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ACALEPHS FROM THE FIJI ISLANDS.

By Alexander Agassiz and Alfred Goldsborough Mayer.

With Seventeen Plates.

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No. 9. — *Acalephs from the Fiji Islands.* By Alexander Agassiz and Alfred Goldsborough Mayer.

INTRODUCTION.

During a visit to the Fiji Islands, extending from November 7, 1897, to January 13, 1898, we devoted considerable time to a study of the Marine pelagic fauna. We made use only of open tow-nets, and while the majority of our hauls were made upon the surface, a number were also made at depths varying from twenty-five to one hundred fathoms. Most of these deeper hauls were made at a station three to five miles south of the entrance of Suva Harbor, and it was remarkable that the tows drawn from one hundred fathoms were far richer, both in number and variety of species, than were those made at twenty-five to fifty fathoms. No precise conclusions can, however, be drawn concerning the bathymetrical distribution of marine organisms from these results, for, owing to the fact that the mouth of the tow-net was constantly open, we cannot state the depth from which any given animal may have come; and, moreover, the near proximity of the land, and the extremely complex currents and eddies that are so characteristic of this region of Coral Reefs, probably play a far more important part in the distribution of pelagic organisms than does the mere fact of depth. The breakers are constantly forcing the ocean water over the reefs into the shallow lagoons, from which it finds access again into the sea through the openings in the walls of the reef, so that in some instances one finds a strong current, that is in great measure independent of the tide, constantly flowing outward from the lagoon into the open ocean. Such currents acting in conjunction with the tidal flow cause extensive eddies that result in a very ununiform distribution of pelagic life.

Besides our hauls in the neighborhood of Suva we made others off Taviuni, Kimbombo, Vanua Mbalavu, Ngamia, Wailangilala, Totoya, Mbatiki, Kandavu, and Nukulau Islands. The hauls were rich in Crustacea, but deficient in the number of Worms, Echinoderm larvæ, and Medusæ. Indeed, our success was remarkably inferior when com-

pared with what we should expect to find in the sub-tropical regions of the Atlantic Gulf Stream. We obtained seven genera of Scyphomedusæ, twenty of Hydromedusæ, nine of Siphonophoræ, and two Ctenophoræ.

With the exception of two Rhizostomæ, all of the genera are represented by species found in the Atlantic Ocean. Indeed, the affinity between the Medusæ of the Fiji Islands and those of the West Indies is remarkably close, and in six cases we are unable to distinguish any specific differences between the Fijian species and well known Atlantic forms, and therefore venture to assert that they are specifically identical. The following table illustrates the Atlantic distribution of these Medusæ that are found also in the Fiji Islands.

1	Halitiara formosa, Fewkes.	Dry Tortugas Islands, Florida.
2	Pandea violacea, nov. sp.	Dry Tortugas Islands, Florida.
3	Rhegmatodes floridanus, L. Agassiz.	Bahamas, Gulf of Mexico.
4	Æginella dissonema, Haeckel.	Canary Islands; Dry Tortugas Islands.
5	Agalma Pourtalesii, nov. sp.	Dry Tortugas Islands, Florida.
6	Abyla (Abylopsis) quincunx, Chun.	Tropical Atlantic, Dry Tortugas Islands, Florida.

In the following ten genera the Fijian form is represented in the Atlantic Ocean by a *very* closely allied species: Linerges, Nausithoë, Tamoya, Cunina, Aglaura, Gonionemus, Mitrocoma, Tiaropsis, Eutima, and Sphæroncetes. Indeed, the acalephan fauna of the Fiji Islands, if one excepts the Rhizostomæ, is more closely related to that of the Dry Tortugas Islands, Florida, than is the latter to the fauna of the Mediterranean Sea.

In this connection it is interesting to notice that A. Agassiz[1] has shown that the deep sea fauna of the Gulf of Mexico and the Caribbean Sea is far more closely allied to that of the Pacific than it is to that of the Atlantic, and this is accounted for upon the supposition that before the Cretaceous period the Gulf of Mexico and the Caribbean were in freer communication with the Pacific than with the Atlantic. Again, in 1892,[2] the same author found that in nearly all the groups of deep sea

[1] Agassiz, A., 1883, Mem. Mus. Comp. Zoöl., Vol. X. pp. 79–84.

[2] Agassiz, A., 1892, Bull. Mus. Comp. Zoöl., Vol. XXIII. pp. 74–82.

Fishes, Crustaceans, Mollusks, Worms, Echinoderms, and Polyps dredged off the west coast of Central America there were familiar West Indian types, or east coast forms.

A recent survey of the region of the Isthmus of Panama has been made by Hill,[1] who considers that it is impossible to make any serious deductions concerning the relations of North and South America during epochs preceding the Jurassic period, owing to the lack of data. He also concludes (p. 261) that the waters of the Atlantic and Pacific were probably as completely separated by a great continental land barrier in Cretaceous times as they are to-day, a proposition fully as tenable as the opposite hypothesis that they were united. If the marine passage ever existed across the Isthmus of Panama, or elsewhere in Tropical America, it must have been during the later Eocene period, and this strait was probably of a shallow and restricted character, and had finally disappeared before the close of the Miocene period.

If straits of considerable width and depth have ever connected the waters of the Tropical Atlantic with those of the Pacific, it is probable that the great Equatorial current would pour through them from the Atlantic into the Pacific, and thus the Pacific Ocean would become impregnated with Atlantic species. Once having gained access to the Pacific, the westerly Equatorial set would soon distribute the pelagic animals widely over the ocean.

It is interesting to notice that while so many characteristic types of Tropical Atlantic Medusæ are also found in the Pacific, the most *eminently* characteristic Tropical Pacific genera, the Rhizostomæ have remarkably few analogues in the Atlantic.[2] This, indeed, is what we should expect as a result of the westerly set of the great Equatorial current that would freely sweep animals from the Atlantic into the Pacific, but would in like measure hinder the entrance of Pacific forms into the Atlantic.

Of the thirty-eight species of Acalephs found by us in the Fiji Islands, twenty-six are new to science.

[1] Hill, R. T., 1898, The Geological History of the Isthmus of Panama, etc. Bull. Mus. Comp. Zoöl., Geological Series, Vol. XXVIII. No. 5, pp. 151–285, Plates I.–XIX.

[2] In this connection, see Lendenfeld, R. von, 1884, The Geographical Distribution of Australian Scyphomedusæ, Proc. Linn. Soc. New South Wales, Vol. IX. pp. 421–433. Also, Vanhöffen, E., 1888, Bibliotheca Zool., Bd. I. Heft 3, p. 46, Map.

DESCRIPTION OF SPECIES.

I. HYDROMEDUSÆ.

Halitiara formosa, Fewkes.

Halitiara formosa, Fewkes, J. W., 1882, Bull. Mus. Comp. Zoöl., Vol. IX. p. 276, Plate IV. Fig. 2.

This Medusa is found in both Atlantic and Pacific Oceans. It is exceedingly abundant throughout the summer at the Dry Tortugas Islands, Florida, and we also found it in considerable numbers late in December in Suva Harbor, Viti Levu Island, Fiji Islands. The entoderm of the proboscis and tentacle bulbs of the male is usually dull brown or drab, while in the female it is bright green.

Pandea violacea, nov. sp.

This Medusa is common throughout the summer at the Dry Tortugas Islands, near the entrance to the Gulf of Mexico. We also obtained several specimens in Suva Harbor, Fiji Islands, early in January, 1898. We hope soon to present a figure of the Medusa in a paper upon "Medusæ from the Dry Tortugas," that is to be published in the Bulletin of the Museum of Comparative Zoölogy. At present we will content ourselves with a description of the animal.

Generic Characters. Pandea, Lesson, 1843. Tiaridæ with numerous tentacles, 8–16 or more arranged in a single row. The outer surfaces of the tentacle bulbs bear ocelli. There is no peduncle to the proboscis. The upper edges of the proboscis are bound to the 4 radial tubes by means of 4 mesenteries. There are 4 simple gonads, with smooth outer surface.

Specific Characters. The bell is 4 mm. in height, and is pear-shaped. The bell walls are of only moderate thickness. There are 32 tentacles. Eight of these are large, being about three times as long as the bell height; and 24 are rudimentary. The bulbs of the large tentacles are hollow. Each and every tentacle bulb bears a single ocellus, making in all 32 ocelli. The velum is well developed. The proboscis is flask-shaped, its proximal portion being distended by the 4 genital glands. The lips are simple and cruciform. There are 4 straight radial tubes and a broad circular tube. The color of the entoderm of the proboscis and tentacle bulbs is delicate pink or light purplish brown. A green streak runs along the outer surface of the entoderm of each of the 4 radial canals. The ocelli of the tentacle bulbs are purple in color.

Pennaria vitrea, nov. sp.

Plate 1, Figs. 1, 2.

Generic Characters. Pennaria, Goldfuss, 1820. Four rudimentary marginal tentacles that are reduced to mere basal bulbs. No ocelli. Four radial tubes. Gonads within the proboscis. No peduncle nor oral appendages to the proboscis.

Specific Characters. The bell is 3 mm. in height; and the walls are thick and rigid. There are 4 rudimentary tentacle bulbs. The velum is not prominent. The 4 radial canals are straight and narrow. The proboscis in the female specimen (Fig. 1) was retracted within the cavity of the bell, but in the male (Fig. 2) it was flask-shaped, and projected for a little distance beyond the velar opening of the bell. These conditions, however, may be merely different states of contraction and not constant differences; but, as we observed only two individuals, one a male and the other a female, we cannot be certain upon this point. The ova are large and pyriform, and are grouped in 4 radially arranged clusters within the proboscis. The mouth opening of the proboscis is very simple, and there are no fimbriations or appendages.

Prominent circular muscles were observed in the ectoderm of the cavity of the bell in the female, but these were not seen in the case of the male. It is possible, however, that they become apparent only during certain states of contraction. In the female the ovæ and tentacular bulbs were flesh-colored, and the entoderm of the mouth of the proboscis was green. In the male the tentacular bulbs were green, the entoderm of the proboscis pink, and the lips green.

Found off Kimbombo Island, November 25, and off Mbatiki Island, December 5, 1897.

Cytæis vulgaris, nov. sp.

Plate 2, Figs. 3, 4, 5.

Generic Characters. Cytæis, Eschscholtz, 1829. Margellidæ with simple unbranched oral tentacles upon the proboscis, and with 4 radially situated marginal tentacles.

Specific Characters. The bell is thin and slightly pyriform in shape, and is 3 mm. in height. The 4 marginal tentacles are somewhat stiff, and are usually seen curled upward in a semicircular curve. The tentacle bulbs are large and prominent. The velum is well developed. There are 4 thin straight radial tubes. The proboscis (Figs. 3, 4) is pyriform, and possesses a slightly developed peduncle. Sixteen simple oral tentacles surround the mouth. The entodermal cells of these tentacle are disk-shaped, and their free ends are armed each with a battery of nematocysts (Fig. 5). The mouth opening is simple, and, excepting for the oral tentacles, there are no other appendages. The color of the entoderm of the tentacle bulbs is dark salmon-red, as is also the entoderm

of the proboscis near the peduncle. The remainder of the entoderm of the proboscis and of the tips of the marginal tentacles is green.

