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No. 11. — *Cruise of the Steam Yacht "Wild Duck" in the Bahamas, January to April,* 1893, *in charge of* ALEXANDER AGASSIZ.

III.

An Account of some Medusæ obtained in the Bahamas. By ALFRED GOLDSBOROUGH MAYER.

THE Medusæ described in the following paper were discovered by Mr. Alexander Agassiz during his recent expedition to the Bahamas in Mr. John M. Forbes's yacht "Wild Duck," in the winter of 1892–93. It was my good fortune to have accompanied Mr. Agassiz on this expedition as his assistant. It is by his permission that I publish this paper.

Although we were cruising upon the Bahama Banks and off the Cuban coast from January 10th until March 19th, it was not until after the middle of February that the surface tows became at all remarkable for the number of specimens taken. This was due in great measure to the rough weather caused by the constant trade wind during the winter months, which rendered attempts at deep-sea hauls wellnigh impracticable for a large portion of the time. It has also been conclusively shown very many times by Mr. Agassiz in his use of the Tanner net that the pelagic fauna sinks down into the ocean when waves disturb the surface, never, however, descending to a depth much greater than one hundred fathoms.

After the middle of February the number of marine animals which came under our daily notice greatly increased, owing to the appearance of many larval forms. An interesting characteristic in the distribution of the pelagic life was the frequent occurrence of "windrows" composed of vast numbers of individuals of a few species. For example, in the surface tow taken in Banes Harbor, Cuba, February 15, there were uncounted hundreds of *Glossocodon tenuirostris* (Agassiz), and almost nothing else. Similarly, in the harbor of Nassau, upon the night of March 12th, one could not drag a tow-net many feet without capturing thousands of the little Discophore, *Linerges mercurius* (Haeckel). These little jelly-fish were all in the same stage of development; still lacking the marginal tentacles which characterize the adult, and their

number was so great as to cause the water of the harbor to appear as though filled with scattered brown specks. After remaining so abundant for several nights, they suddenly disappeared, so that we could not find more than one or two in the tow-net where a hundred were seen before. We also came across floating colonies of Ctenophores, of Annelid larvæ, and of Sagittæ. These windrows of animals are no doubt largely due to the complicated currents and tide eddies, the water of the open seas being constrained to flow through the rather narrow passages between islands. One cannot doubt that there is a plentiful supply of vegetable food for the pelagic fauna of the Bahama Banks; for the little floating alga Trichodesmium is everywhere abundant. We found it present in every tow we made, and indeed it was often impossible to keep marine animals alive over night on account of the rapid decomposition of this sea-weed scattered through the water.

MEDUSÆ.

Hybocodon Forbesii, nov. sp.

Plate I. Fig 1.

A single specimen of a medusa of Hybocodon was found in Nassau Harbor, March 19th. This species has been named for Mr. John M. Forbes, the owner of the "Wild Duck." The bell was 2 mm. in height, its walls thin and transparent. There were four radial tentacles; of these only one is developed and functional, the other three being rudimentary. The single tentacle which was well developed was about 2 mm. long. Its proximal portion was stiff, and projected almost vertically downwards from the bell margin. The distal portion consisted of a bulbous swelling studded thickly with nematocysts. This swollen portion was highly contractile and very sensitive. It was usually carried projecting inwards at right angles to the tentacle itself. The tentacle diametrically opposite this functional tentacle was somewhat longer than the other two. The entodermal cells of the manubrium were bright yellow. The velum was rudimentary.

Bougainvillia Niobe, nov. sp.

Plate I. Fig. 2.

A very interesting specimen of Bougainvillia, for which the name *B. Niobe* is proposed, was taken in a surface tow in Nassau Harbor, March 18th. The bell was 6.75 mm. in height, and its apical portion was very thick. The tentacles of the bell sprung from four bulbous swellings at the bases of the radial tubes. There were between six and eight tentacles arising from each of these bunches.

These tentacles are similar in general features to those of our common *B. superciliaris* (Agass.). At the base of each tentacle, upon the ventral (inner) side, there is a dark purple pigment spot or ocellus, which projects a little from the general level of the ectoderm as a conical protuberance. The velum is well developed. Upon the lips of the manubrium one also finds four bunches of tentacles. These manubrial tentacles arise from the lips of the manubrium as four main stems ; each of these stems branches dichotomously four times, thus giving rise to sixteen tentacle tips from each lip of the manubrium. These tips are slightly knobbed, and are composed chiefly of nematocyst cells. The manubrial tentacles are very flexible, and may be observed waving gracefully to and fro within the cavity of the bell. By far the most remarkable feature of this specimen is the presence of numerous medusa buds springing from the gastric region of the manubrium. These medusa buds were arranged in four radial clusters, and contained individuals in various stages of development. I do not doubt that they become free, and thus the race is propagated asexually in the medusa stage in a manner very similar to that of the *Dysmorphosa fulgurans* (A. Ag.) found at Newport. So far as I am aware, this is the first species of the genus Bougainvillia which has been observed to reproduce in this manner. The color of the digestive portion of the manubrium, and of the basal bulb of the tentacles is rosin-yellow.

