }

As 17th species *Sc. rutilum* Darwin might be added to this list. DARWIN says of this species that its habitat is unknown and adds: associated with *Dichelaspis orthogonia*. As the latter species was collected at three different Stations in the Malay Archipelago, I think it probable that *Sc. rutilum* belongs also to the fauna of this region. H. M. S. "Siboga" collected specimens of three of these species, viz. *Sc. rostratum* Darwin, which was taken at four different Stations and seems to be rather a common form in these seas; *Sc. distinctum* Hoek, taken at two stations and *Sc. moluccanum* Hoek, which was only collected once. The other 35 species have been collected in the Malay Archipelago by the "Siboga" for the first time. Two of these, however, had been observed before outside that Archipelago: *Sc. Peroni* (Gray) was taken by the "Siboga" near the Jedan Islands and was known already from the Swan River, Australia and from Port Western, Bass Straits; *Sc. acutum* Hoek, collected by the "Siboga" at three different Stations in the Malay Archipelago, was taken by the "Challenger" in the Atlantic near the Azores and in the Pacific, near the Kermadec Islands. One of the species of *Scalpellum* collected by the "Siboga" closely resembles a species (*Sc. Stearnsi* Pilsbry) occurring in the Japan Sea: this form is described later as a variety of PILSBRY's species. Thirty two species remain which I have been obliged to consider as new species.

The following list contains the species collected during the cruise of H. M. S. "Siboga", with the places were they were collected and the number of the Station, arranged according to the depth at which they occurred:

Sc. Peroni (Gray)	Jedan Islands	(274)	
Sc. rostratum Darwin	Bay of Bima, Sumbawa; North of Buton; West of Saleyer; South of Timor	47, 204 213, 294	13—94 m.
Sc. pollicipedoides n. sp.	East of Kei Islands	274	57 m.
Sc. aries n. sp.	North of Buton	204	75—94 m.
Sc. uncus n. sp.	South-coast of Timor; Bay of Bima, Sumbawa	285, 47b	34, 296 m.
Sc. imbricatum n. sp.	Near Kei Islands	251	204 m.
Sc. diota n. sp.	Near Kei Islands	251	204 m.
Sc. candidum n. sp.	Near Kei Islands	251	204 m.
Sc. Stearnsi Pilsbry, var. *robusta* n. var.	Near Kei Islands; Madura-Sea West of Makassar; Kei Islands	5, 74 251, 254	204—450 m.
Sc. hamulus n. sp.	Kei Islands	256	397 m.
Sc. polymorphum n. sp.	Kei Islands; North of Sumbawa	256, 45	397, 794 m.
Sc. praeceps n. sp.	Between Halmaheira and New Guinea	159	411 m.
Sc. pellicatum n. sp.	Kei Islands; East of Borneo	256, 94	397, 450 m.
Sc. fissum n. sp.	West of Halmaheira; South of Celebes	137, 212	462, 472 m.
Sc. proclive n. sp.	Near Palos Bay, Celebes	87	655 m.
Sc. deforme n. sp.	Near Palos Bay, Celebes	87	655 m.
Sc. curiosum n. sp.	North of Sumbawa	45	794 m.
Sc. crinitum n. sp.	North of Sumbawa	45	794 m.
Sc. incertum n. sp.	Between Kofiau and New Guinea	161	798 m.
Sc. chitinosum n. sp.	North of Sumbawa; West of Aru Island	45, 271	794, 1788 m.
Sc. poculum n. sp.	Near Rotti, South of Timor	300	918 m.
Sc. javanicum n. sp.	North of Bali	18	1018 m.
Sc. humile n. sp.	East of Saleyer	211	1158 m.

Sc. gracile n. sp.	East of Saleyer	211	1158 m.
Sc. acutum Hoek	Between Gebé Island and Waigeu Island; . .	151,	845,
	East of Saleyer; North of Celebes	211, 122	1158, 1264 m.
Sc. sessile n. sp.	South of Ceram	241	1570 m.
Sc. formosum n. sp.	South of Ceram; South of Ambon	241, 227	1570, 2081 m.
Sc. inflatum n. sp.	West of Aru Island	271	1788 m.
Sc. moluccanum Hoek	West of Aru Island	271	1788 m.
Sc. elegans n. sp.	West of Buton Island	208	1886 m.
Sc. distinctum Hoek	Northern entrance of Strait of Macassar; . . .	88,	1300,
	West of Buton Island; between Ceram and Misool.	208, 175	1886, 1914 m.
Sc. ciliatum n. sp.	South of Ambon	227	2081 m.
Sc. virgatum n. sp.	South of Timor	295	2050 m.
Sc. arcuatum n. sp.	South of Timor	295	2050 m.
Sc. trapezoideum n. sp.	South of Celebes	214	2796 m.
Sc. sculptum n. sp.	Banda Sea	221	2798 m.
Sc. hexagonum n. sp.	Banda Sea	221	2798 m.
Sc. discolor n. sp.	Banda Sea	221	2798 m.

38 species of *Scalpellum* were thus taken at 32 Stations; two of them (*Sc. rostratum* Darwin and *Sc. Stearnsi* Pilsbry, var. *robusta* n. var.) were collected each at four different Stations; two of them (*Sc. acutum* Hoek and *Sc. distinctum* Hoek) were taken each at three different Stations; six of them (*Sc. uncus*, *Sc. polymorphum*, *Sc. pellicatum*, *Sc. fissum*, *Sc. chitinosum* and *Sc. formosum*) were collected each at two different Stations; all the others (28 species in all) were collected only once. Some of the Stations yielded several species of *Scalpellum*:

at Stat. 45, Lat. 7° 24′ S. and Long. 118° 15′.2 E. Depth 794 m. Bottom: fine grey mud, with some Radiolariae and Diatoms, four species of *Scalpellum* were taken, viz. *Sc. chitinosum, crinitum, polymorphum* and *curiosum*.

at Stat. 251, Lat. 5° 28′.4 S. and Long. 132° 0′.2 E. Depth 204 m. Bottom: hard coral sand, four species of *Scalpellum* were taken, viz. *Sc. candidum, diota, imbricatum*, and *Stearnsi* var.

at Stat. 211, Lat. 5° 40′.7 S. and Long. 120° 45′.5 E. Depth 1158 m. Bottom: coarse grey mud, superficial layer softer and brown, three species of *Scalpellum* were taken, viz. *Sc. acutum, humile* and *gracile*.

at Stat. 221, Lat. 6° 24′ S. and Long. 124° 39′ E. Depth 2798 m. Bottom: solid bluish grey mud with Foraminiferae, three species of *Scalpellum* were taken, viz. *Sc. discolor, hexagonum* and *sculptum*.

at Stat. 256, Lat. 5° 26′.6 S. and Long. 132° 32′.5 E. Depth 397 m. Bottom: greyish green mud, three species of *Scalpellum* were taken, viz. *Sc. hamulus, polymorphum* and *pellicatum*.

at Stat. 271, Lat. 5° 46′.7 S. and Long. 134° 0′ E. Depth 1788 m. Bottom: bluish green mud of a uniform appearance, three species of *Scalpellum* were taken, viz. *Sc. moluccanum, chitinosum* and *inflatum*.

at Stat. 87, Lat. 0° 32′ S. and Long. 119° 39′.8 E. Depth 655 m. Bottom: fine grey mud, two species of *Scalpellum* were taken, viz. *Sc. proclive* and *deforme*.

at Stat. 204, Lat. 4° 20 S. and Long. 122° 58′ E. Depth 75—94 m. Bottom: sand with dead shells, two species of *Scalpellum* were taken, viz. *Sc. rostratum* and *aries*.

at Stat. 208, Lat. 5° 39′ S. and Long. 122° 12′ E. Depth 1886 m. Bottom: solid green mud, two species of *Scalpellum* were taken, viz. *Sc. distinctum* and *elegans*.

at Stat. 227, Lat. 4° 50′.5 S. and Long. 127° 59′ E. Depth 2081 m. Bottom: grey mud with an upper layer of brown, both mixed with sand, two species of *Scalpellum* were taken, viz. *Sc. ciliatum* and *formosum*.

at Stat. 241, Lat. 4° 24′.3 S. and Long. 129° 49′.3 E. Depth 1570 m. Bottom: dark sand with small stones, two species of *Scalpellum* were taken, viz. *Sc. formosum* and *sessile*.

and at Stat. 295, Lat. 10° 35′.6 S. and Long. 124° 11′.7 E. Depth 2050 m. Bottom: fine grey mud, 3 cm. thick, upper layer softer, brown with black stripes, two species of *Scalpellum* were taken, viz. *Sc. arcuatum* and *virgatum*.

Thus H. M. S. "Siboga" which made collections at 323 Stations in the Malay Archipelago met with species of the genus *Scalpellum* at 32 of these, and, while only one species was taken at 20 of these Stations,

at 2 Stations the number of species found was 4,
at 4 Stations the number of species found was 3,
and at 6 Stations the number of species found was 2.

Naturally, this may be considered as purely accidental; one feels inclined to admit, however, that certain places are especially favourable to the life or growth of *Scalpellum*-species. That accident plays a great part cannot be denied; most of the species seem to be "rare" animals and are represented by one or very few specimens only.

Adding the 32 new species collected by the Siboga to the 93 of GRUVEL's list of 1904 the number of species of the genus *Scalpellum* would now be 125. In his Monograph GRUVEL has given extensive tables for the determination of the known species and I hardly think it of any use to give such tables again here. I think it will be possible to recognise the new species with the aid of the description and the figure; I point out for each species as a rule what other species I consider its nearest relation and in what regards the two differ.

Before entering on the description of the different species, a few remarks on the classification of the genus may be permitted. The classification I have given in my Report on the "Challenger"-Cirripedia, which afterwards was used and extended by GRUVEL, though useful for the determination of the species, cannot be said to be a good, that is a natural classification. Such a system should give us, as far as possible at least, a representation of the descent or origin of the different species.

In 1883 I separated in the first place those species in which the valves were imperfectly calcified. No doubt the importance of this character has been overestimated by me; I think now it is of no great use, as there are species with perfectly calcified valves which in other regards quite resemble those with imperfectly calcified valves; forms even occur with perfectly and imperfectly calcified valves, which for the rest are so much alike, that they must be considered as belonging to the same species. This is the case with *Sc. Stearnsi* Pilsbry and with *Sc. polymorphum* n. sp.

The first question to be answered is which forms are the oldest, the earliest of the now living species, and I think there can be no doubt that they are those species which, like

DARWIN's *Sc. villosum*, like *Sc. trispinosum* collected by the "Challenger" and like *Sc. pollicipedoides* taken by the "Siboga", have a simply keeled, relatively short and nearly straight carina, a sub-carina and a rostrum. The shape of the valves in these species, of the lower whorl especially, is triangular with the umbo at the apex, i. e. at the extremity opposite to the peduncle. DARWIN said (in 1851), that *Sc. villosum* "leads on to Pollicipes"; I think he would quite agree now that we had better consider that species and those nearly related as derived from Pollicipes. The form of the valves, their number, the occurrence of a sub-rostrum in *Sc. villosum* (as in the no doubt nearly related *Sc. calyculus* Aurivillius) the occurrence of two extra valves of the lower whorl in one of the specimens of *Sc. pollicipedoides*, mihi (cf. the description of that species in the present report) are I think so many proofs for the correctness of that theory.

The other forms are considered by me to be derived from the species with a simply keeled, straight carina. I think we ought to divide them into three groups which I suppose developed independently from the forms with straight carinae. Calling the place where the umbo is situated in a species like *Sc. villosum* its upper extremity, we see the carina lose its original, straight form either by adding almost equally at both ends, in which case its shape becomes angularly bent; or by growing exclusively downwards, its shape becoming more or less strongly bowed and its umbo remaining at the apex; or, in the third place, by doing both, that is adding at both ends, but much more strongly downwards and assuming at the same time the distinctly bowed shape of the carinae of those species which have this valve simply bowed and not angularly bent.

From the presence of a sub-carina in most and of a rostrum in all I conclude that the species with an angularly bent carina are slightly more primitive than those with a bowed carina. The latter never have a sub-carina and in many a rostrum is also wanting[1]. The structure of the complemental males shows also that the species with an angularly bent carina are more like the primitive Scalpellums than those with a bowed carina. Between the two main groups I place those species in which the carina has an intermediate structure. To this last group belong most of the species for which I proposed, in my report of 1883, to create the division distinguished by imperfectly calcified valves.

We would thus have the following four main divisions:

A. Species in which the carina is nearly straight with the umbonal part as a rule projecting freely; a sub-carina and a rostrum are present. Valves of the lower whorl triangular, with the umbo at the apex. The little males, so far as known, have a capitulum with distinct valves. [Sectio: *Proto-Scalpellum*]

Number of species of this group at present known: 14. It is represented in the collection of the "Siboga" by three species: *Sc. pollicipedoides* n. sp., *Sc. aries* n. sp. and *Sc. acutum* Hoek.

[1] With regard to this valve I wish to point out the following difficulty; originally it always belongs to the valves of the capitulum, but in several species it is overgrown or covered by the rostral lateral, the rostral margins of the right and left valves touching one another in the medial line. Sometimes these margins are slightly hollowed out in the middle, in which case a narrow oval-shaped area is seen at the place where the rostrum should be; in that case it is very difficult to decide whether a rostrum is present or not without preparing and isolating the valves — and it is, of course, better not to do so in all those cases in which a species is represented by only one specimen. The value of the rostrum for classification purposes is diminished by this circumstance.

B. Species in which the carina is angularly bent, the part above the umbo equalling or nearly equalling in size that beneath the umbo; a rostrum is always present and a sub-carina in several species. The little males have a capitulum with valves and a peduncle, or rudimentary valves. [Sectio: *Eu-Scalpellum*]

Number of species of this group at present known: 11. It is represented in the collection of the "Siboga" by four species: *Sc. rostratum* Darwin; *Sc. Peroni* Gray; *Sc. uncus* n. sp.; *Sc. Stearnsi* Pilsbry, var.

C. Species in which the carina may be divided into two parts: a much larger part below the umbo and a smaller, sometimes even very small, above; a rostrum is present as a rule, a sub-carina never. The little males have rudimentary valves in a few cases, no valves as a rule. [Sectio: *Meso-Scalpellum*]

Number of species of this group at present known: 23. It is represented in the collection of the "Siboga" by six species: *Sc. chitinosum* n. sp.; *Sc. inflatum* n. sp.; *Sc. javanicum* n. sp.; *Sc. curiosum* n. sp.; *Sc. polymorphum* n. sp. and *Sc. distinctum* Hoek.

D. Species in which the carina is simply, as a rule strongly, bowed; a sub-carina is always wanting, a rostrum often. The little males as a rule have no valves . . . . . [Sectio: *Arco-Scalpellum*]

To this group belong all the remaining species of *Scalpellum*, about 80. It is represented in the collection of the "Siboga" by 26 species; it may best be subdivided according to the shape of the carinal latus.

a. Carinal latus with the carinal margin convex and the umbo at the upper extremity, where the convex carinal margin and the concave upper margin meet at a sharp angle.

Type: *Scalpellum velutinum* Hoek.

To this division belong about 14 of the known species of *Scalpellum*; it is represented in the collection of the "Siboga" by three species: *Sc. moluccanum* Hoek; *Sc. hamulus* n. sp.; *Sc. diota* n. sp.

b. Carinal latus with the carinal margin divided into two parts which meet at an indistinct or obtuse angle. Umbo at the upper extremity where the upper part of the carinal margin forms an angle with the upper margin of the valve.

Type: *Scalpellum sessile* n. sp.

Two new species collected by the "Siboga" must be considered as belonging to this division: *Sc. sessile* n. sp.; *Sc. ciliatum* n. sp.

c. Carinal latus with the carinal margin divided into two parts which meet at a sharp angle at the place where the umbo is situated. Upper part of the margin often hollowed out under part convex, the angle formed by the two parts more or less projecting beyond the line of the carina.

Type: *Scalpellum hamatum* G. O. Sars.

To this division belong about 36 of the known species of *Scalpellum*; it is represented in the collection of the "Siboga" by seven species: *Sc. discolor* n. sp.; *Sc. poculum* n. sp.; *Sc. arcuatum* n. sp.; *Sc. imbricatum* n. sp.; *Sc. crinitum* n. sp.; *Sc. humile* n. sp.; *Sc. pellicatum* n. sp.

d. Carinal latus with the carinal margin divided into two parts, which meet at an obtuse angle or are almost continuous with one another, the umbo being at the place where the two parts meet. Upper part of the margin not, or only very indistinctly hollowed out.

Type: *Scalpellum formosum* n. sp.

To this division belong 17 of the known species of *Scalpellum*; it is represented in the collection of the "Siboga" by nine species: *Sc. gracile* n. sp.; *Sc. proclive* n. sp.; *Sc. deforme* n. sp.; *Sc. trapezoideum* n. sp.; *Sc. hexagonum* n. sp.; *Sc. praeceps* n. sp.; *Sc. elegans* n. sp.; *Sc. sculptum* n. sp.; *Sc. formosum* n. sp.

c. Carinal latus with the carinal margin not divided into two parts, straight or very slightly hollowed out, with the umbo at the base, where the carinal margin meets with the basal margin. The base of the carina touches, or nearly touches, the upper extremity of the peduncle.

Type: *Scalpellum virgatum* n. sp.

To this division belong 7 of the known species of *Scalpellum*; of these four were collected by H. M. S. "Siboga", viz.: *Sc. virgatum* n. sp.; *Sc. candidum* n. sp.; *Sc. fissum* n. sp.; *Sc. incertum* n. sp.

A. Sectio: **Proto-Scalpellum**

1. *Scalpellum pollicipedoides* n. sp. Pl. V, fig. 9—11.

Valves fifteen, covered by thin and transparent membrane. Scutum triangular, tergum rhombiform, carina nearly straight with the apex projecting freely. Upper latus irregularly triangular. Valves of the lower whorl consisting of a rostrum, three pairs of latera and a subcarina, all of them small, triangular, with the apices pointing outwards. The little male has a capitulum with valves.

This curious species is represented by half a dozen specimens.

The capitulum is nearly trapeziform, the occludent and carinal margins running almost parallel to each other. It is rather thick in the under half, flat in the upper half. The valves are covered by thin, transparent membrane, and are separated from one another by chitinous interspaces of a dark-brown colour.

The scutum is rather large; its apex projects beyond the occludent margin of the tergum and is slightly produced. The lateral and basal margins pass over into one another quite insensibly, so that the form of the scutum is triangular with a strongly arched basis. The tergal margin is long, the occludent margin hollowed out.

The tergum is rhombiform and large. The part of the carinal margin above the apex of the carina has about the same length as the occludent margin, the other part of the carinal margin nearly equals the scutal margin. Near the apex the two terga slightly diverge from one another.

The carina is only very feebly bowed longitudinally and has the umbo at the apex which in the largest specimen projects freely. The carina has no flat roof but is laterally bowed and not very deeply keeled. The width increases from the apex to the base; the surface is not smooth but feebly, transversely hollowed out at five places over its length.

The upper latus is small, of triangular shape, with the scutal margin strongly hollowed

out, the tergal and carinal margin confluent and convex, and the basal margins also confluent and strongly convex.

The rostrum is the largest of the valves in the lower whorl. It projects freely for about half its length and has the umbo at the apex which is pointed. Its shape is triangular with the sides hollowed out.

The rostral and carinal latus are of about the same size and shape: triangular, with the apex projecting from the surface of the capitulum.

The infra-median latus has about the same shape but is much smaller.

The sub-carina much resembles the rostrum; it is slightly smaller however and stands out in a more horizontal direction.

The peduncle is short, wide at the summit, slightly narrower only at the base. The calcified scales are very small and not arranged very regularly. They are placed rather close to one another and extend from the surface as bluntly-conical papillae.

Size. The length of the capitulum of the largest specimen was 4 mm., the total length 6,3 mm. The other specimens are but slightly smaller.

The study of the structure of the hermaphrodite animal contained within the capitulum has yielded the following results.

Mouth placed near the adductor muscle; elongated in a vertical direction. Labrum not very swollen, slightly elongated in a longitudinal direction; crest without distinct teeth; palpi minute, triangular in outline, with the apex blunt. Apex and outer margin with rather numerous hairs.

Mandibles with four teeth and the lower angle delicately pectinated. Two very minute teeth are inserted in the cavity between the first and the second tooth; upper side of the fourth tooth pectinated. Surface of the mandible near the toothed edge covered with very delicate hairs placed in groups of two or three; inferior margin clothed with longer hairs.

Maxillae short and broad; two stronger spines and one or two smaller ones at the upper end of the edge; a small notch beneath the upper pair and a single spine planted at its base. The inferior part of the edge forms a sharp angle with the under margin and bears 7 to 8 pairs of spines. On the outer surface numerous groups of hairs (three or four in a group), near the spine-bearing edge.

Outer maxillae rather stout, of oval shape with long bristles on the outer surface.

Cirri. First pair not at a considerable distance from the second. Rami slender and not very unequal in length. The longest has 8, the shortest 7 segments. Upper segments slightly narrower than the basal ones; the latter slightly protuberant at the extremity. Spines relatively long, some of those on the outer segments more than twice as long as the segment.

Second cirrus with rather short rami of 9 segments, lower segments short and broad, upper segments more elongate; 3 pairs of longer spines on the anterior margin as a rule.

The four posterior pairs with their segments, especially the terminal, much elongated. The middle segments more protuberant anteriorly than the others. The segments bear as a rule three pairs of longer spines and a fourth (sometimes even a fifth) pair much more delicate on the front aspect. Dorsal tufts of three or four spines at the extremity of each segment.

Caudal appendages triangular, uni-articulate, small; a tuft of about half a dozen delicate hairs at the extremity.

Penis, rather short, reaching to the extremity of the fifth segment of the last pair of cirri; its basal part broad with only a few scattered hairs, the terminal part of about the same length as the basal part, cylindrical, rather narrow, indistinctly ringed. It bears very delicate hairs, which are irregularly distributed over the surface and a rather dense tuft of hairs at the extremity.

The mantle-cavity of the hermaphrodite animal investigated more in detail contained six rather large and nearly globular eggs. The greatest diameter of the eggs is 0,34 mm., the shortest 0,28 mm. They contained larvae in the Nauplius-stage, some of the larvae had partly shed off the exuviae.

The male of this species is a true complemental male. I found two of them in the one, one in the other pouch of the hermaphrodite specimen. In fig. 10 the place occupied by this pouch is indicated as a little swelling (*b*). The male is figured Pl. 5, fig. 11; its size is 0,35 mm. × 0,25 mm. It has six valves: two scuta, two terga, a carina and a rostrum, the general shape of which can be seen from the figure. The scutum is the largest, the rostrum is much broader than the carina. The tergum has an irregular shape and is divided into two parts: a larger somewhat excavated at the apex and a very small one at the place of the primordial valve. Shape and position of the valves resemble the corresponding parts in the male of *Sc. Peroni* and *Sc. villosum* as described by DARWIN. But the males of the present species have no narrow peduncle, the capitulum going over quite insensibly into the short and flattened part to which the prehensile antennae are attached. The membrane connecting the valves is very slightly rough, but it does not bear distinct hairs. Extremely minute hairs seem to be planted on the surface near the peduncular pole only. The musculature of the peduncular part of the sac is strongly developed.

The structure of the little body within the sac corresponds in general but in reduced condition with that of the hermaphrodite animal as also with that of the males of the nearly related species *Sc. villosum* and *Sc. Peroni*. It has very large eyes situated in the median line, beneath, or rather in front of the strongly developed adductor muscle. The mouth is slightly bullate; the cirri have but few segments (four in the first, five in the second pair). The penis is short, cylindrical, rounded at the extremity, where it bears a few curled hairs or bristles.

This species was collected during the cruise of H. M. S. "Siboga" at:

Stat. 274. December 26, 1899. Lat. 5° 28′.2 S., Long. 134° 53′.9 E. Depth 57 m. Bottom: sand and shells, stones. 6 specimens.

Observations. This is a very curious species. It belongs to the same group as *Sc. villosum* (Leach) and *Sc. trispinosum* mihi as is shown at once by the shape of the carina. It has one pair more latera, however, than one of these two species and the general shape of the capitulum is more like a normal *Scalpellum* in consequence. Like *Sc. villosum* and *trispinosum* it comes near to *Pollicipes*, especially *P. sertus* and this is particularly the case with regard to the shape of the valves of the lower whorl.

One of the specimens shows this relation in a still more conspicuous way and I have

described the discovery of that specimen as an interesting case of reversion in a short note published by the Amsterdam Academy of Science[1]. I quote from that paper the following:

Looking over the six specimens of this new species, I was struck by finding that one of the specimens, though in other regards similar to the other five, differed from them by having in the lower whorl of valves two latera in addition to the three which all the specimens possess. In fig. 9, Pl. V[2] the left side of a normal, in fig. 10 the same side of the abnormal specimen is represented. (At the right side only one of the additional valves is developed.) In fact, the few small valves which according to DARWIN were wanting in the lower whorl of *Sc. villosum* to convert it into a *Pollicipes* occur in one of the specimens of this new species. By calling it a case of reversion I would indicate the high importance, which from an evolutionary point of view I attach to this abnormality. We need not go so far as to consider this species as representing exactly the "missing link" between the genera *Pollicipes* and *Scalpellum*, but I think the case shows clearly that a form with more numerous calcareous plates in its capitulum (like *Pollicipes*) is the older, the form with fewer (like *Scalpellum*) the younger one; moreover that the *Scalpellum*-species with straight carinae, inhabitants of shallow water, must be considered as the oldest, i. e. the species most resembling the primitive form of *Scalpellum*.

2. *Scalpellum aries* n. sp. Pl. V, fig. 12.

Valves thirteen. Carina straight. Scutum and tergum large. Upper latus narrow, nearly reaching the peduncle. Valves of the lower whorl six: a large and prominent rostrum, two small rostral latera of triangular shape, two narrow carinal latera and a rather strong triangular sub-carina.

This species is represented by a single specimen only.

The shape of the capitulum is nearly quadrangular with a triangular apex, being broadest at its lower extremity. The scuta, terga and carina are much larger than the other valves, the upper latus is medium-sized and of the valves of the lower whorl the rostrum is the only one that is strongly developed. All the valves stand rather close together and are not covered by membrane. Their colour is red or reddish, parts of the carina, of the tergum and the scutum only being quite white.

Scutum oblong, breadth slightly less than half the length, with the upper triangular portion produced and the apex projecting beyond the occludent margin of the tergum. The occludent margin is slightly hollowed out, the lateral margin convex.

Tergum large, oblong, elongate-ovate, bluntly pointed at the apex, forming a sharp angle at the lower extremity.

Carina straight with the apex neither directed forward, nor backward; with a laterally bowed roof, gradually widening from the upper to the basal end, rather deeply concave. The upper part of the roof is at some distance from the tergum, which distance grows broader towards the apex, the interspace being filled up by triangular lateral parts.

[1] K. Akademie v. Wetensch. te Amsterdam, Proceedings of the Section of Sciences, VII, 1905, p. 90.
[2] Of the present publication.

Sub-carina triangular, the umbo pointing outwards; laterally it slightly overlaps the carinal latera.

Rostrum strong and rather large, having the shape of a pyramidal wedge, with the apex very prominent beyond the occludent margin of the scutum. Lateral margin nearly straight.

Latera of the lower whorl two pairs, small, corresponding probably with the rostral and carinal latera of other species of *Scalpellum*. The inferior angle of the pentagonal upper latus also meets where they nearly touch one another.

Peduncle wide at the summit, conical, short. Surface with very numerous narrow, chitinous scales, placed rather far from each other, arranged in regular rows.

Length of the capitulum 8 mm., of the peduncle about 2 mm.

The "Siboga" collected this interesting form at:

Stat. 204. September 20, 1899. Lat. 4° 20′ S., Long. 122° 58′ E. Depth 75—94 m. Bottom: sand with dead shells. 1 specimen. (A few specimens of *Sc. rostratum* Darwin were found at the same Station.)

General Remark. This curious form belongs to the same group of species as *Scalpellum villosum* Leach, *Sc. trispinosum* mihi, *Sc. sexcornutum* Pilsbry and some of the species provisionally described by Aurivillius and which are all characterised by straight or nearly straight carinae. In *Sc. aries* the carina may really be said to be straight; it can be distinguished easily from the other species by the number (13) of its valves and by the very characteristic shape of its rostrum.

3. *Scalpellum acutum* Hoek. Pl. VII, fig. 1.

Hoek, Cirripedia collected by H. M. S. "Challenger". 1883, p. 80, pl. III, fig. 19, pl. VIII, fig. 12.

This interesting deep-sea species was collected by H. M. S. "Siboga" at three different Stations. They are very small animals: I measured two, in one the total length was 7,6 mm., the length of the capitulum 5,6 mm., in the other respectively 6,5 and 4,7 mm.

I think there can be no doubt, that the specimens are identical with those collected by the "Challenger". Gruvel[1] has described as a new species *(Sc. longirostrum)* a form of *Scalpellum* much resembling my *Sc. acutum*, the main difference being that the carina of the new species is somewhat broader. My figure ("Challenger" Cirripedia Pl. III, fig. 19) represents the little animal with the rostral side slightly turned up, so that the carina in the figure looks narrower than it really is. And my description: "Carina short, simply bowed; sides almost wanting, only slightly developed in the superior part" has been misleading in so far that I should have added: a little more so towards the inferior extremity. Of the other differences Gruvel points out, the height of the sub-carina, which he says nearly equals that of the rostrum ("presque aussi élevée que le rostre") and which is much smaller in the "Challenger" specimens as also in those collected by the "Siboga", is by far the most important. But altogether these differences are only slight: in comparing the specimens with one another they may perhaps prove after all to be identical.

[1] Gruvel, A., Cirrhipèdes du "Travailleur" et du "Talisman". 1902, p. 70.

At the end of the description of *Sc. longirostrum*, GRUVEL in his "Monographie" (l. c. p. 58) says that the dwarf males also differ. It is true that I named *Sc. acutum* as one of the species whose males have no peduncle, mouth or stomach (Challenger Cirripedia, Anatomical part, p. 20). However, as I did not observe the male of this species (Ibidem, p. 4), this was a supposition only and the name of the species, therefore, was placed in brackets. I found little males (one on each) on two of the "Siboga" specimens and I figure one of them on Pl. VII, in fig. 1. Comparing this figure with that given by GRUVEL for the male of *Sc. longirostrum*, the main difference is the absence of a peduncle in GRUVEL's and its presence in my figure. Had my specimen been without a peduncle then I would admit at once that the little stump had been broken off on isolating the little animal from the female — I dare not say that this happened to Mr. GRUVEL's specimen, but I think it is possible.....

I consider this species, like *Sc. squamuliferum* Weltner and *Sc. striatum* Aurivillius, as belonging to the group of *Proto-Scalpellums*. The carinae of these species are not quite straight but they are only little bowed and (with the exception of that of *Sc. squamuliferum*) relatively short. Further, these species have a rostrum and a sub-carina and the valves of the lower whorl triangular with the umbo at the apex; they have (so far as known) males with a capitulum with valves and a peduncle. In all these regards the present species corresponds with the others of this division.

