ON BRAZILIAN HYDROMEDUSAE AND THEIR DISTRIBUTION IN RELATION TO DIFFERENT WATER MASSES

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1 — INTRODUCTION

The purpose of this paper is to record the species taken in hauls made from January 1954, to December 1956 at different points of the Brazilian coast. Not much is known of the hydromedusae from the western south Atlantic in general and Brazilian region specially. Almost all the papers on this subject refer to collections made during the great oceanographic expeditions, such as the "Plankton", "Valdivia", "Meteor", "Discovery" and others. A few occasional catches were made along the coast and some species were reared from their hydroids (Vannucci 1948, 1949, 1951, 1955, 1956; Vannucci & Ribeiro 1955). Vannucci (1951b) listed all the species of Hydrozoa recorded from or off the Brazilian coast to that date. Kramp (1957, tables 2-3) later extended this list.

It is to be hoped that the publication of the description of hydromedusae that may be found in plankton nettings off this coast will facilitate the investigations of other workers. The original idea had been to haul closing plankton nets at different depths and coordinate the distribution of the species with the different water masses, using the hydrographic data.

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We have encountered many difficulties in the execution of this work and it has been impossible to take hauls at regular intervals or at fixed stations. The data being incomplete, the catches are not comparable and it is not possible to make much more than an attempt to a rough correlation between the hydrographic data and the distribution of the different species.

Some doubtful specimens and some doubtful hauls were dropped and are not considered, we hope for better material.

Acknowledgements — I wish to express my sincere thanks to Prof. P. L. Kramp who sent me many determined specimens collected by different Danish Oceanographic Expeditions and Mr. K. W. Petersen also from the Zoological Museum, Kopenhagen, who gave me some determined specimens for comparative purposes. To the Rockefeller Foundation we are greatly indebted for granting us a large part of the equipment used at sea and part of that of the laboratory at home. Three of the cruises were carried out on board ships of the Brazilian Navy, to which we are also very grateful. Finally, Mrs. G. S. Casari and Mr. J. Lupi helped me to pick out the specimens, prepare the slides and files. I specially wish to thank the colleagues from the Physics Branch who made most of the hauls, many of them in particularly difficult conditions and frequently tightly pressed by time. I thank Mr. I. Marcondes for the drawings of the graphs and sections.

To Dr. I. Emílsson I am specially grateful for all the hydrographic data, graphs of the sections, the horizontal maps of salinity and temperature distributions as well as for reading the typescript critically.

2 — METHODS AND MATERIAL

The available data are insufficient to allow for a detailed study of distribution but the number of catches is such as to enable us to make an overall survey of the general picture of distribution of these species in the upper layer.

Collecting methods varied in the different collecting trips. In the Fernando de Noronha region only plankton nets hauled by hand with hemp rope could be used; one of them was a square mouthed 1 m side pelagic net and two were small 25 cm diameter nets. By attaching heavy lead weights at some distance from the net's mouth and reducing the speed of the launch it was possible to lower the small nets to an estimated 50 m depth. The Fernando de Noronha region was visited only once.

Most of the samples from more southern waters were taken from larger ships and with the Standard closing Zooplankton net. Due to scarcity of time, however, only during one of the cruises it was possible to use it as it should and close it at the required depth. At most of the other stations it was simply used as an open net in surface layers. During one of the trips a Clarke-Bumpus net was used. Details concerning

the catches are given in the tables below. Stations not listed, contained no medusae. Further details may be found in the Station list of three of these trips (Emílsson 1956).

All the samples studied come from series M of our collections and are numbered in succession. The author went personally through all the samples up to number M_{185} and all the medusae present were either picked out or just counted and left in the sample. The percentage of undeterminable medusae is very low.

Unfortunately due to the different sampling methods no quantitative studies are possible. For the same reason all conclusions must be regarded as provisory since the indicator value of the species of the present collection must still be considered rather insufficiently known.

In general only surface layers were sampled and no methodical study is possible concerning vertical migration, but an attempt is made to plot the horizontal distribution of the species and to correlate this with the horizontal distribution of the water masses as studied by I. Emílsson.

Seasonal abundance cannot be studied because most stations here reported were not visited more than once or twice, no hauls were made in April, May, August and December; most of the hauls were made in June and November, the amount of plankton collected varied, and finally, the area covered is too extensive. Apparently, however, it may be said that the commonest species occur the year round.

Special attention is payed to the association of the species at any station, since it is believed that this may give a better picture of the conditions than the presence or absence of certain species, principally in view of the fact that at any given point off-shore in the southern Brazilian region, local conditions vary in quick succession.

As stated above, the medusae from all samples were totally counted since they are too scarce to render any sub-sampling method reliable. Most specimens were simply counted, and when necessary to determine the species, whole mounts coloured with carmin and mounted in Canada balsan were prepared. Interesting details such as food and foes, size at sexual maturity, details on growth and parasites were noted whenever possible. There are two features in common to all species: very small size and small percentage of sexually mature specimens. The causes of the small size may be either high temperature or scarcity of food, or both. The small number of sexually mature specimens may be due to their sinking to greater depths.

The temperature and salinity limits given for each species are those between which the species was found to occur with certainty. Higher or lower data found in the water columm sampled are disregarded whenever for any reason it is not known with certainty if the captured specimens were taken in that particular level. It therefore ensues that the actual endurance range of the species may be wider than here assumed.

3 — LIST OF STATIONS

The samples taken with a Clarke-Bumpus net are marked CB on the tables and the amount of water filtered is recorded on the column "duration of haul".

In the Fernando de Noronha region, the temperature and salinity were measured only at the surface. The letters *V* and *H* in the column marked "depth of haul" in the table, indicate respectively Vertical and Horizontal haul. Where two numbers are given in succession, this means that it was a vertical haul with the standard 50 cm opening (Nansen type) closing net (silk n.º 3), which fished between the levels shown by the numbers; in every instance, the temperature and salinity given refer to the levels at which the net fished. The indication m. w. means "meters wire out".

The temperature is always given in centigrades and the salinity in per mille; depth of haul and local depth are given in meters.

TABLE 1 — LIST OF STATIONS

Sample Nº	*Date*	*Position (*)*	*Time*	*Depth of Haul in m*	*Local Depth in m*	*Temp. °C*	*Salinity ‰*	*Region or Vessel*	*Type of Net Duration of Haul*
M 1	20/ 1/54	3°54′00″S 32°24′00″W	0930	surface	100	27.00	36.07	Fernando de Noronha	25 cm 15m
M 2	20/ 1/54	3°54′00″S 32°24′00″W	1000	8 H	100	27.00	—	Fernando de Noronha	25 cm 20m
M 3	20/ 1/54	3°54′00″S 32°24′00″W	1000	surface	100	27.00	36.07	Fernando de Noronha	25 cm 15m
M 4	21/ 1/54	3°52′00″S 32°28′00″W	0930	10-12 H	60	27.10	—	Fernando de Noronha	25 cm 20m
M 5	21/ 1/54	3°52′00″S 32°28′00″W	0930	2 H	60	27.10	36.08	Fernando de Noronha	1m 20m
M 6	21/ 1/54	3°50′00″S 32°27′00″W	1130	10-12 H	130	28.00	—	Fernando de Noronha	25 cm 15m
M 7	21/ 1/54	3°50′00″S 32°27′00″W	1130	surface	130 (+)	28.00	36.08	Fernando de Noronha	1m 15m
M 8	21/ 1/54	3°49′00″S 32°27′00″W	1200	30 H	—	—	—	Fernando de Noronha	25 cm 20m
M 9	21/ 1/54	3°48′00″S 32°28′00″W	1315	30 H	280 (+)	28.00	—	Fernando de Noronha	25 cm 22m
M 10	21/ 1/54	3°48′00″S 32°25′00″W	1430	40 H	100 (±)	—	—	Fernando de Noronha	25 cm 20m
M 11	21/ 1/54	3°48′00″S 32°25′00″W	1430	surface	100 (±)	27.50	36.14	Fernando de Noronha	25 cm 20m
M 12	21/ 1/54	3°52′00″S 32°23′00″W	1600	surface	80 (±)	28.00	36.09	Fernando de Noronha	— 20m
M 13	21/ 1/54	3°52′00″S 32°23′00″W	1600	10 H	—	28.00	—	Fernando de Noronha	25 cm 20m
M 14	27/ 1/54	3°54′00″S 32°25′00″W	1000	surface	300	29.00	—	Fernando de Noronha	25 cm —

(*) Errata: The seconds should be read as tenth of minutes.

Sample Nº	*Date*	*Position (*)*	*Time*	*Depth of Haul in m*	*Local Depth in m*	*Temp. °C*	*Salinity ‰*	*Region or Vessel*	*Type of Net Duration of Haul*
M 15	27/ 1/54	3°54′00″S 32°25′00″W	1000	50 H	300	—	—	Fernando de Noronha	25 cm 20m
M 16	27/ 1/54	3°54′00″S 32°23′00″W	1200	surface	—	29.00	—	Fernando de Noronha	25 cm 15m
M 19	27/ 1/54	3°54′00″S 32°23′00″W	1200	50 H	300	—	—	Fernando de Noronha	25 cm 15m
M 21-23	12/ 6/50	20°31′00″S 35°52′00″W	—	—	—	—	—	Jaseur Bank	— —
M 24-26	18/ 6/50	20°30′00″S 29°22′00″W	—	—	—	—	—	Trindade Isle	— —
M 30 St. 1	26/ 6/54	24°06′00″S 46°14′00″W	2300	12-0 V	14	21.70 21.40	33.48 33.77	"Igaraty"	"Standard" —
M 32 St. 3	27/ 6/54	24°33′00″S 45°57′00″W	0400	12-0 V	56	21.60 21.40	35.58 35.61	"Igaraty"	"Standard" —
M 33 St. 4	27/ 6/54	24°57′00″S 45°42′00″W	0815	12-0 V	73	21.60 21.60	35.81 35.92	"Igaraty"	"Standard" —
M 35 St. 5	27/ 6/54	25°26′00″S 45°25′00″W	1452	48-0 V	106	21.90 16.90	35.09 35.54	"Igaraty"	"Standard" —
M 36 St. 6	27/ 6/54	25°09′00″S 44°55′00″W	2035	30-0 V	121	22.97 22.90	35.93 36.40	"Igaraty"	"Standard" —
M 37 St. 7	27/ 6/54	25°02′00″S 44°42′00″W	2355	30-0 V	136	23.30 23.30	36.40 36.44	"Igaraty"	"Standard" —
M 38 St. 8	28/ 6/54	24°50′00″S 45°12′00″W	0455	30-0 V	82	21.80 21.20	34.99 35.40	"Igaraty"	"Standard" —
M 39 St. 9	28/ 6/54	24°33′00″S 45°27′00″W	0915	30-0 V	69	21.70 17.80	35.01 35.90	"Igaraty"	"Standard" —
M 40-51 St. 10	28/ 6/54	24°06′00″S 45°43′00″W	1330	surface H	—	about 21.70	about 35.00	"Igaraty"	"Standard" —

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Sample Nº	*Date*	*Position (*)*	*Time*	*Depth of Haul in m*	*Depth Local in m*	*Temp. °C*	*Salinity ‰*	*Region or Vessel*	*Type of Net Duration of Haul*
M 53-55 St. 10	28/ 6/54	24°06'00"S 45°43'00"W	1630	2 H	—	about 21.70	about 35.00	"Igaraty"	"Standard" —
M 56-64 St. 11	29/ 6/54	24°04'00"S 46°07'00"W	1415	2 H	—	21.98	33.63	"Igaraty"	"Standard" —
M 65	12/ 7/55	23°57'00"S 45°45'00"W	1000	5 H	18	—	—	"Ungava" — off Santos	50 cm 15m
M 66	13/ 7/55	23°15'00"S 44°30'00"W	0755	Bottom	36	—	—	"Ungava"	50 cm 15m
M 67	13/ 7/55	23°04'00"S 44°14'00"W	1030	40 V	52	—	—	"Ungava"	50 cm 5m
M 68	13/ 7/55	23°04'00"S 44°14'00"W	1100	40 H	52	—	—	"Ungava"	50 cm 15m
M 69	13/ 7/55	23°04'00"S 44°14'00"W	1100	2 surface	52	—	—	"Ungava"	50 cm 15m
M 70	27/10/55	—	1630	6 H	12	—	—	"Ungava" — Region of Cananéia	50 cm 5m
M 71	27/10/55	—	1645	6 H	—	—	—	"Ungava" — Region of Cananéia	50 cm 5m
M 72	27/10/55	—	1710	6 H	—	—	—	"Ungava" — Region of Cananéia	50 cm 5m
M 74 St. 2	25/ 9/55	24°44'08"S 45°59'00"W	1605	—	70	20.70	33.23	"Presidente Vargas"	"Standard" —
M 75 St. 3	26/ 9/55	25°15'00"S 46°18'00"W	2105	50-10 V	113	20.19 18.72	33.36 35.86	"Presidente Vargas"	"Standard" —
M 77 St. 4	26/ 9/55	25°45'05"S 46°36'09"W	0150	54-0 V	125	20.55 17.53	33.64 35.77	"Presidente Vargas"	"Standard" —
M 78 St. 4	26/ 9/55	25°45'05"S 46°36'09"W	0140	108-54	125	17.53 12.48	35.77 35.10	"Presidente Vargas"	"Standard" —

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Sample Nº	*Date*	*Position (*)*	*Time*	*Depth of Haul in m*	*Local Depth in m*	*Temp. °C*	*Salinity ‰*	*Region or Vessel*	*Type of Net Duration of Haul*
M 82	26/ 9/55	27°36′05″S	1700	92-46	—	20.36	36.06	"Presidente Vargas"	"Standard"
St. 7		47°56′00″W		V		19,64	34.70		—
M 83	27/ 9/55	28°07′05″S	2205	—	63	19.00	33.47	"Presidente Vargas"	"Standard"
St. 8		48°12′00″W				17.14	35.70		—
M 84	27/ 9/55	28°53′00″S	0425	—	61	19.10	33.86	"Presidente Vargas"	"Standard"
St. 9		48°45′00″W							—
M 85	28/ 9/55	30°17′09″S	1950	50-0	106	18.94	34.54	"Presidente Vargas"	"Standard"
St. 12		49°18′00″W		V		19.31	35.26		—
M 86	28/ 9/55	30°17′09″S	1945	100-50	—	19.31	35.26	"Presidente Vargas"	"Standard"
St. 12		49°18′00″W		V		16.50	35.71		—
M 90	7/10/55	31°15′02″S	1637	25-0	27	17.81	33.77	"Presidente Vargas"	"Standard"
St. 24		50°36′07″W		V		17.36	35.32		—
M 91	26/ 2/56	24°08′00″S	0840	10-0	28	27.07	33.35	"Solimões"	"Standard"
St. 1		46°11′05″W		H		26.95	34.97	(see map)	—
M 92	26/ 2/56	24°15′00″S	1035	10-0	44	26.93	35.15	"Solimões"	"Standard"
St. 2		46°03′08″W				26.24	35.15	(see map)	—
M 94	26/ 2/56	24°58′00″S	1718	10-0	90	26.30	35.34	"Solimões"	"Standard"
St. 4		45°43′00″W		H		24.54	35.68	(see map)	—
M 95	26/ 2/56	25°19′00″S	2010	10-0	135	25.80	35.84	"Solimões"	"Standard"
St. 5		45°21′00″W		H		25.78	36.94	(see map)	—
M 97	28/ 2/56	25°39′00″S	1045	10-0	2.250	26.46	36.86	"Solimões"	"Standard"
St. 10		42°52′00″W		H		26.21	36.82	(see map)	—
M 98	28/ 2/56	24°51′00″S	1605	10-0	2.000	25.43	36.47	"Solimões"	"Standard"
St. 11		42°59′00″W		H		25.14	36.47	(see map)	—
M 99	28/ 2/56	24°22′00″S	1912	10-0	1.000	24.89	36.49	"Solimões"	"Standard"
St. 12		43°04′00″W		H		24.74	36.46	(see map)	—
M 100	28/ 2/56	24°01′00″S	2157	10-0	410	22.78	36.06	"Solimões"	"Standard"
St. 13		43°03′00″W		H		22.53	36.06	(see map)	—

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Sample Nº	*Date*	*Position (*)*	*Time*	*Depth of Haul in m*	*Local Depth in m*	*Temp. °C*	*Salinity ‰*	*Region or Vessel*	*Type of Net Duration of Haul*
M 101 St. 19	5/ 5/56	23°04'00"S 42°34'00"W	1210	5-0 H	61	25.90	34.69	"Solimões" (see map)	Clarke Bumpus - 2193 liters Total plankton vol. 8 cc.
M 102 St. 20	5/ 3/56	23°04'00"S 42°17'00"W	1405	5-0 H	75	25.56	35.00	"Solimões" (see map)	Clarke Bumpus - 5559 liters Total plankton vol. 5 cc.
M 103 St. 21	5/ 3/56	23°04'00"S 41°58'05"W	1600	10-0 H	85	25.50 24.36	34.74 34.74	"Solimões" (see map)	Clarke Bumpus - 2601 liters Total plankton vol. 6 cc.
M 104 St. 22	5/ 3/56	23°17'05"S 41°51'05"W	1743	10-0 H	125	22.90 22.06	35.96 36.00	"Solimões" (see map)	Clarke Bumpus - 4386 liters Total plankton vol. 2 cc.
M 105 St. 23	5/ 3/56	23°38'00"S 41°46'00"W	2000	10-0 H	132	20.80 18.93	35.69 35.54	"Solimões" (see map)	Clarke Bumpus - 2499 liters Total plankton vol. 5 cc.
M 108 St. 33	7/ 3/56	24°00'05"S 45°52'00"W	0610	5-0 H	28	26.50	34.30	"Solimões" (see map)	Clarke Bumpus - 4080 liters Total plankton vol. 2 cc.
M 113 St. 41	15/ 6/56	26°45'00"S 43°21'00"W	1200	10-0 H	2.000	21.60 21.54	36.48 36.44	"Iguatemy"	Incomplete Clarke Bumpus
M 114 St. 43	15/ 6/56	27°15'00"S 43°51'00"W	2138 2319	surface	2.000	21.00	36.15	"Iguatemy"	"Standard" —
M 115 St. 44	16/ 6/56	27°15'00"S 44°54'00"W	0325 0436	surface	2.000	22.39	36.74	"Iguatemy"	"Standard" —
M 116 St. 46	16/ 6/56	27°18'00"S 46°45'00"W	1503	surface	1.000	20.72	36.04	"Iguatemy"	"Standard" —
M 117 St. 46	16/ 6/56	27°18'00"S 46°45'00"W	1503	surface	1.000	20.72	36.04	"Iguatemy"	"Standard" —
M 118 St. 47	16/ 6/56	27°19'00"S 47°22'00"W	1840	2-0	142	21.08	36.25	"Iguatemy"	"Standard" —
M 119 St. 47	16/ 6/56	27°19'00"S 47°22'00"W	1840	10 m w	142	21.08	36.25	"Iguatemy"	Clarke Bumpus - 2397 liters —
M 120 St. 48	16/ 6/56	27°19'00"S 47°25'00"W	1940	10 m w	115	20.63	35.90	"Iguatemy"	"Standard" —

(*) Errata: The seconds should be read as tenth of minutes.

Sample N°	*Date*	*Position (*)*	*Time*	*Depth of Haul in m*	*Local Depth in m*	*Temp. °C*	*Salinity ‰*	*Region or Vessel*	*Type of Net Duration of Haul*
M 121 St. 48	16/ 6/56	27°19′00″S 47°25′00″W	1940	10 m w	115	20.63	35.90	"Iguatemy"	"Standard" —
M 122 St. 49	16/ 6/56	27°19′00″S 48°13′00″W	2400	10 m w	63	18.13	34.08	"Iguatemy"	"Standard" —
M 123 St. 50	17/ 6/56	26°55′00″S 47°49′00″W	0313	10 m w	90	20.00	35.57	"Iguatemy"	"Standard" —
M 124 St. 51	17/ 6/56	26°28′00″S 47°30′00″W	0638	10 m w	95	19.58	35.56	"Iguatemy"	"Standard" —
M 125 St. 51	17/ 6/56	26°28′00″S 47°30′00″W	0638	10 m w	95	19.58	35.56	"Iguatemy"	"Standard" —
M 126 St. 52	17/ 6/56	26°04′00″S 47°14′00″W	1000	10 m w	99	19.89	35.70	"Iguatemy"	"Standard" —
M 127 St. 52	17/ 6/56	26°04′00″S 47°14′00″W	1000	10 m w	99	19.89	35.70	"Iguatemy"	"Standard" —
M 128 St. 53	17/ 6/56	28°38′00″S 46°56′00″W	1300	10 m w	80	19.60	35.56	"Iguatemy"	"Standard" —
M 129 St. 54	17/ 6/56	25°13′00″S 46°38′00″W	1600	10 m w	71	19.75	35.57	"Iguatemy"	"Standard" —
M 130 St. 54	17/ 6/56	25°13′00″S 46°38′00″W	1600	10 m w	71	19.75	35.57	"Iguatemy"	"Standard" —
M 131 St. 55	17/ 6/56	24°50′00″S 46°20′00″W	1900	10 m w	54	19.80	35.57	"Iguatemy"	"Standard" —
M 132 St. 56	17/ 6/56	24°36′00″S 46°10′00″W	2055	10 m w	48	20.50	35.89	"Iguatemy"	"Standard" —
M 133 St. 56	17/ 6/56	24°36′00″S 46°10′00″W	2055	10 m w	48	20.50	35.89	"Iguatemy"	"Standard" —
M 134 St. 57	17/ 6/56	24°22′00″S 45°59′00″W	2300	10 m w	41	20.58	35.83	"Iguatemy"	"Standard" —

(*) Errata: The seconds should be read as tenth of minutes.

Sample Nº	*Date*	*Position (*)*	*Time*	*Depth of Haul in m*	*Local Depth in m*	*Temp. °C*	*Salinity ‰*	*Region or Wessel*	*Type of Net Duration of Haul*
M 135 St. 57	17/ 6/56	24°22′00″S 45°59′00″W	2300	10 m w	41	20.58	35.835	"Iguatemy"	"Standard" —
M 136 St. 60	31/10/56	24°28′05″S 45°46′00″W	1435	20 H	62	22.04 21.32	35.38 35.40	"Iguatemy"	"Standard" 10m
M 137 St. 60	31/10/56	24°28′05″S 45°46′00″W	1435	20 m w	62	22.04 21.32	35.38 35.40	"Solimões"	"Standard" 10m
M 138 St. 61	31/10/56	24°51′00″S 45°24′00″W	1740	50 m w	90	22.00 14.37	35.40 35.37	"Solimões"	"Standard" 20m
M 139 St. 62	31/10/56	25°05′00″S 45°03′00″W	2115	50 m w	158	23.38 22.82	36.99 36.89	"Solimões"	"Standard" 20m
M 142 St. 66	1/11/56	27°18′02″S 42°29′08″W	2115	25 m w	2.130	21.14 21.98	36.81 36.83	"Solimões"	"Standard" 20m
M 143 St. 67	2/11/56	27°18′02″S 43°38′00″W	0330	25 m w	—	21.25 21.87	36.92 36.86	"Solimões"	"Standard" 20m
M 144 St. 68	2/11/56	27°19′00″S 44°28′00″W	0900	50 m w	—	21.20 21.16	36.65 36.54	"Solimões"	"Standard" 25m
M 147 St. 71	3/11/56	27°09′00″S 46°12′00″W	0215	surface H	767	20.45	36.79	"Solimões"	"Standard" 20m
M 148 St. 72	3/11/56	27°13′00″S 47°08′00″W	0640	50 m w	213	20.71 21.02	36.05 36.09	"Solimões"	"Standard" 20m
M 149 St. 73	3/11/56	27°18′02″S 47°31′00″W	1100	50 m w	135	21.20 21.10	35.54 35.60	"Solimões"	"Standard" 20m
M 150 St. 74	3/11/56	27°17′00″S 47°54′05″W	1245	50 m w	70	21.40 20.42	35.54 35.70	"Solimões"	"Standard" 20m
M 151 St. 75	5/11/56	28°00′00″S 48°22′00″W	1810	50 m w	58	20.40 16.04?	35.16 35.48?	"Solimões"	"Standard" 20m
M 152 St. 75	5/11/56	28°00′00″S 48°22′00″W	1810	50 m w	58	20.40 16.04?	35.16 35.48?	"Solimões"	"Standard" 20m

(*) Errata: The seconds should be read as tenth of minutes.

Sample Nº	*Date*	*Position (*)*	*Time*	*Depth of Haul in m*	*Local Depth in m*	*Temp. °C*	*Salinity ‰*	*Region or Wessel*	*Type of Net Duration of Haul*
M 153 St. 76	5/11/56	28°24′00″S 48°30′00″W	2100	50 m w	62	19.37 16.48	35.40 35.64	"Solimões"	"Standard" 20m
M 154 St. 77	5/11/56	28°47′03″S 48°38′02″W	2300	25 m w	80	20.61 20.84	35.65 35.62	"Solimões"	"Standard" 20m
M 155 St. 78	6/11/56	29°08′00″S 49°03′00″W	0155	surface H	60	19.02	35.52	"Solimões"	"Standard" 20m
M 156 St. 79	6/11/56	29°27′00″S 49°38′00″W	0405	surface H	40	19.46	35.53	"Solimões"	"Standard" 20m
M 157 St. 80	6/11/56	29°43′00″S 49°06′00″W	0645	50 m w	98	20.68 20.72	35.24 35.22	"Solimões"	"Standard" 20m
M 158 St. 81	6/11/56	30°02′00″S 48°39′00″W	0930	50 m w	148	20.76 20.53	35.11 35.08	"Solimões"	"Standard" 20m
M 159 St. 82	6/11/56	30°25′00″S 48°03′00″W	1320	60 m w	615	20.91 21.30	35.43 36.79	"Solimões"	"Standard" 20m
M 161 St. 84	6/11/56	31°31′00″S 46°33′00″W	2350	50 m w	3.000	18.18 17.82	36.21 36.10	"Solimões"	"Standard" 20m
M 162 St. 85	7/11/56	31°57′00″S 45°45′00″W	0440	50 m w	3.800	18.10 17.76	36.19 36.19	"Solimões"	"Standard" 20m
M 163 St. 86	7/11/56	32°24′00″S 44°54′00″W	0440	50 m w	3.800	18.90 18.63	36.27 36.28	"Solimões"	"Standard" 20m
M 164 St. 87	7/11/56	33°12′00″S 45°40′00″W	1405	50 m w	—	20.19 18.28	36.24 36.26	"Solimões"	"Standard" 20m
M 171 St. 94	9/11/56	33°18′00″S 50°18′00″W	0305	25 m w	1.000	19.94	35.25	"Solimões"	"Standard" 20m
M 173 St. 96	9/11/56	32°30′00″S 51°23′00″W	0858	50 m w	58	19.21 18.32	33.15 34.91	"Solimões"	"Standard" 20m
M 174 St. 97	9/11/56	32°20′00″S 51°37′00″W	1050	25 m w	26	19.40 17.81	32.88 34.54	"Solimões"	"Standard" 20m

(*) Errata: The seconds should be read as tenth of minutes.

