VI. — CIRRIPEDS FROM THE MALAY ARCHIPELAGO IN THE ZOOLOGICAL MUSEUM OF AMSTERDAM

BY C. A. NILSSON-CANTELL, VÄNERSBORG, SWEDEN (WITH 12 TEXTFIGURES).

During several visits to the Zoological Museum, Amsterdam, I have been able to study the whole collection of Cirripeds. Most of the material is already known from Hoek's important study of the Siboga collection. Yet there was some material left undetermined.

By the courtesy of the Director, Professor De Beaufort, I have been able to work out this material. For this I want to express here my best thanks, including in this also thanks to the Curator Dr. H. Engel, who afforded me much help by giving information about the localities.

Duplicates of this collection are preserved in the Rijksmuseum van Natuurlijke Historie, Leiden.

In the present paper I have taken up only those species of the collection which are from the Indomalayan region. The rest of the unidentified material is rather small and most of the species are from the African waters.

The material dealt with here is also from another point of view homogeneous as most of the finds are taken during the cruises of the „Gier" in the years 1907 and 1908. Some specimens from this expedition are already included in Hoek's description of the Siboga material. Those are not dealt with in the present paper.

During my work on this paper another publication about the Indomalayan Cirripedia was published by Broch (1931). From several papers our knowledge of this region is rather good. Still it has been possible to add some new species in the present paper.

First a list of the species and subspecies in the collection may be given. For exact informations about the localities I refer to the detailed descriptions in the special part.

This collection contains in all 30 different forms, if varieties and subspecies are also included. Most of them are already known from the Indo-malayan region. But now there are two new species to add to the already considerable number of 244 species (Broch, 1931) from this region, showing that our knowledge is still incomplete and that, in this region so rich in cirripeds, there is much interesting material for further investigations. Like other material preserved in museums this will not contribute much to clear up the detailed biogeographical questions for many

reasons. But the collection is of value as for most species exact informations about the localities are given. As our knowledge of the morphology even of rather common species is still insufficient, I have included in this paper a number of complementary descriptions.

SPECIES AND SUBSPECIES	LOCALITY	DEPTH in m
Scalpellum stearnsii Pilsbry	Kwandang bay, Celebes	182—274
Scalpellum stearnsii var. *inerme* Annandale	Boeleleng, Bali	548
Scalpellum sociabile Annandale	Boeleleng, Bali	548
Scalpellum baliense nov. spec.	Boeleleng, Bali	548
Lepas anserifera Linné	Amboina, Lomblen, Sunda Islands	—
Lepas fascicularis Ellis and Solander	Amboina, Sunda Islands	—
Alepas pacifica Pilsbry	Java sea	38
Heteralepas japonica (Aurivillius)	North coast of Celebes	750
Trilasmis eburnea Hinds, 1884	Makassar strait; Java sea	31—51
Octolasmis warwicki (Gray)	Makassar strait; Java sea	12—64
Octolasmis nierstraszi (Hoek)	Siam bay	73
Octolasmis tridens (Aurivillius)	Java sea	16—22
Octolasmis lowei (Darwin)	Java sea	33—35
Octolasmis grayi (Darwin)	Java sea	—
Octolasmis angulata (Aurivillius)	Java sea	18—22
Megalasma minus Annandale	North coast of Celebes	750
Megalasma hamatum Calman	North coast of Celebes	750
Verruca intexta Pilsbry	Boeleleng, Bali	548
Chthamalus moro Pilsbry	Nias, west of Sumatra	—
Balanus krakatauensis nov. spec.	Krakatau, Sunda strait	—
Balanus amphitrite communis Darwin	Antjol, Batavia	—
Balanus amphitrite cirratus Darwin	Batavia	—
Balanus amphitrite variegatus Darwin	Batavia	—
Balanus amaryllis Darwin	Java sea	40—51
Balanus bimae Hoek	Java sea	12—16
Balanus ciliatus Hoek	Siambay	73
Balanus socialis Hoek	Makassar strait	29—33
Balanus quadrivittatus Darwin	Makassar strait; Java sea	31—51
Tetraclita porosa viridis Darwin	Deli, Sumatra; north coast of East Flores; Makassar strait	—
Chelonibia patula (Ranzani)	Java sea	12—31

Genus **Scalpellum** Leach, 1817.

Scalpellum stearnsii Pilsbry, 1890.

One large typical specimen: length of capitulum 50 mm, breadth of capitulum 29 mm, length of pedunculus 52 mm, and breadth of pedunculus 17 mm. For the description of this species I refer to those earlier given by Nilsson-Cantell (1921, p. 175) and Broch (1931, p. 16).

On the capitulum of this specimen was situated an empty shell of *B.? pentacrini* Hoek, 1913 and a very small individual of *Heteralepas*, which I hesitate to give a species-name. Even large specimens of the genus *Heteralepas* are very difficult to identify exactly.

New locality: Kwandang bay, Celebes. Depth: 182—274 m, Van Nouhuys leg., 19. IV. 1914.

Distribution: Malay Archipelago, Japan.

Scalpellum stearnsii var. **inerme** Annandale, 1905.

Scalpellum inerme Annandale, 1905; Pilsbry, 1907.
Scalpellum stearnsii, var. *gemina* Hoek, 1907; Pilsbry, 1911.
Scalpellum stearnsii, var. *inerme* Annandale, 1916; Nilsson-Cantell, 1928; Broch, 1931.

One large specimen agrees wholly with Hoek's var. *gemina* with more reduced valves on capitulum. This variety was earlier discussed by Annandale (1916, p. 293—95) and Nilsson-Cantell (1921, p. 176—77 and 1928, p. 2—3). The present material, consisting of one specimen, does not throw new light on the question whether Hoek's var. *gemina* and Annandale's var. *inerme* are well separated. In my opinion both varieties must be united. The specimen was taken from a telegraph cable laid down 1888 and taken up Sept. 1920. This proves that the specimen cannot be older than 42 years. Certainly it is much younger. It would be interesting to know how old these very large individuals are, because we know very little about the greatest age of cirripeds.

The measurements of this individual are: length of capitulum 44 mm, breadth of capitulum 32 mm, length of peduncle 60 mm, and breadth of peduncle 16 mm.

According to Hoek there are some differences in the peduncle between his var. *robusta* and *gemina*. The peduncle in the latter var. is shorter and has less prominent scale rings, differences I cannot find in this specimen. These differences in length of the peduncle are certainly due to occasional contraction of the peduncular muscles like that studied on living material of the related species *Sc. scalpellum* (Nilsson-Cantell, 1921, p. 177; Broch, 1931, p. 17).

Locality: One mile north of Boeleleng, Bali. On a telegraph cable. Depth: 548 m, B. Holthuis leg., S. S. "Telegraaf", Sept. 1920.

Distribution: Malay Archipelago, Indian Ocean.

Scalpellum sociabile Annandale, 1905 (fig. 1).

Scalpellum sociabile Annandale, 1905, 1908; Nilsson-Cantell, 1928.
Scalpellum pellicatum Hoek, 1907.
Scalpellum sociabile vars. *pellicatum* and *parviceps* Annandale, 1916.

Complementary description: One specimen from the telegraph cable, which bore the specimens of *Sc. stearnsii* var. *inerme*, agrees well with the figure by Annandale (1916, Plate IV, 2) of *Sc. sociabile parviceps* Annandale, 1916. This new var. is held by the author (1928, p. 4) only to be a full-grown specimen of typical *Sc. sociabile*, an opinion which will not be upset by this find. To the descriptions of the external parts by Annandale, Hoek and Nilsson-Cantell nothing need be added here. Of the internal parts only the typical caudal appendages are now studied, to show that there is no mistake in the identification.

Measurements of the individual in mm:

Length of capitulum	30
Breadth of capitulum	21
Length of peduncle	49
Breadth of peduncle	14

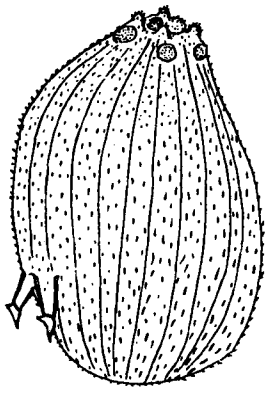

Fig. 1. *Scalpellum sociabile*, complemental male (total length 0.80 mm).

The complemental males were studied by Hoek in the synonym *Sc. pellicatum*. Here also some males were found, showing that the male is of the sacklike type. Yet a detail of interest has been overlooked by Hoek. At one pole I find, after a careful examination, four valves round the mantle opening. Round the opening there were also some small excrescences with short hairs like those found by Hoek on males of *Sc. stearnsii*. No rudiments of cirri are seen. Hoek mentions also these excrescences in *Sc. pellicatum* but his males were covered with mud, which explains how the rudiments of the valves were overlooked. In a paper by Nilsson-Cantell (1931a) an outline is given of the different types of sacklike complemental males in the genus *Scalpellum*. Four types of reduced males are thus selected. The last, most reduced group (IV), contains sacklike males without any traces of valves or cirri. But as many of the species mentioned in this group are only known from the incomplete descriptions

in literature it is possible that some species of group IV belong to other groups. *Sc. pellicatum*, a synonym of *Sc. sociabile*, belongs to group IV according to Hoek's description of the male, referred to by the author (1931*a*, p. 8). According to the data given above, however, it must belong to group II (sensu mihi) with four valves but no cirri. The surface is provided with very minute spines. From the mantle opening many muscular bands issue. Of the interior parts the testes can be discerned. The prehensile antennae were lost, as is often the case during the very difficult preparation of the males. The figure gives some idea of the shape of the male (fig. 1). The male was not studied by Annandale (1916).