The "Siboga" collected this species at the following Stations:

Stat. 122. July 17, 1899. Lat. 1° 58'.5 N., Long. 125° 0'.5 E. Depth 1264—1165 m. Bottom: stone. 2 specimens.

Stat. 151. August 12, 1899. Lat. 0° 12'.6 S., Long. 129° 48' E. Depth 845 m. Bottom: fine grey mud with coarse particles. 1 specimen.

Stat. 211. September 25, 1899. Lat. 5° 40'.7 S., Long. 120° 45'.5 E. Depth 1158 m. Bottom: coarse grey mud. 2 specimens.

What I said in my "Challenger" publication on the distribution of this species, viz. that it occurred at places situated very far from one another, has now proved to be true in a still higher degree: whereas the "Challenger" found it in the Atlantic, near the Azores, and in the Pacific, near the Kermadec Islands, it has now been observed in the Malay Archipelago.

According to GRUVEL the only specimen of his *Sc. longirostrum* he could investigate was taken in the Atlantic Ocean not far from the coast of Portugal at a depth of 1923 m.

B. Sectio: **Eu-Scalpellum**

4. *Scalpellum rostratum* Darwin. Pl. V, fig. 13.

DARWIN, Monograph of the Sub-class Cirripedia. The Lepadidae, 1851, p. 259, pl. VI, fig. 7.

I doubt whether this species has ever been observed since DARWIN published his description. Yet it is perhaps the commonest of the genus under the tropics — at least in the Malay Archipelago; the "Siboga" collected it there at four different places, 6 specimens in one haul at two of them, and numerous specimens at a third.

I have nothing to add to DARWIN's excellent description of this species, neither for the hermaphrodite form nor for the complemental males. DARWIN discovered that the latter were attached in this species to the integument of the hermaphrodite, in a central line, between the labrum and the adductor scutorum muscle, three individuals in a group. Opening the capitulum of one of the "Siboga" specimens I found the little males at once at the place indicated by DARWIN, the only difference being that I found not three but four of them attached to the hermaphrodite. The size and form of the complemental male and of its rudimentary valves (carina and scutum) are in the main as described by DARWIN. The largest specimen measured 0,91 mm. (according to DARWIN its length is $^{35}/_{1000}$ of an inch = 0,89 mm.). The scutum is narrow; it is considerably smaller than that in DARWIN's figure, but it has exactly the size (0,2 mm.) which it should have according to DARWIN's description. The whole of the sac, which represents a combination of capitulum and peduncle, is covered with very minute hairs. Beneath the rudimentary carina and down the peduncular part of the sac are planted numerous much longer spines which to a large extent are bifid at the extremity. The fig. 13 of Pl. V has been drawn with the camera from the largest of the specimens.

DARWIN's specimens were from the Philippine Archipelago, Island of Bantayan, attached to a horny coralline: 20 fathoms (about 36 m.). The "Siboga" collected it at the following places:

Stat. 47. April 8—12, 1899. Bay of Bima (North Coast of Sumbawa). Depth 13—55 m. Numerous specimens.
Stat. 204. September 20, 1899. Lat. 4° 20′ S., Long. 122° 58′ E. Depth 75—94 m. Bottom: sand with dead shells. 2 specimens.
Stat. 213. Sept. 26—Oct. 26, 1899. Saleyer anchorage and Surroundings. Depth down to 36 m. Bottom: coral reefs, mud and mud with sand. 6 specimens.
Stat. 294. January 23, 1900. Lat. 10° 12′.2 S., Long. 124° 27′.3 E. Depth 73 m. Bottom: soft mud with very fine sand. 6 specimens.

5. *Scalpellum Peroni* (Gray). Pl. V, fig. 14, 14*A*, 14*B*.

Smilium Peronii J. E. Gray, Annals of Philos. New series, X, 1825.
Scalpellum Peronii Darwin, Monograph. Lepadidae, 1851, p. 264, pl. VI, fig. 6.

I refer to this species the specimens of *Scalpellum* which were collected by the scientists of the "Siboga" Expedition at the Jedan Islands. Most probably the place where they were found is the anchorage off Palu Jedan, east coast of Aru Islands (Pearl Banks).

There are in all three specimens, one of which is extremely small. The largest one has been figured; it has a total length of 22 mm. and a capitulum of 13 mm. It is considerably smaller than the specimens investigated by DARWIN, which had a total length of little more than one inch (25,4 mm.) and the capitulum of which measured about three quarters of an inch (19 mm.). Perhaps the differences between the description and figure given by DARWIN and the specimens from Jedan must be ascribed to the circumstance that the latter specimens are not quite full-grown.

These differences are in the first place, that the spines which clothe the membrane covering the valves and the interspaces are by no means so strong and so dense as they are represented in the figure given by DARWIN; and secondly, that the rostrum and the subcarina,

which are figured by DARWIN as freely projecting beyond the rostral and carinal margins of the capitulum, are much less strongly developed and hardly projecting in the specimens from Jedan.

So far as I know this is the first time, that specimens of this species have been collected since the publication of DARWIN's Monograph. He knew the species from specimens found in the Swan River, Australia, attached to a coralline, and from Port Western, Bass Straits (Astrolabe Voyage): the Swan River is on the west side of Australia, Bass Straits on the south. The Jedan Islands, the third place where the species occurs, lie between the north of New Holland and New Guinea. [GRUVEL [1], found three specimens of *Sc. Peroni* in the collections of the Paris Muséum d'histoire naturelle; but their habitat is unknown. He pointed out that these specimens are not covered by a complete coating of fine and numerous hairs as in DARWIN's description and figure].

6. *Scalpellum uncus* n. sp. Pl. V, fig. 15; Pl. VII, fig. 2, 3.

Valves thirteen. Carina angularly bent with the umbo in the middle of its length. Rostrum rather large. Three pairs of latera. Upper latus pentagonal. Sub-carina pyramidal, standing out beyond the surface of the carina.

Of this species there are three specimens representing two different forms.

The capitulum is flat, broad in the middle, the upper part slightly produced. It has 13 valves with narrow, but distinct intervals. The valves are not covered with membrane in the one (Station 285) and are covered by a resistant and pigmented membrane in the two other specimens (Station 47[b]).

Scutum middle-sized, with the upper end pointed; nearly quite flat; lateral margin nearly straight, parallel with the occludent margin. In the specimen without membrane a distinct swelling is visible at the place where, on the inner side, a pit is present for the adductor muscle. Basal margin composed of a longer and a shorter segment, making an angle with one another.

Tergum large, triangular, flat. Occludent margin distinctly convex towards the apex which is recurved; carinal margin projecting a little above the apex of the carina; scutal margin slightly convex.

Carina bowed, laterally strongly compressed, and thus internally deeply concave; upper portion above the umbo nearly as long as the part beneath the umbo; roof laterally convex growing wider from the umbo downwards and indistinctly separated from the parietal parts of the valve.

Upper latus pentagonal, with the apex rounded and the umbo at a short distance from the apex.

Rostrum of considerable size, internally concave; outline of the upper portion triangular, of the lower portion trapeziform. The umbo is at the apex, which, especially in the specimens covered with membrane, slightly projects beyond the occludent margin of the capitulum.

Rostral latus very thick and solid, large, irregularly pentagonal, with the umbo near the rostral margin and near the base of the valve and distinctly projecting outwards.

[1] GRUVEL, A., Révision des Cirrhipèdes. Nouvell. Archiv. d. Muséum. (IV). IV, 1903, p. 234.

Carinal latus elongated pentagonal, narrow, with the umbo about in the centrum of the surface, slightly projecting outwards.

Sub-carina small; solid, pyramidal, standing out beyond the surface of the carina.

Peduncle about half the length of the capitulum, rather narrow, narrowest about the middle of its length; surface with minute chitinous scales standing at some distance from one another. In one of the membrane-covered specimens of Station 47^{b} the length of the peduncle is more than half the length of the capitulum.

Size. Length of the capitulum 9,1 mm., of the whole animal 13 mm. in the specimen from Station 285; in the largest specimen from Station 47^{b} the corresponding dimensions are 9 and 13,8 mm.

Complemental males. Two complemental males were observed in one of the specimens from Station 47^{b} attached to the surface of that part of the sac or mantle of the hermaphrodite animal which unites the inferior halves of the two scuta. These males are relatively large, the longest diameter of the body being 0,9 mm. Their shape is elongated oval and the body is divided into a larger capitular part and a very short peduncle. The capitulum has six valves: 2 scuta, 2 terga, 1 carina and 1 very large rostrum. Fig. 3 of Pl. VII has been drawn from the male of this species; it has a great resemblance to the male of *Sc. Peroni* and, no doubt, that of several other shallow-water species.

This species was collected by H. M. S. "Siboga" at two Stations, viz. at:

Stat. 47^{b}. April 12, 1899. Entrance to Bay of Bima (Sumbawa). Depth 296 m. Bottom: fine sand with mud (coral). Two specimens. One of them was attached to a small stick, to which a piece of coral was also attached.

Stat. 285. January 18, 1900. Lat. 8°39′.1 S., Long. 127°4′.4 E. Depth 34 m. On the limit between mud and coral, Lithothamnion. (Anchorage south-coast of Timor). One specimen.

Observations. The present species comes nearest to *Sc. Peroni* of the known species, e. g. in the number of valves, the shape of the carina and the form (not the size) of the tergum. It differs from it by the absence of the fine spines which cover the membrane in *Sc. Peroni*, by the valves not being separated by rather wide interspaces of membrane and in the third place by the shape of the latera.

At first I considered the specimen from Station 285 (Pl. VII, Fig. 2) without a distinct membrane as being different from the specimens from Station 47^{b} (Pl. V, fig. 15), which are covered with a very conspicuous membrane. Looking at the shape of the capitulum and at the form of the different valves more closely, I became convinced, however, that there was no reason to consider them as specifically distinct. It is true that they were taken at very different depths; but other species also range over depths of rather great difference. Thus, for example, *Sc. vulgare* Leach observed in very shallow water and also at a depth of 97 m. For this species GRUVEL[1] has described a very characteristic case of polymorphism, corresponding in many regards to what I found in *Sc. uncus*, viz. that specimens of different localities [? and depths] show differences in the development of the membrane covering the valves, of the interspaces separating the valves, as also in the grade of calcification, the hairiness of the membrane etc.

[1] GRUVEL, A., Révision des Cirrhipèdes. Nouvelles Archives du Muséum. (IV). IV, 1903, p. 234.

7. *Scalpellum Stearnsi* Pilsbry var. *robusta* and var. *gemina* n. var. Pl. VI, fig. 1—12.

Scalpellum Stearnsi Pilsbry is a shallow-water species from Japan. It was described for the first time (1890) by PILSBRY[1] and a year later by FISCHER[2] (as *Sc. calcariferum*). Both WELTNER (l. c. p. 250) and GRUVEL (l. c. p. 44) consider the species of FISCHER as synonymous with that of PILSBRY, and comparing the figures there can be no doubt that they are right.

In the Malay Archipelago H. M. S. "Siboga" collected at different Stations and at depths varying from 204—450 m., specimens of a *Scalpellum*-species, which at first sight showed great resemblance with PILSBRY's *Sc. Stearnsi*. I have been long in doubt, whether they belong to that species or not. The result of a careful comparison of the specimens of the Malay Archipelago with one another and with a specimen from Nagasaki (Japan) has been, that I do not consider them as specifically different, but that the animals collected by H. M. S. "Siboga" must be regarded as two varieties of PILSBRY's species.

I give in fig. 1, Pl. VI, a figure of PILSBRY's *Sc. Stearnsi* from a specimen collected by LISCHKE near Nagasaki which belongs to the collections of the Berlin Museum of Natural History[3]. It was in dry condition but it corresponded in all regards with the descriptions and figures given by PILSBRY and FISCHER. The varieties *robusta* and *gemina* differ from the Japan species in several regards as will be shown.

a. *Scalpellum Stearnsi*, var. *robusta*. Pl. VI, fig. 2, 3, 8—12.

The variety *robusta* differs at first sight by its much more plump, robust shape and by the length of its peduncle. The Japan form has the capitulum more elongated, its length measured along the occludent margins of scutum and tergum being equal to one and a half times the breadth; the apex of its tergum is produced; the length of the peduncle is nearly the same as the breadth of the capitulum and is by all means considerably shorter than the length of the latter. In the variety *robusta* the length of the capitulum is only once and a third its breadth; the apex of the tergum is not produced and the peduncle is considerably longer than the capitulum.

The shape of the different valves in the variety *robusta* is not very different from that in the original Japan species. Yet the upper latus and the infra-median latus are both considerably broader in this variety and this is also the case with the tergum. The latter valve has the apex and the angle formed by the carinal and scutal margins blunt.

As in the Japan specimens the marginal parts of the valves are not calcified: if the surface is thoroughly cleaned with a brush, the calcified portion which is white, is easily distinguished from the chitinous marginal parts which border the valves. In the Malayan specimens, however, the calcified portions are not at the surface, the whole valve being covered by a rather thick chitinous coating. Whether this is also the case in the shallow-water form from Japan I cannot

[1] PILSBRY, H. A., Description of a new Japanese *Scalpellum*. Proceed. Acad. Nat. Sci. Philadelphia. 1890, p. 441—443. *(Sc. Stearnsi)*.

[2] FISCHER, P., Description d'une nouvelle espèce de *Scalpellum* du Japon. Bullet. de la Soc. Zoolog de France. XVI, 1891, p. 116—118. *(Sc. calcariferum)*.

[3] The director of the Museum, Prof. KARL MÖBIUS, and the Keeper of the Collection of Crustaceans, Dr. W. WELTNER, made the study of these specimens easy and agreeable to me.

say; the specimens I have been able to investigate were in dried condition and did not show this detail.

In the specimens of the variety *robusta*, the chitinous membrane is developed very strongly along the line separating the capitulum from the peduncle; here it forms a cushion-like swelling over the basal portions of the valves of the lower whorl. The very long peduncle seems also a remarkable characteristic of this variety. All the known species of *Scalpellum* have rather short peduncles, the longest I have seen being that of *Sc. Darwini* mihi, which measures $^2/_3^{rds}$ of the length of the capitulum. Of the three specimens of the variety *robusta*, one is considerably smaller, most probably not full-grown (this specimen is figured Pl. VI, fig. 3; its capitulum is 28,6 mm. long, its peduncle 20 mm.); the other two seem to be full-grown:

the length of the capitulum is 48 mm. in the one and 52,5 mm. in the other specimen.
the length of the peduncle is 92 mm. in the one and 73 mm. in the other specimen.

PILSBRY and FISCHER both give figures of this species representing specimens at their natural size. PILSBRY says in his description that the peduncle is long and his figure represents it about as long as the capitulum, which is already a fair length for a species of *Scalpellum*; FISCHER's figure shows the peduncle cut off transversely, only slightly longer than half the length of the capitulum; in his description he says nothing about the length of the peduncle. In the two specimens from Nagasaki I was able to investigate, the dimensions of the capitulum and peduncle are as follows:

the length of the capitulum is 48 mm. in the one and 44 mm. in the other specimen.
the length of the peduncle is 30 mm. in the one and 14 mm. in the other specimen.

There are moreover in the variety *robusta* very characteristic and very prominent rings on the surface of the peduncle. The rather large scales are placed in rows which project freely over the surface as so many hoops and are separated from one another by rather deep circular grooves. The specimen of 48 mm. capitulum-length has about 40, the other about 33 such rings on the surface of the capitulum. They are very distinct on the peduncle of the smaller specimen of the variety *robusta* also, but their number is there only 14.

There are in the "Siboga" collection three specimens in all which I consider to belong to this variety. They were caught at three different Stations, viz.

Stat. 5. March 10, 1899. Lat. 7° 46′ S., Long. 114° 30′.5 E. Depth 330 m. Bottom: mud. Large specimen, figured Pl. VI, fig. 2.
Stat. 251. December 8, 1899. Lat. 5° 28′.4 S., Long. 132° 0′.2 E. Depth 204 m. Bottom: hard coral sand. Large specimen attached to a piece of shell, which bears numerous tubes of tubicolous Annelids on its surface.
Stat. 254. December 10, 1899. Lat. 5° 40′ S., Long. 132° 26′ E. Depth 310 m. Bottom: fine, grey mud. Small specimen, figured Pl. VI, fig. 3.

b. *Scalpellum Stearnsi*, var. *gemina*.

The variety *gemina* has imperfectly calcified valves. In the Japan species and in the variety *robusta* the valves with the exception of the marginal portions are perfectly calcified, the calcified portion having the shape of the valve itself. In the variety *gemina* the calcified

portions of the scutum, tergum, upper latus, and infra-median latus have a shape of their own, which can be made out only by separating them from the chininous covering by means e. g. of caustic potash.

The figure 4 of Pl. VI represents this variety and illustrates another peculiarity of the specimens caught by H. M. S. "Siboga"; the four specimens form two couples of two: in the pair figured both specimens are attached to one another and at the same time to the long silicious needles of a sponge; in the other couple the one is attached to the extremity of the peduncle of the other. The shape of the calcareous portions can be distinguished through the chitinous membrane which covers almost the whole surface; very small parts of the scutum near the angle formed by the occludent and tergal margins, and of the tergum near the angle formed by the occludent and carinal margins, remaining uncovered. At these places, where the umbones are, the surface of the valve is quite white and opaque, the chalk being quite amorphous; the rest of the valve appearing blueish, more or less transparent and crystalline. Naturally, this difference can be seen best after isolating and cleaning the calcareous valves (Pl. VI, fig. 5). The peduncle of this variety is longer than the capitulum; it is not so long, however, as in the var. *robusta*. In the four specimens I was able to investigate, the dimensions were as follows:

Specimen 1. Length of capitulum 47½ mm. Length of peduncle 60 mm. Number of rings on peduncle ± 48.

Specimen 2. Length of capitulum 49 mm. Length of peduncle 60½ mm. Number of rings on peduncle ± 49.

Specimen 3. Length of capitulum 45 mm. Length of peduncle 56 mm. Number of rings on peduncle ± 40.

Specimen 4. Length of capitulum 45 mm. Length of peduncle 48½ mm. Number of rings on peduncle ± 48.

The rings formed by the scales on the surface of the peduncle are not so prominent as in the variety *robusta*, they are still, however, very conspicuous. The peduncle as a whole is stout and cylindrical — it looks like a piece of rope.

This variety was collected by H. M. S. "Siboga" at one Station only, viz.:

Stat. 74. June 8, 1899. Lat. 5° 3'.5 S., Long. 119° E. Depth 450 m. Bottom: Globigerina ooze. Four specimens: two couples of two.

In the descriptions of Pilsbry and Fischer, details on the structure of the animal's body are wanting. I studied some of the peculiarities with the aid of one of the specimens of Station 74.

Mouth. Labrum not very bullate with a strongly developed, anteriorly projecting part which is triangular and pointed at the extremity; crest with a few extremely minute triangular teeth. Palpi elongate, about three times as long as broad, densely beset with hairs towards the extremity and along the internal margin.

Mandibles stout with four teeth and the inferior angle. Between the first and second teeth two much smaller ones are observed, making the number six, if these are also counted. Inferior angle blunt, indistinctly pectinated (Pl. VI, fig. 7).

Maxillae with a long, sinuous edge and a great number of nearly equal spines. Those at the upper corner are slightly larger and another group of the larger spines is planted at one-fourth the height from the inferior angle. The apodeme is stout and not very long.

Outer maxillae are well-developed with the bristles of the nearly straight inner margin divided into two separate tufts, separated from one another by a little excavation without bristles. Exteriorly they are swollen and not very densely beset with bristles. The opening leading into the body-cavity is large and situated on the top of a rounded protuberance.

Cirri. First pair short and very stout; rami not very unequal in length; much more so in the number of segments, and espècially in breadth (Pl. VI, fig. 6). The anterior segment has nine, the posterior sixteen segments. The segments of the anterior ramus are oblong in transverse direction and are only united with one another over part of the breadth; the segments of the posterior ramus are as broad as they are long, with the exception of the first segment which is longitudinally oblong. In both rami the segments bear numerous spines along their margins, the outer segments over the whole surface.

Second-sixth cirrus differ from one another mainly in length; this difference is greatest between the second and third cirrus. In the second cirrus the anterior ramus is moreover a little broader than the posterior ramus, in the other cirri this difference does not exist. All the cirri give one the impression of being stout and well-developed.

Caudal appendages small, composed of six cylindrical segments, the width of which diminishes considerably from the first to the last; each segment bears a few very delicate bristles at the extremity; the last segment has about half a dozen longer ones on the rounded apex.

Sex. The specimen investigated showed no trace of male genital organs: neither testicula nor penis; I think this species must be considered as belonging to the group of unisexual species of which I discovered several representatives when studying the Cirripedia of the "Challenger" expedition. The specimens the description of which is given above were probably all females.

Males. At first I could not find the males of this species. At last I found them on the large specimen of Station 5: very small bead-like individuals attached in great number to the surface of that part of the sack or mantle of the female which connects the inferior halves of the two scuta at their occludent margin. I counted well over a hunderd of these little animals. Each of them is enclosed in a chitinous sack and are placed so near one another as to touch and even to flatten each other mutually. Fig. 9, Pl. VI represents a group of three of them; in fig. 8 one of them is seen a little more enlarged. They are attached to the outer surface of the chitinous sack of the female with their small antennae, and their surface is hirsute with very short spines. The opening giving entrance to the interior of the sac is at the top of a little conical papilla which projects beyond the surface of the remaining part of the sac. Round the opening are four very small calcareous parts like so many rudimentary valves and between these, small excrescences with short hairs, like minute tentacles, are planted. I have not been able to study the internal structure (which can be done by making microtome sections only)

but I observed the testiculum and the receptaculum seminis in several specimens. The longest diameter of the specimen of fig. 8 measured 0,66 mm., the shortest about 0,5 mm.

I observed a few (3) males of exactly the same shape and structure and at the same place in one of the specimens of the var. *gemina* from Station 74, and I think the fact that they are wanting in the other specimens must be considered as the consequence of the season or age. While studying the Cirripedia of the "Challenger" more than 20 years ago, I discovered that the larvae of *Sc. Stroemi* develop into the Cypris-stage before leaving the egg-membrane. Whether all the eggs did so could not be made out; but that there are *Scalpellums* which develop without a free-swimming Nauplius-stage cannot, from that discovery, be doubted. One might suppose, that only the complemental-males (or the dwarf-males in the unisexual species) had such an abbreviated development. It seems probable, however, that there are several among the deep-sea species whose females as well as males develop without passing through a free-swimming Nauplius-stage. I conclude this from the fact, that I found half a dozen very small specimens (females and males) attached to the surface of the scutum of the large female *Scalpellum* which was collected at Station 5. DARWIN speaks of the male larva of *Sc. vulgare* "crawling on the scuta of the hermaphrodite" and of discovering the fold in the shell where it invariably attached itself: that males should be found on the scutum is not at all surprising, but for the females it would be different, unless it be that they do not swarm out, but creep from the cavity of the mantle in the cypris- or so-called pupa-stage.

That the little *Scalpellums* I found attached to the outer surface belong really to the same species admits of no question. I figure one of these small animals Pl. VI, fig. 11, and the tip of the capitulum more strongly magnified in fig. 12: the capitulum has exactly the same tentacular appendages which I observed in the males and about at the same place with regard to the primordial scutum and tergum. What the physiological meaning of these tentacles is, is difficult to say; they are larval organs which the females seem to loose and which the males keep in mature condition. Morphologically these tentacles are no doubt also of importance — by all means they render us the good service of enabling us to demonstrate that the little females attached to the fullgrown specimens belong to the same species as the dwarf males attached to the mantle-surface between the two scuta.

C. Sectio: **Meso-Scalpellum**

8. *Scalpellum chitinosum* n. sp. Pl. VII, fig. 4.

Valves thirteen, covered by chitinous membrane. Scutum and tergum imperfectly calcified. Carina with the umbo at some distance from the apex, angularly bent. The part beneath the umbo strongly bent. Upper latus quadrangular, broad with the apex produced in the direction of the scutum. Upper part of the infra-median latus broad triangular. Umbo of the carinal latus at the base, projecting beyond the line of the carina. Rostrum wanting or not calcified.

The collection made during the cruise of H. M. S. "Siboga" contains two (perhaps 3) specimens of this species.

The capitulum is flat and very broad, the length being less than one and a half

times the breadth. The occludent and carinal margins are both strongly convex. The whole capitulum is covered by a chitinous membrane, with the exception only of the apex of the tergum. The shape of the valves is mostly very indistinct: though the largest specimen of Station 45 has been figured the shape of the latera is much more distinct in the smaller specimen of the same Station. Hence for the description of these valves the smaller specimen has been mostly made use of.

The scutum has the occludent margin convex and the tergal margin slightly hollowed out. The calcified part is formed of two segments united at the apex: the one (the occludent segment) is broader at the base and narrower towards the upper extremity; the other (the tergal segment) extends along the tergum, is very narrow and shows the same width over its whole length.

The tergum has the calcified part ⋁-shaped: a shorter and narrower occludent segment and a slightly broader and longer carinal segment having their point of junction at the apex of the valve. Along the occludent segment the chitinous covering forms a cushion-like investment, the free margin of which is strongly arched. The apex of the tergum is recurved, bent towards the carinal side of the capitulum.

The carina has the umbo at some distance from the apex. The part above the umbo is quite covered by the chitinous membrane, the roof of the part underneath the umbo is covered by a thin membrane only. Its width increases distinctly, but not very strongly from the umbo downwards; its margins develop into distinct ridges. The sides are rather broad especially in the uppermost part; its limits cannot, however, be made out distinctly.

The upper latus is broad, trapeziform, the tergal and basal margins running about parallel to each other. The scutal margin joins the tergal margin in a rounded or truncated angle which extends to the extremity of the tergal segment of the scutum. The umbo is near the apex.

The rostral latus is narrow or low. The basal margin is shorter than the scutal margin, the lateral margin slightly convex. The rostral margin of the two rostral latera only meet one another at the upper extremity. A triangular space remains between the two valves which is covered by chitinous membrane only: this is most probably the place for the rostrum if it were present as a calcified valve.

The infra-median latus has the umbo near the base. Its general shape is that of a tall wine-glass, almost without stalk, with a small and narrow foot and the upper part wide.

The carinal latus has the umbo at the base, projecting beyond the line of the carina. The carinal margin is strongly hollowed out; further, there can be distinguished a short and straight upper margin, a slightly hollowed out lateral margin and a somewhat convex basal margin.

The peduncle is cylindrical, compressed laterally. The scales on the surface are rather broad but not very prominent. They are numerous but they are not placed in regular longitudinal rows.

Size. The size of the largest specimen was 28 mm. total length and 21 mm. length of the capitulum.

One of the specimens is attached to a little piece of the shell of a Gastropod mollusc, the other to a small black stick the nature of which is unknown to me.

The study of the structure of the animal contained within the capitulum has yielded the following results:

Mouth. Labrum not very bullate, triangular when seen from above; teeth hardly distinguishable. Palpi rather elongate with a tuft of hairs at and near the extremity.

Mandibles with three teeth equally distant from one another; the inferior angle blunt, with half a dozen small indistinct teethlike nobs. Hardly any hairs on the surface of the mandible.

Maxillae with three stronger and one small upper spine and a notch between these and the other spines. The notch is more distinct on the maxilla of the left side. The straight part of the edge beneath the notch bears 7 or 8 spines, which are all of them smaller than the three upper spines. The surface of the maxilla bears very few and very delicate hairs on the part near the edge only. The apodeme is long and flat at the extremity.

Outer maxillae with the inner margins covered with hair-like spines and the openings leading into the body cavity at the extremity of long tubular projections.

Cirri. First pair much shorter than the five posterior pairs, seated at a little distance from the second pair. The rami of the first pair are unequal in length and breadth: the shorter has 8 segments which are oblong in a transverse direction, the longer ramus has 12 segments which are about as long as broad. The segments of the posterior cirri are elongated, the cirri strongly curved. I counted 32 segments in one of the rami of the last pair.

Caudal appendages with 8 segments; each segment bears a few very delicate hairs on the inner side near the extremity, the segments 5—8 bear moreover a very long spine-like hair on the outer side near the extremity and the broad extremity of the 8th segment supports six of these.

Dwarf males. I found six of them in the pouch on the inner side near the extremity of the left scutum; there are several in the pouch on the right side also, but I left them intact so as not to damage the specimen more than was necessary. The males have the same shape as in the nearly related species: *Sc. javanicum* etc. The shape is oval, but as the peduncular extremity is slightly thicker, the whole is somewhat pear-shaped. A rather large and very distinct opening leads into the cavity of the sac. The surface is covered with short, spinelike hairs, which are larger and more numerous at the peduncular pole. No trace of calcareous plates or valves. The longest diameter of one of the males was nearly 1 mm. (0,93 mm.).

The species was dredged at:

Stat. 45. April 6, 1899. Lat. 7°24′ S., Long. 118° 15′.2 E. Depth 794 m. Bottom: fine grey mud. Two specimens.

Observations. At Station 271, December 21, 1899; lat. 5°46′.7 S., long. 134°0′ E.; depth 1788 m.; bottom green mud, a specimen of a *Scalpellum*-species was collected (together with three specimens of *Sc. inflatum*, mihi) which I think belongs also to the present species. It was found attached to a piece of pumice-stone and it seems to be a slightly older specimen. Its capitulum measures 27 mm., its peduncle is short and has a length of only 10,5 mm. The form of the capitulum and that of the valves corresponds with that of *Sc. chitinosum*, but the chitinous membrane covering the valves is considerably less thick: in consequence the shape of the valves can be made out much easier. The most marked difference I discovered is, that

the roof of the carina is quite flat in this specimen, there being hardly a trace of the longitudinal ridges which are distinct in the specimens of Station 45. This difference, however, is not considered by me of sufficient importance to separate from one another forms which quite correspond in other regards. Another difference is given by the two rostral latera which meet in this specimen over the whole length of the rostral margins, a rounded space in the middle of this margin only remaining uncovered by calcareous matter. A rostrum, however, could not be said to be present in this specimen either.

9. *Scalpellum inflatum* n. sp. Pl. VII, fig. 5 and 5*a*.

Valves fourteen. Capitulum bulky, swollen, covered by a thick chitinous membrane. Membranous interspaces between the valves. Umbo of the carina at some distance from the apex, the valve angularly bent in consequence. Scutum and tergum imperfectly calcified and not divided into two parts by a prominent ridge, their occludent margin strongly convex. Sides of the carina broad; upper latus pentagonal; infra-median latus elongated with the umbo near the base; carinal latus with the umbo near the base. Rostrum quite covered by membrane.

This species is represented by three specimens. It is without doubt nearly related to *Sc. compressum*, mihi, collected by the "Challenger". Its bulkiness, the structure and imperfect calcification of scutum and tergum distinguish it at once from the "Challenger" species. The specimens were covered with mud; the outlines of the valves could only be made out after cleaning the surface with a brush.

The capitulum is relatively short, about one and a half times as long as broad, also thick, swollen: its thickness is about 10 mm. in a specimen the capitulum of which measures 17,5 × 27 mm. The thick chitinous membrane which covers the valves and the interspaces between them, leaves uncovered the umbonal part of the scutum and the tergum. This chitinous membrane is very characteristically pigmented on some of the valves, the scutum especially. The chitinous interspace between the valves is particularly broad between the carina and the other valves.