Sample Nº	*Date*	*Position (*)*	*Time*	*Depth of Haul in m*	*Local Depth in m*	*Temp. °C*	*Salinity ‰*	*Region or Vessel*	*Type of Net Duration of Haul*
M 175 St. 98	9/11/56	32°11′00″S 51°45′00″W	1210	15 m w	19	19.47 18.79	32.59 33.54	"Solimões"	"Standard" 20m
M 177 St. 105	15/11/56	25°49′00″S 48°04′00″W	0840	25 m w	29	22.40 21.00	33.46 34.69	"Solimões"	"Standard" 20m
M 178 St. 106	15/11/56	26°09′08″S 47°48′00″W	1100	50 m w	58	22.71 21.86	34.59 35.45	"Solimões"	"Standard" 20m
M 179 St. 107	15/11/56	26°25′00″S 47°35′00″W	1305	surface	66	23.07	35.57	"Solimões"	"Standard" 20m
M 180 St. 107	15/11/56	26°25′00″S 47°35′00″W	1305	50 m w	66	23.07 21.92	35.57 35.56	"Solimões"	"Standard" 20m
M 181 St. 108	15/11/56	25°58′00″S 47°12′00″W	1720	50 m w	73	22.42 21.78	35.85 35.86	"Solimões"	"Standard" 20m
M 182 St. 109	15/11/56	25°30′00″S 46°48′00″W	2035	25 m w	73	21.80 21.71	35.66 35.59	"Solimões"	"Standard" 20m
M 183 St. 110	16/11/56	25°01′08″S 46°24′00″W	0015	25 m w	63	22.00 22.01	35.56 35.54	"Solimões"	"Standard" 20m
M 184 St. 111	16/11/56	24°39′00″S 46°03′00″W	0300	25 m w	57	22.03 22.02	35.44 35.44	"Solimões"	"Standard" 20m
M 185	16/11/56	24°24′05″S 45°50′00″W	0445	25 m w	56	21.80 19.46	35.49 35.52	"Solimões"	"Standard" 20m

(*) Errata: The seconds should be read as tenth of minutes.

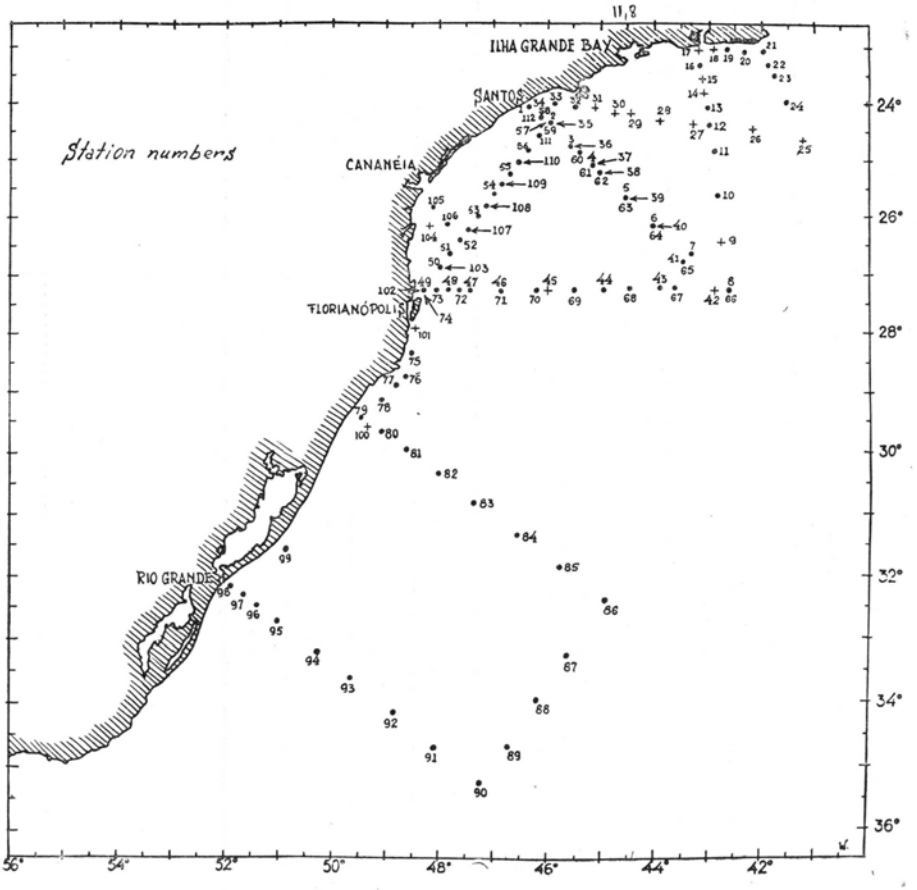

Fig. 1 — Map of the stations of three of the cruises. no. 1-33, ou board corvette "Solimões", February 26, 1956, to March 7, 1956. N.º 37-57, on board corvette "Iguatemy", June 14, 1956, to June 17, 1956. N.º 60-112, on board corvette "Solimões", October 31, 1956, to November 16, 1956. Section marked I is called Santos section in the text. Section II is called Florianópolis section.

4 — LIST OF SPECIES AND THEIR DISTRIBUTION PER STATION.

The numbers in front of the name of the species refer to the number of the sample (not of the station) in which the species was found to occur. The number in brackets refers to the total number of specimens found in that particular sample.

TABLE 2

LIST OF SPECIES AND THEIR DISTRIBUTION PER STATION

Sarsia eximia	M_{40} (7) ; M_{53} (6) ; M_{68} (1) ; Cananéia (1).
Ectopleura dumortieri	M_{66} (1) ; M_{71} (4) ; M_{72} (3).
Corymorpha gracilis	M_{104} (2) ; M_{105} (1) ; M_{124} (2) ; M_{126} (2) ; M_{129} (1) ; M_{130} (1) ; M_{131} (1) ; M_{132} (3) ; M_{133} (3) ; M_{136} (14) ; M_{137} (7) ; M_{138} (151) ; M_{139} (3) ; M_{148} (2) ; M_{154} (1) ; M_{159} (3) ; M_{182} (7) ; M_{183} (4) ; M_{184} (25) ; M_{185} (7).
Eucodonium brownei	M_{40-51} (16) ; M_{149} (3) ; M_{150} (1) ; M_{180} (1) ; M_{181} (27) ; M_{182} (3).
Zanclea costata	M_{21} (5) ; M_{24} (15) ; M_{67} (2) ; M_{175} (1).
Turritopsis nutricula	M_{116} (?1) ; M_{118} (1) ; M_{120} (1) ; M_{122} (5) ; M_{131} (5) ; M_{132} (37) ; M_{133} (5) ; $M_{134-135}$ (48) ; M_{153} (5) ; M_{155} (1).
Podocoryne minima	M_{68} (2) ; M_{69} (?1) ; M_{70} (41) ; M_{72} (707) ; M_{74} (1).
Cytaeis tetrastyla	M_{66} (1) ; M_{134} (56) ; M_{135} (65) ; M_{177} (5) ; M_{178} (1).
Bougainvillia frondosa	M_{123} (1) ; M_{124} (1) ; M_{127} (1).
Bougainvillia ramosa	M_{40} (1) ; M_{135} (1).
Stomotoca dinema	M_{40} (2) ; M_{66} (1) ; M_{68} (1).
Laodicea minuscula	M_{66} (2) ; M_{72} (2).
?Laodicea undulata	M_{152} (2).
Obelia spp.	M_{40} (13) ; M_{63} (2) ; M_{67} (23) ; M_{68} (62) ; M_{69} (22) ; M_{103} (1) ; M_{131} (1) ; M_{132} (3) ; M_{133} (3) ; M_{151} (5) ; M_{152} (21) ; M_{153} (20) ; M_{174} (2) ; M_{175} (1).
Clytia cylindrica	M_{69} (4) ; M_{70} (4) ; M_{71} (1) ; M_{72} (268) ; M_{151} (2) ; M_{152} (4).
Lovenella cirrata	M_{40} (19) ; M_{53-55} (2) ; M_{66} (7).
Eucheilota ventricularis	M_{68} (5) ; M_{69} (1) ; M_{40-51} (1) ; Ubatuba (7).

Eutima mira	M_{12} (4) ; M_{13} (3).
Proboscidactyla ornata	M_{38} (9) ; M_{68} (7) ; M_{69} (2) ; $M_{129-130}$ (75) ; M_{131} (4) ; $M_{132-133}$ (61) ; $M_{134-135}$ (127) ; M_{138} (10) ; M_{148} (12) ; M_{153} (13) ; M_{154} (32) ; M_{155} (30) ; M_{156} (2) ; M_{157} (2) ; M_{159} (2) ; M_{181} (1) ; M_{182} (3) ; M_{183} (18) ; M_{184} (64) ; M_{66} (2).
Liriope tetraphilla	M_{2-19} (27) ; M_{21-24} (3) ; M_{34} (1) ; M_{35} (8) ; M_{36} (4) ; M_{37} (1) ; M_{40-51} (86) ; M_{53-55} (42) ; M_{56-64} (19) ; M_{65} (21) ; M_{66} (453) ; M_{67} (150) ; M_{68} (574) ; M_{69} (314) ; M_{71} (2) ; M_{72} (87) ; M_{77} (8) ; M_{78} (2) ; M_{82} (1) ; M_{83} (3) ; M_{84} (1) ; M_{91} (1) ; M_{92} (4) ; M_{94} (1) ; M_{95} (106) ; M_{97} (96) ; M_{98} (1) ; M_{99} (2) ; M_{100} (7) ; M_{101} (268) ; M_{102} (80) ; M_{103} (439) ; M_{104} (97) ; M_{105} (165) ; M_{108} (1) ; M_{114} (2) ; M_{115} (4) ; M_{116} (47) ; M_{117} (7) ; M_{118} (8) ; $M_{120-121}$ (30) ; M_{122} (146) ; M_{123} (27) ; $M_{124-125}$ (29) ; $M_{126-127}$ (13) ; M_{128} (48) ; $M_{129-130}$ (247) ; M_{131} (14) ; $M_{132-133}$ (59) ; $M_{134-135}$ (45) ; $M_{136-137}$ (11) ; M_{138} (28) ; M_{139} (2) ; M_{147} (2) ; M_{148} (94) ; M_{149} (273) ; M_{150} (557) ; $M_{151-152}$ (222) ; M_{153} (391) ; M_{154} (369) ; M_{155} (188) ; M_{156} (73) ; M_{157} (47) ; M_{158} (16) ; M_{159} (17) ; M_{160} (2) ; M_{161} (3) ; M_{162} (3) ; M_{163} (1) ; M_{164} (4) ; M_{171} (6) ; M_{173} (12) ; M_{174} (88) ; M_{175} (71) ; M_{177} (131) ; M_{178} (275) ; M_{179} (143) ; M_{180} (997) ; M_{181} (1.501) ; M_{182} (2.439) ; M_{183} (1.200) ; M_{184} (68) ; M_{185} (111).
Geryonia proboscidalis	M_{14} (1).
Rhopalonema velatum	M_{2} (1) ; M_{8} (1) ; M_{9} (2) ; M_{10} (2) ; M_{13} (3) ; M_{14} (4) ; M_{19} (8) ; M_{21} (7) ; M_{24} (3) ; M_{66} (3) ; M_{67} (6) ; M_{68} (3) ; M_{69} (4) ; M_{100} (3) ; M_{105} (1) ; M_{114} (3) ; M_{115} (2) ; M_{118} (3) ; M_{122} (2) ; M_{123} (2) ; M_{124} (2) ; M_{130} (11) ; M_{131} (1) ; M_{132} (1) ; M_{151} (1) ; M_{152} (4) ; M_{164} (1).
Aglaura hemistoma	M_{1-16} (84) ; M_{21-26} (25) ; M_{30} (1) ; M_{32} (2) ; M_{33} (1) ; M_{35} (7) ; M_{36} (17) ; M_{37} (11) ; M_{39} (3) ; M_{53-55} (152) ; M_{56-64} (5) ; M_{65} (6) ; M_{66} (9) ; M_{68} (9) ; M_{69} (2) ; M_{74} (2) ; M_{75} (4) ; M_{78} (1) M_{82} (1) ; M_{83} (2) ; M_{84} (2) ; M_{85} (3) ; M_{86} (1) ; M_{90} (2) ; M_{95} (149) ; M_{97} (4) ; M_{98} (37) ; M_{99} (20) ; M_{100} (145) ; M_{104} (1) ; M_{113} (1) ; M_{114} (10) ; M_{116} (85) ; M_{117} (19) ; M_{118} (135) ; M_{119} (4) ; M_{120} (131) ; M_{121} (4) ; M_{122} (117) ; M_{123} (32) ; M_{124} (21) ; M_{125} (4) ; M_{126} (6) ; M_{127} (9) ; M_{128} (16) ; M_{129} (1) ; M_{130} (4) ; M_{131} (6) ; M_{132} (6) ; M_{133} (7) ; M_{134} (3) ; M_{135} (5) ; M_{139} (20) ; M_{142} (3) ; M_{143} (3) ; M_{144} (3) ; M_{148} (33) ; M_{149} (22) ; M_{150} (1) ; M_{152} (1) ; M_{154} (15) ; M_{155} (1) ; M_{157} (18) ; M_{158} (10) ; M_{159} (19) ; M_{162} (5) ; M_{163} (1) ; M_{164} (3) ; M_{171} (1) ; M_{173} (19) ; M_{174} (22) ; M_{181} (156) ; M_{182} (1).
Solmundella bitentaculata	M_{10-13} (3) ; M_{21-24} (4) ; M_{37} (2) ; M_{100} (1) ; M_{114} (4) ; M_{120} (3) ; M_{122} (3) ; M_{123} (6) ; M_{159} (1).
Aegina citrea	M_{159} (1) ; M_{164} (1).
Cunina octonaria	M_{35} (3) ; M_{38} (1) ; M_{39} (1) ; M_{66} (1) ; M_{68} (1) ; M_{74} (1) ; M_{77} (1) ; M_{82} (1) ; M_{101} (4) ; M_{102} (1) ; M_{103} (1) ; M_{104} (1) ; M_{105} (1) ; M_{114} (1) ; M_{115} (1) ; M_{116} (3) ; M_{118} (1) ; M_{120} (4) ; M_{122} (3) ; M_{124} (1) ; M_{125} (1) ; M_{130} (1) ; M_{132} (9) ; M_{133} (2) ; M_{134} (5) ; M_{136} (2) ; M_{137} (5) ; M_{139} (1) ; M_{148} (6) ; M_{150} (28) ; M_{152} (2) ; M_{153} (7) ; M_{154} (6) ; M_{155} (1) ; M_{156} (4) ; M_{175} (2) ; M_{178} (5) ; M_{180} (5) ; M_{181} (23) ; M_{182} (22) ; M_{183} (61) ; M_{184} (39) ; M_{185} (31).

Solmaris spp.	M_{65} (6) ; M_{66} (16) ; M_{67} (9) ; M_{68} (24) ; M_{69} (23) ; M_{103} (4) ; M_{126} (1) ; M_{129} (5) ; M_{130} (2) ; M_{131} (18) ; M_{132} (1) ; M_{151} (2) ; M_{152} (3) ; M_{154} (2) ; M_{157} (1) ; M_{175} (4) ; M_{180} (1) ; M_{181} (32) ; M_{183} (4) ; M_{185} (12).

5 — SYSTEMATIC DESCRIPTION OF THE SPECIES

ORD. ANTHOMEDUSAE

FAM. Corynidae

Sarsia eximia (Allman)

Coryne eximia Allman 1859, p. 141.
Syncoryne eximia Allman 1864, p. 357.
Syncoryne eximia Allman 1872, p. 282, pl. 5.
Syncoryne eximia Browne 1907a, p. 37.
Sarsia eximia Mayer 1910, p. 57, fig. 21.
?*Sarsia eximia* Vanhöffen 1916, p. 415.
Sarsia eximia Russell 1953, p. 50, pl. 2, fig. 3; text-figs. 17A, 18A, B.
Sarsia eximia Ralph 1953, p. 74.

SPECIFIC CHARACTERS — Four tentacles. Ocelli present on bulb. No peduncle. Manubrium short not extending beyond umbrella margin; no asexual reproduction.

HYDROID — Usually called *Syncoryne eximia.*

MEDUSA — Umbrella oval to hemispherical, my largest specimens are 3 mm high; Russell records 3-4 mm for fully grown British specimens. Jelly moderately thick. Velum broad. Manubrium elongate, cylindrical, never extends beyond umbrella margin but may reach as far. Mouth tube-like, simple. Four radial canals relatively large and ring canal narrower. Gonads completely surrounding stomach, all my specimens had immature gonads. Large rounded marginal bulbs bearing each a black abaxial ocellus. The only colour to be seen in my specimens is that of the ocelli.

MATERIAL — Altogether 15 specimens are referred to this species. Fourteen specimens from series M and one from Cananéia. Taken in June, July and October in coastal waters.

DISTRIBUTION — Western North Atlantic: West Indies; Eastern North Atlantic: British Isles, coastal waters of English Channel, North Sea, Norway. North West Pacific; South East Pacific: Valparaiso; South West Pacific: New Zealand (?).

Most probably a euryhaline and eurythermic coastal species.

Discussion — Although several specimens were found I should refer to this species with caution since it is easily confused with other species, specially when preserved. It may easily be mistaken with *S. prolifera*, the latter however is known only from a restricted area (British Isles, French coast, Black Sea and none of my specimens were seen in the process of budding off other medusae. It differs from *Stauridiosarsia producta* by the greater lenght of the manubrium, lack of exumbrellar nematocysts, lack of umbilical canal (which disappears in most adult specimens of *Stauridiosarsia*) and specially by the arrangement of the tentacular batteries of nematocysts which is moniliform in *Sarsia* and scattered in *Stauridiosarsia*. The hydroid of *Sarsia* has not been searched for in Brazilian waters but both hydroid and medusa of *Stauridiosarsia* are known from aquaria (Vannucci 1949, p. 223).

Some specifically undeterminable medusae belonging to the genus *Sarsia* were taken in the Fernando de Noronha region.

fam. Tubulariidae

Ectopleura dumortieri (van Beneden)

Tubularia dumortieri Johnston 1847, p. 50, pl. 7, figs. 1-2.
Ectopleura dumortieri Allman 1864, p. 368.
Ectopleura ochracea Agassiz 1865, p. 191, figs. 320-323.
Ectopleura dumortieri Allman 1871-72, p. 424.
?*Ectopleura ochracea* Fewkes 1882, p. 295, pl. 1, figs. 15-16; 35-36.
Ectopleura dumortierii Browne 1900, p. 705.
Ectopleura ochracea Nutting 1901, p. 373, fig. 82.
?*Ectopleura prolifica* Hargitt 1908, p. 106, figs. 8-11.
Ectopleura ochracea Bigelow 1909, p. 184, pl. 6, fig. 5; pl. 38, figs. 12-13.
Ectopleura dumortieri Mayer 1910, p. 69, pl. 5, figs. 4-5; pl. 6, figs. 1, 1', 2.
Ectopleura dumortieri Vanhöffen 1910, p. 197.
?*Ectopleura dumortieri* Neppi & Stiasny 1913, p. 15, pl. 1, fig. 7.
Ectopleura dumortieri Stechow 1923, p. 50.
Ectopleura dumortieri Kramp 1933, p. 241.
Ectopleura dumortieri Russel 1953, p. 76, pl. 3, figs. 5-6; text-figs. 33 A-C.

Type Locality — Ostende.

Specific Characters — Four pairs of exumbrellar nematocyst tracks. Four perradial tentacles with abaxial nematocyst clusters.

Hydroid — *Ectopleura dumortieri.* I have found this hydroid in the lagoon region of Cananéia (State of S. Paulo), bearing medusa buds 31-12-1952.

Medusa — Umbrella ovoid to spherical, may reach three mm in height. The present specimens were found to bear large gonads when 1.1. or 1.2 mm high (preserved specimens). Jelly rather thick, velum fairly broad. A

pair of nematocyst tracks leaves each bulb extending to the apex of the umbrella. Peduncle absent. Manubrium very large, ovoid to spherical, tapers gradually towards the simple tubular mouth which is armed vith nematocysts. The manubrium when extendend may protrude beyond umbrella margin. Radial canals and ring canal narrow. Marginal bulbs relatively large and bean shaped, the tentacle emerges from the bulb at the hilum. The four tentacles are equally developed, they bear large puff-like abaxial clusters of large nematocysts. Gonads encircle the stomach completely. The colour seems to be variable, usually very brilliant.

Material — Eight specimens. Medusae recorded July and October; hydroid known to produce buds in December. Young medusae were found 5-2-1957 in the region of Cananéia. One specimen from Ilha Grande bay. Surface waters and day hauls. Actinulae with a single whorl of 10-12, usually 12, aboral filiform tentacles were found in samples M_{07} (7 spec.) and M_{168} (8 spec.), July.

Distribution — Western North Atlantic: from Cape Cod to Tortugas. Eastern North Atlantic: British coasts, North Sea. ?Mediterranean. Pacific: Acapulco (Mexico); ?Japan.

Usually rare, this species becomes locally abundant at times. Its precence in the region of Cananéia indicates it certainly as euryhaline and eurythermic. Known in Brazil only from the lagoon region of Cananéia.

FAM. Corymorphidae

Corymorpha gracilis Brooks *

Steenstrupia gracilis Mayer 1900b, p. 29, pl. 16, figs. 36-37.
Steenstrupia rubra Mayer 1910, p. 31, pl. 1, fig. 7 (text, in part).
Steenstrupia rubra Bigelow 1915, p. 318.
Steenstrupia rubra Vanhöffen 1916, p. 414.

Type locality — Atlantic coast of the United States, south of Virginia.

Specific characters — Umbrella with long pointed apical process with permanent canal. A long perradial marginal tentacle with swellings at irregular intervals and a large terminal swelling. Opposite to the large tentacle there is a second perradial small tentacle. There are other two perradial tentacles at right angles with the first, usually reduced to the basal bulbs. Manubrium large.

Hydroid — Unknown.

(*) Mr. K. W. Petersen (Kopenhagen) after examining some Brazilian specimens kindly informs me that this species, should be transferred to the genus "Enphysora".

Medusa — Umbrella bell shaped, ovoid or almost cylindrical. My specimens are small and excluding the apical process do not exceed 3.5 mm. The apical process is variable in breadth and length and may be as long as or up to 1.5 times the length of the bell itself; the total height may thus exceed 6 mm. There is a large apical canal present through life. Jelly thick. As in the other species of the genus, differing in this particular from *Hybocodon*, the umbrella margin is at right angles with the umbrella axis and there are no exumbrellar nematocyst tracks. Velum rather wide. Manubrium large, cylindrical or elongate, barrel shaped, when extended reaches beyond umbrella margin. No peduncle. Mouth simple, tubular, with nematocysts. Four radial canals and ring canal rather broad. There is a long perradial tentacle ending in a large ovoid or rounded, pigmented terminal swelling; similar rounded or oval pigmented swellings occur at irregular intervals along the tentacle; in between the swellings there are numerous nematocyst rings. Opposite to the fully developed tentacle there always is a short tentacle, elongate conic with no swellings. All the specimens observed had these two types of tentacles. At right angles to these there is a pair of small perradial tentacles reduced to small bulbs. The large tentacle has no clearly defined bulb, just an adaxial semilunar pad embracing its base. The same aplies also to the small tentacle that often resembles rather a large hollow elongated bulb tapering gradually into a fine point, rather than a tentacle. The gonads surround the stomach leaving the mouth free. Stomach reddish or greenish; apical process, bulbs and tentacles red.

Material — Altogether 259 specimens taken in March, June, October and November over a wide area. The temperature range was found to be 19.5-23°C; the salinity range 35.4-36.8‰ but it may occur beyond these limits. A single greatly damaged specimen was found at 31°57′ S — 45°45′ W off the shelf over a depth of 3.800 m; this specimen should be disregarded as doubtful. Three specimens were taken at 30°25′ S — 48°03′ W over a depth of 615 m. All the other stations were over the shelf rather far from the coast over depths varying between 48-213 m. Hydroids of *Corymorpha* were dredged by previous authors from deep waters. Most of the specimens were found in the process of ingesting or digesting copepods.

This species is not to be found in coastal waters but over the shelf in higher salinity; it is probably a thermophile species of high salinity.

Distribution — Western North Atlantic: from Virginia to Tortugas, Florida, West Indies.