New locality: One mile north of Boeleleng, Bali. On a telegraph cable. Depth: 548 m. B. Holthuis leg., S. S. "Telegraaf", Sept. 1920.

Distribution: Malay Archipelago and neighbouring waters.

Scalpellum baliense nov. spec. (fig. 2).

Diagnosis: Female. Capitulum with fourteen plates with narrow interspaces. Surface with a thin hairy cuticle. Growth lines marked. Scutum quadrangular with recurved apex, occludent margin convex. Tergum large, triangular. Carina angularly bent, umbo apical, dorsal roof rounded, distinctly marked by small ridges. Sideparts hollowed out. The intraparietal area in the upper part longitudinally ribbed. Upper latus pentagonal, umbo apical. Rostrum triangular with apical umbo. Rostral latus low. Inframedian latus pentagonal; the primary part triangular with the umbo at the top. By development of the secondary part umbo is removed from the apex. From umbo two ridges to the opposite corners. Carinal latus triangular with umbo projecting beyond the base of the carina. Ribs radiate from the umbo. Pedunculus with imbricating broad scales; hairy. Mandible with 5 teeth and a pectinated inner angle. Maxilla I with a straight edge, sinuous, without a notch. Maxilla II with a spineless part on the middle of the front edge; a maxillary lobe developed. Caudal appendages short, two-jointed.

Discussion: A small specimen of a *Scalpellum* was situated on the peduncle of the large *Sc. stearnsii* var. *inerme* Annandale, 1905. I first thought it was a young individual of this species or a *Sc. sociabile* from the same catch. A closer examination showed that here a form different from any other species of *Scalpellum* known in literature was found. Though the specimen is rather small and already many certainly doubtful species of this genus have been described I do not doubt that here a quite new species of *Scalpellum* has to be registered especially characterized by the form of the inframedian latus.

It is difficult to say exactly to which species it is most allied. *Sc. soror* Pilsbry, 1907, belonging to the group of *Sc. rathbunae*, has, like *Sc. rathbunae*, an irregular inframedian latus, both showing resemblance to the species described here. But in other valves of the capitulum the species show differences. With the specimen of the collection *Sc. soror* agrees more closely in the scales of the peduncle than *Sc. rathbunae*. In the new species a short two-jointed caudal appendage is found. In *Sc. rathbunae* a short one-jointed is described (Nilsson-Cantell, 1921, fig. 26 *f*). Unfortunately the internal parts of *Sc. soror* are not known. Both the species erected by Pilsbry differ distinctly from this new one in the more concave roof on the carina. In the following description the other differences may be pointed out as exactly as possible to facilitate further identifications.

Description: Female. Capitulum with a hairy cuticle of ordinary thickness. The plates are nearly in contact with each other, joined by narrow chitinous interspaces. All of the 14 plates are wholly calcified, with well, sometimes strongly marked growth-lines and radial striae (on carinal and rostral latus for instance).

Scutum quadrangular with occludent margin convex. Umbo terminal with a distinct diagonal ridge to the opposite angle. The tergal margin a little hollowed out. Other margins straight.

Tergum large, triangular with the occludent margin nearly straight. Other margins sinuous. A diagonal ridge from the apex.

Carina rather typical, regularly bent with an apical umbo. The roof is rounded (convex, but distinctly marked by small rounded ribs). The side parts also marked by rounded ribs, thus being concave. A small intraparietal area longitudinally ribbed is found in the upper part. Growth ridges are distinct. This plate thus differs from both the species above mentioned.

Upper latus pentagonal, the scutal and tergal margins equal in length. All margins are straight, umbo apical. Ridges from the umbo to the opposite corners. Rostrum small and triangular with the umbo at the apex, not covered by the rostral latera.

Rostral latera low with distinct growth ridges. From the rostral umbo a ridge runs to the opposite corner (fig. 2*h*).

Inframedian latus very typical, pentagonal. The primary part is triangular with the umbo apical. By the development of the secondary part the umbo has become situated above the middle of the rostral side, thus not at the apex of the plate. From the umbo two ridges run to the opposite corners. Between these and the primary part there are two sunken areas with growth lines. In this plate some resemblances to the mentioned species exist, but still the plate is different.

Carinal latus nearly triangular with the umbo projecting a little

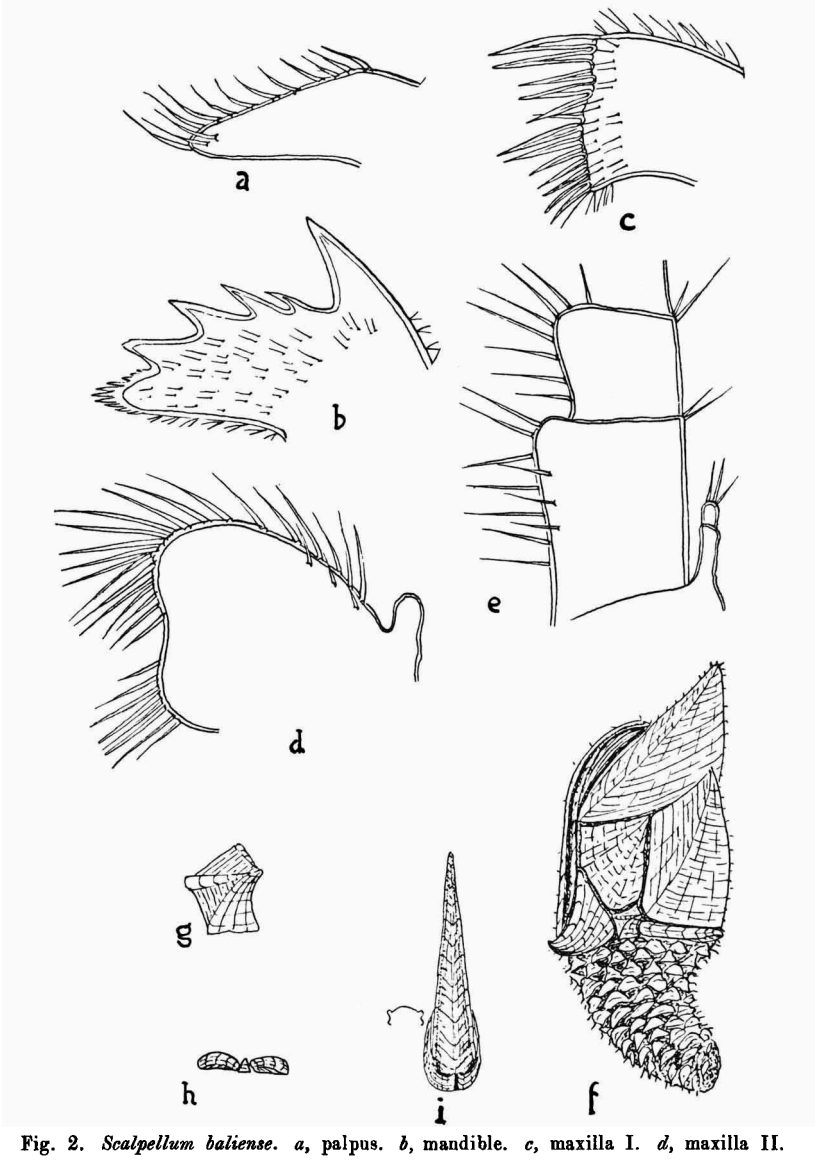

Fig. 2. *Scalpellum baliense*. *a*, palpus. *b*, mandible. *c*, maxilla I. *d*, maxilla II. *e*, cirrus VI and caudal appendage. *f*, holotype. *g*, inframedian latus. *h*, rostrum and rostral latera. *i*, carina and carinal latera.

beyond the base of the carina. The carinal margin above the umbo is concave, below the umbo it is convex emerging into the convex basal

margin of the plate. The lateral margin is straight. The plate is distinctly ridged from the umbo. Growth lines also very distinctly indicated. This plate is rather like that of *Sc. rathbunae.*

Peduncle about $^2/_3$ of the capitulum with well developed imbricating broad scales. The cuticle is hairy.

Measurements of the individual in mm:

Length of capitulum 6	Length of peduncle 4
Breadth of capitulum 4	Breadth of peduncle 2.5

Mouth-parts: Labrum pointed and armed with teeth.

Palpus conical, with bristles at the point and the upper edge.

Mandible in this specimen with five teeth and a pectinated inner angle, the second tooth being smaller.

Maxilla I with nearly straight, somewhat sinuous edge, without a notch.

Maxilla II with a spineless part on the middle of the front edge. A posterior maxillary lobe is formed.

Number of segments of the cirri:

I		II		III		IV		V		VI		Caudal appendage
8	10	13	14	15	15	15	16	17	18	18	18	2

Cirrus I with short unequal rami. The segments on the shorter cirri are broad. The longer cirri have indistinctly marked limits between the segments in the lower part of the rami. Cirrus VI with four pairs of spines on the front edge of the segments.

The caudal appendage is very short, not reaching up to the distal segment of the protopodite and composed of two segments.

Complemental male was not found in this specimen.

Locality: One mile north of Boeleleng, Bali. On the peduncle of *Sc. stearnsii* var. *inerme* Annandale, 1905, taken from a telegraph cable. Depth: 548 m, B. Holthuis leg., S. S. "Telegraaf", Sept. 1920.

Genus **Lepas** Linné, 1767.

Lepas anserifera Linné, 1767.