The outline of the scutum is quadrangular, it is strongly bowed in transverse direction. The occludent margin is convex; where it reaches the tergum a recurved apex is formed which overlaps a part of the tergum. The calcified part consists of an elongated occludent and a short and narrow tergal segment.

The tergum is rather quadrangular than triangular. Its occludent margin is strongly convex forming with the concave uppermost part of the carinal margin a distinctly recurved apex. The scutal margin is nearly straight, the undermost part of the carinal margin which forms the fourth margin of the quadrangle is also straight. The calcified part of the tergum is V-shaped and is composed of a broader occludent and a slightly narrower carinal segment.

The carina has the umbo at some distance from the apex and the part above the umbo forming an angle with the part underneath it. A roof, slightly hollowed out longitudinally and growing rather wide towards the base of the valve, can be distinguished from the sides which are narrow at the base and of considerable width in the uppermost part.

Rostrum (fig. 5*a*) small, triangular, totally covered by thick chitinous membrane.

The upper latus is pentagonal with the sides of unequal length: the basal margin separating it from the infra-median latus is the shortest, the tergal margin the longest. The umbo is seated at a little distance from the apex.

The rostral latus is trapeziform: the scutal and basal margins run parallel, the lateral margin is convex and the rostral margin also slightly arched. The upper halves of the two rostral margins limit a small triangular space which is occupied by the rostrum.

The infra-median latus has a triangular basal part and an elongated triangular upper part. Where the two parts unite the umbo is seated. The lateral margin of this valve can not well be made out; most probably, it is slightly concave.

The carinal latus is quadrangular. The carinal margin is hollowed out, the umbo is seated at a little distance from the base. The basal margin is short, the lateral margin feebly arched, the upper margin short and straight.

The peduncle is cylindrical. The scales are narrow, laterally more strongly developed. They are placed on six longitudinal rows: one rostral, one carinal and on both sides two lateral rows. In the specimen figured there are about 9 scales in each longitudinal row.

Size. The specimen figured is the largest of the three. Its total length was 45 mm., that of its capitulum 27 mm. One of the specimens was found attached to a rounded piece of very porous stone, most probably pumice-stone, the two others to a specimen of *Sc. moluccanum*, the only one collected during the cruise of H. M. S. "Siboga".

The study of the structure of the female animal contained within the capitulum has yielded the following results:

Mouth bullate, same shape as in the other nearly related species. Second maxilla with the openings giving entrance to the body cavity at the end of long and flat tubular projections.

The first cirrus has both branches short, broad, flattened; the anterior branch considerably broader than the posterior. The second cirrus is placed at a little distance from the first with longer, cylindrical rami; the cirri of the four last pairs have very long and strongly curled rami.

The caudal appendages have six segments, the last one is abruptly cut off in a transverse direction and bears numerous hairs on the extremity.

No trace of a penis; I consider the large animals unisexual and female, the males as dwarf-males.

Four dwarf-males were found in the left pouch formed by a duplicature of the sac or mantle, at the inner side of the scutum in front of the adductor muscle. There are several in the right pouch also, but I could not count them without loosening the pouch from the scutum. The size of the males is 1 mm. in length and about 0,6 mm. in breadth; shape oval. Opening giving entrance to the sac at the capitular pole. The prehensile antennae are attached to the little body about the middle of its length. The whole surface bears minute hairs; they are longer and stouter, however, at the extremity opposite the capitular pole. A few longer, but very delicate hairs form a tuft, one at each side of the mantle- or sac-opening. The male corresponds on the whole in shape and structure with that of *Sc. javanicum*, *Sc. curiosum* etc.

H. M. S. "Siboga" collected this species at:

Stat. 271. December 21, 1899. Lat. 5° 46'.7 S., Long. 134° 0' E. Depth 1788 m. Bottom: bluish green mud of uniform appearance.

Observations. This species comes without doubt very near to *Sc. compressum*, mihi, the main difference being that the scutum and tergum do not show the prominent ridge characteristic of the "Challenger" species and are imperfectly calcified. I think it possible, however, that these differences may turn out to be of less importance than we now think, if we only had a richer material at our disposal. *Sc. compressum* was collected in the Celebes Sea at a depth of about 3900 m.

10. *Scalpellum javanicum* n. sp. Pl. VII, fig. 6, 6*a* and 7.

Valves thirteen, partly calcified, covered by chitinous membrane. Tergum strongly recurved. Carina with the umbo at some distance from the apex and the part beneath the umbo very feebly bent. Calcified part of the upper latus of an irregular triangular shape with the base of the triangle hollowed out. Calcified part of the infra-median latus wine-glass shaped. Carinal latus with the umbo at the base. Rostrum absent.

This species is represented in the collection of the "Siboga" by three specimens of different size, the largest of which has been figured. It is very nearly related to *Sc. chitinosum*, and to *Sc. japonicum*, mihi, the latter collected by the "Challenger". To the same group of species belongs *Sc. inflatum*. I describe them as so many different species though admitting the possibility that two or even more of them may afterwards turn out to represent different forms or varieties of the same species. . . . .

The capitulum of the present form has the occludent side more strongly arched than the carinal. It is rather broad, being only one and a half times as long as broad. In consequence of the roof of the carina being of considerable breadth near the base, the capitulum is thick in the undermost part — by no means so flat as that of *Sc. chitinosum*.

The scutum much resembles the same valve of *Sc. chitinosum*. The tergal segment of the present species, however, is much shorter than in the other. The apex of the scutum is slightly produced and forms a very delicate but distinct beak which reaches to the base of the tergum.

The tergum has the calcified part ∨-shaped. Its occludent margin is very strongly arched; the carinal margin of the calcified part is distinctly hollowed out; where the two margins join the strongly recurved apex is formed. The surface occupied by the tergum in this species is smaller than the corresponding surface in *Sc. chitinosum*.

The carina has the umbo at some distance from the apex: the relation of the length of the part above the umbo to the whole carina being about 1 to 7. The part underneath the umbo is only feebly bowed and has a roof and narrow sides. The roof grows rather broad towards the base and is nearly quite flat: the ridges so distinct in many other species being but very feebly indicated. The calcified parts of the sides are narrow.

The upper latus would probably have a pentagonal shape if totally calcified. The

calcified part has a somewhat irregular triangular form, the base (the margin directed towards the carinal latus) being hollowed out, the two others margins being convex. The apex is bluntly pointed, the sharply pointed umbo lying at some distance from the apex.

The rostral latus is trapeziform: the scutal and basal margins are parallel to each other, the latter being much shorter than the former.

The shape of the calcified portion of the infra-median latus is that of a wine-glass with a very short foot. The umbo is near the base.

The carinal latus is quadrangular and has the umbo at the base of the carinal margin, where it slightly projects beyond the line of the carina. The carinal margin is hollowed out and forms with the upper margin a very sharp angle. The lateral margin is indistinctly hollowed out, the basal margin forms a sharp angle with the carinal margin.

The peduncle is cylindrical, slightly narrower at its base than at the upper extremity. The scales on the surface are rather broad and placed at considerable distances from one another. One row is exactly at the carinal side (fig. 6*a*), then there are three lateral rows on each side of the peduncle, the rostral side being occupied by two rows, the scales of which alternate vertically with one another. There are no more than five or six scales in each vertical row.

Size. The largest specimen collected by H. M. S. "Siboga" has a total length of 35 mm. the length of the capitulum being 22 mm.

I have not studied the structure of the animal within the capitulum. I found the dwarf-males lodged in a pouch, formed by a duplicature of the mantle or sac at the margin of the scutum. Each side has a pouch and in the specimen I have investigated each pouch contained two males. I believe I observed them also in the other specimens; but as I did not wish to destroy them I did not investigate very closely with regard to this point. The shape of the male (Pl. VII, fig. 7) is oval; it is rather large, the longest diameter being not quite 1 mm., the breadth about half the length. Its surface is beset with short spine-like hairs; these are more numerous and especially longer at the peduncular than at the capitular pole of the little creature. A small opening at the capitular pole gives entrance to the interior of the sac. There is no trace of real calcareous plates which would represent the valves of the male; but as the surface of the sac is naked and smooth in the immediate neighbourhood of the opening, these slightly swollen marginal parts may after all stand for rudimentary valves. So far as could be ascertained without cutting sections, the structure of this male corresponds with that of the male of *Sc. regium*, *Sc. velutinum* and other deep-sea species. Of the internal organs the male reproductive organs (testicula and receptaculum seminis) are the only ones which are in a relatively good state of development, the abdominal segments with the long spines attached to them being visible but in quite a rudimentary condition.

This species was collected at:

Stat. 18. March 18, 1899. Lat. 7° 28'.2 S., Long. 115° 24'.6 E. Depth 1018 m. Bottom: fine grey mud. Three specimens.

11. *Scalpellum curiosum* n. sp. Pl. VII, Fig. 8, 8*a* and 8*b*.

Valves fourteen, imperfectly calcified, covered by a thin chitinous membrane. Calcified

part of the scutum with a lateral lobe along the tergal margin. Tergum V-shaped. Carina simply bowed with the umbo at a short distance from the apex. Upper latus irregularly pentagonal. Infra-median latus irregularly wine-glass-shaped. Rostrum small triangular.

This species is represented by a single specimen only.

The capitulum has an elongate oval shape, sloping gradually into the peduncle. The valves are separated by chitinous interspaces, their colour is not white but yellowish; they are covered by a thin chitinous membrane. The occludent margins of scutum and tergum form together a continuous arch; the apex of the capitulum is distinctly recurved.

The imperfectly calcified scutum consists of an elongate occludent segment, which is broadest at the base and a narrow tergal segment.

The tergum consists of two segments of about the same width, the carinal segment being much longer than the occludent segment. Apex pointed, distinctly recurved.

Carina simply bowed, for $^{5}/_{6}^{\text{ths}}$ of its length with a flat roof bordered on each side by a ridge. The remaining $^{1}/_{6}^{\text{th}}$ is between the umbo and the apex of the valve and is not flat but bowed laterally.

Upper latus irregularly pentagonal with the tergal margin longest and the umbo pointing in the direction of the tergal segment of the scutum.

Of the valves of the lower whorl, the triangular rostrum (fig. 8*a*) is by far the smallest, the carinal latus the largest. The latter valve has the umbo at the outer angle beneath the carina. The infra-median latus is relatively large; it is wine-glass-shaped, the umbo being placed below the middle and the main growth being upwards. Rostral latera nearly twice as long as broad, umbo placed at the corner where scutum, rostrum and rostral latus are nearest to one another. The exact shape of the valves may for the rest be judged from the drawing (Pl. VII, fig. 8*b*).

Peduncle with the upper end widest, slightly narrower at the base, flattened, more than half as long as the capitulum. Scales large, placed transversely, not numerous, forming together about 7 longitudinal rows. The scales are much nearer to one another in the upper end than downwards.

Size. The total length of the specimen was 13,7 mm., that of the capitulum alone 8,7 mm.

The only specimen was loose — to judge from the objects taken along with it I imagine that it has been attached to a shell or piece of stone.

Complemental male not observed.

The specimen was collected at:

Stat. 45. April 6, 1899. Lat. 7° 24′ S., Long. 118° 15′.2 E. Depth 794 m. Bottom: fine grey mud, with some Radiolariae and Diatomeae.

Observation. At the same Station 3 other species of *Scalpellum* were collected, viz. *Sc. polymorphum*, *Sc. chitinosum* and *Sc. crinitum*.

12. *Scalpellum polymorphum*. Pl. VII, fig. 9—11.

Valves fourteen, covered by membrane, imperfectly calcified in some of the specimens. Carina simply bowed, roof bordered on each side by a strongly developed ridge; umbo very

near the upper extremity of the valve. Rostrum narrow, partly covered by the lateral parts of the rostral latera. Infra-median latus elongate, rhombiform, with the umbo near the base. Carinal latus quadrilateral with the umbo quite at the base projecting beyond the line of the carina.

A perfectly calcified specimen (Pl. VII, fig. 9) of this form (form A) was collected at Station 256, another (form C) very imperfectly calcified (fig. 11) at Station 45. I would not have considered these two forms as belonging to the same species, but for the occurrence of a third form (form B: fig. 10) — collected also at Station 45 — to a certain extent intermediate between the two. A fourth specimen from the same Station 45 is exactly like that of fig. 11. It exhibits, however, what the specimen I have figured does not, the margins of the valves, and shows that these have exactly the shape of the corresponding valves in the other specimens I have at my disposal.

The capitulum is broad, oval, with the carinal side more strongly bowed than the occludent side. The apex is not very strongly recurved. The valves of the lower whorl increase in height from the rostral to the carinal side of the capitulum.

The scutum is perfectly calcified in all the specimens. It varies slightly in shape, as is shown by the figures 9—11 of Pl. VII, being at the tergal extremity narrower in the one specimen than in the other. The occludent margin is more or less strongly convex, the lateral margin hollowed out near the upper extremity. The basal and lateral margins describe together one continuous bow. The tergal and occludent margins meet at the apex and form a small pointed projection which overlaps the tergum.

The tergum is triangular. It has a convex occludent margin, whereas its carinal margin is slightly hollowed out in the upper and slightly convex in the lower half of its length. The scutal margin is nearly straight in the specimen with perfectly calcified valves; it is distinctly concave in the intermediate form (fig. 10) and hollowed out over three quarters of its length in the specimens with imperfectly calcified valves.

The carina is rather strongly bowed; its roof is deeply notched longitudinally. Its sides are broadest in the specimen with perfectly calcified valves and much narrower in the other specimens. A broad stripe of chitinous membrane fills the interspace between the carina and the other valves in these specimens. Another difference is that the umbo in the specimen from Station 256 is quite at the apex, and at a little distance from the apex in the specimens with less perfectly calcified valves.

The upper latus is pentagonal with the umbo at the apex. Beyond the umbo the apex is slightly more produced in the specimens with imperfectly calcified valves than in the others. In the latter the two basal margins are straight, in the others these margins are distinctly excavated.

The rostrum (fig. 9*a*) is very narrow and on both sides covered by the rostral latera.

The rostral latus is quadrilateral with the rostral margin much shorter than the lateral.

The infra-median latus is rather large, broad and flat at the upper extremity, much narrower at the base. The umbo is seated near the base at the tip of a triangular projection, which is slightly raised over the narrow base of the valve.

The carinal latus has a quadrangular shape when perfectly calcified, with the carinal

and basal margins meeting at the umbo and forming a sharp angle projecting beyond the line of the carina. The lateral and upper margins are of about the same length and meet at a very obtuse angle. In the specimens with imperfectly calcified valves, the calcified part has the form of a chinese boot, the part that is not calcified having the shape of a rectangular triangle.

The peduncle is cylindrical and shows 8 to 12 longitudinal rows of scales. In the specimens with perfectly calcified valves these scales are perhaps distributed slightly more regularly than in the others.

Size. The specimens figured measure 20, 19 and 26,6 mm.; their capitulums 13,3, 13,8 and 16,2 mm.

The study of the structure of the animal contained within the capitulum has yielded the following results:

Mouth triangular when seen from above, slightly bullate. Labrum with hardly distinguishable teeth; palpi conical, rather pointed at the extremity, with short and not numerous hairs, those on the apex little longer.

Mandibles with three teeth, which are pointed at the extremity and slightly swollen a little before the extremity; the inferior angle is blunt and furnished at the under side near the extremity with about four triangular, small, sharp teeth. Teeth 2 and 3, and 3 and inferior angle at shorter distances from one another than teeth 1 and 2. Near the inferior angle the surface bears a few very delicate hairs placed in groups of three or four. Along the under margin are planted short hairs.

Maxillae rather narrow; edge with a very distinct notch, a little above the middle; three strong spines, of which the first is the strongest, above the notch; one spine in the notch and 7 to 8 rather strong spines, which do not differ much from one another in strength, beneath the notch. The surface of the maxilla bears delicate hairs, partly in groups, on the distal extremity only. Apodeme broad, not very long.

Second maxillae of the ordinary shape, with hairs along the outer and inner side and also at the apex; a long tubular process, which is flat and truncated at the extremity, gives entrance to the body cavity.

Cirri. First pair at some distance from the second pair; rami unequal: the anterior shorter and broader, the posterior longer and narrower. Both rami have a long basal segment, which is indistinctly divided into smaller segments; the short ramus has moreover 4, the long ramus 8 distinct segments. Along the sides of the more or less flattened segments stout spines are planted on knobs; more slender spines or hairs are scattered all over the surface of the segments.

Second cirrus with about 20 segments in each ramus: the first segment is long and consists of several segments fused together; the following segments short, quadrangular, gradually growing longer, the last being as long as the foregoing ones but considerably narrower. Spines on the anterior side stouter and planted on knobs: four pairs on each segment as a rule; those on the posterior side more delicate, less numerous and not placed so regularly.

Sixth cirrus having in each ramus a long basal segment consisting of several segments fused together and about 25 clearly distinguishable segments. These grow gradually longer and narrower from the base to the extremity. Each segment bears, as a rule, 4 pairs of long spines

on the front side and one or two very short spines on the posterior margin near the extremity. The latter margin in some of the segments bears a spine at about the middle of its length; this margin, moreover, is delicately hirsute with extremely short hairs or teeth.

Caudal appendages long, consisting of 8 narrow segments. Each segment bears one longer hair near the extremity; those on the six last segments are very long, very stout and distinctly serrated. On the interior margin each segment has one or two much more delicate hairs. The last segment bears a group of three very long, feathered hairs or spines at the extremity.

No penis.

Male. I found only one male on the specimen I investigated more closely in this regard: it was the specimen with partly calcified valves represented on Pl. VII in Fig. 11. I found it on the inner side of the left scutum, near the occludent margin. It was not in a very good state of conservation, the body with the cirri hanging out of the opening of the sac. The longest diameter of the sac was about 1,2 mm., the breadth slightly over 0,5 mm. The sac or mantle itself was very thin and soft, not resistant, tough. About the middle of the longest diameter little prehensile antennae are attached. The surface shows numerous very short hairs, arranged in transverse rows, placed at short distances from one another.

This species was taken at the following places:

Stat. 45. April 6, 1899. Lat. 7° 24′ S., Long. 118° 15′.2 E. Depth 794 m. Bottom: fine grey mud. One almost perfectly, two imperfectly calcified specimens.

Stat. 256. December 11, 1899. Lat. 5° 26′.6 S., Long. 132° 32′.5 E. Depth 397 m. Bottom: greyish green mud. One perfectly calcified specimen.

Affinities. This very interesting species is perhaps more closely allied to *Sc. rutilum* Darwin than the descriptions of the two species would at present lead us to suppose. It is also similar in several regards to *Sc. distinctum* Hoek.

13. *Scalpellum distinctum* Hoek. Pl. VII, fig. 12.

Hoek, Cirripedia collected by H. M. S. "Challenger". 1883. p. 111, pl. VI, fig. 10 & 11.

H. M. S. "Siboga" collected a *Scalpellum* at three different Stations which I think is identical with the above-named species. The very curious forms of the scutum, the upper latus and the infra-median latus leave no doubt on the matter.

Yet the resemblance is not absolute and I have therefore thought it useful to give a figure of one of the "Siboga" specimens. The original description was given from a single specimen, a circumstance which of course makes that description less reliable.

The smallest of the two specimens collected by the "Siboga" (total length 20 mm., length of the capitulum 14,4 mm.) has been figured. (The capitulum of the "Challenger" specimen had a length of 15,5 mm. and that of the largest "Siboga" specimen 19 mm.). Comparing the figure with that given in my "Challenger" Report (Pl. VI, fig. 10) one is struck with the much more prominent lines of growth and ridges on the valves of the "Challenger" specimen. To some extent this is the fault of the lithograph: on the original pencil-drawing these lines are much more delicate; on the upper part of the infra-median latus they are however stronger developed in the "Challenger" than in one of the "Siboga" specimens.

The same is the case with the ridges along the roof of the carina: these ridges are by no means so distinct in the "Siboga" specimens as in that of the "Challenger". I should mention also that the scales of the peduncle which in the "Challenger" specimen are placed in not very regular rows, in the largest "Siboga" specimen may be said to form longitudinal rows; in the smaller specimen, however, this can hardly be said.

With regard to the shape of the carina I found that this species belongs also to the Sectio C: the umbo of the carina is not quite at the apex of the valve, but at a short distance from it. In this regard it much resembles *Sc. polymorphum* with which it corresponds also in several other regards.

Finally I must point out, that the chitinous interspaces between the valves which were rather broad in the "Challenger" specimen, are much more prominent in the larger "Siboga" specimen (from Station 175) than in the smaller (the one figured) which was taken at Station 208.

The structure of the animal of the only specimen taken by the "Challenger" was not studied; I have thought it useful, therefore, to examine one of the "Siboga" specimens.

Mouth not very bullate; crest of the labrum with a row of very small knobs at the place of the teeth; palpi conical, rather small, with a group of short bristles at the tip and a couple of very short spines on the internal margin about the middle of its length.

Mandibles with three teeth; distance between 1 and 2 slightly greater than that between 2 and 3; inferior angle close to tooth 3, short, rounded and delicately pectinated. Short hairs are planted along the under margin.

Maxillae with a not very distinct notch about or a little above the middle of the edge; above the notch three unequal spines, in the notch (or as fourth spine above the notch) one spine; beneath the notch six spines. Apodeme stout, rather long and broader at the extremity.

Outer maxillae rounded, with the bristles divided into two separate tufts; the orifice giving entrance to the body cavity at the end of a long and flat process, transversely cut off at the extremity.

Cirri. First pair short, not separated from the second by an interspace; rami unequal in thickness and slightly in length; the shorter ramus has about 8 broad, the longer 10 more cylindrical segments. The first segment in both rami is much longer than the others, the last one considerably shorter. In both rami the segments are thickly clothed with spines.

Second cirrus (in the specimen investigated) both rami broken off at one side, and one ramus broken off at the other side. The only remaining ramus has 17 segments, the first of which is rather long, the following nearly quadrilateral, the last ones cylindrical and much narrower.

Sixth cirrus has 22 segments in both rami: the first one very long, then come four or five nearly quadrangular segments, the following nine growing longer and narrower, the 14th being the longest of all and nearly five times as long as broad. The last segments grow still narrower but diminish in length: the last is very narrow and tapers towards the extremity, where three short spines are planted. The number of pairs of spines found on the front side of each segment is from three to seven; this number is largest at the 14th segment.

Caudal appendages long and narrow, tapering towards the extremity and consisting of 5 (left side) or 6 (right side) segments, of which the penultimate is the longest. Near the

end of most segments are planted a few delicate hairs, one of those found at the tip of the last segment being much stouter and more than twice as long as the last segment. This hair is very distinctly barbed or feathered.

No penis.

Dwarf males. I found three on the left and two on the right side of one of the specimens. They are lodged in a pouch formed by the mantle along the inner side of the scutum, near the occludent margin, slightly in front of the adductor scutorum muscle. They have the ordinary shape and structure; their size is 0,8 × 0,5 mm. The antennae are situated at about $^1/_3{}^{rd}$ the length of the animal from the posterior extremity, the anterior extremity or pole being considered to be where the large opening which gives entrance to the sac is found. No trace of calcareous plates or rudimentary valves. Surface covered with very small hairs or spines, arranged on transverse rows all over the surface. The transverse rows are very close to one another and numerous. A few slightly longer hairs are planted on both sides of the longer axis of the oval opening of the sac. Of the interior structure are seen the rather large testicula, the pointed extremities of which are directed towards the posterior pole of the body; then the receptaculum seminis densely filled with threadlike spermatozoids; cement-glands at the base of the antennae; a rudimentary thorax and abdomen bearing long spine-like hairs at the extremity. The latter represent the cirri and are directed towards the opening of the sac.

The "Challenger" took a specimen of this species in the neighbourhood of the New Britannia Archipelago, east of New Guinea; H. M. S. "Siboga" collected specimens at the following places:

Stat. 88. June 20, 1899. Lat. 0° 34′.6 N., Long. 119° 8′.5 E. Depth 1301 m. Bottom: fine, grey mud. One specimen.

Stat. 175. Aug. 30, 1899. Lat. 2° 37′.7 S., Long. 130° 33′.4 E. Depth 1914 m. Bottom: fine, grey and green mud. One specimen, attached to the shell of a Gastropod.

Stat. 208. Sept. 22, 1899. Lat. 5° 39′ S., Long. 121° 23′.5 E. Depth 2218 m. Bottom: grey mud. One specimen, a small one, attached to a chitinous tube, the skin of the siphon of a Lamellibranchiate Mollusc most probably.

Observations. This species is nearly related to the foregoing: *Sc. polymorphum*. The form of the scutum and of several other valves, however, show its distinctness.

D. Sectio: **Arco-Scalpellum**

14. *Scalpellum moluccanum* Hoek. Pl. VII, fig. 13.

Hoek, Cirripedia collected by H. M. S. "Challenger". 1883, p. 104; pl. V, figs. 3, 4.

H. M. S. "Siboga" collected one specimen of a *Scalpellum* species which I think must be referred to this species. To the left side of this specimen two rather large specimens of the species which I have proposed to call *Sc. inflatum* (p. 76) were found attached and in consequence of this the specimen is slightly abnormal in shape. The carina especially has grown quite asymmetrical making it difficult to judge its original shape.

The specimen belongs certainly to the group of species: *Sc. regium*, *Sc. Darwini* and *Sc. moluccanum* which are nearly related to one another. It comes nearest to *Sc. moluccanum* and as it was taken at about the same locality (see below), I may be entitled to consider it

as belonging to that species. The description of the "Challenger" specimen was given from a single specimen.

The valves of this specimen are to a large extent covered by chitinous membrane, leaving (exactly as in the specimen of *Sc. moluccanum*, described in the "Challenger" report) the apices of the valves uncovered. This membrane was moreover wanting on the left side of the capitulum, at the places from which I had removed the other Scalpellums. Continuing to take away this chitinous membrane I discovered that the area of each valve was distinctly limited by a clear line and that the calcareous valve only occupied a part of that area: only after this chitinous covering was removed was it possible to make out the exact shape of each valve. To decide whether *Sc. regium* and *Sc. moluccanum* are really different species, and also to which the present specimen belongs, it would by all means be necessary to deal with the type specimens as I have now done with the "Siboga" *Scalpellum*. Fig. 13 of Pl. VII represents that specimen, seen from the left side after the chitinous covering was removed from the capitulum.

Whereas the "Challenger" took the species at Lat. 4° 21′ S. and at Long. 129° 7′ E. from a depth of 1425 fathoms (about 2565 m.), H. M. S. "Siboga" collected it at:

Stat. 271. December 21, 1899. Lat. 5° 46′ S., Long. 134° 0′ E. Depth 1788 m. Bottom: bluish green mud of a uniform appearance.

15. *Scalpellum hamulus* n. sp. Pl. VII, fig. 14 and 14*a*.

Surface of the capitulum and of the peduncle covered by a thin membrane with very short hairs. Valves fourteen. Carina simply and strongly bowed with a nearly flat roof which is very wide at the base. Upper latus very narrow at the base. Rostrum triangular. Valves of the lower whorl small with exception of the rather well developed carinal latus. Umbo of the latter at the upper extremity.

This beautiful species is represented by one specimen only.

The capitulum is rather robust, thick especially in the under part; it is of an elongate oval shape with the apex slightly produced. The valves of the lower whorl are relatively small, the carinal latus excepted. The valves touch each other and are covered by a membrane which is clothed with short hairs.

The scutum is very broad at the base, the lateral margin not beginning above the apex of the infra-median latus (as is the rule in this genus) but above the middle of the upper margin of the carinal latus. Apex produced; tergal margin slightly hollowed out; occludent margin convex. Not quite twice as long as broad.

The tergum is likewise rather broad. It has the scutal margin convex and the occludent margin also convex. The apex is slightly produced and terminates in a short but rather sharp and feebly recurved point.

The carina is simply bowed with a nearly flat roof widening very considerably from the apex to the base. The roof is slightly convex laterally and its borders insensibly pass over into the rather narrow side parts.

The upper latus is of a triangular shape with the umbo at the apex fitting into the angle formed by the lateral margin of the scutum and the scutal margin of the tergum. The

carinal margin describes a curve, that part which represents the basal margin of the same valve in other species being very short.

The rostrum (fig. 14*a*) is small, triangular, with the base directed towards the peduncle. Its apex separates the two umbones of the rostral latera from one another; though small the rostrum is distinctly visible at the surface.

The rostral latus is extremely low, its scutal and basal margins running nearly parallel to each other.

The infra-median latus is also small. It has a triangular shape with the umbo at the apex.

The carinal latus has a convex carinal and a hollowed out upper margin; where they meet the umbo is seated; that part projects outwards and forwards.

The peduncle is robust, cylindrical and rather long, being about $^2/_3^{rds}$ as long as the capitulum. It is covered by prominent scales placed in five longitudinal rows.

Size. The length of the animal is 30 mm., that of the capitulum 19 mm.

The specimen representing this species was collected by the "Siboga" at:

Stat. 256. December 11, 1899. Lat. 5° 26'.6 S., Long. 132° 32'.5 E. Depth 397 m. Bottom: greyish green mud.

Observation. This species is no doubt nearly related to the Atlantic species *Sc. velutinum* Hoek. Yet it can be easily distinguished from that species by the form of the upper latus, by the rostrum and by the shape of the carinal latus. It belongs to the same group of species as *Sc. diota* n. sp. but the rostrum and the infra-median latus of the latter species are so different that there can be no question, I think, of these two forms being distinct.

16. *Scalpellum diota* n. sp. Pl. VII, fig. 15 and 15*a*.

Valves 14, covered with hairy membrane. Carina simply bowed, large. Valves of the lower whorl small, increasing in height from the rostral to the carinal side of the capitulum. Carinal latus with the umbo at the strongly recurved apex.

This species is represented by one specimen only.

Capitulum with the occludent margin nearly straight and the carinal margin very strongly convex, with the upper valves large and those of the lower whorl small. The colour of the specimen (in spirits) is light pink, large red spots being observed along the margins of the larger valves etc.

Scutum quadrilateral, not quite twice as long as broad. Occludent margin nearly straight, lateral margin convex, apex produced, pointed, slightly overlapping the tergum.

Tergum large, triangular. Occludent margin nearly straight; apex pointed, slightly produced, hardly curved towards the carina.

Carina simply bowed, roof flat, a depression being only visible at the base between the two carinal latera. The roof increases in width very considerably from the apex to the base. Sides flat, rather narrow.

Upper latus triangular with the umbo at the apex, this part acuminated fitting into the angle between the scutum and the tergum. Lateral margin concave, carino-lateral margin strongly convex and divided into two unequal parts by the recurved apex of the carinal latus.

Rostrum (fig. 15*a*) very small, elongate, not triangular, laterally covered by the rostral latera.

Rostral latus quadrangular, low, with the lateral margin only slightly longer than the rostral margin.

Infra-median latus small, narrow, slightly increasing from the recurved apex to the base. Umbo at the apex.

Carinal latus with the umbo at the strongly recurved apex. The carinal margin is convex, the upper lateral margin hollowed out.

Peduncle short, flat cylindrical, only $^1/_3{}^{rd}$ of the length of the capitulum. Scales rather large, placed in five longitudinal rows.

Size. The total length of the specimen is 10 mm., that of the capitulum about 7,5 mm.

