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REPORTS ON THE SCIENTIFIC RESULTS OF THE EXPEDITION TO THE TROPICAL PACIFIC, IN CHARGE OF ALEXANDER AGASSIZ, BY THE U. S. FISH COMMISSION STEAMER "ALBATROSS," FROM AUGUST, 1899, TO MARCH, 1900, COMMANDER JEFFERSON F. MOSER, U. S. N., COMMANDING.

III.

MEDUSÆ.

BY

ALEXANDER AGASSIZ AND ALFRED GOLDSBOROUGH MAYER.

WITH THIRTEEN PLATES, AND A CHART OF THE ROUTE.

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Reports on the Scientific Results of the Expedition to the Tropical Pacific in charge of Alexander Agassiz by the U. S. Fish Commission Steamer "Albatross," from August, 1899, to March, 1900, Commander Jefferson F. Moser, U. S. N., commanding.

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INTRODUCTION.

The medusæ described in the following paper were obtained in thirty-four surface hauls, and in one bottom trawl made at 830 fathoms in the Marquesas. In addition to these there were thirteen intermediate hauls with an open net, one at 100 fathoms, five at 150 fathoms, and seven between 250–350 fathoms and the surface.

The hauls in which medusæ were captured were distributed as follows:—

	Surface.	Intermediate.	Bottom trawl.
Between San Francisco, Cal., and the Marquesas . .	11	4	. . .
Among the Marquesas, Paumotus, and Society Islands	17	8	1
After leaving the Society Islands	6	1	. . .
Total	34	13	1

We were unable to make many hauls after leaving the Society Islands, and it is therefore impossible for us to draw any accurate conclusions concerning the relative abundance of pelagic life in the eastern and western regions of the tropical belt of the Pacific. It is worthy of note, however, that while our tows among the Paumotus and Society Islands were very poor, and almost no pelagic life was to be seen, as soon as we entered the

region of the Japan current north of the Ladrones the water teemed with life, and the display of phosphorescence at night was truly remarkable. In fact it is evident that pelagic animals are not abundant in regions far from large land masses or where there are no well defined oceanic currents or counter currents. As soon as one approaches the region of great currents or counter currents, or the coasts of continents and larger islands, the number of animals increases with remarkable suddenness.

It was very noticeable that during the daylight hours our surface tows were generally deficient in animal life, while those made at the same time with an open net at depths varying between 300 fathoms and the surface were remarkably rich both in number and variety of the specimens obtained. It is evident that in the regions we examined the pelagic animals sink to an unknown depth during the daytime. It should also be noted that these same animals rise to the surface during the night, for our surface hauls made at night were almost without exception much more successful than those made in the same locality during the day.

Among the twenty Hydromedusæ obtained by the "Albatross," seven are Trachylina and thirteen Leptolina forms. The relatively great number of the Trachylina forms is quite striking, for these medusæ are rare in waters adjacent to the coasts of continents. In the open sea, however, they constituted the greater number of the pelagic types. Our hauls in the free expanse of ocean between California and the Marquesas were wonderfully rich in such Trachylina forms as Rhopolonema, Aglaura, and Liriope, while Ægina and Solmaris were met with occasionally. Almost all of the Leptolina forms were captured near some coast or among the islands of an archipelago. There were, however, two remarkable exceptions to this rule: A young Sarsia was obtained in N. Lat. 9° 45′, W. Long. 137° 47′, where the nearest land (the Marquesas) was more than 1000 miles away; and a Tiara was found 600 miles north of the Marquesas. In general, however, the results support the conclusions of Maas,[1] in the case of the Plankton Expedition, that Leptolina forms are creatures of the shallower waters near coasts, while the Trachylina are animals of the open ocean.

[1] Maas, O., 1893; Craspedoten Medusen der Plankton-Expedition. Also On some Problems of the Distribution of Marine Animals, Natural Science, London, Vol. II., p. 92–99.

The following table will serve to show the extent of our captures: —

	Number of Species obtained.	Number of Species new to Science.	Number of Species already known.
Hydromedusæ	20	11	9
Scyphomedusæ	8	4	4
Siphonophoræ	10	4	6
Ctenophoræ	4	2	2
	42	21	21

The following forms are represented in both the Tropical Pacific and Atlantic by identical or very closely allied species: Aglaura prismatica, Liriope hyalina, Nausithoë punctata var. pacifica, Abyla quincunx, Nectophysa Wyvillei?

DESCRIPTION OF THE SPECIES.

HYDROMEDUSÆ.

Sarsia sp.

A single specimen of a young Sarsia in a greatly damaged condition was found on the surface when the nearest land (the Marquesas Islands) was over 1000 miles away. It is remarkable that this Leptolina form should have been taken so far out upon the open ocean.

S^d;[1] Station 13; September 5, 1899; N. Lat. 9° 57′, W. Long. 137° 47′.

Tiara oceanica, sp. nov.

Plate 1, fig. 1.

The bell is acorn-shaped and 5 mm. in height. The walls are very thin, and there is a small, solid, apical projection. There are eight long, eight medium size, and sixteen short tentacles. The long ones are about as great in extent as the bell height. The medium tentacles are about one-third as

[1] S^d indicates a surface tow made in the daytime; S^n a surface tow made at night; $(150\,f - S)^d$ indicates a haul made with an open net dragged between 150 fathoms and the surface during the day; $(150\,f - S)^n$ indicates the same made at night.

long, and the small ones are mere rudiments. All of the tentacles arise from the bell-margin. The basal bulbs of the long and intermediate ones are conical, and each one bears a single ocellus upon its aboral side near the base. The velum is well developed. There are four narrow radial tubes, the mid-regions of which display jagged edges. The proboscis is bound to the radial canals by means of four mesenteries. The proboscis is short and extends only about one-half of the distance from the inner apex to the velum. The gonads occupy four radially situated linear swellings, the surfaces of which are complexly folded. The four lips are large and are much folded. The proboscis and tentacle bulbs are of a delicate purple-pink and the ocelli are dark red. A single specimen was found about 600 miles north of the Marquesas.

(250 f — S)[d]; Station 16; September 9, 1899; N. Lat. 2° 38′, W. Long. 137° 22′.

Turris pelagica, sp. nov.

Plate 1, fig. 2.

The bell is 16 mm. in height, and the sides are barrel-shaped, being wider at the middle than at either end. There is a small, solid, apical projection. The bell walls are very thin and quite flexible. There are about thirty short tentacles, all being of the same size. These tentacles all arise from the bell-margin, and their bases are large and conical. There are no ocelli. The velum is well developed. There are four radial tubes which are flat and quite broad, being narrower near the circular canal than at any other place. Their outer edges are jagged, excepting in the narrow parts near the circular canal. The proboscis is large and fills the greater part of the bell-cavity. It is bound to the four radial canals by means of four mesenteries. The gonads occupy four radially situated double rows which extend about two-thirds of the distance from the inner apex of the bell-cavity to the velar opening. The outer surfaces of the gonads are transversely folded and give rise to numerous papillæ. There are four well developed, complexly crenulated lips. The lips and tentacle bulbs are of a light port-wine color, and the gonads and radial canals are of a still lighter shade. A single specimen of this medusa was found in a surface haul.

S[d]; Station 1; August 26; N. Lat. 31° 10′, W. Long. 125°.

PSYTHIA, gen. nov.

Williadæ with four simple unbranched radial canals.

In all previously known genera of the family Williadæ the radial canals are branched. The general form, color, shape of proboscis, and method of budding of the present medusa, however, all incline one to place it among the Williadæ. It may be a primitive, or ancestral, form in which the canals have remained simple, or possibly an atavistic sport from some of the more complex Williadæ, or an immature individual which may give rise to medusa-buds before attaining its complete development.

Psythia prolifera, sp. nov.

Plate 1, fig. 3.

In the single specimen obtained, the bell was much shrivelled by contraction, so that its exact shape could not be ascertained. It appeared, however, to be slightly flatter than a hemisphere, and 4 mm. in diameter. The gelatinous substance was of uniform and only moderate thickness. There were four stiff, radially situated tentacles, each of which was about one-half as long as the bell-height. The entoderm of these tentacles was composed of chordate cells, and a very fine axial canal appeared to extend throughout the length of each tentacle. There were four straight, simple, radial canals; and a simple, slender, circular canal. The proboscis was cruciform in cross-section, and about three-quarters as long as the height of the bell-cavity. The four lips were small and slightly recurved. Four medusa-bearing stolons arose from the four radial corners of the stomach very near the points of entrance of the four radial canals. Each of these stolons gave rise to from two to six medusa-buds in various stages of development. When about to be set free the young medusa possesses four simple tentacles and radial canals, as in the adult; but its proboscis shows no trace of the proliferating stolons. The ex-umbrella of the young medusa is sprinkled over with nematocyst cells. The entoderm of the proboscis and stolons is ochre-yellow, all other parts being colorless. A single specimen

of this medusa was obtained, in an open net towed between 300 fathoms and the surface, off Marokau Island, Paumotus Group.

(300 f — S)[d]; Station 136; October 28, 1899; S. Lat. 18° 08′, W. Long. 141° 49′.

Lymnorea ocellata, sp. nov.

Plate 2, figs. 9–12.

The top of the bell is flat and the sides flare outward in a bell-shaped manner. The animal is about 4 mm. in diameter, and is about as high as it is broad. The bell-walls are thin, and quite flexible. There are about fifty short stiff tentacles which are each about one-half the length of the bell-height. These tentacles are usually carried curled upward, and their entodermal cores are solid and composed of vacuolated chordate cells. The basal bulbs of the tentacles are large, and each one contains a mass of red pigment. In addition to this there is a prominent ectodermal ocellus upon the ventral (lower) side of each tentacle at a short distance centrifugally from the basal bulb. The velum is small. There are four straight, narrow radial canals and a slender circular tube. The peduncle of the proboscis is wide and quadratic in cross-section, and its lower portion, near the gastric region, consists of highly vacuolated entodermal cells. The gastric part of the proboscis is pear-shaped, and the mouth is a simple round opening. The entire proboscis extends about one-half the distance from the inner apex of the bell-cavity to the level of the velar opening. There are four well developed oral tentacles, each one of which is about half as long as the height of the proboscis. Each oral tentacle branches dendritically four times, thus giving rise to sixteen distal knobs. Each knob is thickly covered with a bristling cluster of fusiform nematocyst cells. In addition to these there are several patches of nematocystic bristles upon the sides of the main trunk of each oral tentacle. The gonads are developed in four radial regions within the gastric part of the proboscis. The entoderm of the tentacle bulbs and of the gastric part of the proboscis is brick-red. The ectodermal ocelli are black. A number of these medusæ were obtained on the surface in the lagoon of Makemo Island, Paumotus, on October 23, 1899.

Bougainvillia fulva Agassiz and Mayer.

Bougainvillia fulva Agassiz and Mayer, 1899; Bull. Mus. Comp. Zoöl., Vol. XXXII., p. 162, Pl. 2, Fig. 6.

Plate 2, fig. 8.

An immature individual of this species was found by us among the Fiji Islands in 1898, and a mature specimen was obtained off Funafuti Atoll, Ellice Islands, on December 22, 1899.

The bell is about 6 mm. in height and the sides are straight and vertical. The gelatinous substance is of uniform thickness everywhere. There are four bunches, each containing seven tentacles, which arise from the bases of the four radial canals. These tentacles are solid and their entodermal cells are chordate. A single dark-colored ocellus is situated upon the under or centripetal side of each tentacle near the basal bulb. The velum is narrow. There are four straight, narrow, radial canals and a slender circular vessel. The proboscis is quadratic, and its base is wide. It extends about one-third of the distance from the inner apex of the bell-cavity to the velar opening. Four oral tentacles, each of which branches dichotomously four times, arise from the four radial corners of the proboscis near the mouth. The mouth is a simple round opening. The gonads are situated in the proboscis. The entoderm of the proboscis and tentacle bulbs is rosin-yellow. The tentacles are of a translucent milky color, and the bell is transparent. A single specimen was obtained in an open net towed from a depth of 150 fathoms to the surface.