Young Medusa. The youngest Medusa observed by us had only 4 oral tentacles. The red color of the basal bulbs of the marginal tentacles extended for a considerable distance upward along the radial tubes. The bell was 1 mm. in height.

This form is very abundant all over the Fiji Islands in November and December. We came across a great swarm of these Medusæ within the crater of Totoya Island.

Bougainvillea fulva, nov. sp.

Plate 2, Fig. 6.

Generic Characters. Bougainvillea, Lesson, 1843. Margellidæ with dendritically branching oral tentacles, and with 4 radially arranged bunches of marginal tentacles. Proboscis wide and quadratic in cross section. Gonads developed in the ectoderm of the proboscis.

Specific Characters. The bell is pyriform, and 2.5 mm. in height. The bell walls are of moderate thickness. There are 4 radially arranged bunches of marginal tentacles, each one of which consists of 3 tentacles. A dark purple ocellus is found in the ectoderm of the tentacle bulbs at the base of each tentacle. The velum is well developed. There are 4 straight narrow radial canals. The proboscis is wide and quadratic in cross section. There are 4 oral tentacles, each one of which branches dendritically twice. The gonads are found in the ectoderm of the proboscis. The entoderm of the tentacle bulbs and of the proboscis is flesh-colored.

Single specimen, obtained in towing with an open net at 100 fathoms, three miles south of the mouth of Suva Harbor, December 16, 1897.

Laodicea marama, nov. sp.

Plate 3, Figs. 7, 8.

Generic Characters. Laodicea, Lesson, 1843. Leptomedusæ without otocysts, and with 4 simple unbranched radial canals, upon which lie the gonads. Tentacles numerous. The tentacle bulbs are well developed, and many of them possess ectodermal ocelli. There are clubs and cirri upon the bell margin, between the tentacles.

Specific Characters. The bell is quite flat and disk-shaped, and is 5.5 mm. in diameter. There are about 50 long, slender, flexible tentacles, each one of which possesses a well developed basal bulb. A single dark purple ocellus is found upon the inner side of the bulb of most of the tentacles. This ocellus is situated in the ectoderm. There are numerous clubs and cirri (Fig. 8) between the tentacles. The velum is prominent. There are 4 narrow radial canals, in the upper portions of which, near to the proboscis, the gonads are found. The proboscis is short and slender, and the lips not prominent. The entoderm of

the radial tubes and of the basal bulbs of the tentacles is opaque and slightly bluish in color. The entoderm of the proboscis is often green.

This species is common in Suva Harbor in December. It is closely allied to Laodicea ulothrix, Haeckel, of the Canary Islands and Bahamas.

Laodicea fijiana, nov. sp.

Plate 3, Figs. 9, 10.

Specific Characters. The umbrella is thin and bell-shaped, and 6 mm. in diameter. There are about 70 long, slender, marginal tentacles, the free ends of which are usually coiled in a close helix. These tentacles are very fragile, and in the adult Medusa most of them are found to have been broken off near to the basal bulbs. In the young jelly-fish, however, they are usually seen in a perfect condition. A single dark brown pigment spot, or ocellus, is found in the ectoderm on the inner side of the basal bulbs of about three quarters of the tentacle. There are no cirri between the tentacles, but there are about 8 clubs that occupy this situation. The velum is well developed. The lower portions of the 4 radial tubes, near to the circular canal, are straight and narrow; but their upper portions, near to the proboscis, exhibit complex diverticulæ. The gonads are situated upon this complexly developed portion of the radial canals; and in the female (Figs. 9, 10) the ova are prominent, and project outward in grape-like clusters over the surface of the genital organs. The proboscis is short and quadratic in cross section, and there are 4 well developed fimbriated lips. The entoderm of the proboscis and radial and circular canals is opaque and slightly blue in color.

Common at Suva, Viti Levu Island, in December.

Eutimeta levuka, nov. sp.

Plate 9, Figs. 30, 31.

Generic Characters. Eutimeta, Haeckel, 1879. Leptomedusæ with 8 otocysts, and 8 tentacles, and with marginal cirri. The proboscis is borne upon a long peduncle. The gonads are found upon the 4 radial canals.

Specific Characters. The bell is thin, and flatter than a hemisphere. It is 8 mm. in diameter. There are 8 well developed hollow tentacles. Four of these are about as long as the diameter of the bell, and the 4 others are only about one half of this length. Small lateral cirri (see Fig. 31) are found upon the sides of these tentacles. In addition to the large tentacles already described, there are 24 small papillæ upon the bell margin, and these are flanked by lateral cirri exactly as are the large tentacles. There are 8 otocysts, each one of which contains 3–5 otoliths. The velum is large. The 4 radial canals are straight and narrow, and the gonads are found upon them near to the circular vessel. The peduncle of the proboscis is slender, and $1\frac{1}{2}$ times as long as the

diameter of the bell. The proboscis is flask-shaped, and there are 4 flanged lips. The genital organs, tentacles, and proboscis are slightly opaque and bluish in color.

Several specimens, Suva Harbor, January, 1898.

Staurodiscus nigricans, nov. sp.

Plate 4, Figs. 11, 12.

Generic Characters. Staurodiscus, Haeckel, 1879. Leptomedusæ without otocysts, but with clubs between the tentacles. There are 4 radial canals, each of which gives rise to a pair of lateral canals. The gonads are situated upon the canals.

Specific Characters. The bell is thin and flexible, and is 14 mm. in diameter. There are 12 short tentacles having well developed basal bulbs. Between each successive pair of tentacles there are 7 knot-like protuberances upon the bell margin, each one of which bears a sensory club. The velum is insignificant in size. Each of the 4 radial canals gives rise to a pair of lateral branches; and thus 12 canals reach the circular vessel. The gonads are developed upon these canals (see Fig. 11). The proboscis is very short, and the mouth opening wide. The gelatinous substance of the bell has a brownish tinge. The genital organs, basal bulbs of the tentacles, and the proboscis are light sepia in color. The bulbs of the sensory clubs are dark brown.

Single specimen, captured in an open tow-net that was drawn from 100 fathoms, three miles south of the entrance of Suva Harbor, December 11, 1897.

This form differs from the two Atlantic species of Staurodiscus described by Haeckel (1879, Syst. der Medusen, pp. 145, 146) chiefly in that the side branches of the 4 radial canals reach the circular canal, whereas in the Atlantic forms they end blindly.

Gonionemus suvaensis, nov. sp.

Plate 5, Figs. 14-16.

Generic Characters. Gonionemus, A. Agassiz, 1865. Trachomedusæ, not Leptomedusæ (see Haeckel, 1879, Syst. der Medusen, p. 146), with numerous sucker bearing tentacles that are all similar each to each. There are otocysts situated between the tentacles. The gonads are sinusoidally folded, and are situated upon the 4 radial canals. The proboscis is cruciform in cross section, and the lips are prominent.

Specific Characters. The bell is flat and of moderate thickness. It is about three times as broad as it is high, and is 8 mm. in diameter. There are about 70 long, stiff tentacles. The proximal portion of each tentacle is straight, but near the free end there is a small sucking disk, and beyond this the tentacle makes a sharp bend (see Figs. 14, 15). There are about 16 otocysts, 4 in

each quadrant. The velum is well developed. There are 4 straight radial tubes, upon the lower portions of which, near to the circular tube, the gonads are situated. The gonads are folded in a sinusoidal curve alternately to the right and left of the radial tube. The proboscis is cruciform in cross section (see Fig. 16), and the lips are prominent. Green pigment spots are found in the ectoderm of the basal bulbs of the tentacles, and also upon the radial tubes close to their junction with the proboscis (Fig. 16). The entoderm of the radial tubes in the region of the gonads is tinged with green. The ectoderm of the bell margin is of a delicate rose color, and the proboscis and gonads are brown.

This Medusa was common in Suva Harbor late in December. It is more closely allied to the species described by Murbach [1] from Wood's Hole, Massachusetts, than it is to Gonionemus vertens, A. Agassiz,[2] of the Gulf of Georgia, Washington.

Aglaura prismatica, Maas.

Plate 4, Fig. 13.

Aglaura prismatica, Maas, O., 1897. Mem. Mus. Comp. Zoöl. at Harvard Coll., Vol. XXIII. No. 1, p. 24, Pl. III. Figs. 4, 5.

Lessonia radiata? Eydoux, F., et Souleyet, L., 1841–52, Voyage de la Bonite, Vol. II. p. 643, Zoöphytes, Pl. II. Fig. 16.

Generic Characters. Aglaura, Péron and Lesueur, 1809. Aglauridæ in which the 8 gonads are situated upon the peduncle of the proboscis, directly over the points of juncture of the 8 radial canals with the gastric portion of the proboscis. There are numerous tentacles, and 8 otocysts.

Specific Characters. The bell is about 3 mm. in height, and about as broad as it is high. The walls, although rigid, are exceedingly thin. The side walls of the bell are vertical, and the top is quite flat with, however, a slight apical projection. There are about 60 tentacles that are so fragile that they were broken off short in every specimen observed by us. There are 8 club-shaped otocysts, situated midway between the 8 radial canals. Each otocyst contains a single otolith. The velum is very large and powerful, and it is chiefly by means of its rapid movements that the Medusa is enabled to dart through the water. The 8 radial tubes are straight, and very narrow. The proboscis is flask-shaped, and provided with a well developed peduncle. There are 4 prominent cruciform lips. The 8 sausage-shaped gonads project outward from the sides of the peduncle at the point of juncture of the 8 radial tubes with the gastric portion of the proboscis. The gonads and entoderm of the proboscis are usually brownish red in color. Some specimens, however, are almost transparent. The Medusa was very common among the Fiji Islands.

Maas, 1897, has figured a Medusa from the Gulf of Panama that we believe to be identical with our Fijian form. The differences between our figure and

[1] Murbach, L., 1895, Journ. Morphol., Boston, Vol. XI. p. 493.

[2] Agassiz, A., 1865, North American Acalephæ, p. 128, Figs. 197–200.

those of Maas may readily be accounted for by the circumstance that his figures were drawn from preserved specimens that were probably distorted by contraction. A *very* closely allied species is found at the Dry Tortugas Islands, Florida.

Liriope hyalina, nov. sp.

Plate 9, Fig. 32.

Generic Characters. Liriope, Lesson, 1843. Geryonidæ with 4 gonads upon the 4 radial canals. The circular canal is simple, and without blind, centripetal branches. There are 8 permanent tentacles; 4 of these are long, hollow, and radially situated, and 4 are short, solid, and interradial. Eight otocysts; 4 radial, and 4 interradial.

Specific Characters. The bell is about $1\frac{1}{2}$ times as broad as high, and the sides are straight and sloping. It is 6.5 mm. in diameter. There are 8 tentacles; 4 of these are radial, and are about as long as the diameter of the bell. They are hollow, and are covered with rings of nematocysts. The other 4 tentacles are interradial and very short, and are carried curled sharply upward.