Two new and very interesting genera of Hydro-Medusæ, clearly belonging to the subfamily Irenidæ as defined by Haeckel in his "System der Medusen," pp. 167, 199, etc., were found during the cruise. Haeckel defines the Irenidæ as a subfamily of the Eucopidæ distinguished by the possession of numerous otocysts (12–16 or more) and a distinct gastric peduncle. In these new medusæ the peduncle of the manubrium is much less developed than in any hitherto known genus of the Irenidæ. There are twelve interradial otocysts, and the four genital glands develop in restricted regions on the radial canals near the manubrium. We have given them the names *Cubaia Aphrodite* and *Ireniopsis primordialis*.

Cubaia Aphrodite, nov. gen. et sp.

Plate II. Figs. 1, 2, 3.

This very beautiful medusa, for which we have proposed the name *Cubaia Aphrodite*, was found in a surface tow made in the afternoon while we were anchored off Cay Frances, on the northern coast of Cuba, February 17th. A single specimen was captured. The bell was 4.25 mm. wide and 2.7 mm. high, and of a glassy transparency. The velum was distinct and well developed. The manubrium, radial canals, and edge of the bell were slightly opaque and whitish. The radial canals were four in number, and the genital organs were situated upon them near the region of the manubrium. They projected slightly into the cavity of the bell, and were opaque and pearly white in color. The specimen was a male. At the point of exit of each radial canal from the

manubrium there was an oval-shaped, green ectodormal pigment spot. The four lips of the manubrium were very distinct in cross-section, standing off from one another like the four arms of a Swiss cross. There were twenty-four large, stiff, club-shaped tentacles about as long as the height of the bell, and also twenty-four short cirrus-like tentacles lying between the large ones.

The large tentacles were girdled at regular intervals by rings of nematocyst cells. In a state of partial contraction they showed a globe-like swelling near the distal end, terminated by the shrunken cap-like end of the tentacle. The smaller tentacles exhibited only a simple terminal bunch of nematocysts. The entoderm of the basal bulbs of all the tentacles was colored claret-purple, and there was also a green ectodermal ocellus-like spot upon the ventral surface of each bulb. These were similar in color to the green spots upon the manubrium. The entodermal core of all the tentacles was of a claret-purple color. There were twelve elongated spindle-shaped otocysts (see Plate II. Fig. 3) between the tentacles, three in each interradius. In each of these otocysts there was an oval cavity containing a highly refractive spherical otolith. It is remarkable that in this Medusa we find both otocysts and pigment spots! The animal was very vigorous in all its movements, and remarkably tenacious of life in captivity.

Ireniopsis primordialis, nov. gen. et sp.

Plate I. Figs. 3, 4, 5, 6.

Three stages of another curious Hydro-Medusa were found in surface tows made early in March while upon the Little Bahama Bank. It is closely allied to *Cubaia Aphrodite*, described above, but we prefer to place it in another genus, owing to the dissimilarity in shape of the otocysts, the greater development of the peduncle, and certain minor differences in the disposition and growth of the tentacles, which will be explained more in detail further on. The name *Ireniopsis primordialis* is proposed for it.

The youngest specimen (Plate I. Fig. 5) possessed a transparent, thimble-shaped bell 1 mm. in height. The outer surface was scattered over with rather regularly spaced nettle capsules. The ectoderm of the cavity of the bell was of a delicate shade of pea-green. There were four simple radial canals. The manubrium, in this stage of its development, was very small, with four distinct lips. It was green in color. There was, as yet, no trace of the peduncle of the manubrium. There were sixteen tentacles and only four otocysts in the specimen examined. The otocysts were spherical sacs enclosing a cavity within which there was a very refractive otolith. The tentacles exhibited regularly spaced rings of nematocyst cells. At the bases of the tentacles there was an accumulation of green pigment.