Discussion — Mayer united *S. gracilis*, *S. lineata* and *S. cranoires* and considered them to be synonyms of *Steenstrupia nutans* (*Corymorpha nutans*). There seems to be no doubts for what concerns *lineata* and *cranoides*, but it is not so with *gracilis*. Russell (1953, p. 89) states that "A closely allied medusa (to *nutans*), *Steenstrupia gracilis* was described

by Brooks" ... and includes *gracilis* in the list of synonyms with a query. I consider the following to be distinctive features of *gracilis*: much greater development of the apical process, greater and constant development of the three smaller tentacles, peculiar swellings of the large tentacle and constant absence of a peduncle, finally the general aspect of the two is quite different. All these characters are constant in the present specimens. *S. nutans* is classed as a temperate-boreal species by Russell (1953, p. 86) while *S. gracilis* appears to be tropical or, at most, temperate-tropical. Mayer (fig. 1, pl. 1), gives a very good picture of this species but he fails to give it specific rank. I have not seen Leuckart's original description of *S. lineata*, but Mayer (1910, p. 34, fig. A) reproduces Leuckart's figure which shows a specimen resembling *C. nutans* rather than *C. gracilis*. My specimens surely correspond to *Steenstrupia* (= *Corymorpha*) *gracilis* Fewkes. Future research is needed to decide over the synonymy between *lineata* and *gracilis*. Both *C. tetrabrachia* from the Maldive Islands and *C. bigelowi* from the Malayan region have three equally developed medium sized tentacles besides the large tentacle which has no swellings and should be kept separate.

The name *Corymorpha* has priority over *Steenstrupia*.

FAM. Corymorphidae?

Eucodonium brownei Hartlaub.

(Fig. 2 — 3)

Dipurena sp.? Browne 1896, p. 473, pl. 16, fig. 2.
Eucodonium brownei Neppi & Stiasny 1913, p. 14, pl. 1, fig. 6.
Eucodonium brownei Kramp 1927, p. 37.
Eucodonium brownei Russell 1953, p. 93, fig. 40.
Eucodonium brownei Picard 1955, p. 95.

Fig. 2 — *Eucodonium brownei*, modified after Russel 1953, p. 94, text-fig. 40.

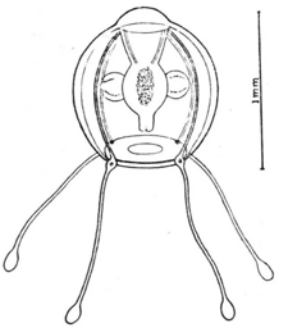

Fig. 3 — *Eucodonium brownei*, side view of bulb.

Type locality — Plymouth.

Specific characters — Four simple tentacles with apical knob, peduncle present, simple tubular mouth, no ocelli, medusa buds on stomach.

Hydroid — Unknown.

Medusa — Umbrella small, up to 1 mm high or slightly over (preserved). Rounded, usually with an apical dome-like projection and flattened margin. Frequently somewhat four cornered at the margin. Jelly fairly thin, except at apex. Velum broad. Broad conical peduncle, flask-shaped stomach, simple tubular mouth. Radial canals narrow, ring canal very narrow, apparently solid. The stomach of the larger specimens carry medusa buds. There are four meridional stripes of dark brown-blackish pigment on the stomach and the medusa buds are produced in this area. As the medusa grows the pigmented area increases in size. The number of buds also augments and they may be found all over the stomach. Some specimens have a greater amount of pigment and the whole stomach is dark. There are four thin solid marginal tentacles about twice as long as the umbrella terminating in a large nematocyst laden knob; there are scattered nematocysts along the tentacles. The tentacle buds are blackish, the amount of pigment on the stomach varies from almost unpigmented to very dark, tentacle bulbs blackish. Gonads are still unknown since no sexually mature specimen was found.

Material — Fifty one specimens taken in June and November, most of them budding other medusae from the manubrium. They were found in three patches, one at aproximately 27°7′ S — 47°40′ W November 3, 1956, four specimens between 50 m. w. and the surface. The second with its center at about 25°58′ S — 47°12′ W, November 15, 1956; 31 specimens between 50 m. w. and the surface. The third patch with 16 specimens was taken June 28, 1954, surface, at 24°06′ S — 45°43′ W. All were from surface water above the thermocline over depths varying between 70-135 m. The temperature range was 21;2 - 22°C, perhaps higher; the salinity range 35.01 — 35.85‰. The largest lot came from sample M_{181} November 15, 1956, 5.20 p.m.; 22° C and 35.8‰ salinity. Most of these samples were collected in the beginning of summer but sample M_{40} with 16 budding specimens was hauled in June.

If we consider these along with previous records, it appears to be a thermophile species of high salinity which can endure much lower temperatures and salinities when carried off by currents (records from the North Sea, Skagerak, Adriatic Sea). The mean temperature for March at Schultz' Grund (Skagerak) where Kramp's single specimen was taken has temperatures at that time of year varying between 2.0 and 4.1° C and salinities varying between 179 and 30.1‰, both depending on the depth. The specimen probably came from about 4°C and 28‰ salinity. I have no data on the Adriatic temperatures and salinities during October, but the temperature is surely higher than in the Skagerak or North Sea. The

budding capacity of this species allied to its capacity to endure lowerings in salinity and temperature are probably responsible for its occasional appearance in unusual bodies of water were it occurs as a temporary visitor. The great number of specimens taken here as compared to its scarcity elsewhere suggests that the normal habitat of this species is in warmer coastal waters.

Distribution — Plymouth; North Sea; Skagerak. Mediterranean; Villefranche, Marseille, Adriatic. It has been recorded as rare, the present collection being, to my knowledge, the largest.

Discussion — This species may or not belong to the family Tubulariidae as defined by Russell (1953, p. 75). The characters of the family are as follows: with or without apical projection, with or without nematocyst tracks, with stomach not extending beyond umbrella margin, with simple circular mouth, with four radial canals, with gonads completely surrounding stomach, with four or fewer hollow marginal tentacles, without ocelli on marginal bulbs. Russell furthermore divides the family in two sub-families according to the characters of the hydroid. This author places *Eucodonium brownei* in the Incertae Sedis as an appendix to the Tubulariidae. It differs from the diagnosis of the family in the character of the tentacles which are here solid. I believe this may be related to the fact that the ring canal is also solid.

Recently Picard (l.c.) based on the solid character of the tentacle and on the cnidome (desmonemes and microbasic euryteles) attributes this species to the family Oceaniidae. The latter however, being an heterogenous assembly of species has been dismembered and there is not much to be gained by removing *Eucodonium* from the Incertae Sedis to the Oceaniidae. *Corymorpha nutans*, fam. Corymorphidae, also has both desmonemes and microbasic eurytheles. Picard mentions the great resemblance of *Eucodonium* with *Podocoryne minima*, the two species are in fact easy to mistake at first sight, but I consider this resemblance a superficial one since the absence of oral tentacles in *Eucodonium* is an important differential character. If *Eucodonium* should be regarded as a degenerate species having lost the oral tentacles through degeneration of the medusoid stage, it would probably not be so actively budding and would have large gonads appearing precociously after liberation. Rees (1957) gives family rank to both the Tubulariidae and Corymorphidae which roughly correspond to the sub-families as established by Russell. It cannot be stated with certainty but it may well be that *Eucodonium brownei* must be referred to the Corymorphidae (Rees 1957, p. 521).

FAM. Zancleidae

Zanclea costata Gegenbaur

Zanclea costata Gegenbaur 1856, p. 229, pl. 8, figs. 4-7.
Zanclea implexa Allman 1864, p. 357.

Gemmaria gemmosa Agassiz 1865, p. 184, fig. 306.
Gemmaria cladophora Agassiz 1865, p. 184, figs. 307-310.
Gemmaria implexa Allman 1871-72, p. 224, 290, pl. 7.
Gemmaria gemmosa Fewkes 1881, p. 150, pl. 1, figs. 8-12.
Corynitis agassizii Murbach 1899, p. 354, pl. 34, figs. 11-14.
Corynitis agassizii Hargitt 1908, p. 100, 118.
Zanclea gemmosa Bigelow 1909, p. 188, pl. 7, fig. 3; pl. 44, figs. 1-2.
Zanclea costata Mayer 1910, p. 87, text-fig. 41; pl. 8, figs. 2-3; 6-7.
Zanclea gemmosa Mayer 1910, p. 88, pl. 6, fig. 7; pl. 7, fig. 5; pl. 8, figs. 4-5.
Zanclea implexa Mayer 1910, p. 89, text-figs. 43-44.
Zanclea cladophora Mayer 1910, p. 90.
Zanclea costata Vanhöffen 1910, p. 199, figs. 3-3a.
Zanclea implexa Vanhöffen 1910, p. 200, figs. 4-4a.
Zanclea implexa Neppi & Stiasny 1913, p. 16.
Zanclea costata Vanhöffen 1916, p. 416.
Gemmaria implexa var. *neapolitana* Brückner 1914, p. 460, text-figs. 7-24; pl. 8, figs. 3-14; pl. 9, figs. 16-25.
Zanclea gemmosa Russell & Rees 1936, p. 107, figs. 1-12.
Zanclea implexa Babnix 1948, p. 139.
Zanclea costata Russell 1953, p. 99, pl. 4, figs. 1-3; text-figs. 43-48.
Zanclea costata Kramp 1953, p. 263.

For a complete list of references see Russell & Rees (1936).

Type locality — Mediterranean.

Specific characters — Four perradial exumbrellar nematocyst tracks. Two to four marginal tentacles each bearing stalked oval nematocyst capsules or cnidophores on the abaxial side. The capsules measure 20-30 micra in length, each containing two to five nematocysts.

Hydroid — *Zanclea costata.*

Medusa — Umbrella bell shaped; may reach 6 mm in height but the Brazilian specimens found up to now are much smaller, the largest being 1.5 mm, immature. Jelly moderately thick. Some specimens have an apical thickening. Four perradial meridional rows of nematocysts, longer in larger specimens, may extend up to half the height of the bell. Velum well developed. Manubrium flask-shaped to cylindrical, may reach umbrella margin. Mouth simple tube-like, armed with nematocysts. Four radial canals and ring canal moderately broad. Gonads iterradial may become so large as to almost encircle the stomach, mouth end remains free. Young medusae have two opposite perradial tentacles and two marginal bulbs at right angles with the tentacles. Larger medusae may develop two tentacles from these bulbs, having therefore four tentacles. The marginal bulbs are mere elongated swellings of the tentacle's basal portion and are not sharply delimited. Immediately below the swelling the tentacles bear stalked capsules with three to five nematocysts each Colour of manubrium pale yellow; radial canals and ring canal pink; marginal tentacle bulbs reddish or orange.

Material — I have altogether counted 23 specimens belonging to this species, all young. They were taken in June 1950, July 1955 and November 1956 from depths 40-0 m.w. Some of the specimens from Jaseur Bank and Trindade are recently liberated specimens, 500 micra wide, indicating that the hydroid lives on the island's shelf and on the bank, the shallower depth of the latter being 15 m Russell & Ress (l.c., p. 115) observed the medusae to be liberated when 500-700 micra in diameter.

The largest specimens are 1.5 mm high and some of them bear incipient gonads in spite of the small size. In the larger specimens there is a slight thickening of the median portion of the radial canals.

A rare species found over a wide area, probably euryhaline and eurythermic.

Distribution — Widely distributed. Western North Atlantic: from Massachussetts to the West Indies. Eastern North Atlantic: British Isles, North Sea, Norway, Mediterranean, including the Adriatic. Indian Ocean: Red Sea, Nicobar Islands. Pacific: Torres Strait, Japan, Great Barrier Reef, Magellanic Region. Probably a circum-tropical and circum-subtropical species penetrating in temperate zones.

According to Rees' suggestion (1953) that *Mnestra parasites* may be identical with *Zanclea costata*, the few specimens of *Phyllirhoe bucephala* found in our plankton were searched for medusae, but none was found.

FAM. Clavidae

Turritopsis nutricula Mc Grady

Modeeria multitentaculata Fewkes 1881, p. 149, pl. 3, figs. 7-9.
Modeeria nutricula Fewkes 1882, p. 294.
Dendroclava dohrni Zoia 1892, p. 409.
Turritopsis nutricula Nutting 1901, p. 375.
Turritopsis nutricula Mayer 1910, p. 143, text-figs. 75-77; pl. 14, figs. 10-13; pl. 15, figs. 10-13.
Turritopsis nutricula Bigelow 1913, p. 8.
Turritopsis nutricula Browne 1916, p. 180.
Turritopsis nutricola Vanhöffen 1916, p. 418.
Corydendrium nutricula Kramp 1935, p. 11.
Turritopsis nutricula Russell 1953, p. 115, pl. 5, figs. 1-5; pl. 29, figs. 1-3; text-figs. 54 A-C, 55, 56.
Turritopsis nutricula Ralph 1953, p. 64.

For a complete list of references and history of the species see Russell 1953.

Type locality — Charleston Harbour, South Carolina.

Specific characters — Sixty to eighty marginal tentacles in a single row. Four radial masses of large vacuolated endodermal cells above stomach. Four lipped mouth bordered with cnidocysts.

Hydroid — *Turritopsis nutricula,* formely ascribed to *Dendroclava* or *Corydendrium.*

Medusa — Umbrella pyriform to bell-shaped, may be up to five mm high, my specimens not larger than four mm. Jelly thin. Velum broad. Manubrium large, rounded, usually occupying two thirds or more of subumbrella cavity but not extending beyond umbrella margin. Peduncle present, cross-shaped due to the presence of four radial masses of large vacuolated endoderm cells enclosing the radial canals and coalesced into a compact mass above stomach. Mouth with four lips and numerous spherical clusters of nematocysts along the margin. Four radial canals and ring canal broad. Eight adradial gonads continuous over the interradial surface; the eggs develop into planulae on the stomach wall as in European specimens. Usually 12-15 and up to 20 solid marginal tentacles per quadrant arranged in a single row; ill defined marginal bulbs which rather resemble a swollen tentacle base with a small adaxial ocellus. Gonads, stomach and ocelli brilliant red, bulbs pale red; radial canals may be reddish. A few specimens were found with attached *Cunina* larvae.

Material — Altogether 108 specimens were collected. The temperature range was found to be between 19 — 21° C. Haul M_{153} may have brought back specimens from lower temperatures. The salinity range was between 35.5‰ and 36.25‰. Five specimens were counted in sample M_{122}, salinity 34.1‰. See later (p.) about this sample which seems doubtful. All specimens were taken in June and November, in shallow waters, depth of botton varying between 41 and 142 m. The two richest hauls, one with 48 specimens and the other with 42 were taken between 10-0 m, 17 June 1956 at 23 p.m. and 8.55 p.m., salinity 35.8‰ to 35.9‰ and 20.5° C temperature, over bottoms 41 m and 48 m deep, off Santos; mature specimens 3-4 mm high (preserved). All but six specimens were taken in June (winter), the six summer specimens (M_{153} and M_{155}) were taken in night hauls as were most of the successful winter hauls. The only successful daylight hauls was M_{120} with a single specimen. This species was absent in intervening daylight stations, and since all the samples are from surface layers, this suggests that it undertakes vertical diurnal migrations. The hydroid is known to inhabit harbours.

Distribution — Eastern North Atlantic: English Channel, Firth of Forth, Ilfracombe; Mediterranean including the Adriatic. Western North Atlantic from Cape Cod southwards to Cuba. Pacific Ocean: from Hokkaido (Japan) to Tsingtao (China); ?Amboina. Indian Ocean: Chagos Archipelago. A widely distributed warm water species.

Discussion — The presence of developing planulae on the gonads of a few of my specimens confirms Mayer's (1910), Bigelow's (1913), Kramp's (1935) and Russell's (1953) view that the American *T. nutricula* and European *T. polycirrha* are one and the same species.

FAM. Hydractiniidae

Podocoryne minima (Trinci.)

Cytaeis sp. (?) Browne 1898, p. 189-190.
Podocoryne minuta Neppi & Stiasny 1913, p. parte, p. 24, pl. 1, fig. 12, pl. 2, fig. 13a-13b
Podocoryne minima Russell 1940, p. 528.
Podocoryne minuta Babnik 1948, p. 19.
Podocoryne minima Russell 1953, p. 134, text-figs. 63 A-C, 64.

TYPE LOCALITY — Gulf of Napoles.

SPECIFIC CHARACTERS — Four perradial marginal tentacles; medusa buds on stomach; peduncle present. Four elongate tentaculiform lips terminating in apical knob.

HYDROID — Unknown.

MEDUSA — Umbrella ovoid to bell shaped may reach 1 mm, specimens 0.8 mm high may be sexually mature. Jelly rather thick often with apical thickening. Velum well developed. Peduncle present, short. Stomach small, cylindrical. Four perradial lips elongated into tentacles bearing each a nematocyst cluster at its apex. Four radial canals and ring canal very narrow. Four interradial gonads when mature appear to surround stomach. Medusa buds present on stomach. Buds and gonads may be produced at the same time. Four solid perradial marginal tentacles; four marginal bulbs, rounded, bearing dark brown pigment but no ocelli. Colour of marginal bulbs and stomach from yellowish to brown or dark brown.

MATERIAL — Altogether 753 specimens were counted. The species was found in bays and mangrove regions from Cananéia to the bay of Ilha Grande. It affords a good example of patchiness in the distribution of plankton organisms. On 27 October 1955 three hauls were made all at 6 m depth in three different but not distant points in the lagoon region of Cananéia, the first at 4.30 p.m., the second at 4.45 p.m. and the third at 5.10 p.m.. The first haul yelded 2 specimens, the second 41 and the third 707 specimens. Most specimens carried medusa buds.

Specimens were collected in July, September and October 1955, all taken between 40 m and the surface. Ripe gonads were seen both 13 July and 27 October. It is most probably a short lived species, neritic, euryhaline and eurythermic. It has appeared here suddenly in large shoals, otherwise rare. A single specimen (M_{74}) was taken off shore in low salinity (33‰) surface coastal waters of 20°C, SE off Santos over 70 m depth. This must be considered a stray specimen.

DISTRIBUTION — Eastern North Atlantic: Plymouth, Naples, Adriatic Sea. Pacific Ocean: (?) Japan.

Discussion — My findings confirm Browne's (quoted from Russell l.c., p. 135, text-fig. 63[B]) that the gonads surround the stomach completely when fully developed. In the Baía da Ilha Grande I have also found a mature female 800 micra high, very well preserved and in every respect similar to *P. minima* except for the absence of a peduncle. Since the same day at a near by station in the same bay I found specimens belonging to *P. minima*, I consider the peduncle-less specimen to be an abnormal *P. minima*. All my specimens had only four tentacles and showed no sign whatsoever of more tentacles; I therefore regard as most improbable the synonymy of *Dysmorphosa* (*Podocoryne*) *minuta* Mayer with this species.

fam. Bougainvilliidae sens. Russell 1953

Anthomedusae without exumbrellar nematocyst tracks; with short stomach not extending beyond umbrella margin; with or without peduncle, with simple tubular mouth, with four, eight or more unbranched or four dichotomously branching oral tentacles inserted above mouth opening; oral tentacles or tentacle branches usually terminated with a nematocyst knob; with four radical canals; with gonads situated adradially or interradially or completely surrounding stomach; with or without asexual budding; with two, four or more solid solitary tentacles or with four, eight or sixteen large marginal bulbs each with a group of solid marginal tentacles; with or without ocelli.

Hydroid, where known, with a single whorl of filiform tentacles.

The principal characteristic is the group of solid unbranched or branched oral tentacles inserted above the opening of the simple tubular mouth.

The above definition is the same as given by Russell (1953, p. 143) with the following additions: eight or more oral tentacles; oral tentacles or their branches usually terminated by nematocyst knobs.

Russell divided the family in three sub-families whose definitions modified from Russell is:

Lizziinae, four or eight unbranched oral tentacles; marginal tentacles solitary or in groups.

Thamnostominae, with four branching oral tentacles, with two, eight or more solitary marginal tentacles.

Bougainvilliinae, with four branched oral tentacles, with four, eight or sixteen groups of marginal tentacles.

To these may conveniently be added a fourth, as follows:

Cytaeinae, with six, eight or more unbranched oral tentacles, with four marginal tentacles. Type genus: *Cytaeis*.

SUB-FAM. Cytaeinae

Genus *Cytaeis* Eschscholtz 1829

Cytaeinae with more than four, usually eight or more solid oral tentacles terminated in nematocyst knob. Four simple, solid perradial marginal tentacles. Gonads interradial or adradial. Hydroid unknown.

TYPE SPECIES — *Cytaeis tetrastyla* Eschscholtz 1829.

Cytaeis tetrastyla Eschscholtz

Cytaeis vulgaris Maas 1905, p. 8, pl. 1, fig. 4-7.
Cytaeis vulgaris Bigelow 1909, p. 190, pl. 6, fig. 3; pl. 40, figs. 2, 5; pl. 43, fig. 4.
Cytaeis tetrastyla Mayer 1910, p. 132-133.
Cytaeis tetrastyla Vanhöffen 1910, p. 204, fig. 6.
Cytaeis atlantica Mayer 1915, p. 200.
Cytaeis atlantica Thiel 1938a, p. 297.
Cytaeis tetrastyla Thiel 1938a, p. 298.
Cytaeis tetrastyla Kramp 1948, p. 3.
Cytaeis tetrastyla Kramp 1953, p. 263.
Cytaeis tetrastyla Kramp 1956a, p. 2.
Cytaeis tetrastyla Kramp 1956b, p. 153, 154.
Cytaeis tetrastyla Kramp 1957, p. 7.

TYPE LOCALITY — Mediterranean.

SPECIFIC CHARACTERS — Eight to twelve oral tentacles, manubrium small, marginal bulbs small, rounded, no medusa buds.

HYDROID — Unknown.

MEDUSA — Umbrella ovoid, jelly fairly thick on the sides of the bell, quite thick at the apex. Two to three mm high, about two mm wide. My largest mature specimens are two mm high. Four straight radial canals and ring canal fairly broad. Velum fairly broad. Four stout solid perradial tentacles each with a well defined rounded bulb. Tentacles as long as bell height in preserved specimens; some specimens have longer tentacles showing that when they are fully extended they probably reach a length of twice the umbrella height. Manubrium large, flask shaped to spherical when the gonads are mature, only larger specimens have a very slight peduncle. Manubrium between one third to half the height of the subumbrellar cavity. There are six to thirteen solid oral tentacles terminating in nematocyst knob. These tentacles arise at a short distance above the simple tubular mouth. There are no medusa buds. Gonads interradial, the testicles are large bulging vesicles, yellowish in preserved material. The ovaries are bulging masses of ovocytes which gradually become detached from the stomach's surface as they grow, upon maturity each ovum

remains attached only by means of a short peduncle which eventually breaks off liberating the ovum. Specimens 1 mm have incipient gonads and sometimes specimens may be found with gonads when only 1 mm high. The tentacle bulbs and tentacle tips bear brownish pigment; stomach yellowish (colours of formalyne preserved specimens).

Material — On the whole 128 specimens were taken, June 1956, July 1955 and November 1956, in coastal and shelf waters between Ilha Grande and Paranaguá. The temperature range is 20.5°C to 22.7°C and the salinity between 33.46 to 35.84‰. The greatest number, 121 specimens, were taken 17 June 1956 at 11 p.m., 20.58°C and 35.8‰ salinity in surface layers over a depth of 41 m. It is most probably a warm water species of high salinity.

It was taken from August to May at the Great Barrier Reef.

Distribution — Atlantic and adjacent seas: Mediterranean, Canary Islands, Açores, Cape S. Roque (Brazil); Pacific Ocean: Northwest of the Galápagos, Torres Strait. A warm water probably widely distributed species, may be found in oceanic waters.

Discussion — I was fortunate to compare my material with specimens of this species determined and donated by Prof. P. L. Kramp, taken at Atlantide st. 30; 19°54′ N — 22°42′ W, 10 m.w. out, on 5-12-1945. My specimens agree entirely with these except that are much paler, almost colourless and much smaller. Two species of this genus were recorded from the Mediterranean and neighbouring Atlantic region: *C. tetrastyla* is the smaller of the two in size, has the smallest number of oral tentacles and also small basal bulbs; next in size comes *C. pusilla* confined to the Mediterranean, with small bulbs and 12 to 24 oral tentacles. *C. tetrastyla* has already been recorded from Brazilian waters, at 1°N — 46°W (Thiel 1938a). Other two species were described in the genus: *C. vulgaris* from the Malayan region and Palao Islands, with large basal bulbs and 32 oral tentacles and *C. herdmanni* from Ceylon, with large pyriform bulbs and 50-60 oral tentacles; both are considered by Kramp (1953) to be synonyms of *C. tetrastyla*. *C. atlantica* is also a synomym of *C. tetrastyla* (see Kramp l.c.). *C. pusilla* may be a valid species.

SUB-FAM. Bougainvilliinae

Bougainvillia frondosa Mayer

Bougainvillia frondosa Mayer 1900b, p. 41, pl. 3, fig. 5.
Bougainvillia frondosa Mayer 1910, p. 171, pl. 16, fig. 6.
Bougainvillia frondosa Vannucci & Rees, in preparation.

Type locality — Tortugas, Florida.

Specific characters — No ocelli. Small size. Oral tentacles branch two to three times and have long basal trunk. Two tentacles on each marginal bulb. Planulae develop on stomach wall.

Hydroid — Unknown.

Medusa — Umbrella ovoid higher than wide, sides almost straight. Two mm high. Manubrium cruciform in cross section, short and flask shaped. Oral tentacles branch dichotomously two to three times and have a long basal trunk. Marginal bulbs bear two tentacles each. Ocelli absent. Radial canals and ring canal narrow. Gonads radial, interradial and adradial (?), planulae develop on surface of the stomach in mature specimens. According to Mayer, endoderm of manubrium and bulbs pinkish white, tentacle tips turquoise. The bulbs of my specimens, preserved, are coloured light yellow.

Material — Three specimens taken the same day, 17-6-1956, at three different stations near 26° S — 47° W, off the state of Sta. Catarina, Brazil, over 90-99 m bottom, in surface waters with temperature between 19.6° — 20°C and salinity 35.44 — 35.57‰.

Distribution — Florida Keys (Tortugas Island). Found in June-July at Tortugas and the beginning of winter in Brazil. In both cases with maturing planulae. Probably a warm water species.

