



THE DANISH
INGOLF-EXPEDITION.

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R. BERGH: NUDIBRANCHIATE GASTROPODA.

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COPENHAGEN.

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THE DANISH INGOLF-EXPEDITION.

SECOND VOLUME.

3.

NUDIBRANCHIATE GASTEROPODA.

BY

R. BERGH.

WITH 5 PLATES.



COPENHAGEN.

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Nudibranchiate Gasteropoda.

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Nudibranchiate Gasteropoda.

By

R. Bergh.

Upon the whole and according to the experiences of deep-sea explorations, we can scarcely expect any considerable result as to nudibranchiate gasteropoda, nor has such a result been obtained by the Ingolf-Expedition, but it has as a compensation brought to light several very remarkable and partly quite new forms.

The complete result was the following forms:

Nudibranchiata holohepatica.

1. *Lamellidoris muricata* (O. F. Müller).
2. *Cadlina repanda* (A. et H.).
3. *Aldisa zetlandica* (A. et H.).
4. *Bathydoris Ingolfiana*, Bgh. n. sp.
5. *Doridoxa Ingolfiana*, Bgh. n. sp.

Nudibranchiata cladohepatica.

6. *Candiella Ingolfiana*, Bgh. n. sp.
7. *Atthila Ingolfiana*, Bgh. n. sp.
8. *Dendronotus robustus*, Verrill.
9. *D. arborescens* (O. F. Müller).
10. *Coryphella* sp.
11. *Cor.* sp.
12. *C. salmonacea* (Couth.).
13. *Goniëolis intermedia*, Bgh. n. sp.
14. *Gon. atypica*, Bgh. n. sp.
15. *Amphorina Alberti*, Quatrefages.
16. *Galvina* sp.

The nudibranchiate gasteropoda form two large groups: the holohepatic and the cladohepatic nudibranchiata. They are chiefly and most generally distinguished by the structure of the liver, the blood-gland, and the seminal vesicle.

All the holohepatic forms have a liver without side-branches, but a gall-bladder; they have a special blood-gland and two seminal vesicles (spermatheca and spermatocyst). In the large cladohepatic group, which is very rich in forms, the liver is branched, no blood gland is to be seen, and only one seminal vesicle (spermatocyst).

Nudibranchiata holohepatica.

R. Bergh, System der nudibranchiaten Gasteropoden¹⁾.

This family comprises only the Dorididae together with the Doriopsidae and the Phyllidiidae as well as the dubious and somewhat deviating Corambidae. Common to all of them — with the single exception of the Phyllidiidae — is the gill which is formed of more or less, single or compound, leaves or tufts, is retractile or not retractile, and is placed in the median line of the back, as well as the position of the anal aperture, which, in consequence of the position of the gill, is found behind in the arch or ring formed by the gill-leaves.

The Dorididae have a strong bulbus pharyngens, often provided with labial plates, but almost always (with the exception of the Bathydoridae) wanting real mandibles.

Dorididae phanerobranchiatae.

Fam. Goniodorididae.

Lamellidoris, Ald. et Hanc.

R. Bergh, System der nudibranch. Gasteropoden. l. c. 1892. p. 1152—1154.

This genus, which belongs to the sucking phanerobranchiate Dorididae (the Goniodorididae) is distinguished from the Adalariae, which it resembles very much in outer structure, by the presence of two prominent chitinous lists below in the inner mouth, and by the narrow radula that has only one outer plate.

The Lamellidoridae belong almost exclusively to the colder seas.

Lamellidoris muricata (O. F. Müller).

R. Bergh, on the nudibr. gaster. moll. of the north pacific ocean (Scientific res. of the explor. of Alaska. Vol. I. art. V—VI), second part. 1880. p. 221—224. Pl. IX, fig. 18; Pl. XI, fig. 10—12.

Pl. V, fig. 31—32.

Of this species two specimens were taken on the 10th of May 1895 at Trangisvaag between Laminariae and red algæ.

The smaller individual was only 6.5^{mm} long, the larger one, which was examined more closely, measured 9^{mm}. The colour was whitish with a yellow tinge, the rhinophores were yellow.

The outer form was the common one; the tubercles on the back were powerful, most of them rather truncate; the rhinophores and tentacles had the common form; the number of gill-leaves was ten, as far as they were to be discerned.

¹⁾ Malacolog. Untersuchungen (Semper, Reisen im Archipel der Philippinen. II, 11). XVIII Heft. 1892. p. 1070—1160.

Of the intestines only the *bulbus pharyngens* was examined. It had a length of 1^{mm} by a breadth of 1.25^{mm}, and it measured in height with its beautiful large sucking crop that resembles a double kettle-drum (fig. 32), also 1.25^{mm}; the sheath of the radula projected strongly from the posterior end. The tongue had thirteen rows of teeth, in the sheath of the radula were 21 rows, of which the three hindmost ones had not yet been fully developed; thus the total number of rows of teeth was 34¹⁾. The lateral teeth were slightly yellowish, the others colourless; the length of the median false tooth-plates (fig. 31 a) was 0.05^{mm}; the height of the lateral teeth (fig. 31 b) was 0.10^{mm}, and of the outermost teeth (fig. 31 c) about 0.06^{mm}. The lateral teeth had the common form, very finely denticulated, but not quite to the point, the number of the denticles appeared to be 15—20. The outermost teeth were of the common form.

This species is, especially by the structure of its radula (by the denticulated lateral teeth), easily distinguished from the typical *Lam. bilamellata* (L.); on the other hand I think it questionable whether *Lam. varians* and *hystericina* which I have established (l. c.), are not mere varieties of *Lam. muricata*.

Dorididae cryptobranchiatae.

Fam. Cadlinidae.

R. Bergh, System d. nudibranchiaten Gasteropoden. l. c. 1892. p. 1100.

Beside the Bathydoridae and a few Chromodoridae²⁾ the Cadlinidae are the only cryptobranchiate Dorididae with rhachidian tooth plates. The family comprises the genera *Cadlina* and *Tyrinna*³⁾; the latter is distinguished from the former by a peculiar form of tentacles and by the penis having no thorny armature.

Cadlina, Bgh.

R. Bergh, Rep. on the Nudibranchiata (Explor. of Alaska) I. 1879. p. 114 (170) — 125 (181).

— malakolog. Unters. Heft XVIII. 1892. p. 1100.

— die Opisthobranchier (Report — Albatross). 1894. p. 168.

The Cadlinae are of an elongated-oval, somewhat depressed form. The back is covered with fine, a little pointed papillæ, not very densely set; the gill is composed of a few bi- and tripinnate leaves; the tentacles are short, lobelike; the foot is rather powerful, with a rounded fore end with marginal furrow.

1) The (2) specimens (from the neighbourhood of Bergen) which I have examined before, showed 32 and 44 rows of teeth.

2) While in several Chromodoridae rhachidian thickenings are found in the radula that may simulate median tooth-plates, those thickenings are in a few forms, in *Chromod. punctilucens* and *scabriuscula* (R. Bergh, rep. on the Nudibranchiata (Blake-Exped.). Bull. Mus. of compar. zool. Harvard college. XIX, 3. 1890. p. 164. Pl. 1, fig. 7 a — p. 162. Pl. 1, fig. 13 a, 14), and in *Chrom. juvenca* (Zool. Jahrb., Supplem. Fauna chilensis. 1898. p. 532. Taf. 31, fig. 7 a) developed into real median tooth-plates.

3) l. c. Fauna chilensis. 1898. p. 523—526. Taf. 30, fig. 21—29; Taf. 32, fig. 21—24.

The oral aperture bears a strong, almost ring-shaped labial plate, composed of densely set, rather high, a little hooked elements with cleft points. The radula has small median tooth-plates and a row of erect lateral plates with denticulated margins. — Glans penis is provided with rows of small thorns.

Of the genus only a few species are known, chiefly from the cold seas, and their specificness is not beyond all doubt, possibly these forms belong to one and the same species.

- | | |
|------------------------------|--|
| { | 1. <i>C. repanda</i> (A. et H.). |
| | M. atlant. or. et oce. |
| | 2. <i>C. glabra</i> (Friele et Arm. Hansen). |
| | M. atl. or. septentr. |
| 3. <i>C. Clarac</i> , Jher. | |
| M. mediterr. | |
| 4. <i>C. pacifica</i> , Bgh. | |
| M. pacific. septentr. | |

Cadlina repanda (Ald. et Hanc.).

R. Bergh, l. c. 1879. p. 115 (171) — 120 (176). Pl. V, fig. 15; Pl. VI, fig. 21 — 22; Pl. VII, fig. 9 — 18; Pl. VIII, fig. 3 — 6.

— l. c. 1894. p. 169 — 171. Taf. VII, fig. 4 — 11.
Pl. II, fig. 16 — 19.

At station 27 i. e. on 64° 54' Lat. N. and 55° 10' Long. W. a single specimen of this species was taken at a depth of 393 faths (temp. — 3° 8').

The specimen that had been preserved in alcohol of 70% showed a chiefly whitish colour, and was of a somewhat stiff and frangible consistency. The length was 13^{mm} by a breadth of 7^{mm} and a height of 5^{mm}; the breadth of the foot was 3^{mm}, the length 10^{mm}; the breadth of the mantle-edge was 15^{mm}; the height of the almost outstretched rhinophoria 2^{mm}, and of the retracted gill likewise 2^{mm}.

The outer form was as usual in this species. The club of the rhinophoria strongly perfoliate; there appeared only to be seven gill-leaves; the genital papilla as usual.

The skin was densely stuffed with very long, slightly yellowish, cylindrical spicules, sometimes slightly and sparsely rugged on the surface, strongly calcified, and measuring 0·025^{mm} in diameter.

The bulbus pharyngens was strong, of a length of 2·75^{mm} with the radula-sheath strongly conspicuous on the under part of the posterior end; the elements of the broad, yellow, ring-shaped labial plate reached a height of 0·075^{mm} (fig. 16). The tongue was broad and flat; the almost colourless radula contained 36 rows, and further backward appeared still 50 rows, the four hindmost of which were not yet quite consolidated; thus the total number of rows was 86. The number of tooth-plates in each row was in the hindmost part of the tongue 44¹⁾. The tooth-plates were almost quite colourless; the length of the median teeth rose to 0·01^{mm}, and the height of the lateral teeth rose to

¹⁾ The number of the series of teeth in the 161 before examined individuals was 51 — 70 and 96; the number of tooth-plates in each row was 22, 25 and 31. In *Cadlina pacifica* the number of the series of teeth was 67 — 85, and of the plates in

0.10^{mm}. The median plates showed on the hooked part outward to each side 2(—3) denticles (fig. 17a); the lateral plates (fig. 17, 18) were quite as before described.

Also the salivary glands, the intestinal canal, and the yellow liver were as before described.

The anterior genital mass was large; the ampulla of the hermaphrodite duct, the seminal vesicles, the two parts of the seminal duct, and the penis-sac were as usual; the armature belonging to the glans penis and part of the seminal duct (fig. 19) showed the thorns in great numbers and of a length of up to 0.030^{mm}. The mucous gland was milk-white.

Fam. Diaululidae.

R. Bergh, System d. nudibranch. Gasteropoden. 1892. p. 1097—1100.

This (provisional) family includes forms with a somewhat flattened body and most frequently with a finely villous back. The tentacles are of a tubercle- or finger-like shape; the branchial cleft is roundish and most frequently crenate, with tripinnate gill-leaves. — The labial disk is unarmed. The narrow rhachis of the radula is naked; its pleurae bear many tooth-plates, and these, at least the greater part of them, are hook-shaped. The penis is mostly unarmed.

The family contains several rather distinctly marked generic forms. Of the nearly related genera *Diaulula* and *Gargamella* the latter is distinguished by a strong armature of the penis (of the same kind as in *Platydoris* and *Hoplodoris*). *Thordisa* and *Aldisa* have small tubercle-like tentacles; but in the former the outermost tooth-plates are comb-shaped, while the tooth-plates in *Aldisa* are erect, staff-shaped, and the penis armed with rows of thorns. The genus *Trippa* has the back covered with villous tubercles, and particular salivary glands of the oral tube (*gland. ptyalinac*). *Halgerda* has a smooth back, a narrower foot, and the outermost tooth-plates are serrated. The teeth of the genus *Baptodoris* are somewhat like those of *Halgerda*, but the penis is here armed with series of thorns (as in the Phyllidiadae and the Doriopsidae). The body of *Peltodoris* is more stiff, and the back finely granulated. The genus *Phialodoris* agrees as to the outer form with the last-mentioned genus, but its penis is of a very deviating shape.

Aldisa, Bgh.

R. Bergh, l. c. 1892. p. 1098.

Aldisa zetlandica (Ald. et Hanc.).

Tab. V, fig. 17—23.

One specimen of this species was taken at station 27 i. e. on 66°33' Lat. N. 20°05' Long. W., at a depth of 44 fathoms (temp. 5.6).

Preserved in alcohol it measured in length 11^{mm} by a breadth of 6^{mm} and a height of 4^{mm}; the length of the foot was 9.5^{mm} by a breadth of 4.5^{mm}; the diameter of the branchial cleft was 2^{mm}, and the gill-leaves reached to a height of 1^{mm}. The colour of the back was a light lemon-colour, but the tubercles were whitish; the rhinophoria and the gill-leaves were yellow; the lower side of the whole body was yellowish white.

The form was oblong-oval, the lateral edges however rather parallel, the rounded anterior and posterior end of the same breadth. The back was everywhere covered with small; a little pointed

tubercles, showing under the magnifying glass, as well as the whole back, fine spicules; the margin of the rhinophore-joinings is covered with quite small tubercles, which is also the case with the margin of the round branchial cleft. The strong club of the rhinophoria appeared to contain 15-20 pairs of leaves. There were 8 gill-leaves, tripinnate; almost in the middle of the circle the but little conspicuous anal papilla was found. The lower side of the not very broad mantle-edge showed oblique bundles of spicules distinctly to be seen from without. The genital papilla had two openings. The mouth was round, and on each side of it was found the short, truncate tentacle. The foot was anteriorly rounded, with a marginal furrow, the foot-brim narrow; the tail rather short, rounded at the end.

The central nervous system (fig. 17) showed the cerebral and pleural ganglia to be distinctly discerned, almost of the same size, roundish; the pleural ones situated (fig. 17 bb) outside the cerebral ones. The pedal ganglia (fig. 17 cc) were lying behind the former pair, also of a roundish shape, about as large as the cerebral ones, and connected by a rather short commissure. The bulb-shaped proximal olfactory ganglia were almost sessile (fig. 17); the roundish buccal ganglia were connected with each other by a not quite short commissure.

The black eyes (fig. 17) were quite short-stalked. The otcysts (fig. 17, 18) were lying on the uppermost edge of the pedal ganglia, measured in diameter 0.10mm , and contained a rather great number of round and oval, firm otoconia of a diameter of $0.007-0.013\text{mm}$ (Fig. 18). The leaves of the club of the rhinophore, as well as its axis and the stalk contained numerous spicules exactly of the same kind as those found everywhere in the skin, especially in large numbers in the back with its tubercles and in the lower side of the mantle-brim. These spicules are long, staff-shaped, cylindrical, or here and there also a little rugged, straight or slightly bent, strongly calcified, clear as glass, and of a diameter of up to 0.03mm ; they are, as is usual with this kind of spicules upon the whole, easily broken, and were often found broken into many pieces.

The short and powerful bulbus pharyngæus together with the thick, strongly projecting radula-sheath measured in length 2mm ; the labial disk was covered with a simple, colourless cuticle. The tongue was broad and flat, and appeared to contain 25 rows of teeth, of which the foremost were very incomplete, and the tooth-plates to a great extent broken; farther back in the radula-sheath still 26 rows seemed to be found, of which the hindmost were not yet completely developed; thus the total number of the rows seemed to be 51. The odontogenous cells of the radula-pulp were arranged in long columns forming the long tooth-plates. The number of tooth-plates in the series was considerable, but could not be made out. The tooth-plates were completely colourless; the outermost were only 0.68mm long, while the largest were at least 0.35mm . The tooth-plates were of the peculiar, before described shape, very long, flattened, and thin, at the point a little broader (measuring 0.013mm), formed like a spoon, in the point and in part of one edge provided with quite fine and pointed denticles (fig. 19); the outermost tooth-plates were less long and denticulated for a longer way (fig. 20).

The whitish salivary glands were seen as a small mass on each side of the fore end of the stomach.

The oesophagus was short; the stomach oblong, of about the same length as the bulbus pharyngæus.

The anterior genital mass was a little oblong, rather large. The glans penis (fig. 21) pro-

jected in a length of 0.16^{mm} and with a diameter of 0.08^{mm} from the anterior genital aperture; it was on the foremost part of the outside and inwardly covered with apparently irregularly arranged (fig. 22) colourless, straight, and a little bent thorns of a height of 0.007—0.016^{mm}, rising from a little flat base (fig. 23)¹. The thorny armature is continued for a (short) way into the seminal duct.

Fam. Bathydorididae.

R. Bergh, System l. c. 1892. p. 1090.

Bathydoris, Bgh.

Report on the Nudibranchiata. Challenger-Exped. Zool. Vol. X. 1884. p. 109.

Corpus fere semiglobosum, sat molle; dorsum papillis conicis parvis ubique sparsis praeditum, margine palliali vix ullo; rhinophoria retractilia clavo perfoliato; tentacula sat magna, nonnihil applanata, acuminata; branchia e fasciculis discretis compluribus (6—10) fruticulosi non retractilibus formata; podarium sat latum.

Bulbus pharyngeus permagnus; armatura labialis nulla; mandibulae magnae, sat applanatae, margine masticatorio laevi, processu masticatorio nullo; series radulae multidentatae, dente mediano et dentibus lateralibus hamo forti obliquo instructis praeditae.

Penis fortis, inermis, fissura laterali coeca, apertura apicali.

This genus was established on a specimen taken during the Challenger Expedition almost in the middle of the Pacific from a depth of 2425 fathoms where the temperature was 1° C.

By the semiglobular form of the body, the separate branchial tufts, and the papillae spread over the back, the Bathydorididae remind not a little of the, otherwise far different, genus *Kalinga* belonging to the Polyceradae, as also, by the position of its branchial tufts, of the Hexabranthidae²). The gigantic bulbus pharyngeus differs essentially from that in all other Dorididae; it is provided with powerful lateral mandibles as those in *Bornella* and *Scyllaca*, and as in these genera they are on the fore side covered by a thick muscular plate. The armature of the tongue resembles that in the Tritoniadae. As in *Bornella* and *Scyllaca* the hermaphrodite gland is quite separated from the liver.

The Bathydorididae appear to form a remarkable connecting link between the Dorididae and the Tritoniadae, showing also a certain resemblance to the Bornellae and Scyllacae; but they have also, as other Dorididae, a blood-gland close to the central nervous system.

The Ingolf-Expedition has from the sea-bottom in the Davis Strait brought, as it would seem, a new form of this genus, which accordingly now comprises

1. *B. abyssorum*, Bgh.

l. c. 1884. p. 109—116. Pl. XII, fig. 14—20; pl. XIII, fig. 1—26; pl. XIV, fig. 15.

M. pacific.

2. *B. Ingolfiana*, Bgh.

