THE DANISH EXPEDITION TO SIAM 1899-1900

Results of the zoological Collections

made by

Dr. Th. Mortensen

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Introduction.

The following notes may serve as an introduction to the scientific works on the zoological collections made by the author in Siam in 1899—1900.

«The Danish Expedition to Siam» had only two members, Mag. Sc. Johs. Schmidt, as Botanist, and the author of those introductory remarks, Dr. Th. Mortensen, as Zoologist. The expedition was made at the expenses of the Danish Government and the Carlsbergfond. Further the East Asiatic Co. in Copenhagen gave us very great assistance, and the Director of the Company, H. N. Andersen, Councellor of state, deserves our best thanks for his liberality. But especially we are exceedingly obliged to H. Exc. Admiral A. de Richelieu, who helped us in every way in Siam; to him it is mainly due that the results of this little expedition are so valuable.

On the 1st of Oct. 1899 we left Copenhagen onboard S.S. «Siam» of the East Asiatic Co. The passage took a rather long time, so we did not reach Bangkok till the 12th of December. We were kindly received by the Siamese Government, and having got a letter of introduction to the Governor of Muang Krat, we left Bangkok on the 19th of Dec. on H. Siamese M.S. «Chamroen» for the little island of Koh Chang in the eastern part of the Gulf of Siam. We had chosen this place with the consent of the Admiral; here was a Government Station, where we could stay, and soldiers to assist us with the dredgings etc., and, last not least: this small place we might hope to study rather completely in the short time (about 3 months), we could stay. Especially for the Botanist this was a matter of importance.

The place however turned out to be a rather bad one for researches on marine Zoology. On account of the several large rivers disemboguing themselves in the neigbourhood the water was quite muddy, and especially the sound between Koh Chang and the mainland was a very bad dredging-ground, the bottom being deep, soft mud with very little animal life; there were almost no corals in the sound, which fact sufficiently indicates the character of the place. Happily I had not to restrain my researches to the

sound — if so my efforts would have been almost lost. Adm. Richelieu placed a rather large boat to my disposition, with which I could go out for several days, and then better places were found with the rich and varied fauna, one might expect in tropical waters. Such places were especially Koh Kahdat, a little island a few miles S. of Koh Chang, and the small islands of Koh Chuen, Koh Mesan, and Koh Kram farther North.

All round Koh Chang the bottom was the horrible mud, which filled the dredge instantly, and gave almost nothing but dead bivalve shells. There was, however, a small good place on the western coast of Koh Chang, the little island of Koh Lom, consisting only of some rocks with a few trees. Here was a very interesting fauna to be found above low-water mark, especially large Chitons and several forms of Cirripedia among the immense numbers of oysters forming here (and everywhere on the rocks of the shores) a broad white border between high and low water mark. Under the smaller stones on the shore were found large numbers of a black Synaptide and several other animals.

At Koh Kahdat there was a beautiful sand-bottom with corals and the rich animal life connected with them. Just outside the reef there was a rich dredging ground, but only a very narrow belt, scarcely a hundred meters broad. At the depth of about 5 fathoms the well-known mud began; when we came there with the dredge, it was instantly filled with mud — and on the other side the corals tore the net of the dredge. The boat was by no means easily steered, and it was too big to be rowed — thus the difficulties connected with dredging here were very great. But when we happened to get over all the difficulties, the hauls were mostly very rich.

Even better was the place at the islands of Koh Mesan, Koh Chuen, and Koh Kram. The bottom was sand with stones and corals out to the greatest depths found here, c. 30 fathoms. As the Madreporarian Corals are found only out to 3—4 fathoms in these waters, there were excellent conditions for dredging outside the reefs, and very rich collections were made here. It was most interesting to compare the fauna of the sound between Koh Mesan and the mainland (Cap Liant) with that of the sound at Koh Chang, the fauna being very rich and varied here in the clear water. — If the station had been here, the collections would have been even much richer; but here was no water to be had, and no people lived in the neigbourhood. A stay of about a week here with the boat was only possible by the Admiral ordering supplies of water and food for us from Rayong. — Among the collections from this place I may mention some bottom-samples, which were extremely rich in small Crustaceans (Cumacea, Ostracoda etc.).

Several times the Admiral allowed me to go with H. S. M. S. «Chamroen» to dredge, and thus I have been able to investigate the fauna of a large part of the east side of the Siam-Gulf, from Koh Kong to Koh si Chang. As the depth is very uniform in the Gulf, and the bottom is mud everwhere, I have not tried to go far out from the coast, supposing

the fauna to be rather uniform over the whole area. Thus I have made only a few dredgings in 20—30 fathoms — except at Koh Kram and Koh Chuen — and my researches are mainly restricted to near the islands named and the Gulf of Rayong, where I have made several dredgings on the way between Koh Chang and Koh Chuen.

The richest parts of the collections are the Fishes, Crustaceans, Mollusks and Porifera. Echinoderms were less numerous than I had expected; thus for inst. only one species of Crinoids was found (whereas I found 4—5 species on a coral-reef at Singapore). Of Fishes I got a very large number in the fishing-stakes of the natives at Koh Kong and in the mouth of the river Paknamwen. An otter-trawl which I had brought with me, was used several times most successfully from «Chamroen», till it was lost in the mud. In the dredge fishes were often taken, but of course not in such vast numbers as in the trawl.

A very rich fauna was found in the coral-blocks: Annelids, Gephyreans, Crustaceans, Ophiurans and boring bivalves were taken in large numbers, when the blocks were broken to pieces. A most important part of this peculiar fauna is formed by the Porifera. All the holes in the coral-blocks, which were not inhabited by other animals, were filled out by fleshy, and mostly flesh-coloured or white sponges; but especially the underside of the blocks was covered by mostly incrusting sponges of the very beautiful colours — red, blue, yellow, green, black, in all variations — a most pleasing sight.

Besides the marine fauna also the interesting animal life in the Mangrove was carefully studied, as well as the fauna on the muddy coasts of the sound, which proved to be of no small interest. — Also collections of the terrestrial fauna were made, though by far the most weight was laid on the marine researches. Some of the lower Arthropods have turned out to be most interesting, especially several species of Pauropus, Scolopendrella and Koenenia.

To give a more detailed account of the animal life in the Mangrove, on the coasts, in the coral-blocks etc. would be very interesting. This, however, must wait till the collections have been worked out.

On the 21st of March 1900 we left Koh Chang, and on the 1st of June we arrived at Copenhagen on S.S. «Cathay» of the East Asiatic Co.

I may now be allowed to express here my best thanks to the Danish Government and the Carlsbergfond for supporting the working out of the collections, and to the Royal Danish Society of Sciences for publishing the scientific results of the Expedition.

Th. Mortensen.

THE DANISH EXPEDITION TO SIAM 1899-1900
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I. Gasteropoda opisthobranchiata

by

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During the time from the 22th of Dec. 1899 to the 21st of March 1900 Dr. Th. Mortensen made a series of collections in the eastern part of the Gulf of Siam, from Koh Kong to Koh si Chang. Researches were made only from the coasts out to the depth of about 30 fathoms. The most important localities were the following:

The sound between Koh Chang and the mainland: the bottom being deep soft mud, very few animals were found there, but at the coasts (Lem Ngob) a varied fauna occurred, also *Nudibranchiata*, partly (*Doriopsis*) on the flat muddy shore, which was dry at low water, partly (*Idalia*) on the stones and rocks covered with algæ (*Acetabularia*) and oysters.

On the N., S. and W. coast of Koh Chang several *Nudibranchiata* were found on old coral-blocks at a depth of about 1 fathom (*Chromodoris histrio*, *Phyllidiella nobilis*, *Ph. pustulosa*).

At Koh Mesan and Koh Kam a very rich fauna occurred at a depth of ca. 5 fathoms: Echinoderms, Crustaceans, Mollusca etc.; the bottom was sand with algæ and phanerogamous plants (*Halophila*). A noticeable feature in this fauna made the numerous specimens of *Philine quadripartita*.

At Koh Chuen and Koh Kram some places at a depth of c. 30 fathoms gave a very rich harvest of Gorgonids, Echinoderms, Mollusca etc. The bottom was hard with small stones.

A little S. of Koh Tulu a single Nudibranch (*Thordisa maculigera*) was taken at a bottom of sandy mud with enormous numbers of dead shells, at a depth of about 10 fathoms. Off Tung Kaben another Nudibranch (*Melibe bucephala*) was taken at a bottom of sandy mud overgrown with the above named phanerogamous plant, *Halophila*, at a depth of about 6 fathoms. W. of Koh Kut, at a depth af about 15 fathoms, soft mud, some specimens of *Philine quadripartita* were found.

On floating Sargasso were found an *Aplysia* and a *Plakobranchus*.

The list of *Opisthobranchiata* obtained through the expedition of Dr. MORTENSEN is the subsequent one:

Tectibranchiata.

Aplysia immunda, BGH. n. sp.
Aplysiella unguifera (RANG)?
Aplysiella incerta, BGH. n. sp.
Aclesia ocelligera, BGH. n. sp.

Doridium lineolatum, H. et A. ADAMS.
Atys naucum (L.).
Philine quadripartita, ASCAN. var. *Siamensis*.

Ascoglossa.

Plakobranchus ocellatus, VAN HASS.

Nudibranchiata.

Thordisa maculigera, BGH.
Chromodoris histrio, BGH.
Casella atromarginata (CUV.).
Idalia plebeia, BGH. n. sp.
Phyllidiella pustulosa (CUV.).
— *nobilis*, BGH.
Doriopsis rubra, KELAART.
— *nigra* (STIMPSON). var. *nigerrima*.
Doriopsilla pallida, BGH. n. sp.

Marionia chloanthes, BGH. n. sp.
Bornella digitata, AD. et REEVE.
— *excepta*, BGH.
Melibe bucephala, BGH. n. sp.
Nossis indica, BGH. N. Gen., n. sp.

Marsenia perspicua (L.).

Tectibranchiata.

Aplysiidae.

Aplysia (L.).

Aplysia immunda Bgh. n. sp.

Pl. I, Figs. 1—8.

One specimen was taken by Dr. Mortensen on February 17th 1900 at Koh Kahdat on a floating alga; on being set in spirit it poured out a carmine fluid from below the dorsal shield.

The length of this specimen was 17^{mm}, the breadth 9^{mm} and the height 8^{mm}; the mantle-shield was 8^{mm} long, the gill-slit 14^{mm} and the gill 5^{mm} long. The sole of the foot was 5^{mm} broad. — The ground colour of the specimen was whitish, but partly oppressed through a dark-gray or gray colour, forming a network on the sides of the foot-lobes; in this network are again seen many round whitish spots. A similar colouring was found on the anterior part of the back and on the head. Some sparingly scattered black round spots formed a contrast to this colouring (fig. 1). The mantle (the dorsal shield) showed a similar, but much lighter, net-like colouring, also with scattered black spots; from the anterior margin of the mantle a median black band ran some way forward. The inside of the foot-lobes was also whitish, but with strong, black, sparingly communicating, perpendicular bands. The gill whitish. The sole of the foot light dirtily whitish.

The form was elongated. The lobes of the foot reached through two thirds of the length of the animal quite to the end of the body, and were, especially in the middle, rather high (3^{mm}).

The shell was 8^{mm} long, and of a breadth of 6^{mm}; it was calcareous, but quite thin, and therefore it had been broken into several pieces.

The central nervous system, as in the typical *Aplysia*, showed the roundish cerebral ganglia, connected by a not quite short commissure; the pleural ones were of about the same size; behind these latter the pedal ganglia were found, more than twice the size of the others, and connected by a commissure, longer than the diameter of the ganglia.

The otocysts had a diameter of $0{\cdot}12^{mm}$. Before the fore end of the gill was seen a longish, yellow spot (*Osphradium*?).

The plump bulbus pharyngeus had a length, height, and breadth of 3mm; the end of the radula-sheath projected rather strongly behind at the lower side of this pharyngeal bulb. The palatal hooks were yellowish, mostly somewhat bent, small staves of a length of up to 0·09mm, often somewhat swollen towards the point (fig. 2). The mandible plates were yellow, the anterior end brown, of a breadth of up to 0·6mm, formed of closely packed cylinders of a length of up to 0·12mm (fig. 3). The broad tongue with a yellow, glistening radula tapering to the fore end, and containing 22 series of tooth-plates; farther backwards in the sheath 12 series were found of which 3 were not fully developed; thus the total number of series was 34. In the series up to 15 lateral plates were found on either side of the median one. The plates were yellow; the breadth of the median plates was 0·18mm; the length of the five outermost lateral ones 0·06—0·08—0·09—0·13—0·15mm. The hook of the outermost plate but four (fig. 4) had a height of 0·08mm. The median plates were of the common form with the legs wide apart; the hook on the edges had (6—7) fine denticles, and at the base of these on either side 2 coarser denticles. The lateral tooth-plates (fig. 5) to the outermost ones had a strong hook with dentate margins, and at the base of the hook outward two larger and a few smaller denticles were found; at the base invard one denticle; the two outermost ones (fig. 6) were quite without hook, the following had a small hook.

The salivary glands were as usual, their tapering posterior end reached almost to the pylorus-region of the masticatory stomach.

The oesophagus was posteriorly dilated into an anterior stomach. The masticatory stomach had a diameter of 3·5mm; on its inside were seen in the usual way the (about 12) clear, pyramidal masticatory plates, most of which, however, were rather small. In the cardial part of the posterior stomach two series of plates were seen, very much resembling the other, but very unequal as to size (fig. 7). The larger plates had a height of up to at least 0·5mm. — All the stomachs were filled with copious, feltlike contents, consisting of different, most filiform algæ.

The yellowish white, almost cylindric liver had a length of 8mm.

The penis was cylindric, 4mm long, with a strong retractor at the posterior end (fig. 8); the praeputium had a very strongly marked furrow on the inside; the glans, which stretched through two thirds of the length of the cavity of the praeputium, was almost cylindric and without any trace whatever of papillæ or hooks, neither were any such seen on the crown of the praeputium.

Aplysiella, P. Fischer.

P. Fischer, descript. d'une espèce nouv. du genre *Phyllaplysia*. Journ. de conchyl. 1872. p. 295—296.
— , man. de conchyliologie. 1887. p. 567.

Vayssière, rech. — sur les moll. opisthobr. I. *Tectibranches*. 1885. (Ann. du mus. d'hist. nat. de Marseille, II, 3). p. 71 (—75). pl. 3, fig. 70—76).
Pelseneers, rech. sur divers *Opisthobranches*. 1894. p. 26. pl. 10, fig. 80—81.

Forma corporis fere ut in Aplysiis propriis, attamen nonnihil elongata, postice nonnihil latior, antice (capite et collo) angustior. Scutum palliale cum testa non desunt. Podarium non angustum.

Ganglia visceralia antice inter pleuralia sita.

1. *Aplysiella incerta*, Bgh. n. sp.

Pl. I, Figs. 9—18.

One specimen of this form was taken together with *Dolabrifera unguifera* (see hereafter) on Febr. 17th, 1900, at Koh Kahdat.

Preserved in spirit the specimen had a length of 25^{mm}, by a breadth of 13^{mm}, and a height of 6^{mm}; the length of the gill-slit was 7^{mm}. The colour was dirtily yellow, on the back scattered black spots were seen; the short and thick gill, of a length of 5^{mm}, was yellowish white; on the sole of the foot scattered yellow gray spots and numerous white dots were seen.

The form was as usual, in the general outline longish-oval; the foot-lobes were small, the right one overlapped the other, and the shell was quite covered; the gill was rather large. On the back small, rather thick cones of a height of up to 0·30^{mm} were found sparingly scattered (fig. 9).

The shell (fig. 10) was horn-like, yellowish, not quite thin, of a length of 9·5^{mm}, by a breadth of up to 8·5^{mm}, only little bent, of the common form; the nucleal part was exceedingly small, the lines of growth were rather distinct.

The yellowish central nervous system (fig. 11) was upon the whole very similar to that of Notarchus. The cerebral ganglia which adjoin each other, were roundish, almost twice the size of the pleural ones; between the latter the two visceral ganglia were found, the right one closely adjoining the right pleural one, the left one connected with the left pleural one by a short connective; close behind the arch formed by the pleural and the visceral ganglia, the large, transverse-oval pedal ganglia are found, somewhat notched in the hinder end, and connected by a short commissure. The rather large buccal ganglia were connected by a short commissure; the short-stalked gastro-oesophagal ganglia were small (of a diameter of 0·08^{mm}), roundish. The nerve cells had a diameter of at least up to 0·12^{mm}.

The otocysts had a diameter of 0·10^{mm}; they were closely filled with otoconia of a diameter of up to 0·016^{mm}.

The buccal tube had a length of 2^{mm}. The short-pyriform bulbus pharyngeus

had a length of 4mm, the radula-sheath projected behind at the lower side. The brownish mandible plates had a height (length) of 1mm, by a breadth of up to 0·28mm; their elements (fig. 12) which were a little bent, were angularly cylindric, of a height of up to 0·020mm, closely set. The palatal hooks (fig. 13) of the upper wall of the buccal cavity were of the common form, of a length of up to 0·065mm, yellowish. A countless number of glands were found everywhere on the walls of the buccal cavity. The powerful tongue had a glittering, brown radula; when spread out this latter had, together with the radula-sheath, a length of 3mm. In the radula which was anteriorly highly tapering, 32 series of tooth plates were found, in the sheath 12 developed series and 4 undeveloped ones; thus the total number of series was 48. In the hindmost series of the tongue about 68 lateral plates were found on either side of the median ones. The plates were yellow, only the outermost ones were colourless. The breadth of the median plates was 0·12mm; the height of the hook of the three outermost lateral ones was 0·05—0·055—0·06mm, and the height rose by and by to 0·08mm. The median plates (fig. 14) were of the common form, with highly spread legs; on either side of the point one somewhat stronger denticle and two smaller ones were found. The inner lateral plates were also of the common form (fig. 14) with two truncate hooks; on the outer edge of the first still two small denticles were found, on the following (5—6) ones only one denticle, which then disappeared, while the cleft between the hooks deepened, and these latter became longer (fig. 15); on the outermost plates only a trace of the cleft was found (fig. 16).

The salivary glands were 6mm long, whitish, somewhat thicker posteriorly, attached to the fore half part of the masticatory stomach.

The oesophagus was posteriorly developed into a proventricle showing strong folds with soft tufts. The masticatory stomach was short-pyriform, of a diameter of 3mm, very muscular and somewhat tendinous glittering; it contained the common, here slightly yellowish, pyramidal masticatory plates, arranged in the usual way, to a number of 12, of which 9 were large, of a height of up to 1mm. In the cardial part of the posterior stomach some series of hooks were found (fig. 17); they were high, little stiff, almost colourless, very finely streaked longitudinally, straight or somewhat bent, truncate or pointed, and had a height of at least up to 0·55mm, by a diameter at the base of up to 0·12mm.

The dirtily brown liver had a length of 12mm, by a diameter of 4mm; it was conical.