There are 8 otocysts (4 radial and 4 interradial), each containing a single spherical otolith. The velum is prominent. The radial canals are wide in the neighborhood of the circular vessel, where the gonads are found. In the upper portions of their length, however, near the proboscis, they are straight and slender. The proboscis projects for a considerable distance beyond the velar opening. The mouth opening is surrounded with nematocysts. This Medusa is extremely hyaline, excepting that the entoderm near the mouth of the proboscis is slightly rose colored.

This form was found off Tavinui Island and in Suva Harbor. It is closely allied to Liriope scutigera, McCrady, of Charleston Harbor and the West Indies.

Æginella dissonema, Haeckel.

Æginella dissonema, Haeckel, E., 1879, Syst. der Medusen, p. 340, Taf. XX. Fig. 16.

This Medusa was found by us in the Fiji Islands. Haeckel describes it from the Canary Islands, and we have found it at the Dry Tortugas, Florida. In a paper that will soon be published in this Bulletin, we hope to present a figure of it.

? Cunina octonaria, McCrady.

Cunina octonaria, McCrady, J., 1857, Gymn. Charleston Harbor, p. 109, Pl. XII., Figs. 4, 5. Also Proc. Elliot Soc., Vol. I. Pl. IV.–VII.

Several specimens of a Cunina that is closely allied if not identical with Cunina octonaria of Charleston Harbor, South Carolina, were found by us in the Fiji Islands early in January, 1898. The Fijian form may be slightly less

highly colored than McCrady's species; the entoderm of the proboscis exhibiting no trace of the sage-green color that usually characterizes the Atlantic form. On this account we are in doubt as to whether the two forms are identical species.

Oceania pacifica, nov. sp.

Plate 5, Fig. 17.

Generic Characters. Oceania, Péron and Lesueur, 1809. Eucopidæ with numerous otocysts scattered irregularly between the numerous tentacles. No marginal cirri. The 4 gonads are developed upon the 4 radial canals. There is no peduncle to the proboscis.

Specific Characters. The bell is of moderate thickness, but is very flexible. It is hemispherical in shape, and is 6 mm. in diameter. There are 16 thin flexible tentacles of moderate length. The tentacle bulbs are large. There are two otocysts between each successive pair of tentacles, and each of these otocysts contains a single spherical otolyth. The velum is well developed. There are 4 straight, narrow, radial canals, in the middle regions of which the gonads are developed. The proboscis is short, and possesses 8 simple lips. The entoderm of the tentacle bulbs, of the proboscis, and of the radial tubes in the region of the gonads is emerald green.

Several specimens found at Suva and at Nukulau Island.

Oceania ambigua, nov. sp.

Plate 6, Figs. 18, 19.

The bell is pyriform, and 4 mm. in diameter. The gelatinous substance is very thick. There are 16 short tentacles with large basal bulbs. There are either one or two otocysts between each successive pair of tentacles. Each otocyst contains a single spherical otolith. The velum is well developed. There are 4 straight, moderately wide radial canals. The gonads are situated upon these canals near to the proboscis. The proboscis is flask-shaped, and there are four simple lips.

The entodermal axis of each tentacle is brown in color, and the ectoderm of the proboscis, gonads, and tentacles is green.

Single specimen found at Suva, January 4, 1898.

Clytia polynesiæ, nov. sp.

Plate 6, Fig. 20.

Generic Characters. Clytia, L. Agassiz, 1862. Eucopidæ with 16 tentacles alternating with 16 otocysts. Gonads upon the 4 radial canals. No peduncle to the proboscis.

Specific Characters. The bell is thin and hemispherical in shape, and is 5 mm. in diameter. There are 16 short, sharply coiled, marginal tentacles,

with large basal bulbs. Sixteen otocysts, each containing a single spherical otolith, alternate with the 16 marginal tentacles. The velum is well developed. There are 4 straight, narrow, radial canals, upon the lower region of which, near the circular canal, the gonads are developed. In the female the ova are very large and prominent. The proboscis is small and flask-shaped, and there are 4 curved lips. The entoderm of the proboscis, tentacle bulbs, and radial canals in the region of the gonads is green.

Several specimens found in Suva Harbor early in January.

Tiaropsis rosea, nov. sp.

Plate 7, Figs. 21, 22.

Generic Characters. Tiaropsis, L. Agassiz, 1849. Eucopidæ with 8 otocysts and 8 pigment spots (2 in each quadrant). There are numerous otoliths within each otocyst. The gonads are developed upon the 4 radial canals. There is no peduncle to the proboscis.

Specific Characters: Young Medusa. The bell in the young Medusa observed by us was ellipsoidal in shape, and 2.5 mm. in height. There were 4 well developed marginal tentacles that were coiled in a close helix. The bulbs of these tentacles were large. In addition to the tentacles mentioned above, there were 4 small protuberances upon the bell margin that probably represented the beginnings of other tentacles. There were 8 marginal sense organs (Figs. 21, 22), 2 in each quadrant. These consisted (Fig. 22) of an entodermal pigment spot, and a number of otoliths contained in an open fold of the velum. A cross section (Fig. 23) of the sense organ of Tiaropsis diademata, L. Agassiz, will serve to illustrate their structure. In Figure 23 the entoderm is represented in brown and the ectoderm in gray; the section is taken through the bell margin. It will be seen that the pigment spot (*pg.*) is situated within the entoderm upon the inner side of the circular tube (*ct.*); and that the otoliths (*ot.*) are ectodermal and enclosed within an open fold of the velum (*vel.*).

There were 4 straight broad, radial tubes. The proboscis was small, and there were 4 prominent, fimbriated lips. The gonads had not yet made their appearance. A number of immature specimens were found in Suva Harbor early in January.

A species that is closely allied, if not identical, with this Medusa is found at the Dry Tortugas Islands, Florida.

Mitrocoma mbengha, nov. sp.

Plate 8, Figs. 24, 25.

Generic Characters. Mitrocoma, Haeckel, 1864. Eucopidæ with numerous open otocysts, and numerous tentacles and cirri. Gonads upon the 4 radial canals. No peduncle to the proboscis.

Specific Characters. The bell is slightly flatter than a hemisphere, and is 9 mm. in diameter. There are 16 short tentacles with large basal bulbs. In addition to these there are about 80 short cirri upon the bell margin. There are 32 otocysts (2 between each successive pair of tentacles). The otocysts each contain 5–9 otoliths. The velum is well developed. There are 4 straight, narrow radial canals, upon the lower regions of which the gonads are developed. The proboscis is short and flask-shaped, and cruciform in cross section. There are 4 prominent, fimbriated lips. The entoderm of the tentacle bulbs and of the proboscis, and the ectoderm of the gonads, are dull yellow. The entoderm of the radial canals is grass-green.

Suva Harbor, Fiji Islands, in January.

Polycanna purpurostoma, nov. sp.

Plate 8, Figs. 26–28.

Generic Characters. Polycanna, Haeckel, 1879. Æquoridæ with numerous simple radial canals. Proboscis very wide; the mouth opening surrounded by numerous small lappets. Gonads upon the radial canals.

Specific Characters. The bell is lens-shaped, and about three times as broad as it is high. It is about 30 mm. in diameter. The gelatinous substance of the bell is very thick, so that the cavity is shallow. There are 16 short tentacles with wide basal bulbs. In addition to these there are about 120 very small tentacles, or papillæ, upon the margin of the bell (see Fig. 28). There are about 100 otocysts, each one of which contains two small, spherical otoliths. The velum is prominent. There are about 100–120 straight, narrow radial tubes, upon the lower halves of which the gonads are developed. The proboscis is very wide and shallow, and the mouth opening large; there are 100–120 small lappets surrounding the mouth (*M.*, Fig. 27). The entoderm of the basal bulbs of the tentacles is flesh colored. The gonads are slaty blue; and the proboscis, especially in young Medusæ, is pink. In old individuals it is usually hyaline.

Common among the Fiji Islands in December.

Rhegmatodes floridanus, L. Agassiz.

Rhegmatodes floridanus, Agassiz, L., 1862, Cont. Nat. Hist. U. S. A., Vol. IV. p. 361.

A Medusa that we are unable to distinguish from Rhegmatodes floridanus of the Bahamas and Gulf of Mexico was met with occasionally in the Fiji Islands.

Eirene kambara, nov. sp.

Plate 8, Fig. 29.

Generic Characters. Eirene, Eschscholtz, 1829. Eucopidæ with numerous otocysts and tentacles, and sometimes also marginal cirri. There is a distinct

peduncle to the proboscis. The gonads are developed upon a restricted portion of the 4 radial canals.

Specific Characters. The bell is flat with sloping sides, and is 8 mm. in diameter. There are about 32 very small, slender tentacles, having well developed basal bulbs. There are 64 otocysts, 2 between each successive pair of tentacles. Each otocyst contains a single spherical otolith. The velum is distinct. The 4 radial canals are straight and narrow, and the gonads occupy their lower portions. There is a distinct peduncle. The proboscis is simple, and possesses 4 curved lips. The entoderm of the basal bulbs of the tentacles and the proboscis are turquoise in color.

Single specimen found in Suva Harbor, December 29, 1897. This form differs from Eutima pyramidalis,[1] L. Agassiz, of the West Indies, in that the peduncle is smaller and the proboscis larger than in the Atlantic form.

II. SCYPHOMEDUSÆ.

Tamoya, sp.

A single specimen of Tamoya, in a very imperfect condition, was found by us in towing with an open net at 100 fathoms, three miles south of the entrance of Suva Harbor.

Nausithoë punctata, var. pacifica, nov. var.

Nausithoë punctata, Kölliker, A., 1853, Zeit. für Wissen. Zool., Bd. IV. p. 323.

This Medusa is extremely close to if not identical with Nausithoë punctata, Kölliker. It appears to differ from the latter, however, in that the brownish yellow spots upon the ectoderm of the ex-umbrella are not so prominent. As this difference appears to be constant, we consider the Fijian form to be a close variety of Nausithoë punctata. Nausithoë punctata is found in the Mediterranean, and we have taken it at the Dry Tortugas Islands, Florida.

Linerges aquila, Haeckel.

Plate 10, Figs. 33, 34.

Linerges aquila, Haeckel, E., 1879, Syst. der Medusen, p. 496.

In the absence of a figure and an accurate description by Haeckel, we are far from certain that the species about to be described by us is identical with L. aquila of the east coast of Madagascar.

Generic Characters. Linerges, Haeckel, 1880. Discomedusæ with simple quadrangular proboscis without mouth arms, and with simple quadratic lips.

[1] We hope soon to publish a figure of Eutima pyramidalis in the Bulletin of the Museum.

There are 8 marginal sense organs, 8 tentacles, and 16 marginal lappets. There are 16 broad radial pouches and branched sac-shaped canals within the lappets. There is no ring canal. There are 4 horseshoe-shaped gonads, the convex proximal arches of which are divided into two adjacent wings by means of a median septum. There are 48–52 (in this species 52) wart-like, hollow protuberances upon the floor of the sub-umbrella.