M. atlant. arctic.

¹) I have formerly overlooked this armature, which is only to be discovered with great difficulty.

²) The number of gills seems in the Bathydorididae to be much varying; as the tufts, of which the gills are composed, may be more or less independent, as is also the case in the Hexabranthidae. Comp. my Malacolog. Unters. Heft. XIII. 1878. p. 561; Heft. XVI. 1889. p. 929.

Bathydoris Ingolfiana, Bgh. n. sp.

Corpus quasi subgelatinosum, dorsum subpellucidum. Rhinophoria et tentacula brunnea, branchia et genitalia externa aurantiaca, podarium e nigro purpureum.

Hab. M. atlant. arctic.

Pl. I; Pl. II, fig. 1—2.

The only specimen of this remarkable form was taken on 59° 12' Lat. N., 51° 08' Long. W. (the broad part of the Davis Strait, about West of Cape Farewell) from a depth of 1870 fathoms, by a bottom temperature of 1.3 C. According to the kind communication by Prof. Jungersten, the trawl here brought up a whole cart-load of large, firm blocks of clay, the substance of which reminded of potter's clay, and seemed to contain no organisms, and also a fluid, yellowish mud, in which were only found some Rhizopoda, small Crustacea (Isopoda, Tanaidae, Amphipoda, Ostracoda), and a few dead shells of Yoldia-like small bivalves, of Dentalia, and of a form of Buccinida. The swabs were empty, and accordingly the bottom must certainly have been poor. Of larger animals the same trawling only brought the common little deep-sea fish *Cyclothone microdon*, a pair of curious Actinia, and a longstalked, cupshaped silicious sponge, as well as a characteristic red Planaria swimming edgewise, and furthermore a Nemertine. Moreover was found in the meshes of the trawl an immense number of colourless lumps of jelly, warty on the surface, and about the size of a hazel-nut.

The nature of the mentioned lumps of clay caused this animal to come up in a partly somewhat rubbed condition. It gave no sign of life at all, and did not contract when touched. It was immediately put into 70% alcohol, and is said to have neither contracted much therein, nor altered its form.

The animal in its fresh state is stated to have been of an, as it were, somewhat gelatinous consistency, and the somewhat scraped dorsal side quite transparent, so that the intestines might be seen through it. With the exception of the almost colourless back the animal was of a dark-brown-violet colour, but much darker on the foot.

The animal, which is rather well preserved in the alcohol, showed on the back a light greenish white ground-colour, crossed through by a network with wide meshes of branched and anastomotic blackbrown stripes, in the crossings of which were often seen small black rings with whitish centre (partly from broken-off papillae?), similar very small and small rings were moreover found spread in the meshes. Towards the foot the colour became velvet-black, and of this colour was also the back of the neck and the upper side of the foot. The rhinophoria were yellowish, the fore part of the head black brown, the tentacles brownish yellow; the exterior genitalia were yellowish; the gills were dirty brown, as was also the sole of the foot. The length of the animal was 9.3^{cm} by a height of 6.5^{cm} and a breadth of 6^{cm}; the foot was 6^{cm} long by a largest breadth of 5.5^{mm}; the footbrim was 13—15^{mm} broad, the tail 6^{mm} long; the fore end of the head was about 2.6^{cm} broad, each tentacle besides projecting 2.5^{cm}, the club of the rhinophore 1^{cm} high; the diameter of the flat gills was 1—1.5^{cm} the height of the anal papilla 7^{mm}; the praepodium projected 6^{mm}. The colossal folds of the vulva were 1.5^{cm} high, and when spread from each other they had a breadth of 3^{cm} by a length from above downwards of 2.5^{cm}.

The form of the animal is almost spherical (fig. 1, 2), a little flattened on the lower side (the foot), strongly reminding of a gigantic *Ochidiopsis*. Below the region of the rhinophoria a little forward and a little behind is found a trace of a dorsal brim (fig. 1), otherwise the back bends smoothly and without any distinct margin downwards and inwards towards the foot, so that the body has no sides properly speaking; anteriorly the body passes without any distinct border into the head (fig. 1). To each side of the back of the neck the short-stalked club of the rhinophore (fig. 1) was seen projecting from its hole the edge of which was smooth; the club contained about 80 rather narrow leaves. The fore-end of the head was large, roundish, rather flat (fig. 1) with vertical-oval aperture, in which the light bluish-white labial disk appeared; from the sides of the head the strong, somewhat compressed, tapering (fig. 1) tentacle projected freely; the narrow chin below the head was smooth (fig. 1). — The evenly and strongly convex back (fig. 1, 2) was everywhere covered with small, disk-like depressed or slightly elevated figures of a diameter of 0.5–2^{mm}, the centra of which were either further depressed or rose to a cone of a height of at most 1^{mm}; the depression would seem to have been caused by a strong retraction or a rubbing off of the little cone. Towards the fore end of the back was seen on each side the projecting margin of the round holes of the rhinophoria, and farther forward the but little conspicuous smooth dorsal edge behind the back of the neck (fig. 2). On the hinder part of the back are seen the rather large, flat branchial tufts (fig. 1), placed in a large circle, which is completed in the median line behind by the short and powerful anal papilla. The number of the branchial tufts were 10; on the left side the three hindmost were drawn closer together, and above these was one more isolated; on the right side three and three were closer together. Each tuft showed a short, black-coloured stalk, from which 3–5 tri- and quadripennate leaves spread flatly. The anal papilla was a little depressed, truncate, with a slightly crenate aperture directed backward and downward (fig. 1). The rather large space circumscribed by the branchial circle, showed a number of smaller and larger small disks like those on the other parts of the back; forward and a little to the right, close to the hindmost branchial tuft of the foremost right group, was seen the renal pore (fig. 1) a little projecting. — The sides of the body are quite low. Anteriorly, on the right side, behind the region of the rhinophore, the outer genitals were seen, foremost the opening of the præputium with a little projecting fold, and behind it the adjoining vulva with its two colossal, indented sidelobes (fig. 2). — The foot is powerful, broad; the fore margin with a deep transversal furrow (fig. 2), the side margins not very conspicuous, the tail rather short (fig. 1).

The intestines were nowhere to be seen from without; the coverings of the back were thin, mostly only 0.3^{mm} thick; the thickness of the foot in the middle about 3^{mm}. The intestines were by short, cobweblike connective tissue attached to the foot and the sides of the back as well as to each other.

The broad and flat central nervous system resting on the hinder part of the bulbus pharyngeus, was of a slightly yellowish white colour; its breadth was 16^{mm} by a length of the cerebral ganglia of up to 5.5^{mm} and a thickness of up to 1.5^{mm}. It was wrapped in a very thin, but adhering capsule, which was prolonged out on the larger nerves. The cerebral ganglia (pl. II, fig. 2aa) are the largest, and anteriorly considerably broader¹⁾, the commissure between them short

¹⁾ On the before examined specimen (comp. l. c. p. 111. pl. XIV, fig. 4) the hindmost part of the supraoesophageal ganglion was thin, and was by me wrongly interpreted as belonging to the pleural ganglion.

and not broad, neither the upper nor the lower surface themselves seemed to send off nerves, but from the fore margin and the outer end, on the contrary, at least 7 nerves arose, from the indentation on the outer margin three, and from the hindmost part of the lower side of the commissure arose a quite thin nerve running backward. The pleural ganglia were almost but half the size of the cerebral ones, of a short-oval contour (fig. 2bb); they sent off four thicker and a pair of quite thin nerves. The pyriform pedal ganglia (fig. 2cc) that were connected, as it were, by a stalk with the cerebral ones, were larger than the pleural; they sent off four strong nerves, one from the lower side. The large common commissure (ca. 25^{mm} long), as usual double (fig. 2d). The cerebro-buccal connective is almost as long as the large commissure; the buccal ganglia (fig. 2ee) were of an ovally roundish shape with a diameter of 25^{mm}, and sent off five nerves; the rather strong buccal commissure (fig. 2f) was 20^{mm} long. — The nerve cells (of the pleural ganglia) were of a diameter of at least 0.30^{mm}; the nerves were in their proximal part often a little reddish. In the skin was seen a rather rich network of nerves and small ganglia, sending off branches to the small papillæ of the skin¹⁾.

In spite of a careful examination I did no more in this individual than in the earlier examined one succeed in finding eyes and otcysts, which nevertheless surely are not wanting²⁾. The strongly developed rhizophores showed along the fore and hinder surface a strong median (transversely folded) rhachis, downwards broad and upwards tapering, from which arise lamellæ without spicules; the point of the club is formed by a little final papilla. Through a special cavity two strong nerves ascended, and besides strong and anastomosing muscular strings stretched through these organs. The small, round disks of the skin were slightly depressed, with a projecting edge, and in the middle was often found a more or less contracted papula (pl. I, fig. 3). No spicules or calcified elements were found in the skin at all.

The mouth-tube of this individual was quite short, the bulbus pharyngens being projected, so that the bluish labial disk was lying in the outer mouth; the labial disk was short-oval, longer in the direction from above downwards, its diameter was 12^{mm}, in the middle was seen the narrow, perpendicular aperture of the inner mouth (pl. I, fig. 2). The exceedingly powerful bulbus pharyngens itself (pl. I, fig. 4; pl. II, fig. 1b) was of a whitish colour; only in the region of the pharynx the underlying colour shone through with a bluish tint; the bulb was 3.4^{cm} long by a breadth of 3.2^{mm} and a height of 3^{mm}; the radula sheath projecting in a semiglobular form posteriorly on the lower surface (fig. 1c) had at its base a diameter of 13^{mm}. The rather strong Mm. bulbo-tubales (Protrusores bulbi) were as has been shown before³⁾. The bulbus pharyngens (fig. 4) is by a rather sharp crest (the margin of the mandibles), only interrupted on the lower surface, divided into a smaller and narrower former part, and a rather larger hinder part; on the sides behind the mentioned crest the latter has an even hollow, posteriorly passing evenly into the common prominences produced by the tongue-muscles to the sides of the pharynx. The upper side of the bulbus pharyngens (fig. 1) is strongly

¹⁾ Comp. I, p. 112, pl. XIV, fig. 5.

²⁾ Eyes are found in a species of *Pleurotoma*, obtained at a depth of 2090 faths, in a *Fusus* from a depth of 1207 faths (W.). Then, on the Depths of the Sea, 1873, p. 4651 and in other mollusks; the presence of eyes in animals from these depths, and, according to the abyssal theory of light, not be incomprehensible. On the other hand a rather large number of deep-sea fishes and a still greater number of abyssal Crustacea without eyes have been found. (Comp. Semper, Die Tief-Extr. d. Thiere, I, 1880, pp. 103, 262).

³⁾ Comp. I, p. 113, pl. XIII, fig. 2.

convex; the anterior half between the projecting hinder edges of the mandibles is flattened and a little hollowed; the posterior half is evenly convex, and from its middle arises the œsophagus, on either side of which is seen a slight hollow with the apertures of the ducts of the salivary glands. The sides of the bulbus pharyngeus are evenly convex with a hollow behind the margins of the mandibles (fig. 4). The lower side is anteriorly slightly convex with a hollow behind the margins of the mandibles, and behind this rises the strong radula-sheath (fig. 4 c). As in the Pleurophyllidae and the Pleuroleuridae, in *Hero* and *Bornella*, and even in *Scylluca* a thick muscular plate (fig. 4, 1) covering the greater part of the anterior surface of the mandibles, is found behind and around the little labial disk; this plate showed a little below the middle of the fore side a transverse, rather broad furrow; the thickness of the plate was about the region of the upper end of the labial disk up to 9^{mm}, decreasing upwards and downwards as well as towards the margins. From the inner margin of the labial disk its coating continues as a thick dark blue or almost black blue covering over the whole inside of (i. e. the opening of) the muscular plate, and attaches near the free margin of the mandible¹⁾, in the middle at a distance of 6^{mm} from it, but upwards and downwards approaching it, until the attachment in the uppermost and nethermost places almost reaches quite to the edge. Above and below the same coating continues through the upper and lower end of the slit between the margins of the mandibles to the backside of these, where it is attached in quite a similar manner as on the foreside, the naked margin of the mandibles being, however, here only 4^{mm} broad in the middle. The covering is continued into the coating of the buccal cavity. When this muscular plate is removed the mandibles are naked; the right one covered (pl. I, fig. 6) with its marginal portion the margin of the left one (in the same manner as in the before examined form). The mandibles are strong and large, 29^{mm} long by a breadth of up to 17^{mm}; resting on the outer margin the mandible rose to a height of 18^{mm}; in the marginal part the thickness rose to almost 2^{mm}. They were of a fine horn-yellow colour, almost the whole of the inner half being brown yellow. Their form (fig. 6) is oval, a little more rounded below than above (fig. 6 a); the inner edge is a little more projecting than the outer one, and tapers a little more towards the middle. The mandibles are evenly bent from above downward; they are thickest where the blue coating is attached, decreasing in thickness towards the edge, especially towards the outer one, which is still somewhat soft; they are quite smooth on the surfaces, very finely concentrically and radially striated; the masticatory edge was almost smooth. The mandibles join, and are immediately connected with each other at the upper end, below they are a little apart (fig. 6). — The mandibles being removed the anterior end of the muscular masses of the mandibles are uncovered, the colour of the inside of these muscles (the cheeks) is dark blue, as is also that of the other parts of the buccal cavity, as well as the tongue and the tectum radulæ, to which the brown radula forms a rather strong contract. — The tongue (pl. I, fig. 5) is very powerful, of the usual form, with a deep slit; in the buccal cavity it projected 7^{mm}, and measured above from the base of the tectum radulæ 15^{mm} in length; its height (from above downward) was 19^{mm}, and its breadth also 19^{mm}; the tectum radulæ had a length of 7.5^{mm}, anteriorly it reached to the middle of the height of the tongue-slit. The radula itself was reddish brown, somewhat glistening, its marginal part of a purple brown; its continuation into the sheath

¹⁾ Comp. l. c. p. 113, pl. XIII, fig. 4.

yellowish white. After being separated from the tongue it measured with its continuation 28^{mm} in length, and when spread out 32^{mm} in breadth. On the radula was found 35 rows of teeth (measured along the outer margin, and farther back 24 rows, about six of which were not yet fully developed, thus the total number was 50). About the twenty foremost rows were more or less incomplete, and the tooth-plates often injured. In the rows were found up to 116 tooth-plates on each side of the median tooth. The length of the median tooth was about 0.5^{mm} by a breadth of 0.22^{mm}; the lateral teeth measured along the backside up to 0.05^{mm}; the lengths of the 6 outermost teeth were: 0.40—0.43—0.45—0.48—0.5—0.6^{mm}. The median tooth is flat, rather thin, somewhat lengthened (fig. 7 a, 8) with an excavated fore end, and a straight hinder margin over which projects a little truncate, median cone; the fore part rises obliquely in a short rounded hook (and the hooks on all the median teeth were of the same form). The lateral teeth (fig. 9—13) are longer, and have a much more powerful base, from which the tapering hook rises obliquely and rather slantingly; the margins of the hook, especially the inner one, project freely anteriorly; otherwise the length and breadth of the hook is somewhat varying. Towards the margin of the rasp the lateral teeth decreased (fig. 12—14) considerably in strength and were narrower. In the 6—8 outer ones, especially the very outermost, the hook was considerably reduced (fig. 12 a). Double teeth, so frequent in the nudibranchiata, were not wanting (fig. 15).

The salivary glands are strongly developed, and cover (pl. II, fig. 1 cc) the sides and partly the lower side of the stomach, where they join almost in the median line. They are somewhat flattened especially above, of a thickness of 1—9^{mm}, yellowish white, somewhat lobed in the margin, especially the left one; this latter was larger than the right one, its length was 22^{mm} by a breadth of also 22^{mm}; the right one was 32^{mm} long and 14^{mm} broad. At the fore margin of the gland the salivary duct was seen widening at its fore end into a little ampulla (fig. 1; 4 c); the length of the duct with the ampulla was almost 10^{mm}.

The oesophagus (pl. II, fig. 1) was of a dark bluish-gray, about 11^{mm} long with a diameter of 9^{mm}; the longitudinal folds shone through indistinctly. The oesophagus passes by degrees into a first stomach, also dark bluish-gray, bag-shaped, of a length of 3.5^{cm} with a diameter of 1.7^{cm}. This stomach appears rather thickwalled on account of the not very numerous (ca. 12), but thick and projecting, wrinkled longitudinal folds, which were slightly to be seen from without, and which partly continue anteriorly into the folds of the œsophagus, become lower posteriorly, but for the greater part continue into the folds of the second stomach. The inside of this first stomach is quite dark blue. Through a slight constriction also indicated exteriorly (pl. II, fig. 1) this stomach passes into the second stomach, situated to the left, 3.6^{cm} long with a diameter of 1.4^{cm}, and exteriorly of a yellowish white colour. It is also rather thickwalled, its yellowish inside that is finely dotted with red, bearing a small number (ca. 12) of highly undulated folds stopping short at the aperture of the biliary duct. Here the yellowish white intestine begins which all the way from the pylorus is rather thinwalled. It (pl. II, fig. 1 dddd) stretches backward along the left margin of the liver, bends behind the middle of the length of the liver over the upper side of it, and runs to the right and forward

¹In the before examined form the number of rows on the tongue was 55, and the total number 75; the number of the lateral teeth was 120 on each side.

to the middle of the right margin of the first stomach, forms here a knee, and stretches backward along the right margin of the liver continuing over its hinder end up to the anal papilla (pl. I, fig. 1). The whole length of the intestine is 25^{cm} by a diameter varying between 10—15^{mm}. The inside of the intestine shows on the middle of the under side particularly fine transverse folds while the rest of the wall chiefly has very fine netforming folds; through the middle of the above mentioned finely transversely-folded part a prominent longitudinal fold stretched for a great part of the hindmost part of the intestine. The wall of the hindmost part of the intestine was more smooth. — The alimentary canal showed through almost its whole length from the cardia to the rectum abundant, as it were, clayey, dark yellowish gray contents, partly quite loose and incoherent, partly forming soft lumps of a length of almost up to 2^{cm} and a diameter of 1^{cm}. These contents consisted of the above mentioned clayey mass with grains of sand, mingled with half disorganized animal substance, with *Polythalamia*, Diatoms, and pointed silicious spicules; also a piece of a wormlike animal, full 2^{cm} long, and almost disorganized, was found.

The very large, dirtily dark brownish gray liver was 7.2^{cm} long by a breadth of up to 4.2^{cm} and a height (behind) of 3.7^{cm}; its contour was roundish, the fore end a little more pointed than the rounded hinder end (pl. II, fig. 1). On the upper side of the fore end was found an impression of the first and especially of the second stomach, along the greater part of the left margin was seen a furrow for the intestine, which at the beginning of the hindmost third part of the liver bent inward over its upper side, and on its way forward was situated in a broad and deep furrow continuing in a more superficial one along the right margin of the liver. The surface of the liver was smooth, with only superficial furrows, partly from vessels. Below on the left margin was found the short and thick biliary duct of a light dirty yellowish colour (9^{mm} long by a diameter of 6^{mm}); it opened at the pylorus of the second stomach, and led into a not very great cavity, on the walls of which 3—4 large openings were seen. The biliary duct and the cavity of the liver were filled with masses like those in the alimentary canal. No gall-bladder was found.