New localities: Amboina, Sunda Islands. Several specimens together with *L. fascicularis*, Willemsz Geerooms leg.

West coast of Lomblen, Sunda Islands. Several specimens on palm leaf, taken from the water, Minkema leg., 21. VI. 1909.

Distribution: Pelagic in temperate and tropical seas.

Lepas fascicularis Ellis and Solander, 1786.

New locality: Amboina. Several specimens on algae. Willemsz Geerooms leg.

Distribution: Pelagic in temperate and tropical seas.

Genus **Alepas** Sander Rang, 1829.

Alepas pacifica Pilsbry, 1907.

Alepas pacifica Pilsbry, 1907; Nilsson-Cantell, 1921, 1925.
Alepas investigatoris Annandale, 1914.

The specimens of the genus *Alepas* are included here as belonging to *A. pacifica* earlier identified by the author. The specimens agree fairly well with the figure given by Annandale (1914, Pl. XXXIII, 2) of his species *A. investigatoris*, taken up by the author (1925) as a synonym of *A. pacifica*.

Measurements of one specimen in mm:

Length of capitulum	23	Length of peduncle	18
Breadth of capitulum	19	Breadth of peduncle	7

The specimens are larger than those earlier described by the author, but do not reach the measurements of Annandale's specimen.

Internal parts have been earlier described by Pilsbry, Annandale, and Nilsson-Cantell.

Here may be pointed out that it is rather uncertain whether all species of this degenerated genus, which in all known cases is situated on the umbrella of pelagic medusae, are valid species. A closer study of richer material from different parts of the oceans would be necessary to clear up this question.

New locality: Gier N°. 12, Exp. 12. 6° 19′ S., 110° 50′ E. Depth: 38 m, 17. X. 1908 (The notice on the label that the specimens are taken from spines of cidarids seems me to be erroneous).

Distribution: Atlantic, Pacific and Indian Ocean.

Genus **Heteralepas** Pilsbry, 1907.

For synonyms see Nilsson-Cantell, 1927.

Heteralepas (Heteralepas) japonica (C. W. Aurivillius, 1893).

New locality: North coast of Celebes. Menado-Kwandang telegraph cable. Three specimens together with *Megalasma hamatum* and *minus*. Depth: 750 m, S. S. „Telegraaf" Sept. 1908.

Distribution: Japanese-Malayan waters, Indian Ocean (eastern and western parts).

Genus **Trilasmis** Hinds, 1844; Pilsbry, 1928.

For synonyms see Nilsson-Cantell, 1931 b.

Trilasmis eburnea Hinds, 1844.

Some specimens on spines of *Prionocidaris bispinosa* together with *B. quadrivittatus*.

For *Poecilasma eburnea* a separate genus has been instituted by Broch: *Trilasmis* Hinds (in his paper 1931 written *Trilaspis*). Concerning the genus *Poecilasma* Pilsbry (1928, p. 308) says: "Formerly I hoped that a generic distinction could be maintained between *Trilasmis* and *Poecilasma*, but intermediate species have turned up, and I agree with Hoek and Annandale that no relation greater than subgeneric can be upheld". *Poecilasma eburnea* is thus taken up under a subgenus *Trilasmis* belonging to the genus *Trilasmis*, which name is used instead of the old generic name *Poecilasma* (Pilsbry, 1928, p. 307—308). Pilsbry's genusname *Trilasmis* has been taken up by me earlier (Nilsson-Cantell, 1931 b).

New localities: Gier N° 12, Exp. N° 13. 6°15′ S., 110°50′ E. Depth: 40—51 m. Bottom: mud, sand, stones. Van Kampen leg., 18. XII. 1908.

Gier N° 14, Exp. N° 5. 3° 30′ S., 116°33′ E. Depth: 31 m. Bottom: mud. 6. XII. 1908.

Distribution: Malay Archipelago, Hawaiian Islands.

Genus **Octolasmis** Gray, 1825.

Octolasmis warwicki (J. E. Gray, 1825) (fig. 3).

For synonyms see Nilsson-Cantell, 1928.

Discussion: The material contains rather numerous specimens of this species and also some specimens of the related *O. nierstraszi* (Hoek, 1907). The collection was of especial interest as Broch recently (1931) in describing the last mentioned species is inclined to consider the species *warwicki* and *nierstraszi* as only "forms" of the same species. Both species had been earlier studied by me. I thus found it interesting to study more carefully the rich material of this collection.

As regards the scuta both species agree rather well, because the carinal segment of this plate is very variable. The margo carinalis is sometimes convex, sometimes very concave, especially in fullgrown specimens, sometimes rather irregularly concave. This is shown in some figures given here (fig. 3 *b*, *d*, *f*).

The terga of both species are distinctly different, which is shown in the figures given here. In *O. warwicki* the tergum is shaped like an axe in all specimens, even in younger ones. The material varies slightly

(fig. 3 *a*, *c*, *e*), but the type is the same in all individuals. The small projection on the carinal side above the apex of the carina which is developed in *O. nierstraszi* is not found in *O. warwicki*.

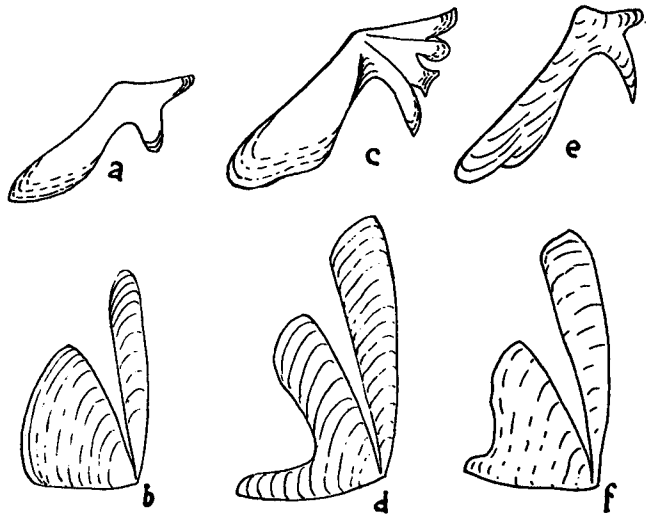

Fig. 3. *Octolasmis warwicki*. *a*, tergum, and *b*, scutum of an individual with a total length of 5 mm. *c*, tergum, and *d*, scutum of an individual with a total length of 8 mm. *e*, tergum, and *f*, scutum of an individual with a total length of 11.5 mm.

In the internal parts earlier described for both species there are no important differences.

In my opinion at present there is no reason to unite these species into one, as it is possible to distinguish them, especially by the rather different terga.

New localities: Gier N° 3, Exp. N° 3. 6° 8,5′ S., 107° 47.5′ E. Depth: 15—18 m. One specimen on a crab. 16. X. 1907.

Gier N° 3, Exp. N° 7. 6° 8′ S., 106° 13′. E. Depth: 30—33 m. Some small specimens. 17. X. 1907.

Gier N° 3, Exp. N° 26. 3° 27′ S., 107° 51′ E. Depth: 16—20 m. Bottom: mud, sand. Several specimens together with *O. tridens* on *Thenus*. 25. X. 1907.

Gier N° 6, Exp. N° 7. 5° 44′,5 S., 113° 54′ E. Some small specimens on *Calappa*. 6. I. 1908.

Gier N° 8, Exp. N° 24. 3° 36′ S., 108° 20′ E. Depth: 20—27 m. One specimen on *Thenus orientalis*.

Gier N° 10, Exp. N° 3. 6° 53′ S., 110° 21′ E. Depth: 12—16 m. Bottom: mud. Several specimens on a Stomatopod. 9. VIII. 1908.

Gier N° 10, Exp. N° ?. 6° 7′—6° 44′ S., 107° 55′—111° 55′ E. Depth: 12—31 m. Bottom: mud. Some specimens on wood. Aug. 1908.

Gier N° 12, Exp. N° 1. 6° 52′ S., 112° 55′ E. Depth: 18—21 m. Bottom: mud, sand, shells. Several fullgrown specimens on *Neptunus pelagicus*. 1. X. 1908 (fig. 3*e*, *f*).

Gier N° 12, Exp. N° 2. 5° 20′ S., 114° 34′ E. Depth: 33—35 m. Bottom: mud, sand. Some specimens together with *O. lowei* on a crab. 3. X. 1908.

Gier N° 12, Exp. N° 3. 4° 25′ S., 114° 31′ E. Depth: 20 m. Bottom: clay, stones. Several specimens on *Thenus orientalis*. 4. X. 1908.

Gier N° 12, Exp. N° 7. 3° 42′ S., 110° 42′ E. Depth: 31 m. Bottom: mud. Three specimens on a crab. 10. X. 1908 (fig. 3, *a*—*d*).

Gier N° 13, Exp. N° 1. 7° 25′ S., 112° 59′ E. Depth: 26—33 m. Some specimens on a crab. 6. XI. 1908.

Gier N° 14, Exp. N° 2. 4° 46′ S., 115° 21′ E. Depth: 60—64 m. Bottom: mud, sand. Several specimens on *Thenus orientalis*. 12. XII. 1908.

Gier N° 14, Exp. N° 6. 3° 26′ S., 116° 24′ E. Depth: 29—33 m. Bottom: mud. Several specimens together with *B. socialis* on a crab. 16. XII. 1908.

Distribution: South China Sea to Indian Ocean.