Specific Characters: Adult Medusa. The bell is 13 mm. high, and 16 mm. in diameter. The side walls are straight and vertical, and the top flat. There are 16 marginal lappets that are about twice as wide as they are long. There are 8 small tentacles that are about $1\frac{1}{2}$ times as long as the lappets. Eight marginal sense organs alternate with the tentacles. The entoderm of these sense organs contains a spherical mass of otoliths (Fig. 34). The 4 gonads are crescent-shaped, the two horns of each crescent being separated by means of a median partition. There are 16 gastro-vascular ponches, and no marginal ring canal. Projecting inward from the floor of the sub-umbrella into the bell cavity there are 52 hollow wart-like protuberances. These are arranged in three rows. The most proximal row contains 4, the middle row 16, and the most distal row 32 of these protuberances. The proboscis is quadrangular in cross section, and there are 4 flanging lips. The general color of the Medusa is brown. There are 8 rows of dark brown pigment spots running longitudinally down the inner surface of the lips of the proboscis. Separated areas of brown entodermal cells are found in the distal portions of the 16 gastro-vascular pouches.

Young Medusa. Ephyræ of this Medusa were common among the Fiji Islands in November and December. They resemble the adult in general color, but the umbrella is very flat and disk-shaped. The youngest specimen observed by us was 2.5 mm. in diameter.

We observed the ephyræ of this Medusa off Taviuni, Ngamia, Wailangilala, and Vanua Mbalavu Islands, and in Suva Harbor. We also came across a large swarm of the adults in the lagoon of Wailangilala Atoll on November 20.

This Medusa differs from Linerges mercurius, Haeckel, of the West Indies in that there are 52 wart-like protuberances upon the sub-umbrella, instead of 48, as in the Atlantic species. Also the brown colored entodermal cells approach nearer to the stomach, and their color is perhaps slightly duller than in the West Indian form.

Aurelia vitiana, nov. sp.

Plate 10, Fig. 35.

Generic Characters. Aurelia, Péron and Lesueur, 1809. Discomedusæ with a simple central mouth, and 4 mouth arms or palps. The radial canals are narrow and branched, and there is a ring canal. There are 8 marginal sense organs, and 8 broad, sometimes bipartite, marginal lappets, each of which bears on its dorsal side, some distance away from the umbrella margin, a row of numerous short tentacles, that alternate with as many dorsal lappets.

Specific Characters. The bell is hemispherical and 80 mm. in diameter. The gelatinous substance is quite thick. There are 8 simple marginal lappets

that bear upon their dorsal surfaces, at a slight distance from the bell margin, a row of numerous short tentacles. The 8 marginal sense organs are large and deeply set within niches between the marginal lappets. Sixteen narrow chymiferous tubes radiate outwards from the stomach cavity. Eight of these are straight and unbranched, and go to the middle of the marginal lappets. The 8 others give off side branches that anastomose. They go to the marginal sense organs (see Fig. 35). The mouth arms, or palps, are short and narrow, and do not protrude beyond the bell margin. Their free edges are lined by a row of numerous short slender tentacles. The 4 gonads are horseshoe-shaped, and the subgenital pits are wide and open. The gonads, palps, and tentacle bulbs of the adult Medusa are of a delicate lilac. The bell is hyaline. Young Medusæ lack the lilac color, and are quite transparent.

This species was common upon the surface in Suva Harbor in the early morning hours in December, when the water was smooth and calm. A slight ripple seemed to be sufficient to cause them to sink out of sight.

RHIZOSTOMÆ.

Cephea dumokuroa,[1] nov. sp.

Plates 11, 12, Figs. 36-39.

Generic Characters. Cephea, Péron and Lesueur, 1809. Discomedusæ without tentacles, and without a central mouth opening. There are 4 sub-genital cavities, and ventral suction cusps upon the 8 mouth arms. The mouth arms give off short branches that are simple and not dichotomous. There are 8 ocular canals, and numerous other radial canals. There are 8 marginal sense organs.

Specific Characters. The umbrella is disk-shaped, and the walls near the peripheri are vertical. It is about 300 mm. in diameter. A large dome, covered with thick conical protuberances, arises from the centre of the aboral surface of the umbrella. There are about 20 protuberances upon the dome. About 8 of these are large, and the remainder are much smaller. There are 8 marginal sense organs that are deeply sunken within niches upon the bell margin (Fig. 39). The entodermal chore of these sense organs terminates in a mass of small white (calcareous?) granules. There are about 9 very short marginal lappets in each octant of the umbrella. There are 8 short, thick, mouth arms, the ventral surfaces of which give rise to numerous short branches covered with suction mouths. Rows of very small tentacles surround these suction mouths. There are 4 sub-genital pits (*spt.*, Fig. 38). A general idea of the internal structure of the medusa is given by Figure 38. The stomach (*S*) is a wide cavity lying within the great central dome of the umbrella. It is completely separated from the sub-genital porticus (*s. por.*) by means of the double membranous folds of the genital organs (*ov.*). Thirty-two tubes (see Fig. 37) radi-

[1] Dumokuro is the native Fijian name for this species.

ate outward from the stomach cavity. Four of these tubes are wider than the remainder, and lead into 4 of the marginal sense organs. All of the radial vessels are connected one with another by means of a broad ring of anastomosing canals that occupies the peripheral zone of the umbrella. The 4 genital organs (*ov.*, Fig. 38) are stretched upon 8 fleshy radii, and serve to separate the stomach cavity (*S*) from the cavity of the sub-genital porticus (*s. por.*). Eight chymiferous tubes spring from the cavity of the stomach, and enter the 8 mouth arms, where they send off side branches to the suction mouths. These tubes also give off side branches that ramify and anastomose within the gelatinous lower floor of the sub-genital porticus. None of these tubes, however, enter the cavity of the sub-genital porticus, that is thus separated entirely from the gastro-vascular system of the Medusa. The general color of the gelatinous substance of the Medusa is blue. There are numerous deep blue streaks upon the apex of the central dome, and a deep blue band runs around the outer surface of the Medusa just above the mouth arms. This band is broad and biforked in the regions of the mouth arms. The chymiferous tubes in the mouth arms and the radial tubes of the umbrella are deep blue. The tentacles of the suctorial mouths and the anastomosing chymiferous vessels of the umbrella are coffee colored.

We suddenly came upon a swarm of these Medusæ off Vanua Mbalavu Island on November 25, and in all our subsequent voyaging through the Fiji group we never saw another specimen. The Medusæ were accompanied by a number of small fish.

Pseudorhiza Thocambaui,[1] nov. sp.

Plate 13, Figs. 40–44.

Generic Characters.[2] Pseudorhiza, von Lendenfeld, 1884. Rhizostomæ with a single sub-genital cavity. There is a central mouth opening upon the lower side of the brachial disk. There are 8 mouth arms, the inner or ventral sides of which contain a deep groove. The mouth arms bifurcate, and there is a single long filament that arises from the place of bifurcation of each mouth arm, making in all 8 filaments. The canal system consists of 16 main radial canals and a ring canal. Centrifugally from the ring canal there is an anastomosing network of canals, and centripetally there are between two adjacent main radial canals about 10 canals running from the ring canal inwards radially.

Specific Characters. The bell is hemispherical and 32 mm. in diameter. There are 8 marginal sense organs, the sensory portion of which consists of a spherical chore of dark brown pigment granules, surrounded by a mass of small transparent otoliths (Fig. 41). There are 9 small marginal lappets between each successive pair of marginal sense organs. The brachial disk, upon which

[1] Named after Thocambau, king of Fiji.

[2] See Lendenfeld, R. von, 1884, Proc. Linn. Soc. New South Wales, Vol. IX p. 292. Also, 1887, Descrip. Catalogue Medusæ, Australian Museum, p. 23.

the mouth arms are borne, is attached to the lower floor of the umbrella by means of 4 pillars. There is a central mouth opening upon the lower floor of the brachial disk. Eight mouth arms arise from the brachial disk. Near their distal ends they bifurcate, and a single long filament arises from the place of bifurcation of each arm. Thus there are in all 8 of these filaments. These are each about 20 mm. in length, and their surface is covered with wart-like protuberances. Numerous suctorial mouths are found upon the inner and lower sides of the mouth arms. They are surrounded by a great number of small tentacles, forming a row around each mouth opening. In addition to these small tentacles there are numerous club-shaped papillæ between the suctorial mouths. The surface of these papillæ is covered with clusters of nematocysts. The 4 gonads are V-shaped, the apex of the V being pointed inwards toward the centre of the disk. The canal system has been described under "Generic Characters." The color of the gelatinous substance of the umbrella is dull blue. The sub-umbrella, brachial disk, and mouth arms are dull green, and the 8 long filaments are deep blue. The 8 radial canals that run to the 8 marginal sense organs are green in color. The remaining radial canals, however, are almost colorless. There are a number of white spots upon the peripheral portions of the exumbrella, and the wart-like protuberances upon the 8 filaments are also white.

The medusa was common in Suva Harbor in December. It swims with great rapidity by means of an incessant contraction and expansion of the umbrella. This movement is accomplished by the action of a powerful system of circular muscles in the sub-umbrella.

Young Medusa (Figs. 42–44). A young ephyra of this species was captured in Suva Harbor on January 11, 1898. The bell was 5 mm. in diameter and quite flat and disk-shaped. There were 8 marginal sense organs. The central mass of dark brown pigment granules of the sense organ was developed, but the peripheral shell of transparent granules had not yet made its appearance (compare Figs. 41 and 44). There were 24 marginal lappets, the 16 ocular lappets being about twice as long as the 8 intermediate lappets. There were 16 radial pouches from the stomach. Eight of these went to the sense organs, and 8 to the intermediate lappets. The sub-genital porticus was already present, and the brachial disk was suspended from the floor of the sub-umbrella by means of 4 gelatinous pillars exactly as in the adult. The ephyra possessed only a simple central mouth opening, having 4 cruciform lips. The margins of the lips were lined with a row of short, slender tentacles, with knob-like ends exactly like those that surround the suctorial mouths on the mouth arms of the adult Medusa. No trace of the genital organs could be detected, but the gastric cirri were represented by 12 short filaments (3 in each quadrant). The color of the ephyra was very similar to that of the adult.

Were it not for the sub-genital porticus and brachial disk, this little Rhizostoma would resemble, in all respects, the young of the Semostomæ. We have observed the ephyra of an allied genus, Stomolophus meleagris, L. Agassiz, that was in a slightly more advanced stage than the one here figured; and in

this individual the central mouth was still used for the capture of food. It seems probable that in those genera of Rhizostomæ that possess a single sub-genital space (the Monodenmia of Haeckel), the brachial disk has become separated from the floor of the sub-umbrella by the enlargement and final coalescence internally of the 4 sub-genital pits of the Semostomæ.

Cassiopea ndrosia,[1] nov. sp.

Plate 14, Figs. 45, 46.

Generic Characters. Cassiopea, Péron and Lesueur, 1809. Discomedusæ without tentacles and without central mouth. There are 8 pinnately or trichotomously branching mouth arms, the lower or ventral surface of which is occupied by numerous suction mouths and vesicles. There are 4 sub-genital cavities, and 4 gonads. There are 12 or more marginal sense organs, and numerous anastomosing radial canals.