The large pericardium, 3.7^{cm} long, and 4^{cm} broad, covered the middle of the liver; folds before on its under side (the pericardial gill) were very distinct. The yellowish ventricle of the heart was 23^{mm} long by a hindmost breadth of 10^{mm}. — The large, whitish, flaccid blood gland was resting on the pharynx, partly attached to the salivary glands, of a length of 2.3^{cm} by a breadth of (before) 1^{cm}, (behind) 1.5^{cm}; before it was rounded, behind straightly curtailed; its thickness was 5^{mm}; it appeared to contain a cavity with folds on the thin walls, but was torn on the under side by the preparing out of the central nervous system; a strong artery ran to the lower side of the organ.

The fine, large, brown-yellow kidney (pl. II, fig. 1) covered the whole hermaphrodite gland and large part of the upper right side of the liver; with its branches it stretched partly under, partly here and there over the intestine; it was rather firmly attached to its underlayer. It was composed of very strongly branched principal stems, some foremost and more hindmost; the stems as well as their branches were in a most varying manner set with leaves, folds, and ampullæ often forming, as it were, greater and smaller grapes. All these growths on stems and branches were as usual composed of closely crowded small cells. About the middle of the kidney (fig. 1) the stems appeared to lead into a urinal chamber continuing in an ureter running backward along the inner margin of the

intestine and ending in the renal pore inside the branchial circle to the right (pl. I, fig. 1). The inside, at least of the last part of the ureter, is covered with strong, compound, and foliaceous folds and papillae. The pericardio-renal organ (the renal syrinx) was powerful, pyriform, almost 1^{cm} long, with strong folds on the inside.

The hermaphrodite gland (Glandula hermaphrodisiaca) rested on the foremost right part of the upper side of the liver, its upper surface completely covered and hidden by the foremost part of the kidney. It was (fig. 16) meniscus-shaped, of roundish-oval contour, with a convex upper surface, and the under surface a little concave; its diameter was about 2.6^{mm} by a thickness on the middle of 1^{mm}; from this middle it sloped evenly towards the not very thick, rounded, almost smooth margin; the surfaces were finely knotty, the colour was gray. The surface of this gland showed everywhere, especially distinct on its upper side (fig. 16), a mass of small clear, semiglobular, prominent papulae, which, when slightly magnified (fig. 17) were seen to be composed of densely crowded balls of a diameter of 0.5–1.5^{mm}, and were attached to a central mass; between and below these balls stretched a system of highly ramifying and anastomotic tubes (fig. 17), the efferent ducts. The deeper parts of the gland contained similar balls and tubes. The balls were ovarian follicles with eggs in different stages of development, attached to a central testicular mass containing bundles of zoosperms. About medianly from the foremost part of the under side of the gland the hermaphrodite duct arose stretching to the anterior genital mass.

This large anterior genital mass (fig. 18) was situated on the right side of the bulbus pharyngens before the liver. Anteriorly and on the under side it was grayish, otherwise of a light yellowish white colour; the length was 5^{cm} by a breadth of 4.1^{cm} and a height of 3.8^{cm}; its lower surface was slightly convex, the upper one strongly convex, posteriorly more abruptly shelving, anteriorly more gradually sloping; the fore end was a little pointed, the hinder end broader and rounded. Its chief part was formed by the large mucous gland (fig. 18a); on the hinder end lay the spermatheca (fig. 18b) with its rather short duct; before and partly upon this (fig. 18) the large bag of the penis. The hermaphrodite duct (fig. 19a) stretches under the spermatheca and the bag of the penis and forms a flattened coil, quite covered by the latter; this coil is composed of rather thinwalled windings, which, when loosened from each other, had a length of about 15^{cm} by a diameter generally of 1.5–2^{mm}; foremost under the neck of the bag the duct was somewhat thinner, and divided in the usual way (fig. 19b) into the short oviduct and the spermatid duct which is only thin near the beginning (fig. 19c). The spermatid duct was powerful, thickwalled, and stretched in a curved way with a length of 3^{cm} and a diameter of 2^{mm} to the hinder end of the bag of the penis (fig. 19d) continuing into the penis. The bag of the penis (the praeputium) (figs. 18, 19dd) was large, 3^{cm} long by a breadth of 2.1^{cm} and a thickness of 1.3^{mm}; it opened with a narrower neck foremost in the outer genital region (pl. I, fig. 2); its walls were not thick, but tough; its inside was smooth, only in the neck were seen longitudinal folds, of which a more strongly marked one was seen in the outer aperture (fig. 2). In the praeputium was the whitish penis, quite bent double (figs. 19, 20); when straightened it measured 4^{cm} by a diameter varying between 0–1.1^{mm}; its contour was round or a little compressed, only the end of the organ was more flat; on one side was found (quite as in the earlier examined *Bathydoris*) a rather narrow, 1^{mm} superficial, rather long narrow without any discoverable aperture in the bottom; on the point was

seen a quite fine round pore (fig. 19f). The spermatic duct entering at the base of the organ (fig. 20a), became by and by a little thinner forward, and with its close windings it was to be traced throughout to the pore on the point of the penis (figs 20, 19f). The short oviduct (fig. 19b) opened into the uppermost part of the duct of the mucous gland. The spermatheca (fig. 18b) was formed like a short bag, of a length of 2^{cm}, it was partly covered by the præputium; its vaginal duct was a little shorter than the seminal vesicle, by its short uterine duct hung by a short stalk the flat spermato-cyst, covered by the spermatheca, empty like this, and about half as large. — The mucous gland formed the chief portion of the whole anterior genital mass; hindmost on its under side was seen a more separated, roundish, more whitish, flat part, of a diameter of ca. 2^{cm}, the foremost part of which might without tearing be loosened from the rest of the mass. In the foremost and undermost part of the mucous gland was found the long and high, compressed cavity of the organ, the foremost wall of which was only thin, while the hindmost one was formed by the chief mass of the mucous gland, the inside of which was yellowish, and showed several communicating cavities. The duct of the mucous gland was short, only 0.5^{cm} long, with strong folds on the inside; the cleftlike outer aperture was bordered by the two above described genital folds, which below were only connected with each other by a narrow commissure, and above by a very broad one (pl. I, fig. 2, 18c).

In itself it was scarcely probable that this deep-sea form from the Davis Strait could be specifically identical with the earlier described form from the large depths in the middle of the Pacific. We have also, in spite of considerable correspondences between the two forms, found not a few and rather great differences. Among these differences were especially prominent the different colour of the cavity of the mouth, another form of the mandibles, and a great difference in the structure of the radula, the tooth-plates of which upon the whole were feebler and longer in this species, and the median teeth especially had quite another form.

Fam. *Doridoxidae*. Nov. fam.

Forma corporis ut in *Doridibus*; sed branchia (dorsalis) nulla, et anus lateralis (non dorsalis).
Rhinophoria ut in *Doridibus*.

Bulbus pharyngeus fortis, mandibulis anticis fortissimis armatus. Radula dente mediano forti, pleuris multidentatis.

We know cladohepatic nudibranchiata in which the whole branchial apparatus with its hepatic lobes has disappeared; such is the case in the *Phylliroidae*, *Pleuroleuridae* and *Hedylidae*¹⁾. And others are found, the *Tritoniadae*, in which the branchial apparatus has remained without the hepatic lobes. It was almost to be expected that also among the holohepatic nudibranchiata forms without gills were to be found. And such a form we find in the below described new animal, which is also distinguished from all other holohepatica by the anus not being situated dorsally, but

¹⁾ R. Bergh, Die Hedyliden, eine Familie der kladohepat. Nudibranchien. Verh. d. k. k. zool. bot. Ges. in Wien. XLV. 1895. p. 1—12. Taf. I—II.



having moved down on the (right) side. The Doridoxidae form a transition to the Tritoniadae, a connective link between the holohaptic and the cladohaptic nudibranchiata.

The habitus of these animals is from the dorsal side quite like that of the Dorididae, in which latter the branchial cleft was especially strongly contracted; but this cleft and the gill itself are completely wanting, and the anus has moved from the dorsal side down on (the right) side of the body. Already this characteristic gives them a resemblance to the Tritoniadae, which form the outermost link of the Cladohaptica. And this resemblance is still greater by the fact that the strong bulbous pharyngus is provided with powerful mandibles situated on its fore side as in the Tritoniadae. By the presence of these mandibles¹⁾ the Doridoxidae are otherwise nearly related to the Bathydorididae, with which they also correspond with regard to the structure of the radula, this also showing median tooth-plates, a feature otherwise rather rare in the Dorididae.

Hitherto the family contains only the genus

Doridoxa, Bgh. N. gen.

and this genus contains only the one species, described below.

Doridoxa Ingolfiana, Bgh. n. sp.

Pl. II, figs. 3—15; Pl. III, figs. 1—3.

One specimen of this species was taken in 1895 at a depth of 55 fathoms, at station 34, i. e. on 65 17' Lat. N. 51 17' Long. W.

It was generally of a yellowish white colour, the back more whitish. The length was 12^{mm} by a breadth of 7^{mm} and a height of 5^{mm}; the length of the foot was 10.5^{mm} by a breadth of 4^{mm}; the breadth of the head was 5^{mm}, of which breadth 1.5^{mm} belongs to each tentacle; the height of the rhinophores was 1^{mm}, the breadth of the mantle-brim 0.75^{mm}. The consistency of the animal was rather soft.

The intestines were nowhere to be seen from without.

The form was oval, the hinder end a little more pointed (pl. II, fig. 3). The back was evenly convex, anteriorly between the rhinophores it joined the somewhat projecting hinder margin of the head; it was everywhere rather densely covered with small and quite small, semiglobular, and more flattened papulae. The margin of the hollows of the rhinophores was slightly projecting, everted and crenate; the (slightly projecting) club of the rhinophores was perfoliate; the dorsal brim was only a little projecting, the margin rather sharp, the lower side smooth. The head was rather large, somewhat flattened, with a rather projecting hinder edge, a little produced on either side; with rather large, roundish-lobelike tentacles; the outer mouth was round (pl. II, fig. 3). The sides of the body are only low before and behind, otherwise rather high, quite smooth; anteriorly to the right is seen the large genital papilla with the prominent little penis, and behind this the vulva (fig. 3); at the beginning of about the last fourth part of the length of the body was the projecting anal papilla, and a little before this the smaller renal papilla (fig. 3). The foot was powerful, but narrower than

¹⁾ In several families of the cladohaptic group quite similar mandibles are seen, in Bornella, Scyllaea, Phylliroidea, Compositulidae and Pleuroleuroidae.

the back, and projected only slightly from the hinder end of this; the rounded fore end was slightly broader than the other part, with a marginal furrow; the foot-brim was narrow; the hinder end only a little pointed (fig. 3).

The central nervous system (fig. 4) was rather flattened, white, chiefly as in the Doridae. The round cerebro-pleural ganglia (fig. 4a) were a little larger than the likewise round pedal ones (fig. 4b), the distinction between their two parts was not conspicuous; the chief commissures were rather short; the globular buccal ganglia (fig. 4c) joined each other immediately.

The eyes at the base of the rhinophores had a diameter of 0.10mm . The otocysts appeared to contain a not great mass of pale otoconia, no spicules at all were seen in the dorsal skin, or its papulae, nor in the leaves of the rhinophores.

The mouth-tube was short. The strong bulbous pharyngens (figs. 5,6) reminded as to its form somewhat of that in the Pleurophyllidiae. It was 3.25mm long by a breadth of 3mm and a height of 2.75mm . Its strongly convex fore side was covered by the large mandibles; from about the middle of the somewhat convex hinder side the oesophagus originated; the radula-sheath did not project externally. The fore side of the large and strong mandibles were (as in the Pleurophyllidiae) for the greater part covered by a muscular plate which was, however, rather thin. The mandibles (fig. 7) were amber coloured, only the masticatory edge was black brown; they were 2.5mm long, and their breadth taken together was 3.5mm ; they were rather bent, so that their height reached almost 1.5mm ; along the middle of their length they showed a smooth, not deep excavation. The hinge-part was rather short, as was also the masticatory process (fig. 7a); the masticatory edge was not narrow; it showed through its whole extent just to the hinge-part small roundish or angular facets (fig. 8) of a diameter of $0.0055\text{--}0.01\text{mm}$. The tongue (figs. 9,10) was broad and flat, and projected only a little in the buccal cavity; the little, forward and downward tapering radula was strongly and shining yellow. The radula contained 15 rows of tooth-plates; further back, in the somewhat bent radula-sheath, which was not to be seen from without, were 24 more rows, of which the three hindmost were not yet quite consolidated; the total number of the rows of teeth were thus 39. The eight foremost rows were very incomplete and the teeth worn; the foremost one contained only 6 and 7 toothplates on each side of the median one. The middle of the radula with the median tooth and two side-teeth were sunk a little under the level of the side parts. On each side of the median one appeared up to 36 lateral tooth-plates. With the exception of the two innermost ones and the very outermost ones they were of a strong yellow colour. The breadth of the clumsy median plates was 0.075mm by a height of 0.10mm ; the height of the two outermost lateral ones was $0.035\text{--}0.04\text{mm}$; then it rose quickly to 0.10 , and continued thus towards the rhachis, the two innermost lateral teeth were much lower (pl. III, fig. 1). The median tooth plates (pl. II, fig. 11 a; pl. III, figs. 1 a, 2 a) were short and clumsy, rather erect, with a strong, broad base, hollowed in the fore edge, and with a short, strong, a little pointed hooked part. The two first (innermost) lateral plates (fig. 11 b; figs. 1 b, 2 b) were of a deviating form with a quite short and pointed hook. The other lateral plates (figs. 12; 1,2) reminded as to their form more of the median plate, but the base was much smaller and the hook was longer. The 2—3 outermost lateral plates (pl. III, fig. 3 a) were feebler, and the hook more pointed.

The salivary glands were white, 3^{mm} long by a breadth of 0.75^{mm}, reaching to the foremost part of the stomach, the excretory duct was more than a third of the length of the gland.

The esophagus (fig. 6 a, 13 a) was rather short. The stomach (fig. 13 b) formed a longish bag 11^{mm} long, the innumerable longitudinal folds of which were distinctly to be seen from without. It contained an abundance of whitish food of indeterminable animal nature with a few imbedded larger oblong bodies resembling those in the *Meyonia*. From the hinder end of the stomach the intestine arose to the right, crossed the fore end of the liver, bent backwards, and ran a little sinuous to the anal papilla (fig. 13 c). Its inner side showed fine longitudinal folds, its cavity was empty.

The liver, the outside and inside of which was yellow, was a little hollowed to the left of the hinder end of the stomach, its hinder end that was a little narrower, was rounded; it was 5^{mm} long by a breadth of 3^{mm}; it opened by a round opening into the stomach. The yellowish biliary bladder (fig. 13 d), of a length of 2^{mm}, was on the left side of the stomach.

The heart was situated behind the basal part of the intestine. The blood gland was large, lying behind the central nervous system, partly covering the stomach, yellowish, 3^{mm} long by a breadth of 1^{mm} and a thickness of 0.5^{mm}.

The pericardio-renal organ (the renal syrinx) was situated under the rectum, a little more inwardly than the renal papilla, was melon-shaped, and showed the usual groups of longitudinal folds.

The hermaphrodite gland was whitish, and covered with its rather large lobes the uppermost and right side of the liver, especially in front; its large follicles contained large egg-cells and bundles of zoosperms. The anterior genital mass was large, 4.5^{mm} long by a height of 3.5^{mm}, and a thickness of 2.5^{mm}, it was situated under and to the right of the intestine. The last part of the spermatheca (fig. 14 b) was thick, and passed into the short, cylindrical (glans) penis (fig. 14 c); this latter, as well as the spermatheca, was without armature. The spermatheca appeared to be globular, its relation to the spermatocyst (fig. 15), which was filled with sperm, somewhat bent together, and about 1.5^{mm} long, was not to be determined. The mucous gland was lime-white, at the base of its duct was seen a larger, yellowish gray part (the albuminous gland?).

D. *Ingolfiana* var.?

Pl. V, figs. 29–30.

The bulbus pharyngens, of a length of 2.25^{mm}, was completely like that in the other specimen, only the end of the radula-sheath projected a little, and the muscular plate on the fore side of the mandibles was a little thicker. The mandibles were a little lighter, and the masticatory edge was only dark yellow; the secondary oral cavities were not small, and their opening rather wide; the masticatory edge as above. On the broad and flat tongue the slightly yellowish radula was seen containing 11 rows of teeth, in the radula-sheath 20 were found, of which the three hindmost were not fully formed; thus the total number of tooth-plates was 31. On each side of the median tooth up to 12 lateral tooth-plates were found. The median teeth were yellow, the lateral teeth almost colourless; the height of the median teeth rose to 0.075^{mm}. The median teeth were essentially of the same

form as above described, but had at the base of the hook a series of fine denticles (fig. 29). The lateral teeth were upon the whole somewhat more slender (fig. 30).

Future examinations must decide, whether we have here a new species, or only a variety.

Nudibranchiata cladohepatica.

R. Bergh, System der nudibranchiaten Gasteropoden. 1892. p. 999—1070.

Fam. Tritoniadae.

R. Bergh, System. 1892. p. 1066—1070.

Among the cladohepatic nudibranchiata this family appears to be the one most closely related to the holohepatic forms; the ramification of the liver otherwise peculiar to the cladohepatic forms, has disappeared, while the Tritoniadae in other respects have retained the essential exterior and interior characters of this group.

The representatives of this family are already easily distinguished exteriorly by their large frontal veil provided with appendages, and the spoon-shaped tentacles attached to it, further by their peculiar rhinophoria, and the branchial tufts on the dorsal edge. In the interior structure the always colossal bulbus pharyngens especially shows peculiarities; the strong mandibles on its fore end are closely resembling those in the Plenrophyllidiae, and like those they are coated with a strong muscular plate on the fore side; the strong radula with many rows and many teeth in the rows has broad, somewhat depressed median teeth with a clumsy denticle on either side of the short and clumsy hook, and the innermost lateral tooth is essentially different from all the others.

Hitherto the Tritoniadae include only two chief types, the real Tritoniae without, and the Marioniae with masticatory plates in the stomach.

A sub-group under the Tritoniae is formed by

Candiella, Gray.

R. Bergh, l. c. 1892. p. 1069.

In this form the frontal veil has on the margin rather long fingers (not short papillæ).

The hitherto known forms of this group have been of smaller size than the typical Tritoniae; in this respect the form described below, differs from the others.

Candiella Ingolfiana, Bgh. n. sp.

Pl. II, figs. 20—22; Pl. III, figs. 4—9.

On 61° 44' Lat. N., 27° 00' Long. W. (station 81) one single specimen was taken at a depth of 485 faths. (bottom temp. 6° 1). It was rather well preserved, only somewhat contracted and hardened, and behind on the left side was found a rupture with a prolapsus of the entrails.