The penis had a length of 4·5mm, by a diameter at the somewhat thicker upper end of 0·5mm; it was grayish; the praeputium was provided with fine longitudinal folds, and a stronger furrow; the glans was almost 1mm long, conical; at its base, as also at the top of the praeputium some few, not hard cones (fig. 18) of a height of up to 0·12mm.

2. *Aplysiella unguifera* (Rang)?

Aplysia unguifera, Rang. l. c. 1828. p. 52, pl. V, fig. 4—7.
Dolabrifera unguifera, Gray, l. c.

Pl. I, Figs. 19—30.

One specimen of the form examined here was taken on Febr. 17th, 1900, at Koh Kahdat.

The animal, preserved in spirit, had a length of 12^{mm}, by a breadth of up to 6^{mm}, and a height of up to 4^{mm}; the length of the gill-slit was 4·5^{mm}. — The colour was whitish; on the back a few scattered black spots were seen, and here and there small whitish tufts with brown-gray, roundish bases; on the fore part of the back three such tufts were found in a longitudinal series. The marginal part of the foot-sole was finely dotted with gray. The gill was whitish.

The form was as usual. The left parapodium joined the shell closely, covering one half of it, while the right one lay almost exposed in the gill-slit, scarcely covered by the right foot-lobe which had a height of 2^{mm}. The tufts of the back (fig. 19) had tubercles and short branches.

The shell (figs. 20, 21) had a length of 5^{mm}, by a breadth of 3·75^{mm}; it was flattened, only posteriorly at the nucleus a little hollowed (fig. 21), rather thin, but highly calcinated and firm; its contour was ovate, narrowing posteriorly, the right margin was posteriorly somewhat notched; the nucleal part projected upward in a knob; the lines of growth were rather strong.

The relations of the central nervous system were not to be determined. The otocysts had a diameter of 0·075^{mm}, they were crammed with otoconia.

The bulbus pharyngeus was whitish, of a length of 1·5^{mm}, the radula-sheath projected a little on the lower side posteriorly. The palatal hooks were as usual, of a length of up to 0·04^{mm}, rising more or less obliquely (fig. 23). The yellowish mandible plates had a length of 0·55^{mm}, by a breadth of up to 0·12^{mm}; their hinder edge was a little convex, while the fore edge was a little concave, above and below they were rounded. The elements of the plates were closely set; their hook mostly bent upwards, forked, now and then somewhat irregular, of a height of 0·10^{mm} (fig. 22). The tongue was as usual; in the slightly yellowish radula 17 series of tooth-plates occurred, in the sheath 12 developed series and 3 undeveloped ones; thus the total number of series was 32. In the series up to 30 lateral plates were found on either side of the median ones. The breadth of the median plates was 0·08^{mm}; the height of the hook of the second lateral plate was 0·055^{mm}, the heights of the 4 outermost plates were 0·04—0·06—0·08—0·10^{mm}, and the height rose to 0·12^{mm}; the colour of the plates was yellowish, the outermost ones were

almost colourless. The median plates (figs. 24, 25) were of the common form, with highly spread legs, the cutting edge had 2 strong denticles on either side of the median hook. Also the inner lateral plates (figs. 24—26) were of the common form; the first had an inner and an outer denticle besides the two truncate median ones; in the following plates only an outer denticle was found, and from the sixth or seventh plate (fig. 27) also this denticle was wanting; in the plates of about the outer half of the series the basal plate was shorter and the compressed hooks erect, rather straight, tapering; the outermost ones (fig. 28 a) decreased in size.

The salivary glands were as usual, rather long, reaching to the masticatory stomach, thin, rugged, whitish.

The hinder part of the oesophagus was developed into a first stomach. The masticatory stomach formed a short, highly muscular cylinder of a diameter of 1·6mm; the length was smaller than the breadth. The stomach showed the common two circles of pyramids; they were hyaline, almost colourless with a bluish tint, of rather irregular forms (fig. 29), of a height of up to 0·30mm, with the common, here scarcely slightly iridescent axial string.

The penis is long, as is also the glans penis; on the inside of the praeputium, as also, but more sparingly, on the glans, a not large number of rather soft cones (fig. 30) distributed into a few longitudinal series, were found, reaching to a height of up to 0·06mm.

For the present it must remain doubtful whether the present form is identical with the *Aplysia unguifera* of the Mediterranean described by Rang. The latter is of a greenish colour, and shows small round wartlets («verruculis rotundis»). Its shell is similar to that described above.

As mentioned above, the relations of the nervous system, i. e. the situation of the visceral ganglia were not to be determined, and so the fact is not certain, although probable, that the present form belongs to the *Notarchidae*. It will then have to be referred to the *Aplysiella*, which is likely to be identical with the *Dolabrifera*.

Aclesia, Rang.

Aclesia, Rang. Hist. natur. des Aplysiens. 1828. (p. 68) Pl. XX, XXI, XXII.

Notaeum sicut rhinophoria et tentacula villis majoribus simplicibus et compositis instructum; fissura branchiali brevi. Scutum palliale sicut testa desunt; branchia, ren et pericardium in cavitate branchiali libera (scuto non tecta). Podarium non angustum.

Ganglia visceralia antice, inter pleuralia sita. Penis conulis armatus.

The genus was established by RANG, and the plates XX—XXII have the name of *Aclesia*; in the text (p. 68) be has retracted the name, referring the species named in the plates to the genus *Notarchus* of CUVIER, where, however, they do not belong. The genus has mostly been adopted by the malacologists and conchyliologists [1]) for forms like those originally given by RANG; but no more exact examination has hitherto been made.

The exterior of the *Aclesia* is characteristic by the simple or compound tufts or appendages scattered over the back, the rhinophores, and the tentacles; the gill-slit is quite short. Mantle-shield and shell are wanting, and accordingly the gill, the kidney, and the pericardium lie exposed (not covered by the mantle and the shell) in the gill cavity. The foot-sole is not narrow, the foot-lobes which surround the gill-cavity, are quite small.

The place of the visceral ganglia, as in the *Aplysiella*, but contrary to the case in the *Aplysia*, is far forward, between the pleural ganglia. The glans penis is armed with soft cones.

The *Aclesia* seem to belong to the warmer seas, and especially to those of the tropics.

Aclesia ocelligera, BGH. n. sp.

Pl. I, Figs. 31—38. Pl. II, Figs. 1—11.

Of this beautifully coloured form a single specimen was obtained on the 25th of Dcbr. 1899 at Koh Chang.

This specimen had in spirit kept a length of 3^{cm}, a height of 1^{cm}, and a breadth of $1{\cdot}2^{cm}$; the length of the rhinophores was 3^{mm}, of the tentacles $3{\cdot}5^{mm}$, and of the gill-slit 7^{mm}. The foot was almost as long as the whole body, of which length the tail made $5{\cdot}5^{mm}$; the breadth of the foot in its greatest length was 9^{mm}, the breadth of the foot-brim $1{\cdot}5^{mm}$. — The ground-colour was yellowish white, appearing here and there, especially on the fore part of the body, as small spots and narrow stripes, but mostly it is superseded by close-standing black points, which very often form small rings; between the rhinophores, as also on the gill-covers (foot-lobes) groups of somewhat larger black spots with a light halo are seen; such rings are also seen at the base of the tentacles. In the middle between rhinophore and tentacle a fine eye-spot is seen on each side, and along the side of the body a series (6—7 in all) of irregularly arranged eye-like spots, moreover 3—4 spots of the same kind on the gill-covers. These eye-like spots were round

[1]) The genus *Thallepus* of SWAINSON (A treatise of Malacology. 1840. pp. 250, 359) is often mentioned as being synonymous with *Aclesia* The characters given by SWAINSON, are partly incorrect, and quite insufficient; the characteristic tufts on the back of the *Aclesia* are not at all mentioned.

or oval, with a largest diameter of 1·25—1·5mm, and showed the pupil whitish, framed inwardly by a brownish yellow ring, and outwardly by a somewhat broader, light ring. The tufts of the back were whitish, only at the hinder part of the back brown at their base. The nether lip of the marginal furrow of the fore end of the foot had fine transversal furrows perpendicular on the margin; in about the first third part of the foot-brim were found whitish small tubercles, in the other part whitish, narrow transversal furrows; the sole of the foot had numerous confluent grayish points and spots.

The intestines were nowhere to he seen from the outside, only the eyes might be seen indistinctly before and outside of the rhinophorium.

The form was the common one. The nether lip of the furrow of the tentacle projected somewhat lobately at the base; on the tentacles were seen several villi of the common kind, among which one was almost as long as the tentacle itself. Between the tentacles, at the fore end of the head, some small villi were found. On the rhinophores (fig. 33) these villi were feebler as on the tentacles; above on the forepart of the body they were almost wanting, while below towards the foot 1—2 series of such villi were seen. The seminal furrow was very conspicuous, yellowish white, almost flat. On the hinder part of the body (with the rudimentary foot-lobes (gill-covers)) were seen 4—5 irregular series of villi (with 7—8 villi in each series). These villi had a height of up to 1·5mm; they were simple, of a tapering conical form (fig. 31), mostly a little compressed, sometimes, especially the hinder ones, dividing into several ends, or compound (fig. 32). The gill-slit was narrow, wider at the fore end, the gill-cover rather thin. The foot of the common form, the foot-lobes very small; the convex anterior margin with projecting corners, the brim not quite narrow, at the margin smaller villi were seen, especially at the end of the mentioned transverse furrows; the tail had an only little conspicuous dorsal crest, also provided with villi. The wide gill-cavity (fig. 1) had a length of 11mm by a breadth of 8mm. On account of the wanting of a shell no mantle-plate was found in this cavity, but the organs were uncovered. Anteriorly the papilla of the vulva (fig. 10 f) was seen; it had a length of 1·5mm, was black dotted, curved, freely projecting, and slit in the right side. Behind this papilla the pericardium and the kidney were found; the former had a somewhat oblique position, and the right part of its upper surface was black spotted. To the right of the kidney the strong gill curved backwards; it was black spotted at the base of the upper surface, otherwise with transverse, dotted stripes; it had a length of 9mm, by a height of up to 4mm, and a thickness of up to 3mm; the lower side was yellow; half of it was not attached. To the left at the base of the gill the distinct reno-branchial opening was found. Behind the base of the gill and turned towards it the rectum was seen; it had a length of 3mm, was black dotted, and somewhat bent to the left; the end of the rectum projected as a free anal papilla (fig. 1 a). At the floor of the

gill-cavity was seen anteriorly outside of the vulva a white dotted, thin layer, the subbranchial gland, while the bottom otherwise was black spotted, and showed the liver and two transverse windings of the intestine.

The central nervous system (fig. 2) was very similar to that of Notarchus [1]). The cerebral ganglia somewhat lengthily joining each other, the pleural ones somewhat removed from the former and much smaller. Between the latter the two visceral ganglia were seen adjacent to each other; the right one of these ganglia was directly adjoining the (right) pleural one, while the left one was connected with the (left) pleural one by a distinct connective. The pedal ganglia (fig. 2 c), which were connected by a short commissure, were little smaller than the cerebral ones. The buccal ganglia were roundish, connected by a quite short commissure. — The nerve-cells reached to a diameter of up to 0·22mm.

The eyes had a diameter of 0·28mm; they were imbedded in the hypoderm, and were copiously provided with black pigment. The otocysts were attached to the pedal ganglia, of a diameter of 0·12mm, filled with not very numerous otoconia. The tufts of the upper surface of the animal (figs. 31, 32) were of the common structure of the skin, only with a much smaller number of pigment cells. The mentioned subbranchial gland showed closely packed globular gland-cells, mostly of a diameter of 0·08—0·16mm.

The buccal tube had a length of 1mm; it was externally gray, internally black dotted. — The bulbus pharyngeus was short pyriform, of a length of 4mm, by a breadth and height of 3mm, of a yellowish white colour, dark-gray in the region of the pharynx, the end of the thick radula-sheath projected posteriorly at the lower side. A great median stripe of the (blackish) palate was covered with irregularly close packed palatal hooks (figs. 34, 35). These hooks were horny, highly compressed, their hinder edge was somewhat thicker; along this edge they had a length of 0·06mm by a greatest height of up to 0·025mm, and the gradually rising hook continued in a short point turned towards the pharynx. The yellowish mandible plates were short reniform, of a breadth of up to 0·8mm formed of closely crowded, cylindrical elements (fig. 36) reaching to a height of up to 0·16mm, by a breadth of up to 0·025mm. The walls of the buccal cavity were black. The short and broad tongue was blackish, to which colour the shining yellow colour of the radula formed a strong contrast. The foremost third part of the radula seemed to be wanting (fig. 3), and the remainder was tapering anteriorly, and provided with much damaged plates. In the radula were seen 14 series of tooth-plates (counted at the outer edge), further backward in the short sheath (fig. 3 a) 8 fully developed ones and 3 not fully

[1]) A. Vayssière, rech. — sur les moll. opisthobr. I. *Tectibranches.* (Ann. du musée d'hist. nat. de Marseille. Zool. II, 3). 1885. pp. 91—97. pl. 4, figs. 94, 95.

developed, so that the total number was 25. There appeared to be up to 25 lateral plates in the series on either side of the median one. The plates were yellowish; the breadth of the median one was 0·20mm, the height of the hook of the inmost lateral ones was 0·10mm, and rose gradually to 0·18mm, whereupon it decreased towards the end of the series; the height of the outmost but one was 0·14mm, that of the outmost one 0·10mm. The median plates (fig. 4 a, 7) were of the kind common in related forms, and showed rather spread legs connected by a thinner part; the pointed hook of the highly recurved fore edge was dentate, and on either side of this hook (3—) 4 denticles were seen. The three inmost lateral plates (fig. 5) were more clumsy, and the hook af these plates was lower; the inmost one (fig. 5 a) had on the inner edge one, one the outer edge 1—2 denticles; the following ones had no denticles inwardly, but 2—3 outvardly. On the following 3 (—4) lateral plates (fig. 4 b) two denticles were found on the hook; the following ones (fig. 8) had only one denticle, and on about the ten outermost ones no denticles were found (fig. 37, 8).

The whitish salivary glands had a length of 5mm; they were slender (fig. 9 b), covered with fine tubercles, and reached to the middle of the stomach, one was attached above the cardia, the other below the same to the right.

The oesophagus was whitish, of a length of 3mm, a little wider at the cardia (fig. 9 a). The stomach (fig. 9 c) was somewhat irregularly globular or short pyriform, of a length and a diameter of 5mm; the foremost part of it was somewhat thin-walled, while the posterior, more yellow part was very muscular and thick-walled. On the inner side of the latter part were found 8 larger and about 12 smaller stomach-plates in two circles displaced among each other. These plates were, as it were, pyramidal, somewhat bent; their base had a diameter of up to 2·5mm, was egg-shaped, angular-roundish or -oval; their height was smaller than the base, they were tapering to the top, or ended in a little angular flat, were of a cartilaginous firmness, translucent bluish, and showed the common, finely iridescent axial or subaxial column. In and at the pylorus of the posterior stomach, which had a length of about 1·5mm, several series of smaller stomach-plates were seen; they were lower, conical, not so hard as the above mentioned, and their base had a diameter of up to 0·25mm. — The intestine (fig. 9 f) rising from the pylorus of the posterior stomach, was to begin with scarcely thicker, of a diameter of 2mm, in the other part somewhat thinner; the first part of it was situated in a furrow of the right side of the fore end of the liver, then it turned to the left covered by the liver, appeared next at the left side of the liver, bent forward, left the upper edge of the fore end of the liver to the right, turned again to the left covered by the liver, appeared again backwards at the left edge of the liver, at the posterior end of which it formed a large winding, and rose to the anal papilla (fig. 1 c, 9 g). The whole length of the intestine was about 5·5cm., by a dia-

meter of 1—2mm. On account of its rather copious contents the intestine was of a blackish gray colour. These contents consisted of a large number of fine and very fine particles of sand mingled with a vegetable substance.

The yelllowish liver whose colour made a contrast to the windings of the intestine, had a length of 12mm, by a breadth of 6·5mm, and a height of 7mm; it was almost sausage-shaped (fig. 9 dd), and by the windings of the intestine it was divided into a number of longer or shorter lobes united with each other. Anteriorly and to the right beside the intestine a little biliary cavity was found, which had several openings at the top, opening close at the pylorus of the posterior stomach; beside this cavity a little, bent diverticulum was found, closely attached to the liver (biliary bladder?).

The pericardium (fig. 1 b) was large, of a short-oval form, of a length of 7mm, by a breadth of 5mm; at the hinder edge to the left the pericardio-renal aperture was found. At the right edge of the pericardium, and closely attached to it (fig. 1), the above mentioned, curved, lengthy organ (osphradium?) was resting; it was black pigmented on the outside, while on the lower side close-standing, round, whitish tubercles were seen of a diameter of up to 0·30mm, the nature of which was not to be more exactly determined. On the lower side of the organ towards the outside a ganglion (osphradial?) was seen, likewise of a diameter of 0·30mm. The ventricle of the heart (fig. 1 b) had a length of 2mm; at the arcus aortae (ant.) a little crista was found with folds on the inside.

The yellowish white kidney (fig. 1 a) had a length of 8mm with a curved left edge; its anterior concavity encompassed the posterior and left half of the edge of the pericardium, while the posterior concavity adjoined the gill. The structure was the common one; concrements were not found in any great number.

The yellowish white hermaphrodite gland was situated at the hinder end of the liver; it was irregularly globular, of a diameter of 3·5mm, of the common structure; in the round lobes ripe oogene cells and zoosperms were scarcely found. The thin, white duct of the hermaphrodite gland (fig. 10 a) wound between the lobes of the liver to the anterior genital mass and farther along the upper and inner edge of this mass. This latter yellowish white mass (fig. 10 b) was somewhat compressed, of a length of 2·2mm, and below at the right side it showed the finer windings of the albuminous gland; on its upper side the small pyriform spermatocyst was found. This mucous-albuminiparous gland continues in a cylindric tube of a length af 4mm, which tube is divided into two parts by a strong fold or partition-wall through its whole length. The tube, the sperm-oviduct, ends in a large vulvar papilla (fig. 10 f), of which the upper part projects digitately, split into two half parts of unequal size, while the nether part receives the duct of the spermatotheca. This latter (fig. 10 e) appears before the ventricle of the heart resting on the hinder end of the masticatory stomach, as a clear, colourless, globular bladder of a

diameter of 1mm, the duct being twice the length of the bladder[1]). — The bag of the penis had a length of 5mm by a diameter at the upper end of 1·2mm, and was tapering anteriorly; the anterior half was black pigmented; at the hinder end a strong retractor (fig. 11 a) was attached, and below the middle another one. The inside is also black dotted, and shows fine longitudinal folds, among which one stronger than the others continues to the conical glans that has a length of 0·40mm. At least the base of the glans as also the top of the praeputium show close standing, soft cones (fig. 38) of a height of up to 0·2mm. (No chitinous covering was found).

A later obtained specimen, taken Dcbr. 30th 1900 on the coast of Lem Ngob had a length of 18mm, by a height and breadth of up to 7mm; the gill-slit had a length of 2·5mm, the height of the dorsal tufts was up to 4mm, the breadth of the sole of the foot was almost 4·5mm. The colour was as above.