An older individual than the above (Plate I. Fig. 3) was found near Burrow Cay, March 8th. The bell had widened out and was 1.6 mm. high, and the nettle cells over its outer surface were much less conspicuous than in the young specimen. The manubrium began to show a slight trace of a peduncle. The

otocysts were now twelve in number. The tentacles in this individual had developed somewhat abnormally, so that there were twenty-seven of them. These tentacles exhibited regular rings of nettle cells, very similar in arrangement to those upon the tentacles of *Cubaia Aphrodite*. There were bright green pigment spots at the bases of the tentacles in the entoderm.

The oldest specimen (Plate I. Fig. 4) was captured near Great Abaco Island, Little Bahama Bank, on March 9th. The bell was 2 mm. high and hemispherical in shape. The most remarkable change was the development of the peduncle of the manubrium, which now hung down for about a quarter of the height of the bell cavity. The genital organs began to appear upon the radial canals in the highest part of the bell cavity. There were twelve otocysts and thirty-two tentacles, eight in each quadrant. A drawing of the otocyst is shown in Plate I. Fig. 6

Other Hydro-Medusæ which have been previously described were found during the expedition. Among these was *Aglaura vitrea* (Fewkes), a single specimen of which was taken in Nassau Harbor and at Grand Turk Island. Fewkes has given a good description and a fair figure of this species. We also captured specimens of Tamoia at Nassau and at Grand Turk Island. *Modeeria multitentacula* was found on the Little Bahama Bank early in March. This species is common at Newport, R. I.

Eirene cœrulæ (L. Agas.), *Rhegmatodes floridanus* (L. Ag.), *Glossocodon tenuirostris* (L. Ag.), *Oceanica languida* (L. Ag.), were met with at various places.

Among the Dyscophoræ the following species are worthy of notice. *Linerges mercurius* (Haeckel), found on the Great Bahama Bank at Nassau. *Aurelia aurita?* and *Dactylometra lactea* (L. Ag.) were very abundant in the harbor of Havana during the last week in February. Among the Ctenophoræ was *Idiopsis Clarkii*, which was found off the coast of Cuba, in the Gulf Stream, in the middle of February.

SIPHONOPHORÆ.

Cannophysa Eysenhardtii.

Plate III. Figs. 1, 2, 4.

A number of specimens of the Siphonophore, described by Fewkes as belonging to the genus Rhizophysa (Fewkes, "On a few Medusæ from the Bermudas," Bull. Mus. Comp. Zoöl. Harvard College, Vol. XI. No. 3), were captured during the cruise. Dr. Fewkes gives a good description and a very poor sketch, which is apparently intended to represent *R. Eysenhardtii*. In our opinion it would be better to adopt the nomenclature of Haeckel, and give to this species the name of Cannophysa, as it is evidently very closely allied to, if not identical with, *Cannophysa Murrayana* from the Canary Islands. (See Plate XXIV., Siphonophoræ of the Challenger Expedition.) The pneumato-

phore of this species, however, was spherical, and not elongated like that of *C. Murrayana.* The position of the pneumatopore was at the centre of a pigmented iris-like spot. The contractions and expansions of this iris-like portion caused the pneumatopore to be opened and closed like the pupil of the eye, and thus the pneumato-sac might be freed of its contained gas. Eight bunches of hyposistic villi projected as branching sac-like protrusions from the entodermal wall of the pneumato-sac into the cavity of the pneumatopore.

An excellent description of the construction of the pneumatophore in the Rhizophysidæ has been given by Gegenbaur (Bau der Pneumatophoren, Zool. Anzeiger, Jahrg. X., pp. 511–529). The hydrosoma bore only feeding polyps and tasterns. These appendages grew out from one side only of the hydrosoma, and were thus arranged vertically under one another, although when the animal was contracted, and the hydrosoma was twisted, it gave them the appearance of being spirally twirled. The appendages of the hydrosoma first make their appearance just under the pneumatophore, and as the hydrosoma increases in length they are carried downward (see Plate III. Figs. 1, 2). The feeding polyps appear first, then the tasterns make their appearance a little farther down the hydrosoma as slight protuberances just above the place of attachment of each polyp. As they increase in age, they begin to show the secondary filaments (see Plate III. Figs. 1, 2). The secondary filaments are fine hair-like structures terminating in a bunch of nematocysts (see Plate III. Fig. 4). Two sets of muscles are found in the hydrosoma and pneumatophore, — a peripheral longitudinal set and a deeper-lying circular system. The contractions of these two systems are very vigorous, and allow the animal to elongate itself enormously, so that it resembles a delicate thread of spun glass, bearing at regular intervals little bunches of glass beads, or it may draw itself up with great rapidity into a closely wound helix. The mouths of the feeding polyps often expand themselves out into a trumpet-shape. The hydrosoma is slightly yellowish in color, and the ectoderm of the pneumatophore is of a delicate rosy tint.