Specific Characters. The bell is flat and disk-shaped, and 50 mm. in diameter. The number of marginal sense organs appears to be variable. In the specimen here figured there were 22, but in another individual there were only 18. Whatever their number may be, they are situated at equal distances one from another. There are 4 small sub-genital ostia. There are 8 pinnately branching mouth arms, each arm being about 30 mm. in length. Their ventral surface is occupied by a great number of suction mouths surrounded by small tentacles. In addition to these there are also a large number of leaf-shaped vesicles scattered among the suction mouths. These vesicles are more numerous near the centre than they are at the free ends of the arms. The umbrella possesses two powerful sets of radial muscle bands. Twenty-two of these (in specimens with 22 marginal sense organs) are situated in the floor of the sub-umbrella, and radiate outwards toward the marginal sense organs. An equal number are situated in the exumbrella, and alternate in position with the set in the sub-umbrella. The muscle bands of the floor of the sub-umbrella usually appear opaque and white in color, especially in states of contraction. The muscles of the exumbrella, on the other hand, are deep blue-green. The general color of the umbrella is ashy brown. A large spearhead-shaped white spot is situated upon the radius of each sense organ at a little distance inward from the bell margin. Thus in a medusa with 22 marginal sense organs there are 22 of these large spots. The apex of each of these spots is directed outward toward the sense organ. In addition to these large spots there are usually 4 short white radial streaks between each pair of adjacent sense organs. There are numerous white spots upon the inner portions of the sub-umbrella. The upper fleshy portions of the 8 mouth arms are white or slightly grayish. The tentacles surrounding the suction mouths are deep brown in color, and the leaf-shaped vesicles are olive-green.

[1] Ndrosi is the native Fijian name for this species.

We found a specimen of this Medusa in Suva Harbor, November 14, 1897. And we also came upon a small swarm of them at Komo Island on November 27, 1897.

On January 3, 1898, we observed an individual of this species resting upon the muddy bottom of Suva Harbor. The aboral surface of the umbrella was pressed against the bottom, while the mouth arms and oral surface were uppermost. In this position it remained quiescent for more than an hour, merely waving its mouth arms in a slow, sweeping manner. Indeed, its appearance reminded one far more of an Actinian than of a Medusa. It is interesting to observe that the common Cassiopea frondosa of the West Indies, and also Cassiopea Mertensii, Brandt, of the Caroline Islands possess similar habits.

The number of marginal sense organs in this species is certainly quite variable, and is greater than has as yet been observed in any other species of the genus Cassiopea. We prefer, however, on account of its close resemblance in all other respects, to place it in the genus Cassiopea.

III. CTENOPHORÆ.

Eucharis grandiformis, nov. sp.

Plate 15, Figs. 47, 48.

The body of this Ctenophore is 135 mm. in length, and our figures represent the natural size of the animal. The lappets in this species are by no means so wide and voluminous as in the Mediterranean Eucharis multicornis,[1] Eschscholtz. The whole outer surface of the body and lappets is covered with numerous long papillæ. The auricles are long, and are often carried coiled in a close helix (see Fig. 48). A pair of long unbranched tentacles arise from either side of the body near the region of the mouth. The ciliated plates are very numerous and close together, and are arranged in 8 rows. The oral sense organ is situated at the bottom of a deep cleft. The windings of the canal system through the lappets are far less complex than is the case in E. multicornis. The ciliated plates, gastric cavity, and chymiferous tubes are cinnamon-yellow in color. All other parts of the animal are hyaline. This Ctenophore is extremely delicate in structure, the least touch being sufficient to tear the tissues of the animal.

We found them in considerable numbers, floating near the surface, in Suva Harbor, early in the mornings of December when the water was perfectly calm. The least ripple caused them to sink to an unknown depth.

[1] Compare our figures with those of E. multicornis by Chun, C., 1880, Fauna und Flora des Golfe von Neapel, I. Monographie, p. 296, Taf. V. Figs. 1–3.

Beroë australis, nov. sp.

Plate 16, Figs. 49, 50.

The animal is 40 mm. in length, and the body is compressed laterally, one side being about three times as broad as the other. Our figure exhibits the broad side. The aboral otocyst is surrounded by a figure 8-shaped row of branched papillæ. The long axis of this row lies in the plane of the broad side of the Ctenophore. There are 8 rows of ciliated plates that are bordered by masses of stellate pigment cells (see Fig. 50). Eight radial canals run beneath the ciliated plates, and in addition to these there are two wide, straight lateral tubes (*l.*, Fig. 49). All of these tubes communicate with the circular canal (*c.*, Fig. 49); and are also put into further communication, one with another, by means of a simple network of connecting tubes (*k.*, *k.*, Fig. 49). The mouth opening is very wide and deep. The pigment cells of the ciliated plates, and of the papillæ surrounding the aboral sense organ, are crimson-lake in color. The gelatinous substance of the animal is quite transparent.

Many specimens of this Ctenophore were found in Suva Harbor in December. The animal swims with remarkable rapidity by means of the movements of its combs of cilia.

IV. SIPHONOPHORÆ.

Physalia utriculus, Eschscholtz.

Physalia utriculus, Eschscholtz, F., 1829, Syst. der Acalephen, p. 163, Taf. XIV. Figs. 2, 3.

Physalia australis, Lesson, R. P., 1830, Voy. de la Coquille, Zoophytes, p. 38, Pl. V. Fig. 1.

Physalia utriculus, Haeckel, E., 1888, Challenger Report, Zoölogy, Vol. XXVIII. p. 351.

Several specimens of this Siphonophore were captured by us among the Fiji Islands. It is well represented by Lesson's figure.

Sphæronectes Köllikeri, Huxley.
Diplophysa Köllikeri, Haeckel.

S. Köllikeri, **Plate 16, Figs. 51, 52.** *D. Köllikeri*, **Plate 17, Fig. 53.**

Sphæronectes Köllikeri, Huxley, T. H., 1859, Oceanic Hydrozoa, Ray Soc. Publication, p. 50, Pl. III. Fig. 4.

Sphæronectes Köllikeri, Haeckel, E., 1888, Challenger Report, Zoölogy, Vol. XXVIII. pp. 130, 361.

Diplophysa Köllikeri, Haeckel, E., 1888, Challenger Report, Zoölogy, Vol. XXVIII. pp. 107, 130, 359.

Generic Characters (Polygastric generation = Sphæronectes). Polygastric Calyconectæ with a single, rounded, edgeless, subspherical, swimming bell. There is a complete tubular hydrœcium on the ventral side of the swimming bell, from the inner apex of which arises the long tubular hydrosoma. The groups of units are eudoxiform, and separated by free internodes. Each feeding polyp possesses a single covering scale.

Generic Characters (Monogastric generation = Diplophysa). Monogastric Calyconectæ, representing a single group of units, consisting in a feeding polyp with tentacle and covering scale, and a fertile gonophore that serves also as a swimming bell. The covering scale is hemispherical, or subspherical, and possesses a simple ovate or cylindrical canal (phyllocyst) within its ventral axis.

Sphæronectes Köllikeri. — The swimming bell is about three quarters of a sphere in shape, and is about 10 mm. in diameter. The cavity of the bell is shallow; and there is a large and powerful velum, by means of the movements of which the animal is enabled to swim. The bell possesses a circular canal, and 4 narrow, somewhat crooked, radial canals (*r, r, r, r*, Fig. 51). These communicate, by means of the narrow duct (*c*), with the gastro-vascular cavity of the hydrosoma (*h*). There is a straight spindle-shaped vacuolated vesicle (*f*) buried within the gelatinous substance of the nectophore. The hydrosoma (*h*) arises from the inner end of a long, narrow invagination of the outer wall of the swimming bell (the hydrœcium). The order of appearance of the various organules upon the hydrosoma is shown in Figure 52. The first to develop are the feeding polyps (*p*); then follow, in order, the tentacles (*t*), the covering scale (*c. s.*), and gonophore (*g*). The hydrosoma attains a length of about 50 mm., and there are numerous groups of units (cormidia) separated by free internodes. One of these groups of units that has very recently become separated from the hydrosoma, and is therefore in the Diplophysa stage, is represented, highly magnified, in Plate **17**, Figure 53.

Diplophysa Köllikeri (Plate **17**, Fig. 53). — This is merely the free Monogastric or Eudoxia form of Sphæronectes Köllikeri, and consists of a single group of units that has become separated from the hydrosoma of the latter animal, and leads an independent existence. The covering scale (*c. s.*) is thick and hemispherical in shape. It contains a simple ovate canal or phyllocyst (*phc.*). There is a single feeding polyp (*p*), a single tentacle (*t*), and a gonophore (*g*). The tentacle gives rise to many small filamentous side branches, which terminate in nematocystic bulbs. The gonophore serves also as a swimming bell, and its manubrium will become much larger than is shown in Figure 53, and will contain the genital products. The tube *ad.* is the means by which the animal was once attached to the hydrosoma of S. Köllikeri. This tube soon atrophies. The entoderm of the feeding polyps of the manubrium of the gonophore and of the nematocystic bulbs of the tentacles is rich yellow or orange. This animal, in the Sphæronectes stage, was met with in various places among the Fiji Islands. Our drawings are derived from a specimen found upon the surface of Suva Harbor, December 12, 1897.

This species is very closely related to Sphæronectes gracilis, Claus, of the Mediterranean and Tropical Atlantic.[1] We have taken S. gracilis at the Dry Tortugas Islands, Florida.

Diphyopsis angustata, Haeckel.

Plate 17, Fig. 54.

Diphyes angustata, Eschscholtz, F., 1829, Syst. der Acalephs, p. 136, Taf. 12, Fig. 6.

Diphyopsis angustata, Haeckel, E., 1888, Challenger Report, Zoöl., Vol. XXVIII. pp. 152, 363.

Generic Characters. Diphyopsis, Haeckel, 1888. Diphyidæ with two angular, slenderly pyramidal swimming bells of similar form and subequal size, one placed behind the other. The first swimming bell possesses a complete infundibular hydrœcium on its ventral side. The groups of units upon the hydrosoma are Eudoxiform, and are separated by free internodes. Each feeding polyp possesses a covering scale. The covering scales are spathiform, with a deep ventral groove.