The colour of the sole of the foot, the genital papilla, and the region of the mouth was somewhat yellowish; the other parts of the body were grayish blue, but the rhinophoria yellow. The length was 5^{cm} by a height of up to 1.4^{cm}, and a breadth of up to 1.6^{cm}; the breadth of the frontal

veil was 2^{mm}, its length 5^{mm}, half of which belonged to the fingers; the height of the sheaths of the rhinophores was 2^{mm}, of the branchial tufts up to 3^{mm}; the breadth of the sole of the foot was up to 1.4^{mm}, at the foot-brim up to 0.75^{mm}. — The animal seemed to have imparted a peculiar odour to the alcohol in which it was kept.

The form was as in other *Candiellae*. The animal was longish, highest in the middle, and sloping from there forward and especially backward where the back ultimately passed into the foot. The free edge of the frontal veil was a little notched in the middle, and had on each side of the notch 6 fingers, and outermost the only little conspicuous tentacle with its furrow. At the base of the veil were seen the somewhat projecting sheaths of the rhinophoria; the strongly retracted club was 2.5^{mm} high, and of the shape common in the *Tritoniæ*, resembling a sword-knot, and the rhachis of the hindmost leaf was prolonged in the usual way. The back was smooth; the edge of the back that only projected a little, had on each side 12–14 small and short-branched branchial tufts, of which the foremost one projected outside the sheath of the rhinophore. The sides of the body were rather high, a little convex, and a little sloping inward towards the foot; the genital papilla was situated about under the the fifth (right) branchial tuft, the anus under the eighth, and close above it the renal pore. Anteriorly the foot was rounded, with a strong marginal furrow; the foot-brim was narrow.

The peritoneum was bluish black, and continuations of its connective tissue penetrated everywhere between and wrapped the entrails.

The yellowish white central nervous system showed a rather closely adherent, dense, and finely black punctuated wrapping; as in other *Tritoniadae* it was rather flat, 4^{mm} broad. The cerebro-pleural ganglia were of oval shape, 2^{mm} long, a little broader anteriorly, the separation between their two parts was only little conspicuous; the roundish pedal ganglia were almost as large as the cerebral ones; the large commissures were half as long again as the breadth of the central nervous system. The buccal ganglia were oblong, 0.6^{mm} long, connected by a short commissure; the long-stalked gastro-oesophageal ones quite small, roundish.

The otocyst is situated closely before the quite short cerebro-pedal connective, containing a not large number of otoconia.

The large bulbous pharyngæus was 1.3^{mm} long by a breadth of 9^{mm} and a height of 7^{mm}, being thus one fifth of the whole length of the body; it was lying in a rather loosely attached veil-like wrapping. Its form and structure in all respects as in other *Tritoniæ*. The mandibles covered with the common thick muscular plate, were greenish yellow, only the hindmost part of the hinge, and the portion nearest to the masticatory edge were brownish; the length of the mandibles was 1.3^{mm}, by a breadth (behind) of 4.4^{mm}, and a height (of the convexity) of 3.5^{mm}, the length of the masticatory prolongation was 3^{mm}. The masticatory edge was slightly convex, even, of a breadth of up to 0.4^{mm}, under the magnifying glass, as it were, finely transversely striated; it had 8–11 series of short, round-edged columns, of a height of up to 0.10^{mm}, and a diameter of up to 0.08^{mm} (fig. 4), the series being somewhat displaced among each other; in the outermost series many of the columns were torn out, and many were worn away and upset more inwardly. — The pharynx was black, the buccal cavity grayish white. — The strong and broad tongue had at the base the powerful tectum radulae

measuring in length (from before backward) 2^{mm} ; behind this was seen the short radula-sheath with its flat hinder end¹); it was 3.5^{mm} long, 3.25^{mm} broad, and was to be seen on the outside of the bulbus pharyngens where it shone through with a reddish tint. The light yellow radula contained 35 series of tooth-plates, the radula-sheath 32, of which the three hindmost were not yet developed, the whole number of plates was thus 67. The length of the radula, when prepared off, was 9^{mm} , and the breadth up to 7^{mm} . The foremost 11 series on the tongue were more or less defect, and the tooth-plates more or less worn and broken; in the 6—7 foremost series only the median tooth and a few lateral teeth were left. The number of tooth-plates in a series rose in the back part of the radula to 85. The tooth-plates were of a very light yellow. The breadth of the oldest median tooth was 1.28^{mm} , that of the youngest ones about the same. The height of the innermost lateral tooth was 0.16^{mm} , that of the next one 0.20^{mm} , and of the third 0.24^{mm} ; the height of the lateral teeth rose to 0.30^{mm} , decreased towards the edge of the radula, and of the three outermost teeth it was $0.12—0.10—0.08^{\text{mm}}$. The median teeth (fig. 5 a) were of the broad and short form common in the Tritoniae, with a clumsy median tooth, and a still more clumsy denticle on each side of this. The clumsy and rather low first lateral tooth (fig. 20; 5) was very finely denticulated along one edge of the hook; the hook of the second lateral tooth was a little longer (fig. 21; 5), but, as all the others, without any trace of denticulation; they had all (fig. 22; 6) the form common in the Tritoniae, the hook decreased in height through the outer teeth (fig. 7).

The whitish salivary glands, parallel to the œsophagus, were longish ($7—8^{\text{mm}}$ long by a breadth of 2^{mm}), flat, highly lobed; the left one was lying on the black peritoneum, the right one under and behind the bulbus pharyngens, between this and the anterior genital mass. The efferent duct was almost as long as the gland itself.

The œsophagus was externally and internally black, 17^{mm} long, in its greatest length sack-like widened (to a diameter of 5.5^{mm}), with deep folds on the inside, empty; it opened into the hind part of the stomach, close to the short biliary duct. The stomach, likewise black on the outside, but gray on the inside, was almost globular, of a diameter of 7^{mm} , and for half its length situated in a hollow in the liver; in the hindmost part of the stomach before the opening of the biliary duct was seen a circle of strong, yellowish, longitudinal folds; the cavity of the stomach was empty. From the fore end of the stomach arose the intestine, externally black, internally gray, of a whole length of 18^{mm} by a diameter of $4—2^{\text{mm}}$, stretched over the anterior genital mass where it formed its curve, and continued somewhat thinner to the anal papilla; throughout almost the whole length of the intestine was seen, besides the fine longitudinal folds, the strong fold, rising to a height of up to 2^{mm} , that had already begun in the hind part of the stomach; also the cavity of the intestine was empty.

The hindmost visceral mass (the liver) was short-conical, broader in the hollowed fore end, with rounded hinder end, of a length of 15^{mm} by an anterior breadth of 12^{mm} , yellowish white, with a rugged surface, wrapped in a very abundant, black, loose, but rather adhesive connective tissue. From the liver itself a longish lobe, 10^{mm} long, stretched over the cardia between the œsophagus and the stomach, with the beginning of the intestine²).

¹) Comp. Malakolog. Unters. Heft XV. 1884. Taf. LXXII, Fig. 5 (Tritonia Hombergi).

²) In the black wrapping round the hindmost visceral mass a Gordius-like worm was found of a length of fully 10^{mm} by a diameter of 0.065^{mm} .

The hermaphrodite gland was only of a little lighter colour than the liver, which latter it covered with a thin coating, in its lobes were found ripe oogene cells and spermatozooids. The duct of the hermaphrodite gland projected freely from under the stomach, and ran along the inside of the anterior genital mass. This latter is also provided with a strong, strongly adhesive, black wrapping, penetrating deeply between its single parts; it is large, longish, 14^m long by a breadth of 7.5^m , and a height of 7^m . On the inside was seen farthest back the ampulla of the duct of the hermaphrodite gland which ampulla formed a couple of short windings; and before it was lying the black seminal vesicle with its long, big duct, and on its fore end the large bundle of the seminal duct. When stretched out the ampulla measured 8^m by a diameter of 2^m . The windings of the seminal duct that were closely attached to each other by the black, cobweb-like connective tissue, measured, when separated from each other and stretched out, 6^m in length by a diameter almost everywhere of 0.6^m . The seminal duct (fig. 9 a) opened in the top of the black, sacklike penis (praeputium) which was fully 6^m long by a diameter of 2.5^m (fig. 9 b.); the walls of the cavity were gray, and in the cavity was lying the white, tapering glans (fig. 9), measuring, when stretched out, 15^m , and to the very point pierced by the powerful seminal duct. The seminal vesicle (fig. 8 a) is, on account of its wrapping, black, as is also its duct; it is bag-shaped, 6^m long by a diameter of 2.3^m , completely filled with sperm; the powerful efferent duct (fig. 8 b) is somewhat curved; when stretched out it is 14^m long by a diameter of $1-1.5^m$. The albuminous-mucous gland formed far the greater part of the anterior genital mass; it was higher and thicker behind than before, showed chiefly longitudinal windings, and was, when free of its black veil, of a yellowish white colour. The vulva and the end of the penis-bag were especially strongly pigmented, and wrapped in black connective tissue.

This Candiella, the largest one hitherto known, must certainly be a new species, what is also indicated by details in the outer and inner structure.

Fam. *Atthilidae*, Bgh. N. fam.

Forma corporis fere ut in Tritoniadis, subelongata, subquadrilateralis. Velum orale non parvum, margine laevi, utrinque tentaculatum prominens; rhinophoria vagina margine bilobata retractilia, clavo simpliciter perfoliato. Dorsum appendicibus paucis simplicibus(?) triseriatis praeditum; margine prominulo serie simplicis branchiarum arbusculiformium(?) instructo. Anus et porus renalis laterales. Podarium sat latum, antice rotundatum.

Bulbus pharyngeus magnus. Mandibulae facie anteriori bulbi impositae, massa musculari fortissime, sat elongatae, processu masticatorio nullo, margine masticatorio laevi. Lingua lata, radula multiseriata; rhachis dente angusto hamo elongato; pleurae multidentatae, dente intimo hamo denticulato, reliquis hamiformibus edentulis.

Hepar non ramificatum. Penis inermis.

The *Atthilidae* resemble, as to their common structure, the *Tritoniae*, but are, however, already in the exterior sufficiently marked off from those. The frontal veil is quite different from that of

the Tritoniae, and does not show the tentacles, peculiar to those. The rhinophores are of a quite different structure. The back is not, as in the Tritoniae, without appendages, but has several series of such; the somewhat projecting dorsal edge appears to have a series of low branchial tufts, resembling those in the Tritoniae. The anus, the renal pore, and the foot are as in the Tritoniae.

The bulbus pharyngeus is very strong as in the Tritoniae, and as in those the mandibles are lying on the fore end of the bulbus, and are covered by a thick muscular plate; but they have no masticatory continuation, and the masticatory edge is smooth. The tongue is broad, and the radula bears a rather large number of series of teeth, and these series contain many tooth-plates. The median teeth are quite different from those in the Tritoniae, longish, with a protracted denticulated hook; also the lateral teeth are of a somewhat other shape, the innermost one with a denticulated hook. — Also with regard to the liver, and the relation between this and the hermaphrodite gland, there seems to be essential differences between the Atthilidae and the Tritoniadae, while both families otherwise seem to agree with regard to the genitalia.

The Atthilidae seem (as the Tritoniadae) to be rather voracious beasts of prey.

Hitherto the family comprises only the one genus

Atthila, Bgh. N. gen.

with the one species

Atthila Ingolfiana, Bgh. n. sp.

Pl. III, figs. 10—26.

At station 40 i. e. on 62° 00' Lat. N., 21° 36' Long. W. one single specimen was fished from a depth of 845 faths, where the temperature was 3°3.

It is stated to have been, when living, pink or of a pale flesh-colour. Preserved in 70% alcohol it was upon the whole of a whitish or slightly yellowish white colour. Its length was 3.2^{cm} by a breadth of up to 1.7^{cm}; the breadth of the frontal veil was 10^{mm}, the height of the sheaths of the rhinophores 3^{mm}; the length of the foot was 27^{mm} by a breadth of up to 10^{mm}, the breadth of the foot-brim was 3^{mm}. — The specimen was somewhat curved and contracted, the back with its edges somewhat rubbed.

The form was somewhat longish, broader before, evenly narrowing and sloping backward, upon the whole rather like the form in the Tritoniae. The frontal veil (fig. 10) was broad with smooth edges, and its rounded, somewhat tentacle-like lateral ends projected 2.5^{mm}, while its free upper margin was 3^{mm} broad. Behind the frontal veil, adjoining the fore end of the dorsal margin, the rhinophores were seen; their sheath stood out with a two-lipped edge (fig. 11), the hinder lip low and convex, the former one seen as a somewhat tapering lobe, 2.5^{mm} long; in the depth between both the point of the club was distinguished; this latter was reddish gray, (highly contracted) 2.5^{mm} high, rather short-stalked, with about 30 broad leaves (on either side), containing a number of highly retractive bag-glands, of a length of up to 0.04^{mm}. The back evenly convex, covered with small, whitish papillæ; as far as I was able to discern, 3 series of such papillæ were found, a median one with 5, and on either side a lateral one with 4—5 papillæ; only a single one was quite preserved, and was

seen to be cylindrical (fig. 3 b) and of a height of 3^m . The dorsal margin projected, about in the same way as in *Tritonia*, and appeared to have been covered with branchial tufts, resembling those seen in that family, only a few ($\approx 1^m$ high) remnants of these tufts were left. The sides of the body were as in *Tritonia*, rather high, and, on account of the projecting dorsal margin, a little bowed and sloping inward; in front the genital papilla was found in the common place as in *Tritonia*, here with the glans penis stretched forth; a little before the beginning of the last third of the length of the body, and somewhat upward the anal papilla was seen projecting 1.5^m ; about midway between this and the genital papilla the minute renal aperture was seen. The foot is powerful; its fore end (fig. 10) rounded, with a slight marginal furrow; the foot-brim of a breadth of up to 3^m ; the back and foot were coalesced quite to the point.

The visceral cavity reached to the beginning of the last fourth of the length of the body.

The white ($1-5^m$ broad) central nervous system (fig. 12) showed the cerebro-pleural ganglia to be roundish, connected with a quite short commissure, with no distinct bordering between the two parts; the pedal ganglia scarcely smaller than the former, of an oval contour; the lower commissures rather long (fig. 12 d). The buccal ganglia were of an oval contour, connected by a commissure, almost six times the length of the ganglion (fig. 12 e).

The otoeysts were situated behind the pleuro-pedal connective (figs. 12, 13) between the ganglia; they had a diameter of 0.14^m , and contained a few (ca. 10) clear, round, and oval otoconia of a diameter of $0.035-0.04^m$. The skin had no larger spicules.

The bulbous pharyngeus was large and powerful, somewhat resembling that in *Tritonia*, but shorter, 6^m long by a height and breadth of 5^m . In front it is (fig. 14) somewhat narrower, and foremost on the upper side it is higher (on account of the hinge-part of the mandibles); behind this projecting part the wide pharynx is found, and behind this the short and broad radula sheath (fig. 14); the margin of the upper side corresponds to the outer margin of the mandible, and below this (above on the side of the bulbous pharyngeus) a hollowing was seen. The labial disk is narrow; behind and outside of it is found, quite as in *Tritonia*, the powerful muscular plate resting on the fore side of the mandibles. These latter (figs. 14-17) are of a light amber-colour, 5.5^m long by a breadth of 1.25^m , at the hinder end of 2.25^m ; the height of the convexity about 2^m ; they were rather thin, nor was the hinge-part thick, thinner as well as lighter in the outer hinder half (fig. 17). The somewhat upwardly directed hinge-part is more narrow, the hinder end broader and emarginate in the middle (fig. 16); a masticatory continuation was completely wanting, and the masticatory edge was quite smooth throughout its whole length (fig. 17). The cheeks join the inside of the mandibles in their whole length; only foremost in the little mouth-cavity a short stretch (fig. 14) of the hinge-part of the mandibles is uncovered. The mouth cavity is almost quite filled out by the (highly contracted) large, high, and broad tongue (figs. 14, 18), the middle part of which is through its whole length (fig. 18) covered by the light yellowish, rather broad radula, which farthest back continues in the short and broad radula-sheath (2.5^m long, 4.5^m broad) (fig. 14). The tongue has 21 series of teeth, further back 12 series were seen, two of which were not yet fully developed. Thus the total number of series of teeth was 33. The number of tooth-plates on either side of the median tooth rose to 120. These were of a very light yellowish colour. The length of the median tooth-plates (on the hind

part of the tongue) was almost 0.12^{mm} by a breadth of 0.065^{mm} and a height of 0.06^{mm} ; the heights of the three innermost lateral plates were $0.12-0.13-0.14^{\text{mm}}$, the 10th measured already a height of 0.20^{mm} , and the height rose to 0.22^{mm} , whereupon it again decreased outward, the height of the three outermost being 0.08^{mm} , 0.06^{mm} , $0.035-0.04^{\text{mm}}$. The median tooth-plates (figs. 19, 22 a) showed a base, narrow anteriorly, broader posteriorly, from which rose a tapering hook, denticulated through the greater part of its length. The first lateral tooth (figs. 20, 21, 22 b) was denticulated on the inside of the hook. All the other tooth-plates showed no denticulation on the somewhat bent and tapering hook (figs. 23, 24); the outermost one was quite low (fig. 25 a).

The whole visceral mass, 23^{mm} long, up to 13^{mm} broad, was at the hinder end short-conical, and showed, when viewed from above, foremost the large, light grayish yellow liver, prolonged along the left side of the mass just to the hinder end; this prolongation has on the right side the hermaphrodite gland, and along part of the right edge the rectum.

The salivary glands were seen as a large and flat, yellowish mass on either side of the hinder part of the bulbus pharyngens.

The oesophagus was short, and opened into the stomach that was completely covered by the liver. This stomach was 11^{mm} long by a breadth of 6^{mm} , with rather thin walls; to the right it was attached to the anterior genital mass with the exception of the region of the cardia, otherwise it was everywhere enclosed by the firmly adhering liver; its inside showed strong longitudinal folds; on the left side was seen a rather wide biliary opening, and on the right side more downwards a smaller one. To the right from the hinder end of the stomach rises the intestine, which is in its foremost, transverse course completely enclosed by the liver, then proceeds freely, and runs down towards the foot along the right side and the lower side of the hermaphrodite gland, running between this and the liver up towards the anal papilla, closely attached to both of those; the length of the intestine was 22^{mm} , its diameter at the base 5^{mm} , else $4-3.5^{\text{mm}}$; in the first part of it a long, beautiful, feather-shaped fold was seen. — The stomach and especially the intestine were distended by strongly brown-red, animal contents, whose colour was due to enormous masses of long finely-thorny and -rugged, reddish spicules, perhaps originating from a form of Alcyonidae; further was found in the stomach a canary-coloured, globular body, on one side a little hollowed in an umbilicate manner, of a diameter of 4^{mm} , the nature of which could not be made out.

The large, light grayish yellow liver covered with a layer, before somewhat thicker, behind thinner, the oesophagus, the stomach, the anterior genital mass, and part of the intestine; its foremost part was on either side attached to the wall of the body. The liver continues along the left side and the lower side of the hermaphrodite gland just to its point; in this part it rose to the largest thickness, up to 3.5^{mm} .

The pericardio-renal organ, of a length of 2^{mm} , was situated near the anus.