We captured a number of specimens, some from the Bahama Banks, but most of them in the Gulf Stream off the northern coast of Cuba. They came up clinging by means of their tasterns to the wire rope of the Tanner tow-net. One specimen was found fastened to the rope when 180 fathoms of it had been drawn in; another, captured in the Gulf Stream, was found in the upper portion of the Tanner net after it had been towed at the depth of 150 fathoms. Evidently this specimen was then swimming within this depth of the surface. The animals were extremely sensitive to touch, and, contracting themselves into a tangled mass, they very soon began to throw off their feeding polyps, after which they died. Figure 2, Plate III., is an enlarged view of a small individual, the actual size being indicated by the scale which accompanies it.

EXPLANATION OF THE PLATES.

PLATE I.

Figure 1. Hybocodon Forbesii, *Mayer*.
" 2. Bougainvillia Niobe, *Mayer*.
Figs. 3–6. Ireniopsis primordialis, *Mayer*.

PLATE II.

Cubaia Aphrodite, *Mayer*.

PLATE III.

Figures 1, 2, 4. Cannophysa Eysenhardti.
" 3 Cannophysa filiformis.

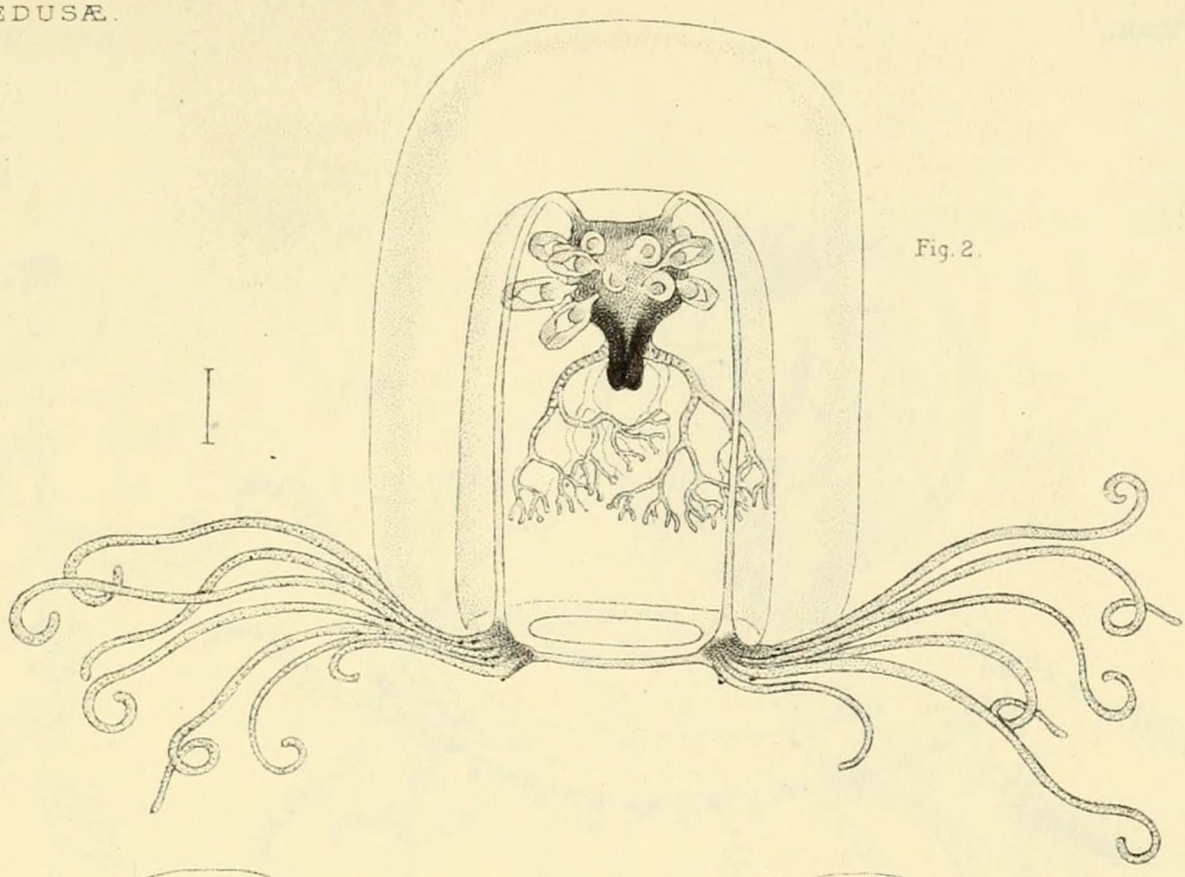

Fig. 2.