Specific Characters. The specimens found by us conform to the definition of the genus Diphyopsis, with the notable exception that we observed no posterior swimming bell, such as is figured by Haeckel (1888, Plate XXXIII.) in Diphyopsis compressa. It is possible that no such structure exists in Diphyopsis angustata, but knowing the ease with which swimming bells are broken off and lost, we hesitate to make such a statement. The anterior swimming bell (the only one observed) is 37 mm. in length. The bell cavity is long and spindle-shaped, and terminates in a long, narrow neck, in the end of which there are usually a number of vacuolated cells containing green pigment (*cp.*, Fig. 54). There is a well developed velum, the sudden contractions of which cause the animal to shoot rapidly through the water. There is a circular vessel within the swimming bell, and also two long curving side tubes (*r*, *r*, Fig. 54). These communicate by means of a long duct (*c*) with the gastro-vascular cavity of the hydrosoma. The cavity of the hydrœcium is about 17 mm. in depth. There is a long spindle-shaped mass of vacuolated cells (*f*) extending from the inner apex of the hydrœcium into the gelatinous substance of the swimming bell. The hydrosoma also arises from the inner apex of the hydrœcium. It often attains a length of 100 mm., and there are numerous groups of units (cormidia) found upon it. These are separated one from another by free internodes. The cormidia all arise from the ventral side of the hydrosoma. The first to appear are the feeding polyps. Then follow, in order, the tentacles and the covering scales. No gonads or swimming bells were seen. Each covering scale possesses a deep open groove along its ventral side. The tentacles give off simple lateral filaments that terminate in nematocystic bulbs. The ento-

[1] See Chun, C., 1892, Abhandl. d. Senckenb. naturf. Ges., Bd. XVIII. p. 84, Fig. 5.

derm of the feeding polyps is rose colored, and the nematocystic bulbs of the tentacles are orange-yellow.

This is the largest species of Diphyidæ known at the present time.

Common among the Fiji Islands in December, 1897.

Abyla quincunx, Chun.

Abylopsis quincunx, Chun, C., 1888, Sitzungs Berichte Akad. Wissen. Berlin, p. 1160.

Abyla (*Abylopsis*) *quincunx*, Chun, C., 1897, Verhandl. Deutsche Zool. Gesell., p. 71, Fig. 13.

A large number of specimens of a polygastric Calyconectæ that appears to be identical with Abyla quincunx, Chun, of the Tropical Atlantic, were found by us among the Fiji Islands. Huxley (1859, p. 58) mentions having found this form in the Indian and Pacific Oceans, and he describes it under the name of Abyla pentagona. Several specimens of the Eudoxia form of this species (see Aglaisma quincunx, Chun, 1888) were found by us while in the Fiji Islands. This Fiji form appears to be identical with one observed by us at the Dry Tortugas Islands, Florida.

Agalma Pourtalesii, nov. sp.

We obtained this beautiful new Siphonophore near the mouth of Suva Harbor, Viti Levu Island. We have also found a number of specimens that appear to be identical in all respects with the Fijian form, at the Dry Tortugas Islands, Florida. We hope soon to present a number of figures of this animal in a paper upon "Medusæ from the Tortugas" that is now in preparation, and will appear in the Bulletin. At present we will content ourselves by presenting a description of the species.

Generic Characters. Agalma, Eschscholtz, 1825. Siphosome short and rigid, about as long as the nectosome. The whole siphosome is densely covered with thick prismatic bracts. The dactylozooide and feeding polyps are thickly scattered along the stem of the siphosome. The gonostyles spring from the internodes between the dactylozooide and feeding polyps. The tentilla are tricornuate, with a terminal ampulla and two paired horns.

Specific Characters. The entire animal is about 25 mm. in length. The feeding polyps, tasterns, gonostyles, and tentacles all spring from the ventral side of the siphosome. The float is of small size, and is balloon-shaped, and the pneumatopore is surrounded by radially arranged streaks of dark red pigment. The swimming bells are dovetailed alternately on either side of the nectosome, so that their velar openings are found on two diametrically opposite sides of the nectosome. The siphosome is densely covered upon all sides with thick prismatic bracts. The feeding polyps are somewhat stouter in shape than the tasterns, but in other respects are quite similar to them in appearance. The

tentacles arise from the bases of the tasterns and feeding polyps. Each tentacle gives off a number of lateral branches which terminate in a coiled nematocyst battery, an ampulla, and two paired horns. Both male and female gonostyles are found upon the same siphosome, and they arise from the side of the siphosome between the tasterns and feeding polyps. The male gonostyles are long and slender, while the female are short and stout, and contain each one of them a considerable number of ovæ. Both male and female gonostyles are borne upon long, slender filaments that are highly contractile. The color of the entoderm of the hydrosoma, swimming bells, feeding polyps, and tasterns is rose-red or pink. The nematocyst batteries upon the terminal portion of the tentacles are dark red. The gonads and bracts are colorless.

LIST OF SPECIES.

[1] Medusæ whose names are preceded by an asterisk are represented both in the Fiji Islands and in the Atlantic Ocean by identical or *very* closely allied species.

Siphonophoræ.

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EXPLANATION OF THE PLATES.

PLATE 1.

Fig. 1. Pennaria vitrea, nov. sp., female.
Fig. 2. " " " male.

PLATE 2.

Fig. 3. Cytæis vulgaris, nov. sp.
Fig. 4. " " Proboscis.
Fig. 5. " " One of the oral tentacles of the proboscis.
Fig. 6. Bougainvillea fulva, nov. sp.

PLATE 3.

Fig. 7. Laodicea marama, nov. sp.
Fig. 8. " " Edge of bell.
Fig. 9. Laodicea fijiana, nov sp.
Fig. 10. " " Edge of bell.

PLATE 4.

Fig. 11. Stauridiscus nigricans, nov. sp.
Fig. 12. " " Edge of bell.
Fig. 13. Aglaura prismatica, Maas.

PLATE 5.

Fig. 14. Gonionemus suvaensis, nov. sp.
Fig. 15. " " Edge of bell.
Fig. 16. " " Aboral view of the proboscis.
Fig. 17. Oceania pacifica, nov. sp.

PLATE 6.

Fig. 18. Oceania ambigua, nov. sp.
Fig. 19. " " Oral view of a quadrant of the bell.
Fig. 20. Clytia polynesiæ, nov. sp.

PLATE 7.

Fig. 21. Tiaropsis rosea, nov. sp.
Fig. 22. " " Marginal sense organ.
Fig. 23. Section through the marginal sense organ of Tiaropsis diademata, L. Agassiz: *ent.*, entoderm; *ect.*, ectoderm; *ct.*, circular vessel, cut across; *vel.*, velum; *pg.*, pigment spot in the entoderm of the circular vessel; *ot.*, otolith enclosed within an open pocket of the velum.

PLATE 8.

Fig. 24. Mitrocoma nibengha, nov. sp.
Fig. 25. " " Edge of bell.
Fig. 26. Polycanna purpurostoma, nov. sp.
Fig. 27. " " Oral view of a portion of the bell. *M.*, mouth.
Fig. 28. " " Edge of bell showing otocysts and tentacles.
Fig. 29. Eirene kambara, nov. sp.

PLATE 9.

Fig. 30. Eutimeta levuka, nov. sp.
Fig. 31. " " Edge of bell.
Fig. 32. Liriope hyalina, nov. sp.

PLATE 10.

Fig. 33. Linerges aquila, Haeckel.
Fig. 34. " " Marginal sense organ.
Fig. 35. Aurelia vitiana, nov. sp.

PLATE 11.

Fig. 36. Cephea dumokuroa, nov. sp. Side view.
Fig. 37. " " Aboral view of the disk.

PLATE 12.

Fig. 38. Cephea dumokuroa. Section to show the internal structure: *gpt.*, sub-genital pit; *m. s. o.*, marginal sense organ; *ov.*, genital organ; *r*, one of the 8 thick gelatinous pillars that support the membranes of the genital organs; these radial pillars correspond in position with the 8 mouth arms; *S*, stomach cavity; *s. por.*, sub-genital portieus; *rt.*, radial chymiferous vessel; *t*, chymiferous tube in the mouth arm.
Fig. 39. Cephea dumokuroa: Marginal sense organ.

PLATE 13.

Fig. 40. Pseudorhiza Thocambaui, nov. sp. Adult Medusa.
Fig. 41. " " Marginal sense organ of adult Medusa.
Fig. 42. " " Side view of a young Ephyra.
Fig. 43. " " Oral view of a young Ephyra.
Fig. 44. " " Marginal sense organ of young Ephyra.

PLATE 14.

Fig. 45. Cassiopea ndrosia, nov. sp. Side view.
Fig. 46. " " Aboral view of disk.

PLATE 15.

Fig. 47. Eucharis grandiformis, nov. sp. View of narrow side.
Fig. 48. " " View of broad side. (Figure uncolored.)

PLATE 16.

Fig. 49. Beroë australis, nov. sp. View of broad side: *l*, lateral tube; *k*, side connecting tubes; *c*, circular tube.

Fig. 50. Beroë australis, nov. sp. View of ciliated plates and of stellate pigment cells.

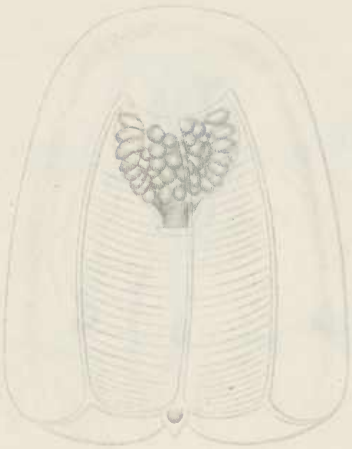
Fig. 51. Sphæronectes Köllikeri, Huxley: *c*, duct connecting radial vessels with the gastro-vascular cavity of the hydrosoma; *c. s.*, covering scale; *f*, vacuolated vesicle; *g*, gonophore; *h*, hydrosoma; *p*, feeding polyp; *r. r, r. r*, radial vessels of the swimming bell; *t*, tentacle.

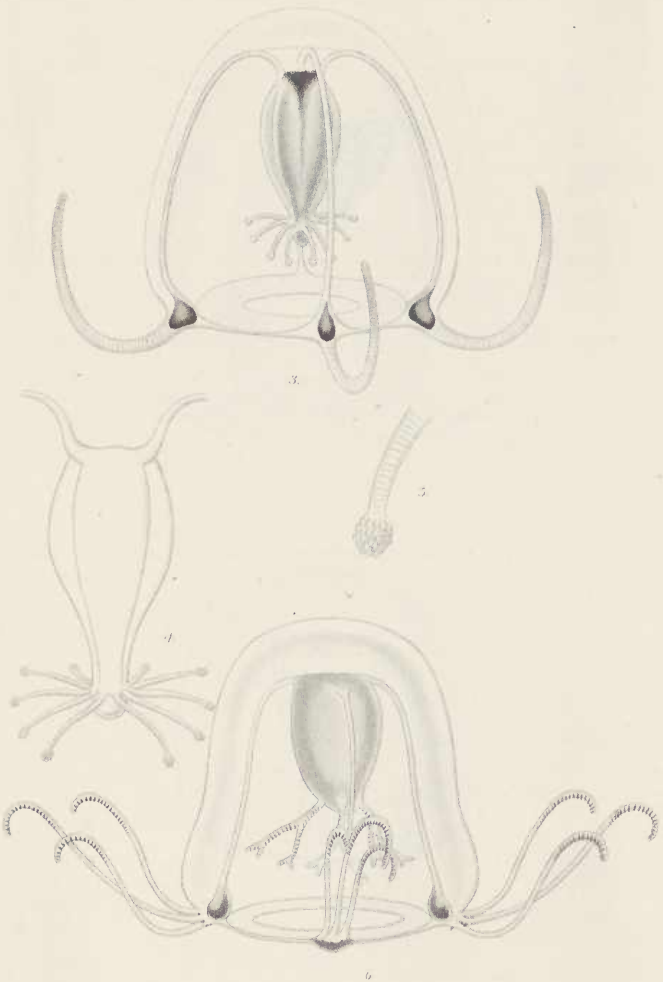
Fig. 52. Sphæronectes Köllikeri, Huxley. Enlarged view of the hydrosoma. Lettering similar to Figure 51.