Discussion — This seems to be the first time the species has been recorded again since the original description by Mayer. This and *B. muscoides* are the only species of the genus devoid of ocelli. It is clearly defined, there being only one unclear point and that is the position of the gonads. Mayer states that there are eight adradial gonads, but his figure (pl. 16, fig. 6) shows four perradial gonads. My material is inadequate to settle this question. The best preserved and larger specimen bears so many planulae on the stomach that it is difficult to recognize the actual boundaries of the gonads. They are surely not perradial, but seem to be four in number and interradial rather than adradial. Apparently a rare species.

Bougainvillia ramosa (van Beneden)

Bougainvillia ramosa Russell 1953, p. 153, pl. 8, fig. 1; pl. 9, fig. 4-5; text-figs. 74 A-C.
Bougainvillia ramosa Vannucci & Rees, under press.

See Russell for a complete list of references.

Type locality — Ostende.

Specific characters — Jelly thick. Oral tentacles branch from one to three times. Four to nine tentacles on each marginal bulb. Round ocelli on bases of tentacles. Peduncle absent or slight.

Hydroid — *Bougainvillia ramosa*. A well known species described by several authors, mainly from the North Sea. It was shown to be very variable according to environmental conditions (see Russel 1953, p. 158; Vannucci & Rees, under press).

Medusa — Rare in plankton catches. A small species up to 4 mm high. Jelly thick. Peduncle absent or slight. Oral tentacles branch three to four times, usually two. Basal trunk of the oral tentacles tends to be long. Stomach short. Gonads adradial or interradial; the stomach may appear cruciform or rounded when viewed from above depending on the position and state of development of the gonads. Ring canal and radial canals narrow. There may be up to nine marginal tentacles on each bulb usually only four to five. Marginal bulb oval to rounded, round ocelli on the adaxial surface of the tentacle's base. The present specimens are 1.5-2 mm high and bear interradial immature gonads, six tentacles per marginal bulb and only one division of the oral tentacles.

Material — Only two specimens undoubtedly belonging to this species were collected, both in surface layers off Santos, 17 and 28 June 1954, 20 — 21°C and 35 — 35.8‰ salinity. It is known to occur the year round in the Adriatic, the present findings indicate it to be mature here in early winter while it was found mature in spring in the Adriatic. At Plymouth and the North Sea it desappears during winter but there are records of its presence in the plankton as early as April and as late as December.

Hydroids were here found liberating medusae August 12, 1957, specimens collected at S. Sebastião (State of S. Paulo). The newly liberated medusae had three tentacles on each bulb, they were otherwise entirely similar to Russell's description.

A coastal species rarely found in the plankton.

Distribution —It will probably be found to have a circumtropical and circumsubtropical distribution. Either the medusa or the hydroid have been found in the following localities: North Atlantic: Rhode Island State (U. S. A); Iceland; around the British Islands; North Sea; Norway; Mediterranean. South Atlantic: off Santos, Brazil; Western Pacific: Japan; China; Australia; Amboina. There are a few wide gaps in the distribution of this species which should be filled before it may be stated with certainty to be circumtropical. These are notably: the eastern Pacific, eastern Atlantic and the Indian Ocean. The causes of this incomplete picture of the distribution of the species may lie in its rarity in plankton catches, in it having been confused with other species and in the great variability of the hydroids according to environmental factors.

Discussion — Small but mature specimens have already been recorded (Kramp & Damas 1925, p. 254; Neppi & Stiasny 1913, p. 29, quoting Hartlaub's *B. ramosa* var. *nana* Hartlaub, 1911) from waters of relatively high temperatures. According to Russel the gonads of large specimens are

adradial, while according to Hartlaub they are interradial in what he calls *B. autumnalis* (=*B. ramosa*, see Russell). Probably the interradial position is common in small specimens.

FAM. Pandeidae

Stomotoca dinema (Péron & Lesueur)

Saphenia dinema Forbes 1848, p. 25, pl. 2, fig. 4.
Perigonimus serpens Allman 1863, p. 11.
Stomotoca apicata Agassiz 1865, p. 168.
Perigonimus serpens Allman 1872, p. 327, pl. 11, figs. 7-9.
Dinematella cavosa Fewkes 1881, p. 151, pl. 2, figs. 2-3; pl. 3, fig. 3.
Stomotoca apicata Fewkes 1881, p. 152, pl. 2, figs. 1, 4, 9.
Amphinema dinema Browne 1896, p. 475.
Stomotoca apicata Mayer 1900a, p. 3, pl. 2, figs. 3-4.
Stomotoca apicata Nutting 1901, p. 371, fig. 77.
Stomotoca dinema Mayer 1910, p. 109, text-fig. 60, pl. 9, figs. 8-10; pl. 10, figs. 1-4.
Stomotoca dinema Neppi & Stiasny 1913, p. 18, pl. 1, fig. 8.
Stomotoca apicata Vanhöffen 1916, p. 416.
Amphinema dinema Rees & Russell 1937, p. 62, figs. 1-4.
Stomotoca dinema Babnik 1948, p. 20.
Amphinema dinema Russel 1953, p. 180, pl. 10, figs. 1, 2-4; pl. 11, figs. 1, 3; text-fig. 89.
Amphinema dinema Kramp 1953, p. 265.

SPECIFIC CHARACTERS — Umbrella with apical process. No peduncle. Mouth with four simple lips. Two opposite tentacles. Eight simple unfolded adradial gonads. Fourteen to twenty four small marginal warts.

HYDROID — *Stomotoca dinema* (Rees 1956, p. 347).

MEDUSA — Umbrella tall bell shaped with a much elongate solid apical process. It may reach six mm but my specimens had relatively large gonads when only 1 mm high. Jelly thick at the summit of the umbrella, moderately thick elsewhere. Velum well developed. Manubrium flask shaped, cruciform in section, may be large and extend to umbrella margin. Mouth with four recurved crenulated lips. Radial canal and ring canal rather broad. Two large opposite perradial hollow tentacles with elongate conical basal bulb. Six to ten reduced marginal warts between the tentacles. No ocelli. The stomach is said to be emerald green to yellowish brown or ochre coloured, the tentacle bulbs crimson, purplish or ochreish. My specimens had already lost their colour when studied.

MATERIAL — Four specimens all from surface waters of the state of S. Paulo; taken in June and July. Two specimens 1.5 mm high had large immature gonads. One was found eating *Doliolum*, it is known to feed also on *Obelia, Calanus, Sagitta* and *Eutima*. Found in about 22°C tem-

perature and 35‰ salinity. Probably an euryhaline thermophile eurythermic species found in coastal waters, rare.

Distribution — Western North Atlantic: Rhode Island, Tortugas (West Indies); Eastern North Atlantic: British Isles, Ireland, English Channel; Adriatic Sea; Pacific Ocean: Great Barrier Reef; Indian Ocean: Madras (?); Almirante Islands.

Discussion — See Russell and Rees (l.c.). This species has often been called *Amphinema dinema* but the generic name *Stomotoca* has priority.

ord. LEPTOMEDUSAE

fam. Laodiceidae

Laodicea minuscula sp. nov.

(Figs. 4-5)

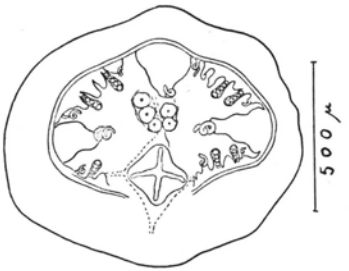

Fig. 4 — *Laodicea minuscula*, oral view.

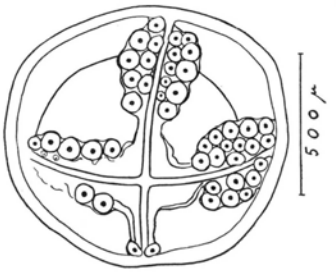

Fig. 5 — *Laodicea minuscula*, aboral view.

Type locality — Ilha Grande bay, state of Rio de Janeiro, Brazil.

Specific characters — Small size, small number of tentacles (four perradial), usually four interradial bulbs, small manubrium, eight cordyli and absence of ocelli.

Description — Umbrella slightly higher than a hemisphere. The larger of the four specimens secured is one mm wide, preserved and mounted in Canada balsam, two specimens have large ova in the gonads. Velum broad. Small stomach with four simple lips. The stomach passes gradually into the radial canals and its walls are continuous with the walls of the gonads. Four straight radial canals and ring canal relatively wide. Gonads large extend from the stomach almost as far as ring canal. The gonads are longitudinally divided by the radial canals. Hollow marginal tentacles and bulbs. Four perradial tentacles each with a large hollow pear shaped bulb.

No ocelli could be seen. The tentacles are thick, short and coiled spirally. There are no lateral cirri. Between adjacent tentacles, in each quadrant, there is an interradial hollow conical bulb; in one of the quadrants there are two such bulbs, side by side. The interradial bulbs are flanked by a large cordylus on each side. Between each cordylus and the large radial bulb there are either one or two long spirally coiled cirri.

Material — Two specimens from sample M_{66}, taken at 7.55 a.m. from 36 m depth with open net in the Ilha Grande Bay, 13 July 1955. Two specimens from sample M_{72} taken 27 October 1955, at 5.10 p.m., 6 m depth with open net in the lagoon region of Cananéia. It was found in inshore waters of the states of S. Paulo and Rio de Janeiro, associated to coastal species, in samples in which either *Aglaura* was absent or *Liriope tetraphilla* relatively much more abundant (453 spec. *Liriope* against 9 *Aglaura*).

Catalogue number of type specimen: Coel. Hydrom. n.° 32.

Discussion — *Laodicea* (?) *neptuna* from the Tortugas, Florida, resembles this species in size, but although Mayer (1910) still includes it in this genus, Browne(1907b, p. 469) had already rightly shown that it does not belong here, due to the absence of cordyli. The closest relative to the present species appears to be *Laodicea fertilis* from Sidney Harbour, New South Wales. The present species differs from *fertilis* for its very small size, for having only four tentacles and for its large pyriform bulbs. *L. ocellata* Babnik (1948, p. 23, figs, 4-5), also a small species, has a much larger number of tentacles. *Laodicea pulchra* is larger and has a much greater number of tentacles. At first sight this species appears to be very similar to *Krampella dubia* Russell (1957, p. 445, figs. 1-2), but the presence of cordyli in *L. minuscula* and presence of eight large tentacles and bulbs in *K. dubia* separates the two sharply.

?*Laodicea undulata* (Forbes & Goodsir)

Two specimens both very young and one poorly preserved were tentatively referred to this species. They were taken 5 November 1956 at 6.10 p.m. in temperature varying between 19.61-20.40°C and salinity between 35.2-35.6‰, at 28° S — 48°22′ W, sample M_{152}. The present identification agrees with the distribution of previous records.

Distribution — Eastern North Atlantic: British isles, Belgian coast, Skagerak, between Iceland and Scotland, Iceland, Portuguese coast, Mediterranean and Black Sea; Western North Atlantic: from Massachussetts to Cuba and West Indies (Vanhöffen 1916, p. 420), off Aracajú (Brazil) and southwest of Cape of Good Hope (Kramp 1957, p. 27), Patagonia (Thiel 1938b, p. 322).

FAM. Campanulariidae

SUB-FAM. Obeliinae

GENUS *Obelia*

HYDROID — *Obelia.*

MEDUSA — *Obelia.* I follow Russell (1953, p. 396) in restraining from attributing specific name to the medusae belonging to this genus since there is a great confusion in the distinction of the species. The purpose of this paper being mainly the recognition of the medusae belonging to different water masses and since all species of *Obelia* are known to be coastal forms, it was not deemed necessary nor interesting for the time being to go into details to distinguish the species. This will be profitably undertaken only when breeding experiments, countings and measurements of morphologic and other characters of large populations will be possible.

Three different species belonging to this genus were recognized with a certain degree of certainty. The first is *O. hyalina* (Vannucci 1955) known to occur in the lagoon region of Cananéia. The second and most abundant probably is *O. geniculata* found here to be quite small, slightly over 1 mm at maturity and with about 56 tentacles. The third species has rather folded lips and was not identified.

Six different species of hydroids were described from Brazilian waters: *O. angulosa, O. braziliensis, O. commissuralis, O. geniculata, O. hyalina* and *O. bicuspidata.*

MATERIAL — Altogether 179 specimens of *Obelia* were counted they were taken in January, March, June, October and November. It may probably be found the year round. The temperature range was found to be 16.48 — 29°C and the salinity 32.59 to 36‰. These species were found along the coast and in the vicinity of the isle of Fernando de Noronha (3°52′ S — 32°23′ W). The most abundant catch (M_{cs}) brought back 62 specimens, July 13, 1955 at 11 a.m. in a vertical haul 40-0 m over 52 m depth in the Ilha Grande Bay (State of Rio de Janeiro).

DISTRIBUTION — *Obelia geniculata* is cosmopolitan and the genus may be found everywhere. These are among the commonest and most abundant medusae in coastal waters. The hydroid grows on drift wood and ship's hulls and medusae are produced by the floating colony. The distribution of these species thus does not seem to be very significative.

SUB-FAM. Campanulariinae

Clytia cylindrica Agassiz 1862, p. 306, pl. 27, figs. 8-9; text-figs. 41-44.
Campanularia attenuata Calkins 1899, p. 350, pl. 2, figs. 9-9c; pl. 6, fig. 9d.
Clytia cylindrica Nutting 1901, p. 343.
Clytia attenuata Nutting 1915, p. 60, pl. 13. fig. 5.
Clytia cylindrica Vannucci & Ribeiro 1955.

SPECIFIC CHARACTERS — The medusa has 16 tentacles at maturity, sixteen statocysts, elongated gonads in the outer third or fourth of the radial canal.

HYDROID — *Clytia cylindrica.*

MEDUSA — The adult medusa may reach five to six mm in diameter. Flatter than a hemisphere. Sixteen tentacles, 16 intervening statocysts, four simple lips, manubrium and velum small. Along the distal third or fourth of the radial canals there are elongated gonads, each ovary bearing 20-35 large ova.

MATERIAL — Where present, usually in large patches. Always to be found in coastal waters. An eurihaline and probably eurythermic species prefering warm waters. Medusae produced the year round. Feeds voraciously on copepods. It was found in temperatures of 19°C to 20.4°C and higher. The largest sample with 268 specimens (M_{72}) was taken in the lagoon region of Cananéia, 27 October 1955, at 5.10 p.m., depth of 6 m. Two more specimens also belonging to the genus *Clytia* were found one in the vicinity of the oceanic isle of Trindade (20°30′ S — 29°22′ W) and the other near the isle of Fernando de Noronha (3°52′ S — 32°23′ W).

DISTRIBUTION — Medusa known from Cananéia and Bay of Ilha Grande. The hydroid is known from Massachussetts to Panama and from S. João da Barra (20°50′ S — 40° W) to Cananéia (25° S — 47°50′ W). Cameron (Africa). American Pacific Coast, from Vancouver Island to the Galapagos.

DISTRIBUTION — The genus *Clytia* is greatly in need of a careful revision. Very few species are known with certainty and according to Mayer's definition (1910, p. 266), supported by Vannucci & Ribeiro (1955, p. 77)it is distinguished from *Phialidium* by never having more than 16 tentacles and an equal number of marginal vesicles. *Clytia cylindrica* differs from the other hitherto known species of the genus in having elongated gonads.

Sixteen more specimens belonging to the genus *Clytia* were found in the Bay of Ilha Grande. These had rounded gonads but were immature and could not be determined with certainty. They belong perhaps to *Clytia folleata*, known to occur in the whereabouts of Santos. Found in coastal waters.

FAM. Lovenellidae

Lovenella cirrata (Haeckel)

Mitrocoma cirrata Mayer 1910, p. 288, text-fig. 154.
Mitrocoma cirrata Kramp 1924, p. 17.
Mitrocomium cirratum Kramp 1932, p. 320.
Euchilota multicirrata Thiel 1938b, p. 330, fig. 8.
Eucheilota cirrata Kramp 1955, p. 254.

SPECIFIC CHARACTERS — Sixteen or more marginal vesicles. Sixteen tentacles and about 48 rudimentary bulbs. Two to four cirri on each side of tentacle's bases.

HYDROID — Probably "*Campanulina*" like.

MEDUSA — Umbrella lower than a hemisphere to hemispherical, may reach 8 mm in diameter. The size of the present specimens varies between 500 micra to 4.5 mm. Jelly moderately thin. Velum narrow. Manubrium short and small, without peduncle, mouth with four simple lips. Four straight radial canals and ring canal narrow. The larger specimens have 16 tentacles there being two to three rudimentary bulbs and one, sometimes two, marginal vesicles between adjacent tentacles. The tentacles bearing bulbs are long, conical, flanked by three to four pairs of spirally coiled cirri. Rudimentary bulbs also bear lateral cirri, usually more than one pair. Gonads elongated having proximal part of radial canals free and not quite touching ring canal, each gonad is parted longitudinally by radial canal. Young specimens have rounded to oval gonads about half way on radial canals but nearer to ring canal.

No sexually mature medusae were found in the samples. Some very small specimens were secured, linked to the larger ones by intermediate stages. The smallest specimens are 0.5 mm across, have four tentacles with two pairs of cirri per bulb and only four marginal vesicles, they bear no gonads and some still have an umbilical canal. Specimens 1 mm wide have four small, rounded incipient gonads, eight marginal vesicles, four marginal tentacles whose bulbs are flanked by two pairs of cirri. The cirri develop in pairs, the two members of a pair appearing at the same time, both in the tentacular bulbs and in the rudimentary ones.

MATERIAL — Twenty eight specimens were collected in June and July in waters of aproximately 21°C and 35‰ salinity. One doubtful specimen from waters of slightly lower temperature and about the same salinity (M_{152}) was taken in November further south (28°00′ S — 48°22′ W). No fully mature specimen was collected here until now. A warm water euryhaline species.

DISTRIBUTION — Mediterranean; Cape Verde and Canary Islands; Gulf of Guinea; Gold Coast; Brazil, near the mouth of the Amazon.

Discussion — Russell (1953, p. 306) very clearly separates *Eucheilota* from *Lovenella* by the number of marginal vesicles, there being only eight in the former and sixteen or more in the latter. Kramp (1955, p. 254) includes this species in the genus *Eucheilota*, but since there are 16 marginal visicles, according to Russell's system it should be transferred to *Lovenella*. I was fortunate to compare my specimens with some donated and determined by Prof. P. L. Kramp, coming from "Atlantide" st. 77 (Accra, Gold Coast), taken 26 January 1946, with 10 m wire out. My specimens agree with the African ones except that none of mine are mature whilst both those determined by Prof. Kramp are mature.

The closest ally to this species seems to be *Lovenella clausa* which differs from the present mainly by the small size of the oval gonads and in having only one to three pairs of lateral cirri per bulb.

Eucheilota ventricularis Mc Crady

(Figs. 6-7)

Eucheilota ventricularis Agassiz 1865, p. 74, figs. 104-105.
Eucheilota ventricularis Fewkes 1881, p. 159, pl. 5, figs. 7-10.
Eucheilota ventricularis Mayer 1900a, p. 55, pl. 38, fig. 128.
Eucheilota ventricularis Mayer 1910, p. 282, pl. 37, fig. 5; pl. 38, figs. 1-1"

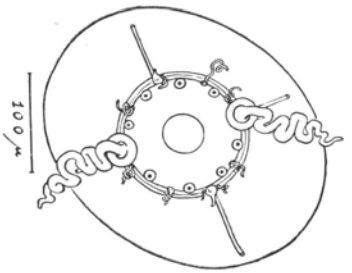

Fig. 6 — *Eucheilota ventricularis* recently liberated, material from aquaria in São Paulo.

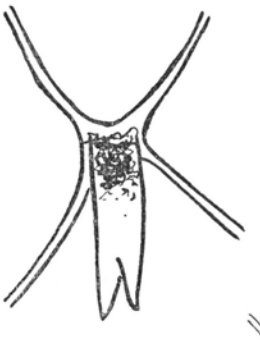

Fig. 7 — *Eucheilota ventricularis*, manubrium.

Specific characters — Sixteen marginal tentacles; eight marginal vesicles; there may be or not some pigment on stomach.

Hydroid — Unknown, probably *Campanulina*-like.

Medusa — Umbrella hemispherical, up to 10 mm high according to Mayer; the present specimens were found to have large gonads when 6-8 mm high (preserved). Jelly rather thick, thinner at sides. Velum broad. Stomach small, without peduncle, mouth with four well developed recurved lips with narrow rims. Four straight radial canals and ring

canal narrow. Gonads on radial canals, elongated, leaving proximal third and distal portion free. Sixteen to twenty marginal tentacles; the present specimens were found to be mature with 8-16 well developed tentacles and eight smaller adradial bulbs. Marginal bulbs elongated conical and large. My specimens have two-three rudimentary bulbs between each of the sixteen well developed ones. Spiral cirri are present one on each side of marginal tentacle base and rudimentary bulbs. Eight closed marginal vesicles with six-eight concretions which are usually dissolved in preserved material. There may be pigment on interradius of stomach. According to Mayer stomach, gonads and bulbs are green; the present preserved specimens are colourless except for the pigment on stomach and some black pigment on tentacle bases of some of the specimens. It was found feeding on *Sagitta*.

Material — Fourteen specimens were collected at Ubatuba and only seven at the other stations, respectively at 24°06′ S — 45°53′ W (M_{40-51}) and in the Ilha Grande Bay. All the specimens come from shallow waters; five come from a 40-0 m deep haul. Specimens were taken in June-July, some of them with developing gonads, mature specimens were taken at Ubatuba 21-11-1956. Some specimens were liberated in aquaria in S. Paulo, 12 August 1957, but the hydroid stock could not be identified with certainty. The newly liberated medusae are almost spherical, 250-300 micra in diameter; they have two perradial tentacles, each with a basal bulb flanked by a single cirrus. The perradial bulbs and tentacles at ninety degrees with these are small and undeveloped. There are four incipient radial tentacles with a small incipient bulb. The small perradial tentacles are flanked by a single cirrus. One was found with two cirri. The interradial tentacles bear cirri. There are eight relatively large marginal vesicles with a single concretion each. The stomach is small, quadratic and lips are only slightly represented. Pigment on the interradii of the manubrium may be present. The radial canals and ring canal are narrow. There is no sign of gonads (Fig. 6). This description agrees closely with the one by Kramp (1926b, p. 244) for specimens 1 mm wide of *E. maculata* taken in the plankton.

Distribution — This species was hitherto known from Virginia, North Carolina, South Carolina. It was here found in inshore waters, in mangrove regions and bays subject to strong lowerings of salinity and high temperature.

Discussion — *E. ventricularis* previously known from the western north Atlantic is now recorded also from the southern Atlantic. Specimens were found with and others without dark pigment on manubrium; when present the pigment is not arranged in a regular black spot and thus the American species is held separate from *E. maculata*. Pigment is usually absent in the American specimens. Developmental features are similar to those of *E. maculata;* young specimens have a single cirrus per marginal bulbs.

FAM. Eutimidae

Eutima mira McCrady

Eutima mira Agassiz 1865, p. 116.
Eutima limpida Agassiz 1865, p. 116, figs. 173, 178.
Eutima mira Brooks 1884, p. 709.
Eutima mira Nutting 1901, p. 378, fig. 93.
Eutima mira Hargitt 1908, p. 111.
Eutima mira Mayer 1910, p. 295, pl. 39, fig. 1; pl. 40, figs. 3-3'.
Eutima mira Vanhöffen 1916, p. 424.

SPECIFIC CHARACTERS — Four perradial marginal tentacles; eight gonads on radial canals, four on peduncle, four on sub-umbrella.

HYDROID — *Eutina mira* (*Campanopsis*). Tentacles unite by a basal membranous web, no hydrotheca was observed in the primary hydranth reared by Brooks.

MEDUSA — Umbrella about 1.5 times wider than high; 15-30 mm in diameter according to Mayer. My larger specimens are 7.5 mm (preserved). Velum well developed. Peduncle elongated, slender, with conical base, two to three times as long as bell height, bears the stomach at its distal end; becomes quadratic in cross section when the gonads develop. Stomach small, square in cross section, may be repeatedly folded near its junction with the peduncle. Mouth with four recurved lips which may be folded. Four straight radial canals and ring canal narrow. Four hollow radial marginal tentacles, about three times as long as bell height, smooth with a basal swelling tapering gradually. In larger specimens there may be up to 25 marginal swellings between adjacent bulbs. Lateral spiral cirri flanking tentacular swellings are present in young specimens, as well as marginal swellings; they usually disappear in larger specimens. There are eight closed marginal vesicles, each with 4-8 concretions. Eight gonads, two on each radial canal, leaving between themselves and stomach a free space. The peduncular gonads are longer than the subumbrellar ones and mature first; mature gonocytes may be found in the peduncle when subumbrellar gonads are still beginning to develop; the inverse sequence has also been reported. My specimens are colourless but Mayer states that the stomach, gonads and tentacles are opaque blue-white.

MATERIAL — It is a fragile species, often found torn or otherwise damaged. The size range of my specimens is 0.6 — 7.5 mm umbrellar diameter. The peduncle grows in length as the umbrella grows in width, it is 2r in the larger specimens and 1.5r in 3.5 mm — 4.2 mm specimens, specimens 1mm wide have only the primordium of the peduncle. The number of marginal swellings also increases in number with the growth of the umbrella; there are 3-4 in each quadrant in specimens 1 mm wide; 5-6 in specimens 3.5-4.2 mm and 11 in 7.5 mm wide specimens. Gonads first appear on the

peduncle of specimens 3.5-4.2 mm, the sub-umbrellar gonads are first noticeable in specimens 7.5 mm. The mouth of the smallest specimen is quadrangular and has very simple lips.

Seven specimens, all from the region of the Isle of Fernando de Noronha, four from surface hauls and three from 10 m depth. Hauled in January at 4 p.m., 28°C and 36‰ salinity.

Distribution — North western Atlantic Coast of North America, from Beaufort, North Carolina to Tortugas, Florida. Occasionally further north at Rhode Island and Woods Hole. A neritic warm water species, stenothermic and probably stenohaline.