(150 f — S)^{d}; Station 195; December 22, 1899; S. Lat. 10° 47′, W. Long. 179° 30′.

Epenthesis rangiroæ, sp. nov.

Plate 1, fig. 4.

The bell is slightly flatter than a hemisphere, and is 7 mm. in diameter. The bell-walls are thin and flexible. There are sixteen well developed tentacles with large conical basal bulbs. Sixteen otocysts, each containing a single spherical otolith, alternate in position with the sixteen tentacles. The velum is broad. There are four straight, slender, radial canals, and a narrow circular vessel. The proboscis is very short and quadratic in cross-

section, and there are four slightly recurved lips. The four gonads are found upon the four radial canals very near to the circular vessel. In the single specimen obtained, each gonad contained from six to eight prominent eggs. The medusa is transparent with the exception of the proboscis gonads and tentacle bulbs, which are translucent and milky in color. This form was found in the lagoon of Rangiroa Island, Paumotus, on September 23, 1899.

(150 f — S)^d; Station 195; December 22, 1899; S. Lat. 10° 47′, W. Long. 179° 30′.

Phortis elliceana, sp. nov.

Plate 2, figs. 5–7.

The bell is much flatter than a hemisphere, and is about 16 mm. in diameter. The gelatinous substance is thick at the aboral pole, but becomes thinner towards the bell-margin, which is sharp-edged. There are about fifty-six hollow tentacle bulbs. Four of these are large, and are situated at the bases of the four radial canals. Twelve others are of medium size, and three of these are found in each quadrant. In addition to these there are about forty very small rudimentary tentacle bulbs upon the bell-margin. There are no lateral or marginal cirri. There are about fifty-six otocysts which alternate in position with the tentacle bulbs. Each otocyst contains two or three spherical otoliths. The velum is well developed. There are four simple, narrow, radial canals, and a slender circular vessel. The peduncle is about as long as the bell-diameter, and projects a considerable distance beyond the bell-opening. The basal part of the peduncle has the shape of a four-sided truncated pyramid, while the distal portion is long, and tapers gradually toward the gastric part of the proboscis. The four radial canals extend down the angles of the peduncle to the gastric portion of the proboscis. The latter is short and flaring, and there are four well developed, recurved, crenulated lips. The gonads are linear, and are developed upon the sub-umbrella regions of the radial canals. The entoderm of the tentacle bulbs and gonads is pink in color, while that of the gastric portion of the proboscis is rosin-yellow. A single specimen of this medusa was found in an open net which was towed from a depth of 150 fathoms to the surface, off Funafuti Atoll in the Ellice Islands.

(150 f — S)^d; Station 195; December 22, 1899; S. Lat. 10° 47′, W. Long. 179° 30′.

Rhegmatodes lacteus, sp. nov.

Plate 3, figs. 15, 16.

The bell is flatter than a hemisphere, and is 50 mm. in diameter. The gelatinous substance is thick at the apex, but thin at the bell-margin. A long funnel-shaped depression, at the apex of the bell, extends downward almost to the level of the stomach. There are ten well developed tentacles, each of which is about one-tenth as long as the bell-diameter. These tentacles are provided with large hollow, bulbular bases. In addition to these large tentacles there are about 250 very small rudimentary ones. There are about 500 otocysts, each containing two small spherical otoliths. The velum is delicate and narrow. There are 105 straight, narrow radial canals, upon the middle and lower regions of which the gonads are developed. The stomach is 25 mm. in diameter, and the canals arise from its periphery. The proboscis is short, and there are 105 simple lips. The tentacles, proboscis, and genital organs are of a translucent milky color. A single specimen was found in a surface haul a few miles north of Tahiti.

Station 73; October 5, 1899; S. Lat. 17° 27′, W. Long. 149° 32′.

Mesonema macrodactylum Brandt.

Mesonema macrodactylum Brandt, J. F., 1838; Mem. Acad. Imp. St. Petersbourg, Sci. Nat. Ser. 6, Tom. IV., p. 359, Taf. IV.

Large numbers of this medusa were found swimming at the surface in the lagoon of Likieb Atoll, Marshall Islands, on January 20–21, 1900. The tentacles are not quite so long as in Brandt's figures. The entoderm of the canals, tentacle bulbs, and lips is slightly milky in color; all other parts of the medusa being colorless. Brandt describes this species from the tropical Pacific, and Chun (1896; Mitt. Nat. Mus. Hamburg, Jahrg. 13, p. 7) records it from the coast of Zanzibar.

Polycanna purpurostoma Agassiz and Mayer.

Polycanna purpurostoma Agassiz and Mayer, 1899; Bull. Mus. Comp. Zoöl., Vol. XXXII., p. 169, Pl. 8, Figs. 26–28.

A single specimen of this medusa, 50 mm. in diameter, was obtained in a surface tow made off Tahaa Island, Society Islands, on November 16, 1899. We found it among the Fiji Islands in December, 1897.

Liriope hyalina Agassiz and Mayer.

Liriope hyalina Agassiz and Mayer, 1899; Bull. Mus. Comp. Zoöl., Vol. XXXII., p. 166, Pl. 9, Fig. 32.

Specimens of this medusa were found by the "Albatross" in the Marquesas, Paumotus, Society, Ellice, and Marshall Islands; and they were especially common in the tropical part of the open ocean between California and the Marquesas. We found this species in the Fiji Islands in 1897–98.

	S^d;	Station 13;	September 5, 1899;	N. Lat. 9° 57′,	W. Long	137° 47′.
	S^d;	" 14;	" 7, "	" 6° 41′,	"	137°.
	S^n;	" 16;	" 9, "	" 2° 38′,	"	137° 22′.
(300 f — S)^n,	S^n;	" 25;	" 14, "	Between Ua Huka and Marchand Islands, Marquesas.		
	S^n;	" 31;	" 19;	S. Lat. 12° 20′,	W. Long.	144° 15′.
	S^n;	——	October 22;	Lagoon of Makemo Island, Paumotus.		
(100 f — S)^d;	Station 173;		November 4;	S. Lat. 18° 55′,	W. Long.	146° 32′.
	S^n;	——	" 17;	off Bora Bora Island, Society Islands.		
(150 f — S)^d;	Station 195;		December 22;	S. Lat. 10° 47′,	W. Long.	179° 30′.
	S^n;	——	" 25;	Lagoon of Funafuti, Ellice Islands.		
	S^n;	——	January 20, 1900;	Lagoon of Likieb Island, Marshall Islands.		

Dipleurosoma pacifica, sp. nov.

Plate 3, figs. 13, 14.

The bell is very flat, being about three times as broad as it is high, and 23 mm. in diameter. The surface of the ex-umbrella is reticulated by a regular system of hexagonal elevations bounded by shallow furrows. There are about one hundred short tentacles with narrow bulbular bases. The entodermal core of these tentacles is solid and composed of chordate cells. At the bases of most of the tentacles, upon the lower side, there is a single black ocellus. Slender club-shaped sensory bodies are scattered at frequent and irregular intervals between the tentacles. The entodermal core of these bodies is solid, and very similar to that of the tentacles. There are no otoliths. The velum is narrow. Six radial canals arise in groups of three from diametrically opposite sides of the stomach. In the single specimen examined two of these canals bifurcate, and thus eight canals reach the circular vessel. The gonads are linear and occupy the middle region of the eight canals. Their surfaces are slightly papillate, and the ova stand out as hemispherical protuberances. The stomach is elongated in the direction of the two opposed groups of radial canals. The proboscis is

very short, and there are six small, slightly crenulated lips. The tentacle bulbs, genital organs, and proboscis are milky white, all other parts of the medusa being transparent. A single specimen was obtained in a surface haul about fifty miles north of Tahiti.

Geryones mexicana, sp. nov.

Plate 4, fig. 17.

The bell is broad and pear-shaped and is about 5 mm. in diameter. The gelatinous substance is very thick at the aboral pole, but becomes thin near the bell-margin. There are six large, hollow, interradial tentacles, the centrifugal sides of which are provided with wart-like nematocyst-bearing swellings. There are also six slender, solid radial tentacles, each of which arises from the side of the bell at a short distance above the margin. There are six otocysts which are situated near the bases of the six interradial tentacles. Each otocyst contains a single spherical otolith. The velum is well developed. There are six straight radial canals which are wider near the proboscis than they are near the circular vessel. The proboscis is short and lacks a peduncle, and there are six slightly recurved lips. No gonads were observed. The entoderm of the proboscis, radial canals, and interradial tentacles is of a delicate pink. A single specimen of this medusa was obtained in a surface haul off the coast of Mexico.

S^{d}; Station 3; August 28, 1899; N. Lat. 26° 18′, W. Long. 128° 54′.

Carmaris rosea, sp. nov.

Plate 4, fig. 18.

The bell is hemispherical, and about 6 mm. in diameter. The gelatinous substance is thick at the aboral pole, but diminishes toward the bell-margin, which is sharp-edged. There are twenty-four incisions, forming twenty-four distinct lappets upon the bell-margin. Two lappets are situated between each successive pair of tentacles. There are twelve tentacles. Six of these, which are long, flexible, and hollow, are situated at the bases of the six radial canals. These tentacles are thickly covered with rings of nematocyst cells, and are about as long as the bell-diameter. The six other

tentacles are solid, and are interradial in position. Their centrifugal sides are studded with about six to ten wart-like, nematocyst-bearing swellings. These tentacles are about as long as the bell-radius, and are carried curled stiffly upwards. There are twelve otocysts, one at the base of each tentacle. Each otocyst is hollow and contains a single spherical otolith. There are six broad, flat, radial canals, upon the mid-regions of which the gonads are developed. In addition to the radial canals there are eighteen blindly ending centripetal canals, three between each successive pair of radial canals. Six of these centripetal canals are longer than the others, and extend about half the distance from the bell-margin to the base of the stomach. The circular canal is wide and flat. The velum is well developed. The proboscis is long and pyriform, and the mouth projects beyond the level of the velar opening. The mouth is situated at the extremity of a long narrow neck, and there are six short, slightly recurved lips. The entoderm of the medusa is of a delicate rosy-pink, and all other parts are colorless. A single specimen was found in a surface haul made south of the Marquesas Islands.

S^{d}; Station 31; September 19, 1899; S. Lat. 12° 20′, W. Long. 144° 15′.

Aglaura prismatica Maas.

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

We first obtained this medusa in N. Lat. 12° 7′, W. Long. 137° 18′; and thereafter it became one of the commonest objects in the tow. Large numbers were obtained among the Marquesas and Society Islands, and in 1897 we found it to be abundant among the Fiji Islands.[1] It was discovered in considerable numbers by the "Albatross" off the west coast of Mexico and Central America in 1891, and it seems safe to conclude that it is widely distributed over the tropical regions of the Pacific.

S^{d}; Station 12; September 4, 1899; N. Lat. 12° 07′, W. Long. 137° 18′.
S^{d}; " 13; " 5, " " 9° 57′, " 137° 47′.
S^{n}; " 15; " 8; " 4° 35′, " 136° 54′.
$(300\,f - S)^{n}$; " 25; " 14; Marquesas Islands.
S^{n}; " 73; October 5; S. Lat. 17° 27′, W. Long. 149° 32′.
S^{n}; —— November 17; off Bora Bora Island, Society Islands.

[1] Bull. Mus. Comp. Zoöl., Vol. XXXII., p. 165, Pl. 4, Fig 13.

Ægina sp.