The form as above, the only difference being that as well the tentacles as the rhinophores (fig. 33) were highly provided with tufts; the number of the series of the dorsal tufts seemed smaller (3—4), and the tufts (fig. 32) were much more complicated. The length of the gill-cavity was 6mm, the gill was 5mm long by a height of 2·5mm; the anal papilla which was also bent anteriorly, had a length of 2mm; the vulvar papilla scarcely projecting, with a simple slit.

The bulbus pharyngeus of a length of 2·5mm, quite as above, as also the palatal hooks and the yellow mandible-plates. The tongue showed 15 series of tooth-plates, in the sheath were found 7 fully developed ones and three not fully developed; thus the total number of the series was 25. In the series, on either side of the median plate, up to 19 lateral plates were seen. The median plates did not quite correspond with those of the other specimen; their legs were less widely spread, and so the breadth was only 0·16mm; on either side of the hook only one denticle was found, and outside the hook three denticles were seen (fig. 7). The first lateral plate had on the outside three denticles (fig. 7). The form of the outermost tooth-plate was very much varying (fig. 8), its height was 0·02—0·04mm, the next one was already 0·07mm high, and the following 0·10mm. The two outermost ones had no denticle, the third showed an indication of such a one, and the ninth or tenth (counted from the outside) had two denticles.

The oesophagus of a length of 3mm. The stomach as above, the diameter of the masticatory stomach 2·5mm.

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[1]) The anterior genital mass appears to be very similar to that of Notarchus punctatus, as shown by Guiart (*Gasterop. opisthobr.* Mém. de la soc. zoolog. de France. XIV. 1901. p. 155, Fig. 95).

Doridiidae.

Doridium, Meckel.

Doridium lineolatum (H. & A. Adams).

Aglaia lineolata, H. et A. Adams. The genera of recent moll. II. 1858. p. 27. III. Pl. 58, fig. 4.

Pl. II, Fig. 12.

The here examined form seems to be identical with the one figured (originally) by Adams, which was taken «von Gould in Australien». To these words and a figure is confined what is hitherto known of the animal.

The only (soft) specimen kept in spirit, was taken by **Dr. Mortensen** on the 6th of Febr. 1900 to the north of Koh Kam at a depth of 5 fathoms on sandy bottom. The length is now 6mm, by a breadth of 4mm, and a height of 3.2mm. — The back (fig. 12) was covered with not quite narrow, brownish gray transverse lines, sometimes dividing and anastomosing, and alternating with similar whitish ones; the outside of the foot-lobes showed similar gray transverse lines, only a little lighter, and still lighter were those on the sole of the foot. The fore-end of the head was whitish, but the edge black, which latter colour was also found on the lower side of the hinder wings. The sides of the body were whitish, dotted with brownish gray, and the upper side of the foot had the same colour. The gill, the vulva, and the seminal furrow on the contrary were white.

The form was the one common in the *Doridiidae*. The fore shield was somewhat longer and a little narrower than the hinder shield; the not thin lateral edges somewhat loosened, the hinder one a little more; eyes were scarcely to be seen. The hinder shield was posteriorly broader, its lateral margins, especially the right one, more conspicuous; the shield passes posteriorly in the median line into the lower side of the body proper, and either of its lateral parts forms a wing-like lobe downwards projecting, with the point turned somewhat inwardly, and somewhat concave on the inside; the right lobe was somewhat larger than the left one. The shields were quite even. The sides of the body were as usual; the gill-cavity which was overhung by the hinder shield, was as usual, and so was also the large gill that was turned downward. The foot was as usual; its even lobes running along its whole length, were rather thick, not high; the whole hinder part of the body rests on the large, broad, freely projecting tail.

The shell, as far as it might be judged, was of the common form, the right end of the large winding projected rather far into the right dorsal lobe; the shell seemed to be calcinated to a great extent, and was very fragile.

The intestines were nowhere to be seen from without.

The central nervous system that encompassed the fore end of the bulbus pharyn-

geus, was the common one, showing all the roundish ganglia, also the genital ganglion was as usual. — The otocysts that were prominent like a watch-glass, had a diameter of 0·10mm, and were highly filled with small otoconia of the common kind.

The bulbus pharyngeus was almost 1mm long, more lengthly than usual. The sativary glands were as usual. The liver was black.

In the lobules of the hermaphrodite gland ripe sexual elements were found. The mucous-albuminous gland was also long and refolded, whitish and yellow. The penis as usual. The prostata seemed to be unicornous.

Bullidae.

Atys, Montf.

Atys, Mtf. Conchol. system. II. 1810. pp. 342—344.
— — A. Adams, monogr. of the fam. Bullidae. Sow., thes. conchyl. II. 1855. pp. 557, 584—585.
— — R. Bergh, malakol. Unters. IV, 3. Bullacea. 1901. pp. 257—261.

Animal testa omnino retractile. Testa solida, periostraco obtecta, globosa vel magis elongata, spiraliter striata, spira non prominenti; apertura longa, ampla, antice paullum latior, columella antice plicata; labium externum antice et postice productum.

Clypeus frontalis postice bilobatus, supra oculis conspicuis; rhinophoria plicaeformia; epipodia sat fortia.

Mandibulae ovales, e columnis angulatis compositae. Radula multiseriata; dentes mediani latiores; laterales non numerosi, hamati; formula radularis ∞ — 1 — ∞. — Ventriculus masticatorius laminis tribus illis Haminaearum subsimilibus instructus.

Penis fortior sacco supplementario et prostata praeditus.

Atys naucum (L.).

Bulla naucum L. Syst. nat. ed X. T. I. 1758. p. 726.
— — ed. XII. T. I, pars 2. 1767. p. 1183.
Atys naucum L. Reeve, conchol. ic. XVII. 1869. Atys. Pl. I, Fig. 1 a—c.
— — L. Kobelt, l. c. Bulliden. 1896. pp. 13—15.
— — L. R. Bergh, l. c. 1901. pp. 259—261. Taf. XX, Fig. 13—21.

Pl. III. Figs. 20—23.

One single specimen of this form was taken on Febr. 13th, 1900 to the north of Koh Kahdat on a depth of 4—5 fathoms; the bottom was coarse sand.

The animal was quite retracted in the shell, and rather hardened. The shell had a length of 33mm, by a breadth of up to 23mm, and a height of up to 20mm; it was of

only little thickness, white, but appeared grayish yellow on account of the thin yellowish cuticle.

The form was not to be determined; at about the middle of the length of the frontal shield the black eyes shone through not far form each other. The arcuate gill was 11mm long by a breadth of 3·5mm, and a thickness of up to 3·5mm; the number of leaf-fascicles on either side was about 18; about the last fourth part of the gill was freely projecting.

The central nervous system was like that of the specimen before examined by me, and so was also the case with the eyes and the otocysts.

The length of the buccal tube was 2mm. — The bulbus pharyngeus had a length of 3·5mm, by a breadth of up to 3mm, and a height of up to 1·5mm. The yellowish brown mandible plates (fig. 20) were separated above and below by a little interval; above they were rather broad and rounded, somewhat tapering below, almost 1mm long; their rather straight fore edge was finely dentate; the elements (fig. 21) formed, from behind forward about 30 quincuncial oblique series, and were somewhat bent, angular columns of a height of about up to 0·14mm; their upper end was dentate. The tongue was strong; the yellow, tapering radula contained 38 series of tooth-plates, the 13 foremost of which were incomplete; in the radula-sheath were further found 24 series, 3 of which were not fully developed; thus the total number of series of tooth-plates was 62. In the series up to 25 lateral plates were found on either side of the median one [1]). The basal piece of the plates was yellow, otherwise they were almost colourless. The breadth of the median ones was 0·07mm, the height of the lateral ones up to 0·14mm. The median plates (fig. 22 a) were small, rather broad, with rather broad hook. The lateral plates with rather broad basal part refolded at the edge, and rather higher and slenderer hook rounded at the end; they had all, also the innermost ones (fig. 22), smooth edges.

The salivary glands were whitish, of a length of 11mm, reaching to the masticatory stomach, thin, tapering in the foremost half-part, and covered with fine tubercles.

The oesophagus of a length of 9mm, with a swelling before the cardia. The masticatory stomach of the common form had a length and breadth of 6mm. The highly curved, beautiful masticatory plates had a length of 3·5mm; the upper part of the body had a beautiful, chest-nut colour, inside the margin was seen an iridescent blue band, and the surface, as before described, was furrowed; the lower part of the body was as usual, transparent, yellowish gray. The short part behind the masticatory stomach without any widening. The greater part of the intestine was extended to a diameter of

[1]) In the specimen formerly examined by me (l. c. p. 260) the number of series of tooth-plates was 70 (44 + 26), the number of lateral plates on either side of the median one 20.

1mm by an animal, brown and gray substance which was not to be determined. — The liver was reddish yellow.

The hermaphrodite gland situated backwards on and in the liver, was, as to colour, scarcely to be distinguished from the latter. The lobes of this gland were, at least great part of them, differentiated as masculine and feminine ones. The hermaphrodite duct was long, strong, and formed several windings; its fore part was much thinner. The anterior genital mass was longish, with several constrictions; it projects below, as often by the *Bullacea*, in a continuation of a length of 5·5mm, which was flattened, and through which ran a longitudinal furrow; at the hinder end the yellowish white albuminous gland with quite fine gyri. Near the latter gland the globular seminal bladder of a diameter of 3·5mm opened by means of a rather short duct. The spermoviduct had the common partition wall; the strong vulvar papilla had a brownish aperture [1]). The strong penis had a length of 9mm; at its compact upper end a strong retractor was attached; the thick-walled prostata of a length of 6·5mm empties by means of a not short duct into the cavity of the praeputium, and not far from this duct the curved appendicular bag of a length of 4mm; above in the praeputial cavity the glans of a length of 2·5mm projects freely, and through it runs a strong longitudinal furrow [2]).

Philine, Asc.

Philine quadripartita, Ascan.

Dr. Mortensen has in February and March 1900 obtained, on muddy bottom at a depth of 5 fathoms to the north of Koh Kam, and on sandy bottom at a depth of 15 fathoms to the west of Koh Kut in the Siam Sea, in all 21 specimens of a *Philine*, probably identical with the typical one.

The specimens had a length of 1·3—3·3 cm. Their colour was transparently milk-white or yellowish white, with exceedingly fine white dots, and the intestines were to be distinguished from without, quite as in the typical form. Also the form was the same, only the hinder end of the foot-lobes was rather constantly somewhat produced backwards.

The three largest (more exactly examined) specimens had a length of 3 and 3·4 cm, by a breadth of respectively 2·2 and 2·8mm, and a height of 7mm; the length of the fore shield was 1·4 and 1·6cm, that of the hinder shield 1·6 and 1·8cm; the foot-lobes had a breadth of up to 1cm, only loosened in the edge, the foot a length of 2—2·2cm. — The

[1]) Comp. R. Bergh, malacolog. Unters. VI. 1902. Taf. XXVIII, Fig. 1.

[2]) Comp. l. c. VI. 1902. Pl. XXVIII, Fig. 2, 3.

shell was quite as in the typical species, of a length of 1.6—1·8^{cm}, by a breadth of 1·2—1^{cm}.

The bulbus pharyngeus had a length of 3·35—3·5^{mm}, with a backward somewhat projecting radula-sheath. The radula was brownish yellow. In the radula were found 13, 15, and 16 series of tooth-plates, in the sheath 10 and 9 such, and thus the total numbers of series were 23, 24, and 25. The length of the plates (measured in a straight line) was 0·7^{mm}, the colour was light yellow; the number of the denticles was nearly 100. — The salivary glands quite as in the typical species.

The length of the masticatory stomach was 9—11·5^{mm} by a breadth of 5.5—6.5^{mm}. The stomach plates were of the common form, also violet on the outside, or more brownish with a whitish middle part, and with the common two small holes; now and then calcified globules were also found here on the outside of the stomach plates. — In the cavity of the stomach shells and shell-pieces of a bivalve were found in an indeterminable animal mass mingled with grains of sand.

The bag of the penis had a length of from 2·5 up to almost 3^{mm}. The prostata formed, as in the typical form, a large ball of windings, mostly of a diameter of 0·018^{mm}; the small globular gland as above. The hammershaped glans had (in all three specimens) longer legs than that of the typical species, and its sheath was longer and bifurcate.

This latter circumstance seems rather different from that of the typical form, but on the other hand it is scarcely sufficient to justify an establishing of a new species. The number of species already etablished on the variations of the shell, is sufficiently large [1]).

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[1]) A. series of species given as new ones, is found in the literature from the Indo-China sea:

Philine argentata, Gould. Proc. zool. soc. VII. p. 139.
— *acutangula*. A. Adams. Ann. mgz. n. h. IX. p. 161.
— *japonica*, Lischke. Japan. Meeresconchylien. III. 1874. p. 77. Taf. V. Fig. 13—14.
Ph. striatella, Tapp. Canefri. Zool. del viaggio—Magenta. Malacologia. 1874. p. 109. Tav. II. Fig. 9.
— *scalpta*, A. Adams. Ann. mgz. n. h. IX. 1862. p. 160.
— *crenata*, Ad. l. c. p. 169.
— *striolata*, Ad. l. c. p. 160.
— *coreanica*, Ad. Sow. thes. II. 1855. p. 601. Pl. 125, Fig. 166.
— *vitrea*, Gould. Proc. Boston Soc. VII. 1859. p. 139.
(— *caurina*, Benson. Journ. As. soc. XXIV. 1856. p. 128.)

And the following from the Australian Sea:

Philine orientalis, Ad. Proc. zool. soc. 1854. p. 672.
— *angasi*, Crosse et Fischer. J. de conchyl. 1865. Pl. 2, F. 8.

and from the Red Sea:

Philine erythraea, Ad. Proc. zool. soc. 1872. p. 11.
— *Vaillanti*, Issel. Malacol. del Mar rosso. 1869. p. 166.

Ascoglossa.

Plakobranchus, van Hass.

R. Bergh, malacolog. Unters. Heft. III. 1872. p. 145—174. Taf. XVII—XX. — IV. Abth. 2. 1900. p. 206—208.
— , neue Nacktschnecken d. Südsee. I. Journ. d. Mus. Godefroy. Heft. II. 1873. p. 12—15. Taf. IX, Fig. 5, 6; Taf. X, Fig. 22—25; Taf. XI, Fig. 3—6.

Plakobranchus ocellatus, van Hass.

Pl. ocellatus, van Hass. Allg. Konst-en-Letter-Bode voor het jaar 1824. I. Deel, No. 3. p. 24—35.
Pl. argus, Bgh., l. c. 1872. p. 151—165. Taf. IX, Fig. 6—9; Taf. XVII, XVIII.

Pl. II. Figs. 13—14.

At Koh Kahdat, on Febr. 19th 1900, was fished a specimen creeping on sargasso.

This specimen had in spirit kept a length of 15mm, by a breadth of 6·5mm, and a height, with the lobes raised, of 4·5mm. — The colour all over the back and on the inside of the foot-lobes was white; at the fore end of the pericardial protuberance and still more numerous at the fore part of the back, small reddish yellow eye-spots were seen with light centra; also the sole of the foot was white with rather numerous, spread, small and quite small, round black spots. The furrow of the (highly contracted) tentacles, and the fore edge of the head were black, and above the edge a series of (4) somewhat larger, black eye-spots were seen. At the edge of the dorsal lobes a series of (16—17) similar black eye-spots were seen, and the other parts of the outside of these lobes were covered with small reddish yellow eye-spots which imparted to the whole region a reddish yellow colour.

The form was as usual. The eyes which are situated beside each other, were indistinctly transparent in the neck. At the pericardio-renal, median protuberance the foremost smaller part containing the ventricle of the heart, was rather strongly separated from the hindermost part with the auricle and the kidney. Not far from the right edge of the pericardium the small whitish anal papilla was seen; more backward the renal pore appeared. The dorsal folds and the folds on the inside of the dorsal lobes were as usual, neither did they reach quite to the end of the body. The number of folds before the middle of the body was about 43 Immediately at the base of the right tentacle the male genital aperture was seen.

The central nervous system showed, as before described, the roundish cerebro-pleural ganglia and the pedal ganglia, as well as the (3) visceral ones situated between the latter: on each side a smaller one, and between these a larger one (gangl. azygum). — The eyes that are situated close to each other, had a diameter of 0·16mm; as before men-

tioned they contained a more yellowish lens and a colourless vitreous corpus. The otocysts had also a diameter of 0·16mm, the globular light yellowish otolith a diameter of 0·10mm.

The buccal tube whose fore end was surrounded by a strong glandular layer, had a length of 0·75mm. The small, scarcely 1mm long, bulbus pharyngeus which was enclosed by thick glandular masses, was of the common form, with the common transverse half-rings on the dorsal side; posteriorly it was provided with the common, semilunar, solid, somewhat flattened, crop-like process; below the globular radula bag was found. The bulbus pharyngeus as usual chiefly formed by the large muscular mass of the tongue. The upper series of tooth plates contained 7 developed plates and one undeveloped one; in the lower series 7 plates were found in a row, and the radula bag (the diameter of which was 0.26mm) contained a very large number. The slight yellowish tooth plates were of the common form, the hooks on each side mostly provided with 11—12 short, blunt denticles (fig. 13).

The globular follicles of the hermaphrodite gland contained ripe sexual elements. The penis bag had a length of 1·2mm; the glans was provided with an almost cylindric, slightly curved prickle, which only at the base was yellowish; it had an oval opening at the end which, as it were, was obliquely cut off (fig. 14).

Since the figure made by von Hasselt of his *Plakobranchus ocellatus*, has been published [1]) (the original specimen is wanting in the museum of Leyden), there can scarcely be any doubt that the *Pl. argus*, more exactly examined by me, is specifically identical with his species. The colour of this form appears to be varying to a high degree, and several forms (*Pl. ianthobaptus*, Gould; *Pl. gracilis*, Pease; *Pl. variegatus*, Pease; *Pl. camiguinus*, Bgh., and perhaps still more) that have been established as species, are likely to be only varieties of locality and colour.

The form examined here, corresponds, with regard to the prickle of the penis, perfectly with the *Pl. argus*.

[1]) R. Bergh, die van Hasselt'schen Nudibranchien. Notes from the Leyden Museum. IX. Note XLIII. 1887. p. 311. Taf. 6, Fig. 5.

Nudibranchiata.

N. holohepatica.

Doridídae.

Doridídae cryptobranchiatae.

Thordisa, Bgh.

Thordisa maculigera Bgh.

Th. maculigera, R. Bergh. Malacolog. Unters. Heft. XII. 1877. p. 540—542. Taf. LXI, Fig. 19—24; Taf. LXII, Fig. 1—2.

Doris villosa, Alder and Hanc. Notice of a coll. of *nudibr.* moll. Trans. zool. soc. of London. V, 3. 1864. p. 119, Pl. XXXIII, Fig. 1.

Pl. II, Figs. 18—21.

One specimen of this form was taken on Febr. 9th 1900 two miles south of Koh Tulu, at a depth of 10 fathoms, on a bottom of mud mixed with sand.