The specimen representing this species in the collection of the "Siboga" was taken at:

Stat. 251. December 8, 1899. Lat. 5° 28′.4 S., Long. 132° 0′.2 E. Depth 204 m. Bottom: hard coral sand.

Observations. This species is nearly related to *Sc. hamulus* as also to *Sc. rubrum* Hoek which was taken by the "Challenger" near Luzon, at a depth of 180 to 207 m. There are however small differences in the shape of the valves, of the rostrum especially, as also in the size and number of the scales of the peduncle. The description of *Sc. rubrum* was also given from a single specimen; its capitulum measured only 5 mm.

17. *Scalpellum sessile* n. sp. Pl. VII, fig. 16.

Valves thirteen, not covered by membrane. Carina short, simply bowed with the umbo at the apex, no flat roof, but laterally bowed. Upper latus trapeziform. Valves of the lower whorl large. Infra-median latus triangular, with the umbo at the apex and a rather broad basis. Carinal latus very large, pentagonal, with the umbo at the upper extremity.

This species is represented by four specimens, one being very small.

The capitulum is rather thick, with the carinal margin much more bowed than the occludent margin. No membrane covers the valves. Whereas the valves of the lower whorl are large, the scutum, tergum and carina are relatively small, the upper latus medium-sized. The valves nearly touch each other; they cannot be said to be separated by chitinous interspaces. The length of the capitulum is twice the breadth it has in the middle, a little above the base of the carina.

The scutum is about twice as long as broad. The occludent margin is hollowed out in the lower and convex in the upper part; the apex is produced, the tergal margin much longer than the basal margin. The lateral margin is more than half the length of the occludent margin.

The tergum is triangular; its three margins, the carinal being the longest, are convex.

The carina is short, simply and rather strongly bowed, with the umbo at the apex. Roof and sides are not separated by ridges, the dorsal surface of the valve being laterally bowed.

The upper latus is trapeziform. There is a short but distinct carinal margin, the length of which is about one fourth that of the scutal margin. The scutal and basal margins meet together at a rather sharp angle.

The rostral latus quadrangular. Basal and scutal margins nearly parallel to each other, the second twice as long as the first. Rostral margin nearly straight and only a trifle shorter than the slightly convex lateral margin.

The infra-median latus is triangular, with a well-developed basal margin and the umbo at the apex. Its rostral margin is slightly hollowed out, its carinal margin slightly convex.

The carinal latus is very large and has an irregular pentagonal shape. Its carinal margin is divided into two: a large part meeting that of the same valve of the other side along the whole length and a very short part separating the valve from the carina. The latter margin forms an angle with the upper margin and here the umbo of the valve is situated. Upper and lateral margins of about the same length; basal margin very short.

The peduncle is short and has a conical shape. The surface is covered with rather large scales, which are chitinous but not very prominent. They are placed in seven not very distinct longitudinal rows.

Size. The specimen figured Pl. VII, fig. 16 has a total length of 5,2 mm., the length of the capitulum being 4 mm. They were found attached to a small stem of what I take to be a calcareous coralline.

The study of the structure of the animal within the capitulum has yielded the following results:

Mouth seen from above triangular, with the part directed forward rounded and bullate. Labrum with a row of small but distinct teeth; palpi conical with a tuft of spines at the tip and a row of half a dozen shorter spines or hairs along the outer margin.

Mandibles with three teeth; the distance between the extremities of tooth 1 and 2 twice as great as that between tooth 2 and 3. Inferior angle pectinated and at a very short distance from tooth 3. The upper margin of tooth 3 shows traces of being pectinated — showing agreement with *Sc. balanoides* Hoek also in this regard.

Maxillae with the outer edge deeply notched about the middle; above the notch 4 spines, two of which are longer; beneath the notch the edge bears 5 or 6 spines and is slightly protuberant.

Second maxillae not larger than usual and of the ordinary shape; spines in three groups, with some distance between two; openings giving entrance to the body-cavity at the tip of a swelling — not at the end of a tubular process.

Cirri. First pair close to the mouth and at some distance from the second pair. Rami unequal: shorter ramus slightly broader, composed of 5 or 6 segments; longer ramus more elongated, having 7 segments. In both rami the limits of the segments are indistinct; they bear numerous hairs, partly at the surface, partly along the margins.

Second cirrus also has unequal rami; the segments of both rami are cylindrical but the longer one has eleven, the shorter only nine segments.

Sixth cirrus (like the 3rd—5th) not very elongated with nearly equal rami of 16

segments. Several segments have only two pairs of spines at the anterior margin: one pair very long near the extremity and a second shorter pair about the middle of its length.

Caudal appendages very minute, one-jointed with a few spines near the extremity and a short and feeble claw-like spine at the tip.

No penis.

The eggs formed a single cluster in the specimen I opened; they had a much more elongated shape than in several other species of *Scalpellum*. They measured 0,47 × 0,27 mm., their number being 17.

This specimen was furnished with a dwarf male at one side only. The latter was attached to the inner surface of the scutum near the occludent margin. Its shape was pear-like, the peduncular pole being considerably the narrower. It showed no trace of valves. The prehensile antennae were inserted very near the peduncular extremity. Its size was 0,5 × 0,3 mm.

The "Siboga" collected this interesting little species at:

Stat. 241. December 1, 1899. Lat. 4° 24'.3 S., Long. 129° 49'.3 E. Depth 1570 m. Bottom: dark sand with small stones.

Observation. This species is very nearly related to *Sc. balanoides* Hoek collected during the cruise of the "Challenger" at Lat. 5° 42' S., and Long. 132° 25' E. at a depth of 129 fathoms, about 230 m. The latter species has about the same size and lives attached to the arms of *Metacrinus Murrayi*. *Sc. sessile* differs from it, 1° by the trapezoid not triangular form of its upper latus; 2° by the greater breadth of its infra-median latus; 3° by the form of its carinal latus, which in *Sc. balanoides* has the apex, where the umbo is, produced and even slightly recurved; and 4° by the shape of the carina, which is much more strongly bowed in *Sc. sessile* than it is in *Sc. balanoides*. Perhaps on closer examination of the "Challenger" form at least some of these differences might turn out to be not so important as I must consider them now.

18. *Scalpellum ciliatum* n. sp. Pl. VII, fig. 17.

Valves fourteen, covered by membrane, clothed with very long hairs. Carina simply bowed, no flat roof. Tergum very large. Valves of the lower whorl small. Upper latus indistinctly quadrangular. Rostrum small, triangular.

This very small species is represented by a single specimen only.

The capitulum elongated, with the apices of the tergum and scutum produced. The hairs which clothe the membrane are longest along the carinal margin of the capitulum.

The scutum is elongated, quadrilateral, more than twice as long as broad, with the upper part produced and pointed.

The tergum is large, elongated rhomboid; the umbo is at the apex which is bluntly pointed and not produced.

The uppermost (umbonic) parts of scutum and tergum are naked, not covered by membrane.

The carina is simply bowed longitudinally and also laterally. It reaches to about half the length of the carinal margin of the tergum.

The upper latus has the scutal margin parallel to the occludent margin of the scutum and its apex is not produced. The carinal and basal margins form together an arch.

The rostrum is very small, triangular, with the base of the triangle directed towards the scuta.

The rostral latus is quadrangular with the longer scutal and shorter basal margins parallel.

The infra-median latus is triangular; umbo at the upper extremity.

The carinal latus has a pentagonal shape with the umbo at the upper extremity, at the angle formed by the carinal and upper lateral margin.

The peduncle is cylindrical and relatively short; the scales are placed in transverse rows and are large and of an irregular shape; they seem to be broken off from the lower part of the peduncle.

Size. Length of the capitulum 3,4 mm., of the whole animal 4,7 mm.

This species was taken at:

Stat. 227. November 13, 1899. Lat. 4° 50'.5 S., Long. 127° 59' E. Depth 2081 m. Bottom: grey mud with an upper layer of brown, both mixed with sand. One specimen.

Observation. This species is, most probably, nearly related to *Sc. hirsutum* Hoek collected by the "Challenger" at a depth of 1500 m. between Celebes and Halmaheira. There are, however, several more or less important differences between the two forms, which I think make it preferable to consider them as distinct; e. g. in the shape of the scutum, tergum and upper latus, but especially in that of the carina and the rostrum. As *Sc. hirsutum* has a capitulum of 6 mm. and *Sc. ciliatum* of 3,4 mm. only, the latter may be found to represent a not quite full-grown stage of the first — a somewhat richer material, however, is necessary to make this out.

19. *Scalpellum pellicatum* n. sp. Pl. VII, fig. 18, 18*a* and 19.

Valves fourteen, covered by membrane of a velveteen appearance. Carina simply bowed, roof nearly flat not bordered by ridges; apex projecting freely. Upper latus quadrangular. Rostrum triangular. Infra-median latus triangular. Carinal latus with the umbo projecting beyond the line of the carina.

This species is represented by one large, one fairly large and half a dozen small specimens. The largest specimen is figured.

The capitulum is white, covered by a membrane which bears short hairs standing off from the surface and thus giving it a velveteen appearance. Most of the valves are separated from one another by chitinous interspaces. The capitulum is broadest at its base, its length is less than one and a half times the breadth.

The scutum is quadrangular; the occludent margin is slightly convex, the basal and lateral margins are nearly straight, the tergal margin slightly hollowed out and forming with the occludent margin a slightly recurved apex.

The tergum has the carinal margin divided into two parts: a larger lower part which is convex and a shorter upper part which is straight. This upper part of the carinal margin runs parallel to the scutal margin: hence the whole valve has the shape of a parallelogram.

The carina is simply and strongly bowed and has the umbo at the apex which projects freely beyond the carinal margin of the tergum. The roof of the carina is broad at the base,

the sides are best developed in the under part of the valve; the angle the roof forms with the side is greater than 90°.

The upper latus is quadrangular and rather large. The angle formed by the scutal and basal margins is truncated. The umbo is near the angle the scutal margin forms with the tergal. The carinal margin is the shortest.

The rostrum is triangular with the apex directed to the base of the scuta. There is a narrow but distinct chitinous interspace between the rostrum and the rostral margins of the rostral latera.

The rostral latus is broad but very low; the scutal margin runs parallel to the basal margin, the short lateral and rostral margins are both convex.

The infra-median latus is triangular, the umbo is at the apex which is distinctly curved towards the rostral side of the capitulum: the rostral margin is hollowed out, the carinal margin distinctly convex.

The carinal latus is pentagonal, the carinal margin being divided into two parts. The upper part is hollowed out, the lower convex. Where they meet the umbo is seated: a pointed and slightly recurved triangular part projects beyond the line of the carina. The basal, lateral and upper margins of the carinal latus are of about the same length.

The peduncle is cylindrical, bent towards the rostral side. It is broadest where it is attached to the capitulum and is laterally compressed and conical in the upper part. It is covered with a hairy transparent membrane through which the scales are visible. They are placed at some distance from one another and are arranged in seven or eight longitudinal rows.

Size. The capitulum of the largest specimen had a length of 27 mm. The total length was about 40 mm.

According to the label the larger specimen of this species was found attached to a specimen of *Culeolus thysanotus* Sluit. This was collected at Station 94. The smaller specimens are attached to one another, as also to a small black coloured stick or spine, the nature of which is unknown to me.

The study of the structure of the animal contained within the capitulum has yielded the following results:

Mouth seen from above triangular, with the apex of the triangle directed towards the adductor muscle; the prominence on which the mouth is situated is not very elevated in this species.

Labrum with extremely small teeth along the edge; palpi short, broad at the base, triangular, with the apex rounded. The inner margin is furnished with numerous hairs growing slightly longer and more numerous towards the apex.

Mandibles with three teeth and the inferior angle; the latter delicately pectinated on both sides, but especially so along the interior margin; a slightly broader spine or small tooth at the tip of the inferior angle. The distance between tooth 1 and 2 about twice as long as that between 2 and 3, or 3 and the inferior angle. Surface of the exterior part with numerous delicate hairs, placed in groups of two or three.

Maxillae have the edge without distinct notch, but with a little excrescence bearing two spines at the tip at about one fifth of the length of the edge from the inferior angle.

Spines numerous and of nearly equal size, the only exception being the upper spine which is considerably stronger. Only a small part of the surface, near the exterior edge, is covered with delicate hairs which are placed in groups of two or three.

Second maxillae with the inner margin distinctly divided into two rounded parts each bearing a group of delicate spines. Outer surface curved and also bearing numerous spines; opening giving entrance to the body-cavity on a small rounded knob.

Cirri. First pair placed at some distance from the second, close to the mouth; rami short and unequal. The anterior is the shortest and has eight to nine segments, most of them being much broader than long; posterior ramus has eleven to twelve segments which are nearly as long as broad, the last being nearly spherical. Surface of all the segments covered with hairs, the distal segments being more densely clothed than the basal. Several hairs, on the distal segments of the longer ramus especially, long and irregularly curled.

Second pair longer than the first pair; shorter, however, and more robust than the cirri of pair 3—6. Longest ramus has 24 segments: the first 10 nearly quadrangular, next come 8 longer segments, which are about twice as long as broad, finally 6 segments which are narrower, but slightly longer than broad. Shortest ramus having 22 segments, 11 of which are nearly quadrangular, 5 cylindrical and 6 much narrower and shorter. Spines on the front side: 3 or 4 pairs on the middle segments, 1 or 2 pairs on the distal segments; on the posterior side: groups of 4—6 stouter and a few more delicate spines on each segment near the extremity.

Sixth cirrus long, slender, 28—29 segments in each ramus. Segments 1—8 nearly quadrangular, 9—20 cylindrical, the longest about twice as long as broad; segments 21—29 narrower, not much shorter than the middle ones. On the front of each segment are 4 to 5 pairs of spines, on the dorsal side groups of three or four spines, of which one or two are stronger, near the extremity of each segment.

Caudal appendages (Pl. VII, fig. 19) 4-jointed with a long and very broad basal segment and three minute distal segments; extremely short hairs along the interior margin of segment 1, 2 and 3 and at the extremity of 4.

Penis short, about twice as long as the caudal appendages, cylindrical, conical at the extremity; indistinctly ringed and having short hairs spread over its surface.

Complemental males. I observed on the right side of the hermaphrodite animal one, and on the left side two small males. They are very small (0,6 × 0,4 mm.), have a short-oval shape and are lodged in a pouch formed by a duplicature of the mantle, which at that place is rather thick and little transparent. The sac or mantle which covers the little male has the surface covered with minute particles of sand or mud, whereas the hairs which ordinarily occur could not be made out. Near the opening of the sac only some very short spines were seen which seemed to be inserted on the tip of a couple of small excrescences.

The Stations where this species was collected are:

Stat. 94. June 26, 1899. Lat. 5° 11′.2 N., Long. 119° 35′.4 E. Depth 450 m. (chart). Bottom: apparently sand and stone.

Stat. 256. December 11, 1899. Lat. 5° 26′.6 S., Long. 132° 32′.5 E. Depth 397 m. Bottom: greyish green mud.

Observation. In the smaller specimens the breadth of the capitulum at the base is about the same as at the height of the upper latus. In these the carinal margin of the tergum is not so distinctly divided into two parts, the apex of the carina does not project freely and the umbo of the carinal latus is not seated at the tip of a triangle which projects beyond the line of the carina. As I feel convinced that these smaller specimens, some of which were attached to the larger, belong to this species, I am inclined to admit that several of these differences result from there being a considerable difference with regard to age and maturity between the specimens at my disposal.

(Remark when correcting the proof of the description given above.) This species is, without doubt, nearly related to *Sc. sociabile* Annandale[1] from Bali Straits, depth 160 fathoms = 310 m. The characteristic figure Annandale gives of the group of specimens of his new species is perhaps not quite so useful for recognizing an individual specimen. As there also occur differences between his description of the valves, of the appendages, mouth-parts etc. and mine, I think it better therefore to keep my species separate; future investigators will, no doubt, easily find out whether the two species are identical or not.

20. *Scalpellum imbricatum* n. sp. Pl. VIII, fig. 15 and 15*a*.

Valves 14. Surface of valves covered by a slightly villous chitinous membrane. Carina very large, nearly reaching to the apex of the tergum, simply bowed, roof furrowed longitudinally. Rostrum narrow, indistinct. Infra-median latus narrow, with the umbo at the apex. Carinal latus with the umbo at a short distance from the base, slightly projecting beyond the line of the carina.

This species is represented by one specimen only.

The capitulum is rather narrow, the carinal margin regularly bowed, the curvature nearly reaching to the apex of the scutum. The surface is covered by a thin slightly villous membrane which makes it difficult at first sight to distinguish the margins of the valves. There are slight interspaces between the different valves, specially distinct in the corner where the upper latus, the carinal and infra-median latera meet.

The scutum is quadrilateral; the length not quite twice the breadth. The apex is pointed and slightly overlaps the tergum.

The tergum is triangular, its occludent margin nearly quite straight. The apex is bluntly pointed and hardly produced.

The carina is very large, nearly reaching to the tip of the tergum. It has a very pronounced curvature. It has well developed sides and a roof that increases in breadth though not very much from the apex downwards. The roof is distinctly furrowed longitudinally.

The upper latus is pentagonal; its umbo is at the apex which fits into the angle formed by the scutal margin of the tergum and the lateral margin of the scutum.

The rostrum (Pl. VIII, fig. 15*a*) is narrow, slightly increasing in breadth downwards, fitting exactly between the rostral margins of the rostral latera, more or less concealed by membrane.

[1] Annandale, N., Malaysian Barnacles in the Indian Museum. Memoirs of the Asiatic Society of Bengal. I, 5, 1905, p. 77, pl. VIII, fig. 2.

The rostral latus is quadrilateral, with the lateral margin considerably longer than the rostral margin.

The infra-median latus is narrow, pointed at the apex where the umbo is.

The carinal latus has the umbo near the base, slightly projecting beyond the line of the carina. Its carinal margin is distinctly hollowed out.

The peduncle is nearly cylindrical; its length is nearly $^2/_3$rds of the length of the capitulum. Its surface is covered with small rounded scales, partly covering one another, each scale being rounded and slightly swollen at the free extremity.

Size. Length of the whole animal 12,5 mm., of the capitulum 8,6 mm.

A single specimen of this species was taken by the "Siboga" at:

Stat. 251. December 8, 1899. Lat. 5° 28'.4 S., Long. 132° 0'.2 E. Depth 204 m. Bottom: hard coral sand.

Observation. The size and the form of the carina, combined with the shape of the valves of the lower whorl, of the carinal latus especially, will make it easy to distinguish this species from those nearly allied (e. g. *Sc. elongatum* Hoek), should it again turn up. It belongs without doubt to the same group of species which include *Sc. pellicatum* mihi and *Sc. sociabile* Annandale.

21. *Scalpellum crinitum* n. sp. Pl. VIII, fig. 1 and 1*a*.

Valves fourteen, covered by hairy membrane and separated from one another by broad chitinous interspaces. Carina simply bowed with the umbo at the apex, roof laterally convex. Rostrum flat conical. Infra-median latus triangular. Carinal latus with the umbo slightly beneath the middle of the carinal margin.

The capitulum is elongated, twice as long as broad, rather thick. The limits of the valves are very indistinct, in consequence of the whole capitulum being covered by a hairy membrane, to which moreover algae or other organisms are attached. Broad chitinous interspaces occur, especially between the carina and the other valves and round the upper latus.

The scutum is quadrangular with the occludent margin nearly straight and the umbo at the slightly produced apex. The valve is rather narrow at the base and grows slightly broader towards the upper extremity. Ridges of growth distinct on the under part of the valve.

The tergum is triangular. Its occludent margin is convex, its apex rounded and not produced in the specimen figured, rather sharp, though hardly produced in the other specimens.

The carina is simply bowed and has the umbo at the apex. The roof is laterally convex and slopes insensibly into the sides. The hairs which are nowhere wanting on the chitinous membrane that covers the capitulum, are longest along the free margin of the carina from which they stand off at right angles.

The upper latus is elongated and narrow, especially in the basal part. This at least holds good for the calcified part of the valve. The scutal margin is hollowed out, its carinal margin is convex.

The rostrum has about the same height as the rostral extremity of the rostral latus.

It is broader near the base, very narrow in the upper part. It is not covered by the lateral parts of the rostral latera.

The rostral latus is of an irregular shape, its basal margin being short and going over imperceptibly into the lateral margin which is convex. The scutal margin is slightly hollowed out, the angle it describes with the lateral margin truncated.

The infra-median latus is triangular with the rostral margin slightly hollowed out and the carinal margin convex. The umbo is at the apex which is distinctly bent forward.

The carinal latus has the umbo a little beneath the middle of the carinal margin. The part of that margin above the umbo is strongly hollowed out, that beneath the umbo distinctly convex. The basal margin is short, the lateral margin feebly hollowed out. The upper margin forms a sharp angle with the upper part of the carinal margin. That part of the latter where the umbo is situated can hardly be said to project beyond the line of the carina.

General remark concerning the form of the valves. The form of the valves as described above only appears after a good deal of the feltlike membrane with the calcareous algae and the muddy particles attached to them has been removed.

The peduncle is cylindrical. The scales on the surface are not very numerous, broad and rather prominent. They are placed on five not very regular rows, about five scales forming such a row.

Size. Length of the whole animal 11,25 mm., of the capitulum 8 mm.

The specimens of this species were found attached to cylindrical black sticks of four or five centimeters in length, the nature of which I do not know.

The study of the structure of the female animal contained within the capitulum has given the following results.

Body narrow, elongated, legs relatively stout.

Mouth with the labrum slightly bullate, edge with a long row of small, pointed teeth. Palpi triangular, pointed, with a few short hairs on the inner side and a tuft of longer ones at the extremity.

Mandibles short, with three teeth, each slightly swollen at the extremity. The inferior angle is delicately pectinated and the surface over a great part is covered with very thin hairs, forming groups of three or more.

Maxillae with a distinct notch beneath the group of upper spines, which consists of one very stout spine, one rather stout and one or two much more delicate. Beneath the notch, in which only some very short hairs are planted, the edge bears about seven spines of unequal size and a few very delicate and much shorter spines. Surface covered with hairs, arranged in groups.

Second maxillae bulky; outer surface rounded covered by numerous long hairs, forming a tuft at the upper extremity. The opening giving entrance to the body cavity is at the end of a broad and flat tubular process, cut off abruptly at the extremity.

Cirri. First pair planted close to the mouth, separated from the second by a distinct interspace. Branches of the first pair of unequal length, the shorter is slightly broader and has seven, the longer nine segments. Nearly the whole surface of both rami is covered with numerous and rather long hairs. Cirri of the following pairs relatively short and stout; the rami of

the last pair have about 15 segments, the lower being very long and representing two or three segments. Two or three pairs of spines on the front of each segment and a third or fourth pair much more delicate.

Caudal appendages minute, one-jointed, cylindrical, with the extremity rounded. One long and two or three much shorter hairs planted at the extremity.

The animal as here described is a female with no trace of a penis.

Males, two; one lodged in a pouch situated on the inner side of each scutum near the occludent margin, the capitular pole slightly projecting out of the opening of the pouch. Shape oval, longest diameter 0,8 mm., shortest 0,4 mm. Structure very simple as in many other deep-sea species. Surface naked, not covered with hairs or short spines. No trace of valves. Prehensile antennae attached at a little distance from the peduncular pole. Muscle-fibres of the sac very distinct, opening of the sac hardly visible.

H. M. S. "Siboga" collected this species at:

Stat. 45. March 6, 1899. Lat. 7° 24′ S., Long. 118° 15′.2 E. Depth 794 m. Bottom: fine grey mud. Five specimens.

Observation. This species might also be considered as belonging to the group with imperfectly calcified valves. It has some resemblance to *Sc. insigne* mihi from the Atlantic; it can be distinguished from that species at first sight, however, 1^0 by the shape and condition of the tergum, which is ∨-shaped in *Sc. insigne*, 2^0 by the presence of a rostrum, which is wanting in *Sc. insigne* and 3^0 by the form of the carina.

22. *Scalpellum humile* n. sp. Pl. VIII, Fig. 2 and 2*a*.

Valves fourteen, not covered by membrane. Scutum very large, of an irregular triangular shape. Carina simply bowed with the umbo at the apex and with a flat roof bordered by ridges. Rostrum extremely small. Infra-median latus with the umbo near the base, with the under part very narrow and the upper part rhombiform. Carinal latus with the umbo below the middle of the carinal margin, projecting beyond the line of the carina.

This deep-sea species is represented by a large and a smaller specimen.

The capitulum is flat and rather broad, the length being slightly less than twice the breadth, where it is broadest. The carinal margin is more strongly convex than the occludent margin. Valves separated by narrow interspaces, that between the carina and the other valves being broader. The surface of most of the valves is delicately furrowed; ridges of growth not very distinct.

The scutum is large; its occludent margin is straight in the under and distinctly convex in the upper part. The tergal margin is convex and slightly hollowed out near the apex which is produced into a very small triangular process overlapping the tergum. The lateral and basal margins slope into one another forming an arch; at the upper extremity a short part of the lateral margin forms a triangle with the extremity of the tergal margin.

The tergum is triangular and rather elongated in consequence of the slightly convex occludent margin not being very long. A small excrescence at the carinal margin above the point where the apex of the carina touches the tergum.

The carina is simply and not very strongly bowed; umbo at the apex. Roof flat not increasing much in width from the upper to the lower extremity, bordered by distinct ridges. Sides of about the same width over the whole length of the carina.

The upper latus has six margins, the scutal margin being divided into two parts, one rather short and straight the other larger and hollowed out. The umbo is at the angle where these two lateral margins meet. The tergal margin is straight, also the short carinal margin. The lateral margin is divided into two parts: a larger which is hollowed out and separates the valve from the carinal latus and a much shorter part between it and the infra-median latus.

The rostrum (fig. 2*a*) is an extremely small valve situated in the corner where the two scuta and the two rostral latera meet.

The rostral latus is irregularly quadrangular; the rostral and lateral margins are both convex, the second is longer than the first.

The infra-median latus has the umbo near the base. The middle part is narrow with the foot slightly broader and the upper part distinctly expanded.

The carinal latus is large. The umbo is at the foot of the carina, where the carinal margin forms a distinct protuberance beyond the edge of the carina. The larger part of the carinal margin is above the umbo and is distinctly hollowed out, the shorter is beneath the umbo and convex. It slopes into the short basal margin. The upper and lateral margins are both slightly convex.

The peduncle is very short and is covered by small and numerous calcareous scales, placed in eight fairly regular longitudinal rows. Between the scales the chitin of the peduncle may everywhere be seen.

Size. The total length of the larger specimen is 10,8 mm., that of its capitulum 9 mm. The smaller one's total length is 7 mm., that of its capitulum not quite 6 mm.

The larger specimen was found attached to a small stick or stem, the nature of which is unknown to me. It was taken at:

Stat. 211. September 25, 1899. Lat. 5°40'.7 S., Long. 120°45'.5 E. Depth 1158 m. Bottom: coarse grey mud.

Observation. But for the shape of the carina this species would have great resemblance to *Sc. distinctum* Hoek. The shape of the upper latus and of the carinal latus, however, is also different; *Sc. distinctum* has, moreover, no rostrum etc. From *Sc. candidum* n. sp. to which it is similar in other regards it can easily be distinguished by the shape of its carinal latus.

23. *Scalpellum arcuatum* n. sp. Pl. VIII, fig. 3 and 3*a*.

Valves fourteen. Carina simply and feebly bowed, with a flat roof bordered by ridges. Upper latus large with a short carinal and long, irregularly bowed scutal margin. Rostrum very small, triangular. Infra-median latus narrow, with the umbo at the apex. Carinal latus with the umbo not far from the base.

This true deep-sea form is represented by one specimen only.

The capitulum is flat with the carinal side slightly and the occludent side strongly arched. It is covered by a thin membrane, which bears short hairs along the carina, forming tufts at the base of that valve and in a less degree at the apex. The carina is separated from the other valves by a distinct chitinous interspace. The valves of the lower whorl are less than medium-sized.

The scutum is quadrilateral and more than twice as long as broad. It has an arched occludent margin; its tergal margin is short; its lateral margin slightly hollowed out in the upper part and strongly convex in the lower. The apex is pointed, but not produced. Growth ridges indicated, but not distinct.

The tergum is large, triangular, with the occludent margin straight. It meets the carinal margin in a very slightly produced little point. The carinal margin is straight in the upper, feebly convex in the under part. Ridges of growth very indistinct.

The carina is simply and not strongly bowed. The roof is flat, increasing in width from the apex downwards, bordered by ridges. The lateral parts rather narrow and having about the same width over the whole length.

The upper latus is large and has a somewhat irregular shape. Its umbo is at the apex which penetrates into the corner between the scutum and the tergum. It has a long scutal margin, slightly convex in the upper and strongly hollowed out in the under part. The carinal margin is short; the lines of growth are rather indistinct.

The rostrum (fig. 3*a*) is very small and triangular; it is placed in the corner between the tips of the rostral latera and the scuta.

The rostral latus quadrilateral, rather small, as is also the case with the other valves of the lower whorl.

The infra-median latus very narrow, with the umbo at the apex, very slightly increasing in width downwards.

The carinal latus has the umbo near the base. It can hardly be said to project beyond the line of the carina. The upper part is triangular and fits into the angle between the carina and carinal latus.

The peduncle is short, broader in the upper part. The scales are broad and narrow; they are irregularly distributed over the surface.

Size. The total length of the animal is 9 mm., that of the capitulum 7,5 mm.

The only specimen is attached to a small stick or rod, the nature of which I cannot make out. It was taken by H. M. S. "Siboga" at:

Stat. 295. January 24, 1900. Lat. 10° 35'.6 S., Long. 124° 11'.7 E. Depth 2050 m. Bottom: fine grey mud.

Observation. This deep-sea form comes nearest to the species I describe on p. 105 as *Sc. gracile*. I consider the two forms as different not so much because a rostrum is present in the one and wanting in the other species, but especially because the valves of the lower whorl are much more developed in *Sc. gracile* than is the case in the present species. The carinal margin of the carinal latus is moreover slightly more hollowed out in *Sc. arcuatum* than in *Sc. gracile*.

24. *Scalpellum poculum* n. sp. Pl. VIII, fig. 4 and 4*a*.

Valves 14 not covered by membrane. Carina simply bowed with a flat roof, bordered by distinct ridges. Upper latus pentagonal with the umbo at the apex; apex produced. Rostrum narrow, slightly broader at the upper extremity. Infra-median latus irregularly wine-glass shaped, with the umbo near the base. Carinal latus with the umbo not far from the base. Peduncle very short.

This species is represented by one specimen only.

The capitulum is flat, broadest about the middle of the scutum, slightly narrower towards the base, distinctly pointed towards the upper extremity. The carina is not strongly bowed, so that the whole capitulum looks as if slightly recurved. No membrane covers the valves.

The scutum has the ordinary shape; its occludent margin is strongly arched. It is about twice as long as broad. The apex is slightly produced and overlaps the tergum.

The tergum is rather large; the occludent margin is nearly straight, the scutal margin also straight, the carinal margin slightly convex beneath and slightly concave above the middle. The apex of the carina presses very slightly into the carinal margin of the tergum. Apex hardly produced. Growth lines visible, but not very distinct.

The carina has a distinct roof and well-developed sides. The roof grows broader from the apex to the base, the sides are broadest in the upper part. The umbo is at the apex. The roof is flat, bordered by distinct ridges.