Two specimens of Ægina were obtained in an open net which was dragged from 250 fathoms to the surface. One of them was 28 mm. in diameter, and they both possessed four slender, slightly greenish-colored tentacles. They were too much damaged for description.

(250 f — S)^{d}; Station 16; September 9; N. Lat. 2° 38′, W. Long. 137° 22′.

Solmaris sp.

Two specimens of Solmaris, one 25 mm. and the other 40 mm. in diameter, were brought up in an open net which had been dragged between 150 fathoms and the surface. They each had sixteen tentacles, and the gonads were of a milky-yellow color. Unfortunately the margins of their bells were too much damaged for specific identification.

(150 f — S)^{d}; September 1, 1899; N. Lat. 17° 32′, W. Long. 135° 40′.

Solmissus marshalli, sp. nov.

Plate 5, figs. 23–25.

The disk consists of a thick doubly convex, central portion, and a thin outer annulus or collar region, and is 60 mm. in diameter. The gelatinous substance of the central region is very rigid, while that of the collar region is flexible. Fourteen equally spaced stiff tentacles arise from the periphery of the central disk. Each tentacle possesses a well developed conical insertion base. The entodermal cells of the tentacles are chordate, and are very thin and much crowded together.

A well developed peronial thickening extends radially outward from the base of each tentacle to the outer margin of the collar region. Owing to the specimen being in a somewhat imperfect condition, only one sense organ could be observed upon the outer edge of the collar region. This one contained a single highly refractive otolith of remarkably small size. The velum is well developed, and its powerful contractions serve to propel the animal through the water. The stomach is wide and flat, and gives rise to fourteen radiating pockets which are situated in the radii of the tentacles.

The mouth is a simple round opening at the centre of the sub-umbrella. The fourteen gonads are situated at the centripetal edges of the fourteen stomach pockets. The gonads and tentacles are slightly milky in color, while all other parts of the medusa are transparent. A single specimen was obtained off Kwajalong Atoll, Marshall Islands. It came up in an open net which had been towed between 150 fathoms and the surface.

(150 f — S)^{d}; Station 220; January 16, 1900; N. Lat. 8° 38′, W. Long. 167° 37′.

Rhopalonema typicum Maas.

Homœonema typicum Maas, 1897; Mem. Mus. Comp. Zoöl., Vol. XXII., p. 22, Taf. III., Figs. 1–3.

Plate 5, figs. 21–22.

Maas describes this species from the west coast of Mexico. We first met with it on September 7, 1899, at N. lat. 6° 41′, W. long. 137°. We also found it at the Marquesas and Paumotus Islands, and at Tahiti. It was especially common in surface hauls made at night, and appeared to be most abundant about 3° north of the equator in W. long. 137°.

The bell is broad and hemispherical, and there is a small solid apical projection. The largest specimen obtained by us was about 15 mm. in diameter, but Maas records one of 20 mm. in breadth. The bell-walls are very thin but are remarkably stiff and rigid, swimming being accomplished by means of the strokes of the powerful velum which is exceedingly flexible. There are eight well developed tentacle bulbs situated at the bases of the eight radial canals. In addition to these there are about twenty-five or thirty smaller tentacles which are interradial in position. It seems probable that the shafts of all of the tentacles were broken off in all the specimens found by us, leaving only the basal bulbs. There are about sixteen exceedingly small otocysts upon the bell-margin, each one of which contains a single spherical otolith. The velum is large, and the contractions of its powerful muscles cause it to vibrate with remarkable rapidity. A well developed system of circular muscles is found in the ectoderm of the sub-umbrella. The proboscis is urn-shaped, the proximal part being narrower than the mid-region. There are four recurved lips. There are six gonads, one upon the middle region of each of the radial canals. Young

individuals are of a glassy transparency, while older ones are slightly translucent and milky in color, especially in the proboscis, gonads, and marginal tentacles.

S^d;	Station 14;	September	7,	1899;	N. Lat.	6° 41′,	W. Long.	137°.
S^n;	" 15;	"	8,	"	"	4° 35′,	"	136° 54′.
S^n;	" 16;	"	9,	"	"	2° 38′,	"	137° 22′.
S^n;	" 31;	"	19,	"	S. Lat.	12° 20′,	"	144° 15′.
S^n;	" 32;	"	20,	"	"	13° 37′,	"	145° 42′.
S^d;	——	"	23,	"	Lagoon of Rangiroa Island, Paumotus Islands.			
S^n;	——	"	24,	"	off Avatoru pass, Rangiroa.			
S^n;	——	October	5,	"	off Pt. Venus, Tahiti.			

SCYPHOMEDUSÆ.

Charybdea grandis, sp. nov.

Plate 6, figs. 26–31.

Adult Medusa. The bell is high and cone-shaped, with a blunt apex. It is 230 mm. high, and 140 mm. in diameter. The gelatinous substance is quite thick and is of a remarkably tough consistency. There are four interradial, wing-like pedalia, the broad sides of which extend outward in a radial direction. These pedalia are each about 40 mm. long, and 25 mm. wide. A wide canal extends through the substance of each of them into the flexible portion of the tentacle, which arises from the distal end of the pedalium. The flexible part of the tentacle is about 140 mm. long, and its surface is ringed and covered with transverse rows of nematocyst cells (Fig. 28). Four sense organs, or rhopalia (Figs. 29, 30), alternate in position with the four tentacles. Each sense organ arises from a deep niche situated about 27 mm. above the level of the velarium. The sense organ is knob-shaped and is mounted upon a short stem, and contains from one to three ectodermal ocelli, and an entodermal otolith. In old medusæ there is usually a single, median ocellus in each sense organ, but in a young specimen 30 mm. in height there was a large median, and two small lateral ocelli. These ocelli are all directed so as to perceive objects within the bell-cavity. The velarium is well developed and is suspended by four mesenteries, or frenulæ, in the regions of the sense organs. Twenty-four short tree-like velar canals (Figs. 26, 31) extend centripetally

inwards into the substance of the velarium. The proboscis is short, and there are four slightly recurved lips. There are four interradial crescentic areas of numerous, short gastric cirri; the horns of each crescent pointing centripetally. Four wide radial pouches extend outward from the stomach. These pouches are separated one from another by four interradial partitions, but are placed in communication one with another by means of the lateral canals leading into the lumen of the pedalia. The gonads consist of eight leaf-like folds attached to the sides of the interradial septæ and hanging free in the radial pockets. The gelatinous substance of the bell is hyaline. The entoderm is translucent and milky white, and the gastric cirri and flexible parts of the tentacles are pink or yellow-pink. The sensory knobs of the rhopalia are dull ochre in color and the ocelli are deep brown — almost black. We first found a single specimen of this medusa in an open net which had been towed from a depth of 300 fathoms to the surface, south of Fakarava Island, Paumotus. The next day we discovered a large swarm of mature individuals off Anaa Island, floating very near the surface of the sea. This species is by far the largest Charybdea known.

(300 f — S)^{d}; October 14, 1899; off Fakarava Atoll, Paumotus.
S^{d}; —— " 15, " off Anaa Island, Paumotus Islands.

Nausithoë picta, sp. nov.

Plate 7, fig. 33.

The bell is quite flat and is 17 mm. in diameter. There are eight solid, stiff tentacles, each of which is about as long as the bell-radius. Eight marginal sense organs alternate with the tentacles. Each sense organ contains a centripetal ocellus and a centrifugal otolith. There are sixteen prominent marginal lappets which alternate in position with the tentacles and sense organs. The mouth is situated at the centre of the sub-umbrella, and is a cruciform slit surrounded by four simple, short lips. Four interradial groups of gastric cirri are arranged so as to alternate in position with the lips. Each of these groups contains about a dozen short cirri. There are eight large gonads which lie in the tentacular radii. In the female the ova are large and prominent. In the sub-umbrella there

is a well developed system of circular muscles which forms a ring, the outer circumference of which meets the bases of the tentacles, while the inner edge coincides in position with the middle points of the gonads. In addition to these circular muscles there are sixteen strands of radial muscles which extend outward on either side of the gonads to the middle of the lappets. There are also eight radial muscle strands in the ex-umbrella which extend outward toward the sense organs, and in addition to these there are eight well developed groups of radial muscles at the bases of the eight tentacles. The stomach consists of a wide lenticular space at the centre of the disk, and this gives rise to eight radial pouches extending outward in the radii of the eight sense organs. Each of these pouches bifurcates and sends a pair of branches into the lappets, making in all sixteen terminal pouches. The bell is translucent and milky in color. The ocelli and gonads are of a rich brown color, and the entodermal core of the gastric cirri are dark blue. Two specimens, one male and the other female, were found at night on the surface south of Rangiroa Island, Paumotus, on September 24, in S. lat. 15° 22′, W. long. 147° 57′.

Nausithoë punctata var. pacifica Agassiz and Mayer.

Nausithoë punctata var. **pacifica** Agassiz and Mayer, 1899; Bull. Mus. Comp. Zoöl., Vol. XXXII., p. 170.

Plate 7, fig. 32.

The disk is quite flat and is about 4 mm. in diameter. There are eight solid tentacles which are quite rigid. These tentacles are each about three-quarters as long as the bell-diameter. They arise from sockets on the sub-umbrella edge of the disk. There are sixteen sharply cleft marginal lappets, two between each successive pair of sense organs. The eight sense organs alternate in position with the eight tentacles, and are situated at the bottom of the niches between the lappets. Each sense organ contains a centrifugal otolith and a centripetal dark-brown ocellus. Eight gonads lie in the eight tentacular radii. In the female the ova are large and prominent. The mouth is a simple cruciform opening in the centre of the sub-umbrella, the arms of the cross passing through two of the tentacular diameters. There are four groups of gastric

cirri which alternate in position with the lips of the medusa. Each of these groups contain from four to seven cirri. The gelatinous substance is slightly bluish or milky in color, and the genital organs are dull cream or slightly ochre colored. In the majority of specimens there are no spots upon the ex-umbrella, but in some there is a brownish or yellowish spot upon the upper surface of each of the eight lappets. This form appears to differ from the Atlantic-Mediterranean species only in its duller coloration and the frequent absence of spots upon the ex-umbrella. Compare the Figure we here present with the drawing of the Atlantic species given in the Bull. Mus. Comp. Zoöl., Vol. XXXVII., Plate 26, Fig. 87.

We obtained this medusa in considerable numbers in Neiafu Harbor, Vavau Island, Tonga, on December 5 and 6, 1899, and we also found it among the Fiji Islands in December, 1897. Our Figure is taken from a specimen obtained near Suva, Fiji.

Atolla Alexandri Maas.

Atolla Alexandri Maas, 1897; Mem. Mus. Comp. Zoöl., Vol. XXIII., No. 1, p. 81, Taf. XI., Fig. 2, Taf. XIV., Figs. 4, 5.

A single specimen, in good condition, was brought up in a bottom trawl at 830 fathoms between Ua Huka and Marchand Islands, Marquesas, on September 14, 1899. It was 24 mm. in diameter, and there were forty-eight marginal lappets and twenty-four tentacles. A number of specimens of this deep-sea form were obtained by the "Albatross" in 1891 in trawls made off the Pacific coasts of Mexico and Central America.

Linerges aquila Haeckel.

Linerges aquila Haeckel, E., 1880; Syst. der Medusen, p. 496.

An immense swarm of ephyræ of this species, all about 3 mm. in diameter, were found in the lagoon of Hikueru Island, Paumotus, on October 27, 1899. Another swarm of somewhat older medusæ was met with in the lagoon of Funafuti, Ellice Islands, on December 24–25; and a single mature individual was captured in the lagoon of Rongelab Atoll, Marshall Islands, on January 17, 1900. We found large numbers of both ephyræ and mature medusæ of this species among the Fiji Islands in 1897.[1]

[1] Agassiz and Mayer, 1899; Bull. Mus. Comp. Zoöl., Vol. XXXII., p. 170, Pl. 10, Figs. 33, 34.