I

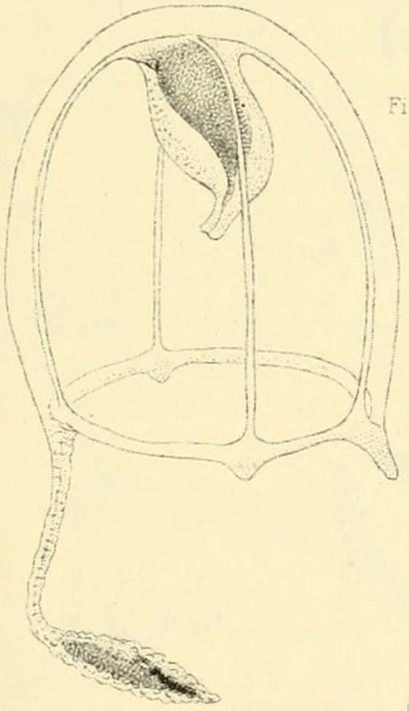

Fig. 1.

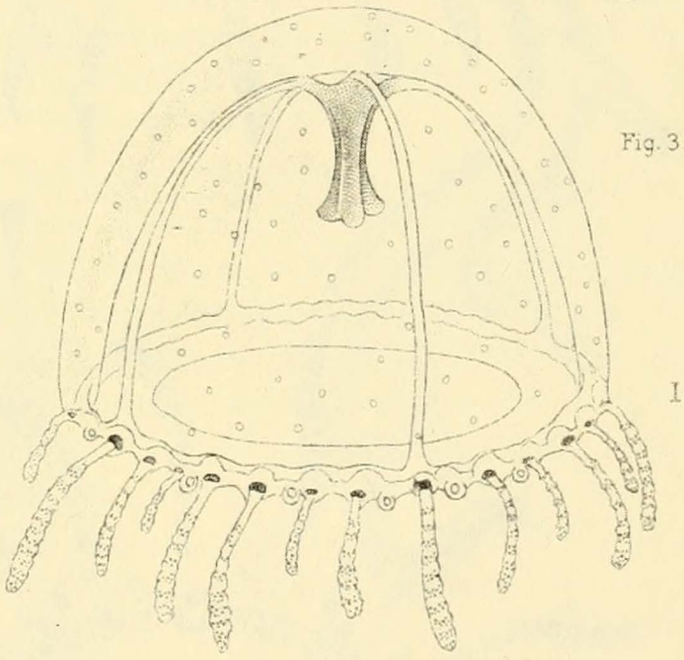

Fig. 3.

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Fig. 6.

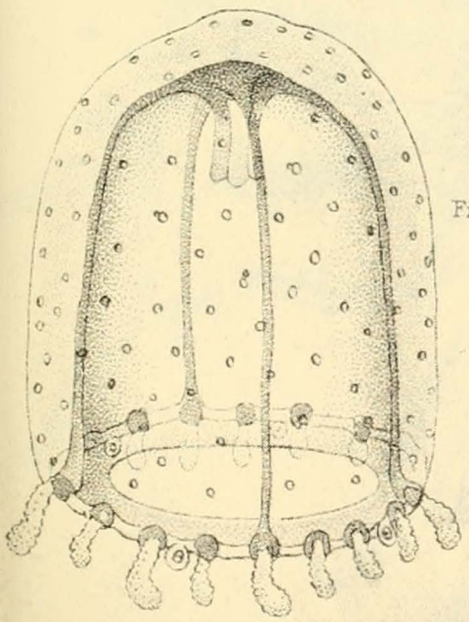

Fig. 5.