This specimen had in spirit kept a length of 22mm by a breadth of 15mm, and a height of 5mm; the height of the retracted rhinophores was 2mm, that of the retracted gill 2·5mm; the breadth of the mantle brim was mostly 5mm, that of the foot 3·5mm, the greater part of which belonged to the foot brim; the length of the tail was 2·5mm. The consistency was not hard, a little stiff. — The ground colour of the animal was yellowish. On the back were found numerous scattered brownish gray dots, often forming small groups, especially on the back proper; on the mantle brim larger gray spots were seen most of which were furnished with the mentioned dots; the club of the rhinophores was brownish red, the gill leaves brownish gray on the outside, yellowish on the inside. The lower side of the mantle brim showed scattered, quite small and small, black dots, and so did also the foot brim; beside the edge of the mantle several larger spots formed by the confluence of smaller ones, were found. — Above the liver shone through with a grayish colour.

The animal was flattened to a rather high degree, the contour oval, the mantle edge bent in a somewhat undulating manner. The back was everywhere covered with very numerous small globular tufts, which were also seen at the roundish openings of the rhinophores and the gill. The club of the rhinophores had about 30 leaves and a white end papilla; the gill showed 6 tripinnate leaves, behind the gill the whitish, almost subcentral truncate anal papilla. The lower side of the mantle brim was smooth. The short tentacles, as it were, refolded at the top. The foot narrow, with a short tail.

The central nervous system as usual, each of the cerebro-pleural ganglia

showed a distinct separation of their two parts, the roundish pedal ones were somewhat larger than each of these parts. The commissures were rather short. The olfactory ganglia were almost sessile, of a flattened bulb-shape, the buccal ganglia with a short commissure.

The eyes were almost sessile, of a diameter of 0·18mm. The otocysts (statocysts) of a diameter of 0·08mm, closely filled with otoconia of the common kind. The leaves of the rhinophores were made stiff in the common way. The skin (of the back) contained a numberless multitude of the common long spicules partly with crumbling content, partly hardened in a glass-like manner, which also rose in the tufts; their diameter rose to 0·04mm.

The short, clumsy bulbus pharyngeus had a length of 2·5mm, by a breadth and thickness of 2mm; the strong, downwards bent radula sheath which projected on the lower side, was almost of the same length as the bulb. The labial disk was covered by a strong cuticle. The yellowish radula of the strong, rather broad tongue contained about 20 series of tooth plates, in the radula sheath were found about 30 series, so the total number of series of tooth plates was about 50. On either side of the quite narrow rhachis about 45—50 lateral plates were seen. These plates were yellowish, of the common hook-shape; the length of the basal plate was about 0·14mm, the height of the hook about 0·12mm; the heights of the hooks of the six outermost ones were 0·05—0·06— 0·075—0·08 —0·12mm. The tooth plates (figs. 18, 19) were of the most common hook-shape; the innermost ones were upon the whole somewhat smaller; else they kept the same size almost to the end of the series, where the basal plate was shortened and at last quite reduced, while in the six last ones the feeble hook-point, as it were, was dissolved into a little flat brush (fig. 20); the seventh plate, again, had the common hook-shape.

The salivary glands were small (about 8mm long), thick, brownish; the efferent duct scarcely shorter than the gland.

The oesophagus had a length of 3mm; the almost globular stomach had a diameter of 4mm; the intestine which issued backward from the upper side of the stomach, and ran in a curve to the anal papilla, was 8mm long. — The posterior visceral mass was a little flattened, of a length of 8mm, by a breadth of 5mm; anteriorly it was broader, with a cleft for the stomach, on the lower side to the right it was somewhat more flattened by the anterior genital mass, chiefly formed by the yellowish brown liver; on the left side of the stomach the yellowish biliary bladder projected with a facet of a diameter of 0·4mm.

The ventricle of the heart had a length of 0·9mm. The brownish blood gland situated before the central nervous system, was flattened, of oval contour, with the point forward, of a length of 2mm. The pericardio-renal organ (the renal syringe) situated to the right beside the base of the auricle, had a length of 0.8mm.

The thin layer of the hermaphrodite gland as usual; the efferent duct which issued

to the right from the fore end of the gland, formed a not long grayish ampulla. The compressed, yellowish anterior genital mass had a length of 4mm; the mucous-albuminous gland was small; the seminal bladders as usual (fig. 21). The seminal duct was not long; it consisted as usual of a prostatic and a muscular part; the penis had a length of 1·5mm, the greater part of its cavity was occupied by the unarmed glans of a length of 1mm, through which the continuation of the seminal duct ran to the point, somewhat wider in the latter part.

The form here examined was *Thordisa maculigera*; if, as may be possible, it should turn out to be identical with the *Doris villosa* of Alder and Hancock, it will have to assume the latter specific name.

Dr. Mortensen took somewhat later at Koh Mesan on stony bottom at a depth of 10—15 fathoms another specimen, somewhat smaller, and with the larger marginal spots more black.

Chromodoris, Ald. et Hanc.

Chromodoris histrio, Bgh.

R. Bergh, neue Nacktschnecken der Südsee. IV. Journ. d. Mus. Godeffroy. Heft XIV. 1878. p. 8—9. Taf. I, Fig. 9—12; Taf. III, Fig. 10—14.

Pl. II, Figs. 22—24.

Of this form two specimens were taken on March 9th 1900, at the west coast of Koh Chang, on old coral blocks, at a depth of one fathom.

These specimens, when living, had a length of 14mm. The ground colour was transparent whitish, and so was also the colour of the rhinophores and the gill; the mantle edge was yellow with longish violet spots; on the back two series of roundish violet spots were seen, and anteriorly further a short median series.

The specimens kept in spirit have a length of 5—6mm, by a breadth of 3mm, and a height of 2mm. The colour was generally yellowish white; no traces of spots were found.

The form was as usual. The rather posteriorly situated gill consisted of 7—8 leaves; the anal papilla was subcentral.

The central nervous system was as usual. The short-stalked eyes of a short-oval form had a length of 0·10mm; the otocysts (statocysts) of a diameter of 0·06mm were closely filled with otoconia of a diameter of up to 0·013mm.

Around the outer mouth a strong glandular layer was found. The bulbus pharyngeus had a length of 1mm, the radula sheath projected somewhat posteriorly.

The dark yellow brown labial plate was strong, of a length of 0·6mm, by a breadth of up to 0·2mm; its elements (fig. 23) of the common hook-shape, split at the end, of a length of up to 0·02mm. The tongue was of the common form; in the radula were found 14 and 18 series of tooth plates, in the sheath 16 and 14, and thus the total number of series was 30—32. In the series up to about 40—50 tooth plates were found. The plates (fig. 24) were very light yellowish, the hooks attained a height of up to 0·02mm. The innermost one had one denticle on the inner edge of the hook, and 2—3 denticles on the outer edge; in the following plates the hook-edge showed 8—10 denticles, while the outermost ones only were denticulated in the point.

The salivary glands were long, whitish.

The digestive as well as the sexual organs were as in other *Chromodorididae*.

Casella, H. et A. Adams.

Casella atromarginata (Cuv.).

Doris atromarginata, Cuv. Ann. du mus. IV. 1804. p. 473. pl. 2, fig. 6.
— — Cuv. Quoy et Gaim., Voy. de l'Astrolabe. II. 1834. p. 251, pl. 16, fig. 6—7.
Casella Gouldii. H. et A. Adams. The genera of recent moll. II. 1858. p. 57. pl. 63, fig. 5.
— *philippinensis*, R. Bergh. Malacolog. Untersuch. Heft. VI. 1874. Taf. XXIII, Fig. 1.
— *atromarginata*, Cuv., R. Bergh. Neue Nacktschnecken der Südsee. Journ. d. Mus. Godeffroy. Heft. VI. 1874. p. 102—109. Taf. II, Fig. 15—29, Taf. III, Fig. 21—32.
— — Cuv., R. Bergh, l. c. Heft. XVII. 1890. p. 942—943. Taf. LXXXVI, Fig. 2; Taf. LXXXIX, Fig. 23—24.

Of this form which oftener (1874, 1890) has been examined by me, one specimen was taken (together with *Marionia chloanthes*) on March 3d 1900 at Koh Kram.

The specimen kept in spirit showed the back and the sides reddish brown, for the greater part white dotted; the dorsal brim was as usual. The length of the highly contracted and refolded animal was 2·8cm, by a breadth of 1·5cm, and a height of 1·2cm.

The mantle edge of the animal was quite as in the typical *Cas. atromarginata*; nevertheless the possibility is not precluded that it may belong to the *Cas. cincta* [1]) found in the western part of the Indian Ocean.

[1]) Comp. R. Bergh, malocolog. Unters. Heft. XVI, 2. 1889. p. 838—841. Taf. LXXVII, Fig. 9.

Doridídae phanerobranchiatae.

Dor. phanerobr. suctoriae.

s.

Goniodoridídae.

Comp. R. Bergh, System der nudibr. Gasteropoden, l. c. 1892. p. 1147—1157.

Idalia, F. S. Leuckart.

F. S. Leuckart, Br. animal. quor. descript. 1828. p. 15. Fig. 2 a, b.
R. Bergh, üb. die Gattung *Idalia*, Leuck. Arch. f. Naturg. XLVII, 1. 1881. p. 140—181. Tab. VI—VIII.
— l. c. 1892. p. 1155—1156.

Corpus vix depressum, dorso angustiori, podario latiori et cauda lanceolata producto. Notaeum sat planum, margine nonnihil prominenti circumcirca continuo, papilligero. Rhinophoria intramarginalia, sat magna, non retractilia; branchia postica, e foliis simpliciter pinnatis arcu dispositis formata. Caput utrinque in tentaculum sat breve desinens. Podarium latum, antice rotundatum, postice cauda applanata continuatum.

Discus labialis annulo angusto hamulorum confertorum armatus. Radula angusta, rhachide nuda; pleurae dente laterali majori hamiformi et externo lamelliformi. Ingluvies buccalis fortis fere sessilis.

Glans penis hamulis armata; prostata magna.

The genus is rather strongly marked off in the group of *Goniodoridae* (provided with sucking apparatus). Only a small number of species is known.

The new species mentioned below, belongs to the

Subg. *Idalia* (proprie).

Notaeum medio papilligerum.

Idalia plebeia, Bgh. n. sp.

Pl. III, Figs. 15—19.

I have before me four specimens of this form obtained near the coast of Lem Ngob.

The colour of the specimens in spirit was light dirtily yellowish white; the rhinophores and the point of the gill-leaves were black or brown black; spots of a similar dark colour were also sometimes found here and there on the dorsal appendages.

The length of the largest specimen was 11.5^{mm}, that of the others about 8^{mm}.

In the former the length of the foot was 11·5mm, by a breadth of up to 4mm; the height of the body was up to 3mm; the length of the dorsal appendages was up to 4·5mm, that of the gill leaves up to 2·5mm, that of the rhinophores 2·5mm, and of the tentacles 0·75mm; the length of the tail was 2.25mm.

The contour of the body was somewhat lengthened-oval. The back was little arched; the appendages rose from the slightly projecting edge all around with rather regular short distances between them; only between the two foremost and the two hindermost ones the distance was a little greater. These appendages, papillæ (epinotidia) were all more or less club-shaped, narrower below, thicker and rounded above, almost of the same size, here and there 1—2 smaller ones (reproducing) were fouud; they were smooth on the surface, not falling of. Anteriorly two (frontal) appendages were found, posteriorly two (caudal) ones, and on either side by the two individuals 6, by the others 7 appendages. The beautiful, slender, strong rhinophores had a short stalk and a not much perfoliated club, with an end-papilla; the number of the leaves was about 25. The rather large gill formed of 10—12 leaves, was placed in a large bow quite posteriorly on the back; the simple leaves decreased posteriorly irregularly in size; on the inside of the leaves (fig. 15) on either side of a quite narrow rhachis, a not large number (up to 15) of transverse folds was found. The only slightly projecting anal papilla was found posteriorly in the rather wide opening of the bow made by the gill. In all the specimens is found medianly, about midway between the rhinophorium and the gill, a single papilla, of about the same size as the marginal papillæ, and otherwise of the same kind. The sides of the body are rather low, anteriorly on the right the genital opening is seen. The rather strong head is flattened anteriorly; above it is on either side produced in a short tentacle. The foot is rather strong, rounded anteriorly; the foot-edge is only little prominent, the flattened tail roundly pointed.

The intestines shone nowhere through.

The central nervous system was almost quite like that of *Idalia elegans* (comp. l. c. Taf. VI, Fig. 1—3). Neither was here found any ganglion olfactorium distale; but on the contrary, as in the former species, a ganglion genitale. The nerve cells had a diameter of at least up to 0·10mm.

The eyes were almost sessile, of a diameter of 0·06mm [1]). The otocysts were attached to the pedal ganglia, of a diameter of 0·08mm, with rather numerous otoconia of

[1]) In one specimen two eyes not far from each other were seen on one side, one of which was somewhat smaller than the other. I have before seen a similar duplicity of the eye in *Phidiana lynceus* (Vidensk. Meddelels. fra den naturhist. Forening i Kjøbenhavn f. 1866. 1867. p. 108. Tab. IV, Fig. 1, 2, 4).

the common kind. In the rhinophores small spicules were seen, as also very sparingly in the skin and in the interstitial connective tissue.

The buccal tube was short. The bulbus pharyngeus was almost quite as in the mentioned species, of a length of almost 1mm; at the hinder end the radula sheath is somewhat projecting; at about the middle of the upper side the crop is situated with a rather broad base. The slightly brownish yellow labial ring was formed of several series of closely packed, somewhat compressed elements of a height of up to 0·009mm, and a diameter of up to 0·0045mm. The buccal cavity was almost quite filled by the large tongue. In the radula and its continuation in the sheath 27—28 series of tooth plates were found (in the three specimens), of which the three hindermost ones were not yet fully developed. The relations of the radula were as in the typical species. The tooth plates were almost colourless, especially the outermost ones. The rhachis was quite narrow. The height of the lateral plates was 0·08mm, that of the marginal ones about 0·04mm. The form of the lateral plates (fig. 16) was about as in the typical species, but the denticulation of the edge of the hook much stronger, the number of denticles was mostly towards 30. The marginal plates (fig. 17) were also chiefly of the same form as in the typical species, the outmost leaf-like, rather low, the nature of the edge was rather varying. — The crop of the bulbus pharyngeus is, as in the mentioned species, almost as large as the bulb itself, mostly globular, of the same appearance and structure as in the mentioned species; its not wide opening was triangular.

The whitish salivary glands were as in the typical *Idalia*, also somewhat constricted in the middle.

The oesophagus (fig. 18 a) was rather long and thin; in its hinder end was found in one specimen a torn out tooth-plate of the tongue; it ran into the stomach at the bottom of the hepatic cleft beside the biliary duct (fig. 18 c). The stomach (fig. 18 b) was bag-shaped, of a length of about 1·5mm, the greater part of its length situated before the liver, with longitudinal folds on the inside, one of which continued almost through the whole length of the intestine (3·5mm) (fig. 18 d). The digestive cavity contained a small mass of animal substance.

The grayish yellow liver had a length of 4·5mm; it was anteriorly curtailed, posteriorly a little pointed, on the lower side flattened; anteriorly to the right it was a little flattened by the anterior genital mass, on the upper side rather strongly furrowed.

The hermaphrodite gland was in colour (now) scarcely to be distinguished from the liver; its structure appeared to be the same as in the typical species; in its lobes were found fully developed ovigerous cells, but scarcely developed zoosperms. — The whitish anterior genital mass was about 2·5mm long, the prostata formed great part of it; the opaque spermatocyst rested on the clear, globular spermatheca below, which

latter had a diameter of about 0·5mm. The prostatic part of the seminal duct was short, the muscular part at least four times as long as the penis into which it passed by and by. The almost cylindric penis had a length of about 1·5mm; anteriorly the glans of a truncate conical form (fig. 19) projected, its diameter was 0·2mm. The inside of the glans was in the common way provided with closely set, slightly yellowish hooklets, most of which were rather clumsy, of a length of 0.013mm, by a height of up to 0·07mm. The armature continues, as usual, rather far into the seminal duct. The duct of the mucous gland was rather wide, with a strong fold. The vestibulum with rather strong longitudinal folds.

Doridídae cryptobranchiatae.

Porostomata.

Doriopsidae.

Doriopsis, (PEASE) BGH.

Comp. l. c. 1892. pp. 1114—1122.

1. *Doriopsis rubra* (KELAART).

Doris rubra, KELAART. New species of Ceylon nudibr. mollusks. Journ. of R. As. soc. (Ceylon) III. 1857. p. 92.
Doriopsis rubra, (KELAART) ALDER and HANCOCK, notice of a coll. of nudibr. moll. Trans. zool. soc. V, 3. 1864. p. 126. Pl. XXXI, Fig. 1 - 2.
— — , (KELAART) COLLINGWOOD, on some new sp. of nudibr. moll. Trans. Linn. soc. 2 S. II, 2. 1881. p. 135 (Pl. X, fig. 18).

Pl. II, Fig. 16.

One single specimen of this species was taken on March 2nd, 1900, at Koh Kram, on a depth of 30 fathoms.

The specimen which was kept in spirit, was highly contracted, soft; it had a length of 18mm, by a breadth all round of 10mm, and a height of 7·5mm; the breadth of the mantle brim was 1·5mm, the height of the rhinophores 2mm, of the gill 3mm; the breadth of the foot was 6·5mm, the length of the tail scarcely 1mm. — The colour of the back was upon the whole red-brown, somewhat spotted; the rhinophores and the gill were darker; the foot was reddish, the sides of the body grayish.

The form was as in other *Doriopsides*. The back was smooth, the mantle brim not broad, bent in an undulating manner; the rhinophores were situated very anteriorly, the gill very posteriorly; the former were provided with numerous thin leaves, the latter was formed of 8 leaves, the strong, reddish yellow anal papilla filled up the branchial circle posteriorly. The point of the pharyngeal cone projected somewhat into the outer mouth, tentacles were scarcely to be seen. The foot was as usual, the tail quite short.

The central nervous system (together with the ganglia rhinophor. distalia) was reddish yellow, in other respects as usual, only the lower commissures were longer than usual, and so the pedal ganglia did not join each other; the roundish buccal ganglia adjoining each other, and situated, as usual, before and between the salivary glands. — The short-stalked eyes had a diameter of 0·25mm, provided with a large lens. The otocysts had a diameter of 0·12mm, closely packed with otoconia of the common kind. Slightly hardened spicules were not wanting in the leaves of the club of the rhinophores.

In the skin of the back calcified cells were found scattered, sometimes reddish yellow, sometimes irregular.

The (slightly reddish-) yellow pharyngeal cone which almost quite filled the buccal tube, was 2·5mm long, truncately conical; the common, strong retractors were attached at its base; through its cavity stretched just to its point the continuation of the bulbus pharyngeus, and along the latter the efferent duct of the secondary salivary gland (*Gl. ptyalina*). This gland which was situated under and behind the pharyngeal cone, was of a reddish gray colour, (3mm) broad, and consisted of two halves adjoining each other. The continuation of the bulbus pharyngeus which projected somewhat bent from the depression at the hinder end of the pharyngeal cone, was yellowish, of a length of 7mm, cylindric, with the common triangular aperture. At its hinder end were found the (slightly reddish) yellow, oval, somewhat flattened salivary glands (*gl. salivales*). The thicker oesophagus which showed several constrictions, was 6mm long. The posterior visceral mass (the liver) was irregularly conical, of a length of 12mm, by a breadth anteriorly of 7mm, and a height of 6·5mm; the slit in the hinder end was 4mm long; the colour was reddish gray; its cavity (the stomach) was wide.