The upper latus is pentagonal, with the scutal and tergal margins by far the longest. The umbo is at the apex which is distinctly produced. The growth ridges are visible on this valve more distinctly than on any of the others.

The rostrum (fig. 4*a*) is very narrow, slightly broader towards the upper extremity. It does not reach quite so far downwards as the basal margin of the rostral latus.

The rostral latus is quadrilateral. Its lateral margin is convex, its scutal margin slightly hollowed out. The umbo is at the angle of the rostral and scutal margins.

The infra-median latus has the shape of a wine-glass, more or less inclined to one side. Though the name I propose for the species was chosen from this characteristic, I do not consider the shape of this valve of so essential importance: I afterwards discovered that the right infra-median latus shows by no means the same shape so distinctly as the left.

The carinal latus is rather large with a long carinal margin and the umbo seated near the base. The lateral margin which is sinuous in the valve of the left side, describes a nearly regular curvature in the same valve of the right side of the capitulum.

The peduncle is very short, the scales are relatively large and not numerous; they cover the whole surface and are much pressed together.

Size. The total length of the specimen is 6,6 mm., that of the capitulum 5,3 mm.

The "Siboga" collected the single specimen at:

Stat. 300. January 30, 1900. Lat. 10° 48′.6 S., Long. 123° 23′.1 E. Depth 918 m. Bottom: fine grey mud.

Observation. This curious deep-sea species may be easily distinguished from the

other species of the same group by the shape of the carina, by the rostrum and by the size and form of the infra-median latus.

25. *Scalpellum discolor* n. sp. Pl. VIII, fig. 5.

Valves thirteen covered by membrane. Tergum triangular, with the occludent margin nearly straight and the carinal margin convex. Carina simply and not strongly bowed with the umbo at the apex; roof flat bordered by ridges; sides hardly broader in the upper than in the under part. Infra-median latus small, with the umbo at the apex and the lateral margins nearly parallel. Umbo of the carinal latus at a short distance from the base, not projecting beyond the line of the carina. Scales of the peduncle covering one another like the tiles of a roof.

This species is represented by one specimen only.

The capitulum is rather flat, broad, less than twice as long as broad. The carinal and rostral sides are nearly equally convex; the occludent margin of the scutum forms an angle with the nearly straight occludent margin of the tergum. Valves covered with a yellowish membrane which is here and there distinctly pigmented with darker brown. The ridges of growth are very distinct in most of the valves, the furrowing of the surface less distinct in most.

The scutum is elongate with the umbo at the apex. The apex is produced, but can hardly be said to project over the tergum. The occludent margin is feebly convex, the tergal and basal margins are of about the same length, the lateral margin is strongly convex with a small excavation near the upper extremity for the reception of the apex of the upper latus.

The tergum is triangular with the occludent margin nearly straight. Its carinal margin is convex and shows a trace of an angular excrescence above the point where the apex of the carina touches the carinal margin. About $^1/_3{}^{rd}$ of the carinal margin extends beyond the apex of the carina.

The carina is simply and not strongly bowed, with the apex at the umbo. The flat roof increases in breadth from the apex to the base and is bordered by distinct ridges. The sides of the carina do not increase in breadth from the lower to the upper half of the valve.

The upper latus has the umbo at a little distance from the apex, which forms a pointed excrescence entering into the angle between the scutum and the tergum. The scutal margin is strongly hollowed out. The shape of the valve is pentagonal.

The rostral latus is quadrilateral with the scutal and basal margins of nearly equal length.

The infra-median latus is also quadrilateral. It has the umbo at the apex in the corner where the four valves: the scutum and three latera meet. Its rostral-lateral margin is hollowed out, its carinal-lateral margin nearly straight.

The carinal latus has the umbo near the base at the carinal margin, which can hardly be said to project beyond the line of the carina.

The peduncle is short, truncated, conical. The scales cover one another like the tiles of a roof. They are not very numerous and arranged in 8 or 9 longitudinal rows.

Size. The total length of the specimen is 18,6 mm., that of its capitulum 14,5 mm.

The single specimen was collected at:

Stat. 221. November 4, 1899. Lat. 6° 24′ S., Long. 124° 39′ E. Depth 2798 m. Bottom: solid, bluish grey mud with Foraminiferae.

Observation. This species is no doubt nearly related to *Sc. trapezoideum* n. sp. and to *Sc. truncatum* Hoek. Under *Sc. trapezoideum* I give the reasons why I think it better to consider them as three different species. *Scalpellum truncatum* Hoek was collected by the "Challenger" (a single specimen also) at a depth of 2520 m., 12° 8′ S.L. and 145° 10′ E.L. and therefore may also be considered as an inhabitant of the Indian Archipelago.

26. *Scalpellum trapezoideum* n. sp. Pl. VIII, fig. 6.

Valves thirteen not covered by membrane. Tergum with the occludent margin straight and the carinal margin distinctly divided into two parts. Carina simply and not strongly bowed with the apex at the umbo; roof flat bordered by ridges; sides considerably broader in the upper than in the lower part. Infra-median latus narrow with the umbo at the apex, hour-glass shaped. Umbo of the carinal latus near the base, slightly projecting beyond the line of the carina. Scales of the peduncle narrow, at some distance from one another, projecting beyond the surface.

This species is represented by one specimen only.

The capitulum is broad, much less than twice as long as broad, flat in the upper, thicker in the lower half; the straight occludent margin of the tergum forms an angle with the occludent margin of the scutum. Valves not covered by membrane, surface showing the growth-ridges, but not so distinct as the furrows.

The scutum is elongate, with the umbo at the apex. The apex is very slightly produced, but cannot be said to project over the tergum. The form of the scutum is nearly the same as in *Sc. discolor*, the lateral margin being however not so strongly convex.

The tergum has the shape of a trapezium: the perfectly straight occludent margin forms an angle of about 80° with the upper part of the carinal margin, which runs nearly parallel to the scutal margin. The length of this part of the carinal margin is about $^1/_4{}^{th}$ the whole length of that margin; where it meets the much longer and slightly convex lower part of the same margin a small excrescence is formed, just above the place where the apex of the carina touches the tergum.

The carina is simply and not strongly bowed, with the umbo at the apex. The flat roof increases considerably in width from the apex to the base and is bordered by distinct ridges. The sides of the carina are considerably broader at the upper extremity than in the lower part.

The upper latus has the umbo near the apex, the scutal margin hollowed out and the carinal margin very short. It is pentagonal as it has a short basal margin separating it from the infra-median latus, and a rather long basal margin along the carinal latus.

The rostral latus is quadrilateral with the upper and basal margins of about the same length.

The infra-median latus is narrow; its shape is that of an irregular hour-glass, the

upper part being smaller than the lower part. The umbo is at the apex in the corner where the scutum, the upper latus, the rostral and infra-median latus meet.

The carinal latus is rather large. The umbo is at a short distance from the base, that part of the carinal margin slightly projecting beyond the line of the carina.

The peduncle is short, truncated, conical, with very prominent scales placed at some distance from one another in five not quite regular longitudinal rows.

Size. The total length of the specimen is 24 mm., that of its capitulum 17,7 mm.

It was found attached to a piece of black stone, the nature of which is unknown to me.

The only specimen was collected at:

Stat. 214. October 27, 1899. Lat. 6° 30′ S., Long. 121° 55′ E. Depth 2796 m. Bottom: grey and green mud.

Observation. This species is nearly related to *Sc. discolor* n. sp. and to *Sc. truncatum* Hoek. It differs from the last-named species by the absence of the rostrum, by the shape of the infra-median latus and also by the less truncated form of the tergum. From *Sc. discolor* it differs by the nakedness of the valves, by the form of the tergum and by the more distinct furrows on the surface of the valves. The shape of the infra-median latus and that of the scales of the peduncle are also different. As there is only one specimen of *Sc. trapezoideum* and one of *Sc. discolor* at my disposal, future investigations will have to determine whether these differences have really the importance of specific characteristics.

27. *Scalpellum proclive* n. sp. Pl. VIII, fig. 7*a*.

Valves thirteen. Surface nearly smooth. Margins of valves distinct. Carina with a flat roof, bordered by ridges. Valves of the lower whorl rather large. Infra-median latus with the umbo beneath the middle and the upper part growing broader towards the tip. Carinal latus with the umbo at a short distance from the base, the two parts of the carinal margin meeting at an obtuse angle.

The capitulum is elongate, more than twice as long as broad. Carinal side about as strongly bowed as the rostral side. Apex of the tergum produced and feebly recurved. The surface of the capitulum is nearly smooth and the margins of the valves can be easily made out in consequence.

The scutum is quadrilateral, with the apex produced. The occludent margin is considerably longer than the lateral margin, the tergal margin is longer than the basal margin.

The tergum is triangular. Its occludent margin is nearly straight; it meets the carinal margin at a sharp angle, so that the apex appears to be produced. The carinal margin is straight in the upper and distinctly convex in the lower part.

The carina is long, reaching to $^1/_4{}^{\text{th}}$ the length of the carinal margin of the tergum from the apex of that valve. It is rather strongly bowed with the umbo at the extremity. It has a flat roof, bordered by ridges, and distinct sides, which have about the same width all over their length.

The upper latus is pentagonal. The umbo is at the apex, near the angle where the

tergal and scutal margins meet. The scutal margin is feebly hollowed out. The short basal margin separates this valve from the infra-median latus, the other, longer basal margin separates the upper latus from the carinal latus.

The rostral latus is quadrilateral; its rostral and lateral margins are longer than its upper and basal margins.

The infra-median latus has the umbo below the centre. The lower part of the valve is narrow and small, the upper part grows broader towards the upper extremity.

The carinal latus is rather large. The umbo is near the base at the tip of a part of the carinal margin which projects slightly beyond the line of the carina. The remaining and larger part of the carinal margin is very slightly hollowed out for the reception of the carina.

The peduncle is cylindrical. Its length is about $^1/_3$rd that of the capitulum, its width is about $^1/_2$ its length. It is covered with distinct, rather large scales of regular form, arranged in six longitudinal rows. The number of scales in each longitudinal row is about 18.

Size. The total length of the specimen representing this species is 9,1 mm., that of the capitulum 6,8 mm.

It was found along with *Sc. deforme* attached to the same small stem of a Tubularian at:

Stat. 87. June 19, 1899. Lat. 0° 32′ S., Long. 119° 39′.8 E. Depth 655 m. Bottom: fine grey mud.

28. *Scalpellum deforme* n. sp. Pl. VIII, fig. 7*b*.

Valves thirteen. Surface covered with a hairy membrane, the margins of the valves not distinct in consequence. Carina simply but very feebly bowed, laterally convex, roof and sides not separated by ridges. Valves of the lower whorl rather small. Infra-median latus narrow with the umbo at the apex. Carinal latus with the umbo at a short distance from the base.

The capitulum is clumsy in shape, nearly as broad at the base as in the middle, less than twice as long as broad. Carinal side feebly, rostral side strongly bowed. Apex of the tergum hardly produced but distinctly recurved. The surface of the capitulum is covered by membrane, which is feltlike and distinctly hairy along the carina.

The scutum is quadrilateral, large. The apex is somewhat produced and distinctly recurved. Tergal margin about as long as the basal margin.

The tergum is triangular and also large. The occludent margin is bowed and meets the carinal margin at a not very sharp angle; this apex is distinctly recurved. The carinal margin is straight in the upper and convex in the lower part.

The carina is feebly bowed, not very long. It reaches to about $^1/^3$rd the length of the carinal margin of the tergum from the apex of that valve. The umbo is at the apex. It has no flat roof, being laterally convex and the roof sloping insensibly into the sides.

The upper latus is large, quadrilateral, with a very short carinal and a very long scutal margin. This latter margin is strongly convex in the lower and slightly convex in the upper part. Where the two parts meet a depressed angle is formed. The tergal margin is somewhat longer than the basal margin. The apex is slightly produced; the umbo is at the apex.

The rostral latus is rather broad, but not high. The upper and basal margins are

considerably longer than the rostral and lateral margins. Where the upper and rostral margins meet the umbo is seated, that part of the valve being distinctly produced.

The infra-median latus is small, very narrow, elongated with the umbo at the apex.

The carinal latus is trapeziform, with a short lateral and a much longer carinal margin. The umbo is near the base; it hardly projects beyond the carina; the upper part of the carinal margin is only very indistinctly hollowed out for the reception of the carina.

The peduncle is thick, short and laterally flat. Its length is only a little greater than its width and is less than $^1/_3{}^{rd}$ the length of the capitulum. It is covered with rather flat but broad scales, the margins of which are not very distinct.

Size. The total length of the specimen representing this species is 10,5 mm., that of the capitulum 8 mm.

The specimen was found along with *Sc. proclive* attached to the same small stem of a Tubularian at:

Stat. 87. June 19, 1899. Lat. 0° 32′ S., Long. 119° 39′.8 E. Depth 655 m. Bottom: fine, grey mud.

Observation. This species belongs to the same group of species or subdivision of the genus as *Sc. proclive*, *Sc. gracile*, *Sc. Novae-Zelandiae* and a few more. It will be for future investigators to settle whether or not we are entitled to consider them as so many different species.

29. *Scalpellum gracile* n. sp. Pl. VIII, fig. 8.

Valves thirteen, covered by a thin membrane. Scutum rather narrow, its tergal margin less than half as long as the tergal margin of the upper latus. Carina with the umbo at the apex, with a flat roof bordered by not very prominent ridges and with the sides narrow. Upper latus large, almost triangular owing to the carinal margin being very short. Infra-median latus elongate, very narrow. Carinal latus with the carinal margin nearly straight and the umbo at a short distance from the base.

This species is represented by three specimens.

The capitulum is flat, oval, twice as long as broad, with the occludent margin as strongly (or slightly more) arched as the carinal margin. The surface of the valves is covered by a thin membrane, to which small particles of mud etc. adhere. Hence the surface has a yellowish colour; the valves are delicately furrowed, but the furrowing is visible only after the surface has been cleaned with a small brush or pencil. Valves of the lower whorl rather large.

The scutum is elongate, more than twice as long as broad. The occludent margin is distinctly bowed, the lateral margin hollowed out in the upper and convex in the lower part. The tergal margin is short; it meets with the occludent margin at the apex, where a small triangular projection is formed which slightly overlaps the tergum.

The tergum is large, triangular. The occludent margin is convex, the scutal margin nearly straight. The carinal margin is convex, with the exception of the upper part which is straight and which meets with the occludent margin at a sharp angle: the apex is slightly recurved.

The carina is simply and not strongly bowed. Its umbo is at the apex. The roof is

narrow and is bordered by ridges which are not prominent. The sides are also narrow, only slightly increasing in width from below upwards.

The upper latus is large with the apex produced, entering into the narrow angle between the lateral margin of the scutum and the scutal margin of the tergum. The shape of the valve is triangular, one of the angles is, however, truncated by the short carinal margin, and another, the basal, by the very short basal margin between this valve and the rostral latus. The umbo is at a little distance from the apex, close to the scutal margin.

The rostral latus is quadrilateral and rather high. The angle formed by the scutal and lateral margins is truncated and the valve at that angle is in contact with the upper latus.

The infra-median latus is narrow and elongate with the umbo at the superior extremity. The latter touches the upper latus.

The carinal latus is quadrilateral. The carinal margin is the longest; it is nearly straight, only very feebly hollowed out in the upper part for the reception of the lower extremity of the carina. The umbo is at a short distance from the base. The lateral margin is straight, the upper margin slightly convex.

The peduncle is nearly cylindrical, compressed laterally. The scales are thin and broad and rather prominent. They are placed in five longitudinal rows, each row having about fifteen.

Size. The whole length of the largest specimen was 13,6 mm., that of its capitulum 10 mm. The size of the other specimens was but slightly different.

The study of the animal contained within the capitulum has yielded the following results:

Mouth. The labrum has the front part somewhat bullate, forming a rounded slightly overhanging projection; crest with very minute teeth; palpi short and broad, rounded at the extremity, where about half a dozen hairs are planted.

Mandibles with three teeth and the inferior angle pectinated; the distance between the tips of the first and second tooth equals that between the tips of the second and third and of the third to the inferior angle.

Maxillae with the edge perfectly straight; about the middle the edge has an interspace without spines, four spines (two large, one smaller and one very small) being inserted above the interspace and about six rather short spines, only one of which is longer than the others, below.

Outer maxillae rounded, bristles in two separate groups. Openings giving entrance to the body cavity at the end of long, flat processus, cut off transversely at the extremity.

Cirri. First pair attached near the base of the mouth and at a little distance from the second pair; rami very unequal, the shortest having 7 to 8 very broad segments, soldered tightly together, so that the limits can only be distinguished with difficulty; the longer ramus has 9 much narrower segments, the first of which is very long. The shape of the shorter ramus as a whole is leaf-like, that of the longer cylindrical. Both rami are covered with numerous and long spine-like hairs.

Second pair elongate, also with unequal rami: the shorter has 12, the longer ramus 16 segments. In both rami the first segment is very long, the 3 or 4 following are nearly quadrilateral, the fifth growing longer and slightly narrower, until the last are very elongate

and narrow. The segments bear numerous spines all over the surface and also 3 to 5 pairs of longer ones along the anterior margin.

The cirri of the 3rd to 6th pair have extremely elongate and narrow rami. Those of the 6th pair have rami of about 23 segments, which are all long and narrow but of which the middle ones (from the 8th—18th) are by far the longest and bear the greatest number (5 pairs) of spines along the anterior margin.

Caudal appendages elongate, narrow, reaching to the end of the pedicel of the sixth cirrus, composed of five cylindrical segments, each having a few long hairs at the extremity. At the end of the fifth segment half a dozen hairs are planted, three of which are very long and measure about the length of the three last segments of the caudal appendage.

No trace of a penis.

The specimen I investigated was furnished with a cluster of eggs attached to the inner side of the sac or mantle; the animal was not in a good state of preservation, and I can only say that the eggs seemed to form but one cluster. There were in all 53 eggs, the size of which was about 0,5 × 0,33 mm., their shape being oval. The colour of the (preserved) eggs was dark orange. The yolk of these eggs was composed of rather large spherical globules.

I observed two small males, one on each side at the ordinary place. They were in a bad state of preservation. Their length was 0,8 mm., they were more than twice as long as broad. The little animals were, however, distinctly shrivelled, therefore narrower, most probably, than they would be in the living condition. Round the opening giving entrance to the sac four small calcareous plates were observed, two small and two slightly larger, all of them of oval shape. The rest of the surface is covered with very minute spine-like hairs which are placed in transverse rows. The prehensile antennae are attached at about one third the length of the animal from the peduncular pole.

This species was collected by H. M. S. "Siboga" at:

Stat. 211. Septbr. 25, 1899. Lat. 5°40'.7 S., Long. 120°45'.5 E. Depth 1158 m. Bottom: coarse grey mud.

Observation. This species is nearly related to *Sc. obesum*; the form of the capitulum as a whole and the greater height of the valves of the lower whorl, together with the different shape of the peduncle and its scales make it necessary to consider them as different species. The present species also shows affinity to *Sc. incertum* and to *Sc. arcuatum*, which, however, are both species with a rostrum.

30. *Scalpellum elegans* n. sp. Pl. VIII, fig. 9.

Valves (14) 13, covered here and there by membrane, beautifully striated. Carina simply bowed, with the umbo at the apex and a flat roof bordered by ridges. Upper latus trapeziform. Valves of the lower whorl well-developed, with exception of the narrow, triangular infra-median latus. Rostrum hardly visible, represented by an extremely narrow streak. Umbo of the carinal latus a little below the middle of the nearly straight carinal margin.

This beautiful species is represented by one specimen only.

The capitulum is elongate, twice as long as broad, rather flat. Its occludent margin is nearly straight, its carinal margin strongly arched. The apex of the tergum is pointed. The surface of the valves is here and there, especially at the occludent side, covered with membrane, bearing short hairs. There is a distinct chitinous interspace between the carina and the other valves. The valves of the lower whorl are strongly developed; the upper margin of the carinal latus is the prolongation of the same margin of the rostral latus.

The scutum is quadrilateral, about twice as long as broad. Its lateral and occludent margins are parallel and nearly straight. Where the occludent and tergal margins meet the slightly pointed and recurved apex projects over the tergum.

The tergum is triangular, with the scutal margin straight, the occludent margin also straight, the carinal margin slightly convex in the lower part, nearly straight in the upper. The apex pointed, but hardly produced.

The carina is strongly bowed, with the umbo at the apex. It has a flat roof bordered by ridges and increasing in width, but not very considerably, from the apex downwards. The sides of the carina are flat; their width in the middle is slightly less than near the upper and under extremity.

The upper latus is trapeziform; its tergal and basal margins are of equal length, its scutal margin is twice as long as its carinal margin. The umbo is at the apex which very slightly projects over the scutum.

The rostrum is hardly visible; as the rostral margins of the rostral latera do not touch one another and as an extremely narrow streak of probably calcareous matter is seen longitudinally in the middle of this interspace, there is reason to consider this as representing the rostrum.

The rostral latus is quadrilateral and rather high. Its rostral and lateral margins are convex, its upper margin hollowed out, its basal margin short and straight.

The infra-median latus is triangular, narrow, with the umbo at the apex. It is considerably less in height than the other latera, so that the lateral margins of the rostral and carinal latus meet above the apex of the infra-median latus.

The carinal latus is elongate, trapeziform. Its carinal margin is the longest. It is slightly hollowed out in the upper half where the carina rests against it, and straight below the umbo. Its lateral and upper margins are of equal length and straight; its basal margin is the shortest.

All the valves, the carina excepted, are beautifully and delicately striated.

The peduncle is cylindrical and short. It is covered by well-developed scales which overlap each other like the tiles of a roof.

Size. The length of the whole animal is 20,5 mm., that of the capitulum 15,5 mm.

The animal is attached to a long tube in the form of a spiral, the dwelling-place probably of a tubicolous annelid.

The specimen was collected by H. M. S. "Siboga" at:

Stat. 208. September 22, 1899. Lat. 5° 39′ S., Long. 122° 12′ E. Depth 1886 m. Bottom: solid green mud.

Observation. This species has some resemblance to *Sc. vitreum* Hoek collected by the "Challenger" not far from Yeddo, in Japanese waters. The form of the whole capitulum, that of the carina and the rostral latus show, however, its distinctness.

31. *Scalpellum sculptum* n. sp. Pl. VIII, fig. 10.

Valves fourteen, not covered by membrane, beautifully grooved. Carina with a flat roof bordered by distinct ridges, short, hardly surpassing in length the carinal margin of the tergum. Rostrum small triangular. Other valves of the lower whorl high. Infra-median latus narrow, rectangular, with the umbo at the apex. Carinal latus pentagonal, with the umbo above the middle of the carinal margin.

This pretty species is represented by one specimen only.

Its capitulum is elongate and nearly equally convex on the carinal and rostral sides. It is not flat, the carina having a broad roof and the scuta being moreover rather convex. The valves are not covered by membrane but show a very fine sculpture of parallel grooves all over their surfaces. There are no membranous interspaces between the valves. The valves of the lower whorl are strongly developed.

The scutum is quadrilateral; its occludent margin is strongly convex, its basal margin nearly straight and much shorter than the tergal margin. The lateral margin is also straight with a slight deviation near the upper extremity.

The tergum is large, triangular. Its occludent and scutal margins are straight, its carinal margin is feebly hollowed out in the upper and slightly convex in the lower part. The apex is slightly produced and recurved.

The carina is short, simply and not strongly bowed, with the umbo at the apex. The roof is flat, increases greatly in width from above downwards and is bordered by distinct ridges. The sides in the superior part are rather broad and at angles greater than 90° with the roof. They are distinctly furrowed in this part.

The upper latus is trapeziform and has the four margins nearly straight. The scutal margin is the longest; where it meets with the tergal margin the apex is truncated. Here the umbo forms a pointed, hardly distinguishable projection.

The rostrum (fig. 10*a*) is very small and of a triangular shape. It is not covered laterally by the rostral latera.

The rostral latus is quadrangular with the rostral and lateral margins of nearly equal length. Its upper margin is feebly hollowed out, its basal margin is short and straight.

The infra-median latus is narrow and elongate. It has the umbo at the upper extremity and as it has about the same breadth all over its length the shape may be given as rectangular.

The carinal latus is pentagonal, owing to its carinal margin being divided into two parts of unequal length which form together an obtuse angle. The umbo is seated at this angle, at the tip of the lower and longer part of the carinal margin. The upper part of this margin is very slightly notched to receive the basal extremity of the ridge which borders the roof of the carina. The upper and lateral margins of the carinal latus are of about the same length.

The umbo of the carinal latus does not project beyond the line of the carina. The right and left carinal latera meet over the whole length of the lower part of the carinal margin.

The peduncle is very short and completely covered by rather large scales, forming six longitudinal rows. About six scales are present in each row.

Size. The total length of the specimen representing this species is 7,6 mm., the capitulum alone measuring 6,2 mm.

The specimen was taken by H. M. S. "Siboga" at:

Stat. 221. November 4, 1899. Lat. 6° 24′ S., Long. 124° 39′ E. Depth 2798 m. Bottom: solid bluish grey mud with Foraminifera.

Observation. This species shows some resemblance to *Sc. vitreum* dredged by the "Challenger" near Yeddo from a depth of 1875 fathoms (about 3375 m.). The general habitus, the sculpture of the surface of the valves, the structure of the carina and the large size of the valves of the lower whorl are nearly equal in both species. But in *Sc. vitreum* no rostrum was observed; its infra-median latus is triangular and much shorter than the other valves of the lower whorl; finally, the carinal latus has the umbo at one fourth of the total length of the carinal margin from the inferior extremity, not above the middle of that margin as is the case in *Sc. sculptum*. Under similar circumstances (bottom mud, depth ± 3000 m.), from perhaps similar ancestors, two forms have developed, the distinctness of which can not be doubted though their resemblance is equally striking.

32. *Scalpellum formosum* n. sp. Pl. VIII, fig. 11 and 11*a*.

Valves fourteen, not or but very indistinctly covered by membrane, beautifully striated. Tergum with the apex produced and pointed. Carina simply bowed, with the umbo at the apex, with a flat roof bordered by ridges and with the sides well-developed. Upper latus trapeziform. Rostrum elongate, very narrow. Valves of the lower whorl well-developed. Infra-median latus triangular. Carinal latus pentagonal, the carinal margin consisting of two parts, forming an angle where they meet.

This fine deep-sea species is represented by two specimens collected at two different Stations.

The capitulum is elongate, rather flat, with the occludent margin slightly more convex than the carinal margin and the apex produced and pointed. The length of the capitulum is about twice its breadth.

The scutum is large, quadrangular, with the occludent margin strongly convex and the lateral margin straight. The tergal margin is a little longer than the basal margin and meets the occludent margin at the slightly recurved apex which overlaps the tergum.

The tergum is triangular; its occludent margin is straight, or even slightly hollowed out (as in the specimen figured). The scutal margin is straight and so is the carinal margin with a little convexity in the lower part only. About a third of the carinal margin projects beyond the apex of the carina.

The carina is simply and not very strongly bowed, with the umbo at the apex and with a roof and well-developed sides. The roof is rather broad at the base and is bordered by distinct ridges. The sides increase but slightly in width from the base upwards.

The upper latus is trapeziform. The length of the carinal margin is less than half the length of the scutal margin. The tergal margin has about the same length as the basal margin.

The rostrum (fig. 11*a*) is elongate, narrow. It is almost entirely covered (especially so in the specimen from Station 227) by the lateral parts of the rostral latera.

The rostral latus is irregularly quadrangular. Its rostral margin is shorter than its lateral margin, its basal margin much shorter than its scutal margin.

The infra-median latus is triangular and has the umbo at the apex. The latter does not quite reach to the slightly truncated scutal-basal angle of the upper latus. The height of this small valve is slightly greater in the specimen from Station 241 than in that from Station 227.

The carinal latus has a pentagonal shape, with a short basal margin, a convex lateral margin, and a straight upper margin. The umbo is below the middle of the carinal margin, the two parts forming an angle together. The upper part is slightly hollowed out at its base where the under extremity of the carina rests against it.

All the valves are beautifully striated. The striae radiate, as a rule, from the umbo over the surface of the valve. The ridges of growth are very indistinct; traces of them may be seen on the scutum and the upper latus.

The peduncle is short, cylindrical. The surface is covered by scales placed on a few longitudinal rows. One of these rows on each side has more prominent scales and the number of scales composing it is six or seven. The peduncle of the specimen from Stat. 241 was found attached to a small piece of black stone (like lava); the other specimen is attached to a small, greyish, calcareous stone.

Size. The total length of the specimen from Station 241 is 14,3 mm., the capitulum alone measuring 11,3 mm.

The two specimens representing this species were collected by H. M. S. "Siboga" at:

Stat. 227. November 13, 1899. Lat. 4° 50'.5 S., Long. 127° 59' E. Depth 2081 m. Bottom: grey mud with an upper layer of brown mud, both mixed with sand.

Stat. 241. December 1, 1899. Lat. 4° 24'.3 S., Long. 129° 49'.3 E. Depth 1570 m. Bottom: dark sand with small stones.

Observation. The two specimens differ from one another in that the rostrum is much narrower in the one than in the other, as also that the shape of the tergum and the size of the infra-median latus are not alike. But I consider the points of agreement of greater importance than these differences. This new species comes nearest to *Scalpellum vitreum* collected by the "Challenger" off Yeddo.

33. *Scalpellum hexagonum* n. sp. Pl. VIII, fig. 12.

Valves thirteen, not covered by membrane. Scutum nearly triangular. Carina simply, not strongly bowed, umbo at the apex. Roof without ridges, laterally slightly convex. Upper latus large, elongate hexagonal. Rostral latus small; infra-median latus narrow and very small; carinal latus rather large, with the umbo in the middle of the carinal margin.

This new deep-sea species is represented by three specimens.

The capitulum is elongate, about twice as long as broad, flat. It is not covered by membrane and the lines of growth of the different valves are not very distinct. Though the carina is not strongly bowed, the carinal side of the capitulum is more strongly convex than the rostral or occludent side. There is no rostrum, hence the total number of the valves is thirteen. The scutum and the upper latus are of considerable size and very peculiar shape.

The scutum is large; in consequence of the shortness of the basal margin the shape of the scutum is almost triangular. The occludent margin is straight, only feebly convex in the upper part. The tergal margin is rather long; it forms a small slightly recurved apex with the occludent margin. The lateral margin has a depressed angle slightly above the middle of its length.

The tergum is medium-sized. Its occludent margin is convex; its carinal margin slightly convex in the lower and hollowed out in the upper part; its scutal margin is feebly hollowed out about the middle. The apex of the tergum is distinctly recurved, but blunt, not pointed.

The carina is rather long, reaching to $^3/_4^{\text{ths}}$ of the length of the carinal margin of the tergum. It is not strongly bowed and its sides are only well-developed in the upper part. The roof increases in width from the apex downwards; it is not bordered by ridges, but laterally convex.

The upper latus is very large and of an irregular, elongate hexagonal shape. The umbo is almost in the middle of the scutal margin, where a slight convexity fits into the depressed angle of the lateral margin of the scutum. The length of the different margins can be seen in the figure.

The rostral latus is very small, its shape is distinctly pentagonal. Its rostral margin is considerably longer than the lateral margin, which separates it from the infra-median latus.