The yellowish white hermaphrodite gland was large, 16^{mm} long by a breadth of 6^{mm} and a thickness of 5^{mm} ; before and behind a little narrower than in the middle; a little curved longitudinally; somewhat convex on the upper surface, concave on the lower one; with superficial furrows; finely gritty; of the common structure. In the endlobes were large oogone cells and zoosperms. — The anterior genital mass was from above hidden by the liver, situated before the intestine, attached to

the right side of the stomach; it was of an oval roundish shape, 8^{mm} long by a breadth of 6^{mm} and a height of 5.5^{mm}, whitish and yellowish white. In a hollow on the hinder end of the mucous gland the intertwined, opaquely yellowish gray ampulla of the duct of the hermaphrodite gland was lying, measuring, when stretched out, 12^{mm} in length by a diameter of up to 2^{mm}; on the fore end were seen the windings of the spermiatic duct forming a little coil; the glands that projected from the penis-bag, was almost cylindrical, 1^{mm} long by a diameter of 1.75^{mm}. Behind the spermiatic duct and partly covered by it was the spermatocyst, bent double in the middle, 4^{mm} long when stretched out, its duct being of about the same length. The mucous-albuminiparous gland was whitish and yellowish white.

Fam. Dendronotidae.

R. Bergh, System d. nudibranchiaten Gasteropoden. 1892. p. 1018—1051.

The Dendronotidae form a group, rather well marked off by its peculiar forms; in this respect, however, but still more by the inner structure, and especially by the structure of the pharyngeal bulb, it proves to be related to the Aeolidiadae.

The animals belonging to this group, have hitherto only been found in the northern temperate, and especially in the cold seas.

The rather strongly limited family includes only two genera, the real *Dendronotus* and *Campaspe*, which latter seemed to be distinguished from the former by a simpler structure of the frontal appendages, of the rhinophoria, and of the dorsal papillæ. It is, however, still to be doubted, whether the two generic groups will not prove to be passing into each other, and the examination of the following form seems already to imply such a result.

Dendronotus, Ald. et Hanc.

R. Bergh, die Nudibranchien gesammelt während der Fahrten des Willem Barents in das nördliche Eismeer. 1885. p. 19—33 (Bijdragen tot de Dierkunde. Afl. levering XIII. Amsterdam. Onderzoekingsreizen van de Willem Barents Expeditie. Gedeelte IV (1886) 1888).

A little series of species has been referred to this genus, but they are likely to be, for the greater part, reduced to varieties of the typical species. The form examined below, seems, however, to be distinctly specifically different from the typical one.

1. *D. robustus*, Verrill.

D. robustus, Verrill. Americ. Journ. I. 1870. p. 405. Fig. 1.

—, V. Catal. of marine moll. added to fauna of New Engl. Trans. Conn. Ac. V, 2. 1882. p. 550.

D. robustus, G. O. Sars. Bidr. til Kundsk. om Norges arktiske Fauna. I. Moll. reg. arct. Norv. 1878. p. 315—316. Tab. 28, Fig. 2; Tab. XV, Fig. 15.

D. robustus, V. R. Bergh, die Opisthobranchien. Rep. on the dredging oper. off the West Coast of Central-Amer. ... by ... Albatross. (Bull. of the Mus. of compar. zool. at Harvard college. XXV, 10). 1891. p. 141—141. Taf. II, Fig. 6—9; Taf. III, Fig. 1.

Pl. III, figs. 27—29; Pl. IV, figs. 1—5.

This species, which, like the typical one, is distributed over the northern parts of both the Atlantic and the Pacific ocean, is already sufficiently marked by its large and broad frontal veil, and by its simply fingered sheaths of the rhinophores (and the want of appendages at the outside of these). Constant differences in the inner structure between this and the typical species have hardly been pointed out.

On the 5th of August 1895 a single specimen was fished on Dyrafiord (on the west coast of Iceland), which was killed by means of anhydrous acetic acid, and preserved in 70% alcohol.

The well preserved specimen that was scarcely contracted to any appreciable degree, was 4^{cm} long, by a height of the body of 1.2^{cm}, and a breadth likewise of 1.2^{cm}; the breadth of the frontal veil from one point to the other 2.5^{cm}, the breadth of the head proper under the veil 10^{mm}; the height of the sheath of the rhinophores with their snips 6^{mm}, the height of the branchial tufts up to 7^{mm}; the length of the foot almost 3.5^{cm} by a breadth of up to 1.1^{cm}; the breadth of the foot-brim 3.5^{mm}, the length of the tail 10^{mm}¹⁾. — The colour was whitish; but a few of the fingers of the frontal veil, the club of the rhinophores, the stem of some branchial tufts, and the genital papilla still showed remnants of an earlier red colour²⁾.

The form was as before described by me. The head proper, which was strongly convex, somewhat half-moonshaped, showed below the vertical mouth-slit, while the frontal margin had a series of sessile or quite shortstalked papulae (fig. 1). Behind the head the enormous (from before backwards almost 5^{mm} broad) frontal veil was seen projecting strongly on the sides with its cleft ends; it bears a series of tentacle-like, unequally large appendages of a length of up to 4—5^{mm}, and set with small knots or short branches (fig. 1). Also between the frontal veil and the frontal margin of the head small papulae are seen here and there. The sheath of the rhinophores as usually high (fig. 27), at the top running into 4—5 unequally large, fingershaped continuations; the club as usual; no appendage at the base of the sheath. On the right margin of the back were seen four branchial tufts, and on the left margin six more irregular ones; the foremost were bipartite, the stems at the base separated or nearly united, and outside of these still a satellite like a branchial tuft was seen, in a few instances coalesced with the branchial tuft proper; this satellite was wanting in the hindmost branchial tufts. On the tail were seen medianly three unpaired gill-like appendages, but only the foremost one showed any trace of leaves (fig. 2). Closely in front of the right second branchial tuft the anal papilla and the renal pore were seen. The back was quite smooth, without any papulae or small appendages. The genital papilla as usual strong, with conically projecting praeputial papilla in front, and behind this a bent, strong fold covering the vulva.

The intestines were nowhere distinctly seen from without, only on the sides they shone through with a grayish tint.

The visceral cavity reached to the base of the tail.

The central nervous system was milk-white. In the cerebro-pleural ganglia the two

¹⁾ Harrington, in the biological section of New York Acad. of sc. (9th of Novbr. 1896), pointed out that the large, pale specimens of *Dendronotus* from Puget sound could reach a length of full 25^{cm}. *Comp. Anatom. Anz.* XIII., 1897. p. 95.

²⁾ According to Sars (l. c. p. 315) the living animal is said to be light red (*laete rufescens*) with numerous scattered white dots.

ganglia were strongly marked off from each other, almost globular; the cerebral ones were a little larger than the pleural ones. The pedal ganglia proceeding downward and inward from the mass of the cerebropleural ganglia, were of a short-ovate form, a little larger than the cerebral ones, connected by a double commissure, which was shorter than the diameter of the ganglia. The buccal and gastro-oesophageal ganglia as in the typical species.

The eyes of a diameter of 0.11^{mm} , with a black pigment, and dark yellow lens of a diameter of 0.03^{mm} .

The bulbus pharyngens was 6^{mm} long, by a breadth of 5.5^{mm} , and a height before of 4^{mm} , behind of 3^{mm} ; its form was as in the typical species. On each side of the round labial disk was seen inwardly a narrow, irregular, dirtily yellow stripe, which was formed of straight or irregularly bent, only little stiff, unequally long, unequally thick, colourless or slightly dirtily yellowish staves (fig. 3) of a length of at least 0.16^{mm} by a breadth of 0.007^{mm} . The mandibles were about as long and high as the bulbus pharyngens, lemon-coloured, only in the hinge-part of a black-brown colour. The projecting portion in front and above together with its prolongation as in the typical species; the masticatory process short with a not large number (at most ca. 50) of denticles which only reached to a height of 0.04^{mm} , and were rather worn and blunt. The secondary (supplementary) oral cavities were rather large, and their opening not narrow. The tongue as usual short, powerful, and keelshaped, with a long foremost, and short upper edge (fig. 28). In the radula, which on account of the median teeth is yellow, were counted on the fore edge of the tongue 11 series of tooth-plates, and marks after several that had fallen off, and on the short upper edge three series; the continuation of the radula in its sheath in the greatest length light red, and containing 16 series of tooth-plates, of which the two hindmost ones were not yet developed; the total number of series was thus 30. The foremost series were very incomplete, and most of the teeth on the tongue were much worn. The breadth of the oldest median teeth was 0.18^{mm} , in the hinder part of the tongue it rose to 0.22^{mm} , and upon the whole it rose to 0.29^{mm} . The strongly coloured median tooth-plates had a strongly projecting hook, on this and to both sides of it was found a not very large number (most frequently about 25) of not very strong denticles (fig. 4). The number of the almost colourless lateral tooth-plates varied from 13 to 15; the innermost plate was a little smaller than the following one, they decreased in size outward, and the two outermost ones, especially the very outermost one, were small; none of them showed (through the whole length of the radula) any trace of denticulation (fig. 5)².

The salivary glands were as in the typical species.

The oesophagus in the first (3^{mm} long) part is rather narrow, then widening and with numerous longitudinal folds that shine through on the exterior, running on and between the two anterior livers, altogether about 14^{mm} long. The thinwalled stomach, which is also provided with numerous longitudinal folds, is almost globular, of a diameter of 5^{mm} , and situated before the principal

² In the two specimens of *D. robustus* that I have examined earlier, no traces of such a prehensile ring were seen, and only in 1 out of 12 examined individuals of *D. arborescens*; in a specimen of *Dendr. Dalli* the prehensile ring was not wanting, but in a single specimen of *D. purpureus*.

³ Verrill, as well as G. O. Sars state the lateral teeth also to be quite or almost quite without denticulation; on the contrary the specimen earlier examined by me, showed a slight and irregular denticulation. The denticulation of the lateral teeth of the *Dendrotopilia* is upon the whole always much varying.

liver, between and on the two anterior livers; near the pylorus it receives in front and below two short and wide biliary ducts from the anterior livers, and behind a similar duct from the principal liver. To the right and upward the stomach opens into the intestine; this was in the first part much distended (wider than the stomach), passes over the hindmost part of the right anterior liver, bends downward along, and is attached to, the anterior genital mass, forms a large curve on the right side of the principal liver, and then rises to the anal papilla; the whole length of the intestine was 2.75^{cm} by a diameter generally of 0.75—1.5^{mm}; the inside of the intestine showed numerous longitudinal folds, of which one was higher than the other. — The stomach and the foremost (distended) portion of the intestine was filled with abundant, white and gray, black-dotted contents consisting of animal substance, the greater part of which could not be determined, mingled with pieces of Copepoda, bristles of Annelida, cnidæ, and grains of sand.

Two anterior livers and a principal liver were found as usual, but separated from each other to a smaller degree than is otherwise the case in the Dendronotidae. They were all of a dirty yellow colour, very strongly lobed, and the lobes loosely connected; I did not succeed in substantiating the existence of liver-branches going into the interior of the branchial tufts. The two anterior livers were somewhat depressed, joining each other on the lower side of the stomach; from as well the right as the left one a conical continuation, 4—5^{mm} long, runs up towards the base of the first branchial tuft. The principal liver, together with the hermaphrodite gland which rested on and was loosely attached to it, formed a conical mass, 18^{mm} long, and, in front, 9^{mm} broad, the fore end of which showed deep impressions of the stomach and the anterior genital mass. It is possible that the fore end of the liver passed directly into the two anterior livers.

The large, flaccid ventricle of the heart was 45^{mm} long. The whitish pericardio-renal organ 2^{mm} long, of the usual structure¹⁾.

The large, yellowish white hermaphrodite gland rises with its fore end a little over the liver, along which it runs to its hinder end; it is composed of small, mostly roundish finely gritty lobes, and in the lobules (the grits) there are ripe oogene cells and spermatozooids. The anterior genital mass was large, a little compressed, 8^{mm} long, by a height of 8^{mm}, and a thickness of 4^{mm}; on the upper edge was seen in front a bundle formed by the windings of the spermatie duct; partly covered by this on the right side of the mass was the smaller bundle of the windings of the prostate gland, and the spermatie vesicle; and behind those the closely set, corkscrew-like windings of the ampulla²⁾ of the duct of the hermaphrodite gland. The male branch of this passes directly into the prostate gland formed by the numerous windings of the spermatie duct; it was a little compressed-globular, of a diameter of 2^{mm}. The freely projecting spermatie duct forms a larger bundle of loosely connected windings measuring, when stretched out, about 4^{cm}. The retracted, thinwalled praeputium had a length of 6^{mm}; the strongly contracted (glans) penis was 4^{mm} long, conical (fig. 29). The pear-shaped spermatheca (2^{mm} long) and the long vaginal duct as in the typical species. The greater part of the anterior genital mass is formed by the powerful, limewhite and white mucous gland, on its right side of a more gray portion (the albuminous gland).

1) Comp. R. Bergh, Nudibranch. . . . des Willem Barents. 1885. Taf. II, Fig. 24 b.

2) Comp. l. c. 1885. Taf. II, Fig. 26.

In 1860 were further taken, on 66 35' Lat. N., 23 47' Long. W. (station 129), from a depth of 117 faths (temp. 6.8). 2 specimens, which were strongly distorted by being preserved in alcohol. They showed here and there strong traces of a purple colour, and had a respective length of 3.5^{cm} and 2.3^{cm}. The common appendages of the frontal veil were reduced to two not very distinctly separated rows of knots or low papillae, and only the lateral ends of the veil projected strongly and in a celt manner; there was no tuft at the base of the simply fingered sheaths of the rhinophores; the larger individual had 6, the smaller one 3 pairs of branchial tufts.

2. *Dendron. arborescens* (O. Fr. Müller).

Sm. R. Bergh, die Nudibranchien des Willem Barents . l.c. 1885. p. 25—33. Taf. II, Figs. 12—28.

As well in 1895 as in 1896 several specimens were fished of this species, that is distributed both in the eastern and western parts of the Atlantic, from the Polar sea to the bay of Biscay, and also is found in the Pacific.

On 66 35' Lat. N., 55 54' Long. W. (station 31) 2 specimens were obtained from a depth of 88 faths. (temp. 1.6), one of which had a length of 4^{cm}, by a height of 1.3^{cm}, and a breadth of 0.7^{cm}; in the other specimen the corresponding measures were 2—0.5—0.45^{cm}. The frontal veil had in the former specimen 12 appendages, in the latter 8; the former had 8, the latter 5 pairs of branchite.

On 65 17' Lat. N., 54 17' Long. W. (station 34) three individuals were taken from a depth of 55 faths, measuring in length 2.4—2.2—1.3^{cm}; they had all six pairs of branchial tufts.

On 65 31' Lat. N., 54 31' Long. W. (station 34), on a depth of 68 faths. (temp. 0.2) was finally taken two specimens. One of them was 2^{cm} long; the other (the frontal veil of which was quite bitten away, and the bulbus pharyngens laid bare and projecting) measured only 1.4^{cm}; the former had 8 appendages on the frontal veil and 7 pairs of branchial tufts, the other only 6.

All these (7) individuals were of a yellowish white colour. By my earlier examinations I have found, in 13 out of 28 individuals, 8 appendages on the frontal veil, and I never found more than 10 appendages; one of the 7 here examined had 12 such. The number of branchial tufts in the earlier examined specimens was generally 6, and did not exceed 7; in one of those here examined, 8 tufts were found on each side. The anal papilla was in these, as in the earlier examined specimens, always situated between the first and the second branchial tuft.

Fam. *Aeolidiadae*.

Subfam. *Coryphellidae*.

R. Bergh, System d. nudibranch. Gasteropoden. 1892. p. 1027—1029.

The *Coryphellidae* have long, simple (not perfoliated) rhinophores (*Himatella* only forming an exception in this respect). The radula has three series of tooth-plates, and the lateral teeth are denticulated. The penis is without armature.

The family comprises the genera *Coryphella* with lengthened, slender body, and a masticatory edge of the mandibles bearing several rows of denticles; *Goniöolis*, which is more clumsy with a broad head with strong rhinophores; and the nearly related *Chlamylla* with its projecting dorsal brim, its scarcely denticulated masticatory edge, its scarcely denticulated lateral teeth, and a developed prostate gland; the genus *Himatella*, finally is separated from the others by its perfoliated rhinophores.

Coryphella, Gray.

R. Bergh, l. c. 1892. p. 1027—1029.

A series of species of this genus have been described, but great part of these, surely, will disappear as being synonymous.

They belong for the greater part to the more cold and temperate parts of the sea.

Coryphella sp. (anonyma).

Pl. V, figs. 14—16.

In 1895 two specimens were taken on 66°35' Lat. N., 55°54' Long. W. (station 31) at a depth of 88 faths (temp. 1°6), one 2^{cm}, the other 1·5^{cm} long; preserved in alcohol they were quite yellowish white.

In the larger specimen the body was 4^{mm} high, 7^{mm} broad; the highly contracted tentacles and rhinophores had a length of only 3·5^{mm}, the papillæ rose to a length of 4·5^{mm}; the foot was 4·5^{mm} broad, of which 1·5^{mm} belonged to the footbrim, moreover the corners of the foot projected 1·5^{mm}; the length of the tail was also 1·5^{mm}. — In the back of the neck the central nervous system with the black eyes shone through, on the right side of the body the white anterior genital mass did so.

The form was as usual. The papillæ closely set on the lateral parts of the back, were indistinctly arranged in transverse rows, and these rows, perhaps, were gathered into three chief groups, the rows containing scarcely upwards of 4—6 papillæ; the papillæ were firmly attached, lengthened-conical. The projecting anal papilla was situated under the middle of the length of the dorsal edge, the fine renal pore midway between this and the genital papilla.

The cerebro-pleural ganglia were angular-oval, with a distinct transverse furrow; the roundish pedal ones were a little larger than the pleural ones, the commissures between them rather short. The nerve-cells, especially those of the pleural ganglia, were very large, and rose to a diameter of 0·26^{mm}. — The almost sessile eyes had a diameter of 0·12^{mm} with a large yellowish lens; the otocysts were only a little larger than the eyes, with many clear otoconia.

The bulbous pharyngeus was 3^{mm} long, by a height of 1·75^{mm}, and a breadth of 2^{mm}; of the common form, the radula-sheath only slightly projecting. The light yellow mandibles were of the same length as the bulbous; the hinge-part was not strong; the masticatory process short; the masticatory edge with 4—5 rows of rounded teeth (fig. 14) rising only to a height of 0·009^{mm}. The secondary oral cavities were rather wide, but their opening rather narrow. The tongue of the common form, the radula colourless. The median tooth-plates were yellowish in the basal part, otherwise the tooth-plates were almost colourless. The height of the median teeth on the hinder part of the tongue

— 0.008^m , the length 0.21^m ; the length of the lateral teeth 0.26^m (the oldest only measured 0.20^m), and their height 0.09^m . On the tongue were seen 12 series of tooth-plates, and in the radula sheath 10 series, two of which were not fully developed; thus the whole number of series was 23. The median tooth-plates (fig. 15) had 6—7 denticles on either side of the only slightly projecting point. The lateral plates had 9—12 denticles on one edge (fig. 16).

The oesophagus was of the same length as the bulbus pharyngeus.

I am not able to decide whether this form is new, or is to be referred to one of the species already described.

Coryphella sp.

Pl. IV, fig. 20; V, figs. 11—13.

Of this form one specimen was taken on Isafjord on the 7th of June 1895, and preserved in 70% alcohol.