Discussion — Maas (1905, p. 34) and Mayer (1910, p. 296) merged the species described under the generic names *Eutima*, *Eutimeta*, *Octorchis* and *Octorchandra* into the single genus *Eutima* with 12 species. On the other hand Mayer kept *Saphenia* (=*Plancia*, *Goodsirea* and *Siphonorhynchus*) as a separate genus, but Kramp (1933) and Russell (1953, p. 367) are of the opinion that the species referred to *Saphenia* are juveniles belonging to the genus *Eutima* . The genera included in Mayer's synonymy of *Eutima* refer to different developmental stages. As is well known for hydromedusae generally, marginal organs such as tentacles, marginal swellings and sometimes also statocysts and other sensory organs increase in number as the umbrella grows in size. These is the reason why all these species were correctly reunited in the genus *Eutima* with the only exception of the genus *Octorchis* recently reinstated by Russell (1953).

Mayer uses the following characters to separate the 12 species of *Eutima* which he considered to be valid: number of tentacles, number and position of gonads, presence or absence of lateral cirri. Tentacles however may increase in number with the size of the bell, cirri are easily lost during growth and the position of the gonads is known to be rather variable. Apparently these are not good specific characters.

Vanhöffen (seg. Bigelow 1919a, p. 296) reduced the genus *Eutima* to three species, according to the following key:

With four tentacles . . . . . *E. mira.*
With eight tentacles or more . . . . . 1).

1) — With gonads limited to median region of peduncle . . *E. gegenbauri.*
With large gonads, when present, on peduncle . . . *E. gentiana.*

As shown by Russell, *E. gegenbauri* should better be placed in the genus *Octorchis*. Removing *O. gegenbauri* we implicitly remove its sinonymys: *E. campanulata* and *E. orientalis* (according to Russell 1953, p. 367). *E. curva* Browne may also be considered a synomym, it was described from a single perhaps immature specimen, from Ceylon, being its only difference the absence of sub-umbrellar gonads. Is is known that there may be irregularities in gonad formation in this genus. The number of marginal bulbs in relation to umbrella size is about the same in *E. curva* as in *O. gegenbauri* and *O. orientalis*. For these reasons *E. curva* is

here tentatively considered to be a synonym of *E. gegenbauri*. Kramp (1953, p. 288) however still maintains *E. curva* as a separate species.

Withdrawing *O. gegenbauri* and its synonyms from the general picture of the species of *Eutima*, Vanhöffen's system would be reduced to two species those with four and those with more than four tentacles.

The following species of *Eutima* have four tentacles: *E. mira*, *E. cuculata* and *E. gracilis*.

E. mira is the type of the genus, an atlantic species, variable but well known.

E. cuculata should tentatively be maintained as a separate species due to the presence of an exumbrellar mesogloeal cap over the tentacle bulbs, but is closely related to *E. mira* and perhaps a synonym.

E. gracilis differs from *E. mira* by having two to four (var. *insignis*) tentacles and gonads restricted to the peduncle. Synonyms of *E. gracilis*: *Saphenia gracilis*, *S. dinema*, *S. mirabilis* and *Syphonorhynchus insignis*.

The following species have more than four marginal tentacles: *E. lactea*, *E. levuka*, *E. gentiana*, *E. coerulea* and *E. pretiosa*. *E. lactea*, *E. levuka* and *E. japonica* may be considered as synonyms of *E. gentiana* as postulated by Vanhöffen (seg. Bigelow 1919, p. 298). The only appreciable difference is the slightly larger number of marginal swellings of *E. gentiana* and the presence of the latter species in the Atlantic while the other are Indo-pacific species. Kramp (1953, p. 288) considers *E. lactea* to be a synonym of *E. levuka* and the latter to be a valid species, but does not mention its similarity with *E. gentiana*. Bigelow, however, doubts of this synonymy in view of Vanhöffen's (1912, p. 23) hypothesis of being *E. gentiana* Haeckel an abnormal specimen of *E. gegenbauri*. However, having removed *E. gegenbauri* to the genus *Octorchis* the synonymy between *E. lactea*, *E. levuka* and *E. gentiana* seems probable. Although the descriptions of *E. gentiana* I have seen do not mention adaxial papillae, this does not mean that they do not exist since they are rather difficult to observe and were frequently overlooked by older authors; it may therefore also be true after all that *E. gentiana* must be regarded as a synonym of *O. gegenbauri*, mainly on grounds of geographic distribution.

Finally *E. coerulea* and *E. pretiosa* bear respectively 32 and 60-80 tentacles and may be considered valid species. Furthermore, the main differences between the two are as follows: *E. coerulea* has three marginal swellings between adjacent tentacles while *E. pretiosa* is devoid of swellings; the oral lips of *E. pretiosa* are greatly developed while they are of the common type in *E. coerulea;* the gonads of *E. pretiosa* extend over the whole lenght of the radial canals, are greatly developed and undulated. It is still possible that *E. pretiosa*, described by Haeckel from a single specimen, is a more advanced stage of development of *E. coerulea*.

E. japonica (Uchida 1925, p. 93) seems to be a valid species whose main characteristic are the shortness of the peduncle, large sac-like subumbrellar gonads, small lips and small number of marginal swellings.

Taking into account the above considerations as well as the number of marginal swellings in relation to the size of the umbrella, the following key may be built for the *Eutimidae* provided with eight closed marginal vesicles.

	With nematocyst laden adaxial papillae		gen. *Octorchis*
	Without adaxial papillae		gen. *Eutima*
Genus *Eutima*:			
	With four or less tentacles	1	
	With more than four tentacles	2	
1	With four tentacles	3	
	With two tentacles when young, when four are present, two are usually smaller		*gracilis*
3	With cap above the tentacular bulbs		*cuculata*
	Without cap on bulbar tentacles		*mira*
2	With eight tentacles	5	
	With more than eight tentacles	4	
4	With up to 32 tentacles		*coerulea*
	With more than 60 tentacles		*pretiosa*
5	With four gonads on peduncle		*gentiana*
	With large sub-umbrellar sac-like gonads		*japonica*

The principal synonyms and the distribution of the species of the genus *Eutima* are as follows:

E. mira — *limpida, emarginata, serpentinum.* Atlantic coast of North America, from Cape Cod to Tortugas.
E. cuculata — North Carolina (Atlantic coast of North America).
E. gracilis — *Plancia gracilis, Goodsirea mirabilis, Saphenia dinema. S. mirabilis, S. gracilis, E. insignis, E. elephas.* Atlantic coasts of France and Britain, North Sea.
E. gentiana — *?E. lactea, ?E. levuka.* Canary Islands, Maldive Islands, Fiji Islands, Malayan Archipelago.
E. coerulea — Florida, Bahamas, Tortugas.
E. pretiosa — Australian coasts.
E. japonica — Northern Japan.
Octorchis gegenbauri — *Eutima campanulata, E. orientalis, ?E. curva.* Australia, Ceylon, Mediterranean, Atlantic coasts of Europe.

The synonymy here proposed reduces the genus *Eutina* to six species, the geographic distribution of which is clear and on its side confirms the synonymy postulated merely on morphological bases. Only further studies will tell if they are good species or mere sub-species of a single widely distributed polytypic species.

For the synonymy of *E. gracilis* see also Kramp (1955, p. 263-264).

The present specimens were compared with two specimens of *Eutima gracilis* determined and donated by Prof. P. L. Kramp, taken near Accra, Gold Coast, "Atlantide" st. 77, 26th January 1946. The difference between the two species is slight and the number of gonads must be considered the decisive differential character, there being only four, on peduncle, in *gracilis* and eight, four on sub-umbrella and four on peduncle, in *mira.*

Mayer (1915, p. 201, pl. 3, fig. 5) described a new species from Torres Strait, Australia, under the name of *Eutima australis*. This is described with 64 blunt, short excretory papillae upon the bell margin into which a black pigment is accumulated and from which it is discharged if the medusa be left without food for several days. According to Russell's system this species should be removed to the genus *Helgicirrha*, family *Eirenidae*. Kramp (1953, p. 289) considers *E. australis* a synonym of *E. curva*.

ORD. LIMNOMEDUSAE

FAM. Proboscidactylidae

Proboscidactyla ornata (McCrady)

Willia ornata Agassiz 1865, p. 171, figs. 274a-279.
Willia ornata Fewkes 1882, p. 299, figs. 22, 23 non 24.
Willia gemmifera Fewkes 1882, p. 299, pl. 1, fig. 24.
Dyscannota gemmifera Mayer 1900b, p. 47, pl. 8, fig. 17.
Willia ornata Nutting 1901, p. 377.
?*Proboscidactyla flavicirrata* var. *stolonifera* Maas 1905, p. 21, pl. 4, figs. 24-28.
Proboscidactyla flavicirrata Maas 1906, p. 89.
Proboscidactyla ornata var. *stolonifera* Bigelow 1909, p. 220, pl. 6, figs. 1-2; pl. 41, figs. 1-7.
Proboscidactyla ornata Mayer 1910, p. 189, pl. 20, fig. 1-10, text-fig. 100.
Proboscidactyla ornata var. *gemmifera* Mayer 1910, p. 192, pl. 21, figs. 1-3.
Proboscidactyla ornata var. *gemmifera* Vanhöffen 1916, p. 419.
Proboscidactyla ornata var. *stolonifera* Foerster 1923, p. 30.
Proboscidactyla ornata Uchida 1925, p. 87, fig. 12.
Proboscidactyla ornata Thiel 1938a, p. 301.
Proboscidactyla ornata Kramp 1952, p. 10.
Proboscidactyla ornata Kramp 1953, p. 299.

TYPE LOCALITY — Charleston Harbour (South Carolina, Atlantic coast of North America).

SPECIFIC CHARACTERS — Branched radial canals. Sixteen to twenty marginal tentacles with large darkly pigment bulbs. Intertentacular exumbrellar nematocyst tracks.

HYDROID — Unknown, probably *Lar*-like.

MEDUSA — Umbrella hemispherical with vertical to flaring sides, about 5-6 mm high. Jelly thick. Velum narrow. Stomach wide, short flask shaped, with four bulging sides prolonged sometimes into four rather ill defined radial lobes. A very slight peduncle may be present in large specimens. Four ample undulating perradial lips. Four primary radial canals emerge from the four corners of the stomach. These radial canals

branch alternately to right and left, very often according to the pattern illustrated by Mayer (1910, fig. 100) frequently the branching of the radial canals departs from this basic pattern and becomes rather irregular: always the branches terminate in the bulbs of the marginal tentacles. There may be more than 16 tentacles and as many as 20. The bulbs are hollow, rounded and heavily pigmented with black or dark brown pigment. The tentacles are solid as well as ring canal. The gonads are known to be interradial. Medusa buds may arise directly from the stomach, usually however they are produced on stolons which bud off from the corners of the stomach or at some distance along the radial canals. Medusae with only eight tentacles may already carry other medusa buds and stolons. The buds are liberated as young medusae at the stage of four tentacles each, some were found with five tentacles. Stomach and gonads may be ochre yellow or greenish yellow. The marginal bulbs are very darkly pigmented. A large specimen five mm wide was found with parasitic *Cunina* larvae.

Material — It was found in the area between Ilha Grande and off Torres in June (1954, 1956), July (1955), October and November (1956). Altogether 480 specimens, 58.9% of which taken in June, but found at more stations in October-November. It was always more abundant in night hauls The temperature varied between 19° C and perhaps lower, to 22° C. The salinity between 35.4 ‰ or perhaps 35‰ and 35.8‰ or perhaps 36‰. The richest haul came from the upper 10 m, 11 p.m., 17 June 1956, 20.5° C and 35.8‰ salinity ($M_{134-135}$).

Distribution — From Cape Cod to the Bahamas (*P. ornata* s.str.). Distribution of *Proboscidactyla ornata* s. latu: Pacific Ocean: Malay Archipelago, Great Barrier Reef, Acapulco, Louisiade Island (North Pacific); North western Atlantic: from Cape Cod to the Bahamas; South Atlantic: Fernando Po, eastwards from Rio Grande do Sul, southwards of Rio de Janeiro.

Geographic distribution of the species of the genus — The species of this genus apparently have a rather restricted distribution, being confined to a definite area. They are all neritic forms or coastal. This type of distribution may be due either to definite ecological requirements of the species, or else to the restricted distribution of the polychetes on which the hydroids are known to live. The hydroids, where known, belong to the genus *Lar* which lives on the mouth rim of the tubes of Sabellariid Polychetes. The distribution of the medusae is as follows:

Southern boreal species — 1) — *P. stellata* — North eastern Atlantic, North Sea, Norway and Japan.

P. brooksi — from North Carolina may be a synonym.

Atlantic Ocean —

2) — *P. brooksi* — from North Carolina maybe a synonym or very close ally of *P. stellata*.

3) — *P. ornata* — Western Atlantic, from Cape Cod to the Bahamas. Southern coast of Brazil. Also Isla Quellín, Chile (Kramp, 1952). ? Madras.

4) — *P. mutabilis* — South western Atlantic, Falkland Islands.

Pacific Ocean —

5) — *P. flavicirrata* — North Pacific, Kamtschatka; Eastern Pacific, Vancouver Island, Puget Sound, Washington State.

6) — *P. circumsabella* — Eastern Pacific. California.

7) — *P. occidentalis* — Eastern Pacific. California.

8) — *P. ornata* var. *stolonifera* — Malayan East Pacific region. Acapulco; Lousiade Island in the north Pacific. *P. varians* may be a synonym.

Indian Ocean —

9) — *P. minima* — Gulf of Manaar (south easthern coast of India).

10) — *P. varians* — Maldive Islands. May be a synonym of *P. ornata*. syn. ? *P. tropica* Browne.

Discussion — The genus *Proboscidactyla* is here considered as inclucluding *Willia* according to what has been clearly established by Russell (1953, p. 386). Mayer distinguishes three varieties of the species *P. ornata* (*P. ornata* s. str, *P. ornata* var. *stolonifera* and *P. ornata* var. *gemmifera*). Undoubtedly *P. ornata* var. *gemmifera* is a synonym of *P. ornata* s. str. Mayer considers it to be an immature or budding variety, I believe it is only a question of some specimens being collected with buds and others without, as the case of *Rathkea octopunctata* of which sexual and budding specimens are known to occur. The distribution of the two is about the same: from Cape Cod to the Bahamas for one, and from North Carolina to the Bahamas for the other. *P. gemmifera* has never been found with gonads and *P. ornata* has never been found with buds.

Mayer separates *P. ornata* var. *stolonifera* on grounds of the different place of budding. Stolons are produced at the second or third forkings of the radial canals in this variety and there is a larger (16-20) number of marginal tentacles. This I do not believe to be a sufficient reason to separate them as different varieties. However the geographic distribution is such that it may be reasonable to keep them separate, *stolonifera* being exclusively found in the Malay Archipelago and Acapulco (Pacific coast of Mexico).

Proboscidactyla tropica (Browne 1916, p. 184) is most probably identical to *P. varians* and therefore probably a synonym of *P. ornata.*

Proboscidactyla conica Menon was described from the Madras Coast, but I could not read the paper (Bull. Madras Govt. Mus. N. S. Nat. Hist. Sect., v. 3, pp. 1-32, 3 pls. 1932). *P. ornata* is also recorded from the same area in this paper.

For the Pacific Ocean species see the recent paper by Hand (1954).

ORD. TRACHYMEDUSAE

FAM. Geryonidae

Liriope tetraphylla (Cham. & Eisen)

Liriope rosacea Annandale 1917, p. 103.
Liriope tetraphylla Thiel 1935, p. 49, fig. 30.
Liriope tetraphylla Thiel 1936, p. 45, fig. 10.
Liriope tetraphylla Bigelow 1938, p. 127.
Liriope eurybia Kramp 1947, p. 37.
Liriope exigua Ranson 1949, p. 132.
Liriope tetraphylla Ranson 1949, p. 133.
Liriope tetraphylla Vannucci 1951, p. 91, pl. 3, fig. 24; pl. 2, fig. 4.
Olindias sambaquiensis Vannucci 1951, only fig. 4, pl. 2.
Liriope tetraphylla Russell 1953, p. 419, pl. 24, fig. 2; figs. 275-282.
Liriope tetraphylla Kramp 1953, p. 301.
Liriope tetraphylla Kramp 1956a, p. 4.
Liriope tetraphylla Kramp 1956b, p. 159.

For a complete list of references see Russel 1953, l.c.

SPECIFIC CHARACTERS — Peduncle present. Four radial canals. Centripetal canals from ring canal present. Flattened leaf shaped gonads. Both hollow and solid tentacles. Enclosed sensory clubs.

MEDUSA — A holoplanktonic species with no hydroid stage. Umbrella approximately hemispherical up to 2-3 cm wide. Jelly thick. Tapering long peduncle present, its length varying with the degree of contraction upon preservation and with degree of maturity of specimen, always extending beyond umbrella margin in fully grown specimens, may be as much as twice umbrella height. Velum well developed specially in smaller specimens. Stomach small, rounded, into its cavity projects a conical mesogloeal point visible when the lips are turned up. Four simple or sligthly elongated lips bordered with nematocysts. Four radial canals and ring canal broad; there are usually three and up to seven centripetal canals in each quadrant. There are four small radial primary tentacles which emerge from the exumbrella and are lost in the adult; in the young medusae four short radial and four interradial exumbrellar nematocyst

tracks are present. There are four solid interradial tentacles with nematocyst clusters on their adaxial surface and four secondary marginal perradial tentacles with nematocyst rings. Gonads leaf-like, flattened on radial canals and of very variable shape. Eight closed marginal vesicles embedded in the jelly near umbrella margin; four perradial and four almost interradial just left (medusa seen from the side, manubrium down), on the base of the interradial tentacles. The development and morphology of this species are well known. Frequently gonads, stomach and interradial tentacles rose-red or greenish. Living specimens were seen with brilliant green stomach, red mouth lips, gonads greenish and pink exumbrella.

Material — The larger mature specimens seen were about 2 cm wide when alive. This is by far the most abundant species in the collection, 13,881 specimens were counted. Besides these large shoals were seen (21-7-1953) in the mangrove regions of Cananéia and in the bay of Paranaguá (state of Paraná, 6-9-1953). The temperature range was found to be between 17.53° C and perhaps lower to 29° C. Two specimens were taken in a vertical haul (M_{78}) 108-54 m depth in which the temperature gradient was 12.48 — 17.53° C and the salinity 35.10 — 35.77‰. One of them had immature gonads. Thiel (1936, p. 53, fig. 10) established the lower temperature limit of this species at 20° C. In the present collection 1.785 (12.8%) specimens were surely taken in waters temperatures below 20°C and of these 591 (4.2%) specimens surely came from lower than 19°C. Presumably some of the remainder 12.096 came from temperatures lower than 20° C. Thiel (l.c.) also states that the species is most abundant in the area limited by the 25° C isotherm. In the present collection however only 504 (3.7%) specimens surely come from waters above 25° C.

The salinity range of the species is found to be in this series of samples 33‰ and probably lower up to 36.9‰. Being found active and in large shoals in mangrove regions, probably it tolerates still lower concentrations. Annandale found this species in similar environment in India.

The most abundant catches come from waters with salinity between 35‰ and 36‰ and temperature between 20-25° C, centering around 21-23° C, irrespective of season and hour of day or night. It is a holoplanktonic species which probably breeds the year round since young and adults were collected throughout the year when hauls were made. Largest numbers were taken in November, temperature not higher than 23° C and 35‰ salinity. It is euryhaline and eurythermic prefering warm water.

Distribution — A surface layer, circumtropical species, according to Thiel (1936, p. 53) confined to the area limited by the 20° C isotherm being the majority of specimens comprised in the area limited by the 25° C isotherm. Kramp (1953) found it to be most abundant from

November to January at the Great Barrier Reef. According to the present findings we should say that this species is here found to be usually restricted to the area limited by the 19° C isotherm being most abundant in waters around 23° C and only rarely found in waters with temperature lower than 19° C. Kramp found few specimens near the northern boundary of the Gulf Stream, in waters 13-14° C. The relative abundance of *Liriope tetraphylla* and *Aglaura hemistoma* seems to indicate that the two species exclude each other or have different environmental requirements. The species feeds on Sagittae, copedods, fish larvae and young fish and in aquaria eats small pieces of bloody meat. Large specimens digest their food in about three hours at 20° C. Some specimens bear parasitic *Cunina* larvae. I observed that living specimens are slightly phosphorescent.

Discussion — Russell (l.c.) gives a complete list of references to this species and discusses the question of the numerous "species" described in this genus. Early authors established numerous different "species" which were later merged into one. Some authors have letf the question open and Russell writes that "these variations in form thus remain to be explained and to this end therefore the type to which the animals conform should be stated when the species is reported". Presumably the situation is as follows: this is a holoplanktonic species with direct development, which reproduces the year round and develops reportedly in six days (temperature not stated). It is undoubtedly a very variable species with few predators and efficient defensive means such as long nematocyst laden tentacles and turgescent jelly. A small number of parent animals may therefore, when placed in suitable conditions, produce a large number of viable eggs and therefore a large number of offsprings which tend to agglomerate in extensive shoals and whose members will tend to be similar owing to their common ancestry. This explains the well known fact that specimens from the same patches are similar. For the same reason, different swarms will tend to be rather dissimilar. The crossability of specimens from different populations is demonstrated by the existence of all intermediate morphological forms. Another question, not yet studied, is the possibility of the existence of different ecological races within the species. This question requires future studies.

The capacity of relatively extensive horizontal displacement and the crossability of the different races has probably not favoured the subdivision of the species into subspecies.

According to Thiel (1936, p. 51) larvae and young specimens up to 2 mm diameter have an annular mouth and no peduncle. My specimens when 2 mm wide already have a peduncle as long as the bell diameter. The peduncle grows in length as the umbrella grows in diameter but never exceeds 2.5 times the radius of the umbrella in my specimens. The measurements taken of a large number (over 500 specimens) of living specimens in Cananéia showed that both the length of the peduncle and that of the tentacles is very variable in living specimens due to their

great contractility. Fixation increases the fragility of these organs and augments the variability of their aspect, they cannot therefore be used satisfactorily as systematic characters.

TABLE

Umbrella size in mm	*Length of peduncle in terms of bell radius*	*Sex*	*N.º of centripetal canals*
0.9	0	larva	—
1	0	"	—
1.5	0	"	—
2	r	juvenile	— attached
2.4	1.2r	"	1 *Cunina* larva
3.5	1.5r	"	3
5	2.5r	female	1
5.5	2r	"	3
6	2r	"	3
6.4	2.5r	"	3
6.5	2.5r	male	1
8.4	2r	mature male	1

This table refers to specimens from Fernando de Noronha.

Gerionia proboscidalis (Forskal)

Geryonia proboscidalis Leuckart 1856, p. 8, pl. 1, fig. 3.
Geryonia proboscidalis Gegenbaur 1856, p. 254, pl. 8, fig. 16.
Geryonia fungiformis Fol 1873, p. 472, pl. 24-25.
Geryonia hexaphylla Maas 1897, p. 26, pl. 3, fig. 6.
Geryonia mexicana + *Carmaris rosea* Agassiz & Mayer 1902, p. 149, pl. 4, fig. 17-18.
Geryonia proboscidalis Vanhöffen 1902, p. 84, pl. 10, fig. 15.
Geryonia proboscidalis Bigelow 1909, p. 116.
Geryonia proboscidalis Mayer 1910, p. 425, pl. 53, figs. 1-3; pl. 54, fig. 10.
Geryonia elephas Mayer 1910, p. 427, fig. 283.
Geryonia elephas Vanhöffen 1912, p. 373.
Geryonia proboscidalis Bigelow 1913, p. 56.
Geryonia proboscidalis Neppi & Stiasny 1913, p. 59.
Geryonia proboscidalis Bigelow 1915, p. 316.
Geryonia proboscidalis Browne 1916, p. 199.
Geryonia proboscidalis Bigelow 1938, p. 127.
Geryonia proboscidalis Kramp 1924, p. 34.
Geryonia proboscidalis Uchida 1928, p. 83, fig. 4.
Geryonia proboscidalis Thiel 1936, p. 53.
Geryonia proboscidalis Kramp 1953, p. 301.

SPECIFIC CHARACTERS — The same as in *Liriope*, but with hexamerous symmetry.

Medusa — A holoplanktonic species. In all respects similar to *Liriope tetraphylla* except in the symmetry which is tetramerous in *Liriope* and hexamerous in *Geryonia*. Umbrella hemispherical to nearly spherical, stated to be up to 80 mm in diameter. Jelly thick. Peduncle long, tapering gradually, with a conical point extending into the stomach. Six simple or slightly elongated lips. Radial muscle fibers well developed in the sub-umbrella and peduncle. Six primary perradial exumbrellar tentacles; six perradial, marginal, hollow secondary tentacles with nematocyst rings, six solid interradial tentacles, with nematocyst puffs on adaxial surface. Six radial canals and ring canal rather broad. Six to seven blindly ending centripetal canals arise in each sextant from the ring canal, they are alternately long and short. Twelve enclosed marginal vesicles with a single statolith, six perradial and six near the base of the interradial tentacles. Large leaf like gonads develop on the radial canals. Usually pink or colourless.

Material — A single specimen from sample M_{14}, in the Fernando de Noronha region, taken 27-1-1954, temperature 29° C and salinity presumably about 36‰. It is a well preserved specimen with the complete set or tentacles. The six secondary perradial tentacles have each 10 adaxial nematocyst batteries. This specimen is 5.6 mm wide and has no gonads. The centripetal vessels are not very evident but six may be counted with certainty, one in each sextant. Kramp (1924, p. 35) observed that two over four specimens 5 mm in diameter, from the Mediterranean had only the central interradial centripetal canal, while those 7 mm wide had two additional ones in the process of budding. According to the same author gonads begin to appear in specimens 30 mm wide.

Distribution — Circum-tropical in surface layers. Very abundant in the Mediterranean, elsewhere rare. Thiel (1936, p. 56) considers the natural boundary to be the isotherms of 15° C. Probably stenohaline of high salinity and eurythermic.