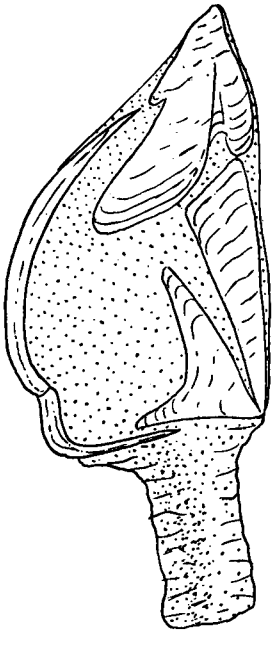

Fig. 4. *Octolasmis nierstraszi*, fullgrown specimen (total length 11.5 mm).

Octolasmis nierstraszi (Hoek, 1907) (fig. 4).

Dichelaspis nierstraszi Hoek, 1907.
Octolasmis nierstraszi Nilsson-Cantell, 1921, 1927; Broch, 1922, 1931.

The collection contains some individuals of this species, situated on *Balanus ciliatus*. They are of interest for comparison with the rich material of *O. warwicki*. The discussion of both these species has already been given under *O. warwicki*. For comparison one specimen is figured here, showing differences from *O. warwicki* in the tergum. As regards internal parts no addition is needed. The specimen figured agrees well with those figured by Hoek (1907).

New locality: East coast of Pulo Wai about 9° 30 N., 103° E. Siam bay. Some specimens on *B. ciliatus* taken from a telegraph cable. Depth: 73 m. S. S. "Telegraaf", 17. VIII. 1906.

Distribution: Malay Archipelago, Persian Gulf, Japan.

Octolasmis tridens (C. W. Aurivillius, 1893) (fig. 5 and 6).

Poecilasma tridens C. W. Aurivillius, 1893, 1894; Gruvel 1905.
Dichelaspis tridens Annandale, 1909.
Octolasmis tridens Barnard, 1924.
Dichelaspis occlusa Lanchester, 1902.

Discussion: Several specimens of this well defined species may be noted here. The shape of the plates of fullgrown and typical specimens are well known from the descriptions of Aurivillius (1894) and Annandale (1909). Here some figures of younger and older specimens may be given. No cypris stage is found in this material. The youngest stage (fig. 5*a*) is of importance as it shows that the primordial valve is undivided. Thus there is no doubt that this species belongs to genus *Octolasmis*.

It has been recently stated by Broch (1931, p. 30) that one species of the genus *Poecilasma* (sensu Darwin), *P. excavatum*, has the primordial scutum divided into two plates already from its first appearance. This is an interesting observation. Unfortunately the figure given by Broch (1931, fig. 10) to illustrate this does not clearly show the correctness of the observation. Further studies on material of the species *P. excavatum* and related species will be of interest, because Broch from this single observation has established a separate genus *Temnaspis* Fischer to which according to him probably *P. excavatum*, *fissum*, *vagans*, *lenticula* and some others must belong. In my earlier studies of the species above mentioned I did not find younger stages. That the species *O. tridens* dealt with here shows an external similarity to these above mentioned follows from the observation by Barnard (1924, p. 57): "This species forms the transition from the genus *Poecilasma* to the present genus" (*Octolasmis*).

Without having studied younger specimens of the species *tridens*, Broch (1931) in his list of Indomalayan cirripeds includes this species under the genusname *Temnaspis* with the primordial scutum already from its first appearance divided into two plates. In my description below it is shown that the species *O. tridens* is a typical *Octolasmis* with a single primordial scutum. Pilsbry (1928) uses instead of the name *Poecilasma* the genusname *Trilasmis*, a fact not mentioned by Broch (1931) and places *Temnaspis* (type *P. fissum* [1]) as a subgenus under this genus. As we know so little about the division of the scuta of the related species *lenticula*, *vagans*, etc., and the observations by Broch on *excavatum* and by Pilsbry on *fissum* do not agree, I prefer to keep *Temnaspis* as a subgenus. As a result of this study I find that *Octolasmis tridens* must as before be placed into the genus *Octolasmis*.

1) According to Pilsbry (1928) in *fissum* the segments of the scutum adhere to the base.

Complementary description: The younger stages figured here show as far as regards the tergum that the shape typical of fullgrown specimens of this species is reached successively during the development. For the scutum the figures show even at very young stages that the carinal segment is more or less reduced. In the two fullgrown specimens

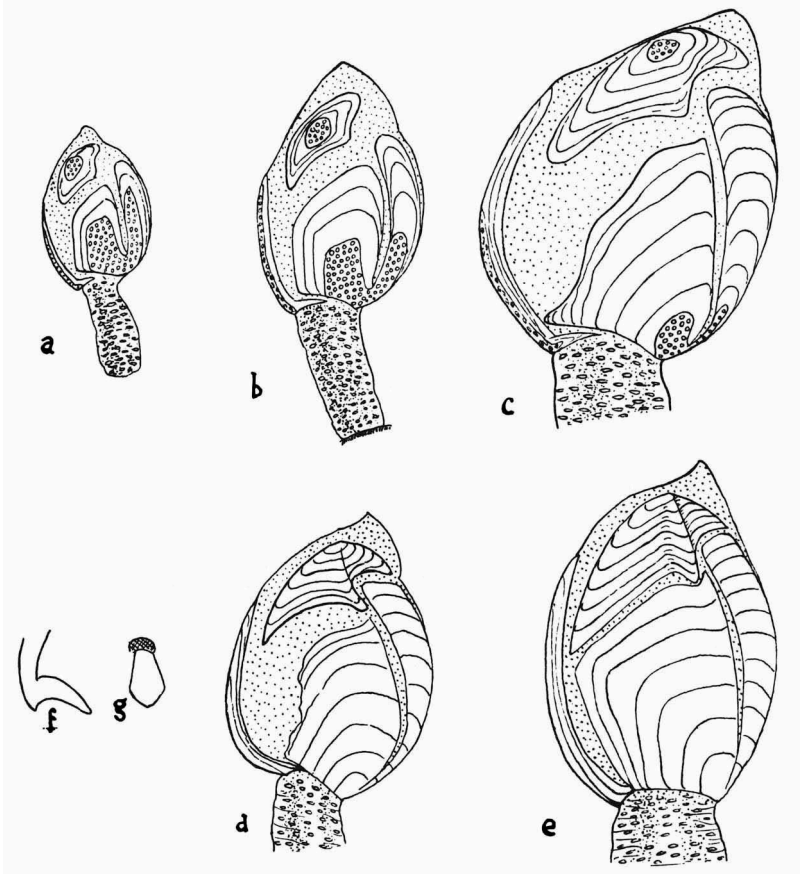

Fig. 5. *Octolasmis tridens*. *a*, *b* and *c*, young specimens in which the primordial valves have not yet disappeared (total length 1.12, 1.58, and 2.93 mm respectively). *d*, and *e*, fullgrown specimens (total length 3.5 and 8.5 mm respectively). *f*, lower part of the carina seen from the side. *g*, the same from beneath.

(fig. 5 *d*, *e*) one has a fully developed scutum, the other a more reduced. The real shape of the lower part of the carina is known to the authors, and is shown in the figures here given.

The peduncle in the specimens studied was covered with chitinous points, larger than those on the capitulum. The length of peduncle is, as

already known, very variable. The largest specimens measured in length of capitulum 4 mm and length of peduncle 4,5 mm.

The internal parts are known from the descriptions earlier given. As no figures are given for the mouth-parts and this material shows that there are some remarks to add, some details and figures may be given.

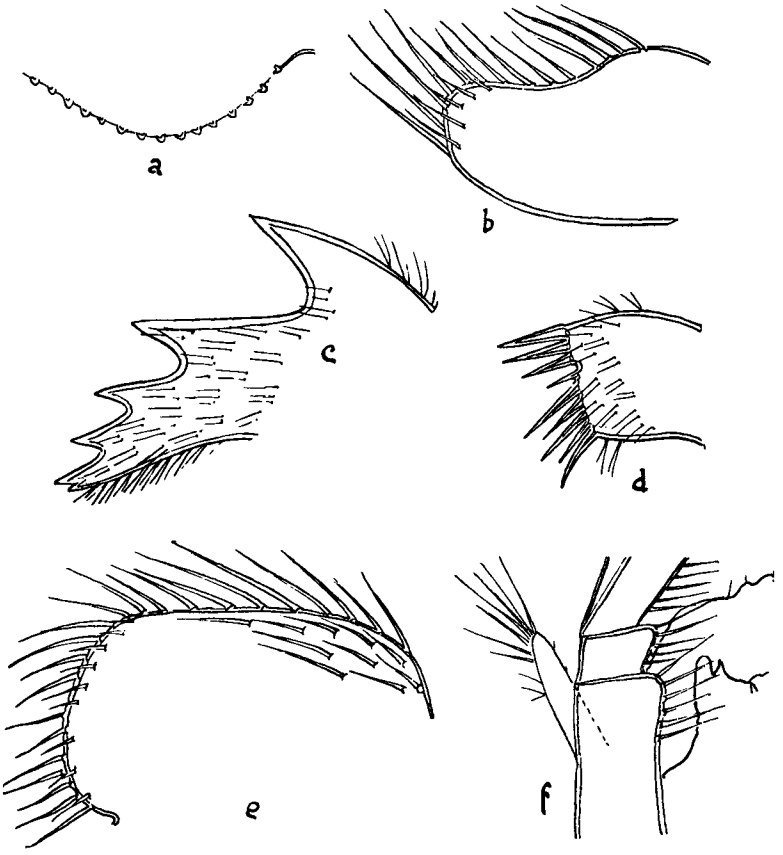

Fig. 6. *Octolasmis tridens*. *a*, labrum. *b*, palpus. *c*, mandible. *d*, maxilla I. *e*, maxilla II. *f*, cirrus VI and caudal appendage.