This individual was 9^m long, by a breadth of 2.5^m and a height of 3^m ; the length of the rhinophores and the tentacles was 1.5^m , of the dorsal papillæ 2.5^m ; the breadth of the fore end of the foot with its corners projecting in a fingerlike manner, was 2.25^m . — The colour was now only whitish with strong remnants of a dark brown pigment, especially on the back and sides.

The form was as in other *Coryphellæ*. The head was large; the papillæ (which had for a great part fallen off) appeared to be gathered into four groups that only seemed to contain few series, and few papillæ in each series. The anal opening was at the hind end of the second group of papillæ, in the dorsal edge.

The bulbus pharyngeus was 2^m long, of the common form; the secondary mouth cavities were rather large, their hind wall black-brown, their opening wide. The mandibles were yellowish, with a darker hinge-part, the masticatory edge had a series of (about 40) denticles mostly truncate (fig. 11), and inside of these several irregular series of low tubercles (fig. 11). The tongue was of the common form, with 5 series of tooth-plates, further back 9 series were found, two of which were not yet consolidated; thus the total number of series was 14. The median tooth-plates were yellow, the lateral ones almost colourless. The length of the median plates was 0.20^m , by a breadth of 0.10^m , and a height of 0.08^m ; the length of the lateral ones was almost 0.14^m . The median tooth-plates (figs. 12a, 13; 20a) were of the common form, with 5—6 powerful denticles on each side of the short, a little bent point. The lateral tooth-plates (figs. 12b; 20b) had the common form, with a less deep notch in the fore end, and commonly with 12—13 denticles.

This *Coryphella* seems scarcely to be identical with the preceding one, the lateral teeth respectively being too different for that.

Cor. salmonacea (Couth.).

Coryphella salmonacca (Couth.). R. Bergh, anatom. Bidr. til Kundsk. om Aeolidierne. Kgl. D. Vidensk. Selsk. Skr. 5. R., naturv. og mathem. Afdel. VII. 1864. p. 227—237. Tab. IV.

Pl. IV, figs. 18—19; Pl. V, figs. 2—8.

To this species may with rather great certainty be referred 3 specimens, taken on 65°34' Lat. N., 54°31' Long. W. (station 29) at a depth of 68 faths (temp. 0°2). — One large individual was quite eviscerated, of the other the bulbus pharyngens was taken.

According to an accompanying note the living animals were white with brown dorsal papillæ¹). The specimens that had been preserved in alcohol, were as a rule of a yellowish white colour.

The length of the two large individuals was now 2.5^{cm}, while the little one only measured 1.5^{cm}; the breadth of the body was in the two former 8^{mm}, in the latter 3.5^{mm}, the height of the body respectively 7^{mm} and 3^{mm}. In the large specimens the tentacles had a length of 5^{mm}, the rhinophores of 6^{mm}, and the dorsal papillæ of up to 3.5^{mm}; the foot rose to a length of 6.5^{mm} and a breadth of 5.5^{mm}, the corners of the fore edge were only little produced, the foot-brim was narrow, the tail short.

The form was as usual. The head was as before (l. c. pl. IV, figs. 34, 40) described. The not broad, papillose lateral parts of the back showed close-set, indistinctly separated, and often displaced transverse and oblique series of papillæ, the series mostly containing 4—6 papillæ. The papillæ were lengthened-conical, and did not easily fall off. — From the region of the strong genital papilla the intestine was seen very distinctly shining through in its direct course to the anal papillæ, projecting at the dorsal edge a little behind the middle of the length of the body; the fine renal pore was seen (above the intestine) midway between the genital and the anal papilla. — The foot was powerful, rather broad.

The white central nervous system was as before (l. c. fig. 41) described by me; the right pleural ganglion sent forth a rather long N. genitalis forming a rather large ganglion (of a diameter of 0.24^{mm}) with one large cell (diam. 0.16^{mm}) and several smaller cells.

The almost sessile eye situated in front of the cerebro-pedal connective, is globular, of a diameter of 0.12^{mm}. Close behind the eye the otocyst is seen of a diameter of 0.14^{mm} with a not great number of clear otoconia.

The bulbus pharyngens is large and powerful, in the two large individuals of a length of 5.5—6^{mm}, by a breadth of 4—4.5^{mm} and a height of 3.25^{mm}. Its form was as has earlier been described (l. c. figs. 1—3); the labial disk large, the radula sheath projecting in a knoblike manner; in situ the mandibles were seen of a light grayish brown colour. They were of the earlier (l. c. figs. 4—6) described form, greenish yellow with a not strong hinge-part, short and powerful masticatory process; the masticatory edge rather broad with mostly 8—9 series of obtuse or, on the edge itself, pointed denticles (fig. 2). The secondary oral cavities were not small, but their opening narrow (comp. l. c. figs. 4, 10); their hinder wall is, for the greater part, covered with a strong, yellow cuticle, crossed

¹) According to the MSS of the Greenland investigator Møller (comp. l. c. 1864. p. 228) the animals are said to be semitransparent, pink, with gray-brown or red papillæ with white point.

by parallel, curved lines. The tongue is as earlier described (comp. i. e. figs. 14—17); the shining, greenish yellow radula contained in one specimen 13 series of teeth, in the other 16 series; further back were seen in the radula sheath in one specimen 17 series, in the other 14 series, of which the two hindmost ones were not yet fully developed; thus the whole number of series was 30¹⁾. Of the series on the tongue the 9—10 foremost ones showed more or less worn tooth-plates, especially the lateral plates were sometimes broken or torn out. The median teeth were yellow, the thin lateral teeth colourless. The height of the median teeth behind the middle of the tongue was 0.28^{mm}, hindmost in the radula-sheath it was 0.37^{mm}; the length of the lateral teeth rose to 0.29^{mm} by a breadth of the base of 0.12^{mm}. The median teeth (fig. 3a) showed a short bifurcation of the side parts of the base; the hook had commonly down the sides 8—9 denticles, of which all the outer ones were small. The lateral teeth were flat, thin, tapering, with a rather broad base, finely and closely denticulated along the greater part of their inner edge (fig. 3 b, 4).

The salivary glands (Gland. salivales) were white, lengthened, attached to the stomach, composed of lengthened, ramifying lobes (fig. 5). Partly interwoven with this another gland (Gl. pyralina?) seemed to be, the lobes of which were longer, thinner, and of a quite different appearance (fig. 6); its long excretory duct was rather abundantly set with small glandular lobes (fig. 6), and perhaps it opened into the mouth tube²⁾.

The oesophagus had a length of 1.5^{mm}; the inside showed strong longitudinal folds. The stomach was large, bagshaped, 9^{mm} long by a diameter of 4^{mm}; from its cardia fine folds radiated continuing through the whole length of the stomach and farther down through the blind bag of the stomach, and out through the intestine. The intestine originating from the hinder end of the stomach, runs to the right a little forward, and then with a bend backward. — The stomach and the fore part of the intestine had ample whitish and gray contents, which were for the greater part of an indeterminate animal nature, but in which were found portions of small crustacea and hydroidea, as well as diatoms, enidæ, and grains of sand.

The large, light yellowish white hermaphrodite gland reached behind only to the last third of the length of the body; it rested on the blind bag of the stomach (the principal biliary duct), which continued backward to the beginning of the tail; the length was 8^{mm} by a breadth (behind) of up to 3.5^{mm} and a thickness of up to 2^{mm}; it was composed of 4 large lobes; in the small endlobes were ripe oogene cells and spermatozooids. — The whitish anterior genital mass was 5^{mm} long and broad. In front was lying the large (fig. 7b), 5^{mm} long bag of the penis, which was rather thick-walled; the white glans was only 1^{mm} long, a little curtailed, compressed-conical (fig. 8). The seminal duct (figs. 7a, 8a) was very long, and formed a large bundle. I did not succeed in finding the seminal vesicle.

Coryph. salmonacea (C.), var.

Pl. V, figs. 9—10.

A specimen of this species that has come to hand after the finishing of the preceding examination, was taken on 65° 17' Lat. N., 51° 17' Long. W., at a depth of 55 faths, and preserved in 70% alcohol.

¹⁾ The number of series in 7 earlier (i. e.) examined specimens was 29—32, in one it even rose to 36.
²⁾ Comp. i. e. p. 216.

The specimen, which had lost great part of its dorsal papillæ (they were lying loose in the glass), was of a whitish colour, only the papillæ being slightly brownish. The length was 18^{mm} by a height of the body of up to 4^{mm} and a breadth of 6^{mm}; the length of the rhinophores and the tentacles was 2.5^{mm}, of the papillæ — 3.5^{mm}; the breadth of the foot in front was 4^{mm}, the length of the tail only 1^{mm}.

The form was as in the other specimens. The number of the papillæ in the series (numbering perhaps 60) seemed to be 6—7. Also in this specimen the rectum shone whitish through in its course to the anal papilla.

The powerful *bulbus pharyngeus* together with its conical radula sheath, was 5^{mm} long by a breadth of 3.6^{mm}, and a height of 2.4^{mm}. The mandibles were yellowish with black-brown hinge-part; the masticatory edge as above described. The hinder wall of the secondary oral cavities was seen as black-brown towards the narrow entrance. The tongue had twelve series of teeth; farther back 16 series were seen, the two hindmost of which not yet consolidated; thus the total number of series was 28. The median teeth were yellow, the lateral ones almost colourless; the former rose to a height of 0.26^{mm}, the latter had a length of 0.25^{mm}. The median teeth as above, but the denticles (8—12) most frequently a little more numerous (fig. 10) as also the denticulation on the lateral teeth (fig. 9) oftenest a little more marked.

Goniöolis, M. Sars.

M. Sars, Beretn. om en i Sommeren 1859 foretagen zool. Reise ved Kysten af Romsdals Amt. 1860. p. 4.

G. O. Sars, on some remarkable forms of animal life from the great deeps of the Norwegian coast. I. 1872. p. 39—40.

R. Bergh, die Nudibranchien des Willem Barents. 1885. p. 13—18 (Bijdragen tot de Dierkunde. Aflevering XIII. Amsterdam. Onderzoekings-tochten van de Willem Barents Expeditie. Gedeelte IV (1886). 1888).

— , l. c. 1892. p. 1029.

Corpus oblongum, subdepressum, subpalliatum; caput sat latum tentaculis fortibus productum; rhinophoria fortia, simplicia, elongata; podarium dorso paullo latius, antice vix angulatum.

Margo masticatorius seriebus denticulorum minutissimorum armatus. Dentes laterales radulae fere ut in *Coryphellis*.

This genus, which belongs to the family of the *Coryphellidae*, has the characters common in this family; the long, simple rhinophores and a lateral tooth on each side of the median teeth of the radula. It is most nearly related to the genus *Chlamylla*, and it will perhaps, by further examinations, be impossible to maintain the generic separation of these two generic forms.

Goniöolis has a somewhat peculiar and depressed clumsy form with projecting dorsal edges, and colossal rhinophores and tentacles; the masticatory edge of the mandibles has several series of quite small irregular knobs.

Hitherto the genus only comprised the species found by Sars and examined by me. The Ingølf expedition has brought home two specimens of *Goniöolis*, mutually different, and one of them especially so deviating from the typical species, that I have thought it better, at least for the present, not to identify these new individuals with the typical species.

1. **Gon. typica**, M. Sars.

R. Bergh, l. c. 1885, p. 14—18. Taf. III, Fig. 1—26.

This species seems to be marked off from the two others by a different form of the mandibles, by a stronger denticulation of the lateral teeth (and perhaps by the want of a specially developed prostate gland).

2. **Gon. intermedia**, Bgh. n. sp.

Pl. IV, figs. 16—17.

Together with the following species one individual of the present species was taken on June 11th, at 9:30 a. m. on 66° 43' Lat. N., 55° 57' Long. W. with the trawl from a depth of 88 faths (temp. 2.6—2.).

The specimen that was rather well preserved in alcohol, was of a whitish colour; its length was 2.7^{mm}, the other measures relatively as in the following species.

The form was as in the typical species, the dorsal lateral edges more projecting than in the following species; the corners and the fore edge of the foot distinctly projecting, more so than in both the other species; the flaccid, dorsal papillæ, many of which had fallen off, rose to a length of 6^{mm}; the genital openings were quite as in the typical species, and so was the anal papilla.

The central nervous system together with eyes and otcysts were as in the species described below.

The bulbous pharyngens was to a remarkable degree like that in *Chlamylla borealis*¹⁾, and was likewise hollowed in the hinder part of the upper surface; it was 4^{mm} broad by a length and height of 3^{mm}. The light yellow mandibles had the same form as in the following species; only the keel in front on the outside was a little slighter; the masticatory process and the masticatory edge were quite as described below. The tongue was quite as in the following species; in the colourless radula 8 series of teeth were seen, and as many in the short radula sheath, which was directed backward; thus the total number of series was 16, of which the two hindmost ones were not yet quite developed. The tooth-plates were almost quite colourless; the breadth of the median teeth rose to 0.26^{mm} by a height of 0.10^{mm}, and a length of 0.35^{mm}; the length of the lateral teeth rose to 0.20^{mm}. The form of the median tooth-plates (figs. 16a, 17a) was between the form of those in the preceding species and those in the following one, though nearer to the latter; on each side of the rather short point 12—15 rather strong denticles were seen. The lateral tooth-plates (figs. 15b, 17b) were shorter and more clumsy than in both the other species, and without denticulation.

¹⁾ Comp. R. Bergh, die Nudibranchien . . . des Willem Barents. l. c. p. 11. Taf. I, Fig. 11.

The anterior genital mass was of about the same form as in the typical species, 6^{mm} long by a breadth of 4^{mm} and a thickness of 5^{mm}. The ampulla of the duct of the hermaphrodite gland was also as in the typical species, forming several windings. As in the following species¹⁾ a little whitish prostate gland of a diameter of 2^{mm} was found, formed of fine interwoven windings; the muscular seminal duct arising from this gland, was loosely rolled to a little bundle, also as in the following species, its thinner fore end plunged into the top of the little preputial bag which projected externally with its foremost edge; from this bag the highly tapering glans penis projected 3^{mm}²⁾. The seminal vesicle as in the other species continuing in its powerful duct, the opening of which was seen in the depth of the vulva³⁾ that projected externally. The white and whitish albuminous-mucous gland formed the greater part of the anterior genital mass.

By the examination and the specific determination of Nudibranchiata it is frequently an awkward thing that this examination and determination has to be made by the means of only one individual, especially when the forms of this individual as far as possible have to be spared. Many of these animals seem to be able to vary considerably as well with regard to the outer as to the inner structure. The individual here examined, agreed in the outer form more with the typical species, in the nature of the mandibles and the presence of a prostate gland with the following species, but differed from both by the structure of the radula.

3. *Gon. atypica*, Bgh. n. sp.

Pl. IV, figs. 6—15; Pl. V, fig. 1.

Of this form one specimen was taken on July 11th 9:30 a. m. on 66° 43' Lat. N., 55° 57' Long. W. with the trawl from a depth of 88 faths (temp. 2° 6—2°).

The individual, which was well preserved in alcohol, was generally of a whitish colour⁴⁾. — It surpassed in size the hitherto found *Goniöolides*; its length⁵⁾ was 5.5^{cm}, by a breadth of the back of 1.6^{cm} and a height of 1.3^{cm}. The length of the tentacles in this colossal individual rose to 11^{mm}, and that of the rhinophores to 15^{mm}; the breadth of the lateral parts of the back, that were set with papillæ, appeared to rise to 4—5^{mm} and the remaining papillæ rose only to a length of at most 3^{mm}. The length of the foot was almost 5^{cm} by a breadth of up to 1.6^{cm}; the breadth of the foot-brim was 3^{mm}, and the length of the tail 3^{mm}.

The form is somewhat flattened, and the height evenly decreasing backward, very slight at the hinder end. The head (figs. 6, 7), the region between the rhinophores and the tentacles, sloping

1) It is hardly possible that I should have failed to notice the existence of a prostate gland in the typical species.

2) Comp. R. Bergh, die Nudibranchien . . . des Willem Barents . . . l. c. p. 18. Taf. III, Fig. 25 ef, 2.

3) Comp. l. c. p. 18. Taf. III, Fig. 2 f.

4) According to Sars the colour of the typical species is commonly yellowish white, only the lateral parts of the back (on account of the liver) being yellowish brown; in the median line of the body, especially on the sole of the foot, a minium-red stripe shone through.

5) The (3) individuals of *Gon. typica* examined by Sars, measured 12^{mm}, the (3) specimens earlier examined by me, measured 2—2.3^{cm} in length.

toward. In front the strong conical tentacle (fig. 6a) projects on either side; behind the rather close set, longer, and more powerful rhinophores, likewise conical (fig. 6b); in front the roundish outer mouth. The back is broad, its last fourth part highly decreasing in breadth, almost flat, smooth; its lateral parts rising only a little over the sides of the body. The papilligerous lateral parts are rather narrow, in front almost stretching to the base of the tentacles (fig. 6c-a), behind almost meeting at the base of the tail. The papillae were densely crowded without being distinctly placed in oblique series, those series perhaps containing 6-8 papillae¹⁾. The size of the papillae is upon the whole as in other Acolidiadae, decreasing outwardly; the remaining papillae were uncommonly small, conical, and did not fall off quite easily. The sides of the body were not quite low. In the region under the right rhinophore a rather long and rather strongly projecting fold was seen running towards the anus; the fore end (praeputium penis) of this fold projected 5^{mm} in a lobelike manner, and behind and partly covered by this fold the genital aperture was seen (fig. 6). Farther back, about at the middle of the side of the body the anal papilla was found directed a little upward, and before it the little renal papilla (fig. 6d). The foot is powerful, the rounded fore end with a deep marginal furrow (fig. 6), and medianly emarginate upper lip; the foot-brim not narrow; the tail flat, lanceolate, rather short.

At the uppermost part of the sides of the body towards the dorsal edge the liver shone through as quite small, slightly yellowish white grains; similar grains, but more powerful (for a great part with mark from fallen-off papillae) were seen on the lateral parts of the back towards the papillae.

The central nervous system showed almost the same structure as was seen by the preceding examination²⁾ of the typical species; especially on account of the contractility of the enclosing loose capsula, the absolute and relative form and size of the different ganglia vary not a little in the Nudibranchiata. The boundary between the cerebral ganglia and the pleural ones (fig. 8a) was rather distinctly marked, and the pedal ganglia (fig. 8b) a little larger than the cerebro-pleural ones. The strong ganglia rhinophorialis (olfactoria) (fig. 8c) were rather short-stalked; the buccal ganglia and the gastro-oesophageal ones (fig. 8d) were as before described. The pedal commissure was a double one, before it the much thinner pleural one was seen, and in front a subcerebral commissure.

The otcysts as earlier described. I succeeded also in this individual in finding eyes (fig. 8); they were almost sessile, of a diameter of about 0.16^{mm}, with a black pigment and a yellowish lens.