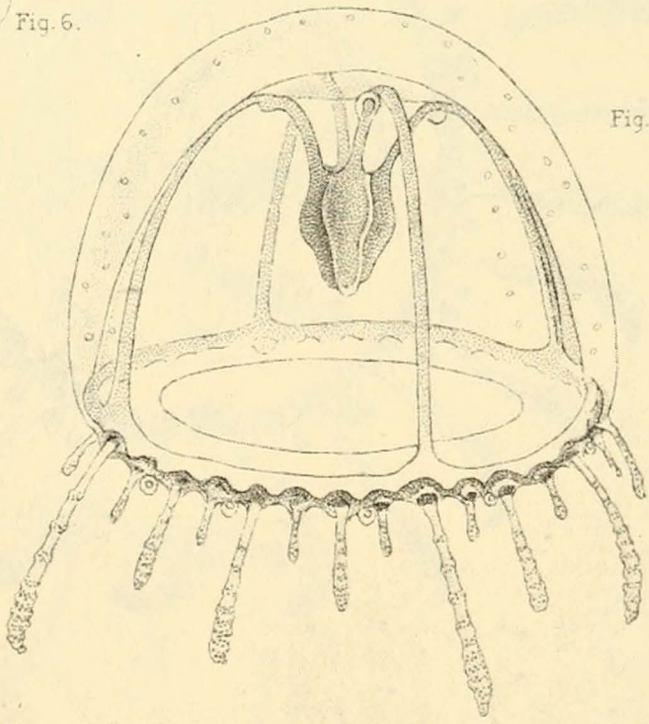

Fig. 4.

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Fig. 1.