Zonephyra corona, sp. nov.

Plate 4, figs. 19, 20.

The bell is a little more than a hemisphere and is about 15 mm. in diameter. The gelatinous substance is quite thick at the aboral pole, but becomes thinner near the bell-margin. The surface of the ex-umbrella is thickly sprinkled with nematocyst cells. There are eight short hollow tentacles and eight marginal sense organs. Each sense organ contains an entodermal mass of red-colored granules. There are thirty-two broad lappets, two between each successive tentacle and sense organ. The sub-umbrella is provided with a well developed set of circular muscles. In addition to these there are sixteen spear-head-shaped radial muscle strands in the sub-umbrella; the broad ends of these muscle strands are centripetal. These strands extend to the notches between each successive tentacle and sense organ. Sixteen narrow radial muscle strands are also found in the ex-umbrella, and they alternate in position with the strands of the sub-umbrella. The proboscis is broad and flask-shaped, and there are four recurved, crenulated lips. The four gonads are interradial in position and are horseshoe shaped, the concavity being directed outward. Each gonad is thrown into complex corrugations, and in the female the eggs are easily seen on account of their deep purple color. Each gonad is provided with from eight to ten gastric cirri. The gastro-vascular cavity extends outwards in thirty-two pockets, one in each lappet. The gelatinous substance of the bell is of a greenish-amber tinge. The entoderm of the tentacles and the sensory entoderm of the marginal sense organs is of a claret color, as are also the eggs. The entire entoderm of the gastro-vascular cavity is of a delicate claret color, and the radial muscle strands of the sub-umbrella are of a glistening white. A single specimen of this medusa was found. It differs from the two species described by Haeckel, 1880, in that there are thirty-two lappets instead of sixteen as in Haeckel's forms.

S^{d}; Station 14; September 7, 1899; N. Lat. 6° 41′, W. Long. 137°.

Pelagia tahitiana, sp. nov.

Plate 8, figs. 34, 35.

Immature individual. The disk is twice as broad as it is high, and is about 16 mm. in diameter. The ex-umbrella is quite regularly sprinkled over with large wart-like papillæ which bear nettling cells. The papillæ near the aboral apex of the disk are larger than the others, those near the bell-margin being very small. There are eight hollow tentacles, the distal three-quarters of which are covered profusely with nettling cells. These tentacles are each about three-quarters as long as the bell-diameter. Eight marginal sense organs alternate with the tentacles. Each sense organ contains a mass of dark-red pigment of entodermal formation. There are sixteen partially cleft lappets. The mouth is surrounded by four well developed crenulated palps which are about three-quarters as long as the bell-diameter. There are four inter-radial gonads, each one of which is horseshoe shaped, with its concave side turned outward (centripetally). Each gonad is furnished with from eight to twelve short gastric cirri and a well developed sub-genital pit. The stomach is a wide lenticular space at the centre of the disk. It gives rise to sixteen radial pockets which extend outward, eight to the tentacles and eight to the sense organs. These pockets are entirely separated each from each, and there is no ring canal. There is a well developed set of circular muscles in the sub-umbrella, and also a powerful radial set of sixteen muscle strands which alternate in position with the tentacles and sense organs, and extend down the septæ between the radial pockets. In addition to these there are sixteen radial muscle strands in the ex-umbrella. These extend to the bases of the tentacles and sense organs. The disk and palps are of a dull amber-yellow color and the tentacles are of a darker hue. The nematocyst cells over the ex-umbrella and the palps are orange-red, and the genital organs are of a dull ochre color. A single specimen of this medusa was found on the surface south of Rangiroa Island, Paumotus.

S^{n}; September 24, 1899; off Rangiroa, Paumotus Islands.

Aurelia vitiana Agassiz and Mayer.

Aurelia vitiana Agassiz and Mayer, 1899; Bull. Mus. Comp. Zoöl., Vol. XXXII., p. 171, Plate 10, Fig. 35.

This species was very abundant upon the surface during the afternoon hours in Neiafu Harbor, Vavau Island, Tonga, on December 5 and 6, 1899. None were to be seen in the morning. We found it also in Suva Harbor, Fiji, in December, 1897; but here it appeared during the early morning hours, and then only on perfectly calm days. It is interesting that although it was very calm while we were in Neiafu Harbor, yet the medusæ did not come to the surface in the morning, but swarmed there during the afternoon.

SIPHONOPHORÆ.

Porpita pacifica Lesson.

Porpita pacifica Lesson, R. P., 1830; Voy. de la "Coquille," Zoöl., Tom. 2, Zoöphytes, Pl. 7, Figs. 3, 3′.

This species is widely distributed over the tropical belt of the Pacific. The general color of the pneumatocyst and polypites is not so gray but more yellowish than in Lesson's figure.

S^a;	Station 7;	September 1, 1899;	N. Lat. 18° 19′,	W. Long. 134° 57′.
S^d;	" 13;	" 5, "	" 9° 57′,	" 137° 47′.
S^d;	" 31;	" 19, "	S. Lat. 12° 20′,	" 144° 15′.
S^a;	——	November 17, "	off Bora Bora Island, Society Islands.	
S^d;	——	December 25, "	Lagoon of Funafuti Atoll, Ellice Islands.	

Velella pacifica Eschscholtz.

Velella pacifica Eschscholtz, F., 1829; Syst. der Acalephen.

S^d;	Station 14;	September 7, 1899;	N. Lat. 6° 41′, W. Long. 137°.
S^d;	——	November 16, "	Tahaa Island, Society Islands.

DIPHYOPSIS APPENDICULATA.

ERSÆA APPENDICULATA.

Diphyopsis appendiculata Agassiz and Mayer.

Diphyes appendiculata Eschscholtz, F., 1829; Syst. der Acalephen, p. 138, Taf. XII., Fig. 7.
Diphyes appendiculata Huxley, T. H., 1859; Oceanic Hydrozoa, p. 34, Pl. I., Figs. 2–2c.

Plate 9, figs. 38, 39.

This species was first obtained by the "Albatross" in N. lat. 17° 32′, W. long. 135° 40′, and it continued to be abundant throughout the tropical regions of the Pacific. In the Pacific species the entoderm of the polypites and nematocyst batteries is milky, or slightly yellow or pink in color, while in the Atlantic form the polypites are of a more or less intense green and the nematocyst batteries of the tentacles are yellow or orange (see Bull. Mus. Comp. Zoöl., Vol. XXXVII., No. 2, Pl. 34, Fig. 114). A still more important difference between the two species lies in the fact that in the Pacific form the monogastric sexual generation belongs to the genus Ersæa, and lacks a manubrium within its swimming-bell; while in the Atlantic form it belongs to the genus Eudoxia, for it possesses a manubrium within its bell. The Pacific form, therefore, is a Diphyopsis, while the Atlantic form belongs to the genus Diphyes.

The animal is 18–20 mm. in length, and the anterior swimming-bell is somewhat larger than the posterior. The anterior bell is angular and pyramidal and its cavity is voluminous. There are two ascending, curved radial canals and a simple circular vessel. The phyllocyst is long and narrow and contains an "oil globule" near its distal extremity. There is a moderately deep conical hydrœcium upon the ventral face of the anterior nectophore, and the siphosome arises from its inner apex. The first appendage of the siphosome is the large posterior swimming-bell (*p s*, Fig. 39). This is somewhat smaller than the anterior bell, and a deep groove covered by a projecting tooth runs down the side upon which the siphosome is situated. Indeed the siphosome lies within this groove and is protected by the covering tooth. The second appendage of the siphosome is the small auxiliary swimming-bell (*a s*, Fig. 39). Immediately below this comes a cluster of immature feeding polypites, the older ones being successively

lower down the siphosome. The tentacles bud out from the sides of the polypites, and then come the bracts which protect them. The units upon the siphosome are separated by free internodes. When set free as Ersæa appendiculata, each unit is provided with a covering scale, polypite, tentacle, and immature swimming-bell.

	S^n;	Station	7;	September	1,	1899;	N. Lat.	18° 19′,	W. Long.	134° 57′.
	S^d;	"	12;	"	4,	"	"	12° 07′,	"	137° 18′.
(150 f — S)^d;		"	15;	"	8,	"	"	4° 35′,	"	136° 54′.
(250 f — S)^d;		"	16;	"	9,	"	"	2° 38′,	"	137° 22′.
(300 f — S)^n;		"	25;	"	14,	"	Marquesas Islands.			
	S^n;	"	31;	"	19,	"	S. Lat.	12° 20′,	W. Long.	144° 15′.
	S^d;	"	32;	"	20,	"	"	13° 37′,	"	145° 42′.
	S^d;	——		October	23,	"	Lagoon of Makemo Island, Paumotus Islands.			
	S^d;	——		"	28,	"	off Marokau, Paumotus Islands.			
	S^d;	——		December	24,	"	Lagoon of Funafuti, Ellice Islands.			

Ersæa appendiculata.

Plate 9, fig. 40.

The mature animal is 5 mm. in length. The anterior covering scale is irregularly pyramidal, one face being plane, with angular edges. The ventral side is concave and fits over the anterior part of the swimming-bell. The phyllocyst is long and is composed of highly vacuolated cells, and there is generally an "oil globule" near its distal extremity. The swimming-bell is quadratic in cross-section, having four longitudinal, sharp edges. The cavity of the bell is quite wide at the base, but tapers to a narrow inner apex. There is no manubrium, but there are four straight, narrow, radial canals and a simple circular vessel. The velum is well developed, and its contractions serve to drive the animal forward with considerable speed. The single polypite is fusiform, and its entodermal gastric cells are arranged in wart-like protuberances upon the inner wall of the stomach. There is a single tentacle which gives rise to side branches, each one of which terminates in a well developed nematocyst battery. Several gonophores in various stages of development arise from the side of the polypite immediately proximal to the tentacle. Each gonophore contains four simple radial canals and a circular vessel. The entoderm of the polypite is usually faint yellow, but occasionally it is of a delicate pink or milky color. The radial canals of the swimming-bell are usually colorless, but sometimes they are tinged with yellow spots. This form is common every-

where in the tropical Pacific wherever the Diphyes generation is found. This species may be Eudoxia Lessoni of Eschscholtz, figured by him in Syst. d. Acal., p. 126, Taf. XII., Fig. 2, and by Huxley in 1859 under the same name in Oceanic Hydrozoa, p. 57, Pl. III., Fig. 6.

DIPHYOPSIS ANGUSTATA.

ERSÆA ANGUSTATA.

Diphyopsis angustata Haeckel.

Diphyes angustata Eschscholtz, F., 1829; Syst. der Acal., p. 136, Taf. 12, Fig. 6.
Diphyopsis angustata Haeckel, 1888; Challenger Report, Zoöl., Vol. XXVIII., p. 152.

Plates 8, 10, figs. 37, 42.

This species was first obtained by the "Albatross" in N. lat. 6° 41′, W. long. 137°, and from this time on throughout the cruise in the tropical regions of the Pacific it continued to be the commonest of all Siphonophoræ. Several perfect specimens were obtained in which the posterior nectophore remained attached to the siphosome. This is very readily broken off at the time of capture, and it was not observed in any of the specimens obtained by us in 1897 among the Fiji Islands (see Bull. Mus. Comp. Zoöl., Vol. XXXII., p. 179, Pl. 17, Fig. 54). The posterior swimming-bell is quite similar in relative size and general appearance to that of D. compressa figured by Haeckel, 1888; in Siphonophoræ of the "Challenger" expedition, Pl. XXXIII., Figs. 1–4.

