THE CARLSBERG FOUNDATION'S
OCEANOGRAPHICAL EXPEDITION ROUND THE WORLD 1928—30
AND PREVIOUS "DANA"-EXPEDITIONS
UNDER THE LEADERSHIP OF THE LATE PROFESSOR JOHANNES SCHMIDT

DANA-REPORT No. 63

THE HYDROMEDUSAE OF THE PACIFIC AND INDIAN OCEANS

BY

P. L. KRAMP

ZOOLOGICAL MUSEUM, COPENHAGEN

WITH 13 FIGURES IN THE TEXT

PUBLISHED BY THE CARLSBERG FOUNDATION

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CONTENTS

INTRODUCTION

The hydromedusae collected during the expeditions in the Atlantic by the "Dana" and other vessels were dealt with by the present author in the Dana-Report No. 46, 1959. That paper was divided into three sections: *A*, Systematic account of the collected species, *B*, a survey of the hydromedusae occurring in the Atlantic Ocean and adjacent waters (with diagnoses, figures, and keys for identification), *C*, Zoogeography. It is the intention to deal with the Indo-Pacific fauna in the same manner, but the present paper comprises the first section only; the two other sections are under preparation, and I hope to live long enough to accomplish the plan.

The material comprises: the results of the passage of the "Dana" through the Pacific and Indian Oceans from September 1928 to January 1930; collecting by various merchant vessels carried out by request of the "Dana" Committee; other expeditions in the same waters, mainly the "Galathea" Expedition in 1951–52, and also a number of species collected by the late Dr. TH. MORTENSEN during his various expeditions.

In 1951 I had the good fortune to join the "Galathea" Expedition during its passage from Africa to Australia, which gave me an excellent opportunity to study numerous medusae in fresh condition. A preliminary account of some new or little-known species collected by this expedition has been published (KRAMP 1959 *c*) and will not be repeated in the present paper.

For each species are given: a list of the localities with numbers of specimens collected, morphological and systematic remarks, and geographical distribution. References to previous literature are restricted to the most important titles, complete lists being available in A. G. MAYER: "Medusae of the World", for the time before 1910 (MAYER 1910 *a*), and in my "Synopsis of the Medusae of the World" (KRAMP 1961 *a*) for the period 1910–1959.

Two new species are described: *Mitrocomella grandis* and *Tiaropsidium polyradiatum*. From a zoogeographical point of view the material is rich in surprises, many species being found to have a much more extensive distribution than known before, which shows how little we have known about the pelagic fauna in these waters.

The collections, which comprise 150 species, are deposited in the Zoological Museum, Copenhagen.

P. L. KRAMP,
Zoological Museum, Copenhagen.

Appliances. "Dana": P 50 silk-net, 50 cm wide; S 50, 150, 200, ringtrawl, stramin, opening diameter 50, 150 and 200 cm respectively; P 100, combined stramin and silk net, 100 cm wide; E 300, ringtrawl, 300 cm wide, meshes 12–24 mm. "Galathea": DNLL, dip-net by light; SN 50, silk-net, 50 cm wide; S 100, 200, ringtrawl, stramin, opening diameter 100 and 200 cm respectively; HOT, herring ottertrawl; TOT, triangular ottertrawl.

For further descriptions see Dana Reports 1, 1934 p. 18 and Galathea Reports 1, 1957 p. 22.

A. SYSTEMATIC ACCOUNT OF THE COLLECTED SPECIES

I. Anthomedusae.

Fam. **Corynidae.**

Dipurena ophiogaster HAECKEL.

Material:

Galathea" St. 531. 1 mile E. of Port Moresby, New Guinea. 25.X.51. SN 50, 10 m. wire. 1 specimen.

Distribution: Palao Islands; Japan; Ceylon; Mexico Pacific; Mediterranean; N.W. Europe.

Sarsia eximia (ALLMAN).