Labrum has distinct teeth, which may have been overlooked by Annandale (1909) as he says: "apparently without chitinous teeth".

Palpus is broadly conical.

The mandible has, as indicated by the authors, four teeth and a pointed inner angle, which can be divided into one or two smaller secondary teeth.

The maxilla I has a straight front edge with a rather indistinct notch, sometimes without a notch, as indicated by Aurivillius (1894).

The maxilla II is broad and quadrangular.

The caudal appendages figured by Aurivillius are much shorter than those in the figure given here. Annandale also indicates a small variation, but says that the appendages usually reach to the tip of the pedicel.

New localities: Gier N° 3, Exp. N° 26. 3°27′S., 107°51′E. Depth: 16—20 m. Bottom: mud, sand. Several specimens together with *O. warwicki* on *Thenus*. 25. X. 1907.

Gier N° 12, Exp. N° 1. 6°52′S., 112°55′E. Depth: 18—22 m. Bottom: mud, sand, shells. Several specimens from gills and mouth-parts of *Neptunus pelagicus*. 1. X. 1908.

Distribution: Malay Archipelago, Bay of Bengal. On different decapods.

Octolasmis lowei (Darwin, 1851).

For synonyms see Nilsson-Cantell, 1927.

Two typical specimens on gills of *Thenus orientalis*. In the shape of the tergum they agree closely with the specimens described by Filippi (1861) as *Dichelaspis darwini*, which species like many others is a synonym of *O. lowei*.

New locality: Gier N° 12, Exp. N° 2. 5°20′S., 114°34′E. Depth: 33—35 m. Bottom: sand, mud. 3. X. 1908.

Octolasmis grayi (Darwin, 1851).

For synonyms see Nilsson-Cantell, 1930.

Several specimens on a sea snake (*Hydrus platurus*) certainly belong to this species. Supplementary description of this species has been given by the author (1930). It is possible that these specimens agree with the form of this species called by Annandale (1909) var. *pernuda*, the var. characterized by complete or almost complete absence of valves.

New localities: Reede van Semarang, Java. Specimens on a sea snake *Pelamis (Hydrus) platurus*. P. Buitendijk leg.

Distribution: Pacific and Indian Ocean. Pelagic on sea-snakes.

Octolasmis angulata (C. W. Aurivillius, 1893) (fig. 7 and 8).

Dichelaspis angulata C. W. Aurivillius, 1893, 1894; Gruvel, 1905; Annandale, 1909.
Dichelaspis aperta C. W. Aurivillius, 1893, 1894; Gruvel, 1905.
Dichelaspis cuneata C. W. Aurivillius, 1893, 1894; Gruvel, 1905.
Dichelaspis bullata C. W. Aurivillius, 1893, 1894; Gruvel, 1905.
Dichelaspis transversa Annandale, 1906, 1908.

Complementary description: Many specimens on gills of *Neptunus pelagicus*, a host earlier noted by the authors. As regards synonyms this species has already been revised by Annandale (1909). As pointed out, there is a great deal of variation in the development of the valves of the capitulum.

In these individuals there is no trace of any terga. The scuta are sinuous as in figure 4 of Plate VI by Annandale (1909). The carina is rather reduced, in some specimens very strongly, but never forked at the base. As no younger stages have been figured previously, some stages may be described here.

In the first pupa stage no primordial valves have developed. The finer details of the antennae could not be made out, as they were so effectively fixed on the substratum. The next stage has well developed primordial scuta and carina. The fullgrown stage figured here has a shorter peduncle. As a rule the peduncle is much longer than the capitulum. The surface is totally covered with chitinous points, indicated in the figure.

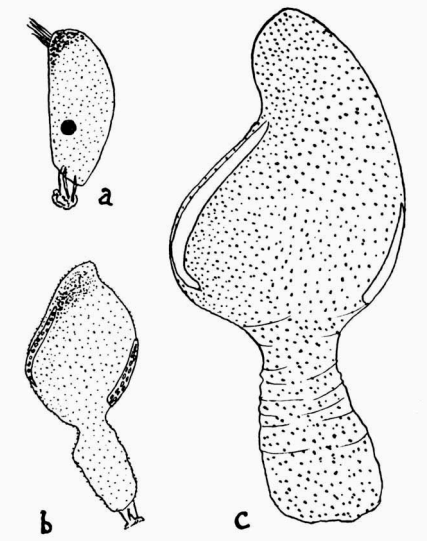

Fig. 7. *Octolasmis angulata*. *a*, pupa stage (total length 0.70 mm). *b*, young specimen (total length 1.1 mm). *c*, fullgrown specimen (total length 3 mm).

Mouth-parts: Labrum has strong teeth, which in the dissected specimen are arranged in two rows. Those teeth have not been mentioned by the earlier authors.

Palpus bluntly conical with bristles at the top and along the inner margin. The outer margin carries some scales.

The mandible has here like in Annandale's specimen four teeth and a pointed inner angle which is bifid. Aurivillius describes in some of his species (which I regard as synonyms of *D. angulata*) 5 teeth and an inner angle. This proves that also in this respect the species is rather variable.

The maxilla I has a straight front edge without a notch as stated by the authors.

The maxilla II broad with a distinct front edge with rounded corners. All margins with long spinelike hairs.

To the description of the cirri there is not much to add. The first

cirrus is short with subequal rami consisting of about 5 segments. The longer cirri have rami with about 10 segments. The front edge of the segments has about seven pairs of spines.

The caudal appendage in the specimen dissected is one-jointed and a little shorter than the proximal segment of the protopodite, with hairs

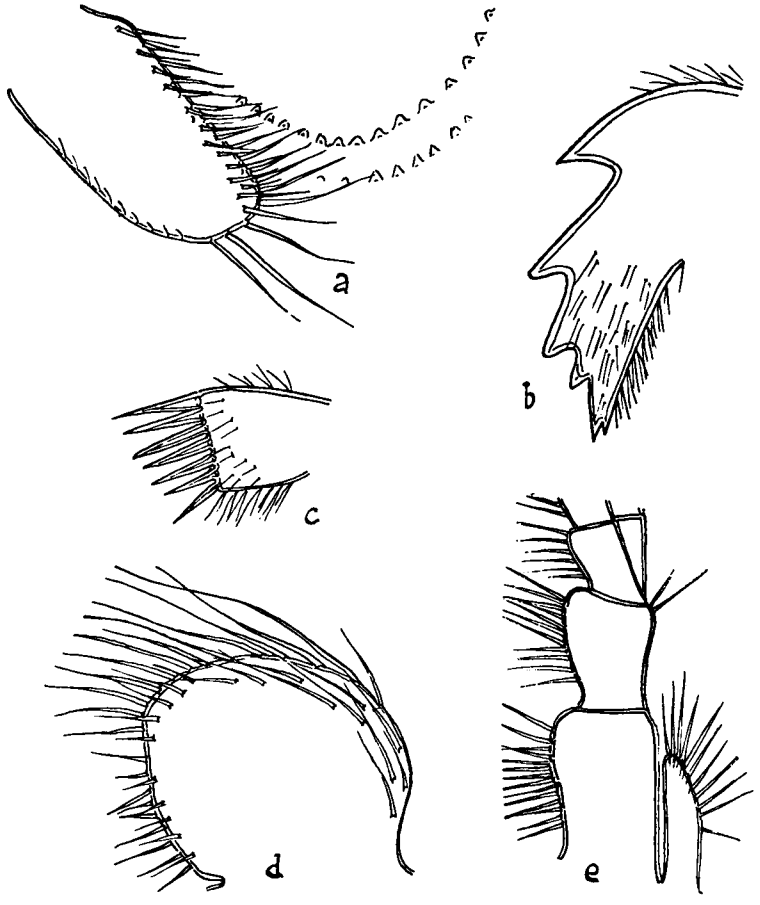

Fig. 8. *Octolasmis angulata*. *a*, labrum and palpus. *b*, mandible. *c*, maxilla I. *d*, maxilla II. *e*, cirrus VI and caudal appendage.

at the tip and the distal half of the convex margin. Annandale's specimen has an appendage which is a little longer, a variation of no great importance. The bristles in Annandale's specimens are grouped on the distal half, a character certainly of no specific importance. The penis is very thick, terminating in a point with a tuft of hairs. The surface is covered

with chitinous teeth of two types mentioned by Annandale. Figures of these are given by Monod (1922) in a paper on *Octolasmis angulata*. The specimens figured in this paper agree with the species *O. cor* Aurivillius. Monod is inclined to regard *O. cor* as a synonym of *O. angulata*. It is, however, possible to separate specimens described as *O. cor* from typical *angulata*. Monod (p. 268) says on this question: "L'examen d'un abondant matériel permettra de préciser — peut-être de combattre — les idées émises ici". As the present material consists of typical *angulata* and consequently cannot be used to solve this question, I prefer to include only those synonyms in *O. angulata* which are proposed by Annandale and certainly belong to the species. If we go further in this way to unite many *Octolasmis*-species, it is a short step from *O. maindroni* Gruvel, 1900 (according to Monod a synonym of *O. angulata*) to *O. geryonophila* which agrees in the scuta and carina with *O. maindroni* but has a tergum. Traces of a tergum are also found in some specimens of typical *O. angulata* (Annandale, 1909). If so many species should be united, some of these must be taken up as subspecies or respectively varieties.