We give two figures, one showing a complete unit of the siphosome a short time before it is detached from the stem, and the other a drawing of the terminal nematocyst battery of the tentacles. The monogastric sexual generation, Ersæa angustata, nov. sp., was met with quite frequently.

S^d, S^n;	Station	14;	September	7,	1899;	S. Lat. 6° 41′, W. Long. 137°.
(300 f — S)^n;	Station	25;	September	14,	1899;	Marquesas Islands.
(300 f — S)^d, S^d;	"	30;	"	18,	"	S. Lat. 10° 29′, W. Long. 141° 52′.
(300 f — S)^d, S^d;	"	32;	"	20,	"	" 13° 37′, " 145° 42′.
S^n;	——		October	5,	"	off Point Venus, Tahiti.
S^d;	——		"	14,	"	off Fakarava Atoll.
S^d;	——		"	23,	"	Lagoon of Makemo Island, Paumotus Islands.
S^d;	Station	173;	November	4,	"	S. Lat. 18° 55′, W. Long. 146° 32′.
S^d;	"	180	"	15,	"	" 17° 30′, " 149° 41′.
S^d;	——		December	25,	"	Lagoon of Funafuti, Ellice Islands.
S^n;	——		January	20,	1900;	Lagoon of Likieb, Marshall Islands.

Ersæa angustata, sp. nov.

Plate 10, fig. 41.

The animal is about 6 mm. in length. The anterior covering-scale is irregularly pyramidal and is provided with a deep fissure upon its ventral face, which embraces the upper portion of the large posterior swimming-bell. The upper apex of the anterior covering-scale is usually pointed, and the two dorsal edges are quite sharp and angular. The phyllocyst is long and sometimes contains a highly refractive "oil globule," situated near its distal extremity. The single feeding polypite is quite long and is capable of being extended beyond the lower edge of the covering-scale. A group of tentacles arises from its side, and immediately above this there are one or two gonophores in various stages of development. The entoderm of the polypite and phyllocyst is rose-colored, while the terminal nematocyst batteries of the tentacles are orange as in the Diphyopsis generation. The posterior swimming-bell is rectangular in cross-section with four sharp-edged longitudinal ridges, which are often serrate. A deep trough-like longitudinal groove extends down the ventral side of the swimming-bell. The bell-cavity is irregularly conical, and the velum is very powerful. There are four straight, narrow, radial canals and a simple, slender, circular canal; and these are placed in communication with the gastrovascular space of the polypite by means of a short, straight duct. There is no manubrium within the swimming-bell.

This Siphonophore may readily be distinguished from the Atlantic form by its pink coloration, the Atlantic species being green.

Abyla quincunx Chun.

Abyla quincunx Chun, C., 1897; Verhandl. d. Deutsch. Zool. Gesell., p. 71, Fig. 13. (Atlantic form.)

Plate 11, figs. 46, 47.

Aglaisma quincunx Mayer.

Aglaisma quincunx Mayer, 1900; Bull. Mus. Comp. Zoöl., Vol. XXXVII, p. 78. (Atlantic form.)

Plate 10, fig. 45.

A large number of specimens of this Siphonophore were obtained throughout the Tropical regions of the Pacific. A comparison of the Figures here given with those of the Atlantic form by Chun, 1897, and Mayer, 1900, will serve to show the close relationship which exists between the Pacific and the Atlantic representatives of this Siphonophore. It will be noticed that in Figure 45 a saw-toothed projection extends down the open groove of the inferior nectophore, and that this is absent in the Figures of the Atlantic form given by Chun and Mayer. This peculiarity is, however, not seen in all individuals, and seems to occur quite as commonly in the Atlantic as in the Pacific specimens, and it cannot, therefore, be used as a basis of distinction between them. The Pacific and Atlantic specimens are, moreover, of the same size, being about 7–9 mm. in length for the Diphyes, and 4–5 mm. for the Aglaisma generation. The only fairly constant difference appears to be that in the Atlantic specimens the terminal nematocyst batteries of the tentacles are usually orange or yellow in color, whereas in the Pacific forms they are generally colorless. This distinction is not invariable, however, for some Pacific specimens are found in which they are slightly yellow, while other specimens from the Atlantic have them colorless.[1] We therefore conclude that there can be, at most, but a varietal difference between the Atlantic and Pacific forms of this Siphonophore, and venture to assert that they belong to the same species.

(300 f — S)^n;	Station	25;	September	14, 1899;	Marquesas Islands.
(300 f — S)^d;	"	30;	"	18, "	S. Lat. 10° 29′, W. Long. 141° 52′.
(300 f — S)^d, S^d;	——		October	28, "	off Marokau Island, Paumotus.
S^d;	Station	173;	November	4, "	S. Lat. 18° 55′, W. Long. 146° 32′.
S^n;	——		December	"	Suva Harbor, Fiji Islands.
S^d;	——		"	25, "	Lagoon of Funafuti, Ellice Islands.

[1] We had also found this species in Fiji in 1897–98. See Bull. Mus. Comp. Zoöl., 1899, Vol. XXXII., No. 9, p. 180.

Abyla Leuckartii Huxley.

Abyla Leuckartii Huxley, T. H., 1859; Oceanic Hydrozoa, p. 49, Pl. III., Figs. 2–2^{b}.

Two specimens of this Siphonophore were obtained by the "Albatross," one in the Marquesas, and the other about 100 miles north of the Paumotus Islands. Huxley found it off the east coast of Australia. The smaller of our specimens is well represented by Huxley's Figure 2; in the larger, however, the anterior nectophore is 22 mm. in length and has the shape of a narrow, elongate, five-sided pyramid; the apex of which is sharp and pointed. It is much flattened laterally in the plane passing through the axes of the phyllocyst, hydrœcium, and bell-cavity. The cavity of the anterior swimming-bell is long and tapers to a point very near the apex of the bell. There are four radial canals and a simple circular vessel, and these are put into connection with the gastro-vascular cavity of the hydrosoma by means of a short, straight duct, which reaches the side of the bell-cavity at about its middle point. The velum is well developed and is provided with powerful muscles by the rapid contraction of which the animal is enabled to dart through the water. A deep, funnel-shaped hydrœcium is situated midway between the bell-cavity and the phyllocyst. The hydrosoma arises from the inner apex of this cavity. In both Huxley's and our specimens there were but two well developed polypites, but there were several other smaller ones, probably in course of development. The largest polypite is terminal and a cluster of small or undeveloped tentacles arises from the side of its proximal end. Among these tentacles there is one which is much longer than the rest, and this one terminates in a coiled, helical, nematocyst battery. The nematocyst batteries of the short tentacles, however, are straight and finger shaped. Close to the proximal end of the hydrosoma there is a cluster of small immature polypites and among them a single small, auxiliary swimming-bell. No large inferior swimming-bell existed either in Huxley's or in our specimens, and it is probable that it had been lost through accident. The phyllocyst is large and cucumber shaped, and is connected with the hydrosoma by means of a short, straight duct. It lies imbedded in the gelatinous substance, and extends downward parallel with the longitudinal axis of the animal. It is composed of large,

highly vacuolated, reticulated cells; and contains several small "oil globules." The gelatinous substance of the animal is of a translucent milky color, the entoderm of the polypites being somewhat more opaque. In one of our specimens the phyllocyst was milky, while in the other it was of a decided green color. This form is evidently quite closely related to Abyla carina (Haeckel 1888; Siphonophoræ, "Challenger" Report Zoöl., Vol. XXXVIII., Pl. 35) of the Tropical Atlantic.

S^d; Station 27; September 15, 1899; off Marchand Island, Marquesas.
S^d; " 32; " 20, " S. Lat. 13° 37′, W. Long. 145° 42′.

Abyla Huxleyi Haeckel.

Abyla pentagona Huxley, T. H., 1859; Oceanic Hydrozoa, p. 40, Pl. II., Figs. 2–2^e.
Calpe Huxleyi Haeckel, E., 1888; Siphonophoræ, "Challenger" Report, Zoöl., Vol. XXVIII., p. 164.

Plate 11, fig. 48.

A number of specimens of the tropical Pacific form of Abyla were found by us at various places during the cruise through the warm regions of the ocean. The Pacific species is certainly very close to, if not identical with, the Atlantic form (see Calpe Gegenbauri, Haeckel, 1888; p. 164, Pls. XXXIX., XL.). The remarkable range of individual variability in different specimens, and the great difference which arises with successive stages of growth, renders it extremely difficult to decide whether the Atlantic and Pacific forms be identical or not. The only difference which seems to be fairly constant is that in the Pacific form the entoderm of the feeding polypites is usually milky in color, whereas in the Atlantic form it is generally of a more or less decided green. The Pacific species attains a length of about 25 mm. We give a figure drawn from an individual obtained near Rongelab Atoll, Marshall Islands. Other specimens were obtained in the Marquesas, Paumotus, Society, and Ellice Islands.

S^d; —— September 15, 1899; Tai-o-hae, Marquesas Islands.
(300 f — S)^d; Station 32; " 20, " S. Lat. 13° 37′, W. Long. 145° 42′.
S^n; —— November 17, " off Bora Bora Island, Society Islands.
S^n; —— December 24, " Lagoon of Funafuti, Ellice Islands.
(150 f — S)^d; —— January 17, " off Rongelab Atoll, Marshall Islands.

Anthemodes Moseri,[1] sp. nov.

Plate 12, figs. 49–57.

The entire animal varies in length from about 100 mm. to 450 mm., according to its state of contraction. All of the units arise from one and the same side of the stem, although the twisting of the animal often gives one the impression that this is not the case.

The pneumatophore is small and pyriform and is situated at the anterior extremity of the nectosome. Its opening is small and circular, and is situated at the pointed anterior end of the organ. Gas may be extruded through this opening, thus enabling the animal to alter its specific gravity, become less buoyant, and sink.

The nectosome is a straight, rigid tube, which comprises about one-fifth of the entire length of the animal. It is provided with from twenty to thirty diametrically opposed, dove-tailed swimming-bells, the sudden and simultaneous contraction of which enables the animal to dart through the water with remarkable rapidity. The gelatinous substance of these swimming-bells is tough and rigid, and their cavities are capacious. Each bell (Fig. 51) is provided with four radial canals, a circular vessel, and a well developed velum.

The siphosome is highly flexible and contractile and is covered throughout its length with numerous tough, gelatinous, spear-head shaped bracts (Figs. 55–57). The various groups of units upon the siphosome are separated by free internodes.

There are about two dozen (only six are shown in Fig. 49) feeding-polypites (Fig. 53). These are separated from one another by long intervals. Each polypite is attached to the stem by means of a short, cylindrical pedicle. The body of the polypite is long, slender, and flexible, and the mouth is capable of being expanded into a trumpet shape. Several small rudimentary, or immature, and a single long, functional tentacle arise from the side of the polypite near the distal end of the pedicle. The tentacles

[1] Named after Commander Jefferson F. Moser, U. S. N., in command of the U. S. F. C. S. "Albatross."

give rise to several side branches, and each of these, as well as the distal end of the tentacle itself, terminates in a coiled nematocyst battery, protected by a gelatinous funnel-shaped hood, and ending in a simple terminal filament (Fig. 54).

The gonostyles (Fig. 52) are much more numerous than the feeding polypites. They are spindle shaped and are attached to the siphosome by means of a short, cylindrical pedicle. It is probable that there is an opening at the distal extremity of each of these organs, and that they are, therefore, equivalent to the Cystons of Haeckel. A single long, slender, unbranched tentacle arises from the upper side of each gonostyle near the distal end of the pedicle. Clustered near the base of this tentacle there are three or four male and from six to ten female gonads. The male gonads are long and finger shaped and contain each a single unbranched axial canal. The female gonads are small and spherical and each one contains a single ovum, which is surrounded by a winding system of slender canals.