The infra-median latus has the umbo at the apex. It is a narrow and relatively short valve.

The carinal latus is irregularly pentagonal. Its carinal margin is divided into two nearly equal parts at an angle with one another. The upper part is hollowed out for the reception of the basal part of the carina. The upper margin has a slight excrescence about its middle point. The lateral margin is the shortest of all.

The peduncle is short, cylindrical, slightly broader at the upper extremity. Its surface bears rather broad and narrow scales placed in not quite regular rows: one at the carinal and one at the rostral side alternating with one placed in the middle of the left and one in the middle of the right side.

Size. The total length of the specimen figured is 7,5 mm., that of the capitulum 6,6 mm.

The study of the structure of the animal contained within the capitulum has yielded the following results:

Mouth slightly bullate, with the part directed forward rounded. Labrum with a row of small but distinct teeth, those in the middle of the row slightly larger and distinctly pointed. Palpi slender, with a few short hairs along the outer margin and a couple slightly longer near and at the tip.

Mandibles with three equally distant teeth and the distance between the third teeth and the pectinated inferior angle very short.

Maxillae with a distinct notch about the middle of the edge; with four spines, two of

which are longer than the others, above and four beneath the notch. Of the latter, one is much longer and stronger than the three others. Apodeme moderately long.

Outer maxillae rounded, hairs in three distinct groups; processus with the opening giving entrance to the body cavity rather long and rounded at the end.

Cirri. First pair with very unequal rami: the anterior indistinctly divided into six segments, broad, growing narrower towards the extremity, flat; the posterior ramus longer, composed of eight segments, somewhat cylindrical. In both rami the first segment is much longer than the following; the last is again rather short. Surface of both rami covered with long bristles. The first pair of cirri is attached close to the mouth and at some distance from the second pair.

The second pair has nearly equal rami of respectively 12 and 13 segments. The first segment in both rami is the longest; next come three or four segments which are only slightly longer than broad; then five or six segments which grow gradually longer and narrower, while the remainder are shorter than the foregoing, but narrower. The longest segments have four pairs of spines along the anterior margin: the first pair short, the second pair slightly longer, the third rather long, the fourth pair by far the longest and stoutest.

The last pair of cirri has 20 segments in both rami, 13 segments, however, in one of the rami of the right cirrus. Segments gradually increasing in length, with 3 and 4 pairs of spines on the anterior margin. The spines of the last segments are extremely long and distinctly curved.

Caudal appendages rather long and narrow, composed of five segments. The end of the fourth segment reaches to the end of the pedicel of the sixth cirrus. A couple of very long and delicate hairs are planted at the end of the third and fourth segments, half a dozen at the tip of the 5th segment.

No penis. Animal unisexual. The specimen I investigated was furnished with a cluster of eggs, altogether 20 in number, soldered together and attached with two threadlike "ovigerous frena" to the inner surface of the mantle or sac. The size of the eggs was: 0,43 × 0,3 mm. Their shape was oval.

I found one little male attached to the interior of the left scutum in one of the specimens and I think I also saw one on the right side of the same individual. The shape of the one I loosened from the female was broad, oval, its dimensions being 0,55 × 0,4 mm. I observed the prehensile antennae attached to the sac at a short distance from the peduncular pole. No trace of valves. Extremely short and delicate hairs could be seen only at that part of the surface, which corresponds to the capitular pole. [The little animal was not in a very good state of preservation — other details of its structure could not well be made out.]

Of this interesting species three specimens were found attached to a much ramified deep-sea organism of unknown nature. A specimen of Verruca spec. was attached to the same plant. It was dredged at:

Stat. 221. November 4, 1899. Lat. 6° 24′ S., Long. 124° 39′ E. Depth 2798 m. Bottom: solid bluish grey mud with Foraminifera.

Observation. This is a very characteristic species. The shape of its scutum is much like that of *Sc. distinctum* Hoek and *Sc. humile* n. sp.; in other regards (more elongate form

of its upper latus, smallness and shape of its infra-median latus, form of the carinal latus etc.) the present species is, however, so different, that it can be distinguished from the above-named species at first sight.

34. *Scalpellum praeceps* n. sp. Pl. VIII, fig. 13.

Valves fourteen, covered by a velvety membrane; margins of valves not everywhere to be distinguished. Carina with the umbo at the apex, simply and strongly bowed, with a flat roof bordered by ridges. A chitinous interspace between the carina and the other valves. Rostrum covered by membrane, narrow, elongate. Infra-median latus small, triangular. Carinal latus with the umbo not far from the base, at the tip of an obtuse angle formed by the longer upper and shorter under half of the carinal margin.

This species is represented by one specimen only.

The capitulum is covered by a chitinous membrane which has a villous or velvety appearance. The little hairs are especially conspicuous along the free margin of the carina. As shown in the figure the margins of the valves in consequence of the presence of this covering can not everywhere be made out distinctly. The carina is separated from the other valves by a chitinous interspace which is broadest between the tergum and the carina. The capitulum is rather steep (*praeceps*) and elongate, being twice as long or high as broad. The occludent margin is slightly, the carinal margin strongly convex. The apex of the tergum and of the whole capitulum is in consequence pointed and very slightly recurved.

The scutum has the ordinary shape; the occludent margin is convex in its upper part. The apex forms a very distinct recurved projection over the scutal margin of the tergum. The scutum is about twice as long as broad.

The tergum is triangular. Its occludent margin is convex; its carinal margin nearly straight. Where these two margins meet the pointed and feebly recurved apex is formed.

The carina is simply and rather strongly bowed with the umbo at the apex. Its roof increases in width from the apex downwards, longitudinally hollowed out, being bordered by rather prominent ridges. The sides of the carina have about the same width over the whole length.

The upper latus is trapeziform: the carinal margin runs parallel with the scutal one. The umbo is at the apex, which is very slightly produced.

The rostrum is very narrow, covered by membrane, overlapped at each side by the lateral margins of the rostral latera.

The rostral latus is quadrilateral, with the scutal or upper margin uplifted and forming the continuation of the upper margin of the carinal latus. The length of the upper margin is less than twice the length of the basal margin of the same valve.

The infra-median latus is very small, triangular, with the umbo at the apex.

The carinal latus is rather large and irregularly quadrilateral in shape. The upper part of the carinal margin is slightly hollowed out, the under part slopes into the basal margin and is convex. Where the two parts of the carinal margin meet the umbo is formed, which very slightly projects beyond the line of the carina. The lateral and upper margins meet at a very blunt angle. The basal margin can hardly be distinguished as a special margin.

The surface of the valves seems to be delicately striated; this striation, however, is made nearly quite invisible by the chitinous membrane. It is slightly more distinct on the surface of the carinal latus.

The peduncle is cylindrical, rather stout and short: about $^1/_4{}^{th}$ the length of the capitulum. Its surface is invested with large scales, placed on five longitudinal rows, each row composed of about 6 scales. The peduncle is also covered by membrane.

Size. The length of the specimen is 14,5 mm., that of its capitulum 11,7 mm.

It was taken by H. M. S. "Siboga" at:

Stat. 159. August 16, 1899. Lat. 0° 59'.1 S., Long. 129° 48'.8 E. Depth 411 m. Bottom: coarse sand.

Observation. This species in the shape of its capitulum and valves has a great resemblance to *Sc. striatum* Gruvel, a species taken by the "Talisman", at a depth of 2995 m. in the Atlantic not far from the Azores. But it differs from that species by its velvety membrane and also by the form of the rostrum which is narrow and hardly visible in *Sc. praeceps* and which (according to Gruvel) in *Sc. striatum* is: "très net, triangulaire, allongé".

35. *Scalpellum incertum* n. sp. Pl. VIII, fig. 14 and 14*a*.

Valves fourteen, not covered by membrane, growth-ridges indistinct. Carina simply bowed, with the umbo at the apex and with a flat roof bordered by ridges. Upper latus trapeziform with the scutal margin nearly straight. Rostrum very small, hardly visible. Infra-median latus triangular, very narrow, with the umbo at the apex. Umbo of the carinal latus very close to the base of the carinal margin.

Of this species the "Siboga" collected two specimens.

The capitulum is flat, nearly twice as long as broad, with the apex pointed and not recurved. The scutum is rather large though not very broad; the rostral latus is much narrower at the base than at its scutal margin. The carina is not strongly bowed, the lower extremity reaches to near the base of the carinal latus. A chitinous interspace separates the upper part of the carina from the tergum.

The scutum is quadrangular, about twice as long as broad; the basal and tergal margins are of the same length, the occludent margin is strongly convex, the lateral margin very feebly convex, nearly straight.

The tergum has a straight occludent margin, a straight scutal margin and an almost straight carinal margin: the latter is slightly convex only in the lower part.

The carina is simply and not strongly bowed. The smaller and no doubt younger specimen of the two has the carina less bowed than the larger (the one figured). The umbo is at the apex; the roof is not very broad but bordered by distinct ridges; the sides are rather narrow and of nearly equal breadth over the whole length of the valve.

The upper latus is nearly trapeziform, not quite so as the angle formed by the scutal and basal margins is truncated. The carinal margin is very short the scutal margin is nearly straight, but slightly hollowed out. The umbo is at a little distance from the point where the scutal and tergal margins meet.

The rostrum is hardly visible, being covered on both sides by the margins of the rostral latera. The rostral margins of the two rostral latera do not touch, so that a narrow strip of the small rostrum remains uncovered.

The rostral latus is quadrangular with the angle formed by the lateral and scutal margins truncated. Its basal margin is much shorter than the scutal margin.

The infra-median latus is triangular, very narrow, with the umbo at the apex. The apex does not quite reach to the truncated angle of the upper latus.

The carinal latus is quadrangular, with the carinal margin only very slightly hollowed out, with the upper margin straight and the basal margin slightly shorter than the lateral margin. The umbo is very close to the lower extremity of the carinal margin and does not project beyond the line of the carina.

The peduncle is short, cylindrical but laterally compressed. The scales on the surface are narrow, horizontally extended and at some distance from one another. They are arranged in seven longitudinal rows: three on each side and one on the carinal side of the peduncle. There are about 8 scales in each longitudinal row in the largest specimen.

Size. The total length of the largest specimen was 11 mm., that of its capitulum 8 mm.

Both specimens were found attached to a brownish-coloured thread or fibre the nature of which is unknown to me.

They were collected by H. M. S. "Siboga" at:

Stat. 161. August 17, 1899. Lat. 1° 10'.5 S., Long. 130° 9' E. Depth 798 m. Bottom: muddy sand. 2 specimens.

Observation. This species has a great resemblance to various other species, for example, to *Sc. gracile* n. sp. It differs from it by the shape of the upper latus and of the carinal latus, as also by the presence of a rudimentary rostrum of which no trace could be found in *Sc. gracile*. But for the shape of the carinal latus it would be considered as belonging to the same group of species as *Sc. formosum*, *Sc. truncatum* (which have a rostrum) and as *Sc. tenue*, *Sc. proclive* and *Sc. deforme* (species without a rostrum).

36. *Scalpellum fissum* n. sp. Pl. IX, fig. 1 and 2.

Valves thirteen. Tergum with the apex recurved. Carina simply and not strongly bowed with the umbo at the apex, with narrow sides and with a laterally convex roof, bordered by ridges. Upper latus with a longitudinal fissure. Infra-median latus wine-glass shaped. Carinal latus with the umbo at the base.

The curious species is represented by four specimens, two large and two smaller ones.

The capitulum is rather flat and covered by a delicate membrane to which Radiolarians etc. adhere. Margins of the valves distinct. The occludent margin convex, in the smaller specimens even more strongly bowed than the carinal margin. Apex of the tergum recurved. Valves of the lower whorl well-developed.

The scutum is quadrilateral with the occludent margin convex. The tergal margin is also convex in the larger specimens; in the smaller it is nearly straight. The lateral margin is

convex in the under part, where it forms a continuous curvature with the basal margin. It is hollowed out in the lower part where the apex of the upper latus borders upon it.

The tergum is triangular. The occludent margin is convex, the carinal margin is slightly hollowed out above the middle at the place where the apex of the carina touches it. The surface of this valve appears to be larger in the smaller (shown in fig. 2) than in the larger specimens as represented in fig. 1. Apex distinctly recurved.

The carina has a well-developed roof and narrow sides. The roof is not quite flat, but laterally convex with narrow, rather flat borders. This valve is simply bowed, not very strongly in the full-grown specimens, but much less so in the younger specimens, one of which is represented in fig. 2. The carina of the latter is almost straight, making the convexity of the occludent side of the capitulum much more prominent.

The upper latus is the most characteristic of the valves: it is almost divided into two nearly equal halves by a split or fissure reaching from the basal margin to near the umbo of the valve: the same fissure has about the same relative length on both sides of the four specimens at my disposal. The apex of the valve is truncated, the umbo is at the extremity of a triangular portion which rises slightly above the surface of the valve. The carinal margin of the upper latus is short, the basal margin hollowed out, being divided into two parts, the longer of the two having a very conspicuous curvature.

The rostral latus is quadrilateral with the lateral margin convex. The scutal margin is slightly longer than the basal margin.

The infra-median latus is wine-glass shaped and has the umbo very near to the base.

The carinal latus is irregularly quadrangular. Its carinal margin is nearly straight, its basal margin also straight. The lateral margin is convex and its upper margin is divided into two parts, which meet together at an angle entering into the hollowed out basal margin of the upper latus. Near its base the carinal margin has a little excrescence of nearly quadrangular form meeting beneath the base of the carina with the same excrescence of the same valve on the other side.

The peduncle is cylindrical. In all four specimens it is distinctly curved, more strongly, however, in the full-grown specimens than in the smaller. Its base of attachment is prolonged at one end towards the occludent side of the capitulum and is covered by a large number of scales arranged in fairly regular rows. The number of these rows is greater in the larger than in the smaller specimens; while they are at some distance from one another in the smaller specimens, they nearly touch in the full-grown animal. In consequence of the peduncle being bent it is not easy to count the number of the longitudinal rows; in the full-grown specimen their number, however, is not less than 14 to 15.

Size. The largest specimen had a capitulum of 9,2 mm. Its peduncle, if it could be stretched quite straight, would measure about 7 mm. One of the smaller specimens had a total length of 9,1 mm., its capitulum measuring 6,5 mm.

The specimens are attached to small stems or sticks of different nature.

The study of the structure of the animal within the capitulum has yielded the following results:

Mouth slightly bullate; crest of labrum with a row of very minute bead-like teeth.

Palpi short, broad at the base, conical; a tuft of bristles at the apex, a few short hairs on the interior margin.

Mandibles with three teeth and the inferior angle pectinated; tooth 1 and 2 twice as far from one another as tooth 2 and 3; distance between 3 and inferior angle still smaller. Surface of mandible covered with delicate hairs in groups of two or three on the part near the toothed edge. Short hairs along the inferior margin.

Maxillae with a distinct notch slightly above the middle of the edge. Above the notch the edge bears three strong and a smaller spine; beneath the notch the edge is straight and is furnished with seven or eight spines of nearly equal size. Surface near the edge covered with hairs; superior margin furnished with a few hairs in the neighbourhood of the first spine, inferior margin with a row of numerous hairs.

Outer maxillae have the inner surface rounded with numerous bristles, which can hardly be said to be divided into two different groups; opening communicating with the body-cavity at the end of a very long and flattened projection, cut off transversely at the extremity.

Cirri. First pair at a little distance from the second, short, with unequal rami, shorter ramus flat with eight segments which are oblong in transverse direction; segments much flattened towards the inner margin where each is furnished with a row of five or six strong spines; longer ramus with 9 segments, of a more cylindrical shape, furnished with a row of five to six spines along the outer as well as along the inner margin. Both rami thickly clothed with longer hairs.

Second cirrus shorter than the following. Anterior ramus with seventeen, posterior with eighteen segments. First segment long, segments 2—8 nearly quadrilateral, segments 9 and following ones becoming more and more elongate, last segments very long and narrow. Each segment has about four pairs of bristles along the anterior margin, a few hairs along the posterior margin and also one or two longer hairs at the extremity of each segment.

Sixth cirrus rather long with about twenty-four segments in each ramus. Basal segment long, cylindrical, segments 2—6 quadrilateral, 7 and following ones growing gradually longer and more slender. As a rule the segments are furnished with four pairs of spines along the anterior margin and a single spine (or no spine) at the posterior margin near the extremity.

Caudal appendages have six segments. They are very slender, and reach with their last segment only slightly beyond the pedicel of the 6th cirrus. Very long and delicate hairs are planted at the extremity of the second to sixth segments. The extremity of the last segment is furnished with half a dozen hairs, two of which are longer than twice the length of the segment.

No penis.

Male. I found two males on the one, three on the other side of one of the females. They are attached to the inner side of the scutum, near the occludent margin, in a duplicature of the sac or mantle, slightly in front of the adductor muscle. They have the ordinary long oval shape and show no trace of valves. Their size is about 0,84 × 0,42 mm. Their surface is clothed with very short hairs or spines, which stand alone or in groups of two or three without forming regular rows. Slightly longer hairs form a little tuft on each side of the opening giving entrance to the interior of the sac. The prehensile antennae have the ordinary shape: a longer

cylindrical segment and a shorter conical one; they are attached about the middle of the length and not at or near the extremity of the male. The musculature of the sac is strongly developed, the muscles forming parallel hoops along the inner side of the transparent sac. The male genital apparatus is well-developed, the animals being in ripe or nearly ripe condition. The testiculum is heart-shaped and communicates with an oval receptaculum seminis, quite filled up with the thread-like spermatozoa.

This species was collected by H. M. S. "Siboga" at two stations, viz.:

Stat. 137. August 3, 1899. Lat. 0° 23'.8 N., Long. 127° 29' E. Depth 472 m. Bottom: fine dark muddy sand. One large and two smaller specimens.

Stat. 212. September 26, 1899. Lat. 5° 54'.5 S., Long. 120° 19'.2 E. Depth 462 m. Bottom: fine grey and green mud. One larger specimen.

Observation. This is without doubt a very characteristic species. The curious shape and structure of the upper latus entitles one fully to say so. The change in shape of the capitulum and of the carina and tergum especially, which appears to take place during growth is, I think, also worthy of mention. I give two figures therefore: one of the largest and one of a younger specimen.

37. *Scalpellum candidum* n. sp. Pl. IX, fig. 3 and 3*a*.

Valves fourteen, not covered by membrane. Carina simply bowed with the umbo at the apex; its roof flat, very broad, bordered by ridges. Upper latus pentagonal, apex not produced. Rostrum small, circular. Infra-median latus large with the umbo at the base. Carinal latus triangular, with the umbo at the angle formed by the carinal and basal margins.

This small species is represented by one specimen only. In many regards it resembles *Sc. poculum* (pag. 100) and I think it best merely to point out the differences between these two species.

The lateral and basal margins of the scutum and the short margin separating this valve from the infra-median latus describe together one continuous arch, which is not the case in *Sc. poculum*.

The occludent margin of the tergum is distinctly convex, its apex is recurved.

The carina has the lower part of the roof broader than in *Sc. poculum*.

The apex of the upper latus is not produced, not so distinctly produced as in the other species.

The rostrum is hardly visible. It is a very small circular plate fitting exactly between the upper rostral extremities of the rostral latera.

The rostral latus has the rostral margin considerably shorter than the lateral margin so that the basal and scutal margins are not nearly parallel (as in *Sc. poculum*) but distinctly diverging.

The infra median latus of the present species has a more compressed form.

The carinal latus is large and has an irregular triangular shape, the lateral and upper margins sloping into one another insensibly and the carinal margin forming one straight line. The umbo is seated quite at the base where the carinal and basal margins meet at a sharp angle.

The scales of the peduncle are very distinct, at some distance from one another and placed in 8 longitudinal rows. The length of the peduncle is about half the length of the capitulum.

Size. The total length of the animal is 7,8 mm., that of the capitulum 5,5 mm.

The "Siboga" took the specimen at:

Stat. 251. December 8, 1899. Lat. 5° 28'.4 N., Long. 132° 0'.2 E. Depth 204 m. Bottom: hard coral sand.

38. *Scalpellum virgatum* n. sp. Pl. IX, fig. 4.

Valves thirteen covered with a delicate brownish membrane. Carina with the umbo at the apex and with a flat roof bordered by ridges. Lateral margin of the scutum with a deep triangular incision near the upper extremity for the reception of the apex of the upper latus. Valves of the lower whorl large. Infra-median latus wine-glass shaped with the umbo near the base. Carinal latus quadrilateral with the umbo near the base.

This curious deep-sea species is represented by a single specimen only.

The capitulum is rather flat, little more than twice as long as broad, having the carinal margin slightly more convex than the occludent margin. The apex of the tergum is pointed and a little recurved. The surface is of a browny yellowish colour; scratching it with a needle a very delicate skin or membrane loosens in little flocks from the surface. The ridges of growth are very distinct on most of the valves; parallel furrows are visible on the scutum, on the upper latus and also on the carinal latus near the base. The valves are separated from each other by narrow, but distinct chitinous interspaces; that between the tergum and the upper half of the carina being much broader than the others.

The scutum has a very characteristic shape. Its occludent margin is convex; its tergal margin hollowed out near the apex and convex towards the other extremity. The lateral and basal margins slope into one another quite insensibly; near the upper extremity the lateral margin shows a very characteristic incision in which the apex of the upper latus fits exactly.

The tergum is triangular. Its occludent margin is convex, its carinal margin slightly hollowed out in the upper, slightly convex in the lower part. The apex is not strongly, yet distinctly recurved.

The carina has a flat roof which is bordered by ridges, but does not increase in width very strongly from the apex downwards. The sides of the carina are well-developed over its whole length, they increase only slightly in width from the base to the tip of the valve.

The upper latus is pentagonal with the sides of very unequal length. The carinal and the basal margin along the infra-median latus are the shortest, the convex tergal margin which is slightly hollowed out in the middle is the longest. The lateral margin is hollowed out and a little longer than the basal margin separating this valve from the carinal latus. The umbo is at the apex which may be called beaked.

The rostral latus is quadrilateral; the upper and basal margins are of about equal length, the rostral margin is slightly convex, the lateral margin distinctly convex.

The infra-median latus has the shape of a wine-glass and is relatively large. Both

lateral margins are distinctly hollowed out. The umbo is near the base, beneath the centrum of the triangular part which represents the foot of the wine-glass.

The carinal latus is large and has an irregular quadrilateral shape. The carinal margin is nearly straight, the umbo of the valve is at the angle where the carinal and basal margins meet. The upper and lateral margins meet at a very blunt angle.

The peduncle is short and shows eight not very distinct, longitudinal rows of scales: three on both sides, one along the carinal and one along the rostral side of the peduncle. The scales are much larger and much more distinct near the upper extremity of the peduncle.

Size. The only specimen representing this species has a total length of 19 mm. the length of the capitulum being 14,8 mm. It was found attached to a bundle of brownish threads or hairs, the nature of which is unknown to me. It was taken by H. M. S. "Siboga" at:

Stat. 295. January 24, 1900. Lat. 10° 35'.6 S., Long. 124° 11'.7 E. Depth 2050 m. Bottom: fine grey mud.

Observation. This species is at once recognisable by the form of its scutum and that of its infra-median latus and carinal latus. It belongs to the same group of species as *Sc. fissum*, *Sc. candidum* and *Sc. incertum*, but may be very easily distinguished from each of these species.

Genus **Pollicipes** Leach

In the Malay Archipelago this genus is represented by one species only[1]: *P. mitella* (Lin.). Like the other species, *P. mitella* lives near the coast in shallow water, attached to rocks, stones or shells.

Darwin described six species of this genus in 1851 and since his Monograph appeared the number has increased by one species only: *P. Darwini* Hutton from New Zealand. It is the oldest known fossil genus of Lepadids and it must have been represented by very numerous species in former geological periods: Darwin enumerates 22 fossil species in his Monograph on the fossil Lepadidae of Great Britain.

The above-named species was collected by H. M. S. "Siboga" on two different occasions.

1. *Pollicipes mitella* Lin.

This is a very characteristic species and Darwin has given an excellent description of it.

Rumphius knew it already as an inhabitant of the Malay Archipelago and also Seba. It occurs as far north as Japan, as far west and south as Madagascar, as far east as Hawaii (autor. Gruvel).

Concerning the bathymetrical distribution of this species not much is known: it is generally considered to be a shallow-water species or even a littoral form. In my Report on the Cirripedia of the "Challenger" Expedition I said that it was not on record that any one of the species of *Pollicipes* occurs at a depth of even 10 fathoms, and so far as I know this still holds good.

[1] Gruvel, Monographie p. 18, says that *P. elegans* Lesson occurs at Java, but he does not name the authority who observed that species there — I hardly believe he is right.....

During the cruise of H. M. S. "Siboga" specimens of this species were collected on two occasions:

At Station 51: Madura Bay in the southern part of Molo Strait; on the shore. About 20 specimens.
At Station 50: Bay of Badjo (West coast of Flores); on the shore.

N.B. As mentioned already p. 47 specimens of *Ibla Cumingi* Darwin were found attached to several specimens of *P. mitella* at Station 51.

Genus **Lithotrya** Sowerby

Of this genus six species were known to DARWIN in 1851 and only one new species (*L. pacifica* Borradaile) has been added to this number in the 55 years since then. They are found lodged in cavities, in calcareous rocks, shells, or corals and have been observed "generally" within the tropics. All the species occur only in shallow water.

In the Malay Archipelago and in Australian waters, 4, perhaps 5, of the known species have been observed: *L. cauta* Darwin, New South Wales, Australia; *L. nicobarica* Rhdt., Timor; *L. truncata* Quoy et Gaimard, Philippines; *L. pacifica* Borradaile, Funafuti. [Perhaps *L. rhodiopus* J. E. Gray, the habitat of which was unknown to DARWIN, belongs to the same region also; the Copenhagen Museum possesses specimens labelled *L. rhodiopus* J. E. Gray, Funafuti; they are specimens purchased from the Museum Godefroy.]

H. M. S. "Siboga" met with specimens of this genus on five different occasions; four different species are represented in this collection.

1. *Lithotrya nicobarica* Rhdt.

REINHARDT (1850) has given the description of this species founded on specimens from the Nicobar Islands. DARWIN (1851) when giving the description of this species in his Monograph had REINHARDT's paper at his disposal, but he could not compare the typical specimens used by REINHARDT. The specimens which DARWIN identified with R.'s species were from Timor.

Through the courtesy of the Director, Prof. JUNGERSEN, and the Keeper of the collection of Crustacea, Dr. MEINERT, of the Copenhagen Museum, I got free access to the specimens of this species which are to be found in that Museum. They are — according to the label — from Pulo Milu, Galatea. As Galatea Bay is the name of a Bay of the Island Sambelong (Great Nicobar), and as they are the only specimens of this species in the Museum, the probability that they are the original specimens of REINHARDT seems great[1]. They correspond with DARWIN's description and figures in all essential regards.

Several forms collected during the cruise of H. M. S. "Siboga" belong doubtless to this species. They are from two different Stations: from the reefs near Lucipara and from the reefs of the Island of Kur, West of the Kei Islands. At both places, however, together

[1] These had not been put aside as type-specimens, as is now the custom with specimens which have served for the institution of "novae species", so that Dr. MEINERT could not say with absolute certainty, that they were REINHARDT's types.

with, I might say, typical specimens of *L. nicobarica*, other specimens of a form or species of *Lithotrya* were collected, which after careful study I feel inclined to consider as different from REINHARDT's *L. nicobarica*. I shall describe the other form as a new species and call it *Lithotrya conica*; as the comparison of the different specimens with one another and with DARWIN's description brought to light that more or less interesting differences occur even between the specimens which doubtless belong to the original species of REINHARDT, I think it useful to enter into some detail on that species first of all.

With regard to the valves of *L. nicobarica* the following may be pointed out:

The scutum has the tergal margin either straight or slightly sinuous, in which case the upper part is hollowed out.

The carina has a well-developed central, internal ridge which extends over the upper half of the valve. The inner growing surface is in most specimens but very indistinctly pentagonal.

The rostrum is different in size in the different specimens, the number of zones preserved varying in the 18 specimens I was able to observe from 2—7. This number was 2 in three specimens, 3 in ten, 5 in three, 6 in one and 7 in one. The number of the subjacent scales of the peduncle, which the rostrum equals in width, varied from 4 to 7: it was 4 in four specimens, 5 in five, 6 in seven and 7 in two. In one of the specimens from Pulo Milu, Galatea, which I was able to study more carefully, the number of distinct zones was 3 and the number of scales of the peduncle which the rostrum equalled was 7. [In the figure of this species DARWIN reproduced after REINHARDT a much greater number of zones is indicated.]

The latera which according to DARWIN are unusually large in this species vary greatly in the different specimens. Their general shape is as described by DARWIN: triangular, elongated transversely with the carinal angle a rectangle; but they are much broader in some, narrower in other specimens. I compared the length of this valve with that of the carina and I thus found that it can be less than half as long as that valve and also nearly as long as it: in a specimen the length of the carina in which was 13 mm. the latus measured 11 mm., and its length was 6 mm. in another specimen, the carina of which was 7 mm. long. The number of zones of growth preserved in the specimens I investigated also differed greatly: on 18 specimens this number was once 8, twice 7, three times 5, four times 4 and six times 3. In the two remaining specimens the zones of the little valves were quite covered with chalk and could in consequence not be distinguished. The latera as a rule equal in width the seven subjacent scales of the peduncle; in some of the specimens this number, however, is six or five and in one specimen four of the scales equalled the width of this valve.

With regard to the peduncle the only difference from DARWIN's description I noticed was that the shape of the upper scales was more irregular.

With regard to the body of the animal I may point out the following:

The labrum has a row of blunt teeth; its palpi have their ends rather more rounded than truncated.

The mandibles have the distance between the tips of the first and second teeth 7, taking the distance between the tip of the second tooth and the inferior angle as 9.

The maxillae sometimes have the notch beneath the large upper and two smaller

spines distinct, sometimes it is hardly visible. In no case have I observed two large upper spines. In the notch, or if it is absent at the place it occupies in other maxillae, three or four very short and delicate hairs are planted. Next follows a slightly protuberant part with 5 or 6 pairs of spines and then a second smaller notch. Then about 8 pairs of spines and finally the slightly prominent inferior angle with a brush of rather short spines.

The outer maxillae have a small but distinct notch between the upper and lower group of spines.

Of the cirri the first pair is short; the general shape of the segments of this pair is: narrow at the base and broader at the other extremity. The anterior ramus has 8 segments on the right side and 12 on the left, the posterior 12 and 13 respectively. The segments are thickly paved with bristles, which are themselves coarsely and doubly serrated.

The second cirrus has 17 and 20 segments; the 8 basal segments of the anterior ramus are highly protuberant and thickly clothed with spines; the posterior ramus has only 5 of these basal segments and 15 upper segments with the usual structure.

The third cirrus has 22 and 24 segments: six and five of these are highly protuberant and thickly clothed with spines.

The fourth cirrus has 23 segments in both rami and the front of the basal segments not protuberant, as is the case in the three preceding pairs.

The fifth cirrus has 25—26, the sixth 23—26 segments.

The caudal appendages are long, reaching as far as the extremity of the eighth segment of the anterior ramus of the sixth cirrus. The number of segments was 23.