PLATE 17.

Fig. 53. Diplophysa Köllikeri, Haeckel. The free Eudoxia form of Sphæronectes Köllikeri: *ad.*, tube by means of which the group was once attached to the hydrosoma of S. Köllikeri; *c. s.*, covering scale; *g*, swimming bell-gonophore; *p*, feeding polyp; *phc.*, phyllocyst of the covering scale; *t*, tentacle.

Fig. 54. Diphyopsis angustata = Diphyes angustata, Eschscholtz: *c*, duct connecting the chymiferous vessels of the swimming bell with the gastro-vascular cavity of the hydrosoma; *c. p.*, oleocyst; *f*, vacuolated vesicle; *h*, hydrosoma; *p*, feeding polyp; *v, v*, ascending vessels of the swimming bell; *t*, tentacle.





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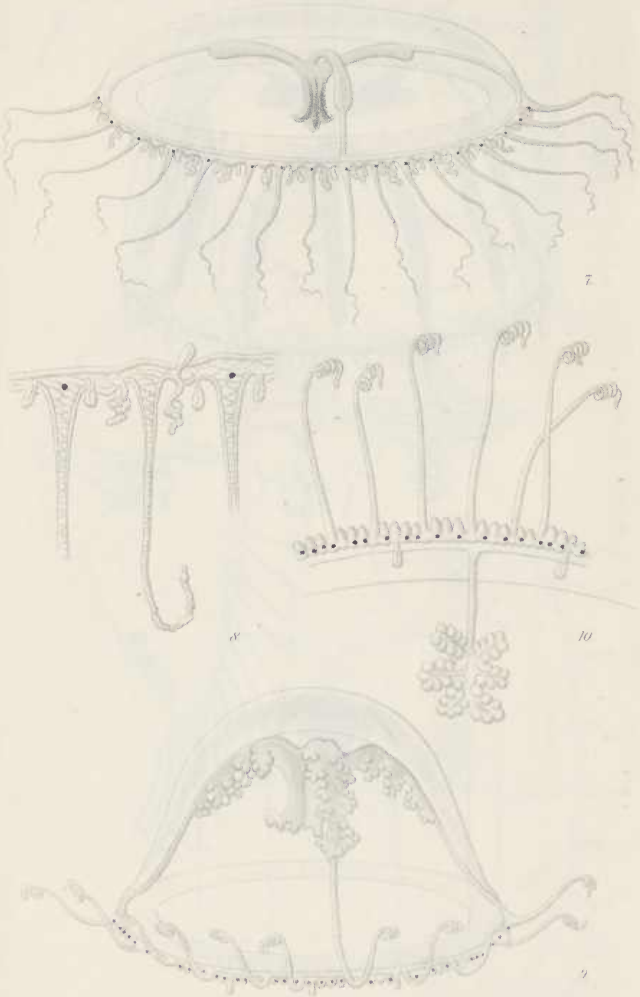

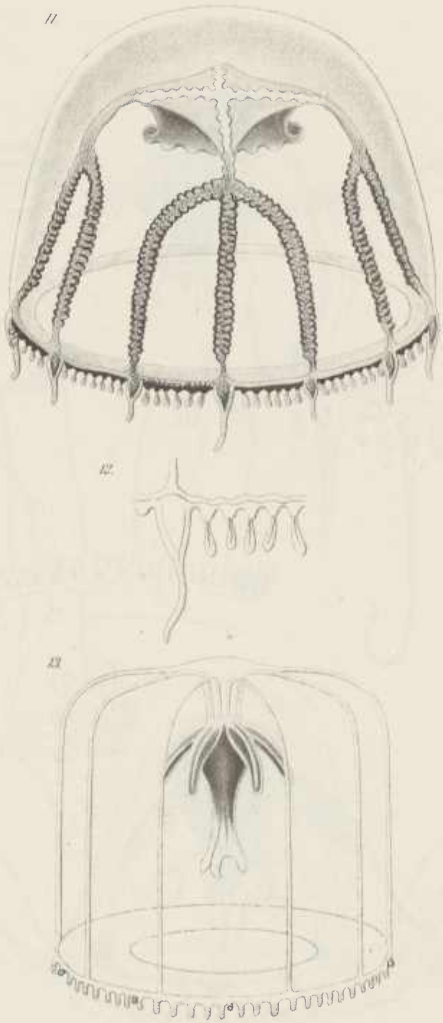

Plate 5.

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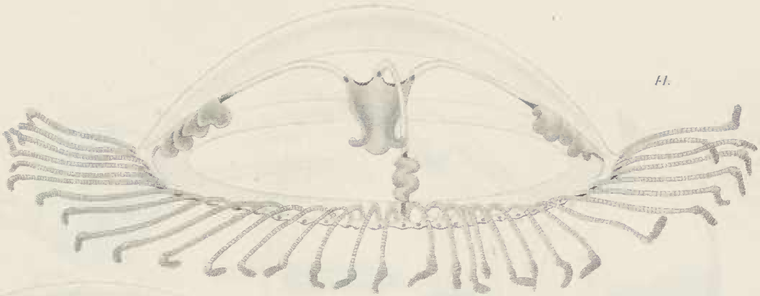

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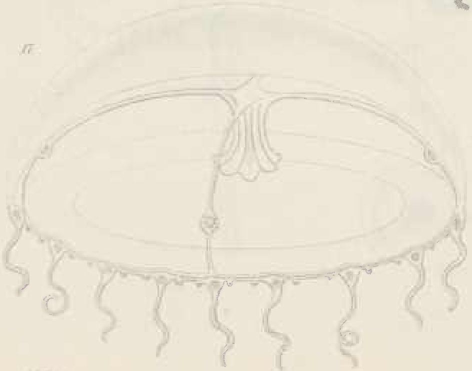

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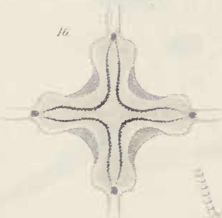

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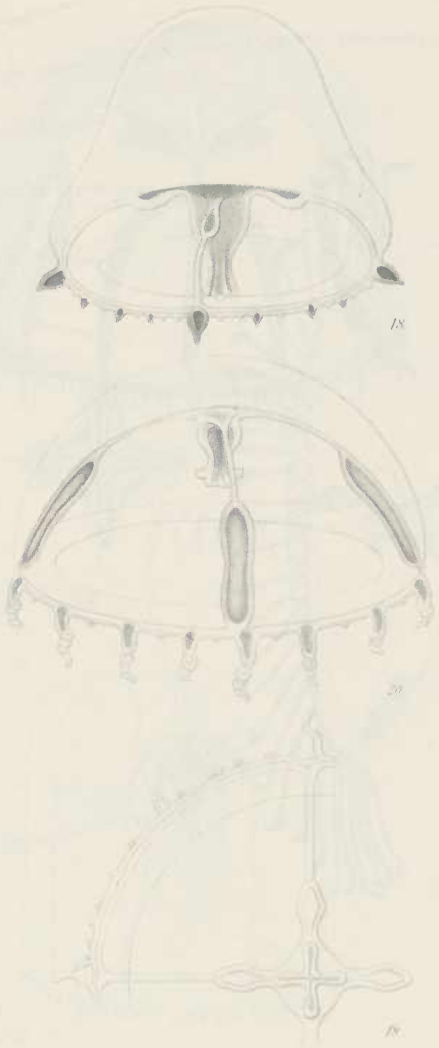

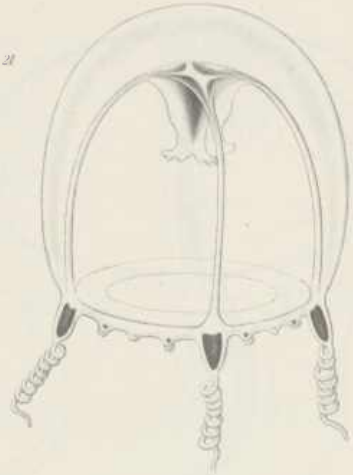
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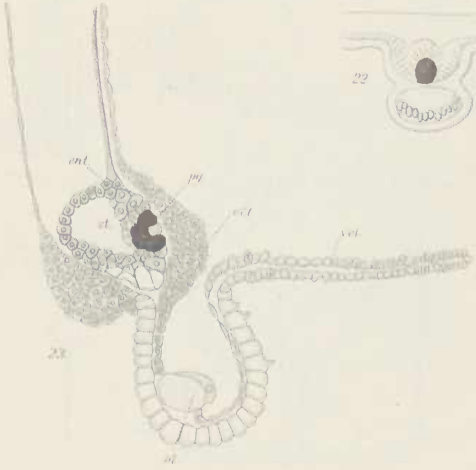
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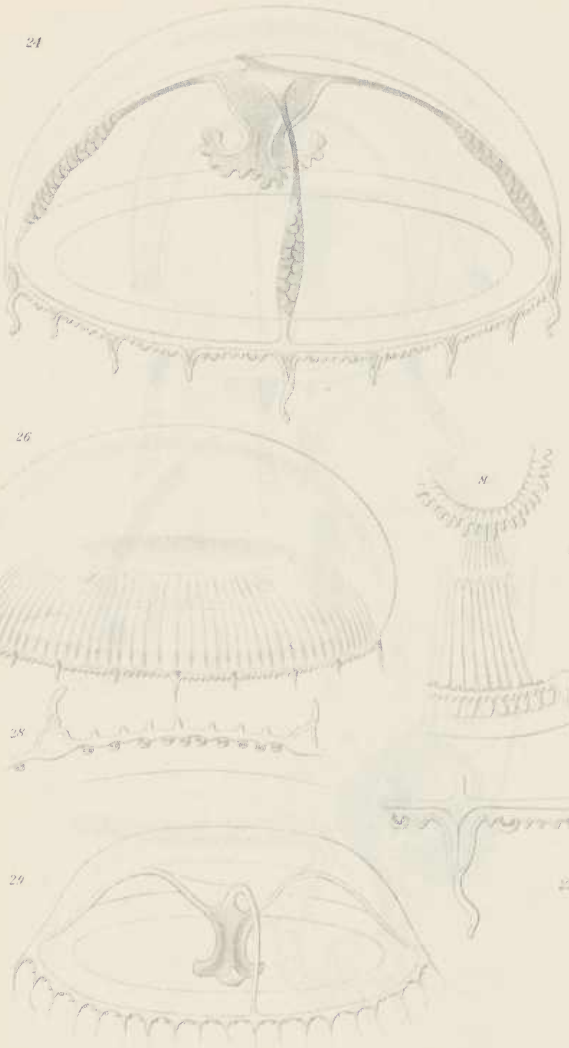
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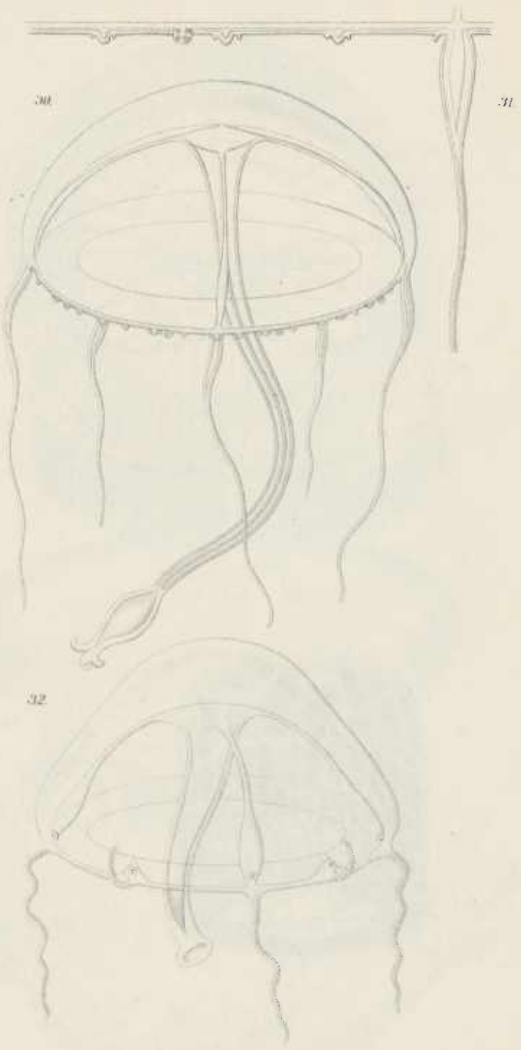