Material:

"Dana"
St. 3579. 23.X.28. 20°56′ S. 160°03′ W. S 150, 300 m. w. 1 specimen.
St. 3581. 26.X.28. 17°02.5′ S. 166°18′ W. S 150, 50 m. w. 1 specimen.
St. 3582. 27.X.28. 15°36′ S. 168°57′ W. S 150, 300 m. w. 1 specimen.

These localities are among the Tonga and Samoa Islands. The specimens measure 1.9–3 mm in height and slightly less in diameter; the apex is evenly vaulted, and there is no apical chamber or apical canal. The manubrium is retained in the specimen from St. 3581 (mutilated in the others) and is about as long as the bell cavity, surrounded by the gonad from its base to near the distal end. The exumbrella is smooth. The tentacles are somewhat longer than the height of the bell, evenly tapering, their nematocysts evenly distributed without any indication of collecting into annular or knob-shaped groups. The tentacle bulbs are broad, similar to those of *Sarsia eximia* and other species of this genus, in the best preserved specimen with a small, black ocellus. The specimens cannot be distinguished from European specimens of *Sarsia eximia*, and I believe that they belong to that species, which is recorded from California and Alaska.

Further distribution: North-western Europe.

Fam. **Tubulariidae.**

Euphysilla pyramidata KRAMP.

Euphysilla pyramidata KRAMP 1955 p. 245, Pl. 1 fig. 1, Pl. 2 fig. 3.

Material:

"Dana" St. 3954. 9.I.30. 16°53′ S. 42°12′ E. S 150, 50 m. w. 4 specimens.

It was interesting to find this species, which was described from the Gulf of Guinea, off the east coast of Africa, between Madagascar and Mozambique. The specimens are 1.8–2.0 mm wide; staining and clearing show that the gonad is actually confluent around the stomach and not interrupted in the perradial edges, which confirms my supposition that the genus belongs to the family Tubulariidae.

Further distribution: Gulf of Guinea, West Africa.

Ectopleura dumortieri (VAN BENEDEN).

Material:

"Galathea" St. 713. 4.V.52. 16°51′ N. 99°55′ W. SN 50, near surface. 1 specimen.

The specimen is 0.8 mm high and was taken near Acapulco Harbor, Mexico.

Distribution: Once before taken on the Pacific coast of Mexico; further: Chefoo, China; coast of Vietnam; India; West Africa; Mediterranean Sea; Portugal; N.W. Europe; North America from South Carolina to Cape Cod; near Cape Frio, Brazil.

Ectopleura minerva MAYER.

Ectopleura minerva MAYER 1900 *b* p. 31, Pl. 16 fig. 38, Pl. 37 fig. 125.
Ectopleura minerva NAIR 1951 p. 51.

Material:

"Galathea" St. 319. Nancowry Harbour, Nicobars. 6.V.51. SN 50, near surface. 2 specimens.
St. 373. Off Kerteh, Malacca, 4°30′ N. 103°28′ E. 7.VI.51. SN 50, near surface. 1 specimen.

The specimens are 1–1.2 mm high; the apical process is faintly developed, but contains a short apical canal. The eight meridional lines of nematocysts on the exumbrella are elevated, forming sharply protruding keels. This species is easily recognizable having only two tentacles, opposite each other, each with an abaxial row of 6–7 knobs of nematocysts.

Distribution: Originally described from the Tortugas, Florida (MAYER 1900 *b*), later recorded from the Trivandrum Coast, India (NAIR 1951), and now found in two localities in the Bay of Bengal.

Euphysora bigelowi MAAS.

Euphysora bigelowi MAAS 1905 p. 7, Pl. 1 figs. 1–3.
Euphysa bigelowi UCHIDA 1927 *a*, p. 189, Pl. 10 fig. 3, textfig. 28.