New locality: Gier N° 12, Exp. N° 1, 6° 52′ S., 112° 55′ E. Depth.: 18—22 m. Bottom: mud, sand, shells. Many specimens on gills of *Neptunus pelagicus*. 1. X. 1908.

Distribution: Indian Ocean, Malay Archipelago.

Megalasma Hoek, 1883.

In agreement with earlier authors except Broch (1931) I prefer to retain the genus *Megalasma* including the two subspecies *Glyptelasma* and *Megalasma*. Annandale (1909) says p. 95: "It is certainly very difficult to separate the species of *Glyptelasma* from those of the typical *Megalasma*".

Megalasma (Megalasma) minus Annandale, 1906.

For synonyms see Calman, 1919.

One specimen fixed on *Megalasma hamatum*.

New locality: North coast of Celebes. Menado-Kwandang telegraph cable. Depth: 750 m, S. S. "Telegraaf". Sept. 1908.

Distribution: Indian and Pacific Ocean.

Megalasma (Glyptelasma) hamatum Calman, 1919.

Two specimens together with *Heteralepas japonica* and *Megalasma minus*.

New locality: North coast of Celebes. Menado-Kwandang telegraph cable. Depth: 750 m, S. S. "Telegraaf". Sept. 1908.

Distribution: Atlantic, Indian, and Pacific Oceans.

Genus **Verruca** Schumacher, 1817.

Sectio **Rostratoverruca** Broch, 1922.

Verruca intexta Pilsbry, 1912.

Verruca intexta Pilsbry, 1912, 1916; Nilsson-Cantell, 1927, 1928.
Verruca conchula Hoek, 1913.

One specimen of *Verruca* was situated on the capitulum (top of the carina and scutum) of *Sc. sociabile*. It agrees wholly with the figure by Hoek (1913) of *Verruca conchula* Hoek, 1913, also from the Malay Archipelago. The only difference I can find in the external parts is that the movable scutum, which in Hoek's specimen has three articular ridges, here has a trace of a fourth ridge. Such variation is stated by the author for other species of this genus as *V. calotheca flavidula* Pilsbry, 1916 (Nilsson-Cantell, 1927).

As mentioned before by the author (1929) *V. conchula* seems to by synonymous with *V. intexta*. Internal parts of this species have been studied by the author (1927).

New locality: One mile north of Boeleleng, Bali. One specimen on *Sc. sociabile*, taken from a telegraph cable, Depth 548 m, Holthuis leg., S. S. "Telegraaf", Sept. 1920.

Distribution: Indian Ocean, Malay Archipelago, Madagascar.

Genus **Chthamalus** Ranzani, 1820.

Chthamalus moro Pilsbry 1916 (fig. 9).

Discussion and complementary description: Some small *Chthamalus* specimens on bark from Nias seem to me identical with Pilsbry's *Ch. moro* from Mindanao. The type specimens have been incompletely described as they were preserved in dry state, and consequently their mouth-parts and cirri could not be studied. Afterwards other specimens have been mentioned by Broch (1931) The measurements of the type specimens are not known. Judging by these specimens the species is of rather small size. The carino-rostral diameter of these specimens measured about 2,5—3,5 mm. At first I was inclined to regard these specimens as typical *Ch. st. stellatus* but after studying the opercular valves, I found such a great resemblance to Pilsbry's description, that there can be no doubt that the specimens belong to *Ch. moro*. This species is said to be nearly related to *Ch. stellatus*. Though it was difficult to study the finer details of mouth-parts and cirri, as the individuals are

of a small size, I found that the mandibles are of the shape typical of the *Ch. stellatus*-group (Nilsson-Cantell, 1921, p. 275). Thus the species is correctly placed by the author (1921, p. 277) in this group, which is now established with certainty.

For comparison some drawings of the opercular valves are given here

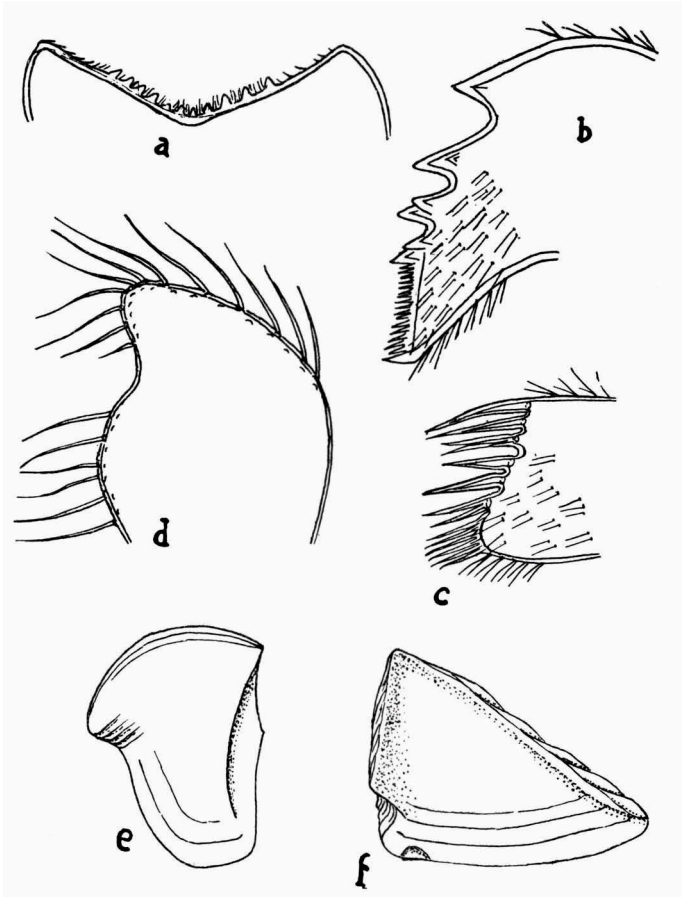

Fig. 9. *Chthamalus moro*. *a*, labrum. *b*, mandible. *c*, maxilla I. *d*, maxilla II. *e*, left tergum, internal view. *f*, left scutum, internal view.

— the drawings made from microscope, as the valves are very minute — showing good agreement with Pilsbry's figures. The valves are here so thin that the growth-striae are seen through the valves. A typical feature of the tergum is the broad spur, on account of which the valve is wide at the base. The crests on the carinal lobe are very distinct.

The scutum is higher than in *Ch. st. stellatus*, the tergal margin nearly as long as the basal. The pit for the lateral depressor muscle is very distinct in this species, as also seen in this figure. No adductor ridge is found. On these specimens I could not distinguish the pit for the depressor muscle.

Externally the specimens agree with Pilsbry's figures. The sutures are simple. Some very young specimens were also found. It was of interest to study the number of the valves in these younger individuals. S. Runnström (1925) states that in *Balanus* a tetramerous stage precedes the hexamerous. On the young *Chthamalus* of this collection six well separated compartments are seen even in very small individuals. The agreement with the figure of a young stage of *Chthamalus stellatus* given by Broch (1927, Pl. 1, 3) is complete, even in the presence of the paired eyes. The conclusion by Broch that in *Chthamalus* no tetramerous stage precedes the hexamerous can be further confirmed here.

The internal parts, though small and in these specimens not preserved in a good state, were yet possible to study.

The mouth-parts do not differ strongly from those of *Ch. st. stellatus.*

Labrum has a strongly concave edge, with well developed teeth and hairs on the middle.

Palpus with clubshaped indistinctly marked front edge.

Mandible with four teeth, some of them laterally double. The lower part of the front edge is pectinated and ends in a stout spine.

The maxilla I has a very indistinct notch in the upper half of the front edge. The lower third of the front edge has smaller crowded spines as in the species above mentioned.

The maxilla II is concave on the middle, thus being bilobate as typical for *Chthamalus.*

The number of the segments of the cirri for specimens of the size above mentioned are for some cirri, which could be studied: Cirrus I, 5 and 7; cirrus II, 5 and 6. The rami of these cirri are slightly different in length. Cirrus II has pectinated spines, but without large teeth below, the serrate portion of the spine is like that found in *Ch. st. stellatus* (Nilsson-Cantell, 1921, p. 282).

The longer cirri have about 15 to 16 segments in the rami. The segments have 5 pairs of spines in the front edge.

Old locality: Zamboanga, Mindanao, on *Tetraclita porosa.*

New locality: Nias Island, west of Sumatra. Several specimens on bark. Kleiweg de Zwaan leg.

Genus **Balanus** Da Costa, 1778.

Subgenus **Megabalanus** Hoek, 1913.

Balanus krakatauensis nov. spec. (fig. 10 and 11).

Diagnosis: Wall mediumsized, conical to cylindrical. Orificium rhomboid. White or dull rosa coloured with red longitudinal lines. The longitudinal tubes in the parietes without transverse septa, inside of the wall has ribs continuous with the septa in the wall. Radii well developed with horizontal summits, the sutural edges denticulated on both sides. Scutum with short basal margin, without adductor ridge, depressions for adductor and depressor lateral muscles indicated. Externally well developed growth lines, but no longitudinal striation. Tergum with rather short spur, and situated very near to the basiscutal angle (half its own width); the end

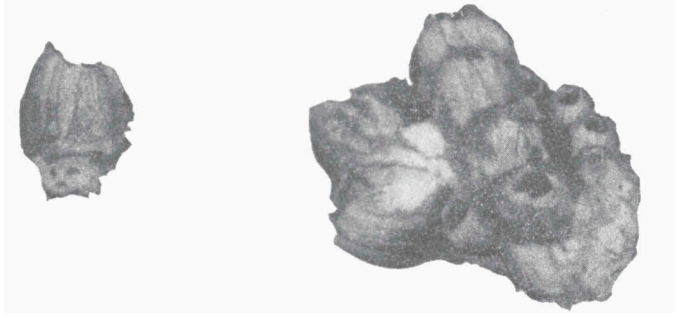

Fig. 10. *Balanus krakatauensis*. Left figure, holotype. Right figure, paratypes. × 1.3.

of the spur not rounded; the breadth of the spur about 1/5 of the basal margin, which on its carinal half is straight. Crests for depressor muscle indistinct. Externally an inflected furrow. Maxilla I with a straight edge with a notch below the upper spines. Cirrus III with teeth on the front edge of the segments of both rami.