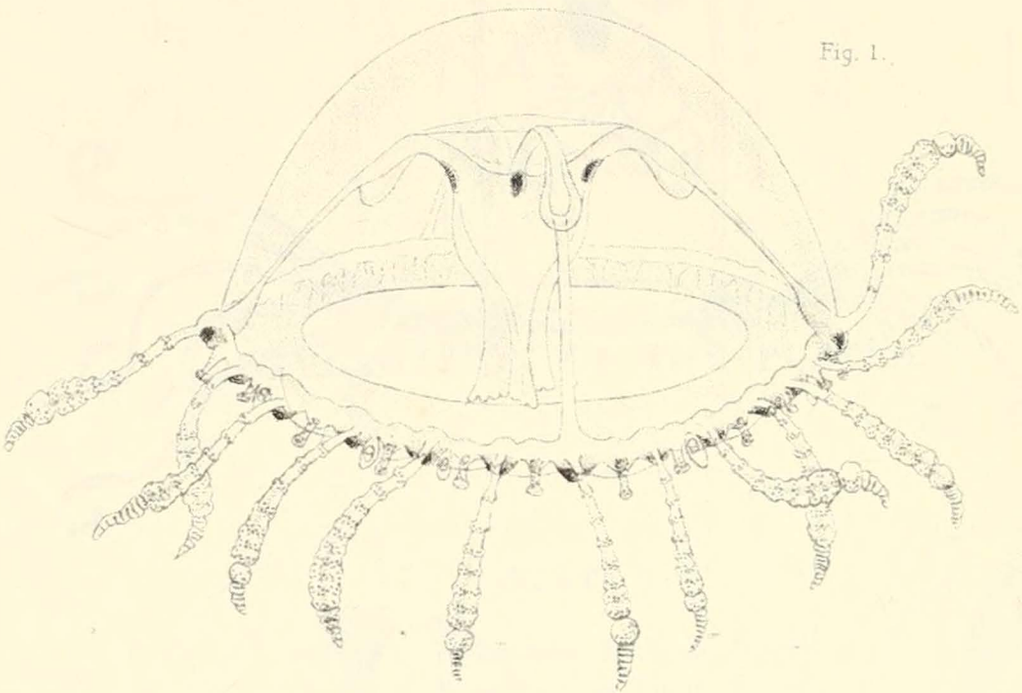
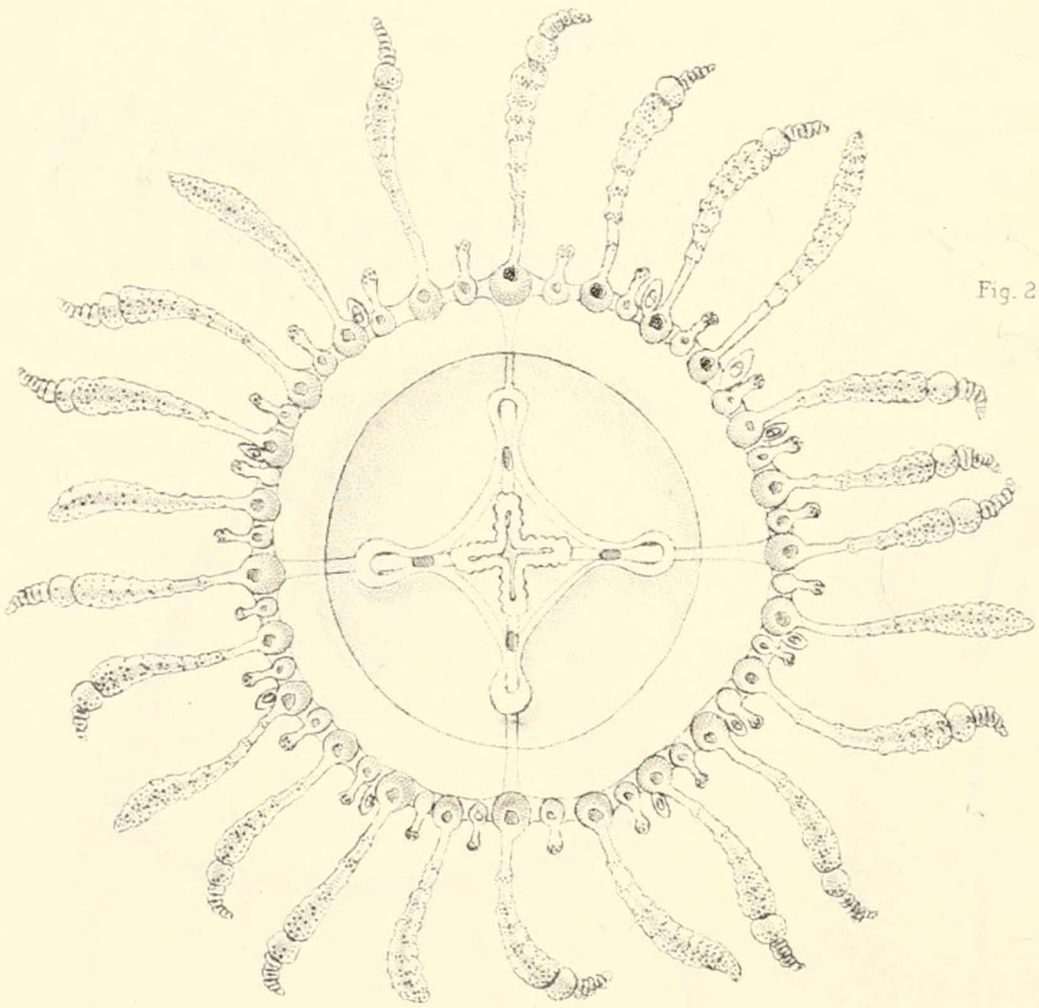