The entoderm of the siphosome and feeding polypites is slightly milky in color, while the gelatinous substance of the swimming-bells and bracts is of a glassy transparency. The pore of the float is surrounded by port-wine-colored polygonal cells, and the invaginated portion of the float is of a delicate amber hue. The entoderm of the nectosome and siphosome is marked with small, scattered port-wine-colored blotches. There are two port-wine-colored spots at the distal ends of each of the two lateral radial canals in every swimming-bell; and the entoderm of the gonostyles and feeding polypites is marked with the same color. The nematocyst cells in the batteries of the lateral tentacles are of a deep port-wine color, as are also parts of the entoderm of the male gonophores.

Large numbers of this beautiful siphonophore were found swimming during the morning hours, upon the surface, in the lagoon of Funafuti Atoll, Ellice Islands, on December 24–26, 1899.

This Pacific species differs in many respects from the Atlantic form of the genus described by Haeckel, 1888; "Challenger" Report, Zoöl., Vol. 28, p. 229, Pls. XIV., XV.

Nectophysa Wyvillei? Haeckel.

Nectophysa Wyvillei Haeckel, 1888; "Challenger" Report, Zoöl., Vol. XXVIII., p. 327, Plate 23.

Plate 8, fig. 36.

A single specimen of a Siphonophore that we are unable to distinguish from N. Wyvillei was found by us on August 28. The specimen came up attached to the end of a wire rope, which had been lowered to a depth of 500 fathoms. Haeckel's specimens were found at Lanzerote, Canary Islands. The pneumatophore of our specimen is egg-shaped and the pore is situated at its upper apex. The invaginated air-sac hangs free in the general cavity of the pneumatophore, and gives rise at its lower end to a number of finger-shaped villi, which branch sparsely and irregularly. The feeding polypites and tentacles all arise from one side of the stem. The polypites are elongate and flask-shaped and are capable of much contraction or expansion. The mouth is often seen expanded outwards in a trumpet shape. A single tentacle arises from the upper side of each feeding polypite. Simple unbranched tentillä arise at regular intervals from the side of each tentacle. The body of the pneumatophore is clear amber-yellow color, and an iris-like ring, composed of radiating lines of deep brown pigment, surrounds the pore of the air-sac. The entoderm of the air-sac near the region of the pore is pink in color. The stem and feeding polypites are pink. The main shafts of the tentacles are transparent and the side branches are of a fleshy-pink color. The animal was about 300 mm. in length when expanded, and the pneumatophore was 6 mm. long and 4 mm. in diameter. No gonads were observed.

Station 3; August 28, 1899; N. Lat. 26° 18′, W. Long. 128° 54′.

Physalia utriculus Eschscholtz.

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

Plate 10, figs. 43, 44.

A large number of specimens of this Siphonophore were found by us throughout the Tropical regions of the Pacific. The adult has been well figured by Lesson (1830; Voy. de la "Coquille," Zoophytes, Pl. V., Fig. 1).[1]

[1] See also Huxley, T. H., 1859; Oceanic Hydrozoa, p. 101, Pl. X., Figs. 1–15[e], Pl. XII., Fig. 12.

A number of young individuals between 2 mm. and 4 mm. in length were found by the "Albatross" among the Paumotus and Society Islands. Those 2 mm. in length (Fig. 43) possess but one primary axial polypite, from the side of which there arises a single tentacle. This tentacle bears a number of wart-like nematocyst-bearing swellings upon one side. The float at this stage is simple and terminal, and the air-sac is oval and communicates with the outer world by means of an apically situated pore. The gastric portion of the axial polypite contains a number of disk-shaped hepatic villi. Two very small evaginated protuberances are seen projecting outward from the ventral floor of the float. These are the beginnings of the secondary polypites and tentacles, which in the adult are much larger and more numerous than the primary. In specimens about 4 mm. in length (Fig. 44) the secondary tentacle has become larger than the primary, and there are several feeding polypites of the secondary set budding outward around its conical base.

Unlike the adult, these young individuals possess the ability to sink beneath the surface; a feat which they accomplish by extruding a bubble of gas through the pore of the float. In a few minutes the gas regenerates, and then the animals rise to the surface. Figure 44 shows the creature in the act of forcing a gas bubble out of the pneumatophore, and it will be seen that the muscular inner wall of the air-sac exhibits an annular contraction.

S^{d}; Station 13; September 5, 1899; N. Lat. 9° 57′, W. Long. 137° 47′.
S^{d}; " 14; " 7, " " 6° 41′, " 137°.
S^{d}; " 16; " 9, " " 2° 38′, " 137° 22′
S^{d}; " 173; November 4, " S. Lat. 18° 55′, " 146° 32°.
S^{d}; —— January 22, 1900; Lagoon of Wotje, Marshall Islands.
S ; Fiji Islands; 1897–98.

CTENOPHORÆ.

Pleurobrachia ochracea, sp. nov.

Plate 13, fig. 58.

The animal is egg-shaped and about 12 mm. in length. The body is somewhat compressed in the diameter perpendicular to the tentacular axis. The aboral pole is quite blunt. The outer surface is smooth and there are no papillæ. The apical sense organ is quite large and contains a mass of spherical otoliths. There are eight meridional canals which extend

from the region of the apical sense organ to about two-thirds the distance down the sides of the animal, and end blindly. Eight rows of ciliated plates follow the courses of the eight meridional canals and extend about two-thirds of their length. Each of these rows contains about fifteen combs of cilia. The lateral tentacles arise from the bottom of two deep, narrow clefts, one in each side in the plane of the wide lateral diameter of the animal. These clefts open quite high up on the sides not far from the aboral pole, but their deep-lying portions extend downward to about one-third of the distance from the mouth to the apex. The two lateral tentacles are simple and quite thick, and no lateral tentacula were observed, although a large number of specimens were examined. In this respect this species differs from all other Pleurobrachiæ. The mouth is a narrow slit. The funnel canal and the radiating canals to the meridional vessels are straight and slender. The entoderm of the stomach is of a decided yellow color and the tentacles are slightly milky, all other parts of the animal being of a glassy transparency.

This Ctenophore was first obtained in N. lat. 31° 10′, W. long. 125°. It became rarer as we went southward, and disappeared before we reached the Tropics.

S^{d}; Station 1; August 26, 1899; N. Lat. 31° 10′, W. Long. 125°.
S^{d}; " 6; " 31, " " 20° 26′, " 133° 28′.

Lampetia fusiformis, sp. nov.

Plate 13, figs. 59, 60.

The animal is narrow and pear-shaped, and about 40 mm. in length. The oral pole is long and narrow, and the aboral quite blunt. The body is compressed laterally, the tentacular diameter being the longer. The apical sense organ is half egg-shaped and contains a large mass of otoliths. It is surrounded by raised ridges. The eight meridional canals arise from the vicinity of the apical sense organs and extend about two-thirds the distance down the sides of the body, where they end blindly. Each canal is covered throughout its length with numerous (about forty) combs of ciliated plates. The lateral tentacles arise from the bottom of long, narrow, tortuous clefts, which open upon the sides of the body about one-

third of the distance down from the apical sense organ. These clefts extend downward along the sides of the stomach for about three-quarters of the distance between the apex and the mouth. The tentacles are capable of considerable expansion and contraction, and are furnished with simple lateral branches. The mouth is a narrow slit at the bottom of a shallow trough in the oral pole of the animal. The stomach is flat and narrow and gives rise to two blindly ending lateral canals in the tentacular diameter. These canals extend downward along the sides of the stomach to points very near the region of the mouth. The funnel canal and the radiating canals, which connect the middle points of the meridional vessels with the stomach, are quite broad and straight. The tentacles are milky in color, and the entoderm of the stomach is of a faint steely blue. All other parts of the animal are of a glassy transparency.

This Ctenophore was first obtained in N. lat. 28° 11′, W. long. 111° 16′. It became more and more abundant as we approached the Tropics, and we met with swarms of them among the Paumotus Islands.

S^d;	Station	2;	August	27,	1899;	N. Lat.	28° 23′,	W. Long.	126° 57′.	
S^n;	"	7;	September	1,	"	"	18° 19′,	"	131° 57′.	
S^d;	"	14;	"	7,	"	"	6° 41′,	"	137°.	
S^n;	"	14;	"	7,	"	"	5° 40′,	"	136° 47′.	
S^n;	"	15;	"	8,	"	"	4° 35′,	"	136° 54′.	
S^n;	"	16;	"	9,	"	"	2° 38′,	"	137° 22′.	
S^n;	——		"	21,	"	Lagoon of Rangiroa Island, Paumotus Islands.				
S^d;	——		"	23,	"	"	"	"	"	"
S^n;	——		"	24,	"	off south shore of Rangiroa Island.				

Cestus sp.

Several fragments of a Cestus, the largest being about 100 mm. in length and 23 mm. in width, were found by the "Albatross."

S^n;	Station	14;	September	7,	1899;	N. Lat.	6° 41′,	W. Long.	137°.
S^d;	"	15;	"	8,	"	"	4° 35′,	"	136° 54′.

Beroë australis Agassiz and Mayer.

Beroë australis Agassiz and Mayer, 1899; Bull. Mus. Comp. Zoöl., Vol. XXXII., p. 177, Pl. 16, Figs. 49, 50.

A single specimen of this Ctenophore was captured by the "Albatross."

S^d; December 23, 1899; off Funafuti, Ellice Islands.

EXPLANATION OF THE PLATES.

PLATE 1.

Fig. 1. *Tiara oceanica*, sp. nov.
" 2. *Turris pelagica*, sp. nov.
" 3. *Psythia prolifera*, gen. et sp. nov.
" 4. *Epenthesis rangiroæ*, sp. nov.

PLATE 2.

Fig. 5.	*Phortis elliceana*, sp. nov.	
" 6.	" "	Gastric portion of the proboscis.
" 7.	" "	Portion of the bell-margin.
" 8.	*Bougainvillia fulva* Agassiz and Mayer.	Mature medusa.
" 9.	*Lymnorea ocellata*, sp. nov.	Side view of mature medusa.
" 10.	" "	Side view of a tentacle-bulb, showing the ectodermal ocellus.
" 11.	" "	Terminal portion of one of the oral tentacles.
" 12.	" "	Nematocyst capsules on the terminal portion of one of the oral tentacles.

PLATE 3.

Fig. 13.	*Dipleurosoma pacifica*, sp. nov.	Oral view of mature medusa.
" 14.	" "	Portion of the bell-margin.
" 15.	*Rhegmatodes lacteus*, sp. nov.	
" 16.	" "	Portion of the bell-margin.

PLATE 4.

Fig. 17.	*Geryones mexicana*, sp. nov.	Immature medusa.
" 18.	*Carmaris rosea*, sp. nov.	
" 19.	*Zonephyra corona*, sp. nov.	Side view of mature medusa.
" 20.	" "	Oral view of one of the marginal sense organs.

PLATE 5.

Fig. 21.	*Rhopalonema typicum* = *Homœonema typicum* Maas.	
" 22.	*Rhopalonema typicum.*	Portion of bell-margin showing the very minute otocysts.
" 23.	*Solmissus marshalli,* sp. nov.	Side view, natural size.
" 24.	" "	Oral view of medusa, natural size.
" 25.	" "	View of marginal sense organ.

PLATE 6.

Fig. 26.	*Charybdea grandis*, sp. nov.	Side view of a young medusa.
" 27.	" "	Side view of a tentacle from a mature medusa, natural size.
" 28.	" "	Enlarged view of a portion of the flexible part of the tentacle, showing the linear arrangement of the nematocysts.
" 29.	" "	Enlarged side view of a sense organ of a mature medusa.
" 30.	" "	Surface view of a sense organ of a young medusa.
" 31.	" "	Enlarged view of one of the velar canals.

PLATE 7.