Discussion: Several specimens of a *Balanus* from Krakatau are of great interest as they represent a new species. Judging by the radii the species belongs to subgenus *Megabalanus* with well developed porous radii. The scuta are externally strongly sculptured, but without longitudinal striation. In the opercular valves the specimens differ from *B. tintinnabulum*, which includes many subspecies. Some resemblance is observable to the species *B. algicola* from South Africa. Also this species seems not to attain a large size. But differences in the opercular valves and other parts are so distinct that I cannot include the specimens under this species. A new species of *Balanus* is consequently here to be noted.

Description. Shell white or dull rose coloured, with distinct longitudinal red lines, without horizontal lines as in many other *Balanus* species. The radii nearly white.

The wall is conical or cylindrical. The parieties are of moderate thickness, having longitudinal tubes without transverse septa. The internal

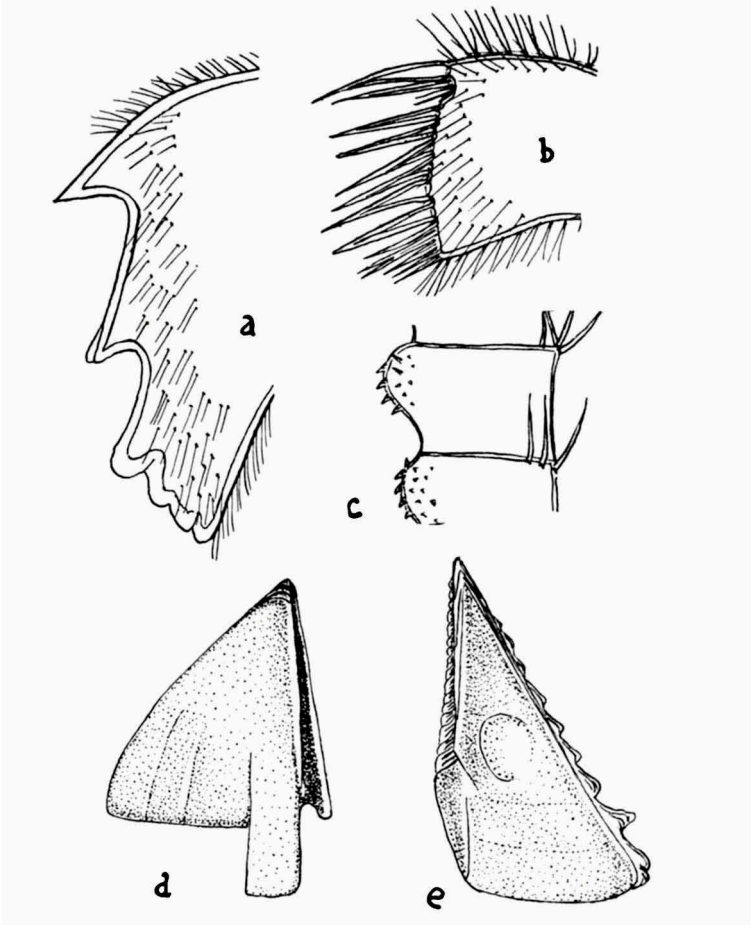

Fig. 11. *Balanus krakatauensis*. *a*, mandible. *b*, maxilla I. *c*, segment 4—5 of the anterior ramus of cirrus III. *d*, left tergum, internal view. *e*, left scutum, internal view.

surface of the parietes with ribs in all continuous with the septa in the wall. The external lamina is not ribbed between the septa.

The radii are well developed with horizontal summits. The interlocking septa and sutural edges are straight and denticulated on both sides as in *B. tintinnabulum* (a difference from *B. algicola*). The horizontal pores of

the radii are well developed, yet filled up in the internal parts of the radii. In other species of this section, e. g., *B. decorus*, I have noticed that the pores can begin to be filled up, but not so completely as in other sections of this genus.

The alae are of the shape typical for *Balanus*.

The basis is thin, radially porous.

The opercular valves are typical for the species.

Externally the scutum has no longitudinal striation as in many subspecies of *B. tintinnabulum* and others. The basal margin is short, the scutum thus being not very broad. The transversely arranged growth lines are very well developed; between these there are rather wide depressions. The articular ridge like the not very broad articular furrow are well developed. The pit for the adductor muscle is marked, but no adductor ridge is to be found. The pit for the lateral depressor muscle is limited by a ridge but not very distinctly. Internally the growth ridges are seen on the middle of the valve, as the valve is rather thin there. In the scutum there are thus distinct differences from *B. algicola*.

The tergum more closely agrees with that of *B. algicola*, but is yet distinct from it and from that of *B. tintinnabulum*. Externally there is a longitudinal furrow with the sides more or less folded in. Spur rather short in comparison with tergum of *B. t. tintinnabulum*, with the end not rounded and situated very near (half its own width) to the basiscutal angle. Articular ridge is distinct but not very high. The articular furrow not very deep. The basal margin is on its carinal side straight, on the other side much hollowed out. The crests for the depressor muscle are indistinctly indicated. This valve is also different from that in *B. algicola* and *B. t. tintinnabulum*.

Measurements in mm:

Specimen	Carino-rostral diameter	Height
Holotype	12	12.5
Paratype	17	13
Paratype	6	6

Mouth-parts: Labrum with three teeth on either side of the notch.

Palpus of the for *Balanus* typical club-shaped appearance.

Mandible with four to five teeth, the lowest more blunt and indistinctly separated from the lower corner. The second tooth is double.

Maxilla I has a straight edge. Below the upper spines there is a very minute notch with small spines. At the lower corner small teeth are situated.

Maxilla II is bilobate offering no specific characters.

Number of segments of the cirri:

Specimen	I		II		III		IV		V		VI	
Holotype	12	25	9	12	12	15	22	24	30	31	35	36

Of the three shorter cirri, cirrus I has rami of very unequal length. The shorter ramus with protuberant segments. The cirrus II with rami of unequal length, the anterior ramus 4 segments longer. Both rami have protuberant segments. Cirrus III also with rami of unequal length, the anterior 4 segments longer. The segments of both rami are convex anteriorly and armed with strong recurved teeth. As far as concerns the longer cirri corresponding teeth occur on the segments in the lower half of the anterior ramus of cirrus IV. Cirrus VI has four pairs of spines on the front edge of the segments. In *B. algicola* there are from six to eight spines.

The penis with a conspicuous acute basidorsal point, as found in many other species of *Balanus*.

This species seems to me well separated from others and most related to *B. algicola*.

Locality: Krakatau, Sunda strait. Several specimens attached to each other.

Subgenus **Balanus** Da Costa, 1778.

Balanus amphitrite communis Darwin, 1854.

New locality: Antjol, Batavia. Some specimens on a snail-shell Van Kampen leg., 3. IV. 1906.

Distribution: With certainty known from West India, European Seas, Mediterranean, West and South Africa, Malay Archipelago, New South Wales. Pacific Ocean?

Balanus amphitrite cirratus Darwin, 1854.

Discussion: Some specimens of *B. amphitrite* are totally white in colour but possess distinct horizontal longitudinal stripes, thus being transversely freckled with white, as is typical for Darwin's var. *cirratus*. In Hoek's description of *B. amphitrite* there are some specimens from Bay of Badjo, West coast of Flores (Hoek, 1913, Stat. 50, p. 168) which in my opinion must be identical with those dealt with here. Hoek says they show some resemblance to Darwin's var. (9) *cirratus*. After studying the types of Darwin's varieties I prefer trying to identify Darwin's

varieties than to simplify the question by inserting many forms into the two varieties of Hoek: *communis* and *malayensis*. This has already been discussed by the author (Nilsson-Cantell, 1921). The characters of the two varieties mentioned by Hoek can not be upheld.

These specimens I therefore identify as *cirratus*. This variety usually has a pale purplish brown colour, but Hoek also mentions nearly white specimens. According to Darwin the colour varies greatly. The opercular plates do not differ in any important detail from those of other specimens of this variety which I have described previously. Also the internal parts agree well. Maxilla I with a strongly projecting part in the lower half of the front edge (Nilsson-Cantell, 1921, Text-fig. 65*a*).

New locality: Bay of Batavia. Some specimens on mussel shells. C. P. Sluiter leg.

Distribution: Mouth of Indus and other localities in India, Sunda Islands, Philippines. China and Australia.

Balanus amphitrite variegatus Darwin, 1854 (fig. 12).

Discussion: Several specimens of *B. amphitrite* seem to me to agree with those described by Hoek in Siboga expedition as: "IX Batavia. Upon bambusa from sero, Dr. van Kampen misit 1908". The specimens in the present collection also have been taken from bamboo of a sero (a fish trap) by the same collector. In Hoek's opinion the specimens seem to agree with var. *communis*. I regard them, however, as belonging to the var. *variegatus* originally described from New Zealand. The shell is flat conical with narrow radii with very oblique summits. The violet coloured narrow longitudinal stripes are crossed by white bands, more distinct than those found in the variety *communis*.