The pericardium was as usual; the blood gland reddish gray.

The anterior genital mass had a roundish-quadratic contour, was biconvex, and had a length and height of 5mm by a thickness of 3mm; it was reddish yellow and yellow. The globular spermatotheca had a diameter of 2·5mm. the spermatocyst was much smaller, strutting with sperm; the uterine duct as usual long and with many windings. The prostata was large, with several bends, continuing into the thin, highly wound seminal duct, the end of which (as also the end of the vaginal duct, the vagina) was red brown. The strong bag of the penis was 2·5mm long, black at the base; the yellowish glans was cylindric, somewhat broader at the base, 0·37mm long by a diameter in the middle of 0·10mm. The glans in the greater length of its outside (fig. 16), was provided with about 20 series of (quincuncial) hooks; this armature continued further to a length of 2mm into the seminal duct (fig. 16). The sligthly yellowish hooks had the form common in the *Doriopsidae*, and had a height of up to 0·02mm, and they showed also irregularities as in other species.

The examined form, no doubt, belongs to the *Doriopsis rubra*, which is very common in the Indian Ocean.

2. *Doriopsis nigra* (Stimps.) var. nigerrima.

R. Bergh, malacolog. Unters. Heft XVII. 1890. p. 963—964.

Pl. II, Fig. 17.

One specimen of this species, which is widely spread in the Indian Ocean, the Indo-Chinese Sea, and the Japanese Sea, was taken on Jan. 2nd 1901 at Lem Ngob.

This specimen is said to have been velvet black when living; it was in spirit quite black, a little lighter at the sides of the body. Its length was 2·5^{cm}, by a breadth of 1·5^{cm}, and a height of 0·6^{cm}.

The form was as usual. The diameter of the branchial tuft, which was formed of 8 leaves, was 8^{mm}.

The yellowish glans penis projecting from the genital aperture, had a length of 0·35^{mm}, and was armed with about 12 irregular quincuncial series of hooks; the armature continued in the common way into the seminal duct, at least to a length of 6^{mm}. The hooks were yellowish, almost always straight, of a length of up to 0·4^{mm} (fig. 17).

Doriopsilla, Bgh.

R. Bergh, die Doriopsen d. Mittelmeeres. Jahrb. d. malacozool. Ges. VII. 1880. p. 316—326. Taf. 11, Fig. 3—11.

— üb. die Gattung *Doriopsilla*. Zoolog. Jahrb. IX. 1896. p. 454—458.

The genus *Doriopsilla* is already externally distinguished from the *Doriopsis*, which are all soft, and mostly with smooth back, by their stiffness and the granulous nature of the back and still more by the quite different situation of the buccal ganglia.

In the whole large group of *Gasteropoda* the situation of the buccal ganglia is below the pharynx, accordingly backward on the upper side of the pharyngeal bulb; the organ situated before these ganglia, is the bulbus pharyngeus, and behind them the oesophagus begins. The fore end of the alimentary canal is, in all *Doriopsididae*, a peculiar suctorial apparatus, and as well mandible plates as tongue is wanting. In the genuine *Doriopsis* the buccal ganglia are situated at the hinder end of a long, cylindric, muscular tube, where also the small salivary glands open. To judge by the place of these ganglia and the salivary glands, this tube would have to be regarded as a bulbus pharyngeus. This arrangement is quite different in the *Doriopsillae*. In the latter the buccal ganglia are situated at the fore end of this tube, at the base of the pharyngeal cone, close behind the pedal ganglia. The arrangement of the alimentary system in the *Doriopsillae* is otherwise quite as in the *Doriopsis*, and so the single parts of the system should be homologous. But this is, according to the situation of the buccal ganglia, which seems otherwise to be determinative, not the case here. In the *Doriopsis*, in which the ganglia are situated far behind, the long tube ending in the pharyngeal cone, was to be regarded as the pharyngeal bulb; while in the *Doriopsillae*, where the buccal ganglia are situated before, the pharyngeal cone alone represented the bulbus pharyngeus, and the part behind the bulb. the oesophagus.

The salivary glands have in both genera kept the same place, and, according to the above interpretation, they should in the *Doriopsis* as usual open in the hinder end of the bulbus pharyngeus, in the *Doriopsillae* at the base of the pharyngeal cone.

Of this genus only one species, the *D. areolata*, from the Adriatic Sea and the eastern part of the Atlantic Ocean (the northwestern coast of Spain), has hitherto been known. To this is now to be added another species, *D. pallida*, from the Indian Ocean (the Siamese Sea). If the *Doriopsis granulosa* of PEASE (Proc. zool. soc. London. XXVIII. 1860. p. 32) from the neighbourhood of the Sandwich Islands really belongs to the *Doriopsididae*, it is likely also to be a *Doriopsilla*.

Doriopsilla pallida, BGH., n. sp.

One little specimen of this form was found between Koh Mesan and Cape Liant on a large Alcyonid, which was taken on March 7th, 1900, at a depth of 5—8 fathoms.

The specimen which was kept in spirit, showed the rather stiff back to be whitish with slightly grayish, small prominences; the rhinophores and the gill-leaves were somewhat darker gray, the foot was grayish. In the middle of the back the liver shone through with a dark gray colour. — The form was short-oval, the length was 6^{mm}, by a breadth of 5^{mm}, and a height of 3^{mm}.

The back proper was framed all round by the stiff, rather thin mantle brim which had a breadth all round of $1{\cdot}5^{mm}$; the back was everywhere covered with truncate conical, slightly grayish, not stiff tufts; on the upper, as well as on the smooth lower surface of the mantle brim series of spicules were seen shining through, more or less perpendicular on the edge. The rhinophores were small, conical; the contracted, roundish gill-slit was surrounded by somewhat larger tufts; the number of gill-leaves seemed to be four. The head formed only a small papilla, as it would seem, without tentacles. The sides of the body had almost disappeared, the genital papilla was as usual. The foot was rather strong, anteriorly rounded; it was also rounded posteriorly, but here somewhat tapering; the tail was quite short.

The central nervous system was as in other *Doriopsididae*, only the buccal ganglia — one of the chief characters of the *Doriopsillae* — were situated anteriorly. — The short-stalked eyes had a diameter of $0{\cdot}16^{mm}$; they had a large, slightly yellow lens and a large black pigmental capsule. The otocysts had a diameter of $0{\cdot}06^{mm}$, and were closely filled with otoconia of the common kind. Everywhere in the skin was found a great many long spicules, most of which were not much calcified; they had a diameter of 0·013—0·016 (0·020)^{mm}; such spicules were also found (up to $0{\cdot}2^{mm}$ high) in the tufts of the back. Similar spicules were also everywhere mingled in the interstitial connective substance.

The pharyngeal cone (bulbus pharyngeus) of a length of 0·5mm filled almost completely the buccal tube; the secondary salivary gland (*gland. ptyalina*) was situated below the latter. The bent continuation (bulbus pharyngeus, oesophagus) was 2mm long, cylindric, as usual with triangular aperture; at the hinder end of this the small salivary glands. The narrower hinder end was joined by the likewise bent, thickwalled, somewhat thicker continuation (oesophagus, the first stomach), which had a length of 3mm, and opened somewhat tapering into the cavity of the brown gray liver.

The specimen seemed not to be sexually developed, and the penis was not seen.

Phyllidiidae.

Comp. R. Bergh, l. c. 1892. p. 1123—1129.

Phyllidiella, Bgh.

1. *Phyllidiella nobilis*, Bgh. Var.

Phyllidiella nobilis Bgh. R. Bergh, Bidrag til en Monographi af Phyllidierne. Naturhist. Tidsskrift. 3 R. V. 1869. p. 485—492; 512—513. Tab. XXIV, Fig. 8—12.

— — Malacolog. Unters Heft. 10. 1876. p. 383; — Heft. XVI, 2. 1889. p. 860—862. Taf. LXXXIV, Fig. 11—18; — Heft XVII. 1890. p. 973. Taf. LXXXV, Fig. 4; Taf. LXXXIX, Fig. 48.

— — R. Bergh, neue Beitr. zur Kenntn. d. Phyllidiaden. Verh. d. k. k. zool. bot. Ges. in Wien. XXV. 1876. p. 661—662.

Phyllidia spectabilis, Collingwood. On some new species of nudibranchiate moll. Trans. Linn. soc. II, 2. 1881. p. 136. pl. X, fig. 19—23.

Pl. II, Fig. 15.

The specimen examined here, and figured, when living, by Dr. Mortensen, was taken on Jan. 18th, 1900, at the southwestern point of Koh-Chang, on coral bottom, at a depth of 1 fathom.

The length of the living animal was 15mm. The animal, with regard to colour, agreed with the figure given by Brock (l. c. Taf. LXXXV, Fig. 4), in the arrangement of the dorsal figures it agreed rather well with my figures (l. c. 1869. Tab. XXIV, Fig. 9, and l. c. 1890. Taf. LXXXIX, Fig. 48).

The specimen, which was well kept in spirit, had a length of 11mm, by a breadth of 4mm, and a height of 2mm. All the three figures of the margin of the mantle brim, as well as those of the front and of the tail, as of the fore part of the back, were of a dull, wax-yellow colour; the figures of the middle and hinder parts of the back were greenish white, all the figures showed whitish tubercles. The velvet black colour separating the figures was in this variety of the species not at all found in the dorsal figures,

and in those of the brim only as a short wedge penetrating from the edge. According to what is stated above, upon the whole 20 transverse stripes shone through all around on the lower side of the brim. The rhinophores were black, the foot yellow.

The animal was not more exactly examined. The specific determination seemed to be sure enough.

Of this species were further taken 3 specimens of a respective length of 13, 14, and 16^{mm}, on March 9th, 1900, on coral blocks at the north end of Koh-Chang; these specimens approached nearer to the typical specimen by being provided with a velvet black colour in the figures of the dorsal side.

2. *Phyllidiella pustulosa* (Cuv.).

Phyllidia pustulosa, Cuv. Ann. du Mus. V. p. 268. pl. XVIII A, fig. 8.
Phyllidiella pustulosa, Bgh. l. c. 1869. p 455—485; 510—512. Tab. XX—XXIV A.
— — , R. Bergh, malacol. Unters. Heft X. 1876. p. 382—383. Taf. XXV, Fig. 4, 5. — Heft. XVII. 1890. p. 933.

One specimen of this form of a length of 2^{cm} was taken together with the above mentioned specimens of *Ph. nobilis*.

Nudibranchiata cladohepatica.

Fam. **Tritoniidae.**

Marionia, Vayss.

Comp. R. Bergh, l. c. 1892. p. 1069—1070.

Marionia chloanthes, Bgh. n. sp.

Pl. II, Figs. 25—27.

One specimen of this beautiful animal was taken by Dr. Mortensen on March 3d, 1900, at Koh Kram together with *Casella atromarginata*.

The specimen had, kept in spirit, a length of 20mm, by a breadth of the body of up to 7mm, and a height of up to 5·5mm; the breadth of the frontal veil was 5·5mm; the height of the rhinophores together with their sheath was 2·25mm, that of the gill up to 3·5mm; the breadth of the foot was 7·5mm, the length of the tail 0·5mm. — The ground colour was yellowish white with a slight reddish tint, the tubercles of the back were more whitish; the sheath of the rhinophores, as also the stalk of the gill was strongly grass-green; medianly through the whole length of the back, a broad, green stripe, less distinct at the edges, shone through.

The form was as usual in the genus. The frontal veil was not highly projecting, medianly it was somewhat notched, and had on either side 4 conical papillæ, some of which showed tubercles on the lower side; at the outer margin of the veil the common, but not highly developed, spoon-like tentacle was found. The club of the rhinophore was as usual of a form like a sword-knot. The back was flattened, and everywhere (as also the upper side of the frontal veil and the sheaths of the rhinophores) covered with rather close-standing tubercles; the margin of the back was a little projecting. On either side of the back, and rather regularly arranged, were seen 9 rather strong gills, of somewhat different sizes, the hindmost ones, however, as large as the largest ones. The (green) powerful stem was also mostly divided into 2—3 branches above, or had, as was also the case with the branches, small twigs on the sides; the leaves of these twigs were two or three times pennate. Between these gill-stems here and there single, almost sessile small gills were found. The sides of the body were not low, smooth; the genital aperture as usual; the anus was found about in the middle of the body. The foot was anteriorly somewhat tapering, rounded, with a rather long, slight, marginal furrow; the foot brim not quite narrow, the tail quite short.

The intestines were nowhere to be seen from without.

The central nervous system had a breadth of 2mm; it was of the common form, the roundish pedal ganglia were larger than the pleural ones, which were only little separated from the cerebral ones. — The otocysts which were situated before the short cerebro-pedal connective, had one larger otolith and several small pale ones.

The buccal tube had a length of 4mm, and was surrounded by a not strong glandular layer. The bulbus pharyngeus was of the common form, 7mm long, by a breadth and height of 4·5mm; the upper wall of the buccal cavity was to be seen from without with a deep black colour; the palate is medianly quite slightly rough at the small longitudinal folds; also the tectum radulæ, the cheeks, and the rhaphe of the lower side of the tongue are velvet black. The plate on the fore side of the mandible was as usual; the transversely folded marginal part of the labial disk was dirtily yellow. The mandibles measured in a straight line 7mm; the single ones had a breadth of 2·5mm; they were yellow, only the marginal part was strong reddish yellow; the form was as usual, only the hinder end rather tapering; the masticatory edge showed the usual (here about 5—6) series of tubercles, the oblique cones of a height of up to 0·08mm. The tongue was as usual strong and broad; its radula was yellow, tapering anteriorly, and containing 22 series of tooth plates, in the sheath 10 more were found, of which the three hindmost ones were not fully developed; thus the total number of series was 32. On either side of the median plate up to 45 lateral ones were found. The plates were yellow; the breadth of the median ones was up to 0·16mm; the height of the outermost lateral one was 0·16mm, that of the outermost but three from the outer end of the series 0·20mm, and the height increased to 0·25mm. The median plates (fig. 25 a) were of the common form, with a clumsy short median tooth and two similar smaller lateral teeth. The first lateral plate (fig. 25 b) was of the common form deviating from that of the other lateral plates, with a short, strong hook; the other plates were all of the common hook-shape (fig. 26), with smooth edges; the outermost ones were weaker.

The whitish salivary glands were as usual.

The oesophagus was short, black next to the pharynx, passing into the first stomach, which, by its contents, was globularly extended (to a diameter of 4mm). Behind the first stomach the masticatory stomach is found; it is muscular, formed somewhat like an hour-glass, of a diameter of 2·5mm; its somewhat larger fore half part showed the common girdle of firm leaves, in situ red yellow, placed lengthwise, and converging towards the axis of the circle, where they almost join each other. These stiff, yellow leaves (fig. 27) were of different sizes, of a height of up to 0·75mm, by a length of 1mm; their number was about 30—40, and they were of the structure otherwise common in the Marioniae. From the hinder end of the stomach issues the intestine (of a length of 7mm); its fore part is dilated by similar contents as those of the first stomach. These

contents were composed of small, up to 2mm long, pieces of a red Alcyonaria, and gray lumps of a similar kind.

The grayish yellow principal liver was short-conical, of a length of 5·5mm, hollowed on the fore side; its small cavity was filled by chymus. Quite separated from this liver was found a little, plane-convex secondary liver of a length of 3mm, with a special efferent duct leading to the first stomach before the girdle of plates.

The pericardium and the renal syrinx were as usual.

The thin layer of the hermaphrodite gland, which, as to colour, was scarcely to be distinguished from the liver, was provided with developed sexual elements. The lengthy, narrow anterior genital mass had a length of 4mm, by a height of 1mm, and was whitish and slightly yellowish; at the fore end of this mass the penis was found, at the hinder end the seminal vesicle. This latter was pyriform, and contained but little semen; the efferent duct together with its wider end (vagina) was twice the length of the vesicle. The short-pyriform bag of the penis had a height of 0·75mm (with a lengthy ganglion on its crown); the almost cylindric glans issuing from the bottom, projected with the point from the genital aperture. The mucous-albuminous gland vas small.

The genus *Marionia* has not hitherto been known from the Indo-Australian Seas. The form examined here, seems to be a new species; the *M. occidentalis* of the western Atlantic (Buenos Ayres) shows also a green colour, but seems to differ from the present form.

Fam. **Bornellidae.**

Comp. R. Bergh, l. c. 1892. p. 1051—1054.

Bornella, Gray.

Gray, figures of moll. animals. IV. 1850. p. 107.
R. Bergh, neue Nacktschnecken d. Südsee. II. Journ. d. Mus. Godeffroy. Heft. VI. 1874. p. 95—102. Taf. I, Fig. 3—4. Taf. II, Fig. 30—33. Taf. IV, Fig. 1—28.
— malacolog. Unters. (Semper, Philippinen) Heft. VII. 1874. p. 287—308. Taf. XXXVI—XXXIX.
— report on the *Nudibranchiata*. The Zoology of H. M. S. Challenger. Zoology. Vol. X. Part XXVI. 1884. p. 34—43. Pl. VII, Figs. 13—22; pl. VIII, figs. 1—13.
— Die Nudibranchien des Sunda-Meeres. Malacolog. Unters. Heft. XVII. 1890. p. 884—889. Taf. LXXXVIII, Fig. 26—30. Taf. LXXXIX, Fig. 1—2.

The genus *Bornella* has been provided with a series of species. Of the hitherto mentioned species scarcely more than three can be kept up: *B. digitata*, Ad. et R., *B. calcarata*, Mørch, and *B. excepta*, Bgh. The other never really examined species

(*B. arborescens*, Pease; *B. Hancockana*, Kelaart; *B. Adamsii*, Gr.; *B. Hermanni*, Angas) are likely to belong to the typical species, the *Bornella digitata*[1])

1. *Bornella digitata*, Ad. et Reeve.

Bornella digitata, Adams et Reeve. Voy. of the Samarang. 1848. p. 67. Pl. XIX, fig. 1.
— — , Ad. Ald. et Hanc., notice of nudibr. moll. Trans. Zool. soc. V. 1866. p. 139—141. Pl. XXXIII, Fig. 8—9.
— — , Ad. Bgh. l. c. 1874. p. 301—308. Taf. XXXVII, Fig. 14—19; Taf. XXXVIII, Fig. 13—22.

Pl. III, Figs. 1—3.

Of this species 4 specimens were taken on March 2nd, 1900 at Koh Kram at a depth of 30 fathoms. Two of these specimens were sacrificed for the anatomical examination.

They are said, when living, to have been beautifully red with white transverse bands on the back, and with white rings on the dorsal papillæ.