Discussion — In all details this species is similar to *L. tetraphylla* including developmental features differing only in the symmetry. This fact allied to the rarity of *Geryonia* when compared to *Liriope* led Thiel (1936, p. 54) to presume the former to be a mere variety of *Liriope*, which however seems rather improbable, because, as Thiel himself points out, even the very early stages of both genera have a clearly defined symmetry. It seems however extremely probable that *Geryonia* evolved from *Liriope*. *Geryonia elephas* Haeckel 1879 described from a single South African specimen and never again recorded may be considered a synonym of *G. proboscidalis* and thus the genus is reduced to one species. The features mentioned to be distinctive were: globular bell, longer cylindrical peduncle and wider gonads, all characters which are not of specific rank.

FAM. Rhopalonemidae

Rhopalonema velatum Gegenbaur

Rhopalonema velatum Gegenbaur 1856, p. 251, pl. 9, figs. 1-5.
Rhopalonema typicum Agassiz & Mayer 1902, p. 152, pl. 5, figs. 21-22.
Rhopalonema coeruleum Mayer 1910, p. 380, p. parte, text-fig. 222.
Rhopalonema striatum Mayer 1910, p. 381, text-fig. 224.
Rhopalonema clavigerum Mayer 1910, p. 382, pl. 49, fig. 1, text-fig. 225.
Rhopalonema velatum Thiel 1936, p. 10.
Rhopalonema velatum Bigelow 1938, p. 113.
Rhopalonema velatum Kramp 1947, p. 13.
Rhopalonema velatum Babnik 1948, p. 41.
Rhopalonema velatum Kramp 1953, p. 299.
Rhopalonema velatum Russell 1953, p. 430, text-figs. 283-284.
Rhopalonema velatum Kramp 1956a, p. 2.

For a complete bibliography see Russel 1953, l.c.

TYPE LOCALITY — Mediterranean.

SPECIFIC CHARACTERS — Umbrella eight to ten mm wide. Specimens over two mm have a shallow conical apical process; gonads on middle third of radial canals; eight radial tentacles, one to three smaller intermediate tentacles; eight to sixteen enclosed sensory clubs each on right hand side adjacent to the base of a marginal tentacle.

MEDUSA — Umbrella flatter than a hemisphere, jelly stiff, rather thin, larger specimens have a dome-like apical projection. Velum broad and well developed usually held hanging down and found in this position in preserved material. Manubrium small, elongate, quadrilateral with octogonal base, it first appears in medusae 1 mm wide; when fully extended it may reach the bell margin. Four simple lips. Eight simple radial canals and ring canal narrow. Eight oval to elongated gonads along middle or distal third of radial canals. Eight solid radial tentacles with swollen distal portion; one to three small, solid, rather stiff tentacles in each octant. Small specimens up to 1 mm in diameter have four external sensory clubs hanging from umbrella margin with one enclosed statolith; specimens between one and two mm have eight clubs and specimens two or more mm have 16 clubs which become enclosed.

The manubrium increases in size with the growth of the umbrella, it is absent in very young specimens and the stomach opens by a wide circular mouth with no lips; later 2 lips develop and only specimens 1 mm or larger have four lips. The tentacles are fragile and usually absent in preserved material. Usually the apical process first appears in specimens 1.8 to 2 mm. I have however found a specimen 1 mm wide which already had eight statocysts and a well formed apical process; it is present in all

specimens larger than two mm. Gonads were found to be present in specimens 4.5 mm while they were still absent in one 5.6 mm taken at the same place at the same time of year. The statocysts may be quite close to or more distant from the tentacle's base, but are always on their right side (lateral view with manubrium down). The principal food seems to be copepods and appendicularians. Frequently eaten by *Sagitta*. Numerous very small medusae were taken which could be referred to this species thanks to the existence of intermediate stages.

Material — Ninety two specimens were referred do this species, some of them, the smaller ones, with some degree of uncertainty. It was collecetd in January, February, March, June, July and November. It may probably be found the year round. Taken from waters with temperature varying between 18.1 — 29° C and salinities 34-36,7‰. This is a warm water eurythermic holoplanktonic euryhaline species prefering high salinity.

Distribution — A widely distributed species to be found in circumtropical waters, confined between the isotherm of 15° (Thiel 1936, p. 15), the greatest numbers being found between the 25° C isotherms, according to the same author. Occurs in the three Oceans, including the Mediterranean. It is said to reach depths of 4.000 m but is usually taken from upper layers (see Thiel 1935, p. 44).

Discussion: Browne (1906) later supported by Russell (1953, p. 430) included all the species attributed by Mayer (1910) to this genus, in the synonymy of *R. velatum* with the only exception of *R. funerarium* Mayer's description of *R. coeruleum* (1910, p. 380) includes representatives of the only two valid species: *R. velatum* and *R. funerarium*. *R. velatum* has a conical apical projection, absent in *funerarium* as well as in young stages of *R. velatum;* the gonads of *R. velatum* are spherical or ovoid and placed in the middle third of the radial canals while they are elongated and placed in the distal third in *R. funerarium; R. velatum* has eight to sixteen sensory organs while *R. funerarium* has 32; *R. funerarium* usually inhabits greater depths. Thiel (1936, p. 11) considers *R. funerarium* a possible variety or even a synonym of *R. velatum*, but agrees that the two should temporarily be kept separate. Russell (1953) maintains the two as separate species.

Aglaura hemistoma Péron & Les.

Aglaura hemistoma Gegenbaur 1856, p. 248, pl. 8. figs. 13-15.
Aglura peronii Leuckart 1856, p. 10, pl. 1, figs. 5-7.
Aglaura vitrea Fewkes 1882, p. 277, pl. 7, fig. 10.
Aglaura hemistoma Maas 1893, p. 25, pl. 1, figs. 12, 13.
Aglaura hemistoma var. *laterna* Maas 1893, p. 25, pl. 1, fig. 14.
Aglaura hemistoma Mayer 1900b, p. 65, pl. 25, figs. 79-80.
Aglaura hemistoma Vanhöffen 1902, p. 77.

Aglaura hemistoma Hargitt 1902, p. 14, fig. 1.
Aglaura octagona Bigelow 1904, p. 257, pl. 2, fig. 9.
Aglaura prismatica Maas 1906, p. 97, fig. 12.
Aglaura hemistoma Browne 1906, p. 176.
Aglaura ciliata Perkins 1908, p. 148, pl. 3, fig. 14-16.
Aglaura hemistoma Bigelow 1909, p. 119, pl. 2, fig. 6.
Aglaura hemistoma Mayer 1910, p. 398, pl. 46, fig. 4; pl. 49, figs. 3-7; pl. 50, fig. 11, etc.
Aglaura hemistoma Neppi & Stiasny 1913, p. 58.
Aglaura hemistoma Vanhöffen 1912, p. 374.
Aglaura hemistoma Bigelow 1913, p. 42.
Aglaura hemistoma Bigelow 1915, p. 316.
Aglaura hemistoma Bigelow 1919b, p. 387.
Aglaura hemistoma Uchida 1928, p.
Aglaura hemistoma Candeias 1932, p. 8.
Aglaura hemistoma Thiel 1935, p. 49, fig. 29.
Aglaura hemistoma Thiel 1936, p. 39.
Aglaura hemistoma Babnik 1948, p. 315.
Aglaura hemistoma Ranson 1949, p. 130.
Aglaura hemistoma Berrill 1950, p.
Aglaura hemistoma Kramp 1953, p. 300.
Aglaura hemistoma Vannucci 1954, p. 119.
Aglaura hemistoma Kramp 1956a, p. 4.

Specific characters — Very high umbrella. Peduncle present. Eight sacculiform gonads on the peduncle. There may be as many as 88 tentacles all alike, usually less. Eight free sensory clubs. A holoplanktonic species.

Medusa — Umbrella rather stiff, much higher than wide, up to 8 mm high, jelly thin, margin frequently tends to an octogonal shape. The sides of the umbrella are about parallel and the apex usually a truncated cone. Velum well developed carried hanging down. Peduncle present, conical of variable length, lengthens with the growth of the umbrella. The stomach is small, conical or globoid, with four lips in specimens larger than 0.8 to 1 mm high; smaller specimens have only two lips. The eight radial canals and the ring canal are all very narrow. There may be up to eleven tentacles in each octant, frequently less and as a rule they are broken near their base in preserved specimens. Eight free sensory clubs, one between adjacent radial canals. The eight saussage shaped gonads hang from the peduncle at the point were the radial canals open into the stomach. The gonads first appear in specimens 1.5 mm umbrellar height or more, they are large and mature rapidly in specimens 2.5 mm high with 48 tentacles. A few specimens 2.5 mm high were found with only the primordium of the gonads, it may well be that once shed the sexual products new gonads replace the old ones. Bigelow found incipient gonads in specimens 2.5 mm from the Sea of Japan. The tentacles develop in the following manner (specimens from Fernando de Noronha):

up to 0.8 mm umbrellar height	—	8 tentacles
from 1.2 — 1.4 mm to 1.7 mm	—	24 tentacles
from 1.7 mm to 2 mm	—	32 tentacles
from 2 mm to 2.4 mm	—	40 tentacles
from 2.4 mm to 2.9 mm	—	40 — 48 tentacles.

Specimens larger than 2.9 mm were not found in the very warm waters of the Fernando de Noronha region. Kramp (1953 p. 300) in material from Australian waters found specimens the year round comprised between the same size limits (1.5-4 mm) and arrived at the conclusion that this species has no clearly defined breeding season. The same may probably be said for *Aglaura hemistoma* off the Brazilian coast. This species was the most frequent in the collection made by the Great Barrier Reef Expedition, but only second in frequence in the present collection.

Material — A total number of 1,723 specimens was collected in January, February, March, June, July, September, October and November. Most probably to be found the year round in warm oceanic waters. The temperature limits were found to be 17.5 — 29° C, however only 288 specimens (or 16,7%) were hauled from waters with temperature below 20° C, most of them in small numbers excepting a single haul with 117 specimens (M_{122}) coming from coastal waters 18,73° C and 34.08‰ salinity. This was a midnight surface (10 m.w.) haul, off Florianópolis, 27°19′ S — 48°13′ W the 16 June 1956.

The salinity limits were found to be 33.3‰ to 36.9‰.

Seven samples contained more than 100 specimens, all of them with the only exception of M_{122} which had 117, with a total of 878 specimens, were taken in waters whose temperature varied between 20.6° C and 25° C and salinity between 35‰ and 36‰.

This may be considered a species finding its optimum between 35.36‰ salinity and over, but may be found in concentrations down to 33.5‰. It is eurythermic, ocurring preferably in warm waters above 20° C. It probably is an indicator of the warm and highly saline waters of the Brazil current but may survive for a certain time when carried by currents to colder waters.

Distribution — Like most Trachymedusae, the oceanic species *Aglaura hemistoma* is widely distributed circum-tropically and circum-subtropically, including the Mediterranean and the Adriatic. It has been taken as deep as 225 m (Thiel 1935, p. 49; Kramp 1953, p. 320). According to Thiel (1936, p. 42) its distribution is limited by the isotherm of 20° C to the north and south, but it is here found that although rare it may be taken also in colder waters, probably as a sporadic immigrant.

Discussion — This is one of the most common and abundant Trachymedusae, having in warm waters an ecological value comparable to that of *Aglantha digitale* in cold waters. Both are readily distinguishable from any other medusa in their habitat, being each the only species in the genus.

Aglaura hemistoma is highly variable as is often the case with such widely distributed species as for instance *Liriope*, and this explains why so many so-called "species" and varieties were described in former years. On account of its abundance, its wide distribution, its relatively simple

geometrical shape, the facility with which morphological characters are counted and measured, this species seems to be well suited for biometric, population and variation studies. Preliminary measurements along this line have shown this to be possible and may lead to interesting results.

ORD. NARCOMEDUSAE

FAM. Aeginidae

Solmundella bitentaculata Quoi & Gaimard

Aeginopsis mediterranea Gegenbaur 1856, p. 266.
Aeginopsis mediterranea Leuckart 1856, p. 33, pl. 2, figs. 8-9.
Aeginopsis mediterranea Metschnikoff 1874, p. 26, pl. 4, figs. 17-22.
Aeginopsis mediterranea Maas 1893, p. 54, figs. 1-2.
Aeginopsis henseni Maas 1893, p. 55, pl. 5, fig. 11.
Aeginella dissonema Agassiz & Mayer 1899, p. 166.
Aeginella dissonema Mayer 1900b, p. 66, pl. 14, figs. 30-32.
Aeginella dissonema Bigelow 1904, p. 261.
Aeginopsis mediterranea Maas 1905, p. 73.
Solmundella bitentaculata Maas 1905, p. 73, pl. 11, fig. 74; pl. 12, fig. 75; pl. 13, figs. 86-89.
Solmundella bitentaculata Maas 1906, p. 99.
Solmundella bitentaculata Maas 1906, p. 12, pl. 1, fig. 5; pl. 3, fig. 23-24.
Solmundella mediterranea Dawydoff 1907, p. 119, 3 figs.
Solmundella bitentaculata Vanhöffen 1907, p. 45, pl. 3, figs. 11-15.
Solmundella mediterranea Bigelow 1909, p. 77, pl. 2, fig. 3.
Solmundella bitentaculata Mayer 1910, p. 455.
Solmundella bitentaculata var. *mediterranea* Mayer 1910, p. 456.
Solmundella bitentaculata Browne 1910, p. 37.
Solmundella mediterranea Browne 1910, p. 38.
Solmundella bitentaculata Bigelow 1913, p. 63.
Solmundella bitentaculata Vanhöffen 1916, p. 428.
Solmundella bitentaculata Bigelow 1919, p. 331.
Solmundella bitentaculata Thiel 1932, p. 473.
Solmundella mediterranea Mackintosh 1934, p. 72.
Solmundella bitentaculata var. *mediterranea* Babnik 1948, p. 47.
Solmundella bitentaculata Kramp 1952, p. 10;
Solmundella bitentaculata Kramp 1953, p. 302.
Solmundella bitentaculata Kramp 1956, p. 4.

SPECIFIC CHARACTERS: Two long opposite tentacles. Four radial furrows and peronia. Eight adradial stomach pouches. No peripheral canal system.

MEDUSA — A holoplanktonic species. Umbrella rounded, with two long, opposite tentacles turned up towards the aboral pole. The umbrella may be 3-6 mm high and wide. Jelly stiff not very thick, the aboral pole is smooth and rounded. The tentacles taper gradually ending in very fine points, the gastrodermal cells are highly vacuolated piled up as a pile of coins and the base of the tentacles has a strong muscle. Four deep pe-

ronial grooves and peronial tissue embedded in the jelly. Eight interradial gastric pouches. Large widely opened mouth with no lips. There are up to 32 marginal sensory organs.

Material — Twenty-four specimens taken from surface layers in temperatures varying between 18° C and 28° C and 34.1‰ and 36.4‰ salinity. It was taken in January, February, June and November, but no sexually mature specimens were found although some quite large. The largest catch was in June, 3.13 a.m., 10 m.w. out in 20° C and 35.5‰ salinity, six specimens (M_{123}). In sample M_{122}, June 16, 1956, at 24 p.m., 27°19′ S — 48°13′ W, in 18° C and 34‰ salinity were found three specimens of *Solmundella*. Both temperature and salinity were lower than for all other samples and it was found associated to a large number of both *Liriope* and *Aglaura*. The same day at a near by station (M_{120}) at 9.40 a.m., also in surface waters but in 20.4° C and 35.8‰ salinity three other specimens were collected. *Solmundella* is an oceanic species stenohaline and eurythermic.

Distribution — Widely distributed, circumtropical and circumsub-tropical, to be found even in the immediate neighbourhood of the Antarctic Continent and northwards in the Sea of Ochotsk and at about 45° N in the Atlantic. Particularly common in the southern hemisphere (Kramp 1953, p. 302). It was caught as deep as 2.600 m. Kramp (1957, p. 64) found it to be most abundant between 100-500 m. A few were taken in the Antarctic in temperature as low as 0.48° C. Thiel (1936, p. 72) believes this to be a cold water species penetrating into warm waters, however he presents no reason for this assertion which contradicts the opinion of other authors.

Discussion — The genus *Solmundella* was initially described under different names, a good list of references may be found in Mayer (1910, p. 454). Later authors established two species: *S. bitentaculata* and *S. mediterranea* and finally most authors agreed in considering the two as synonyms. The differences between the two "species" would be: *S. bitentaculata* reaches a height of 12-15 mm being *S. mediterranea* not more than 4-6 mm high; the tentacular diameter of the former is greater than the one at 90° while they are both alike in the latter; the former has an apical keel-like expansion parallel to the tentacular plane that is absent in the latter; the tentacles of the former may reach a length of 100 mm while they do not surpass 18 mm in the latter; the former may have as many as 32 marginal sense organs while there are not more than 16 in latter; finally *S. bitentaculata* has two intertentacular partially closed grooves and peronial stripes embedded in the jelly while *S. mediterranea* has four open peronial grooves with peronial stripes in the concavity.

The present specimens resemble more to *S. mediterranea* but have closed peronial grooves. Considering that the characters pointed as differential may appear mixed in a single specimen, I follow the other authors con-

sidering them all as belonging to a single species. The two "species" are macrogeographically sympathric and it may be that the specimens corresponding to the "*mediterranea*" type are small specimens with precocious maturation of the gonads due to high environmental temperature.

Maas (1906, p. 12) still kept the two separate and so did Mayer (1910, p. 455) with certain hesitation giving to the two only the rank of varieties. Vanhöffen (1907, p. 45) was the first who merged the two into a single species. Kramp (1953, p. 302) records *S. bitentaculata* from the Great Barrier Reef Expedition but does not discuss the synonymy; he only says that the specimen recorded by Mauer in 1915 from Torres Strait as *S. mediterranea* is propably or perhaps even certainly (l.c., p. 311) *S. bitentaculata*. I do not know if Kramp means that the particular specimens studied by Mauer is *bitentaculata* or that the two species are synonyms. Mauer's paper is inaccessible to me. Also Thiel (1936, p. 71) studying the "Meteor" material found small specimens.

Aegina citrea Eschscholtz

Aegina citrea Maas 1905, p. 71, pl. 11, fig. 72; pl. 13, figs. 79-82.
Aegina brunnea Vanhöffen 1907, p. 51, pl. 7. fig. 4.
Aegina lactea Vanhöffen 1907, p. 50, pl. 7, fig. 3.
Aegina citrea Vanhöffen 1907, p. 50.
Aegina rosea Vanhöffen 1907, p. 48, pl. 7, figs. 1-2; pl. 9, figs. 16-17.
Aegina citrea Bigelow 1909, p. 73, pl. 1, fig. 5; pl. 14, fig. 5.
Aegina alternans Bigelow 1909, p. 74, pl. 17, fig. 1.
Aegina eschscholtzi Mayer 1910, p. 453.
Aegina citrea Mayer 1910, p. 451, figs. 299-300.
Aegina rosea Mayer 1910, p. 452, pl. 52, fig. 5; pl. 54, fig. 2.
Aegina aeginoides Mayer 1910, p. 454.
Aegina pentanema Kishinouye 1910, p. 32, pl. 5, fig. 34.
Aegina citrea Bigelow 1919a, p. 330.
Aegina rosea Bigelow 1919a, p. 330.
Aegina rosea Thiel 1936, p. 73, fig. 15.
Aegina citrea Bigelow 1938, p. 131.
Aegina citrea Bigelow 1940, p. 313.
Aegina citrea Kramp 1947, p. 36.
Aegina citrea Russell 1953, p. 467, pl. 28, fig. 1; figs. 308-10.
Aegina citrea Kramp 1957, p. 63.
Aegina citrea Petersen 1957, p. 42.

Specific characters — It is regarded by Russell as the only species of the genus. Eight, occasionally ten or twelve stomach pouches which may or may not have secondary divisions; peripheral canal system present; typically four, occasionally three, five or six primary marginal tentacles; without secondary marginal tentacles; without otopopae.

Medusa — A holoplanktonic species. Umbrella hemispherical up to 5 cm wide. Jelly thick in upper half, may be dome shaped, rather thin at sides and margin. Four peronia. Velum rather well developed. Large lenticular to conical stomach, may be dome shaped dorsally, typically with

eight rectangular interradial stomach pouches some of which may have slight median clefts. Mouth simple circular never extending beyond margin. Peripheral canal system present. Gonads on walls of stomach pouches, sometimes extending on the main body of stomach. There usually are four exumbrellar tentacles emerging at upper end of peronia from deep exumbrellar furrows, with endodermal "root" embedded in jelly. The tentacles are up to twice as long as umbrella diameter. As many as 100 marginal sensory clubs. No otoporpae. Stomach, stomach pouches and marginal tentacles yellow, yellowish brown, brown, pink or colourless.

Material — Two specimens, the larger 6 mm in diameter. Hauled the 6th and 7th November 1956, at 1.20 p.m. and 2.05 p.m. with 50 and 60 m. w. out, at 30°25′ S and 48°03′ W and 33°12′ S — 45°40′ W. Temperature limits between 19° C and 21.34° C and salinity 35.43 and 36.80‰. In the first of these samples there were about equal numbers of *Liriope* and *Aglaura*, 17 of the first and 19 of the latter, 1 *Solmundella bitentaculata*, three *Corymorpha gracilis* the hydroid of which is known to be found also in great depths and six *Proboscidactyla ornata*. The second specimen was found associated to a small number of both *Liriope* and *Aglaura* (respectively four and three specimens) and one *Rhopalonema velatum*.

Distribution — According to Russell (l.c., p. 468), this is a deep sea oceanic species world wide in distribution and recorded from all oceans as far as 54° S and 63° N. Bigelow (1938, p. 131) however found it repeatedly in surface waters and near the coast as well as in deep hauls with closing nets and as low as 1.030-830 m. The present findings tend to confirm Kramp's view (1947, p. 36) that species occurs at all depths in the warmer regions. Kramp (1957, p. 63) again found this species in surface hauls 5-0 m deep, as well as from 1.000-900 m. Russell discusses the species in detail and I refer to him. Kramp (1957, p. 63) includes also *A. rhodina* in the synonymy of this species.

FAM. Cuninidae

Cunina octonaria McCrady

Cunina köllikeri Müller 1861, p. 42, pl. 4.
Foveolia octonaria Agassiz 1865, p. 51.
Cunina octonaria Brooks 1884, p. 710.
Cunina octonaria Maas 1893, p. 53.
Cunina octonaria Agassiz & Mayer 1899, p. 166.
?*Cunoctantha octonaria* Maas 1905, p. 67, pl. 12, figs. 77-78; pl. 13, figs. 83-85.
Cunoctantha octonaria Maas 1906, p. 98, pl. 3, fig. 11.
Cunoctantha octonaria Bigelow 1909, p. 52, pl. 14, fig. 4; pl. 15, figs. 5-6; pl. 17, figs. 2, 4, 5.
Cunoctantha octonaria Mayer 1910, p. 461, pl. 55, figs. 1-2.
Cunina octonaria Kramp 1953, p. 304, p. 305.
Cunina octonaria Kramp 1955, p. 284.

Specific characters — Usually eight stomach pouches and eight tentacles. One to three marginal sense organs in each lappet.

Medusa — Umbrella flat, may reach 7 mm in diameter. Stomach lenticular, central round mouth with no lips. Typically eight perradial stomach pouches, eight peronial furrows, eight marginal lappets. Peripheral canal system absent. There are eight exumbrellar tapering tentacles which emerge about half way between margin and apex. The tentacles are stiff, solid, the gastrodermal cells are piled up as coins, each tentacle has an endodermal "root" of large vacuolated cells penetrating in the jelly in the middle of each pouch. There may be a number of pouches and tentacles different from eight, usually more than eight.

Six specimens (2.1%) were found with other than eight tentacles: two with ten tentacles, three with nine and one, with seven. (mean = 9). Those with more than eight tentacles were also the largest specimens, reaching 5 mm in width. Four larvae were recorded, ranging in size between 0.6 to 3 mm. The smallest had only four well developed tentacles plus four budding ones. Two of these larvae were found parasitic in *Aglaura* and three parasitic stolon larvae (Kramp 1953, p. 305) were recorded in *Liriope*. Two medium sized medusae and one 5 mm wide were found with numerous parasitic larvae in the stomach. The number of marginal sense organ was found to vary between one and five, there being more often three. One medusa was found in the process of being eaten by *Sagitta bipunctata*.

Material — Three hundred and sixteen specimens were counted. It was recorded in March, June, July, September, October, November. The temperature limits were found to be between 18.13° C and perhaps lower to 25.5° C and the salinity 33.5‰ and 36.90‰. Two hundred and four specimens (66%) were taken in November and in water temperatures between 21° C and 22° C and salinity between 35.4 and 35.8‰. The richest hauls were night hauls.

Probably euryhaline and eurythermic within restricted limits of variation. Although the relationship is not clear, it is more frequently found in waters in which *Liriope tetraphylla* outnumbered *Aglaura* or the latter was absent.

Distribution — Widely distributed in the warmer parts of all Oceans. A surface water species. In the original description F. Müller describes and draws a stolon larva found attached to *Liriope* (l.c., pl. 4, fig. 30).

Discussion — The specimens taken by the Great Barrier Reef Expedition and referred by Kramp (1953) to *Cunina octonaria* had three to five or even a single sensory organ in each marginal lappet varying in different specimens and within the same specimen in different antimeres. Later Kramp (1957, p. 81) distinguishes four different species in the genus.

My specimens are similar to each other and one of them was determined as *Cunina octonaria* by Prof. P. L. Kramp himself, to whom I am much obliged. The number of tentacles is only slightly variable around eight and the number of sensory organs varies between one and five in each lappett.

FAM. Solmaridae

Solmaris spp.

GENERIC CHARACTERS — Solmaridae without otoporpae and without peripheral canal system. Holoplanktonic medusae probably oceanic.