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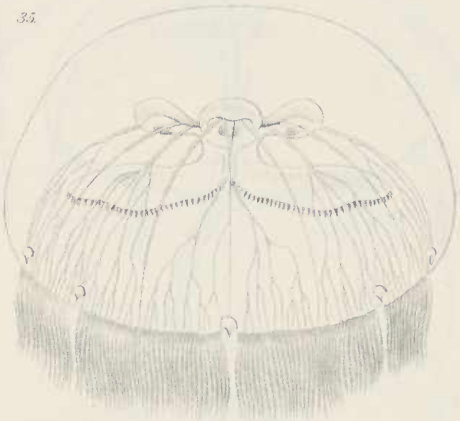

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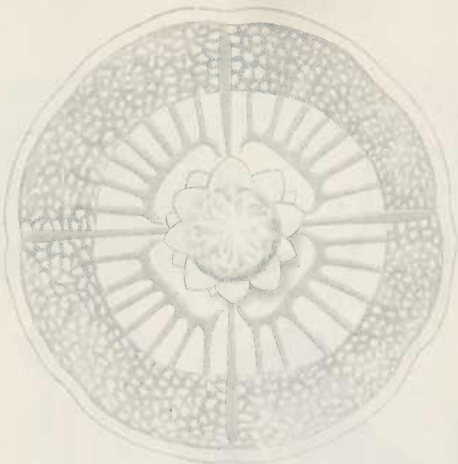

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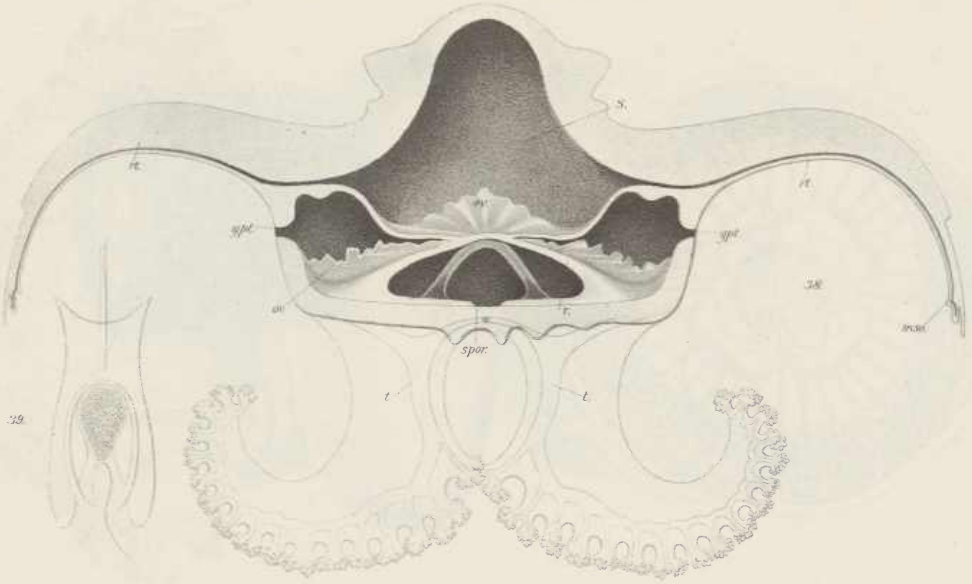
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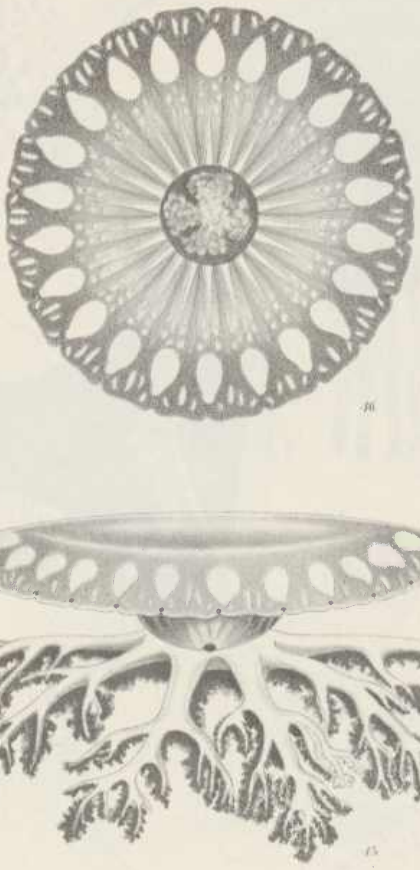

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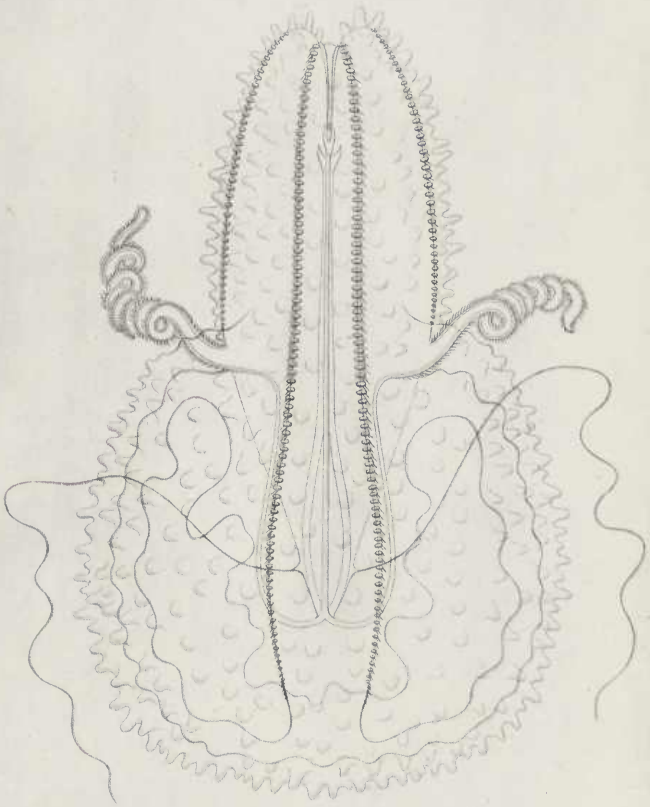

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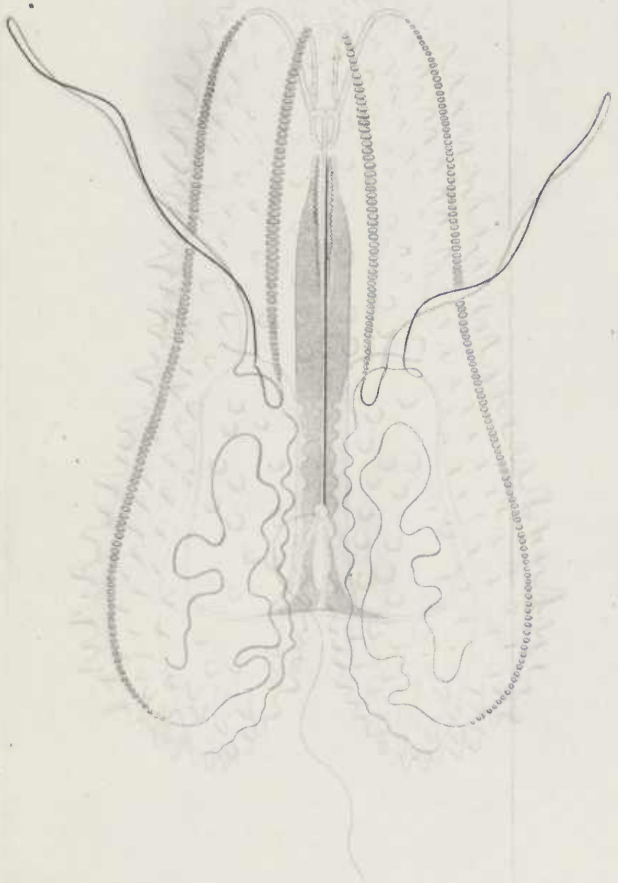

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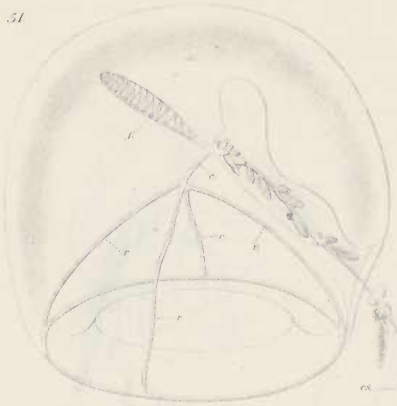

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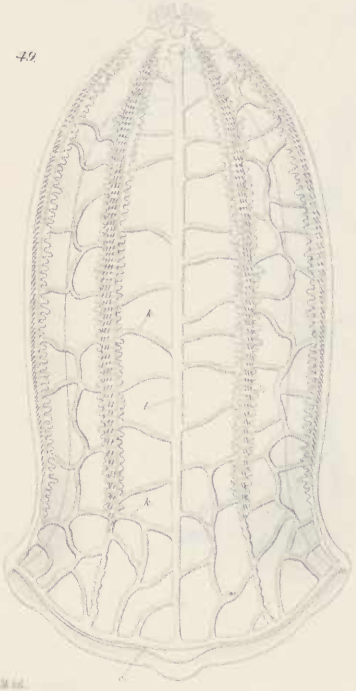

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