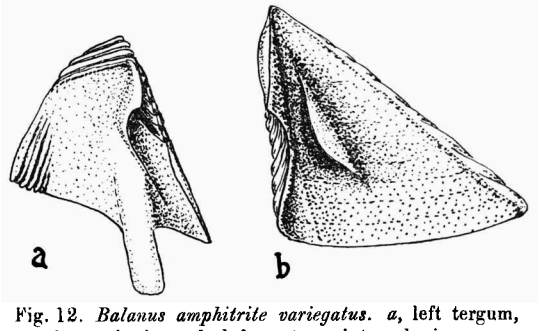

Fig. 12. *Balanus amphitrite variegatus*. *a*, left tergum, internal view. *b*, left scutum, internal view.

In Darwin's description the scutum is said to have a small adductor ridge. In these specimens the ridge is, as pointed out by Hoek (1913, p. 171) "remarkably prominent", but short.

The spur of the tergum is long and narrow and sometimes pointed, sometimes not. In this it agrees with Darwin's type specimens, which I have studied earlier, and also with the very nearly related var. *cirratus*. *B. communis* has a shorter spur on the tergum.

Of the internal parts the cirrus III has on the front margins of the segments recurved teeth, best developed on the anterior ramus.

New Locality: Batavia. On bamboo from a sero (a fish trap), Van Kampen leg.

Distribution: New South Wales, New Zealand, Malay Archipelago.

Subgenus **Chirona** Gray, 1835.

Balanus amaryllis Darwin, 1854, forma **euamaryllis** Broch.

New locality: Gier N° 12, Exp. N° 13, 6° 15′ S., 110° 50′ E. Depth: 40—51 m. Bottom: mud, sand, stones. One specimen (carinorostral diameter 20, height 17 mm) on a spine of *Prionocidaris bispinosa.*

Distribution: Malay Archipelago, Indian Ocean, Japan, China, Northern coast of Australia.

Balanus bimae Hoek, 1913.

Discussion: This species comes very near to *B. amaryllis* and also to *B. tenuis.* After studying the type material in Amsterdam I came to the conclusion that there are some differences. Recently the species has been re-identified by Broch (1931) on material from the Malay Archipelago (Kei Islands). Three specimens in this collection agree well with the description given by Hoek. Like in Broch's specimens the basal part of the shell is not swollen, as stated by Hoek. But the shell is distinctly toothed. The colour in these specimens is quite white, but there are hyaline longitudinal bands crossed by growth lines, as indicated in Hoek's figure. The compartments are rather thin. Inside the compartments have a distinct sheath and below this there are vertical ridges. The radii are extremely narrow, sometimes hardly visible, with very oblique summits, they are not crenulated. The opercular valves agree totally with the figures by Hoek (1913). The internal parts also agree well with the figures earlier given. The segments of the longer cirri have two and sometimes, as in the middle segments of cirrus VI, three pairs of spines, the third being very small. In the two related species *B. tenuis* and *B. amaryllis* there are two to three pairs of spines. Measurements of the largest specimen: carinorostral diameter 7 mm, height 5 mm.

New locality: Gier N° 4, Exp. N° 20, 6° 51′.5 S., 112° 56′ E. Depth: 12—16 m. Three specimens 15. XI. 1907.

Distribution: Malay Archipelago. Depth 13—15 m.

Subgenus **Solidobalanus** Hoek, 1913.

Balanus ciliatus Hoek, 1913.

Balanus ciliatus Hoek, 1913; Nilsson-Cantell, 1925.

Discussion: This species, discovered by Hoek and refound by the author (Nilsson-Cantell, 1925) from a more northern locality: Bonin Island, seems never to attain a large size. The largest specimen from Bonin Islands measured 8.3 mm; most of the other specimens are smaller. The colour of the wall is rather typical, characterized by the red longitudinal stripes, not to be seen in Hoek's figure, but more distinctly indicated by Nilsson-Cantell (1925, Pl. I, fig. 7). The study of the type material in Amsterdam proved that my previous identification was correct. To the description and figures given by Hoek (1913) and Nilsson-Cantell (1925) nothing need be added here.

New locality: East coast of Pulo Wai, Siam bay, about 9° 30′ N., 103° E. Several specimens on gorgonian and mussel shell taken from a telegraph cable. Depth: 73 m. S. S. "Telegraaf". 17. VIII. 1906.

Distribution: Malay Archipelago, Bonin Islands.

Balanus socialis Hoek, 1883.

Balanus socialis Hoek, 1883, 1913; Gruvel, 1905.

Some *Balanus* specimens collected together with *Octolasmis warwicki*, agree well with the description given by Hoek (1913) of *B. socialis*. This species, included by Hoek (1913) under the section *Solidobalanus*, consequently cannot be related to *B. glandula* of the subgenus *Balanus* as was presumed earlier (Hoek, 1883). In the four specimens of this collection the parietes in the lower part are a little divided into ridges. Hoek pointed out that the shape of the wall is variable. Some of these specimens have the hyaline stripes mentioned by Hoek for some specimens. As regards the opercular valves and the internal parts the agreement with the description by Hoek is complete. The largest specimens measured in carino-rostral diameter 6 mm, thus a little larger than the specimens of the Siboga expedition.

New locality: Gier N° 14, Exp. N° 6. 3° 26′ S., 116° 34′ E. Depth: 29—33 m. Bottom: mud. Some specimens on a crab. 16. XII. 1908. According to Hoek, the species is situated on different objects. The substratum mentioned here is not found in the earlier descriptions.

Distribution: Malay Archipelago.

Subgenus **Armatobalanus** Hoek, 1913.

Balanus quadrivittatus Darwin, 1854.

Balanus quadrivittatus Darwin, 1854; Weltner, 1897; Hoek, 1913; Pilsbry, 1916; Nilsson-Cantell, 1921.

Discussion and complementary description: The material dealt with here was collected by the Gier Expedition. Some of the specimens of the collection are already named „*B. quadrivittatus*", and are probably the specimens mentioned by Hoek (1913, p. 216). For the localities this material of the Gier expedition may be mentioned here. Darwin (1854) says, that this species is somewhat doubtful and closely related to *B. cepa*. Yet I think after studying both species that if an extensive material is available it is possible to identify the species. Typical specimens of *B. quadrivittatus* were studied by the author earlier (1921). The typical character of the shell (the four brownish gray bands) does not always exist, as is also the case in some specimens of this collection. One specimen, however, has very typical bands. The opercular valves are rather like those of *B. cepa*, but the scutum of *B. cepa* externally has a longitudinal striation, which is not found in *B. quadrivittatus*. As pointed out by Nilsson-Cantell (1921) the pit for the lateral depressor muscle sometimes is distinct even in *B. quadrivittatus*. In the specimens of this collection they are also rather distinct. This character consequently is a little variable. The internal parts could also be studied in these specimens, they show good agreement with the description given by Hoek.

The fourth cirrus is armed, especially the distal segment of the protopodite. I find 5—6 recurved teeth, in accordance with previous results (Nilsson-Cantell, 1921, fig. 72). The teeth of the lower segments of the internal ramus of the same cirrus are fewer than in the figure above mentioned. Whilst studying *B. cepa* (Nilsson-Cantell, 1932) I found that the number of the recurved teeth on the protopodite of cirrus IV was more numerous (9—12), perhaps a character of some importance. Broch in his description of *B. cepa* (1931) gives no data of any value for comparison regarding the armation of the protopodite.

New localities: Gier N° 12, Exp. N° 13. 6° 15′ S., 110° 50′ E. Depth: 40—51 m. Bottom: mud, sand, stones. Some specimens together with *B. amaryllis*, *Trilasmis eburnea*; some specimens on spines of *Prionocidaris bispinosa* Lam. 18. X. 1908.

Gier N° 14, Exp. N° 5. 3° 30′ S., 116° 33′ E. Depth: 31 m. Bottom: mud. Some specimens. 16. XII. 1908.

Distribution: Malay Archipelago.

Genus **Tetraclita** Schumacher, 1817.

Tetraclita porosa viridis Darwin, 1854.

Localities: Makassar, Sumbawa. Some larger and typical specimens on stones. Toxopeus leg., 1921.

Deli, Sumatra. Two specimens. De Bussy leg.

L'Gedong, west of Floreshoofd, north coast of East Flores. One specimen on a stone on the shore. V. d. Sande leg., May 1904.

Batavia bay. Several specimens. C. P. Sluiter leg.

Genus **Chelonibia** Leach, 1817.

Chelonibia patula (Ranzani, 1818).

Some typical specimens from the Indomalayan waters may be registered here as earlier finds from these parts are rare.

New localities: Tegal, Java. Several specimens. Van Kampen leg., 18. VI. 1906.

Gier N° 10, Exp. N° 2. 6° 12′ S., 108° 21′ E. Depth: 31 m. Bottom: mud. Two specimens on *Neptunus pelagicus*. 5. VIII. 1908.

Gier N° 10, Exp. N° 3. 6° 53′ S., 110° 21′ E. Depth: 12—16 m. Bottom: mud. Six specimens of different sizes on a stomatopod. Van Kampen leg., 9. VIII. 1908.

Distribution: Mediterranean, Atlantic Ocean, Malay Archipelago, Australia.

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