MEDUSA — Russell (1953, p. 476) has recently described in detail *S. corona* and Thiel (1936) has revised the genus and suggests that there may be only two variable species. The principal distinguishing feature between the two would be that in *S. flavescens* the bristles are confined to the sensory club, whereas in *S. corona* the sensory club rises from a broad cushion which alone has bristles. I believe that *S. flavescens* is a synonym of *S. leocostyla*, the latter name having priority.

Both species were present in my material but much difficulty was encountered in separating these two species from each other and from another as yet unidentified form. I cannot therefore give any details with certainty on the distribution and occurrence of these species.

6 — DISTRIBUTION AND ASSOCIATION OF THE SPECIES

1 — *Sarsia eximia* — This is listed by Russell (1953, p. 30) as a southern boreal species with a query. Small species found in coastal waters. It was here collected from Cananéia to the bay of Ilha Grande, until now recorded only in winter, between June and October. It was found associated to coastal species such as *Fritillaria haplostoma, Obelia* spp, *Eucheilota ventricularis* e *Lovenella cirrata*. Eurythermic and euryhaline.

2 — *Ectopleura dumortieri* — This is listed by Russell (l.c.) as a southern boreal species with a query. A small species recorded from the lagoon region of Cananéia and a single specimen from Ilha Grande Bay. Associated to large numbers of *Liriope, Podocoryne minima* and *Clytia cylindrica*. It is most probably eurythermic prefering high temperatures. Euryhaline. Found to the present day only in inshore waters. Kramp (1933, p. 242) recorded this species from the Skagerak in waters 18° C, associated to large numbers of *Noctiluca* and *Eucheilota ventricularis*. Both species are here found in the same water as *Ectopleura*.

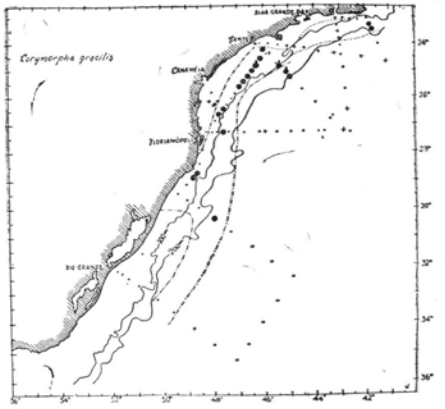

Fig. 8 — *Corymorpha gracilis*, distribution.

\+ — Stations at which no plankton was hauled.

. — Stations with plankton, but present species found to be absent.

● — Hauls successful for this species.

—.—.—.— 35‰ and 36‰ isohalines during the November 1956 cruise in surface layers.

— — — — 35‰ and 36‰ isohalines during the February-March cruise in surface layers.

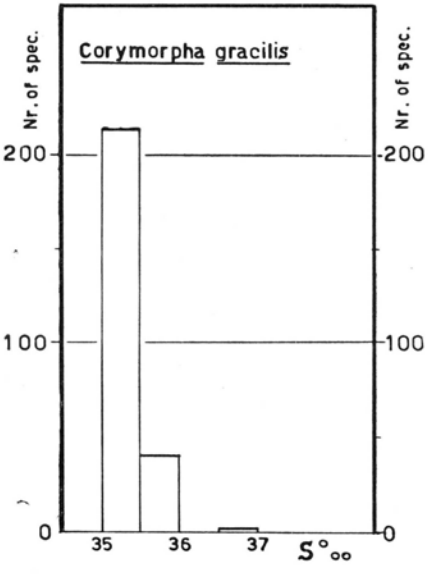

Fig. 9 — *Corymorpha gracilis* — Diagram of frequency plotted against salinity.

3 — *Corymorpha gracilis* (Figs. 8, 9) found over the shelf or more rarely over the slope; three specimens from sample M_{159} were found over 615 m depth. At station 82 (M_{150}) a layer of shelf waters was found over higher salinity layers and it may be presumed that this species comes from this layer. All the other specimens were taken in surface waters over bottoms between 50 m and 100 m and in the shelf water mass (salinity between 35‰ and 36‰). In March this species was found only at two stations southeast of Cabo Frio ($M_{104-105}$) both of them over the shelf. In June it was found exclusively along the Florianópolis-Santos section. By far the largest population (172 specimens) was found along the southeast section off Santos, in October ($M_{130-139}$); this also was over the shelf and in the same water mass as earlier that same year, except for the three specimens from M_{139}. The small number of specimens taken off Cabo Frio ($M_{104-105}$) may be due to the small amount of water filtered and

correspondingly small catch. These two samples were taken with a Clarke-Bumpus net and the amount of water was 4,386 liters in M_{104}; with 2cc total plankton volume; in this sample two specimens were found. Sample M_{105}, with 2,499 liters of water filtered yielded a total plankton volume of 5cc but a single specimen of *Corymorpha gracilis*. It is therefore five times relatively more abundant in sample M_{104} than in sample M_{105}, but the total plankton volume is 5.4 times greater in the latter sample for equal volume of water. Surface temperature at M_{104} was lower, 19-20.8° C against 22-22.9° C and salinity also lower: 35.5‰ against 36‰. This together with the data of sample M_{138} suggests that the species is stenohaline for about this salinity (lower than 36‰ and higher than 35‰) and eurythermic prefering temperatures above 20° C not over 23° C. It is absent in northern waters with higher salinity than 36‰. The largest patch was found east off Santos, the largest catch being M_{138} where 151 immature specimens were collected, or say 58% of the total for the species. This haul was made with an open net, 50 m.w. out over 90 m depth, October 31, 1956. The temperature and salinity were as follows:

depth in m	*temp. in* °C	*salinity in ‰*
0	22	35.40
10	18.61	35.33
19	14.37	35.37
29	14.04	35.39

According to the findings and to the distribution of specimens in the neighbouring stations, it may be that these specimens were living in warm waters above thermocline; on the other hand, the large number of specimens taken at this station, much greater than at any other suggests that the population may have been living in colder waters and this would explain the relatively small number at the other stations which did not sample deeper layers and were definitely above the thermocline ($M_{136, 137, 148, 182, 184, 185}$). The vertical distribution of salinity as shown in this table indicates that the column is homogeneous for this property in this interval, it therefore seems that the high surface temperature as compared with that of subsurface layers may be caused by local heating of the water mass. It may therefore be safely said that the salinity range of the species was here found to be between 35 — and 36‰ being the optimum apparently around 35.4‰. The temperature limits are uncertain, perhaps varying between 14.° C and 22° C, the optimum unknown. It may lie around 22° C, as well as 14° C. Further data are necessary to clear this point (Figs. 29-31).

It appears from the data that at all trips the section south east off Santos was successful for this species, however in March it was found only off Cabo Frio. The June trip found this species only along the Florianópolis-Santos section while in October (beginning of the southern summer), the species was found both in the Florianópolis-Santos section and Santos section. The same patch was sampled in this trip along the two sections which cross at stations 60 and 112, having altogether been

found at this point 28 specimens in 35.4‰ salinity and 22° C temperature. The other medusae present in both hauls were also the same, except for the absence of *Solmaris* sp. in M_{185}. It is also the same association as in M_{138} where the largest number of *Corymorpha* was taken.

Corymorpha gracilis was found associated to large numbers of *Liriope tetraphylla*, *Cunina octonaria* and *Proboscidactyla ornata*. In all the samples in which *Corymorpha gracilis* occurred, *Aglaura hemistoma* was either absent or very scarce. The largest catch comes from sample M_{138} in which 151 specimens were taken along with 28 *Liriope*, 10 *Proboscidactyla ornata* and no other species of medusae.

It is a stenohaline species found between 35-36‰ salinity. Taken in March, June, October and November. Rather rare, to be found in large patches when present. Probably a good indicator of the shelf water mass.

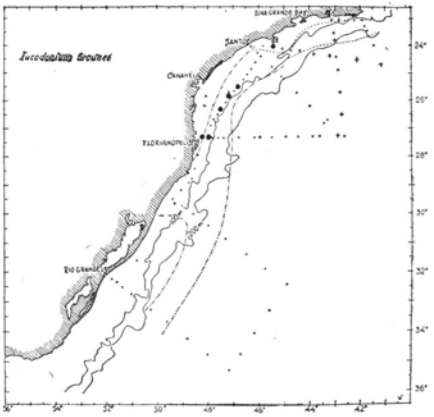

Fig. 10 — *Eucodonium brownei* — Same as for Fig. 8. Coastal waters have salinity lower than 35‰ — Northern waters have higher salinity than 36‰ — Shelf waters have salinity between 35‰ and 36‰
ò — Samples with 16 and 28 specimens.

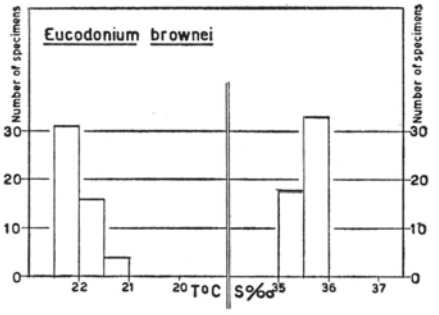

Fig. 11 — *Eucodonium brownei* — Diagram of the frequency plotted against temperature and salinity.

4 — *Eucodonium brownei* (Figs. 10, 11) — As stated above, this species was previously known from a small number of specimens taken at Plymouth, North Sea Skagerak, Villefranche, Marseille and Trieste in the Mediterranean. The present finding suggests this to be a rather rare Atlantic species which may be carried far away by currents, successive generations surviving thanks to the species' budding capacities. This may explain why it appeared in such places as previously recorded as an occasional immigrant. It was here found in relatively large numbers and in a narrow temperature and salinity range. It was always found in the shelf water mass or in mixed coastal and shelf waters.

The population sampled in June 1954 (16 budding specimens) (M_{40-51}) was taken over the 50 m isobath in coastal waters with a certain degree of mixture associated to typical coastal water species such as *Obelia* spp., *Lovenella cirrata, Bougainvillia ramosa, Sarsia eximia, Octophialucium bigelowi* and an extremely large number (4919) of *Fritillaria haplostoma* (Tunicata Copelata, see Björnberg & Forneris 1956) and *Penilia* sp. both considered to be coastal water species.

The population sampled in November 1956 was found over the slope in the shelf water mass. It was found associated to large numbers of *Liriope*, few *Aglaura*, relatively abundant *Cunina* and very abundant *Penilia*. It was not however found also in stations nearer to the coast ($M_{178-179}$) where *Penilia* was also very abundant, but not so *Eucodonium*.

Eucodonium brownei was here found in a very narrow temperature and salinity range, 21-22°C and 35.4-35.8‰ salinity, in was never taken in oceanic waters nor in pure coastal waters with low salinity, nevertheless it is not safe to consider it a stenohaline and stenothermic species in view os previous records. These findings suggest that it probably does not inhabit and reproduce in waters of low temperature and salinity but endures such conditions and may be found there as a rare immigrant. It was here found to be rather rare and occurring in patches.

5 — *Zanclea costata* — A neritic species found over shallow depths. Widely distributed, euryhaline and probably eurythermic. Usually rare.

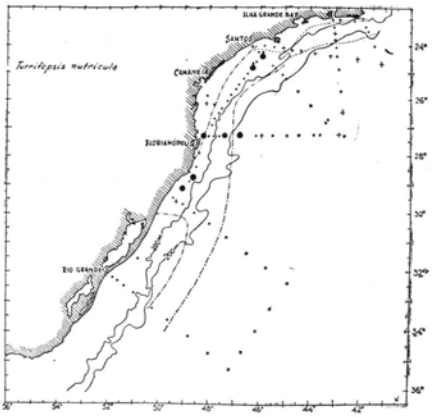

Fig. 12 — *Turritopsis nutricula* — The same as for Fig. 8.
ȯ — Samples with 42 and 48 specimens.

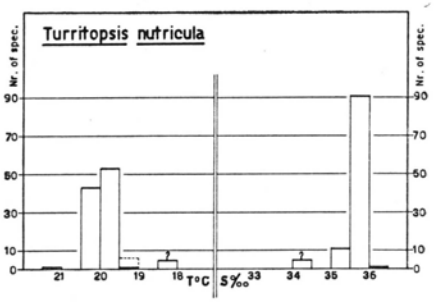

Fig. 13 — *Turritopsis nutricula* — Diagram of frequency plotted against temperature and salinity.

6 — *Turritopsis nutricula* (Figs. 12, 13) listed by Russell (1953, p. 30) as a southern species. Neritic apparently of high salinity, the range was found to be between 35.5 to 36.25‰; five specimens came from waters

34.1‰ salinity. Eighty five percent of the specimens were taken in waters of salinity slightly under 36‰. The species was found to live between 19.5 to 21° C; five of the 108 specimens collected may have been taken in colder waters; 84% of the total comes from waters about 20° C temperature and 35.‰ salinity, a surface night haul in June. The temperature optimum is presumably between 20-21° C and salinity optimum between 35.5-36‰ concentration. All but a doubtful specimen were taken after sunset in surface lavers while none was taken at the intervening daylight stations in the same area. Ninety four percent of the specimens were taken in shelf waters while only 5% come from coastal waters (sample M_{122} doubtful. About this sample see below under the heading Sample M_{122}). Two percent of the total was taken in northern waters (Brazil current). It was taken in June and November, being most abundant in June. It was usually found associated to *Cunina octonaria* and in samples in which both *Aglaura* and *Liriope* were present, it was most abundant where large numbers of *Proboscidactyla ornata* occur (surface hauls at 8.55 p.m. and 11 p.m.).

Eurythermic warm water species, probably euryhaline within rather restricted limits.

7 — The distribution and present findings of *Prodocoryne minima* indicate it to be here an eurythermic species prefering rather high temperatures, euryhaline prefering low salinites and inhabiting inshore and lagoon region waters. Rare, when present it usually appears in large shoals. It is found during late summer in high northern latitudes while it was here found during late winter. This suggests that the hydroid liberates the medusae only under definite temperature and perhaps salinity conditions. Almost all specimens were taken in the lagoon region of Cananéia. It was found associated to *Clytia, Obelia* spp, and *Ectopleura dumortieri.*

8 — *Cytaeis tetrastyla* (Figs. 14, 15) was found here exclusively in coastal and shelf waters in the neritic province but is recorded in the literature also from oceanic waters of high temperature and salinity. Over 95% of the specimens were taken in shelf waters with temperature between 20.5 to 21° C. Probably stenothermic and to certain degree euryhaline prefering high salinity. It was here constantly found in waters in which *Liriope* predominated over *Aglaura.*

9 — *Bougainvillia frondosa* a neritic species probably stenothermic and euryhaline very rare in plankton hauls; found in shelf waters. Taken in winter in samples in which *Aglaura* and *Liriope* were about equally abundant.

10 — *Boungainvillia ramosa* was taken in shelf and coastal waters during winter. A widely distributed species listed as southern boreal by Russell. Found in waters in which *Liriope* strongly predominated over *Aglaura* or where the latter was absent. Associated to large numbers of coastal species such as *Fritillaria haplostoma.*

11 — *Stomotoca dinema* listed by Russel as a southern species. Rare, widely distributed, found in coastal waters. Euryhaline, probably thermophile. It was found associated to coastal species such as *Obelia* spp., *Clytia cylindrica*, *Eucheilota ventricularis*, *Fritillaria haplostoma* and in waters in which either *Aglaura* was absent or *Liriope* greatly predominated. It was only taken in June and July.

12 — *Laodicea minuscula* found up to now only in inshore waters of Ilha Grande Bay and in the lagoon region of Cananéia, associated to large numbers of *Ectopleura dumortieri*, *Clytia cylindrica* and *Liriope*.

13 — *Laodicea undulata* is listed by Russell as a southern boreal species. Specimens tentatively reported to this species were here found associated to coastal species.

14 — *Obelia* spp. are eurythermic and euryhaline coastal species usually found in inshore waters where they are most abundant. They may be found in oceanic waters of high salinity (M_3) when sampled over

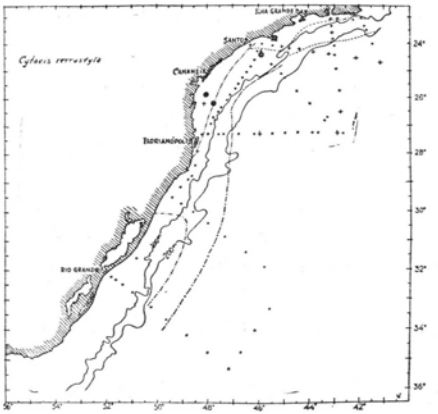

Fig. 14 — *Cytaeis tetrastyla* — Same as Fig. 8.
ó — Most abundant sample, with 121 specimens.

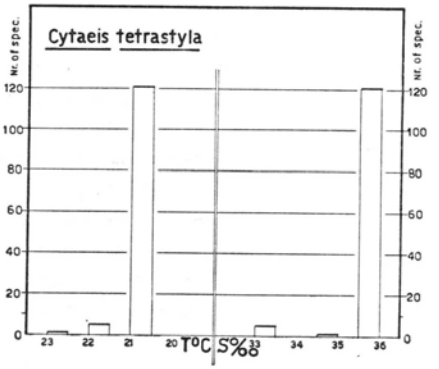

Fig. 15 — *Cytaeis tetrastyla* — Diagram of frequency plotted against temperature and salinity.

insular shelfs on which the hydroids find suitable living conditions. The medusae are short lived and usually absent in plankton samples taken far offshore. It was found to be most abundant at Ilha Grande Bay, July 13, 1955, where it was present in the whole water column, being somewhat more abundant in the lower layers. It was found associated to such coastal species as *Fritillaria haplostoma*, *Sarsia eximia* and *Eucheilota ventricularis* and always in hauls in which either *Aglaura hemistoma* was absent or greatly outnumbered by *Liriope*.

15 — *Clytia cylindrica* is apparently restricted to inshore and coastal waters. Eurythermic prefering warm waters and euryhaline. It is fre-

quently found associated to *Podocoryne minima*. In sample M_{70} these were the only two species present and sample M_{72} was the richest sample of the two. It was constantly taken in waters in which *Liriope* was greatly predominant over *Aglaura*.

16 — *Lovenella cirrata* is an euryhaline species confined to warm coastal waters. It was usually found in waters with a great percentage of *Fritillaria haplostoma* and in which *Liriope* outnumbered *Aglaura*.

17 — *Eucheilota ventricularis* was here always found in inshore waters of low and variable salinity and high temperature, associated to *Clytia cylindrica* and *Obelia bicuspidata* which are among the commonest leptomedusan species in the lagoon region of Cananéia.

18 — *Eutima mira* was found only in the very warm and highly saline waters of Fernando de Noronha area. Surface waters of 28° C and over 36‰ salinity. Rare and fragile.

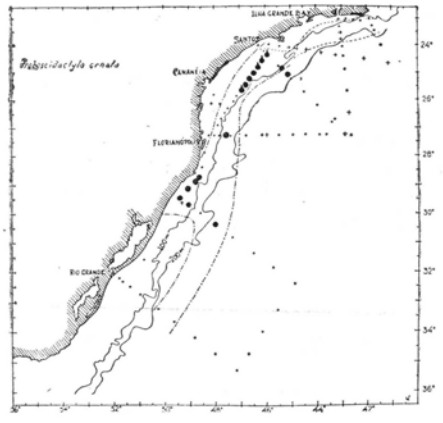

Fig. 16 — *Proboscidactyla ornata* — Same as Fig. 8.
ó — Most abundant samples, with 61, 64, 75 and 127 specimens.

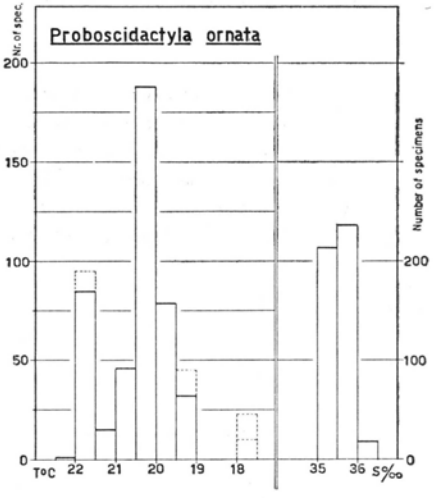

Fig. 17 — *Proboscidactyla ornata* — Diagram of frequency plotted against temperature and salinity.

19 — *Proboscidactyla ornata* (Figs. 16, 17) is a species of high salinity found over the shelf or, more rarely, over the slope (M_{150}) and in coastal waters (M_{68-69}), eurythermic. The specimens taken at st. 82 (M_{159}) were associated to *Corymorpha gracilis* also a shelf water species. At this station a shallow layer of shelf water overlies the higher salinity and higher temperature mass of northern waters. I believe we may safely presume that both species of medusae were taken in the upper layer of 35.4‰ salinity and 20.6-20.9° C temperature. At station 72 (M_{148}) the

inverse relation was found since the high salinity northen waters were underlayed by shelf waters of 35.87‰ salinity and 21° C temperature. Also in this case we may presume the medusae came from the shelf water layer. This species was found in a narrow salinity range, varying between 35.2 to 36‰ salinity; 98.1% of the specimens were taken between 35.4-36‰ salinity. This is a warm water species but tolerates lower temperatures since 28.5% of the specimens were taken in temperatures below 20° C and perhaps as low as 17-18° C. The optimum lies between 20-21° C, with 48,4% of the total number; 24% of the specimens were taken in water temperature from 21° C to 22° C and 28.5% from temperature below 20° C. All hauls were surface hauls, and 80.2% of the specimens were taken at night hauls, which suggests a nightly vertical migration. This is not a common species but whenever present it tends to form large patches. It was found associated to *Corymorpha gracilis*, *Solmaris* sp. and *Eucodonium browenei*. Both *Corymorpha* and *Proboscidactyla* were taken at st. 82 (M_{150}) and it is here assumed that both were taken in the tongue of shelf water found at this station in surface layers. This is further suggested by the fact that the proportion of the two species taken at this station as compared with the total number of each, is about the same.

For the distribution of this species see also what is said above for *Corymorpha*. It is a stenohaline species found between 35-36‰ salinity and probably warm water eurythermic tolerating to certain degree of lowering in temperature. The optimum appears to be between 21-22° C. As well as *Corymorpha gracilis* it probably is a good indicator of shelf waters. The distribution of the two species is the same.

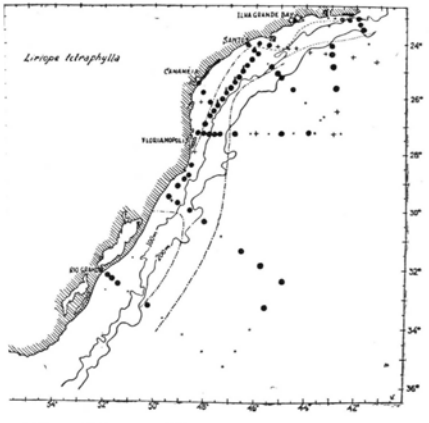

Fig. 18 — *Liriope tetraphylla* — Same as in Fig. 8.
ó — Most abundant samples with respectively 997, 1200, 1501 and 2439 specimens.

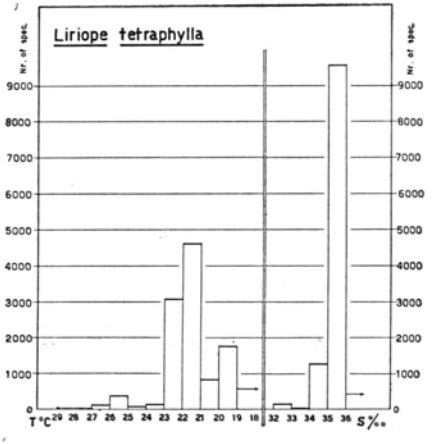

Fig. 19 — *Liriope tetraphylla* — Diagram of frequency plotted against temperature and salinity.

20 — *Liriope tetraphylla* (Figs. 18, 19) a holoplanktonic warm water species to be found in waters between 20° C and 25° C but which may survive in lower temperatures. It is euryhaline and extensive shoals may be found both in oceanic surface waters of high salinity and in estuarine and lagoon region waters. It was found the year round although it was much more abundant during summer.

It is here recorded as the most ubiquitous and abundant species of the present collection. (See *Aglaura hemistoma*).

21 — *Geryonia proboscidalis* a very rare species in the Atlantic, eurythermic prefering high temperature and stenohaline of high salinity. A northern water species.

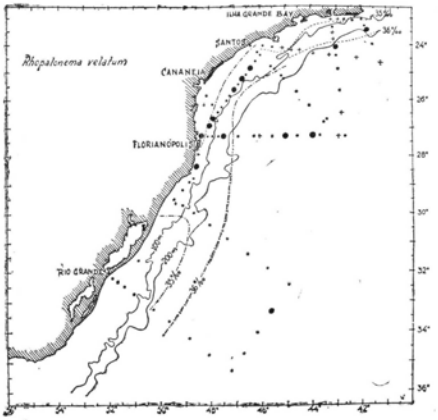

Fig. 22 — *Rhopalonema velatum* — Distribution, simbols as in Fig. 8.

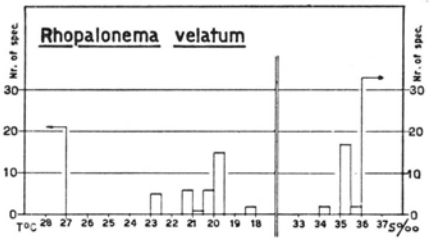

Fig. 23 — *Rhopalonema velatum* — Diagram of frequency plotted against temperature and salinity.

22. — *Rhopalonema velatum* (Figs. 22, 23) a holoplanktonic oceanic species most abundant in northern waters of salinity above 36‰ and temperature above 25° C. It was found as far south as 33°12′ lat. S in northern waters (M_{164}, salinity over 36‰, temperature between 19-20° C, with 50 m.w. out). A large number of specimens was found in shelf waters and few very small ones (M_{66-69}) doubtfully referred to this species were found in coastal waters. A stenohaline species enduring a certain degree of variation and euryhaline prefering high temperatures.