The specimens which were kept in spirit, were upon the whole more or less pale yellow, with no trace of the former splendour. The length of the three largest was 6cm, by a height of the body of up to 1·4—1·5cm, and a thickness of up to 0·9cm; the height of the tentacles was 2·5mm, that of the first dorsal papilla 9—13mm, of the following ones about the same, that of the last ones 3mm; the breadth of the foot was anteriorly 5mm, posteriorly smaller.

The form was as usual. The singular tentacles were formed of 10—12, also 18—19 somewhat conical papillæ, placed in 2—3 narrow curves or circles. The sheath of the rather high rhinophores was always produced into three fingers; the club had a height of 4mm, and was provided with about 30 leaves on either side; the first finger-shaped papilla which was coalesced with the rhinophore, was of about the double height of the club. No appendages were found outside at the base of this papilla, nor at the base of the following ones. The second papilla had 3 strong fingers and 2 branchial tufts inside at the base. In the interval between this papilla and the following one at the margin of the back, or more inwardly, the sunken anal opening is found, and inside of this the renal pore. The third papilla had also three fingers, one of which was also sometimes forked in the end, and two gills; the fourth had two or three fingers, one of which, in one specimen, was again divided into three fingers, it had two to three gills; the fifth papilla was simply formed as a finger or had two fingers, with 2—3 gills; the sixth was simply finger-shaped or had two fingers with one or two gills. Medianly on the here narrow back were still found a seventh and eighth papilla,

[1]) Comp. R. Bergh, System der nudibranchiaten Gasteropoden. Malacolog. Unters. Heft. XVIII. 1892. p. 1053—1054.

formed by the coalescing of two papillæ, the seventh was mostly also slit in the end. — The tail projecting behind the last papilla, had a length of up to 2mm.

The visceral mass which reached to behind the sixth papilla, was attached to the wall of the body by a loose, felt-like connective tissue, and the different parts of the mass were loosely connected by such a substance.

The central nervous system was quite as before described (comp. l. c. 1874. Taf. XXXVIII, Fig. 17); the nerve cells had a diameter of up to at most 0·14mm. The long N. opticus was in the latter part black pigmented; the larger diameter of the short-ovate eye was 0·30mm, the lens was dark yellow. The otocysts which were situated at the quite short cerebro-pedal connective, had a diameter of 0·12mm, and were closely filled with otoconia of a diameter of up to 0·016mm. The club of the rhinophores with a large ganglion at its base.

The buccal tube is quite short. The bulbus pharyngeus is short and powerful, of a length of 5—6mm, by a breadth of 5—6mm, and a height of 3·5—5mm; its form is as shown before (l. c. Taf. XXXVI, Fig. 14, 17; Taf. XXXVIII, Fig. 20, 21). The labial plates which cover the thick praemandibular muscular mass anteriorly, join each other above and below; they are lemon-coloured or reddish on the outside, in the mouth-slit darker to dark brown; each plate, when spread out, measured 3mm in length, 2mm in breadth, they were, as usual, formed of small scales or plates arranged in series, and situated close behind each other, measuring in diameter about 0·007—0·009mm (comp. l. c. Taf. XXXVI, Fig. 15—16). When the above mentioned strong muscular mass is removed, the fore side of the powerful mandibles is laid free; they are yellow, below the hinge-part reddish chestnut; their length was 3·25—3·5mm, and the breadth of both together in situ 4mm, their vault in situ 1·25mm; the thin masticatory edge was smooth, the form as shown before (comp. l. c. Taf. XXXVIII, Fig. 1). The supplementary oral cavities were quite small. The cheeks anteriorly (in the region of the fore end of the tongue) and also the palate are lined with a powerful, brown yellow, as it were, very fine-grained cuticle. The erect tongue (comp. l. c. Taf. XXXVI, Fig. 17; Taf. XXXIX, Fig. 6, 7) of a height of 1·5—1·75mm and a breadth anteriorly of 1·25mm was of the common form with light yellow radula. At the anterior edge of the tongue 8—9 series of tooth plates were found, at the somewhat sunk upper side 6—5 series; in the somewhat (downwards) sloping radula sheath were found 24—26 fully developed series and three younger ones; so the total number of tooth plates was 38—41. The lateral plates of the foremost (oldest) series were much damaged, and often torn away; posteriorly on the back of the tongue their number on either side was 17 [1]). The yellow median plates had a height of up to 0·10mm, by a breadth of

[1]) The number of series of toothplates in the specimens before examined by me, was about the same, viz. in *B. arborescens* 33—45, in *B. digitata* 39, in *B. calcarata* 41, and in *B. excepta* also 41.

0·8mm, and were of the before described form (comp. l. c. p. 305. Taf. XXXIX, Fig. 8), with 10—11 fine denticles (fig. 20). The very slightly yellowish lateral plates (figs. 2 b, 3) were quite as before described, with somewhat obliquely rising, smooth-edged hook; the innermost ones and especially their hook were shorter, the hook then reaching by and by a height of up to 0·14mm; the outermost ones were again shorter.

The salivary glands formed as usual a whitish, felt-like mass, situated behind the bulbus pharyngeus and surrounding the fore end of the first stomach.

The oesophagus (fig. 1 a) was short, about 2mm long. It passed, without any distinct bound, into the first stomach (fig. 1 b), which was only little wider, about 4mm long, also thinwalled, and on the inside provided with fine longitudinal folds. The first stomach is on the upper side posteriorly quite covered by the two liver-branches of the second pair of papillæ; these branches join each other above, but are separated at the base; they pass below in a rounded way into a quite short, thinwalled biliary duct, opening into the hinder part of the stomach on each side; further down to the left one more opening is found of the quite similar biliary duct of the principal liver. Behind this stomach, the second one, the grayish hook-stomach (fig. 1 c) is found; it was cylindric, of a length of 6—7mm, by a diameter of 3mm, and through the muscular wall fine longitudinal lines (the series of thorns) shone through. At least 18 such series were found, with about 30 hooks in each series. The brown or reddish brown hooks had a height of up to at least 0·65mm; they varied much in form, height, and thickness, as before described (comp. l. c. pp. 296, 306). This stomach is distinctly bounded, as well at the cardia as at the pylorus, and set with hooks converging towards the middle. The following part is perhaps to be interpreted as a third stomach; it has a length of 6mm, by a diameter of 4mm; its fore end forms on one side a little horn, in which the refolded upper end of a strong fold begins; this fold shines highly through in its whole course some way along one side of the intestine; otherwise longitudinal folds are found in this stomach. The intestine (fig. 1 e) is the immediate continuation of this stomach; it runs first backwards, and then it turns upward; its length was about 10—15mm by a diameter of 2—3mm. — The stomachs and the intestine showed rather copious brown contents, formed of an undetermined animal mass in which were found diatomees, cnidæ, and strings of eggs, mingled with loose stomach-thorns.

The two large liver-branches belonging to the second pair of papillæ[1]), have at the base a thickness of 3mm; they are rounded below, with a quite short biliary duct open-

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The number of lateral plates in the series beside the median ones was in *B. arborescens* 8—11, in *B. digitata* 13—14, in *B. calcarata* 11, and in *B. excepta* 17—19.

[1]) In the first pair of papillæ, coalesced with the rhinophores, no liver-branch exists.

ing into the back part of the first stomach. The principal liver opens to the left into the stomach in a quite similar manner. This latter was lengthily conical, of a length of 4^{cm}, and reached to the region of the sixth pair of papillæ; anteriorly it was 7^{mm} broad, posteriorly its diameter was only $0{\cdot}5^{mm}$; it gives off branches to the third, fourth, and fifth pairs of papillæ, which branches still at the base of the papillæ had a diameter of 1^{mm}, and showed a comparatively not wide opening. The liver was redbrown, its relations was otherwise as before described (comp. l. c. pp. 297, 306).

The ventricle of the heart had a length of $3{\cdot}5^{mm}$. The pericardio-renal organ (the renal syrinx) was short-pyriform, $1{\cdot}5^{mm}$ long.

The light yellow hermaphrodite gland situated between the liver branches of the third pair of papillæ, stretched both before and behind half-way to the next liver-branch; it had a length of about $14—15^{mm}$, by a breadth of $5—6^{mm}$, and was formed of about 20—26 lobes arranged in a single layer; these lobes had a diameter of $0{\cdot}75—1{\cdot}5^{mm}$. The hermaphrodite duct formed as usual an ampulla. The anterior genital mass was rather large, 6^{mm} high, by a length of 5 and 10^{mm}, and a thickness of 4^{mm}; more than half part of it was formed by the powerful penis. The long seminal duct, which winds in close-lying, brownish yellow coils along the inside of the mucous-albuminous gland, passes into a whitish continuation rising along the hinder side of the penis to its top (comp. l. c. Taf. XXXVII, Fig. 19). The penis was bag-shaped, of a length of 6^{mm}, somewhat curved, and rather thick-walled. This organ, having been cut open, showed on the inside quite the same structure in the two large specimens; in the upper part ran, along one side, two low rolls issuing above at the opening of the seminal duct, and below passing into each other; they, as well as the part between them, are transversely furrowed; no trace, however, was found of the armature of hooks, otherwise found in the Bornellae, and the cuticle was almost quite smooth. I have, however, once before found the same relation (comp. l. c. 1890. p. 889). The small mucous albuminous gland was yellowish and whitish; the short-stalked seminal vesicle as usual.

2. *Bornella excepta*, Bgh.

R. Berch, report on the Nudibranchiata (Challenger). l. c. 1884. p. 36—43. Pl. VII, Fig. 13—22; pl. VIII. Fig. 1—13. Pl. III, Figs. 4—5.

One specimen of this form was taken together with specimens of the preceding species at Koh Kram, and was put together with these specimens.

The colour may consequently be supposed to have been scarcely different from that of the preceding species. The specimen, kept in spirit, was somewhat more whitish

than the others. The length was 3.2^{cm}, by a height of the body proper of up to 7^{mm}, and a breadth of up to 4^{mm}; the breadth ot the foot was 3^{mm}; the diameter of the tentacle-star was 2^{mm}; the height of the rhinophore together with its papilla was 7^{mm}, and that of the second and third dorsal papilla was the same.

The form was upon the whole as usual. The tentacle-star had about 12 papillæ arranged in 2—3 circles; the papilla of the rhinophore was slit into 3—4 laps above; the second pair of papillæ showed 3 laps, outwardly at the base 3 small finger-shaped appendages, and inwardly 2—3 branchial tufts; the third pair was also three-fingered above, also with 2—3 similar appendages outside and two gills inside; between the second and third papilla the anus, and before it the renal pore, was found; the fourth pair of papillæ had 2—3 fingers, with 2 appendages and 2 gills; the fifth pair had 2 appendages and one gill; the sixth papilla was situated medianly, finger-shaped, with appendage inside and outside, but no gill, and the smaller, likewise median seventh and eighth papillæ had neither appendage nor gill.

The hepatic mass shone through the sides of the body with a gray colour, the anterior genital mass whitish.

The central nervous system was quite as before described (comp. l. c. p. 38). The oval otocysts had a largest diameter of 0·16^{mm}, and were closely filled with otoconia of a diameter of up to 0·025^{mm}. The eyes had a diameter of 0·28^{mm}, the lens was strong yellow.

The bulbus pharyngeus was of the common form, 3^{mm} long and broad, by a height of 2·5^{mm}; the labial plates were, quite as in the other species, shining yellow brown, darker farther down in the mouth-slit; their scales had a breadth of up to 0·09^{mm}. The muscular plate covering the mandibles, was of the common thickness. The mandibles themselves showed the common form (comp. l. c. Pl. VIII, Fig. 2—3); they were yellow, dark chestnut along the masticatory edge, of a breadth together of 3^{mm} by a length of 3^{mm}. On the inside of the cheeks and on the palate, a strong, smooth, yellow brown cuticle-lining was found. The tongue was of the common form, with yellow radula. In the latter 13 series of tooth-plates, in the sheath in all 21; thus the total number of series was 34. The number of lateral plates was up to 16. The median tooth-plates were yellow, the lateral ones yellowish; the height and breadth of the median plates was 0.08^{mm}; the length of the lateral ones was up to 0·2^{mm}. The median plates were as before described, the number of denticles on either side was 10—12; the lateral ones as in other species (comp. l. c. Pl. VIII, Fig. 4—8).

The salivary glands were as in the other species.

The short oesophagus passes into the first-stomach (Fig. 4 a), which posteriorly on either side receives a short biliary duct, and besides, quite posteriorly to the left, the duct of the principal liver (Fig. 4 b b-c). This stomach passes through a slight narrowing

into the somewhat longer, almost cylindrical, gray thorn-stomach (Fig. 4 d) (comp. l. c. Pl. VIII, Fig. 9). This stomach had a length of 3mm by a diameter of 0·8mm; it showed the common series of thorns, in all apparently about 20, in the series about 60—70 thorns seemed to occur. The thorns were dirtily yellow brown, of a height of up to 0·40mm, by a diameter at the base of up to 0·08mm; they were cylindric, a little thicker at the base, straight or somewhat bent, with truncate point, often with rough surfaces, otherwise as shown before (comp. l. c. p. 40. Pl. VIII, Fig. 10—11). This stomach passes into a thin-walled bag, along one side of which a strong fold is found; most likely this bag is a third stomach which continues with a narrowing into the short intestine. — The scarce contents of the alimentary cavity were an indeterminable animal mass, in which were found small Copepoda, cnidæ, and loose stomach-thorns.

The relations of the dirtily- and dark gray liver which showed many lobules on the surface, deviated very much from that which I have seen in the specimen of this species before examined, in which absolutely no liver-branches were given off to the papillæ (comp. l. c. p. 41. Taf. VIII, Fig. 9)[1]. In the hinder part of the first stomach two liver-branches opened as usual, and the principal liver almost medianly. The anterior liver-branches (Fig. 4 bb) are very strong at the base, and continue in a process, first rather thick, then thread-like thin, rising into the second papilla; from the right branch issued one more similar process, stretching along the body-wall in the vicinity. The principal liver-branch (fig. 4 c) has a length of 2·2cm by a diameter of up to 3mm, its surface is rather rough. This principal liver provided the third and fourth pairs of papillæ with liver-branches. These latter were then tapering from the base, and at the passing into the papillæ almost filiform; they rose undivided to the place of furcation above the gill; the branches were thick-walled at the base, then they became thinner, and at last they only showed a quite thin layer of hepatic cells.

The heart, the renal syrinx, and the urinal chamber were as before described.

The yellow hermaphrodite gland which covered the anterior half of the principal liver, had a length of 10mm, by a breadth of 3mm, and was formed of 10 larger lobes. The anterior genital mass had a length of 7mm, the full half of which was formed by the penis. The short-bag-shaped penis was 4mm high; when opened it showed quite the same structure as in the specimen examined before (comp. l. c. p. 42. Pl. VII, Fig. 18—19), the two festoons set with hooks passing into each other above and below. The thorns mostly placed in one series, were dark chestnut, only at the point a little bent, reaching to a height of 0·08mm (fig. 5), otherwise as before described. The mucous-albuminous gland was yellowish and whitish, the seminal vesicle pyriform.

[1]) This reminds of the variability of the liver-branches in Dendronotus.

Fam. Tethymelibidae.

Comp. R. Bergh. l. c. 1897. p. 1039—1043.

Melibe, Rang.

Melibe, Rang. Man. — des moll. 1829. p. 129. pl. III, Fig. 3.
— , R. Alder and Hanc., notice of nudibr. moll. Trans. zool. soc. of London. V, 3. 1864. p. 37.
— , R. Bergh, malacolog. Unters. Heft. 9. 1875. p. 382—386. Taf. XLV—XLVIII.
— — , Beitr. z. Kenntn. d. japan. Nudibr. I. Verh. d. k. k. zool. bot. Ges. in Wien. XXX. 1880. p. 160—165, Taf. II, Fig. 1—11; Taf. III, Fig. 1—2.
— — , Beitr. z. Kenntn. d. Gatt. Melibe, Rang. Ztschr. f. wiss. Zool. XLI. 1884. p. 142—152. Taf. III.
— — , Beitr. zur Kenntn. d. Aeolidiaden. IX. Verh. d. k. k. zool. bot. Ges. in Wien. XXXVIII. 1888. p. 688—693. Taf. XVII, Fig. 13—14; Taf. XIX, Fig. 3—7.
Chioraera, Gould. Un. St. Explor. exped. Moll. 1852. p. 309. Fig. 404.

This so peculiarly and singularly looking animal has already in the infancy of malacology (1829) been formulated as representing a generic group, but remained very long (till 1864) misappreciated; it has, however, in the later decennaries several times been subjected to examination.

These animals which in some parts of the seas very likely will be found as frequent as Tethys in the Mediterranean, belong only to the warmer and tropic seas. Continued examination is likely to reduce the number of the mentioned species, which are the following:

1. **M. rosea**, Rang. — M. capense.
2. *M. Rangii*, Bgh. — M. rubrum.
3. **M. fimbriata**, Ald. et Hanc. — M. indic.
4. *M. pilosa*, Pease. — M. pacific.
5. **M. capucina**, Bgh. — M. philipp.
6. *M. leonina* (Gould). — M. pacific.
7. **M. vexillifera**, Bgh. — M. japon.
8. *M. papillosa* (de Filippi). — M. japon.
9. *M. ocellata*, Bgh. — M. indic.
10. *M. ? australis*, Angas. — M. pacific.

M. bucephala, Bgh, n. sp.

Pl. III, Figs. 6—10.

One single specimen of this form was taken on Febr. 22nd, 1900, not far from Tung Kaben, on a bottom of mud mixed with sand, at a depth of 6 fathoms, creeping on phanerogame plants (Halophila).

The animal, which was otherwise well preserved had unfortunately lost all its (large) dorsal papillæ, with the only exception of three.

The colour of the soft, living animal is stated to have been brown, passing in spirit almost instantly into green. Kept in spirit its colour was greenish white, but everywhere covered with very fine white dots, which were especially close-standing at and round the papulæ of the skin; on the sides of the body as also on the large dorsal papillæ (epinotidia) scattered brown papulæ were found; the inside of the cowl and the sole of the foot had no dots. — The length of the animal was 6^{cm}, by a height of the body of up to $1{\cdot}9^{cm}$, and a breadth at the back anteriorly of 1^{cm}; the length of the head was 15^{mm}, by a height of 9^{mm}, and a breadth of up to 15^{mm}; the height of the rhinophores was 4^{mm}; the length of the innermost cirrhi of the margin of the cowl was up to $2{\cdot}5^{mm}$; the height of the largest preserved dorsal papillæ was 15^{mm}, by a breadth of 9^{mm}, and a thickness of up to 4^{mm}, at the base of the tail one more was found of a height of 9^{mm}; anteriorly the foot projected freely to a length of $2{\cdot}5^{mm}$, the breadth of the sole was 7^{mm}, of which breadth almost 3^{mm} on either side belonged to the foot-brim; the length of the tail (behind the large dorsal papillae) was 7^{mm}.