The buccal tube is short. The bulbus pharyngens very strong, short³⁾, 8^{mm} broad by a length of 6^{mm}, and a height of 6^{mm}, the radula sheath not projecting or indicated on the hinder end. The mandibles were as long and high as the bulb, light amber coloured, only the crista connectiva and the masticatory edge yellowish brown (fig. 9); in front on the outside was seen a short, strongly projecting, broad keel (fig. 10); the masticatory edge rather broad (—0.010^{mm}), the masticatory process rather short, straight; the masticatory edge somewhat worn with many (up to about 20) irregular rows of close set, little (0.013^{mm}) projecting nodules, most frequently obtuse and cleft (fig. 11). The secondary oral cavities rather large with a rather wide opening; their hinder wall had a slightly yellowish

¹⁾ In the smaller individuals of the typical species earlier examined by me, the series appeared to contain more than 10 papillae, and the innermost of these to rise to a greater length (5.5^{mm}).

²⁾ Loc. cit. p. 5.

³⁾ Comp. loc. cit. III, fig. 7.

cuticula, that was dark-coloured towards its inner edge. The tongue was short and powerful, only 2.25^{mm} long, and of almost the same height and breadth, with an almost colourless radula. In this latter were counted 13 series of tooth-plates; farther back, in the short (2^{mm} long) whitish radula sheath that was directed backward, 12 series were found, two of which were not yet quite developed; thus the total number of series was 25; but on the lower edge of the tongue marks were visible of 8 series that had fallen off. The tooth-plates were almost colourless (very pale yellowish), highly fragile, and all the plates on the tongue were worn or otherwise injured (fig. 14). The breadth between the legs of the foremost tooth-plates was 0.20^{mm}, but it rose to 0.35^{mm}. The median tooth-plates (fig. 12) were of a shape somewhat different from that in the two other species; they were broader and their hook shorter. The lateral plates were likewise of a somewhat different shape (figs. 13—15), and the denticulation of the edge of the hook was far slighter than in the typical species.

The whitish salivary glands were lengthened and stretched to the lower side of the stomach; their excretory duct was rather long.

The oesophagus short (4^{mm} long). The form of the stomach was oval, it had a length of 13^{mm} by a diameter of up to 7^{mm}, and on the inside were strong longitudinal folds; it receives on either side a biliary duct, and from the hindmost part of its right side it sends forth the intestine, inside of which it, as it were, continues in the chief biliary duct (the blind bag of the stomach). The intestine runs along the upper edge of the anterior genital mass, forms a curve downward, and rises to the anal papilla; its whole length was 18^{mm} by diameter of 2.5—2^{mm}; its inside showed numerous longitudinal folds. — The abundant white contents of the alimentary canal were an indeterminable animal mass, in which were to be seen remains of Copepoda, bristles of Annelids, and a large quantity of cœnidæ.

The chief biliary duct runs somewhat curved in a deep furrow on the lower side of the hermaphrodite gland, receives from either side several rather short, ramifying biliary ducts, and continues a little way behind the hermaphrodite gland. The branches of this duct, as well as of the other two biliary ducts are covered with liver-cells, and form thus the thick, and, as it were, somewhat spongy layer of slightly yellowish liver mass covering the sides of the body above and the lateral parts of the back, and shining through on the outside (fig. 7); from this layer the liver lobes of the dorsal papillæ rise, almost filling out their cavity; they are almost cylindrical, only little rugged. At the points of the papillæ the lengthened cœnidocyst is seen, filled with mostly rounded cœnidæ.

The ventricle of the heart had a length of 4.5^{mm}. The renal layer and the pericardio-renal organ as before described.

The hermaphrodite gland was powerful, yellowish, its whole length was 22^{mm} by a breadth in front of 9^{mm}; in front it projects with a somewhat flattened lobe under the rectum and the stomach; it consists of a number of large lobes, made up of smaller ones; its end-lobes contained large oögene cells and developed zoosperms. — The anterior genital mass was large, lengthened, compressed, running along, and attached to, the right side of the stomach; it had a length of 14^{mm} by a height of 9.5^{mm}, and a thickness of 5^{mm}; the light yellowish gray ampulla of the duct of the hermaphrodite gland (fig. 1 b) ran for the greater part of its length along its inside; at its fore end the windings of

the seminal duct were seen, behind them on the inside the prostate gland, and under that the seminal bag was found. The ampulla was 10^{μ} long by a diameter of 2^{mm} ; anteriorly it sends forth a quite short oviduct and a seminal duct a little longer. The latter formed a large prostate mass (fig. 1 c), 7^{mm} long, 3.5^{mm} high, and 3^{mm} thick, which mass was bent once or twice, and measured, when stretched out, 20^{mm} by a diameter of 2^{mm} ; it consisted of close set, quite fine windings; anteriorly it tapered a little, and passed into the muscular continuation of the seminal duct (fig. 1 d). The windings of this duct measured, when stretched out, 18^{mm} ; it tapered anteriorly, and ended in a hollow on the top of the 2.5^{mm} broad, thin-walled hinder end of the penis bag (fig. 1 e), which bag continues in the outer, free part (fig. 1 f) that inclosed 4^{mm} of the glans (fig. 1), the whole length of which was 6.5^{mm} , and which is covered by a strong ciliated epithelium; the seminal duct that grew thinner in its course, continued in snake-like windings to the very point of the glans. The seminal bag (fig. 1 g) the position of which is rather hidden, is globular, of a diameter of 2.5^{mm} ; it passes by degrees into its only a little longer duct (fig. 1 h). The whitish and limewhite mucous-albuminiferous gland formed the greater part of the anterior genital mass.

This species is especially by the remarkable formation of a fold on the right side of the body marked off from both the other species, from which it further appears to deviate with regard to the nature of the lateral teeth of the radula.

Subfam. **Tergipedinae.**

R. Bergh, System der nudibranch. Gasteropoden. 1892. p. 1024—1027.

This group contains forms with a somewhat compressed body, simple rhinophores, and a latero-dorsal position of the anal papilla; the dorsal papillae are short and thick, clubshaped, and, as it were, arranged in one or a few longitudinal series; the foot is rounded anteriorly. — The masticatory edge of the mandibles bears mostly a single series of denticles; the tongue has most frequently only a single series of tooth-plates. The otcyst contains only a single otolith.

The family comprises the genera: *Tergipes* (Cuv., Ald. et Hanc.) with a single series of papillae and unarmed penis; *Capollinia* (Trinchese) also with only one series of papillae, but with three series of tooth-plates (like the Galvinae) and with armed penis; *Embletonia* (Ald. et Hanc.) has one or more series of papillae, a smooth masticatory edge, and unarmed penis; nearly related with this genus is *Enneta* (Bgh.), which has, however, real tentacles (and not head-lobes). *Amphorina* (Quatrefages) has peculiar tooth-plates, large Gl. ptyalinae, and armed penis; *Galvina* (Ald. et Hanc.) has three series of toothplates, also Gl. ptyalinae, but unarmed penis; *Myja* (Bgh.) resembles somewhat *Tergipes*, but has a smooth masticatory edge; perhaps also the singular *Forestia* (Trinchese) in which the radula is transformed into a serrated band, must be referred to this family.



Amphorina, Quatrefages.

- Amphorina*, Q. Mém. sur les Gastérop. phlebenterés. Ann. des sc. nat. 3 S. I. 1844. p. 145—151.
 — , Q. R. Bergh, Beitr. z. Kenntn. d. Aeolidiaden. VII. Verh. d. k. k. zool. bot. Ges. in Wien. XXXII. 1882. p. 54—61. — VIII. l. c. XXXV. 1885. p. 37—39.
 — , Q. Vayssière, rech. sur les moll. opisthobr. II. Nudibranches et Ascoglosses. 1888. p. 107—111.
Trinchesia, Iher. Zoolog. Anz. II. 1879. p. 137 Note.

Papillae subinflatae, fusiformes.

Margo masticatorius serie denticulorum minorum praeditus. Dentes (mediani) apice quasi elevato. Glandulae ptyalinae. — Penis stylo recto vel curvato armatus.

The genus comprises only a few species:

1. *A. Alberti*. Quatref.
 var. *leopardina*, Vayss.
 M. atlant., mediterr.
2. *A. coerulea* (Mtg.).
 Eolidia Bassi, Ver.
 M. atlant., mediterr.
3. *A. molios*, Herdmann.
 M. atlant.

Amphorina Alberti, Quatrefages?

- R. Bergh, Beitr. zur Kenntn. d. Aeolidiaden. VII. l. c. XXXII. 1882. p. 55—57. Taf. IV, Fig. 10—24; Taf. VI, Fig. 19—21.
 Pl. V, figs. 24—28.

On the 10th of May 1895 two specimens probably of this species were taken at Trangisvaag.

One individual had a length of 4^{mm}, the other of 5.5^{mm}, by a height of about 1^{mm}, and a breadth of almost 0.75^{mm}; the height of the papillæ rose to about 1.25^{mm}. The body had a yellowish white colour, the head was whitish, the dorsal papillæ were brownish gray with a whitish point.

The form was the common one. The body was lengthened and narrow; the smooth, a little truncate rhinophores and tentacles were not long. The papillæ were arranged in six groups with two, sometimes three papillæ in each; in the groups in front the papillæ were smaller, and in the hindmost group they were quite small; the two inmost papillæ were of about equal size, and in the three groups very powerful, short-fusiform; if a third papilla was found it was always much smaller. The anal papilla was situated immediately at the outer edge of the fourth group of papillæ. The foot was narrow, anteriorly a little broader, with rounded corners; the tail was short.

The bulbus pharyngens was of an oval form, 0.8^m long. The hinge-part of the mandibles (fig. 24a) was strongly yellowish, otherwise they were almost colourless; the not short masticatory edge had a single series of pointed denticles of a height of 0.0015^m (fig. 24b). The lengthened, narrow tongue showed a very slightly yellowish radula containing 46 tooth-plates (34 on the lower side, 12 on the upper one), and two were further found lying loose posteriorly at the base of the tongue; in the radula-sheath 20 tooth-plates were seen, of which the three hindmost ones were not yet fully developed; thus the total number of tooth-plates was 66¹⁾. The tooth-plates were yellowish; they had a breadth of 0.06^m by a height of 0.04^m , and were of the earlier described form with 6 pointed denticles on each side of the but little strong hook (figs. 25—27).

The liver-lobes were as before mentioned. The pyriform endocyst was in the largest papillæ 0.30^m long; the endæ were roundish, their largest diameter $0.007-0.013^m$.

The penis was as described before; the colourless hook that was slightly curved, and at the end, as it were, obliquely cut off, (fig. 28a) was about 0.07^m long.

Galvina, Ald. et Hanc.

R. Bergh, System der nudibranchiaten Gasteropoden. 1892. p. 1026—1027.

The Galvinae form a rather well marked group. Even their exterior is remarkable by the dorsal papillæ being, as it were, somewhat inflated; they show, however, especially a quite peculiar structure of the radula, which has strong median teeth, the hooks of which are, as it were, bent down and situated below the level of these teeth; the lateral teeth are very broad, and their inner part projects backwards in a lanceolate hook.

The Galvinae seem chiefly to belong to the less warm tracts of the sea.

Galvina sp. (anonyma).

Pl. IV, figs. 21—25.

Together with some specimens of *Coryphella salmonacca* (mentioned above) another little Aegidia was taken, which, in a short notice, is said to have been whitish with red dorsal papillæ.

The individual, which was only middlingly preserved in alcohol, was of a yellowish white colour. Its length was 10^m , by a breadth of the body of up to 3^m , and a height of up to 2.5^m . The rhinophores were 2^m long, the tentacles 1^m , and the (remaining) dorsal papillæ likewise only 1^m long.

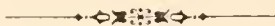
The form was the common one. The lateral parts of the back that were covered with papillæ, were more narrow than the naked middle part; the number of series of papillæ was not large, and the number of papillæ in a series exceeded scarcely 6. The papillæ were conical, partly somewhat inflated, a great deal had fallen off. The foot was anteriorly rather broad, almost without projecting corners.

To spare the only known individual, only the bulbus pharyngens was examined. It showed the usual form, the radula formed a cone on the hinder end; the length was 2.3^m , by a breadth

¹⁾ The number of tooth-plates in the (3) earlier examined specimens was 67, 61, 64; in *A. coerulesa* it was 60, 57, 60.

of 2^{mm}, and a height of 1.3^{mm}; the hinge-part was not strong; the masticatory process was rather short and slightly bent; the masticatory edge had a few series of short teeth, displaced among each other (fig. 21). The tongue was of the common form; the radula was almost colourless, and had on its long lower edge and short upper one 35 series of teeth (and besides a loose lying median tooth below); in the radula sheath 41 series were seen, the four hindmost of which were not yet completely developed; thus the whole number of series was 76. The median teeth were slightly yellowish, the lateral teeth colourless. The height of the oldest (foremost) median teeth was 0.08^{mm}, and the breadth likewise 0.08^{mm}; the hindmost ones seemed to have the same measures, as also the lateral teeth, the breadth of which was 0.12^{mm}. The tooth-plates were of the form, which has been pointed out in the other Galvinae; the strong median teeth (figs. 22 a, 23, 24, 25 a) had the usual bent down hook, and to each side of that four, more rarely three, denticles, of which the inner one was the more clumsy. The weak, but broad lateral teeth (figs. 22 b, 25 b) showed the usual lanceolate, short hook.

None of the hitherto known (northern) Galvinae have shown the above mentioned colours, and thus the possibility is not excluded that we have here a new form. It seems not to be possible to differentiate the Galvinae by means of the structure of the radula.



EXPLANATION OF THE PLATES.

Most of the figures are drawn by means of the camera lucida.

PL. I.

Bathydoris Ingolfiana, Bgh.

- Fig. 1. The animal, from behind. Natural size.
- 2. The same, from before. Natural size.
- 3. One of the papulae of the back.
- 4. The bulbus pharyngens, lateral view. Natural size. *a* the labial disk, *b* the region of the outer margin of the mandible, *c* the radula-sheath, *d* the oesophagus, *e* the duct of the salivary gland with its ampulla.
- 5. The tongue with *a* the radula, behind this the tectum radulae, and hindmost *b* the end of the radula-sheath.
- 6. The mandibles, from before, *a* the upper end. Natural size.
- 7. A piece of the median part of the radula, with *a* median tooth, and *bb* innermost lateral tooth. $\times 100$ diam.
- 8. Median tooth. $\times 200$ diam.
- 9. First lateral tooth. $\times 100$ diam.
- 10. The same, lateral view. $\times 100$ diam.
- 11. Two of the largest lateral teeth. $\times 100$ diam.
- 12. Outermost part of a series of teeth with 11 tooth-plates, *a* the outermost one. $\times 100$ diam.
- 13. One of the outer tooth-plates, lateral view. $\times 100$ diam.
- 14. A couple of the outermost tooth-plates, from above. $\times 100$ diam.
- 15. (abnormal) double tooth-plate. $\times 100$ diam.
- 16. The hermaphrodite gland, from its upper side.
- 17. Follicles of the hermaphrodite gland.
- 18. The anterior genital mass; *a* the mucous gland, *b* the spermatheca, in front of and upon it the penis bag, *c* the coalesced genital vulvarian folds.
- 19. *a* the duct of the hermaphrodite gland, *b* oviduct, *c* seminal duct, *d* the base of the praeputium, *e* glans penis, *f* the aperture on its point.
- 20. *a* seminal duct, *b* glans penis, slit longitudinally, with the continuation of the seminal duct to the aperture *c* on its point.

PI. II.

Bathydoris Ingolfiana, Bgh.

- Fig. 1. *a* labial disk, *b* bulbus pharyngens, *cc* the salivary glands on the sides of the first stomach, to the left of this the second stomach, *dddd* the intestine, circumscribing the liver, and to the right the renal branches with the base of the urinal chamber.
- 2. The central nervous system, mostly drawn with cam. luc. *aa* Ganglia cerebralia, *bb* G. pleuralia, *cc* G. pedalia, *d* Commissura magna, *ee* G. buccalia, *f* Comm. buccalis.

Doridoxa Ingolfiana, Bgh.

- Fig. 3. The animal from the ventral side. $\frac{4}{1}$.
- 4. The central nervous system, from above. $\times 55$ diam. *aa* cerebro-pleural ganglia, *bb* pedal ganglia, *c* buccal ganglia.
- 5. The bulbus pharyngens, from the lower side, a little obliquely.
- 6. The same, lateral view. *a* oesophagus.
- 7. The mandibles, from before; *a* processus masticatorii. $\frac{10}{1}$.
- 8. A piece of the innermost part of the masticatory edge. $\times 350$ diam.
- 9. The tongue with the radula, from before.
- 10. The same, lateral view.
- 11. The middle part of the radula, from below. *a* median teeth, *bb* innermost lateral tooth.
- 12. A piece of the middle part of two series of teeth.
- Figs. 11—12 drawn with cam. luc. $\times 350$ diam.
- 13. The alimentary canal. *a* oesophagus, *b* stomach, *cc* intestine, *d* biliary bladder.
- 14. *a* the thinner, *b* the thicker part of the seminal duct, *c* penis. $\times 55$ diam.
- 15. Seminal vesicle, *a* its duct. $\times 55$ diam.

Cadlina repanda (A. et H.).

- Fig. 16. A piece of the labial plate.
- 17. Middle part of the radula, *a* median teeth.
- 18. The largest tooth-plates.
- 19. Piece of the armature of glans penis and seminal duct.

Figs. 16—19 drawn with cam. luc. $\times 350$ diam.

Candiella Ingolfiana, Bgh.

- Fig. 20. The first lateral tooth.
- 21. Second and third lateral teeth.
- 22. One of the largest lateral teeth.

Figs. 20—22 drawn with cam. luc. $\times 350$ diam.

PL. III.

Doridoxa Ingolfiana, Bgh.

- Fig. 1 The middle part of the radula, from above. *a* median teeth, *b* innermost lateral tooth.
 — 2 Similar part, partly lateral view. *a* and *b* as in fig. 1.
 — 3 Outermost part of two series of teeth. *aa* outermost tooth-plate.
 Figs. 1–3 drawn with cam. luc. $\times 350$ diam.

Candiella Ingolfiana, Bgh.

- Fig. 4 A piece of the masticatory edge of the mandible, *a* the free edge. $\times 200$ diam.
 — 5 A piece of the middle part of the radula, *a* median tooth.
 — 6 One of the largest lateral teeth.
 — 7 The outer end of a series of teeth, *a* outermost tooth.
 Figs. 5–7 drawn with Cam. luc. $\times 350$ diam.
 — 8 *a* Seminal vesicle, *b* its duct.
 — 9 *a* Seminal duct, *b* penis bag with the glans penis situated in its cavity.

Althila Ingolfiana, Bgh.

- Fig. 10 The fore end of the body with the oral aperture, tentacles, and fore edge of the foot.
 — 11 The two-lipped sheath of the rhinophore, between the two unequally long lobes the point of the club of the rhinophore is seen.
 — 12 The central nervous system, drawn with cam. luc. $\times 55$ diam. *a* cerebro-pleural ganglia, *b* pedal ganglia, *c* buccal ganglia, *d* the large common commissure, *e* the buccal commissure.
 — 13. Otocyst. $\times 350$ diam.
 — 14. The bulbus pharyngens from above, the pharynx removed, so that the tongue is laid bare, *a* the region of the fore end of the mandibles.
 — 15. The mandibles, from before, *a* the hinge-part. $\times 100$ diam.
 — 16. The hinder end of the mandible. $\times 100$ diam.
 — 17. The hindmost part of the masticatory edge of the same. $\times 100$ diam.
 — 18. The tongue, from below, with radula.
 — 19. Median tooth from three series of teeth.
 — 20. The first lateral tooth.
 — 21. A similar one in another position.
 — 22. *a* two median teeth, and *b* first lateral tooth, lateral view.
 — 23. The ninth and tenth lateral teeth (counted from the median tooth) of two series.
 — 24. One of the largest lateral teeth.
 — 25. The outer end of a series of tooth-plates with 5 tooth-plates, *a* the outermost one.
 Figs. 19–25 drawn with cam. luc. $\times 350$ diam.
 — 26. Dorsal papilla.