The penis is short, thick at the base, distinctly ringed.

During the cruise of H.M.S. "Siboga" this species was observed at the following places:

Station 225^{e}: Reef near Lucipara islands; 8—10 November 1899. 17 specimens.
Station 250: Reef near Kur island (to the W. of the Kei islands), December 6—7, 1899. 1 specimen.

2. *Lithotrya conica* n. sp. Pl. IX, fig. 10—12.

Scutum large, indistinctly beaked and slightly overlapping the tergum; tergum much smaller than the scutum, their tips coming close together; carina triangular, strongly bowed laterally, feebly bowed vertically; rostrum small, as wide as four (or less) of the subjacent scales; latus having the shape of a parallelogram, its base as wide as four of the subjacent scales.

Palpi with the tips rounded, conical; mandibles with not very numerous pectinations between the teeth; maxillae with the inferior angle hardly prominent; outer maxillae without notch between upper and lower group of spines.

The capitulum as a whole has a conical shape, its rostral and carinal margins being both nearly equally curved. The tip of the scutum reaches as far or slightly farther than that of the tergum, the tip of the carina not extending so high up.

The scutum (Pl. IX, fig. 11 *A*) is considerably larger than the tergum, its occludent margin is bowed and long, its tergal margin is hollowed out, or (in the largest specimen)

straight. It is indistinctly beaked: the tip being rounded off as a rule. It overlaps the tergum only very slightly.

The tergum (fig. 11 *B*) has an irregular triangular shape. It is divided by a ridge running from the apex to the basal-scutal angle into two parts: a larger triangular part and a smaller one of an irregular shape. The latter part is to a small extent overlapped by the scutum. Its free margin (the scutal margin) is bowed in the upper half and slightly hollowed out in the lower half.

The carina (fig. 11 *C*) has about the same size as the tergum, its shape is triangular and it is bowed in a lateral as well as in a vertical direction: the inner surface is concave in consequence. The upper free portion has a very slight central ridge. The inner growing portion is indistinctly pentagonal.

Scutum, tergum and carina have numerous and very distinctly projecting rims on which numerous and very small teeth are visible.

The rostrum is small and is composed of only two or three zones of growth. The number of subjacent scales of the peduncle, which the rostrum equals in width, is three, in one specimen four.

The latus is also small. It has the shape of a parallelogram and shows only 3 or 4 zones of growth. Along its base there are at most four scales of the peduncle.

The peduncle shows a distinctly swollen ring covered by about six horizontal rows of scales immediately beneath the capitulum. The first, second and third row have the scales of an irregular transversely elongated shape, the inferior margin being crenated. The scales of the three following rows are much smaller (Pl. IX, fig. 12). A few rows of much smaller scales of an irregularly rounded form are seen under this swollen ring and then follows the main part of the peduncle which shows no scales on the surface and is indistinctly ringed. The width of the peduncle diminishes considerably from the capitulum downwards.

The size of the largest specimen was: length 46 mm., 34 mm. being accounted by for the peduncle; greatest breadth of the capitulum at its base: 13 mm., smallest breadth: 7 mm. Most specimens are, however, considerably smaller.

The body of the animal differs from that of *L. nicobarica* in the following regards:

The labrum has about twelve small blunt teeth on its central and about 15 on each of the lateral parts. Palpi short conical, with the tips rounded.

The mandibles have less numerous pectinations between the first and the second, as also between the second and third teeth, viz.: 12 and 7 to 8 respectively.

The maxillae have a notch, two spines are inserted above it, half a dozen delicate ones in the notch and numerous pairs of spines beneath it. The inferior angle can hardly be said to be prominent.

The outer maxillae have the spines continuous over the inner and outer margin.

The cirri correspond in general with those of *L. nicobarica*, but the number of segments is not inconsiderably smaller:

The left cirrus of the first pair has 9 and 11 segments in the slightly unequal rami; the cirrus of the right side has 11 and 12 segments in the same specimen.

The second pair has 15 and 18 segments,
the third pair 17 and 20 segments,
the fourth pair 20 and 20 (21) segments,
the fifth pair 21 and 21 segments,
the sixth pair 22 and 22 segments.

The surface of the segments of the 4th—6th cirrus is smooth or nearly so; the minute comb-like scales, which make the surface hirsute in *L. nicobarica*, are wanting in *L. conica*.

The caudal appendages contain 18 segments in the specimen in which the sixth cirrus had 22 segments in each ramus.

The penis is much like that of *L. nicobarica*.

This species was collected at the following Stations during the expedition of H.M.S. "Siboga":

Station 225e: Reef near Lucipara Islands; 8—10 November 1899. 8 specimens.
Station 250: Reef near Kur Island (to the West of the Kei Islands), December 6—7 1899. 3 specimens.

General Remark. At both places where specimens of *L. nicobarica* were collected, specimens of *L. conica* were also found. It cannot be made out, however, with the aid of the preserved material, whether the specimens were really found at exactly the same place and lived under absolutely similar circumstances, or not. The specimens of *L. conica* are smaller than most of *L. nicobarica*; some of the latter, however, are as small as most of the *L. conica*, yet show the differences in the shape of the capitulum and of the valves, which I think are very striking. There is therefore no reason for me to admit that the one form represents younger, the other older specimens of the same species. On the other hand I would by no means be surprised if future investigations show that the two forms really belong together in some way or other.

3. *Lithotrya pacifica* Borradaile. Pl. IX, figs 13, 13*a* and 14.

Borradaile, L. A., On some Crustaceans from the South Pacific. Part V. Proceedings of the Zool. Soc. of London. 1900, p. 798, Pl. LI, figs 3, 3*a*.

On the east coast of Lombok two specimens of a *Lithotrya* were collected which I think belong to the species described for the first time by Borradaile from specimens from the outer reef of Funafuti.

The specimens from Lombok differ in several more or less important points from the diagnosis given by Borradaile. I consider it useful therefore to give a figure of the largest of the Lombok specimens (fig. 13) and to point out the most essential differences in a short description.

The scutum is triangular, considerably shorter than the tergum, overlapping the latter valve not a little; its external surface is very distinctly ridged.

The tergum is somewhat narrow, more elongate-rhomboidal than triangular; its basal portion is overlapped on the one side by the scutum, on the other by the latus; externally the part not overlapped by scutum and latus shows a prominent longitudinal ridge with the zones of growth running transversely and nearly straight. The latus is long and stout, its length about $^3/_4$ths the length of the tergum, its extremity being nearly on the same level with that of the

scutum. It consists of about 8 divisions, separated by prominent transverse ridges, each of which is curved with the curvature away from the extremity. The base of the latus corresponds with 4 (indistinctly 5) of the underlying scales.

The carina is very long and rather narrow, curved longitudinally and strongly bowed laterally, hence very distinctly concave over its whole length. Its extremity stands off and reaches higher up than that of the tergum. The middle row of knobs described by BORRADAILE very distinct.

The rostrum composed of 4 (in the smaller specimen 3) divisions, small and narrow, its base bordered by a row of five scales (fig. 13*a*).

The peduncle is rather thick, swollen and not very long: as long as the capitulum in the smaller specimen, about twice the length of the tergum in the larger specimen. The upper scales (fig. 14) are broad and distinctly crenated; those of the second whorl are half or one third the size of those of the upper whorl and are so placed that one is exactly under the centre of an upper scale and another between two of these. The scales of the third and fourth whorls are much smaller and not placed so regularly; then follow still smaller ones, rounded calcareous beads invisible to the naked eye, which are distributed over the whole surface of the peduncle.

The colour of the capitulum and the peduncle is a dark, beautiful brown, the tip of the tergum and the rows of scales immediately underneath the capitulum being white.

Size. The length of the largest specimen, including the peduncle, is 25 mm., the length of the carina in the same specimen being 9 mm.

The two specimens were collected at Labuan Pandan, which is on the east coast of the island of Lombok.

Observations. Perhaps DARWIN's *L. cauta* comes nearest to this species — the specimen DARWIN made use of for his description was only 5 mm. in length including the peduncle, and may not have been fullgrown.

The smaller specimen of the two collected by H. M. S. "Siboga" has the tips of some of the valves (tergum and carina) broken off and the space between the slightly distended valves is filled up with dirt; a small specimen of *Ibla* (? *Cumingi* Darwin) was found attached to the inner side of one of the valves.

4. *Lithotrya truncata* (Quoy et Gaimard).

Of this curious species, which was founded for specimens from the Friendly Archipelago, and was known to DARWIN from specimens from the Philippine Archipelago, two specimens were collected during the cruise of the "Siboga" at:

Stat. 60. 27—28 April 1899. Haingsisi, Samau Island, Timor: Shore exploration.

They are small specimens: the largest of the two measures (capitulum and peduncle together) about 11 mm. A very small specimen of what I believe to be an *Alepas* (perhaps identical with the *Alepas lithotryae* I found attached to *L. nicobarica*) occupies the corner between the tergum and the carina where the rudimentary latus is to be looked for.

PLATES

PLATE I

Fig. 1. *Poecilasma carinatum* Hoek.

Fig. 1. Group of animals; magnified 3,25 diameters.

Fig. 2—4. *Poecilasma dubium* n. sp.

Fig. 2. Animal, lateral view; magnified 3,6 diameters.
Fig. 3. Carina, lateral view; magnified 11 diameters.
Fig. 3*a*. Carina, lower part, internal view; magnified 11 diameters.
Fig. 4. Maxilla; magnified 134 diameters.

Fig. 5—8. *Poecilasma excavatum* n. sp.

Fig. 5. Animal, lateral view; magnified 4 diameters.
Fig. 6. Tergum; magnified 10 diameters.
Fig. 7. Carina, lateral view; magnified 8 diameters.
Fig. 7*a*. Carina, lower part, external view; magnified 8 diameters.
Fig. 8. Caudal appendages; magnified 36 diameters.

Fig. 9—10. *Poecilasma excavatum*, varietas.

Fig. 9. Animal, lateral view; magnified 5,3 diameters.
Fig. 10. Apex of the scutum with the division of the tergum; magnified 36 diameters.

Fig. 11—22. *Poecilasma obliquum* n. sp.

Fig. 11. Animal seen from the right side; magnified 3,6 diameters.
Fig. 12. Animal from the left side; magnified 3,6 diameters.
Fig. 13. Scutum of the left side, interval view; magnified 3,6 diameters.
Fig. 14. Tergum of the right side, external view; magnified 36 diameters.
Fig. 15*a*. Carina, lateral view; magnified 3,6 diameters.
Fig. 15*b*. Carina, internal view; magnified 3,6 diameters.
Fig. 16. Labrum, seen from above; magnified 36 diameters.
Fig. 16*a*. Teeth of the labrum; magnified 180 diameters.
Fig. 17. Mandible; magnified 52,5 diameters.
Fig. 18. Maxilla; magnified 52,5 diamaters.
Fig. 19. Outer maxilla; magnified 52,5 diameters.
Fig. 20. Left cirrus of the fifth pair; magnified 36 diameters.
Fig. 21. Right cirrus of the fifth pair; magnified 36 diameters.
Fig. 22. Caudal appendages; magnified 36 diameters.

1
× 3 1/4

2

3

4
× 11

5

10

11
× 3 2/3

12

13

15

15 a

16
× 36

16 a
× 130

17

18

19

20
× 36

21

22

P. P. C. Hoek del.

POECILASMA.

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PLATE II

Fig. 1—7. *Dichelaspis Nierstraszi* n. sp.

Fig. 1. Animal, lateral view; one of the large, hairy specimens collected at Station 258, Tual Anchorage, Kei Islands; magnified 11 diameters.

Fig. 2. Animal, lateral view, made transparent; magnified 11 diameters.

Fig. 2*a*. Very young specimen; magnified 11 diameters.

Fig. 3*a* and 3*b*. Scutum and tergum of a young specimen; magnified 28 diameters.

Fig. 4*a* and 4*b*. Scutum and tergum of a full-grown specimen; magnified 28 diameters.

Fig. 5. Carina, lateral view, of a full-grown specimen; magnified 11 diameters.

Fig. 5*a*. Carina, lower part, internal view; magnified 11 diameters.

Fig. 6. Mandible; magnified 180 diameters.

Fig. 7. Maxilla; magnified 180 diameters.

Fig. 8—13. *Dichelaspis Tydemani* n. sp.

Fig. 8. Animal, lateral view, made transparent; magnified 34 diameters.

Fig. 9. Scutum; magnified 63 diameters.

Fig. 10. Tergum; magnified 63 diameters.

Fig. 11. Carina, lower part, internal view; magnified 63 diameters.

Fig. 12. Mandible; magnified 356 diameters.

Fig. 13. Maxilla; magnified 356 diameters.

Fig. 14—18. *Dichelaspis orthogonia* Darwin.

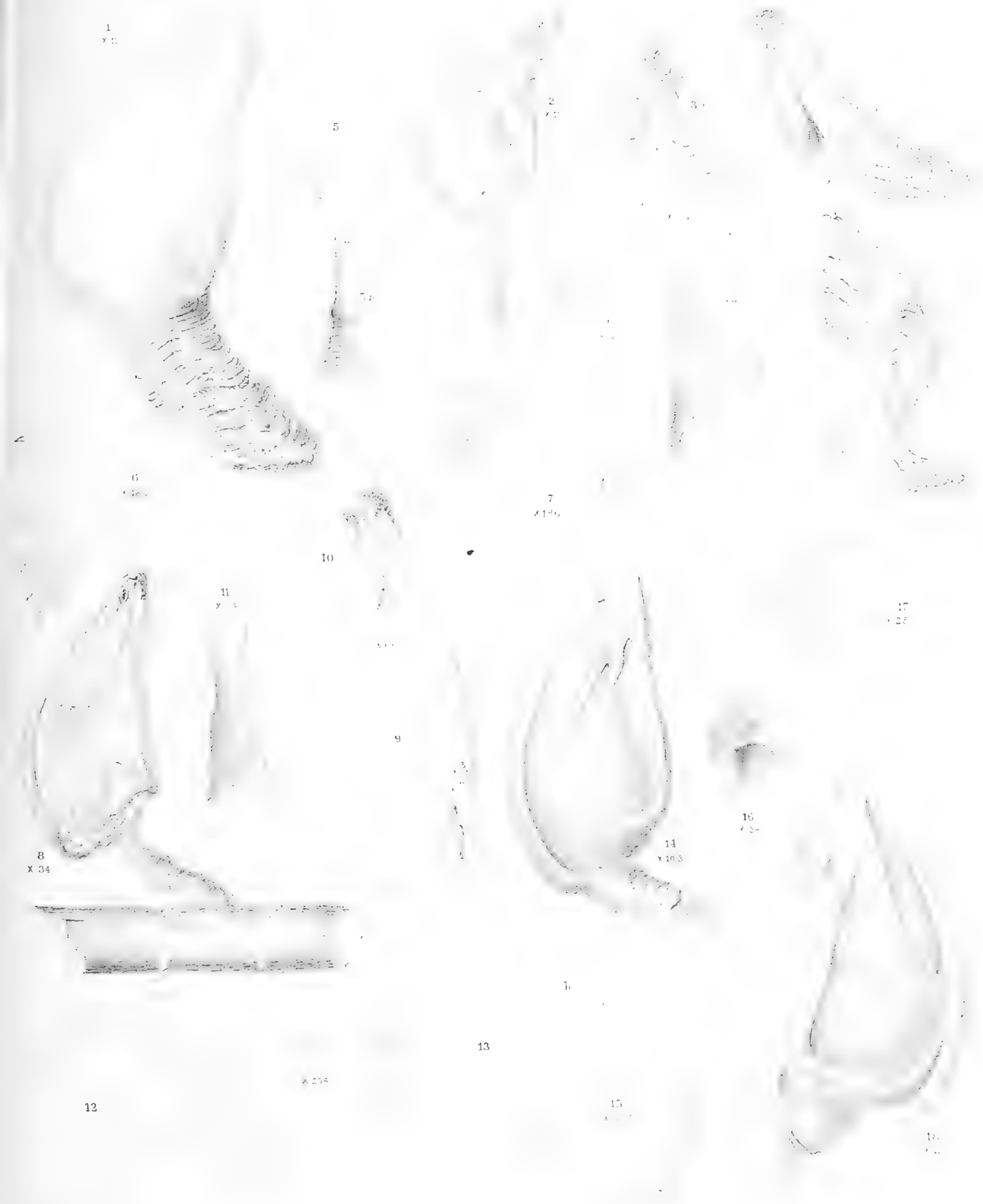
Fig. 14. Animal, lateral view; magnified 10,3 diameters.

Fig. 15. *a*. Scutum; *b*. Tergum; *c*. Carina; magnified 10,5 diameters.

Fig. 16. Termination of the carina, external view; magnified 28 diameters.

Fig. 17. Maxilla; magnified 254 diameters.

Fig. 18. A specimen of the same species from another Station; magnified 11 diameters.



P. P. C. Hoek del. DICHELASPIS. Fa P. W. M. Trap, impr.

PLATE III

Fig. 1, 1*A*, 1*B* and 10*b*. *Dichelaspis orthogonia* Darwin.

Fig. 1. *a*. Scutum; *b*. Tergum; *c*. Carina; magnified 19 diameters.
Fig. 1*A*. Very young specimen; magnified 36 diameters.
Fig. 1*B*. Young specimen; magnified 36 diameters.
Fig. 10*b*. Carina from the interior; magnified 15 diameters.

Fig. 2—7. *Dichelaspis Weberi* n. sp.

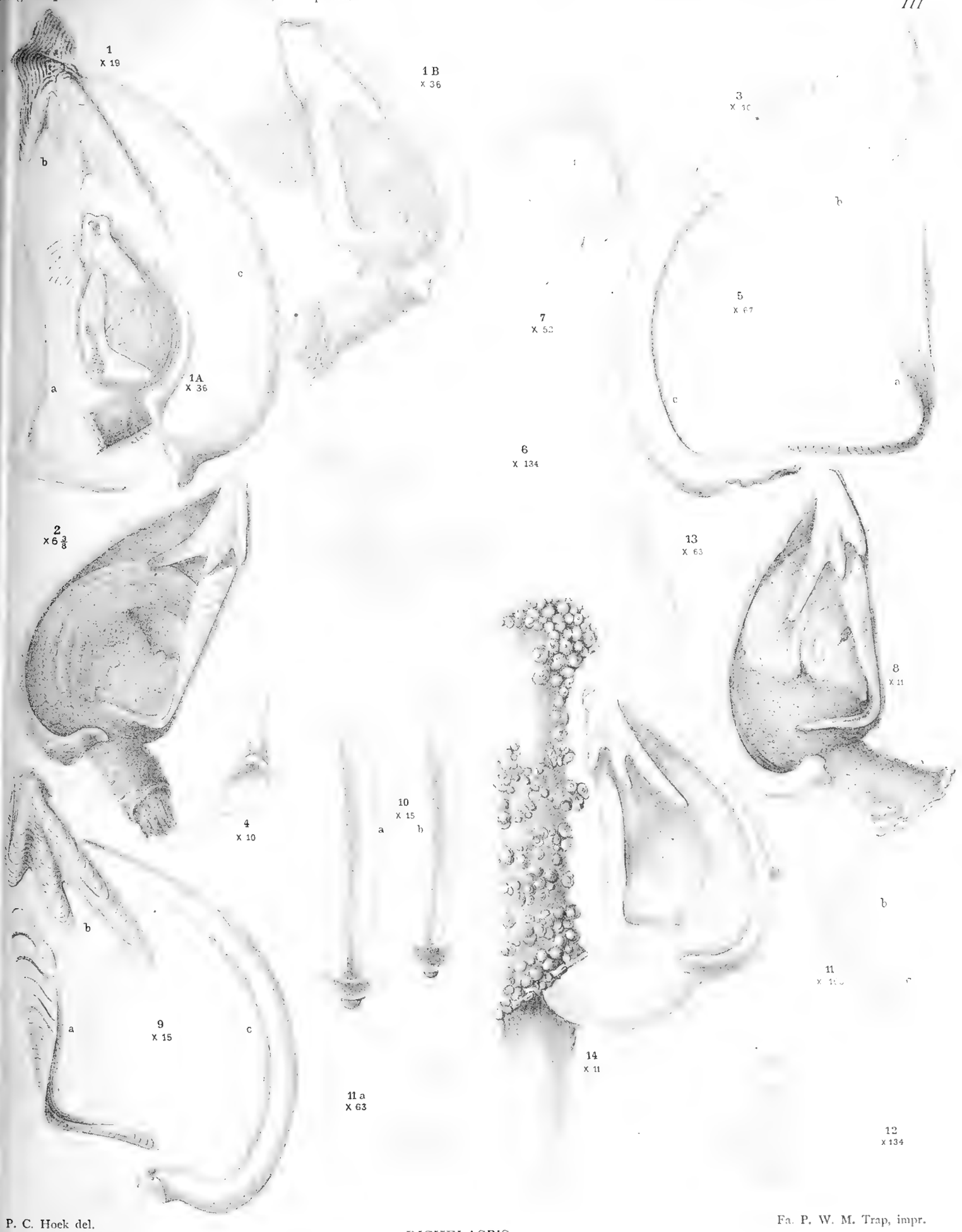
Fig. 2. Animal, lateral view; magnified $6^3/_8$ diameters.
Fig. 3. *a*. Scutum; *b*. Tergum; *c*. Carina; magnified 10 diameters.
Fig. 4. Carina, external view of the disc; magnified 10 diameters.
Fig. 5. Mandible; magnified 134 diameters.
Fig. 6. Maxilla; magnified 134 diameters.
Fig. 7. Outer maxilla; magnified 52 diameters.

Fig. 8—13. *Dichelaspis Versluysi* n. sp.

Fig. 8. Animal, lateral view; magnified 11 diameters.
Fig. 9. *a*. Scutum; *b*. Tergum; *c*. Carina; magnified 15 diameters.
Fig. 10*a*. Carina from the interior; magnified 15 diameters.
Fig. 11. *a*. Mandible, magnified 63 diameters; *b*. inferior angle of the mandible of the right side; *c*. the same of the mandible of the left side. 11*b* and *c* magnified 160 diameters.
Fig. 12. Maxilla; magnified 180 diameters.
Fig. 13. Caudal appendage; magnified 63 diameters.

Fig. 14. *Dichelaspis Versluysi*, varietas.

Fig. 14. Animal, lateral view; magnified 11 diameters.



P. P. C. Hoek del.

DICHELASPIS.

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PLATE IV

Fig. 1—8. *Megalasma lineatum* n. sp.

Fig. 1. Animal, lateral view; magnified 5 diameters.
Fig. 2. Same, as seen from the carinal side; magnified 5 diameters.
Fig. 3. Interior of *a*, scutum, *b* tergum and *c* carina; magnified 5 diameters.
Fig. 4. Carina, dorsal view; magnified 5 diameters.
Fig. 5. Labrum; magnified 52,5 diameters.
Fig. 6. Mandible; magnified 52,5 diameters.
Fig. 7. Maxilla; magnified 52,5 diameters.
Fig. 8. Pedicels of cirri of the sixth pair with the caudal appendages (c. a.); magnified 52,5 diameters.

Fig. 9—12. *Alepas morula* n. sp.

Fig. 9. Animal, lateral view; magnified 3,4 diameters.
Fig. 10. Labrum; magnified 52,5 diameters.
Fig. 11. Mandible; magnified 52,5 diameters.
Fig. 11*a*. Inferior angle of the same; magnified 180 diameters.
Fig. 12. Maxilla; magnified 52,5 diameters.

Fig. 13—16. *Alepas intermedia* n. sp.

Fig. 13. Animal, lateral view; magnified 3,6 diameters.
Fig. 14. Labrum; magnified 52,5 diameters.
Fig. 15. Mandible; magnified 52,5 diameters.
Fig. 16. Maxilla; magnified 52,5 diameters.

Fig. 17—18. *Alepas ovalis* n. sp.

Fig. 17. Animal, lateral view; magnified 3,3 diameters.
Fig. 18. Animal, seen from the rostral side; magnified 4 diameters.

Fig. 19. *Alepas tenuis* n. sp.

Fig. 19. Animal, lateral view; magnified 3,3 diameters.

Fig. 20—22. *Ibla Sibogae* n. sp.

Fig. 20. Animal, lateral view after the right half of the capitulum and the whole body has been taken away. Two little males are seen in the mantle-cavity; magnified 3 diameters.
Fig. 21. Interior of the scutum *A* and the tergum *B*; magnified 18 diameters.
Fig. 22. Labrum with the mandible of the right side; magnified 52,5 diameters.
Fig. 22*a*. Inferior angle of the mandible; magnified 254 diameters.

P. P. C. Hoek del.

MEGALASMA — ALEPAS — IBLA.

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PLATE V

Fig. 1—8. *Ibla Sibogae* n. sp.

Fig. 1. Maxilla; magnified 180 diameters.

Fig. 2. Second maxilla; magnified 78 diameters.

Fig. 3. Male; magnified 36 diameters.

Fig. 4. Front part of the same male; magnified 78 diameters.

Fig. 5. Front part of another male, seen from the dorsal side; magnified 180 diameters.

Fig. 6. Labrum with palp and mandible *in situ*, of a male; magnified 180 diameters.

Fig. 7. Mandible of a male; magnified 440 diameters.

Fig. 8. Maxilla of a male; magnified 440 diameters.

Fig. 9—11. *Scalpellum pollicipedoides* n. sp.

Fig. 9. Animal seen from the left side; magnified 11 diameters.

Fig. 10. Another specimen; *a*, the two additional valves of the lower whorl; magnified 11 diameters.

Fig. 11. Complemental male; *a*, antennae, *c*, carina, *r*, rostrum, *sc*, scutum, *t*, tergum, *t'*, part of the tergum, corresponding with the primary valve; magnified 180 diameters.

Fig. 12. *Scalpellum aries* n. sp.

Fig. 12. Animal, lateral view; magnified 5,6 diameters.

Fig. 13. *Scalpellum rostratum* Darwin.

Fig. 13. Complemental male; magnified 52,5 diameters.

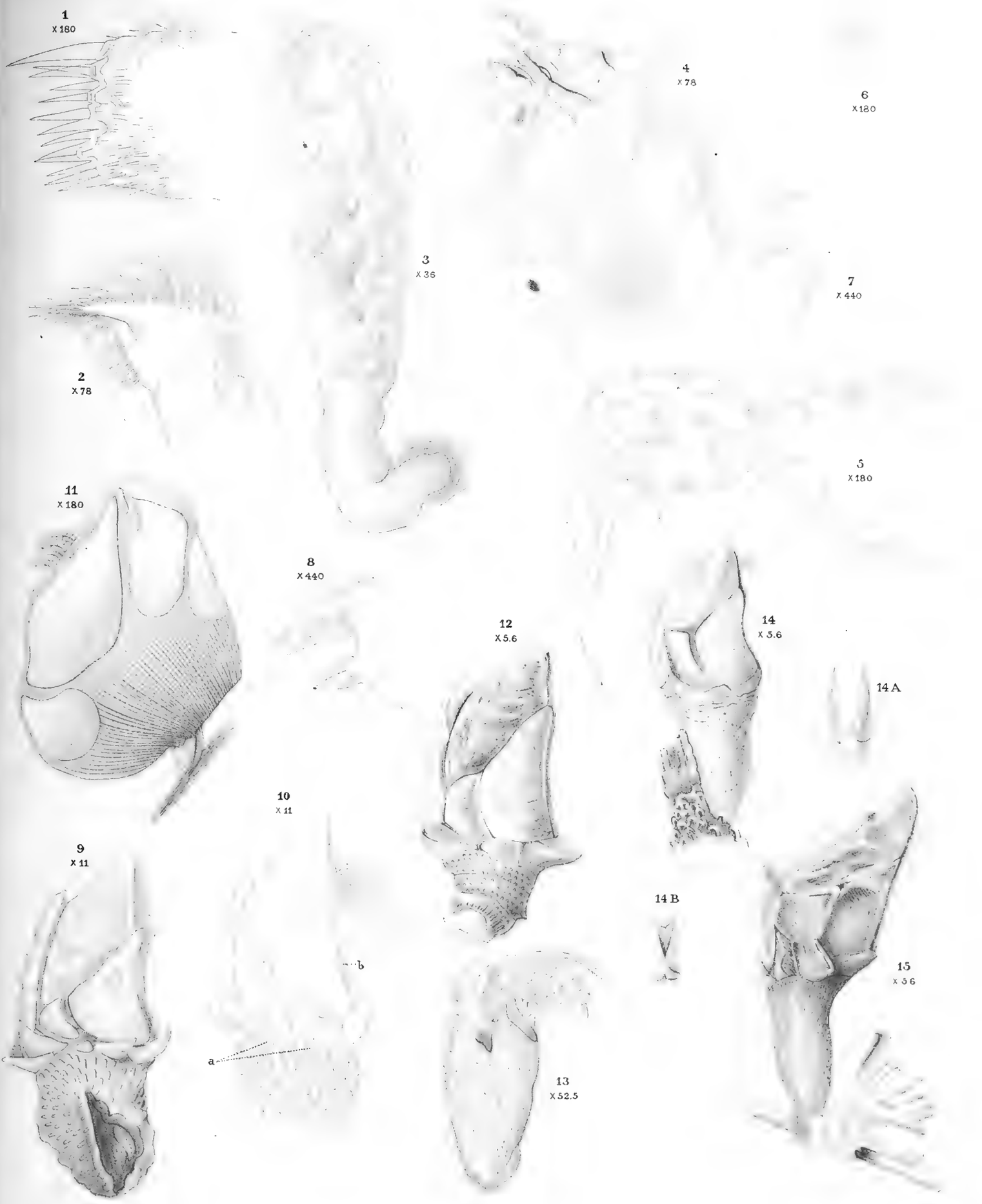
Fig. 14. *Scalpellum Peroni* (Gray).

Fig. 14. Animal, lateral view; magnified 2,8 diameters.

Fig. 14*A*, Sub-carina; 14*B*, Rostrum.

Fig. 15. *Scalpellum uncus* n. sp.

Fig. 15. Animal, lateral view; magnified 5,6 diameters.



P. P. C. Hoek del.

IBLA — SCALPELLUM.

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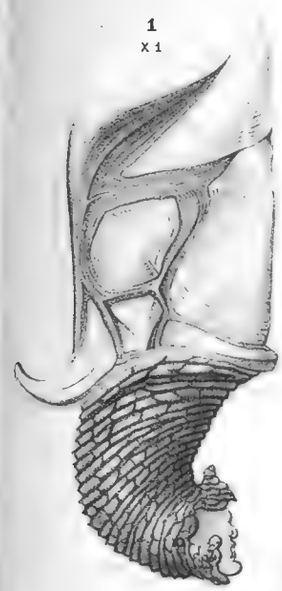
PLATE VI

Fig. 1. *Scalpellum Stearnsi* Pilsbry.
Fig. 1. Animal seen from the left side; natural size.

Fig. 2—3. *Scalpellum Stearnsi* Pilsbry, var. *robusta* n. var.
Fig. 2. Animal seen from the left side (Station 5); natural size.
Fig. 3. Idem (Station 254); magnified 1,1 diameters.

Fig. 4—7. *Scalpellum Stearnsi* Pilsbry, var. *gemina* n. var.
Fig. 4. Two specimens attached to a sponge (Station 74); natural size.
Fig. 5. Valves, isolated; natural size.
Fig. 6. First cirrus; magnified $3^1/_2$ diameters.
Fig. 7. Edge of mandibles; magnified 18 diameters.