With regard to the form of the body this species agrees with other *Melibes*. The cowl-shaped head had the common size, and was by a constriction separated from the body. The edge[1]) of the head is rather thin above and almost smooth (fig. 6); its other parts, however, are thick, inwardly somewhat refolded or convoluted, and provided with several, mostly perhaps about 5, close-set series of cirrhi, which are displaced among each other; these cirrhi are conical, somewhat constricted at the base, the innermost ones are the larger, towards the outside they decrease regularly in length. The inside of the cowl was smooth, only towards the oral aperture, and quite into it, it was closely covered with fine tubercles. The outside of the head was covered with similar tubercles and papulæ as those of the back; behind its middle was found on either side, and somewhat to the side, the rather high rhinophore, which was on the outside like the vicinity, above it was spread in a somewhat cup-like way and hollowed, with indented edge; from the bottom rises the beautiful club with about 10 leaves and a small terminal papilla. — The body which is upon the whole soft, was rather compressed. The back was longitudinally only little arched, rather flat, on it was found scattered everywhere small rounded papulæ and globular small papillæ set with fine tubercles. The lateral edges of the back seem to have been provided with 5—6 large dorsal papillæ set at rather regular distances, and in the intervals between these papillæ sometimes smaller ones of a height of 2—3^{mm}. The large

[1]) The rather broad notch of the upper edge can scarcely have been produced by mutilation, as it is too regular, and the edge with the cirrhi tapered on either side towards this notch.

papillæ were sessile, below somewhat narrower, above broader with the edge more or less indented; their inner side was flat and almost smooth, while the outer side was somewhat arched and covered with rounded papulæ, as were also the edges. The anal aperture was before the second papilla (of the right side). The somewhat arched sides of the body were covered with white, mostly somewhat conical papulæ; between these papulæ similar ones were found sparingly scattered, most of which were retracted towards their base, brownish, of a diameter of about 0·75mm. Before (on the right side) the contracted genital aperture was found surrounded by papulæ. The narrow foot projected a little anteriorly, its rounded fore end was provided with a marginal furrow, the foot-brim was relatively broad; the sole of the foot was of almost the same breadth through its whole length; the tail was a little tapering.

The intestines were nowhere to be seen from without, which was, however, the case with thin muscular strings running along the whole length of the sides of the body. The walls of the body were rather closely connected with the intestines by a loose connective tissue. The cavity of the body did not reach to the last of the dorsal papillæ.

The central nervous system which was only with difficulty to be prepared off from the closely attached covering of connective tissue, was about like that of *M. papillosa* (comp. l. c. 1884. p. 148. Taf. III, Fig. 5, 14 d); its surface was rather uneven; the nerve cells had a diameter up to 0·2mm. — The quite short-stalked eyes had a diameter of 0·16mm. The otocysts had a diameter of 0·12mm, with rather numerous otoconia. The skin showed everywhere the common large number of glandular cells.

The outer mouth (below at the bottom of the cowl) is set with quite small white cones; also the inside of the buccal tube is covered with such cones more close-standing; this latter is separated from the bulbus pharyngeus outwardly and inwardly by a furrow. Both the buccal tube and the pharyngeal bulb are wrapped with a closely adhering connective tissue; the length of both together is 5mm by a diameter of 3·5mm; the long retractors of the pharyngeal bulb are as those of *M. papillosa*. The inside of the small pharyngeal bulb shows slight longitudinal folds set with very small papillæ. The mandibles joining above, are of a form about like that of other *Melibes* (fig. 7), somewhat curved longitudinally, of a length of 2·25mm, divided by a longitudinal ridge into an inner yellowish part and an outer (whitish-) colourless part; the masticatory edge is finely dentate in the upper part, in the lower part provided with coarser, rounded teeth.

The salivary glands were as usual, small (1mm long), uneven, whitish.

The oesophagus had a length of 4mm by a diameter of 2mm; the fine folds of its inside cease abruptly by the transition to the stomach. The stomach had a length of 6mm, by a diameter of 4mm, its form was oval; the belt of the stomach plates shines through in about the first half of it, and immediately before the belt the foremost liver branch is

attached on either side somewhat upwardly; the hinder, somewhat larger, part of the stomach transparent, it was rounded posteriorly, and from its hinder part the intestine issues to the right. The belt of plates consisted of 28 faint lemon-coloured, rather firm plates, partly alternating in height and length (figs. 8, 9), most of which were large; they had a length of up to 2·5mm by a height of up to 0·45mm. The part of the stomach behind the belt of plates was smooth. The short intestine was wider in its first part, and showed several small pocket-like widenings arranged in a series (comp. the corresponding organ in *M. papillosa*. l. c. Taf. III, Fig. 15 c); next the intestine passed arcuately down, and then rose to the anus; it was provided with a strong longitudinal fold. — The alimentary cavity was quite empty.

The three principal liver branches were as those in the last-mentioned species (comp. l. c. Fig. 14). The two foremost branches which open into the stomach anteriorly, were almost sessile, and had a thickness at the base of 3mm; the left one was already at the base connected with the long common liver-branch. This latter ran through the cavity of the body towards the last large dorsal papilla[1]); together with its ramified hepatic tubes, and the papillar principal branches, as also the numerous round lobules of the hermaphrodite gland, it is wrapped in felt-like, closely adhering connective tissue. The axial principal branch is quite thin-walled, tapering posteriorly, covered all round with close-standing lobules, which ramify from the base in a grapelike manner, and rise between the globular hermaphrodite glandules for a great part covering these latter. The 5—6 thick branches rising on either side to the dorsal papillæ, are of the same structure. The continuation of these branches, the intrapapillar hepatic branchlets, reach scarcely farther upward than half the length of the papillæ; below they are unbranched, and farther upward they only give off a few short branches (comp. l. c. Fig. 18).

On the foremost two thirds of the principal liver stem the numerous lobules of the hermaphrodite gland were found, lying partly more deeply, partly on the surface, more or less wrapped by connective tissue and by closely adhesive hepatic lobules. The lobules of the hermaphrodite gland are mostly globular, with a strong navel on one side, and reach a diameter of up to 1mm; they are composed of closely pressed smaller globes, the peripheric part of which contains eggs, the central part fully developed zoosperms (comp. l. c. 1875. Taf. XLVII, Fig. 21, 22; Taf. XLVIII, Fig. 13). The duct of the hermaphrodite gland appears anteriorly behind the pylorus, and runs to the anterior genital mass which is situated to the right anteriorly (fig. 10). This mass is large, 10mm long by a height of 6mm and a thickness of 4mm, and the duct of the mucous gland with the

[1]) In the hinder part of the body a Spionide was lying, of a length of 15 mm, by a diameter of 0·75 mm, with the head attached in the region of the attachment of the last dorsal papilla.

vestibulum genitale adds still 2mm to the length; on the outside the seminal vesicle is seen in the middle with its duct that turns down with many windings; before the former the prostata, aud before the latter the penis with the seminal duct is found. The duct of the hermaphrodite gland forms at the middle of the inside a not thick, and not long, somewhat twisted ampulla; at the navel of the back side of the prostata this ampulla divides into the ovigerous and the seminal duct. The ovigerous duct is rather long, twisted, up to the last third part somewhat thicker (forming, however, no «fanshaped organ»), and opens at the thick end of the duct of the seminal vesicle beside the albuminous gland. The globular, yellowish prostata (fig. 10 b), which is quite finely granulated on the surface, has a diameter of 3·5mm; it has a strong navel on the hinder side, a less pronounced one on the fore side; from the latter issues the powerful seminal duct (fig. 10 a), of a diameter of 0·6mm and a length of 11mm. This duct opens into the top of the penis, which has a length of 8mm by a diameter of 2mm. The penis (fig. 10 d) is inversely conical, somewhat compressed; the praeputium is thin, and its cavity is quite filled by the strong, also somewhat compressed, conical glans, through which the seminal duct runs directly to its pointed, refolded end. The seminal vesicle (fig. 10 a) is bagshaped, 3mm long, its contents were semen; the winding, powerful duct was wider below, it opened in at the base of the duct of the mucous gland. The mucous-albuminous gland was grayish and whitish; the efferent duct passes into the vestibulum genitale (fig. 10 c) by a shallow narrowing.

Beside the animal was found a large spawn, which Dr. Mortensen regards as perhaps arising from it. The spawn forms a large heap of a diameter of 3·5cm, composed of the innumerable windings of a dull yellow tube of a diameter of 0·75mm. The tube contained inside of the tough, transparent covering several, between each other displaced series of more or less cleft eggs [1]).

If the form of the cowl does not originate in mutilation, we have here a new species; on a contrary supposition the animal examined here would perhaps belong to the *Melibe papillosa* (de Filippi).

Fam. **Aeolidiidae.**

Subfam. **Flabellinidae.**

Comp. R. Bergh, System der nudibranch. Gasteropoden. Malacolog. Unters. Heft. XVIII. 1892. p. 1033.

[1]) Accordingly the spawn would be rather different from that of the Tethys. Comp. Lo Bianco, notizie biologiche. Mittheil. aus d. zool. Station zu Neapel. VIII. 1888. p. 421.

Corpus elongatum, gracile; notaeum processibus brachioformibus vel limbo marginali lato continuatum papillis non caducis praeditis. Rhinophoria perfoliata, tentacula elongata; podarium angulis tentaculatim productis.

Margo masticatorius mandibularis seriebus denticulorum instructus. Radula triseriata.

Although the nudibranchiate Gasteropoda already some years ago were known to such an extent and in such a way, that a systematic arranging might be attempted, the given arrangement will be likely to prove only to be temporarily justified, as the discovering of new forms that will not fit in with the given generic groups, will necessarily bring many alterations in the provisional arrangement.

Absolutely common to the different genera that have been put together in the family *Flabellinidae*, is only the elongated form of the body with the strong development of the marginal part of the back, as also the rather long tentacles. With the exception of *Calma* they have all perfoliate rhinophores, and with the exception of *Samla*[1]) they have all long foot-feelers. The latter genus shows also only one series of denticles on the masticatory edge of the mandibles, while the other genera have several series of such denticles. With the exception of *Pteraeolidia*, the radula of which is uniserial, the others have three series of tooth-plates[2]). In *Flabellina* and *Calma* the glans penis is armed with a sting, while in the other genera it is unarmed.

The family, as established at present, contains the genera *Flabellina*, *Calma*, *Samla*, and the present new one[3]).

Nossis, Bgh. N. Gen.

Notaeum limbo marginali lato. — Penis inermis.

The genus is distinguished from the others by the thin conspicuous dorsal brim, otherwise it seems to be rather nearly related to *Samla*, and as in this latter the penis is unarmed, while by *Samla* the foot-feelers are wanting, and the masticatory edge of the mandibles has only one series of denticles.

Nossis indica, Bgh. n. sp.

Pl. III, Figs. 11—12.

Two specimens of this form were taken at Koh Kam on March 2nd 1900, at a depth of 30 fathoms.

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[1]) R. Bergh, Ergebn. einer Reise nach dem Pacific (Schauinsland). Die Opistobranchien. Zoolog. Jahrb. XIII, 3. 1900. p. 237.

[2]) Three series of tooth-plates are also found in the distant genera *Galvina*, *Capellinia*, *Hero*, *Madrella*. and in the *Coryphellidae*.

[3]) νόσις, a Grecian poetess.

The length of the smaller specimen was 9mm, that of the larger one 11mm, the measures below refer to the latter. The height of the body proper was 2·5mm, the breadth (of the back) up to 4mm, 1mm on either side belonging to the dorsal brim; the length of the tentacles was 1mm, the height of the rhinophores 2mm, the length of the dorsal papillæ up to 7·5mm (by a diameter at the base of 0·6mm); the breadth of the foot was in the middle 2·5mm, nearly 1mm on either side belonging to the foot-brim, the length of the foot-feelers 2mm, of the tail 3mm. — The colour was upon the whole whitish; the brown-gray liver-lobes were distinctly seen shining through in the papillæ, and the yellowish liver was to be discerned everywhere through the body.

The form was elongated and rather narrow, posteriorly the tail projected over the body. The head showed well developed, but not long tentacles; the rhinophores were not long-stalked, the club had about 30 leaves (on either side of the rather broad rhachis) and end-papilla. The back proper was narrow, but with a thin, relatively broad brim, which projected into 7—8 little conspicuous, short and rounded lobes, on which the papillæ were placed in curves; of such curves 9—10 seemed to be present, and in the curves 4—7 papillæ seemed to be found; the number of papillæ appeared on either side to be 50—60; the back proper was even, as it were somewhat sunk between the brims, and, with the exception of the very hindermost part, naked. The papillæ were cylindric, a little tapering above, very closely adhesive (non caducae), the outermost ones were short, the innermost ones (2—3) very long, often (in the dead state) wound round others by which fact the determination of the distribution into series became very difficult and somewhat incertain. The sides of the body were rather low, somewhat sloping inward; the genital papilla was found in the usual place; the anal papilla was lying between the first and second third parts of the length of the body, in a notch in the dorsal brim, in the margin of the back. The foot was anteriorly rather broad, with a marginal furrow, continuing through the rather long foot-feelers; the foot-brim was rather broad; the tail in which the back by and by passes, rather long, flatly tapering.

The cerebro-pleural ganglia were roundish, of almost double the size of the more oval pedal ones, the commissure ot which was of about half the length of one of the ganglia; the large olfactory ganglia were a little larger than the pedal, globular (of a diameter of 0·25mm). — The almost sessile eyes had a diameter of 0·075mm; the globular otocysts had a diameter of 0·08mm, and were closely filled with otoconia of the common kind.

The buccal tube was surrounded by a strong glandular layer. — The bulbus pharyngeus had a short-oval form, 1·5mm long, the radula-sheath projected a little posteriorly. The mandibles were brown yellow; the hinge-part was not strong; the masticatory process was rather short; the masticatory edge, of a breadth of up to 0·06mm, was

set with several (up to about 12) close-standing (quincuncial) series of cones, which had a height of up to 0·012mm, and were somewhat indented at the mouth-edge. The secondary mouth cavities were rather wide, and their back wall was lined with a strong yellow cuticle. The tongue had a long lower edge and a short upper one; on the former was found in the larger specimen 10 series of tooth-plates, on the latter 3 such series; in the smaller respectively 12 and 2 series were found. In the long radula-sheath was found in the former specimen 20 fully developed series and two undeveloped ones, in the latter specimen 17 and 2 series. Thus the total number of series of tooth-plates was 35 and 33. The median tooth-plates were light yellow, the lateral ones almost colourless. The breadth of the median plates was 0·06mm, their height 0·035mm; the length of the lateral ones was mostly 0·10mm. The median plates (fig. 11 a) were rather low, the cutting edge had 6—7 pointed denticles, the basal plate was anteriorly deeply notched. The lateral plates (fig. 11 b) were much flattened, thin, highly notched in the fore edge, and the outer leg of the basal plate was longer than the inner one; the tapering hook showed on the inner edge 8 (—10) short, pointed denticles.

Besides common salivary glands (*Gl. salivales*) also secondary salivary glands (*Gl. ptyalinae*) seemed to be present.

The oesophagus was short. Into the roundish stomach opened on either side a biliary duct, and posteriorly the larger duct of the principal liver. The intestine was rather short.

The hepatic lobes of the dorsal papillæ were long, sometimes somewhat bent in a serpent-like way, with even surface. The yellow liver-branches issuing from the base of these lobes united at the base of the series, and branches of 2—3 series formed larger stems shining very distinctly through the clear dorsal brim. At the end of the dorsal papillæ the cnido-bag was found as usual, it was pyriform, of a length of up to 0·7mm, by a diameter below of up to 0·30mm; besides smaller elements it contained larger ones of a length of 0·037—0·045mm (fig. 12). (In the buccal cavity of both specimens a countless number of these large cnidæ was found.)

The yellow hermaphrodite gland was of the same breadth as the back proper, and ran to the end of the body; in its close-pressed roundish lobules developed sexual elements were found. — The anterior genital mass was roundish, of a diameter of 2·25mm, yellowish and whitish. The bag of the penis showed the unarmed glans.

Marseniidae.

R. Bergh, malacolog. Unters. Supplementheft III, 1—2. 1886—1887. m. 14 Taf.

Marsenia, Leach.

Marsenia perspicua (L.).

Pl. III, Figs. 13—14.

Of this form 4 specimens, 3 female, and one male, were taken on Dcbr. 30th 1900 at the coast of Lem Ngob, of which only the largest one was more closely examined.

The largest one of the much hardened specimens which were kept in spirit, had a length of 11mm, by a breadth of 9·5mm, and a height of 5mm; the length of the foot-sole was 6mm by a breadth of 3·5mm; the length of the tail was 3mm; the breadth of the mantle-brim was almost 2·5mm. The length of the smallest (male) specimen was 4mm. — The colour of the mantle-brim was gray on the upper side with numerous white spots shining through, and with scattered black spots and stripelets; the back (fig. 13) itself was dark gray with numerous whitish dots and a few black spots. The lower side of the whole body was whitish gray, posteriorly and at the left side the shell shone through with a strong whitish colour, and the whole contour of the shell was upon the whole highly conspicuous. The upper side of the tentacles and the neck were black, as was also the upper side of the foot.

When the whole mantle was removed from the shell, the inside of the whole (also outwardly dark gray) middle part was seen to be gray with close-standing black spots, between which a few white ones were sprinkled.

The (slightly yellowish-) white, rather firm shell had a length of 7·5mm, by a breadth of almost 6mm, and a height of 4·5mm. Its form was as usual, the stripes of growth rather strong.

The form of the larger, more closely examined (female) specimen was the typical one. The back was completely smooth.

The central nervous system was quite as usual.

The buccal tube was 1·25mm long, black at the fore edge. The bulbus pharyngeus had a length of 2mm, by a breadth of 1·75mm, and a height of 1.5mm; its form was quite as usual. The mandibles were as usual; their fore end was yellow as far as the fold, otherwise they were colourless. — In the slightly yellowish (up to 0·30mm broad) radula of the tongue, 12 series of tooth-plates were found, under the tectum radulae 5 series, and in the long, rolled up sheath 33 series, of which the four hindmost ones were still undeveloped; thus the total number of series was 50. The median plates had

behind a breadth of 0·10mm, the anterior refolded edge had on either side of the pointed hook 3 (—4) denticles, the legs which were not of quite the same length, were less spread than usual (fig. 14). The lateral plates were of the common form; their body (as far as to the bending into the hook) had a length of 0·16mm; the hook showed at the upper edge mostly 11—12 denticles, sometimes also 7—8, at the lower edge 4 (—5) denticles.

The oesophagus as usual with a widening. On the fore side of the yellowish «psalterium», of a diameter of 1·5mm, the common, transversely situated bag (the second crop) is found. The stomach proper and the intestine seemed to be as usual. — The liver was yellow.

The gill was as usual, its height was up to 2mm. The olfactory organ (Spengel) had a breadth of up to 1·25mm.

No developed sexual elements seemed to be found in the ovary. The somewhat flattened mucous-albuminous gland was whitish; the few seminal vesicles were small and white. — The penis of the common form.

The larvæ of the Marseniae, the Echinospira a. s. o. are found widely spread in plankton, and carried far and wide by the currents, and by far most of the forms of *Marsenia* described as species, are likely to be only local varieties of the *Marsenia perspicua* which seems to be almost cosmopolitan[1]).