Dendrouotus robustus, Verrill.

Fig. 27. The rhinophore with its sheath and club.

- 28. The tongue from above with the radula-sheath shining through and with the upper end of the radula.
- 29. *a* Seminal duct, *b* glans penis projecting from the bottom of the praeputium.

Pl. IV.

Dendrouotus robustus, Verrill.

Fig. 1. The fore end of the animal.

- 2. The tail of the animal.
- 3. Elements of the prehensile ring. $\times 350$ diam.
- 4. A median tooth, from above. $\times 200$ diam.
- 5. The outer end of a series of teeth, *a* the outermost tooth, *b* the edge of the radula. $\times 350$ diam.

Goniöolis atypica, Bgh.

Fig. 6. The fore end of the animal, from the right side, with *a* tentacles, *b* rhinophores, and *c* dorsal papillæ; with the genital aperture, the renal pore, *d* anal papilla, and *e* foot-brim.

- 7. The fore end, from above; *aa*, *c* as in fig. 6.
- 8. The central nervous system, from above, drawn with cam. luc; *a* Ganglia cerebro-pleuralia, *bb* Ganglia pedalia, *cc* Ganglia olfactoria, *dd* G. buccalia and gastro-oesophagalia, *e* commissura subcerebralis, *f* comm. pleuralis, *g* comm. pediaea.
- 9. The mandibles from the fore side. $\frac{5}{1}$.
- 10. The hinge-part of the right mandible, from before.
- 11. A piece of the masticatory edge, *a* fore edge. $\times 350$ diam.
- 12. Median tooth-plates, from above.
- 13. Lateral tooth-plate, from the radula.
- 14. Worn foremost (oldest) lateral tooth-plate.

Figs. 12—14 drawn with cam. luc. $\times 200$ diam.

- 15. Lateral tooth-plate. $\times 250$ diam.

Goniöolis intermedia, Bgh.

Fig. 16. From the middle part of the radula, *a* median plate, *b* lateral plate.

- 17. A similar piece, lateral view. *a* and *b* as in fig. 16.

Figs. 16—17 drawn with cam. luc. $\times 350$ diam.

Coryphella salmonacea (Couth.).

Fig. 18. Excretory duct of the Gland ptyalina? $\times 100$ diam.

- 19. Lateral teeth. $\times 350$ diam.

Coryphella sp. (anonyma).

Fig. 20. A piece of the radula, lateral view, *a* median teeth, *bb* lateral teeth. $\times 350$ diam.

Galvina sp. (anonyma).

Fig. 21. A piece of the masticatory edge of the mandible.

— 22. A piece of the radula, from above, *a* median teeth, *b* lateral teeth.

— 23. A median tooth, from above.

— 24. Two median teeth, from the under side.

— 25. A piece of the radula, lateral view; *a* and *b* as in fig. 22.

Figs. 21—25 drawn with cam. luc. $\times 350$ diam.

PL. V.

Goniöolis atypica, Bgh.

Fig. 1. The efferent ducts of the genital system, viewed from the inside of the anterior genital mass. ** the hinder edge of the anterior genital mass; *a* the duct of the hermaphrodite gland, *b* ampulla of the same; *c* the prostatic part, and *d* the muscular part of the seminal duct; *e* the inner part, and *f* the outer part of the penis (with glans); *g* the seminal vesicle, and *h* its duct.

Coryphella salmonacea (Couth.).

Fig. 2. A piece of the masticatory edge of the mandible, *a* the free edge. $\times 350$ diam.

— 3. A piece of the radula, lateral view, *aa* median teeth, *bb* lateral teeth. $\times 200$ diam.

— 4. A lateral tooth. $\times 350$ diam.

— 5. A piece of the salivary gland (Gl. saliv.).

— 6. A piece of the gland of the oral tube (Gl. ptyalina).

Figs. 5 and 6 drawn with cam. luc. $\times 100$ diam.

— 7. *a* seminal duct, *b* penis bag.

— 8. *a* seminal duct, *b* glans penis.

Coryphella salmonacea (Couth.), var.

Fig. 9. Lateral tooth-plate, from above.

— 10. Median tooth-plate, lateral view.

Figs. 9—10 drawn with cam. luc. $\times 350$ diam.

Coryphella sp.

Fig. 11. A piece of the masticatory edge of the mandible, *a* the hinder end.

— 12. A piece of the radula, lateral view, *aa* median teeth, *bb* lateral teeth.

— 13. A median tooth, from the under side.

Coryphella sp. (anonyma).

- Fig. 14. A piece of the edge of the masticatory process of the mandible, *a* the free edge.
 — 15. A median tooth, from the under side.
 — 16. Two lateral teeth, from above.

Figs. 11—16 drawn with cam. luc. $\times 350$ diam.

Aldisa zetlandica (Ald. et Hanc.).

- Fig. 17. The central nervous system, from above. $\times 55$ diam. *aa* cerebral ganglia, *bb* pleural ganglia, *cc* pedal ganglia.
 — 18. Otocyst. $\times 350$ diam.
 — 19. One of the largest tooth-plates.
 — 20. One of the outermost plates in the series of teeth.

Figs. 19—20 drawn with cam. luc. $\times 750$ diam.

- 21. Glans penis. $\times 350$ diam.
 — 22. A piece of the latter part of the seminal duct. $\times 350$ diam.
 — 23. Elements of the armature of the same. $\times 750$ diam.

Amphorina Alberti, Quatref.

- Fig. 24. The fore end of the mandible, with *a* the hinge-part, *b* the masticatory process.
 — 25. A tooth-plate, from above.
 — 26. A similar one, from the under side.
 — 27. A similar one, lateral view.
 — 28. Penis, with *a* its hook.

Figs. 24—28 drawn with cam. luc. $\times 350$ diam.

Doridoxa Ingolfiana, Bgh., var.

- Fig. 29. Median teeth, from above (the denticles drawn too strong).
 — 30. Lateral tooth-plates of the outer third part of a series.

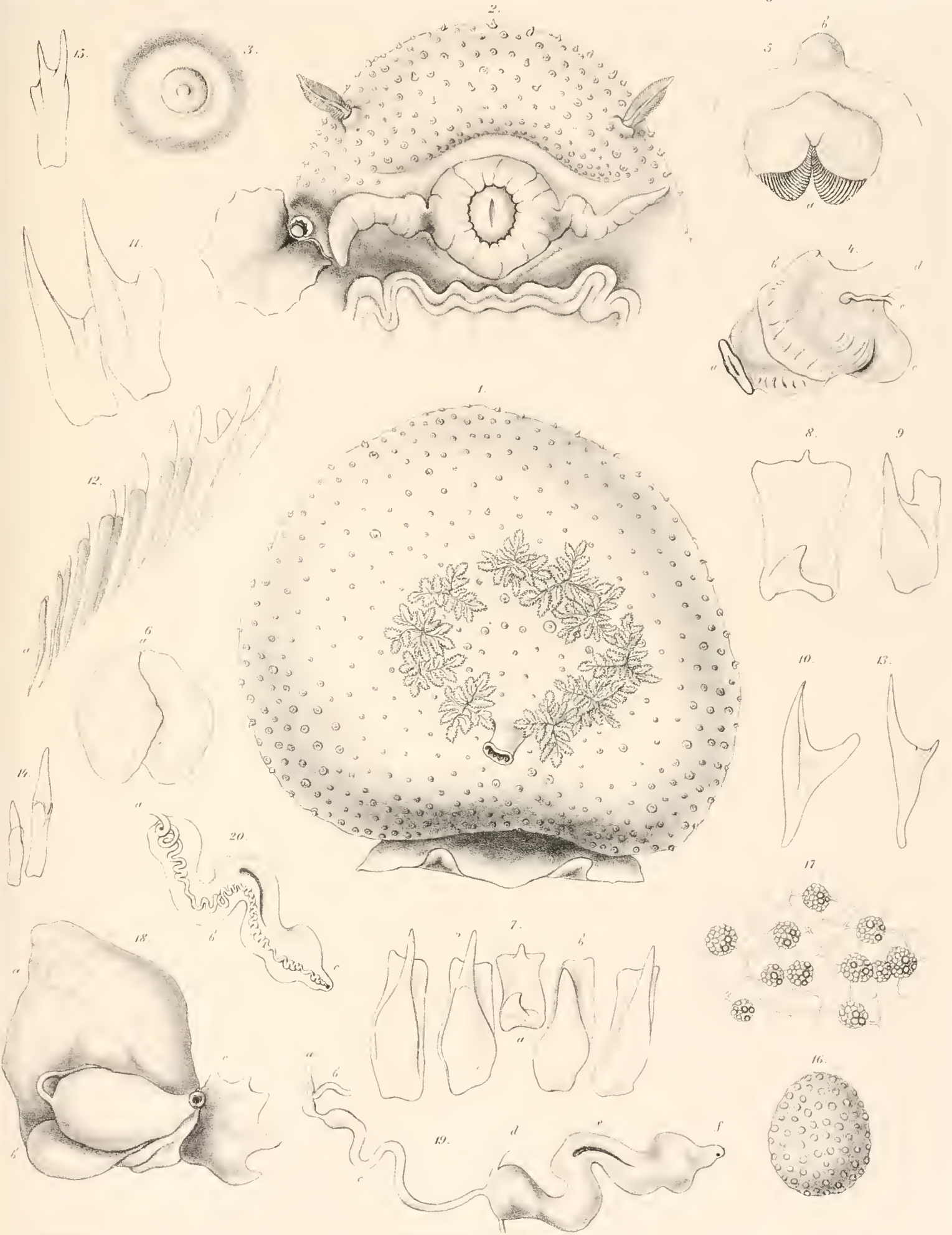
Lamellidoris muricata (O. F. Müll.).

- Fig. 31. A piece of the radula; *a* false median tooth-plates, *b* lateral tooth-plates, *c* outermost tooth-plates.

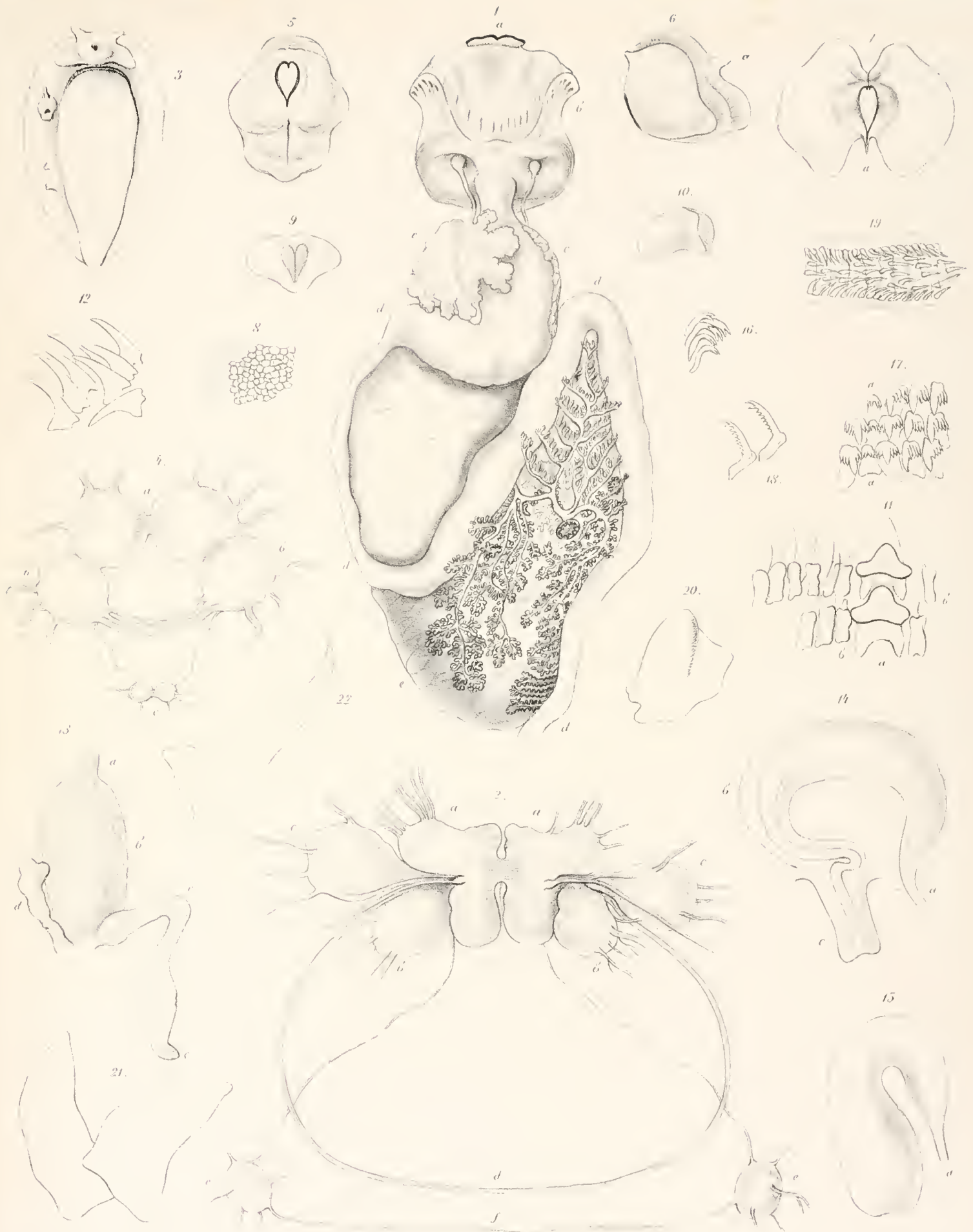
Figs. 29—31 drawn with cam. luc. $\times 350$ diam.

- 32. Crop of the bulbus pharyngeus, *a* the stem of the same.





Bathydoris Ingolfiana, B



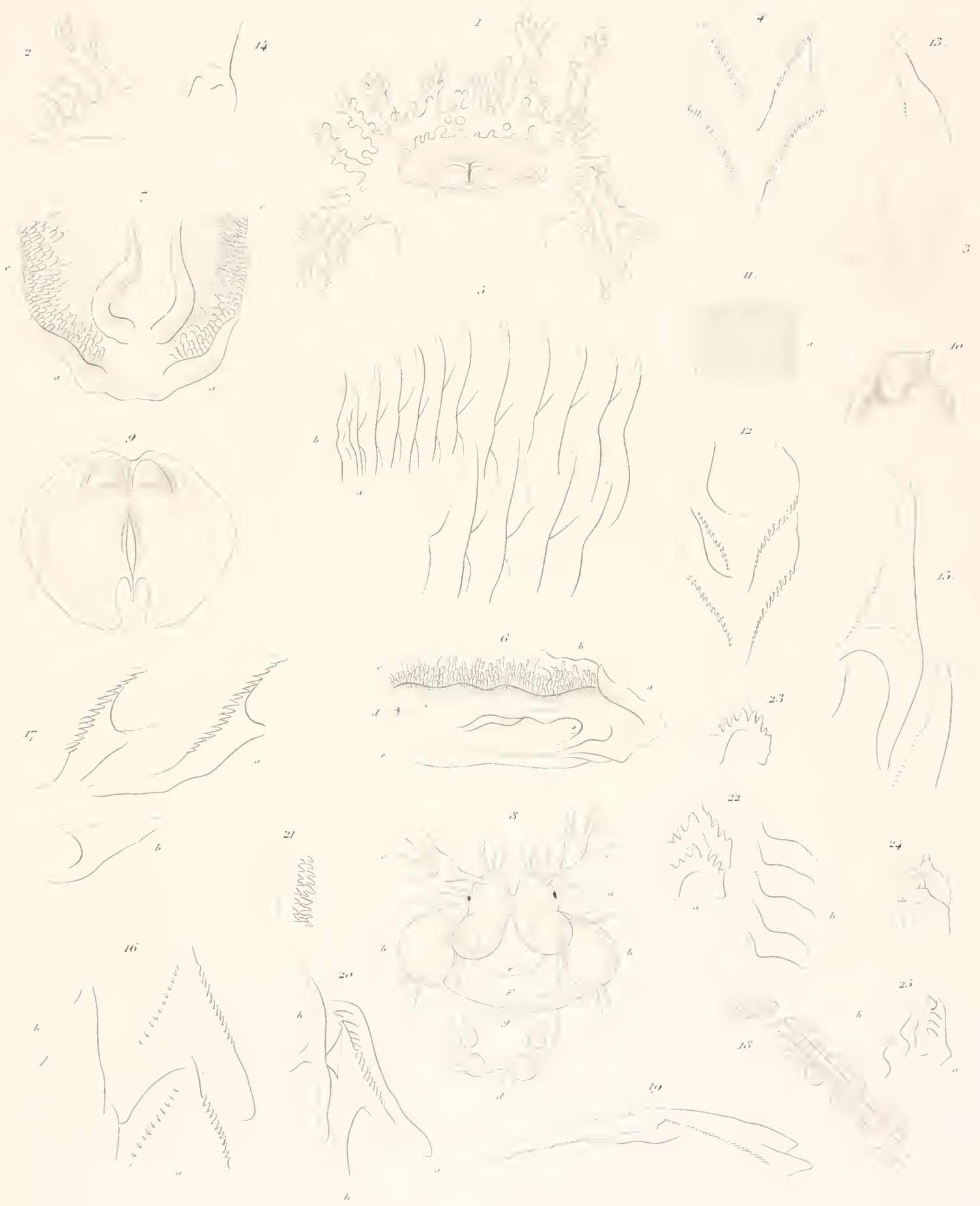
1 2. *Bathydoris Ingolfiana*, B.

3 15 *Doridosa Ingolfiana* B. 16 19 *Cadhuia repanda* (Acl. II). 20 22 *Candiella Ingolfiana* B.



1-3. *Doridoea Ingolliana*, B.
 10-26 *Athila Ingolliana*, B.

4-9 *Candicella Ingolliana*, B.
 27-29 *Dendronotus robustus*, V.



1-5 *Dendronotus robustus* V 6-15 *Goncolis atypica* B 16-17 *Gon intermedia* B.
 18-19 *Coryphella salmonosa* C 20 *Cor* sp 21-25 *Galvina* sp



1. *Gonicolix atypica* Bgh.

2-8. *Coryphella salmonacea* C

9-10. *Cor. salmonacea* var.

11-13. *Coryphella* sp.

14-16. *Cor. sp. anonyma*.

17-23. *Aldisa zetlandica* A et H

24-28. *Amphorina Alberti* Quatref.
B Bergh del

29-30. *Doridosa Ingolliana* B

31. *Lamellidoris muricata* O.E. Mull
Loven del sc