Fig. 8—12. *Scalpellum Stearnsi* Pilsbry, var. *robusta* n. var.
Fig. 8. Male; magnified 78 diameters.
Fig. 9. Group of three males; magnified 52,5 diameters.
Fig. 10. Young animal creeping out of the Cypris-shell; magnified 78 diameters.
Fig. 11. Young animal, recently attached; magnified 36 diameters.
Fig. 12. Extremity of capitulum with the primary scutum and tentacles of the young animal of fig. 11; magnified 168 diameters.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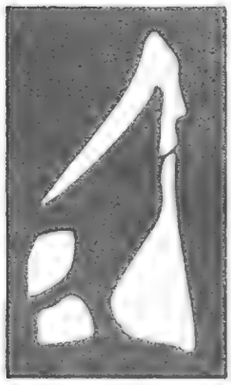
X 1


3
X 11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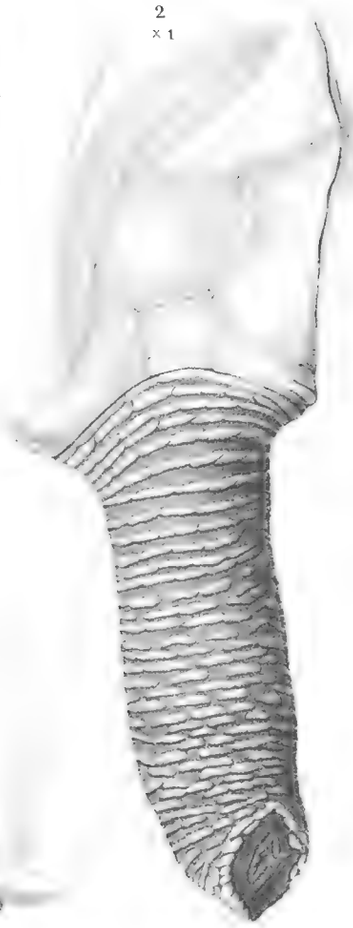
X 1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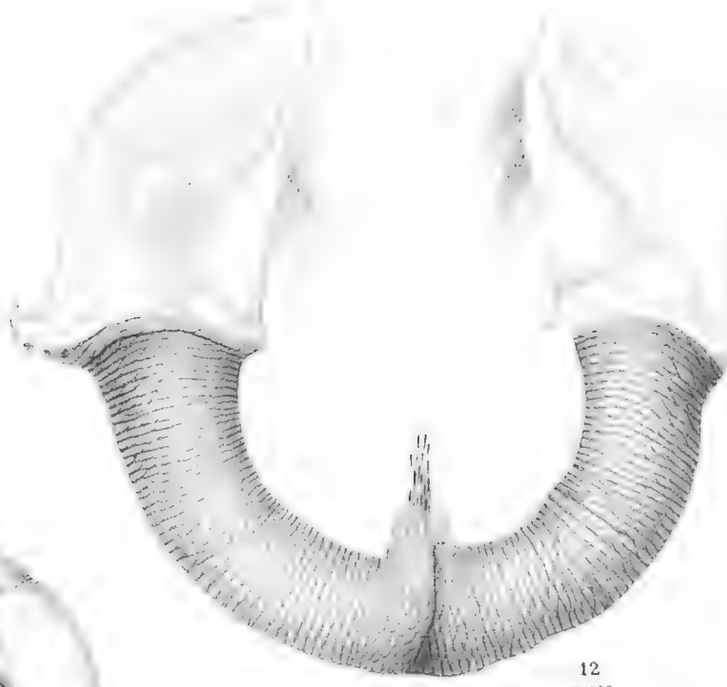
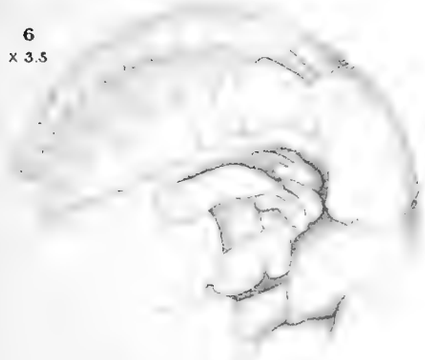
X 1

4
X 1




7
X 18

11
X 36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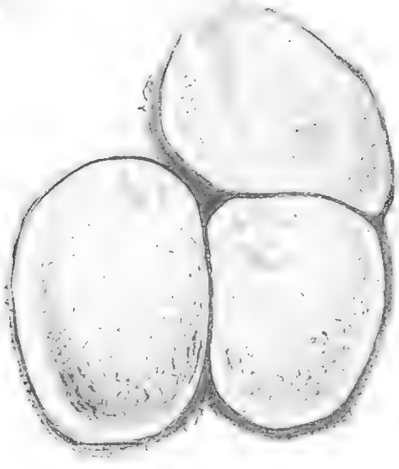
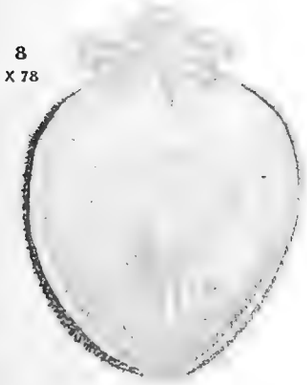
X 3.5

12
X 163

9
X 52.5




8
X 78

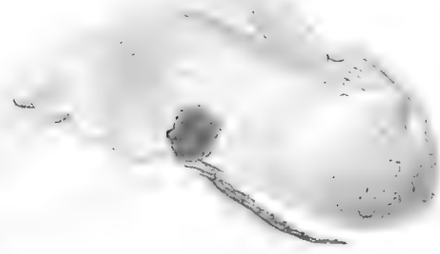
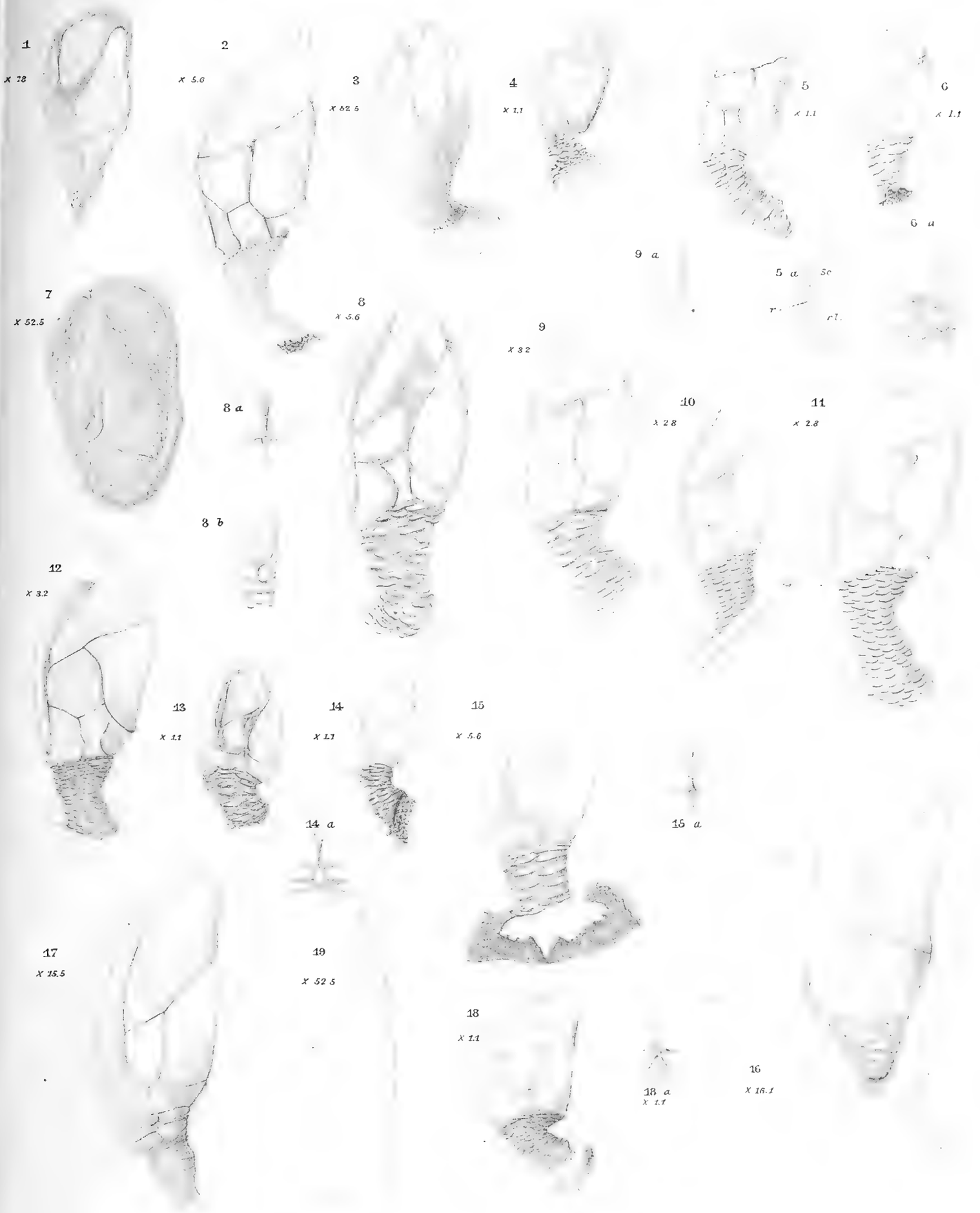

10
X 78

Fig. 1, 2 et 4 G. S. Hoek, ceter P. P. C. Hoek del. Fa P. W. M. Trap, impr.

SCALPELLUM.

PLATE VII

Fig. 1. *Scalpellum acutum* Hoek. Male, magnified 78 diameters.
Fig. 2. *Sc. uncus* n. sp., magnified 5,6 diameters.
Fig. 3. *Sc. uncus* n. sp. Male, magnified 52,5 diameters.
Fig. 4. *Sc. chitinosum* n. sp., magnified 1,1 diameters.
Fig. 5. *Sc. inflatum* n. sp., magnified 1,1 diameters.
Fig. 5*a*. *Sc. inflatum* n. sp. View of rostrum, sketch. *r.* rostrum; *r.l.* rostral latus; *sc.* scutum.
Fig. 6. *Sc. javanicum* n. sp., magnified 1,1 diameters.
Fig. 6*a*. *Sc. javanicum* n. sp. View of basis of carina, sketch.
Fig. 7. *Sc. javanicum* n. sp. Male, magnified 52,5 diameters.
Fig. 8. *Sc. curiosum* n. sp., magnified 5,6 diameters.
Fig. 8*a*. *Sc. curiosum* n. sp. View of rostrum, sketch.
Fig. 8*b*. *Sc. curiosum* n. sp. View of basis of carina, sketch.
Fig. 9. *Sc. polymorphum* n. sp. form A, magnified 3,2 diameters.
Fig. 9*a*. *Sc. polymorphum* n. sp. form A. View of rostrum, sketch.
Fig. 10. *Sc. polymorphum* n. sp. form B, magnified 2,8 diameters.
Fig. 11. *Sc. polymorphum* n. sp. form C, magnified 2,8 diameters.
Fig. 12. *Sc. distinctum* Hoek, magnified 3,2 diameters.
Fig. 13. *Sc. moluccanum* Hoek, magnified 1,1 diameters.
Fig. 14. *Sc. hamulus* n. sp., magnified 1,1 diameters.
Fig. 14*a*. *Sc. hamulus* n. sp. View of rostrum, sketch.
Fig. 15. *Sc. diota* n. sp., magnified 5,6 diameters.
Fig. 15*a*. *Sc. diota* n. sp. View of rostrum, sketch.
Fig. 16. *Sc. sessile* n. sp., magnified 16,4 diameters.
Fig. 17. *Sc. ciliatum* n. sp., magnified 15,5 diameters.
Fig. 18. *Sc. pellicatum* n. sp., magnified 1,1 diameters.
Fig. 18*a*. *Sc. pellicatum* n. sp. View of rostrum, sketch.
Fig. 19. *Sc. pellicatum* n. sp. Caudal appendage; magnified 52,5 diameters.



P. P. C. Hoek del.

SCALPELLUM.

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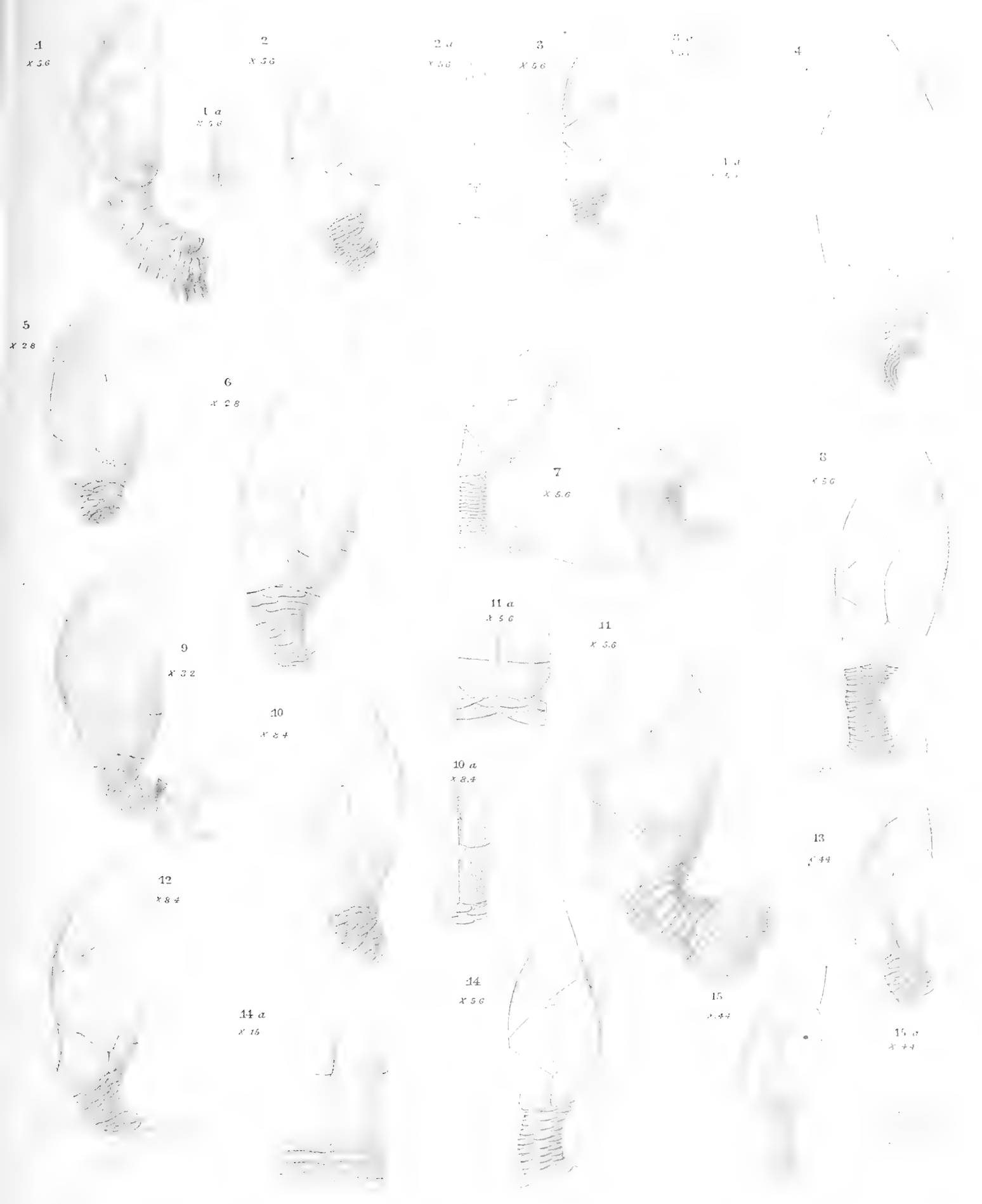
PLATE VIII

Fig. 1. *Scalpellum crinitum* n. sp., magnified 5,6 diameters.
Fig. 1*a*. *Sc. crinitum* n. sp. View of rostrum, sketch.
Fig. 2. *Sc. humile* n. sp., magnified 5,6 diameters.
Fig. 2*a*. *Sc. humile* n. sp. View of rostrum, sketch.
Fig. 3. *Sc. arcuatum* n. sp., magnified 5,6 diameters.
Fig. 3*a*. *Sc. arcuatum* n. sp. View of rostrum, sketch.
Fig. 4. *Sc. poculum* n. sp., magnified 13 diameters.
Fig. 4*a*. *Sc. poculum* n. sp. View of rostrum, sketch.
Fig. 5. *Sc. discolor* n. sp., magnified 2,8 diameters.
Fig. 6. *Sc. trapezoideum* n. sp., magnified 2,8 diameters.
Fig. 7*a*. *Sc. proclive* n. sp., magnified 5,6 diameters.
Fig. 7*b*. *Sc. deforme* n. sp., magnified 5,6 diameters.
Fig. 8. *Sc. gracile* n. sp., magnified 5,6 diameters.
Fig. 9. *Sc. elegans* n. sp., magnified 3,2 diameters.
Fig. 10. *Sc. sculptum* n. sp., magnified 8,4 diameters.
Fig. 10*a*. *Sc. sculptum* n. sp. View of rostrum, sketch.
Fig. 11. *Sc. formosum* n. sp., magnified 5,6 diameters.
Fig. 11*a*. *Sc. formosum* n. sp. View of rostrum, sketch.
Fig. 12. *Sc. hexagonum* n. sp., magnified 8,4 diameters.
Fig. 13. *Sc. praeceps* n. sp., magnified 4,4 diameters.
Fig. 14. *Sc. incertum* n. sp., magnified 5,6 diameters.
Fig. 14*a*. *Sc. incertum* n. sp. View of rostrum, sketch.
Fig 15. *Sc. imbricatum* n. sp., magnified 4,4 diameters.
Fig. 15*a*. *Sc. imbricatum* n. sp. View of rostrum, sketch.



P. P. C. Hoek, del.

SCALPELLUM.

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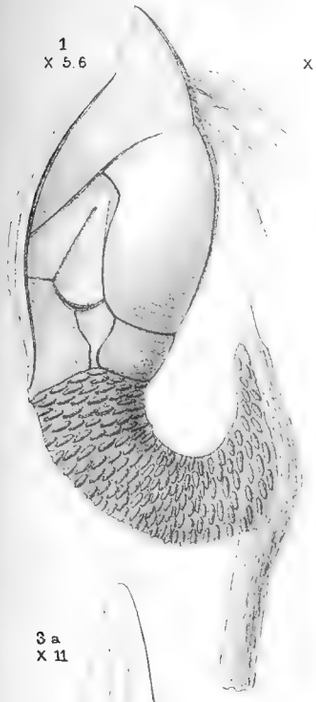
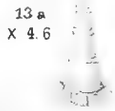
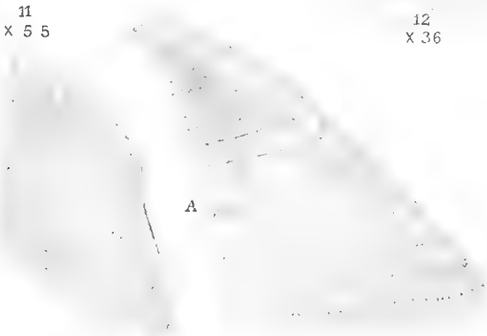
PLATE IX

Fig. 1. *Scalpellum fissum* n. sp., with bowed carina, magnified 5,6 diameters.
Fig. 2. *Sc. fissum* n. sp., with straight carina, magnified 7,8 diametres.
Fig. 3. *Sc. candidum* n. sp., magnified 11 diameters.
Fig. 3*a*. *Sc. candidum* n. sp. View of rostrum, sketch.
Fig. 4. *Sc. virgatum* n. sp., magnified 5,6 diameters.
Fig. 5—8'. *Alepas lithotryae* n. sp.
Fig. 5. Animal, lateral view; magnified 8,5 diameters.
Fig. 6. Mandible; magnified 80 diameters.
Fig. 7. Maxilla; magnified 180 diameters.
Fig. 8. Cirrus of 6th pair, caudal appendage, penis; magnified 52,5 diameters.
Fig. 8'. One of the rings of the penis; magnified 254 diameters.
Fig. 9. *Lithotrya nicobarica* Reinhardt, magnified 1,5 diameters.
Fig. 10—12. *Lithotrya conica* n. sp.
Fig. 10. Animal, lateral view; magnified 1,5 diameters.
Fig. 11. Valves, magnified 5,5 diameters. *A*. Scutum; *B*. Tergum; *C*. Carina.
Fig. 12. The scales of the peduncle immediately beneath the capitulum; magnified 36 diameters.
Fig. 13, 13*a* and 14. *Lithotrya pacifica* Borradaile.
Fig. 13. Animal, lateral view; magnified 5 diametres.
Fig. 13*a*. Rostrum; magnified 4,6 diameters.
Fig. 14. The scales of the peduncle immediately beneath the capitulum; magnified 36 diameters.







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SCALPELLUM—ALEPAS—LITHOTRYA.

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PLATE X

Fig. 1*a*—1*d*. *Poecilasma dubium* n. sp. Four specimens with abnormal capitulum; magnified 10,5 diameters.

Fig. 2—5. *Poecilasma fissum* Darwin.

Fig. 2. Maxilla; magnified 78 diameters.

Fig. 2*a*. Clawlike spines at the upper angle of the maxilla, notch with the minute hairs; magnified 254 diameters.

Fig. 3. Second maxilla; magnified 78 diameters.

Fig. 4. Spines at the extremity of the 8th segment of the 6th cirrus; magnified 254 diameters.

Fig. 5. Pedicel of 6th cirrus, root of penis and caudal appendage; magnified 78 diameters.

Fig. 6—7. *Poecilasma eburneum* Hinds.

Fig. 6. Second maxilla; magnified 78 diameters.

Fig. 7. Spines at the extremity of the 8th segment of the 6th cirrus; magnified 180 diameters.

Fig. 8—16. *Microlepas diademae* n. sp.

Fig. 8. Capitulum attached to a spine of *Diadema saxatile* L.; magnified 3,6 diameters.

Fig. 9. Mandible; magnified 72 diameters.

Fig. 10. Maxilla; magnified 72 diameters.

Fig. 11. Second maxilla; magnified 72 diameters.

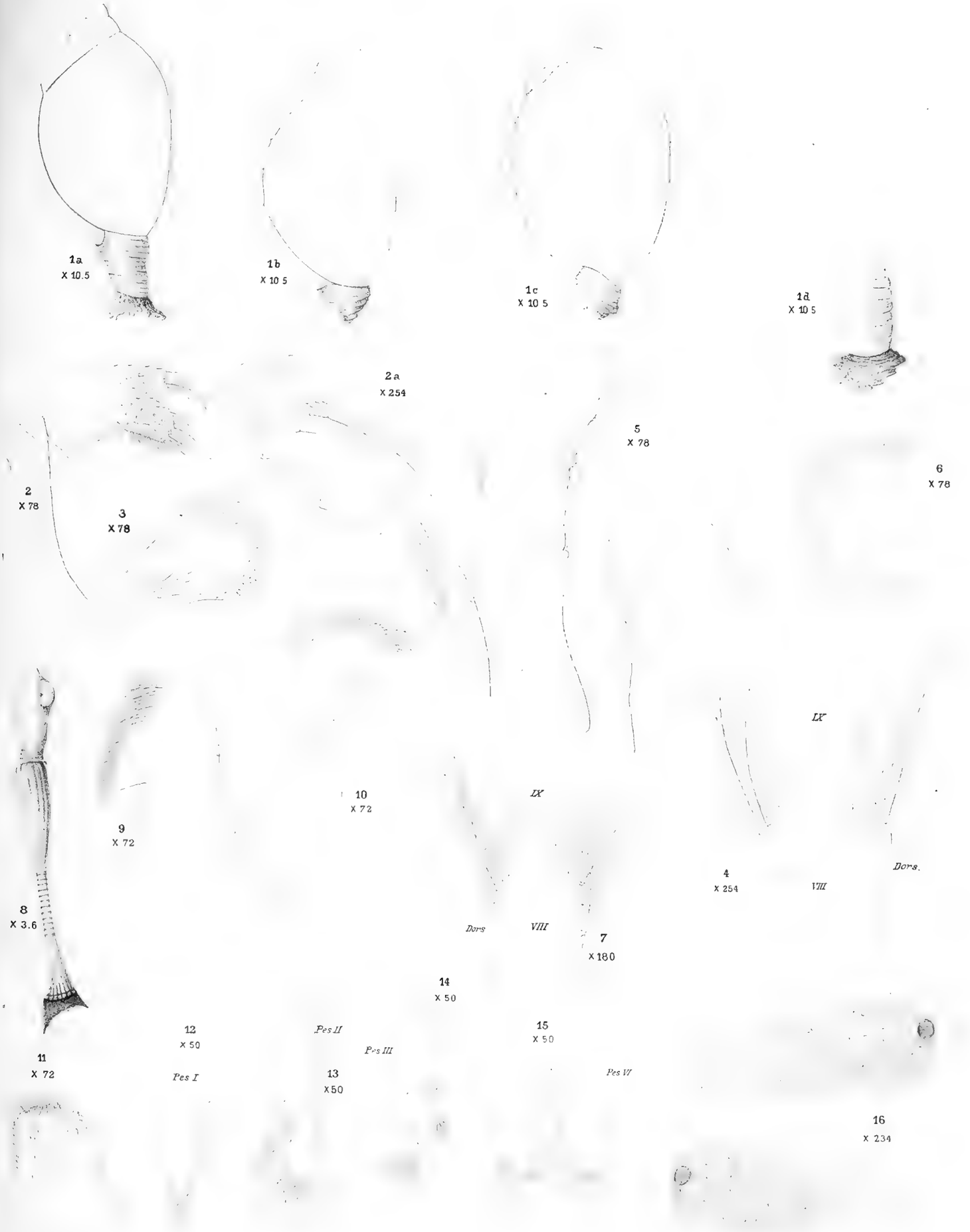
Fig. 12. Cirrus of the first pair; magnified 50 diameters.

Fig. 13. Cirrus of the second pair; magnified 50 diameters.

Fig. 14. Cirrus of the third pair; magnified 50 diameters.

Fig. 15. Cirri of the sixth pair and penis; magnified 50 diameters.

Fig. 16. Two eggs with the nauplius-larvae developed; magnified 234 diameters.



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POECILASMA—MICROLEPAS.

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1°. L'ouvrage du „Siboga" se composera d'une série de monographies.

2°. Ces monographies paraîtront au fur et à mesure qu'elles seront prêtes.

3°. Le prix de chaque monographie sera différent, mais nous avons adopté comme base générale du prix de vente: pour une feuille d'impression sans fig. flor. 0.15; pour une feuille avec fig. flor. 0.20 à 0.25; pour une planche noire flor. 0.25; pour une planche coloriée flor. 0.40; pour une photogravure flor. 0.60.

4°. Il y aura deux modes de souscription:
a. La souscription à l'ouvrage complet.
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Dans ce dernier cas, le prix des monographies sera majoré de 25 %.

5°. L'ouvrage sera réuni en volumes avec titres et index. Les souscripteurs à l'ouvrage complet recevront ces titres et index, au fur et à mesure que chaque volume sera complet.

Déjà paru:

		Prix: Souscription à l'ouvrage complet	Monographies séparées
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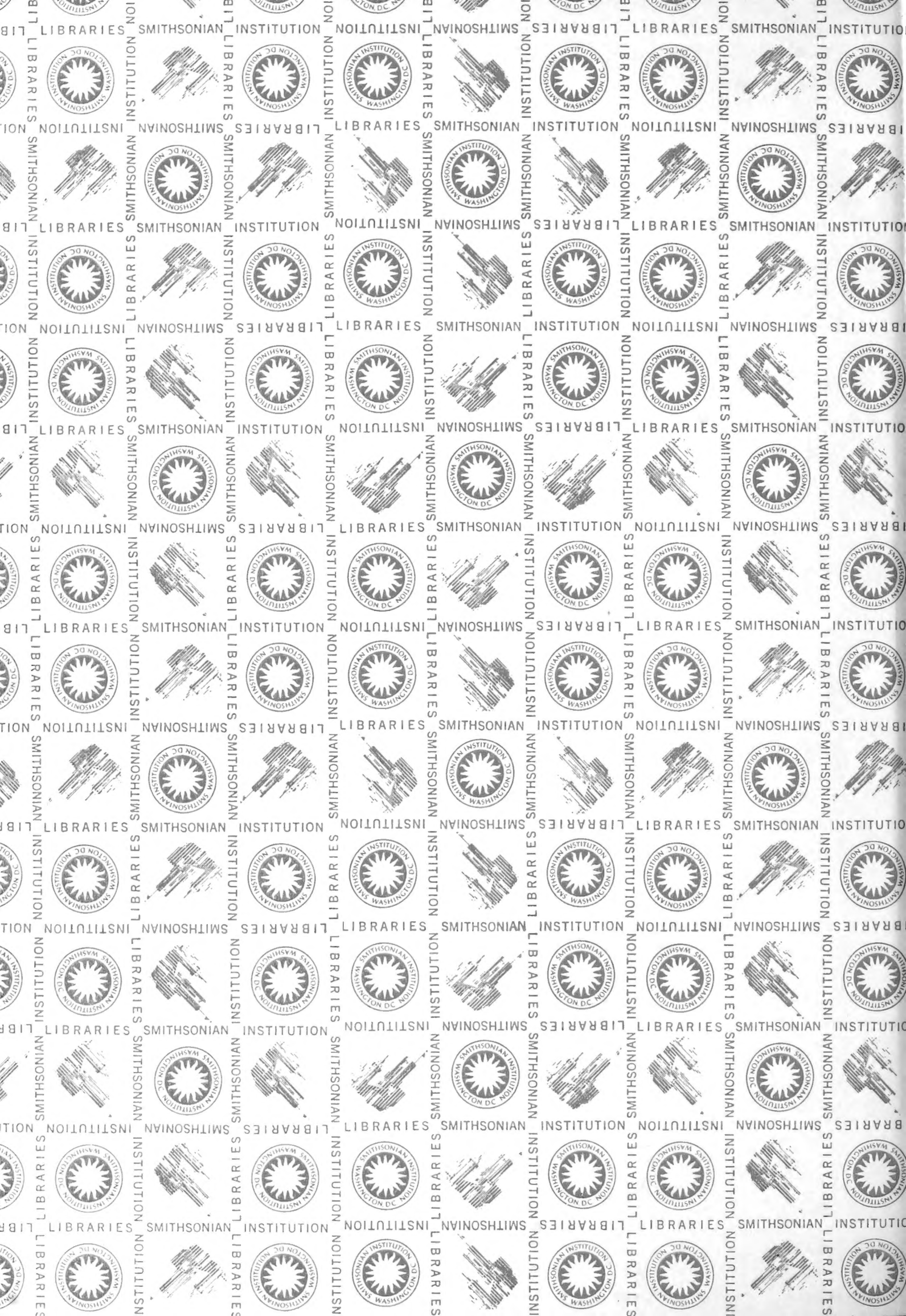
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