[1]) Among the *Marsenia* collected by Plate at the western coast of South America I have pointed out several such varieties. Comp. Die Opisthobranchien der Sammlung Plate. Zool. Jahrb. Supplement IV, 3. 1898. pp. 564—569.

Plate I.

Aplysia immunda, Bgh.

Fig. 1. Piece of the anterior back.
— 2. Thorns of the palate.
— 3. Elements of the mandibles.
— 4. Median and first (left) lateral plates.
— 5. Lateral plates.
— 6. Outer end of a series of plates, *a* outmost.
Figs. 2—6 with cam. drawn. 350 ×
— 7. Plates of the posterior stomach. 55 ×
— 8. Penis, *a* M. retractor.

Aplysiella incerta, Bgh.

Fig. 9. A papilla of the back. 100 ×
— 10. The shell, from the upper side. $^3/_1$.
— 11. The central nervous system. 55 ×. *a a* Ganglia cerebralia, *b b* Ganglia pleuralia, between the latter the two visceral Ganglia, *c c* Ganglia pedalia, *d* N. genitalis, *e* N. osphradialis, *f* Ganglia buccalia & gastro-oesophagalia.
— 12. Elements of the mandibles.
— 13. Thorns of the palate, *a* a thorn seen from the upper margin.
— 14. Median part of the rasp, *a* median plates.
— 15. The 24th plate from the end of three rows.
— 16. Outer end of a row of plates, *a* outmost.
Figs. 14—16 with Cam. 350 ×
— 17. Thorns from the posterior stomach. 200 ×
— 18. Cones of the glans penis. 350 ×

Aplysiella ? *unguifera* (Rang) ?

Fig. 19. Villus of the back. 100 ×
— 20. The shell, from the upper side. $^5/_1$.
— 21. Hinder end of the same, from the underside.
— 22. Elements of the mandibles.
— 23. Thorns of the palate.
— 24. Part of the rhachis of the rasp from the upper side, *a* median plates.
— 25. Similar from the underside.
— 26. One of the interior lateral plates, from the side.
— 27. A plate from the middle of a series, from the side.
— 28. Outer end of a series of plates, *a* outmost.
Figs. 24—20 drawn by Camera. 350 ×
— 29. Plates of the stomach. 100 ×
— 30. Cone of the glans penis. 350 ×

Aclesia ocelligera, Bgh.

Fig. 31. A simple Villus. 55 ×
— 32. A compound Villus.
— 33. The rhinophor.
— 34. Part of the palate. 350 ×
— 35. A single thorn of the same. 750 ×
— 36. Elements of the mandibles.
— 37. Outmost lateral plates, *a* the outmost one.
— 38. Cones of the bottom of the praeputium.
Figs. 36—38 drawn by Cam. 350 ×

Plate II.

Aclesia ocelligera, B.

Fig. 1. The gill-cavity from above. *a* kidney, *b* pericardium with the transparent heart, *c* its right darkly pigmented margin, *d* the gill, *e* anal papilla.
— 2. The central nervous system; *a* cerebral and *b b* pleural ganglia, between the two latter the two visceral ganglia, *c c* pedal and *d* buccal ganglia.
— 3. The tongue from the upper side, *a* rasp sheath.
— 4. From the rhachidian part of the rasp; *a* median, *b* lateral plates.
— 5. Inmost part of a lateral series of plates, *a* first, *b* fourth plate.
— 6. *a* the sexth, *b* the seventh plate.
Figs. 4—6 drawn by Cam. 350 ×
— 7. Median and first lateral plate from a smaller individual.
— 8. Outmost part of 6 series of plates, *a* outmost.
Figs. 7—8 drawn by Cam. 350 ×
— 9. *a* oesophagus, *b* salivary glands, *c* stomach, *d d* margins of the posterior visceral mass (liver), *e* posterior stomach, *f g* intestine.
— 10. *a* Duct of the hermaphrodit-gland, *b* anterior genital mass, *c* spermatocysta, *d* spermoviduct, *e* spermatotheca, *f* vulvar-papilla.
— 11. Penis. $^{8}/_{1}$. *a* M. retractor.

Doridium lineolatum, Ad.

Fig. 12. The animal, from the backside. $^{5}/_{1}$.

Plakobranchus ocellatus, van Hass.

Fig. 13. A dental plate.
— 14. The hook of the penis.
Figs. 13—14 drawn by Cam. luc.

Phyllidiella nobilis, Bgh.

Fig. 15. Drawing by Dr. Mortensen of the living animal.

Doriopsis rubra (Kelaart).

Fig. 16. End of the glans penis; *a* vas deferens.

Doriopsis nigra (Stimpson).

Fig. 17. Part of the armature of the vas deferens.
Figs. 16—17 drawn by Cam. luc. 350 ×

Thordisa maculigera, B.

Fig. 18, 19. Plates in different positions.
— 20. End of a series of plates, *a* the outermost one.
Figs 18—20 drawn by Cam. 350 ×
— 21. *a* spermatotheca, *b* spermatocysta.

Chromodoris histrio, B.

Fig. 22. Drawing of the living animal by Dr. MORTENSEN.
— 23. Elements of the lip-plates.
— 24. Plates of the rasp in different positions.
Figs. 23—24 drawn by Cam. 350 ×

Marionia chloanthes, B.

Fig. 25. *a* median plate, *b* first lateral one.
— 26. From the middle of the series of lateral plates.
Figs. 25—26 drawn by Cam. 200 ×
— 27. A stomachal plate. 55 ×

Plate III.

Bornella digitata, AD. et REEVE.

Fig. 1. *a* oesophagus, *b* first stomach with the bilious duct, *c* masticatory stomach, *d* third stomach, *e* intestine, *f* anus; from the underside.
— 2. Median plates, from the side, *b* lateral.
— 3. *b* lateral plates, from the side.
Figs. 2—3 drawn by Cam. (350 ×)

Bornella excepta, B.

Fig. 4. *a* oesophagus and first stomach, *b b* anterior (lateral) liver, *c c* posterior (chief-) liver, *d* masticatory stomach, *e* third stomach.
— 5. Part of the festoon of the praeputium with its thorns. 350 ×

Melibe bucephala, B.

Fig. 6. The cap-formed head with the mouth-opening, from beneath, *a* margin of the fore end of the foot.
— 7. The jaw, *a* upper end.
— 8. Larger and
— 9. Smaller stomachal plate.
Figs. 7—9 drawn by Cam. 55 ×
— 10. Anterior genital mass. $^5/_1$. *a* spermatotheca, *b* prostata, *c* spermduct, *d* penis, *e* vestibulum genitale.

Nossis indica, B.

Fig. 11. Part of the rasp, *a* median, *b* lateral plates.
— 12. End of a papilla with *a* expulsed cnidae.
Figs. 11—12 drawn by Cam. 350 ×

Marsenia perspicua (L.).

Fig 13. The animal from the backside. $^3/_1$.
— 14. Median plates, from the upper side. 350 ×

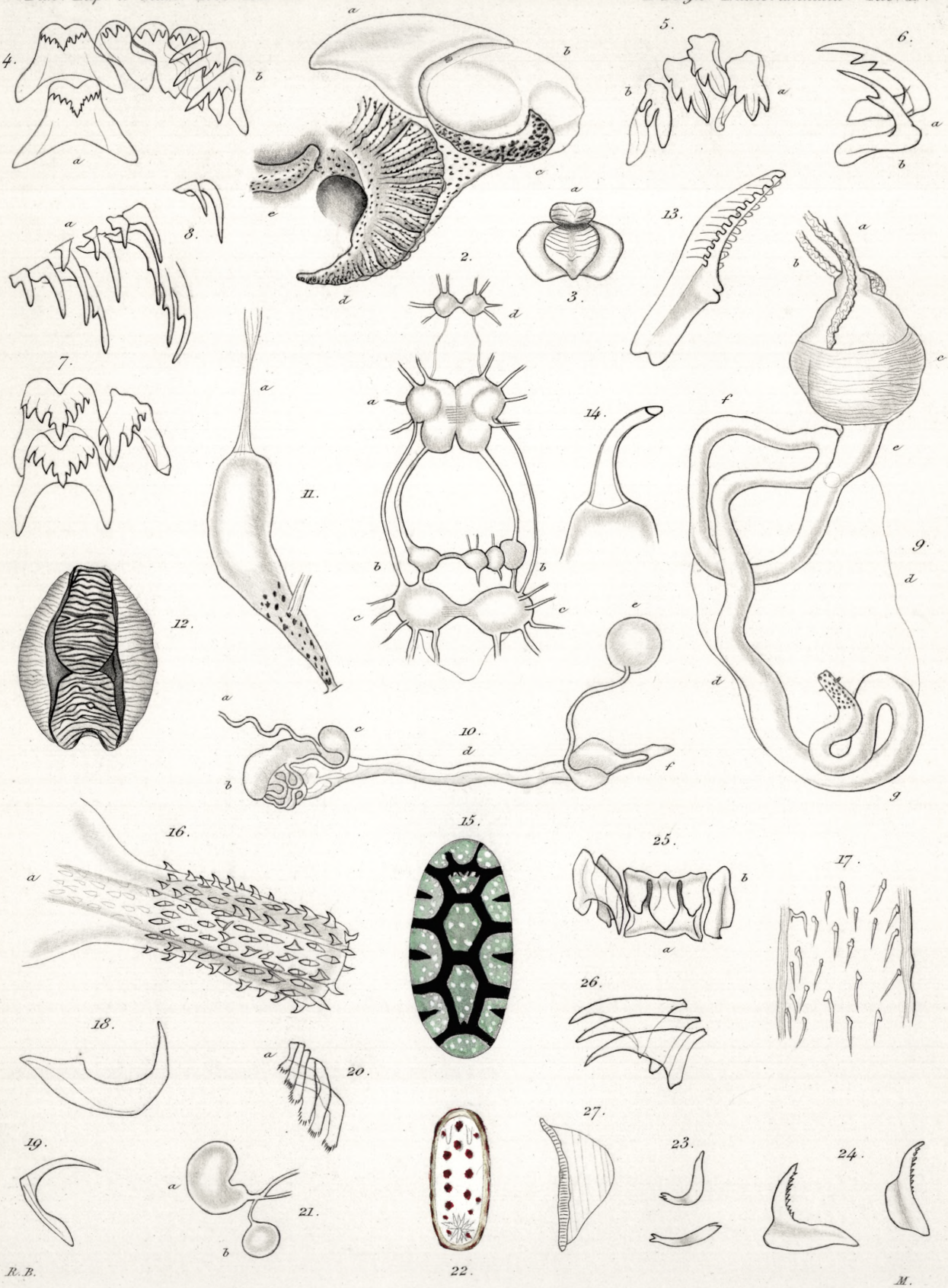
Idalia plebeia, Bgh.

Fig. 15. Branchial leaf from the side. 55 ×
— 16. Lateral plate of three rows.
— 17. Lateral and outer plate.
Figs. 16—17 drawn by Cam. 350 ×
— 18. *a* oesophagns, *b* stomach, *c* bilious duct, *d* intestine.
— 19. Glans penis with armature of the inside. 350 ×

Atys naucum (L.).

Fig. 20. Mandibular plate. 55 ×
— 21. Elements of the same.
— 22. From the middle of the rasp, *a* median plates.
— 23. Lateral plates.
Figs. 21—23 drawn by Cam. (350 ×)

R. Bergh. T. N. Möller.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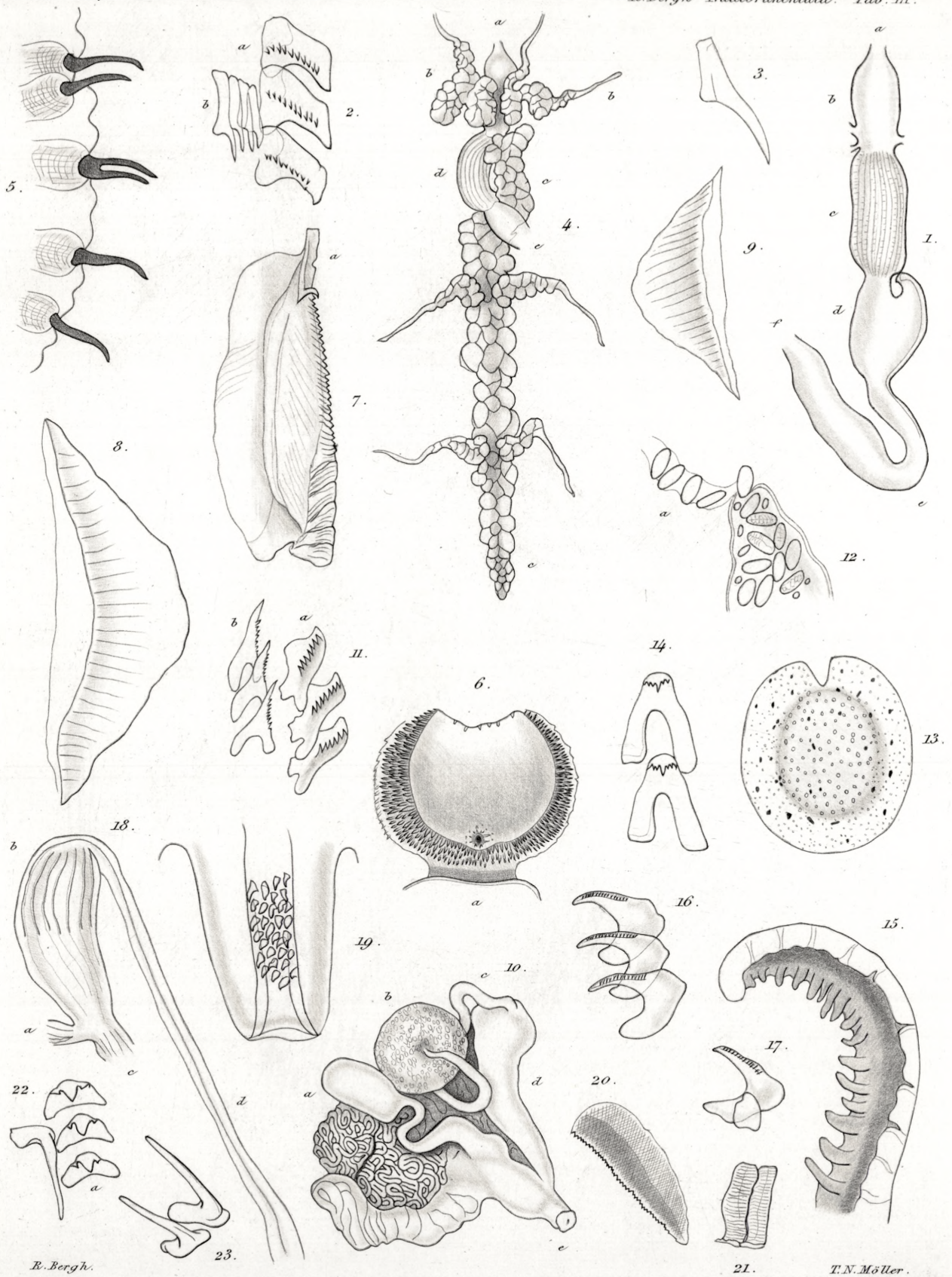

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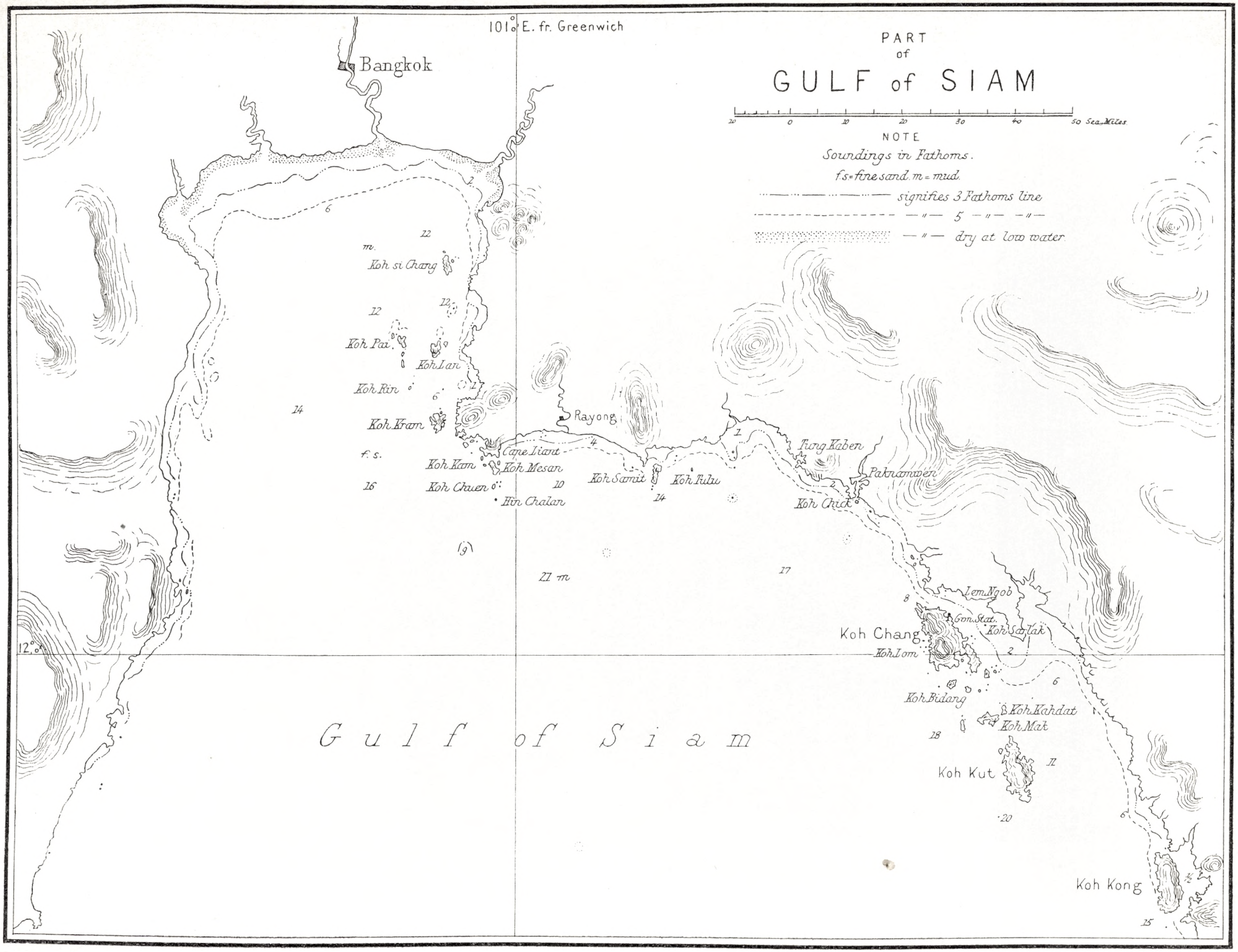
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Koh Samit
Koh Pulu
Tung Kaben
Paknamwen
Koh Chick
Lem Ngob
Gov. Stat.
Koh Chang
Koh Sarlak
Koh Lom
Koh Bidang
Koh Kahdat
Koh Mak
Koh Kut
Koh Kong
Gulf of Siam