Fig. 32.	*Nausithoë punctata* var. *pacifica* Agassiz and Mayer.	
" 33.	*Nausithoë picta,* sp. nov.	Oral view of ♀ medusa.

PLATE 8.

Fig. 34.	*Pelagia tahitiana*, sp. nov.	
" 35.	" "	Oral view of a portion of the disk.
" 36.	*Nectophysa Wyvillei?* Haeckel.	
" 37.	*Diphyopsis angustata* Haeckel.	Terminal nematocyst-battery of a tentacle.

PLATE 9.

Fig. 38.	*Diphyopsis appendiculata.*	Side view of the polygastric generation.
" 39.	" "	Side view of the siphosome, showing the order of development of the the polypites, tentacles, and bracts. (*ps*) Inferior swimming-bell; (*as*) auxiliary swimming-bell.
" 40.	*Ersæa appendiculata.*	The monogastric, sexual generation of Diphyes appendiculata.

PLATE 10.

Fig. 41.	*Ersœa angustata*, sp. nov.	The monogastric sexual generation of Diphyopsis angustata.
" 42.	*Diphyopsis angustata* Haeckel.	Enlarged view of one of the units upon the siphosome. (*b*) Immature swimming-bell; (*c*) covering-scale; (*p*) polypite; (*ss*) siphosome; (*t*) tentacle.
" 43.	*Physalia utriculus* Eschscholtz.	Young individual 2 mm. in length; with primary polypite and tentacle.
" 44.	" " "	Young individual 4 mm. in length; with secondary tentacle and polypite.
" 45.	*Aglaisma quincunx* Mayer.	The monogastric sexual generation of Abyla quincunx.

PLATE 11.

Fig. 46.	*Abyla quincunx* Chun.	Specimen obtained at Suva, Fiji.
" 47.	" " "	Terminal nematocyst-battery of a tentacle.
" 48.	*Abyla Huxleyi* = *Calpe Huxleyi* Haeckel.	

PLATE 12.

Fig. 49.	*Anthemodes Moseri*, sp. nov.	The entire animal.
" 50.	" "	Side view of the float.
" 51.	" "	Side view of a swimming-bell.
" 52.	" "	A gonostyle. ♂ male, ♀ female gonophores.
" 53.	" "	A feeding polypite.
" 54.	" "	Side view of one of the terminal nematocyst-batteries of the tentacles.
" 55.	" "	Side view of an immature bract.
" 56.	" "	View looking down on a mature bract, showing the upper surface.
" 57.	" "	Lower surface of a mature bract.

PLATE 13.

Fig. 58.	*Pleurobrachia ochracea*, sp. nov.	
" 59.	*Lampetia fusiformis*, sp. nov.	
" 60.	" "	Side view of apical sense organ.

PLATE 14.

Track of the "Albatross."

ALPHABETICAL LIST OF SPECIES.

HYDROMEDUSÆ.

SCYPHOMEDUSÆ.

SIPHONOPHORÆ.

CTENOPHORÆ.

1

2

3

4

A.G.M del

B Mercel lith

A.G.M. del.

B. Meisenbach & Co. Berlin

13

14

16

15

17

18

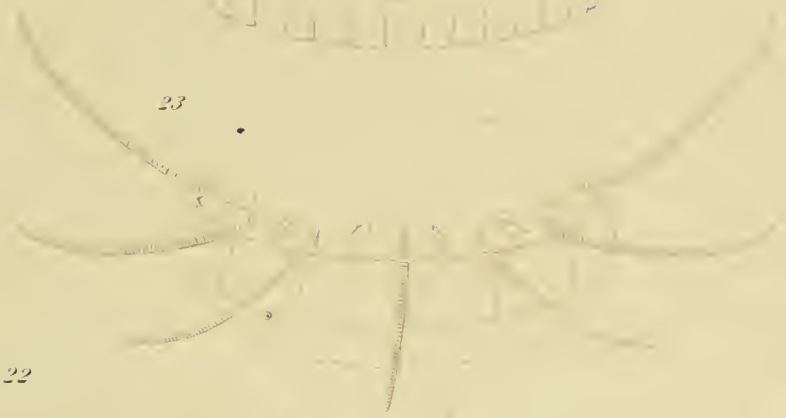
20

19

A.G.M. del B. Mc[illegible] lith. Boston

21

23



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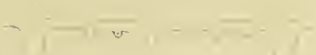

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A.G.M. del

B Mersel lith Boston

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A.G.M del.

B. Metsel lith. Boston

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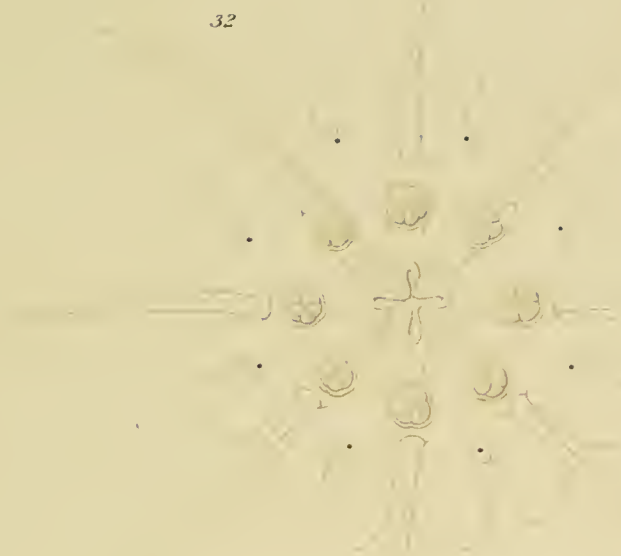

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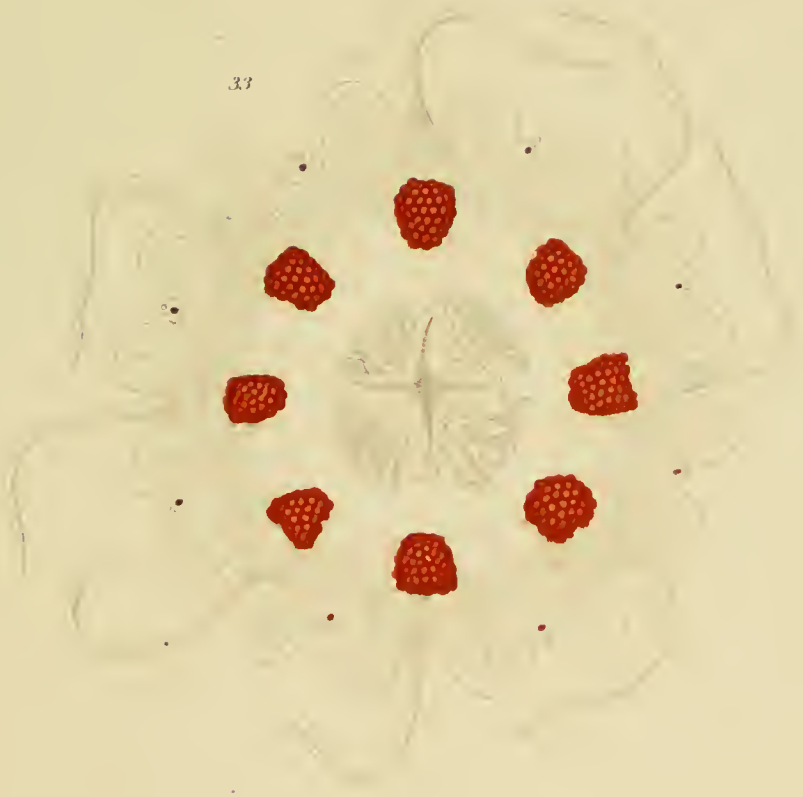

A.G.M. del

B. Mensel lith. Boston

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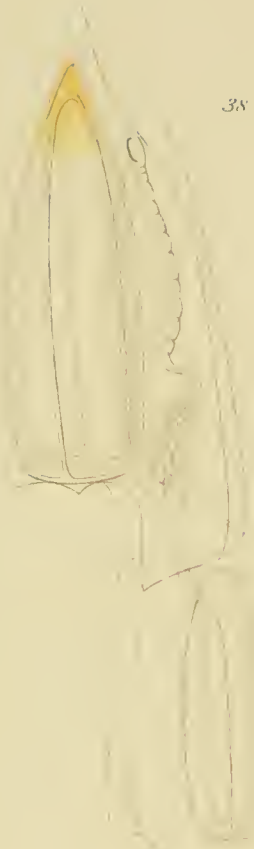

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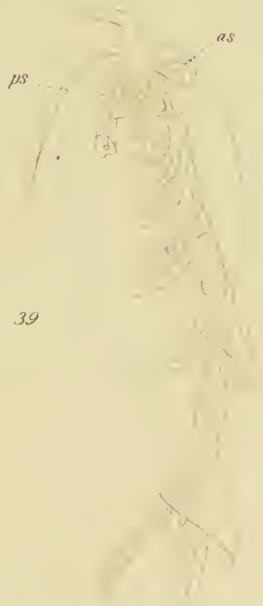


39

= tuberculata

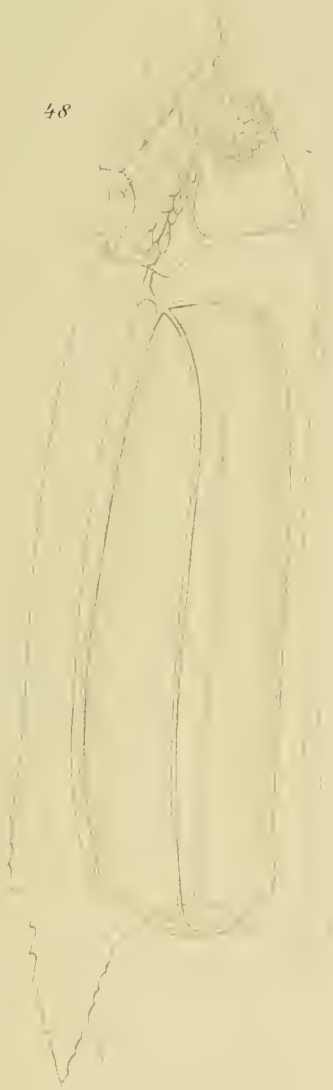
A.G.M del

B Mey... lith ...nn


45
42
43
44
41

= a. pentagona, Haeckel ?