Fig. 3.

Fig. 2.



A. G. Mayer, del.

Fig. 1.

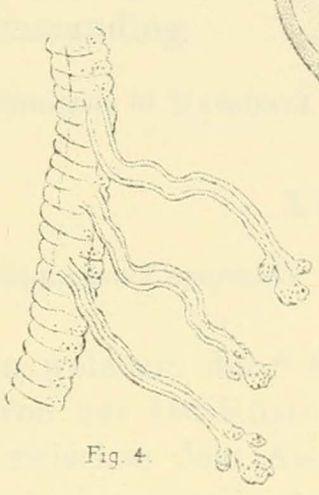


Fig. 4.

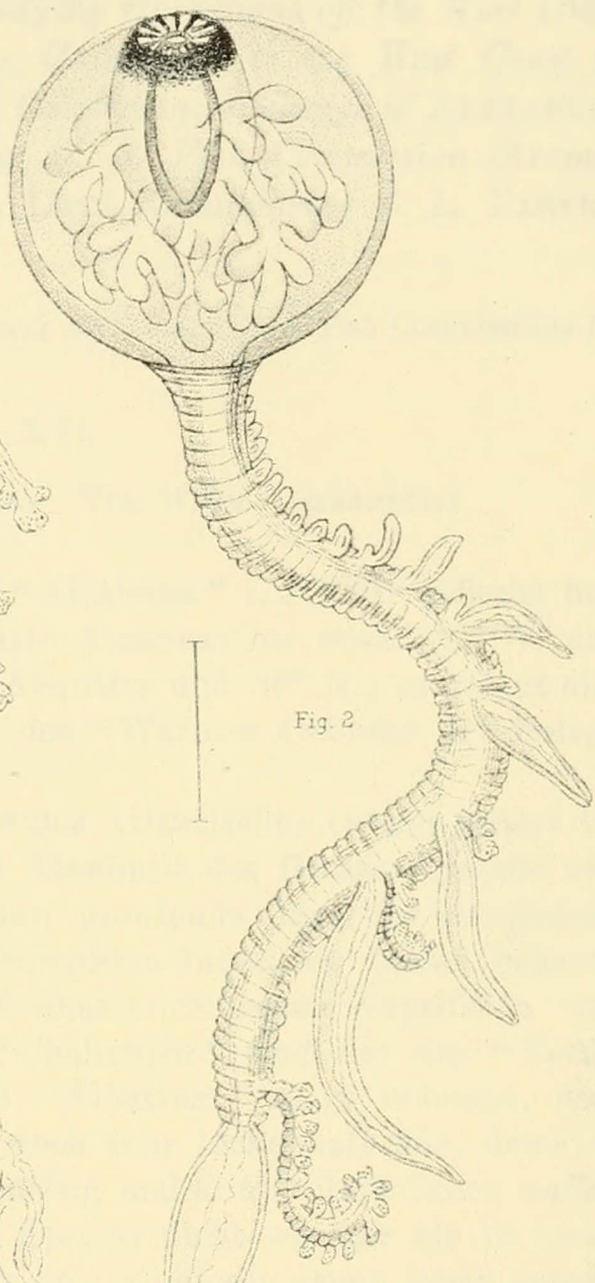


Fig. 2.

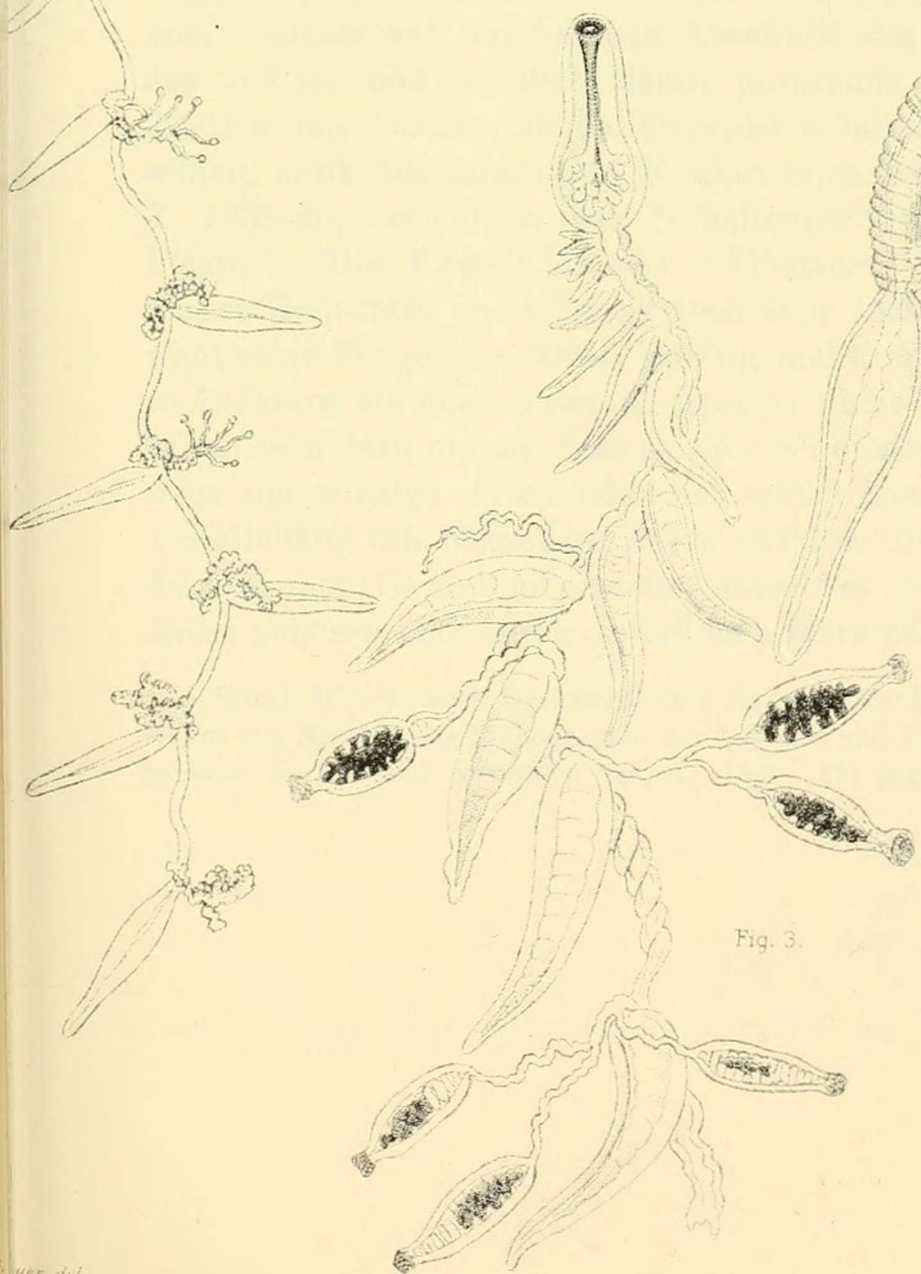


Fig. 3.

G. uer. del.