23 — *Aglaura hemistoma* (Figs. 20, 21) an oceanic eurythermic warm water species found in waters with temperature higher than 18° C and most probably stenohaline living in waters above 34‰ salinity but surviving in greater dilutions in mixed waters. It was taken in northern and shelf waters, rarely in coastal waters. The distribution curves of *Aglaura* and *Liriope* in relation to temperature and salinity are compa-

rable. The latter tolerates and is more abundant in lower salinities and for this reason *Liriope* is frequently found in large patches in coastal and lagoon water regions where *Aglaura* never penetrates. Although the curves of the two species are similar, they are rarely present in about equal percentual abundance, their frequency being usually inversally proportional. Having drawn the graphs of the occurrence of the two species, no definite relation could be found between their distribution and the water masses except for the greater euryhalinity of *Liriope*. A probable explanation of the mutual relations of the two species appears to lie in the patchiness

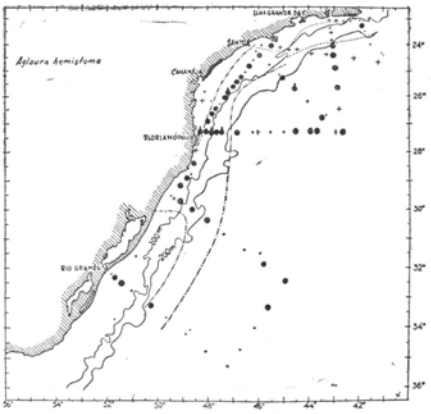

Fig. 20 — *Aglaura hemistoma* — Same as Fig. 8.
ó — Sample with more than 100 specimens.

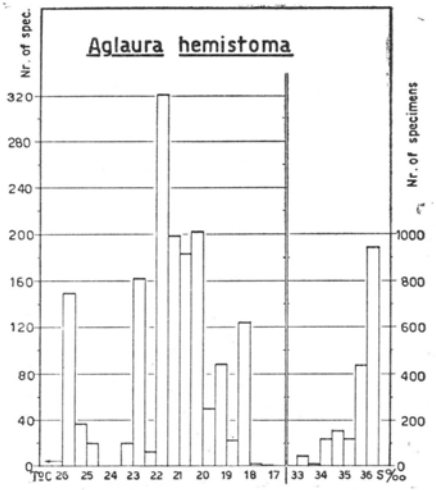

Fig. 21 — *Aglaura hemistoma* — Diagram of frequency plotted against temperature and salinity.

of distribution of both of them so that when one is sampled the other is not.

Kramp (1953) found in the Great Barrier Reef material a similar relationship between the two species (l.c., p. 316, fig. 9). *Aglaura* was most abundant species, it predominated in August, October, November, April through June. *Liriope* was found to be more abundant January through March. The data from table 18 (l.c., p. 321) show that the two are inversely abundant in the samples and seldom occur in about equal numbers at the same station.

Kramp (1953, p. 302) considers "the short and very distinct period of maximal occurrence ... of *Liriope* ... remarkable considering the truly oceanic habitat of this medusa". This remark agrees with the present findings which show that *Liriope* is not as oceanic a species as was presumed. As well as for the present collection, Kramp (l.c.) found that "young and middle sized specimens were found at any time adult speci-

mens were altogether rare and were taken only occasionally and at irregular intervals". The same was found to be true here for both *Liriope* and *Aglaura*. The same author (l.c., p. 316, text-fig. 9) found that *Liriope*, *Aglaura* and *Cunina* behave rather differently and his diagram shows clearly the relative abundance of *Aglaura* and *Liriope* to be inversely proportional. The diagram obtained here is not as clear.

The data from the Plankton Expedition show *Liriope tetraphylla* to penetrate much closer inshore at the mouth of the Amazon river than *Aglaura hemistoma* who thus avoids the strongly diluted surface waters, confirming the general data of the present collection.

Fig. 24 — Distribution of *Solmundella bitentaculata* and *Aegina citrea*.
ȯ — Samples with larger amount of specimens of *Solmundella respectively* 4 and 6.

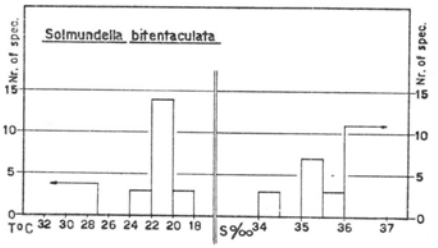

Fig. 25 — *Solmundella bitentaculata* showing frequency plotted against temperature and salinity.

24 — *Solmundella bitentaculata* (Figs. 24, 25) Acoording to Kramp (1953, p. 312) this species as well as *Rhopalonema velatum* and *Aglaura hemistoma* is a holoplanktonic species known to inhabit mainly the upper strata; it was here found associated to the two species. Eurythermic and probably euryhaline of high salinity. Widely distributed but rare.

25 — *Aegina citrea* (Fig. 24) The two specimens belonging to this species were taken in the southern part of Brazil current waters where the salinity is still higher than 36‰ but the temperature is already much lower, varying between 19° C and 21° C. It was found associated to northern water species.

26 — *Cunina octonaria* (Figs. 26, 27) an euryhaline and eurythermic species prefering rather high salinity and temperature. It was here found between 33.5‰ and 36.90‰ salinity and 18° C to 25° C temperature over a wide area. It will probably be found the year round at day and night

stations the most abundant being night hauls; 85% of the specimens were taken in shelf waters, over a wide area. It was found associated to *Liriope, Proboscidactyla ornata, Corymorpha gracilis* and *Eucodonium brownei.*

27 — The species of *Solmaris* found were not studied systematically with sufficient precision to warrant any detailed study on their distribution.

Sample M_{122} was taken in a midnight haul, with 10 m. w. out in coastal waters lying over shelf waters. Local depth 63 m. In this sample the following species were taken: *Liriope* (146 specimens), *Aglaura* (117), *Turritopsis* (5), *Solmundella* (3), *Cunina* (3), *Rhopalonema* (2). For both *Turritopsis* and *Solmundella* this is the only catch in coastal waters and salinity falling off the curve. For both species the minimum salinity found elsewhere was 35.5‰. The temperature also is lower than at any other station, being 18° C, while other sucessful hauls were taken at or

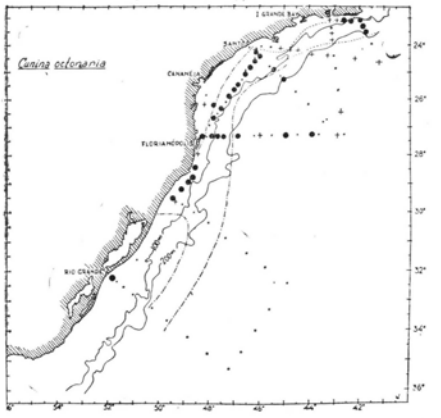

Fig. 26 — *Cunina octonaria* — Same simbols as in Fig. 8.

ó — Samples with more than 30 specimens.

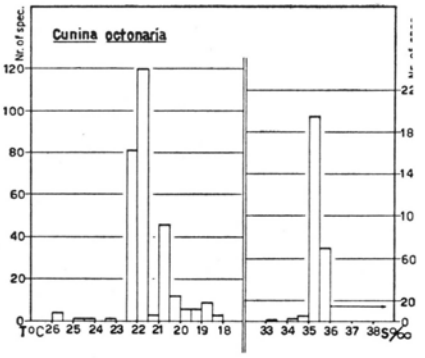

Fig. 27 — *Cunina octonaria* — Diagra of frequency plotted against temperatu and salinity.

over 19° C for *Turritopsis* and at or over 20° C for *Solmundella.* This suggests that these high salinity species present in surface layers at midnight had migrated upwards from the botton layer. This is further suggested by the large number of *Aglaura* in relation to *Liriope.* No error could be detected in the labeling on the sample or other.

Sample M_{150} was taken with 60 m.w. out. At this station the upper layer was of shelf waters (35.4‰ salinity — 20° C temperature), down to 15 m depth. Salinity at this depth was found to be 36.4‰ and temperature 21.1° C, indicating these to be northern waters. The net fished through both layers and this explains the presence in the same sample of *Corymorpha* and *Proboscidactyla* coming from the shelf water layer and *Solmundella* and *Aegina* from the northern water layer. *Liriope* (17

specimens) and *Aglaura* (19) were found in about equal numbers, in this sample.

Samples M_{68} and M_{00} were hauled at the same station, Bay of Ilha Grande, at 11 a.m., with an open 50 cm diameter zooplankton net, during 15 minutes. M_{68} was hauled at a 40 m depth and M_{00} at 2 m. Comparing the two, it may be seen that *Podocoryne minima* (2 specimens), *Cunina octonaria* (1), *Sarsia eximia* (1) and *Amphinema dinema* (1) — numbers in brackets are the numbers of specimens — were found only in the deeper layer. All the other species were more abundant near the bottom; *Liriope* (260), *Aglaura* (7), *Solmaris* (1), *Obelia* (40), *Clytia* (3), *Eucheilota ventricularis* (4), *Proboscidactya* (5); — the numbers in brackets indicate how many more specimens were counted in the deep layer for each species. This clearly shows a greater condensation of specimens near the bottom.

The Clarke-Bumpus plankton sampler hauls and samples taken with the same net hauled during the same time indicate that the maximum plankton abundance was found in shelf waters and south of Cabo Frio where there may be upwelling of waters from sub-surface layers. Coastal waters at places may be as rich in total plankton volume as shelf waters.

Summing up it seems safe at this stage to consider the following as typical associations of species of the high salinity and high temperature northern waters (Brazil current) in decreasing order of abundance: *Aglaura hemistoma, Liriope tetraphylla* and *Rhopalonema velatum.* These are present in almost every sample and associated to the following species of Chaetognatha listed in decreasing order of frequency: *Sagitta serratodentata, Pterosagitta draco, S. enflata, Krohnitta pacifica, S. hexaptera* (Hosoe 1956). The northern water mass, gradually cools off as it proceeds southwards and therefore the thermophile species gradually disappear. The total volume of plankton in the southern portion of the northern water mass is somewhat smaller than in shelf waters and smaller than the plankton from the warmer portions of the Brazil current (samples taken with same net hauled during the same time). This suggests that the surface waters proceeding southwards become gradually impoverished not only in number of species but in total productivity as well.

The typical association of shelf waters with salinity between 35‰ and 36‰ is, in decreasing order of frequency: *Corymorpha gracilis, Proboscidactyla ornata, Turritopsis nutricula.*

Eucodonium brownei was here found only in shelf waters. The total volume of plankton was found to be greater than elsewhere in shelf waters.

Accurate salinity and temperature data for many of the samples taken in coastal and lagoon region waters are not available but salinity is lower than 35‰ and often much lower. The typical association of such coastal species was found to be variable in frequency of species and specimens. Most coastal and mangrove species appear in the plankton in large numbers or are totally absent. This may in some cases be explained by the movement of the tides which bring with them swarms of species from offshore to the inshore region, as is typically the case with

Liriope tetraphylla whose movements may be followed with the unaided eye and which comes and goes with the tide inside bays and mangrove regions. Most of the species of inshore waters appear in large numbers in the plankton at times when they are liberated by the hydroid or the ova shed and thus become gathered in large patches. The association, in decreasing order of frequency is: *Podocoryne minima, Clytia cylindrica, Obelia* spp. and rarer species such as *Lovenella cirrata, Sarsia eximia, Ectopleura dumortieri, Eucheilota ventricularis.*

7 — ZOOGEOGRAPHIC NOTES

The area covered by this preliminary survey of the hydromedusan fauna of Brazilian waters extends from the isle of Fernando de Noronha (3° lat. S) to about the latitude of Montevideo (35° lat. S), in surface layers. The different areas however were quite unequally sampled and the majority of hauls was made in the region between the latitude of Cabo Frio (23° S) and that of Florianópolis (27° S).

The hydromedusan fauna here studied is typically a warm water fauna as might be expected since most of the samples come from surface layers and low latitudes. The samples containing no medusae come either from northern waters, from very diluted coastal waters under the influence of rivers or were inadequately hauled. The poorest waters in number of species and specimens are those from the southernmost stations, in many no medusae were found at all. These are either cooled off northern waters (Brazil current) or diluted mixed waters under the influence of the Plata River and the Lagoa dos Patos. Northern waters are poor waters both in number of species and of specimens and as this water progresses southwards and becomes cooled off and or diluted, the fauna is increasingly impoverished because the stenothermic and stenohaline species gradually desappear. Accordingly, at these stations the only species found were a few *Aglaura, Liriope,* a single *Aegina citrea* and a doubtful *Rhopalonema* (Samples M_{160} to M_{174}). The same may be said for samples M_{140} to M_{147} from a more northerly area.

The zoogeographic affinities of this collection of hydromedusae may thus be summarized:

1 species described as new:

Laodicea minuscula (coastal waters of the State of S. Paulo).

8 species exclusively Atlantic:

Eucodonium browcnei
Podocoryne minima (? also Japan)
Laodicea undulata
Lovenella cirrata
Corymorpha gracilis
Bougainvillia frondosa
Eutima mira
Eucheilota ventricularis

The last four mentioned are exclusive of the Western Atlantic.

2 Atlantic and Pacific species:

Clytia cylindrica (only western Pacific)
Proboscidactyla ornata

14 circumtropical species:

Sarsia eximia, *Ectopleura dumortieri*, *Stomotoca dinema* } probably

Aglaura hemistoma
Solmundella bitentaculata

Aegina citrea, *Cunina octonaria*, *Cytaeis tetrastyla*, *Zanclea costata*, *Turritopsis nutricula*, *Bougainvillia ramosa*, *Liriope tetraphylla*, *Rhopalonema velatum*, *Geryonia proboscidalis* } widely distributed

As is usually the case with planktonic animals, endemisms are rare and the greater percentage of species has a wide distribution. The new species described is probably restricted to coastal waters and has a short free-living stage.

Fifteen species are here recorded from coastal waters, thirteen of them belonging to the Antho - and Leptomedusae which are meroplanktonic species requiring relatively shallow depths to complete their life cycle. Two oceanic holoplanktonic species tolerate diluted coastal waters, one of them, *Liriope* may be found there in very large numbers. Within certain limits, they are probably euryhaline and eurythermic species. The following were taken in coastal waters:

Ectopleura dumortieri, *Podocoryne minima*, *Laodicea minuscula* — only in lagoon regions.

Eucheilota ventricularis, *Sarsia eximia*, *Clytia cylindrica*, *Obelia* spp. — in lagoon regions and coastal waters.

Bougainvillia ramosa, *Lovenella cirrata*, *Stomotoca dinema* — coastal waters.

Zanclea costata — known to be a neritic species taken over shallow depths.

Liriope tetraphylla, *Cunina octonaria* — in coastal, shelf and northern waters. Predominantly in shelf waters.

Turritopsis nutricula — a shelf water species penetrating in coastal waters.

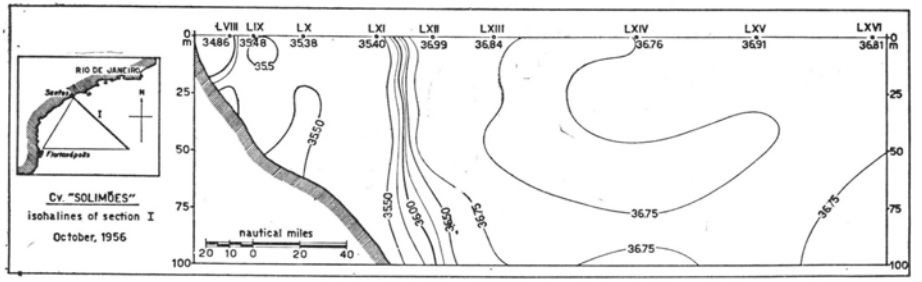

Fig. 28 — Santos section, isohalines, October 1956. This section shows the three different water masses: coastal (less than 35‰ salinity), shelf water mass (35‰) and northern waters (above 36‰).

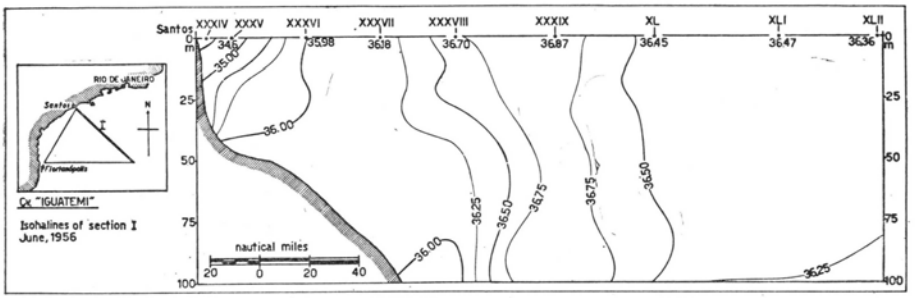

Fig. 29 — Santos section, isohalines, June 1956. Same as Fig. 28.

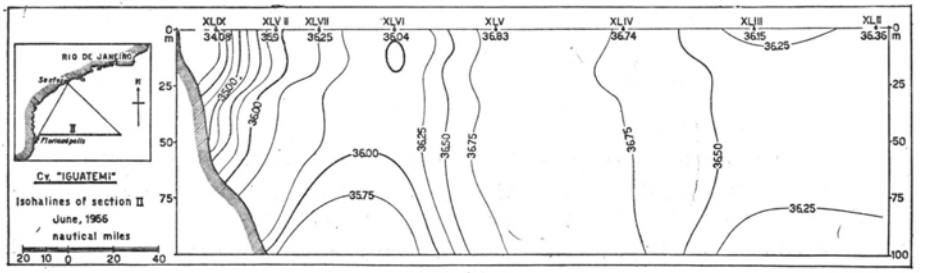

Fig. 30 — Santos section, isohalines, March 1956. Same as Fig. 28.

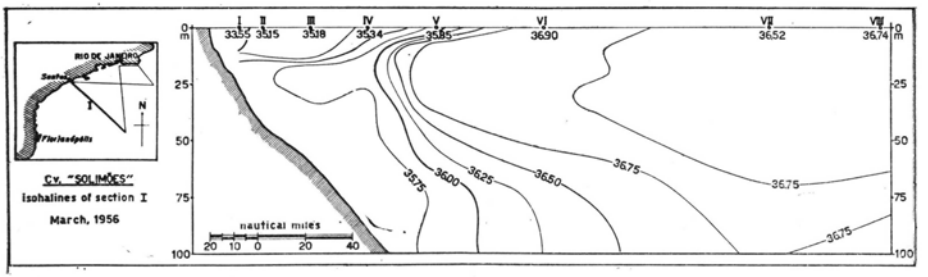

Fig. 31 — Florianópolis section, isohalines, June 1956.

As may be seen by the sections and isohaline diagrams (Figs. 28, 29, 30, 31) for which I am indebted to I. Emílsson, a deep water mass is interposed between coastal waters and northern waters. This water mass has been called "shelf water" by I. Emílsson and the same name is used here. If we compare quantitatively the different samples for what concerns the total amount of plankton and take into consideration the type of net and duration of haul, it is immediately evident that shelf waters yield a much larger amount of plankton than northern waters which yielded a very small total volume of plankton. Coastal waters come next to shelf waters in total amount of plankton and may at places be equal.

The following species come from shelf waters:

Proboscidactyla ornata
Corymorpha gracilis
Bougainvillia frondosa
} found only in shelf waters.

Eucodonium brownei — elsewhere also coastal.
Turritopsis nutricula — doubtfully also coastal.
Cytaeis tetrastyla — rarely also coastal.

Bougainvillia ramosa
?Laodicea undulata
} probably also coastal.

Cunina octonaria
Liriope tetraphylla
} shelf water species also found in coastal and northern waters.

Solmundella bitentaculata
Aegina citrea
} mainly northern waters.

The off-shore oceanic mass, called northern waters by I. Emílsson is, from Cabo Frio southwards, the southernmost branch of the Brazil current which reaches the latitude of Montevideo in surface layers. As might be expected its fauna is the same as in the Fernando de Noronha and Trindade areas, gradually impoverished by the temperature decrease and lack of interchange with richer water masses.

The following species were taken in northern waters:

Eutima mira *Geryonia proboscidalis*	northern waters
Rhopalonema velatum *Aglaura hemistoma* *Solmundella bitentaculata* *Aegina citrea* *Liriope tetraphylla* *Cunina octonaria*	also in shelf waters (see above)

All northern water species, with the only exception of *Eutima mira*, which was secured on the insular shelf of Fernando de Noronha, are holoplanktonic species which do not have a benthonic stage and belong to the Trachymedusae and Narcomedusae.

In spite of the wide geographic gap, the collection of Hydromedusae taken by the Great Barrier Reef Expedition and recently studied by Kramp (1953) is the more readily comparable with the present one.

At the Great Barrier Reef fewer stations were worked at regular intervals during one year, they are placed at lower latitudes (around 15° S) and the temperature varied between slightly over 20° C and 29°C the salinity between about 33‰ and above 35‰.

Under these conditions, Kramp found 44 different species, a greater number than here. This is due to the greater number of coastal species which belong typically to the rich Indo-west Pacific fauna.

From the Great Barrier Reef Kramp (1955, p. 312) lists six circumtropical holoplanktonic species which were all recorded also here: *Rh. velatum, A. hemistoma. G. proboscidalis, L. tetraphylla, S. bitentaculata, C. octonaria.* It is interesting to notice that all but *Cunina* belong to monotypic genera or to genera with only two closely related species.

Of the meroplanktonic species listed by Kramp four occurring mainly in northern seas; two of these were present also here: *Zanclea costata, Amphinema* (*Stomotoca*) *dinema.*

Of the five species recorded as typical of tropical and sub-tropical seas, four were also recorded here: *C. tetrastyla, P. ornata, Phialucium carolinae* and *Aequorea* have already been found in Brazilian waters but are not yet published.

Ten species are listed by Kramp as typical of the Indo-west Pacific region. None of these was recorded here, but several among them have their Atlantic twin species belonging to the same genus. We thus have *B. fulva* (Indo-west Pacific) with *B. carolinae* and *B. platygaster* (Atlantic). *Eutima levuka* (Indo-west Pacific) with *E. mira, E. gentiana. Phialucium mbenga* (Indo-west Pacific) with *Phialucium* spp. yet undescribed. *Olindias singularis — Olindias sambaquiensis.*

Seven species are listed from the Indian Ocean and two from the Western Pacific by Kramp (1953). None of them was found here.

The following 16 species were not taken by the Great Barrier Reef Expedition: *S. eximia, E. dumortieri, C. gracilis, E. brownei, T. nutricula, P. minima, B. frondosa, B. ramosa, L. minuscula, Obelia* spp., *L. undulata,*

C. cylindrica, L. cirrata, E. ventricularis, E. mira, A. citrea. These sum to 63% of the total which is not in common with the fauna from the Great Barrier Reef as sampled by the Expedition.

The greatest affinities of the meroplanktonic species taken in Brazilian waters in undoubtedly with the tropical and sub-tropical western Atlantic fauna and in a lesser degree also with the eastern Atlantic fauna.

It may still be added that other species may be expected to be found here in the future. Thus none of the six species, with the only exception of *Laodicea undulata*, listed by Kramp (1957, p. 124) as neritic species taken by the Discovery Expedition and others in the Western Tropical Atlantic were found in the present collection. Of the 20 species listed by the same author as oceanic species predominantly epipelagic, seven were not taken here. None of the oceanic bathypelagic species mentioned by Kramp (l.c., p. 126) from the Atlantic warm waters was again recorded now.

8 — RESUMO

Estuda-se neste trabalho a fauna de hidromedusas das águas brasileiras em sua sistemática e distribuição.

1 — Tôdas as espécies são descritas em detalhe porque a maioria é nova para esta parte do Atlântico. De várias dá-se uma sucinta revisão do gênero.

Uma espécie é descrita como nova: *Laodicea minuscula.* Seus caracteres específicos são: tamanho diminuto dos espécimes sexualmente maduros; apenas quatro tentáculos bem desenvolvidos, perradiais: quatro bulbos interradiais; manubrium pequeno; oito córdilos, ocelos ausentes.

A presença de *Eucodonium brownei* constitue achado zoogeogràficamente inesperado. *Bougainvillia frondosa* foi reencontrada agora pela primeira vez depois da descrição original. *Corymorpha gracilis* é mantida como espécie distinta de *Corymorpha* (*Steenstrupia*) *nutans* europea.

2 — As medusas aqui estudadas pertencem tìpicamente a uma fauna de águas quentes. Quatorze espécies têm reconhecida ou provável distribuição circuntropical ou são vastamente distribuídas.

Sete são exclusivamente Atlânticas, sendo 3 destas exclusivas do Atlântico ocidental. Apenas duas são comuns ao Atlântico e Pacífico. A única espécie nova é de águas costeiras.

3 — Na massa de águas costeiras, cuja salinidade é inferior a 35‰, foi encontrado o maior número de espécies diferentes. Dez destas são exclusivas de águas costeiras.

4 — As águas da plataforma, com salinidade entre 35 e 36‰ caracterizam-se pela grande quantidade de espécimes, sendo indicadoras dessa massa de águas: *Corymorpha gracilis, Proboscidactyla ornata* e *Turritopsis nutricula.*

5 — As águas do norte, com salinidade acima de 36‰ caracterizam-se por uma associação de espécies holoplanctônicas, sendo indicadora: *Geryonia proboscidalis,* e havendo preponderância de *Aglaura hemistoma* sôbre *Liriope tetraphilla.* As águas do norte tornam-se cada vez mais empobrescidas à medida que progridem para o sul.

6 — Há indícios seguros de que várias espécies realizam migrações diurnas verticais, entre outras: *Proboscidactyla ornata, Turritopsis nutricula, Cunina octonaria.*

7 — Tôdas as espécies oceânicas são holoplanctônicas, circuntropicais e representantes de gêneros monotípicos ou de pouquíssimas espécies. As espécies meroplanctônicas são costeiras ou de águas da plataforma, com distribuição geográfica mais restrita. A abundância relativa de *Aglaura* e *Liriope* parece ser inversamente proporcional.

8 — Faz-se, por fim, uma comparação com os resultados alcançados no estudo das medusas coletadas pela Great Barrier Reef Expedition.

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