48



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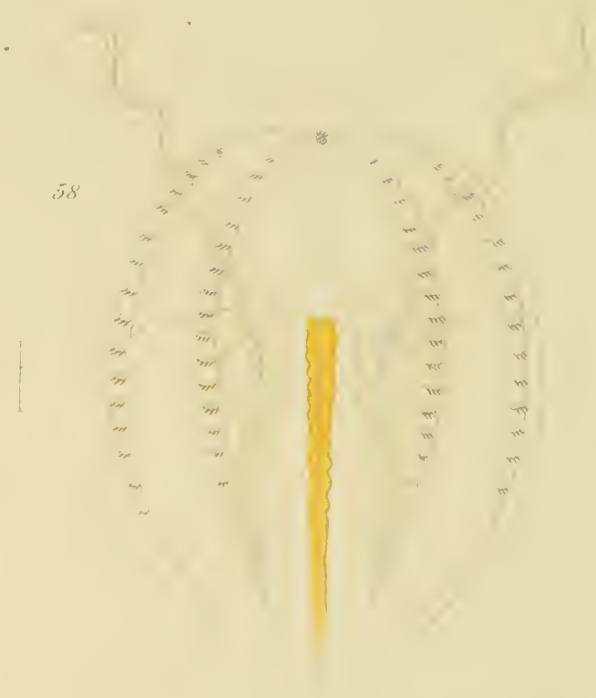
A.G.M. del. B. Meisel lith. Boston



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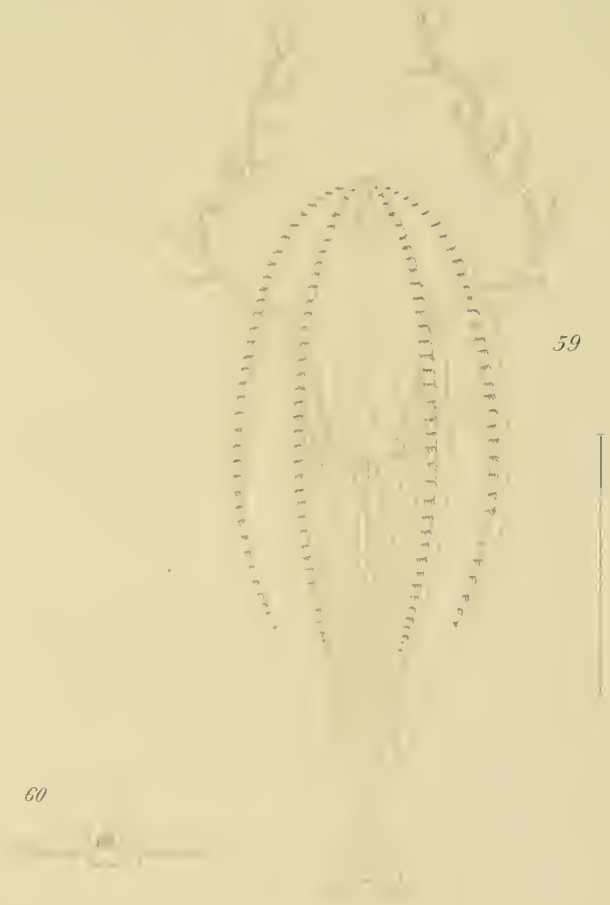

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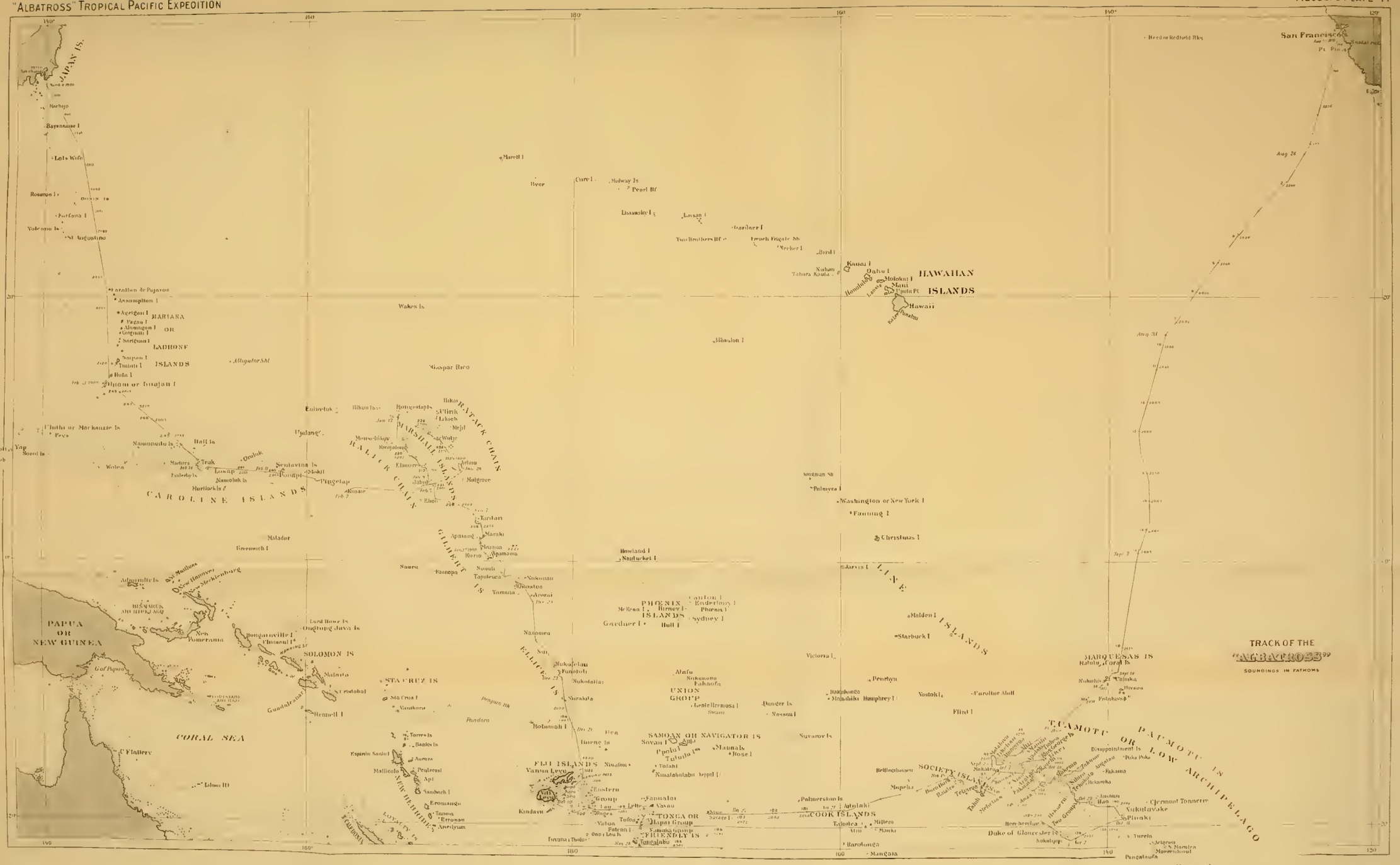
A. G. M. del

B. Mensel lith. Boston


SAIPAN IS.
Rachajo
Bayonnaise I
Lot's Wife
Rosario I.
Portana I
Volcano Is
St Augustino
Agrihan or Pagaros
Assumption I
Agrigan I
Pagan I
Almagan I
Guguan I
Sarigan I
MARIANA OR LADRONE ISLANDS
Saipan I
Tinian I
Rota I
Aguiguan or Guajan I
Alligator Sht
Gaspar Rico
Wakes Is
Marcus I
Byer
Curie I
Midway Is
Pearl Bk
Lisianski I
Lasan I
Gardner I
Two Brothers Rks
French Frigate Sh
Necker I
Bird I
Nihau
Tahura Kauia
Kauai I
Oahu I
Molokai I
Maui
Hawaii
HAWAIIAN ISLANDS
Honolulu
Lahaina
Hilo Pt
Kealakekua
Monson I
Reed or Redfield Rks
San Francisco
Pt Pinos
Santa Cruz
Aug 24
Aug 31
Sept 7
Stegman Sh
Palmyra I
Washington or New York I
Fanning I
Christmas I
Jarvis I
LINE ISLANDS
Malden I
Starbuck I
Victoria I
Penrhyn
Vostok I
Caroline Atoll
Flint I
Hakahonga
Majahiki Humphrey I
Danger Is
Nassau I
Suvarov Is
Bellingshausen
Mopelia
SOCIETY ISLANDS
Tahiti
Eimeo
Teturoa
Tubuai
Rimatara
Rurutu
Oheteroa
Meheetia
Maitea
Nukuhiva
Hivaoa
Fatuhiva
MARQUESAS IS
Hahutu
Coral Is
Nukahiva
Uapoa
Ohiwaoa
Fatuhiva
TUAMOTU OR LOW ARCHIPELAGO
Disappointment Is
Roka Poke
Pakaina
Nukuroa
Aratika
Takume
Rekareka
Anaaun
Hao
Clermont Tonnerre
Vahitahi
Pinaki
Reao
Bow Group
Duke of Gloucester Is
Nukutipipi
Tureia
Aclarom
Nortuka
Marokau
Pangatauta
Morane
Mangareva Is
Timoe
Oeno
Henderson
Ducie
Pitcairn
Carolines
Ngatik
Kayangle
Ruckallaoob
Korroro
Pilelo
Yap
Sorol Is
Pelew or Palaos Is
Augaur
Caroline Atoll
Ulithi or Mackenzie Is
Peys
Halli Is
Namonuito Is
Weiwa
Truk
Lamap
Mortlock Is
Namoluk Is
Ponape
Ascension
Ruk
Oolnik
Mariners Bk
Fanbeely Is
Senyavina Is
Mokil
Pingelap
Kusaie
CAROLINE ISLANDS
Enibretok
Bikon Isss
Rongerik Is
Bikar
Rarack Chain
Ujelang
Ujae
Mejit
Wotje
Kwajalein
Ebon
Jaluit
Maloelap
Rhoi
MARSHALL ISLANDS
RALICK CHAIN
Tarawa
Apaiang
Maraki
Mariana
Butaritari
Makin
Apamama
GILBERT IS
Nauru
Pleasant I
Ocean I
Malador
Greenwich I
Howland I
Nuttucket I
Nonouti
Taputeuea
Nikunau
Onoatoa
Arorai
Tamana
Nanomea
Nui
Nukufetau
Funafuti
Nukulailai
Nurakita
ELLICE IS
PHOENIX ISLANDS
McKean I
Birney I
Gardner I
Hull I
Sydney I
Canton I
Enderbury I
Phoenix I
UNION GROUP
Nukunono
Fakaofu
Gentlemen's I
Swains
Alafu
Tafahi
Niuatobutabu
Keppel I
SAMOAN OR NAVIGATOR IS
Savaii
Upolu
Tutuila
Manua Is
Rose I
Bunner Is
Rotumah I
Rotuma
Fiji
Dec 21
Dec 28
Jan 4
Jan 11
Jan 18
Jan 25
Feb 1
Feb 7
Feb 14
Feb 21
Feb 28
Mar 7
Mar 14
Mar 21
Mar 28
Apr 4
Apr 11
Apr 18
Apr 25
May 2
May 9
May 16
May 23
May 30
June 6
June 13
June 20
June 27
July 4
July 11
July 18
July 25
Aug 1
Aug 8
Aug 15
Aug 22
Aug 29
Sept 5
Sept 12
Sept 19
Sept 26
Oct 3
Oct 10
Oct 17
Oct 24
Oct 31
Nov 7
Nov 14
Nov 21
Nov 28
Dec 5
Dec 12
Dec 19
Dec 26
Admiralties
St Matthias
New Hanover
New Mecklenburg
BISMARCK ARCHIPELAGO
PAPUA OR NEW GUINEA
Gulf Papuan
New Pomerania
Bougainville I
Choiseul I
Lord Howe Is
Ongtong Java Is
SOLOMON IS
Malaita
St Isabel
Guadalcanal
Rennell I
STA CRUZ IS
Ste Cruz I
Vanikoro
Torres Is
Banks Is
Aurora
Pentecost
Api
Sandwich I
Eromanga
Tanna
Aneityum
Espiritu Santo
Malicolo
New Hebrides
Loyalty Is
Lifu
Uea
Fotuna
Aniwa
CORAL SEA
Flattery
Lihou ID
Penrhyn Ik
Pandora
Torres Str
Fiji Islands
Vanua Levu
Viti Levu
Kandavu
Eastern Group
Lau
Lakemba
Fulanga
Ono
Vavau
Tofua
Tongatabu
Nomuka Group
Haapai Group
TONGA OR FRIENDLY IS
Niuafoo
Futuna
Alofi
Tafahi
Niuatobutabu
Keppel I
Palmerston Is
Manuae
Mitiaro
Atiu
Mauke
Rarotonga
Mangaia
Aitutaki
Manuai
COOK ISLANDS
Tubuai
Rimatara
Rurutu
Oheteroa
Meheetia
Maitea
Nukuhiva
Hivaoa
Fatuhiva
TRACK OF THE "ALBATROSS"
SOUNDINGS IN FATHOMS

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