Material:

"Dana"
St. 3722 29.V.29
25°11′ N 122°35′ E
S 50, surface 1

St. 3809 4.IX.29
6°22′ S. 105°12′ E.
S 200 600 m. w. 2

St. 3900 9.XI.29
4°41′ N. 98°13′ E.
S 50, surface 1

St. 3901 10.XI.29
4°20′ N. 98°47′ E.
S 50, surface 1
S 200 50 m. w. 4
S 200 100 m. w. 3

St. 3922 12.XII.29
3°45′ S. 56°33′ E.
S 50, surface 1

St. 3955 9.I.30
18°30′ S. 42°18′ E.
S 150 50 m. w. 2

"Pacific"
St. 4798 1.I.34
21°23′ N. 119°51′ E.
S 150 201 m. w. 13

"Galathea"
St. 305 26.IV.51
Bay of Bengal
20°51′ N. 87°58′ E.
Depth 43–52 m
SN 50, surface 1

St. 319 6.V.51
Nancowry Harbour, Nicobars
Depth 30 m
SN 50, surface 1

St. 326 10.V.51
Strait of Malacca
2°38′ N. 101°22′ E.
SN 50, surface 6

St. 328 11.V.51
Strait of Malacca
1°35′ N. 103°01′ E.
Depth 20 m
SN 50, surface 8

St. 381 8.VI.51
Gulf of Siam
7°00′ N. 103°18′ E.
Depth 54 m
SN 50 1

St. 383 9.VI.51
Gulf of Siam
9°08′ N. 102°04′ E.
Depth 75 m
SN 50 3

St. 390 11.VI.51
Gulf of Siam
13°02′ N. 100°33′ E.
Depth 22 m
SN 50 30 m. w. 2

St. 414 16–19.VII.51
Dinagat, Philippines
10°20′ N. 125°32′ E.
Depth 40 m
SN 50 10 m. w. 1

St. 425 29–30.VII.51
Bucas Grande Isl., Philippines
9°40′ N. 125°05′ E.
Depth 50 m
SN 50 16 m. w. 1

St. 446 18.VIII.51
Basilan Isl., Philippines
6°42′ N. 121°58′ E.
SN 50 1

St. 482 12.IX.51
Near Bali
8°46′ S. 115°14′ E.
SN 50 16 m. w. 1

In his original description MAAS (1905) gives the size of this species as up to 10 mm in height, though most of his specimens were only half that size. Specimens observed by later authors never exceeded 3.5 mm in height, and the same applies to those examined by me. The specimens from the "Galathea", which were measured immediately after being caught, varied in height from 1.5 to 3.5 mm, and the largest specimens taken by the "Dana" are 5 mm high in their present state of preservation.

In most of the specimens examined by MAAS, but not in all of them, an apical canal extends from the stomach somewhat upwards into the gelatinous apical process; specimens examined by later authors, and also by me, are usually without any trace of an apical canal, or it may occasionally be represented by a slightly elevated conical protrusion from the apical wall of the stomach.

Euphysora bigelowi is evidently a strictly neritic, epipelagic medusa; the specimens from "Dana" stat. 3809 in Sunda Strait, which were taken in a haul with 600 m wire out, may have been caught during the hauling in of the net.

Distribution: This seems to be a truly Indo-West-Pacific species. It is common in the Indo-Malayan region, its occurrence extended northwards as far as Chefoo at the entrance to the Gulf of Chihli in China and to the southern parts of Japan, southwards to north-eastern Australia, westwards to the coasts of India. All the localities listed above, except two, are within this same area. "Dana" stat. 3922 and 3955, however, are in the western part of the Indian Ocean, near the Seychelles and in the Strait of Mozambique, between Madagascar and Africa. The only record from the eastern Pacific is that of a poorly preserved, crumbled specimen from the coast of Chile (KRAMP 1952 p.3); a re-examination of the specimen may prove that the identification was erroneous.

Euphysora furcata KRAMP

Euphysora furcata KRAMP 1948 *b* p. 19, Pl. fig. 7–8.
Euphysora furcata KRAMP 1957 *a* pp. 5, 97, 125. Pl. 1 fig. 2.
Euphysora furcata KRAMP 1959 *a* p. 4, fig. 40 *b*.

Material:

"Dana"
St. 3570 7.X.28
14°01′ S. 147°51.5′ W.
S 150 3000 m. w. 1

St. 3579 23.X.28
20°56′ S. 160°03′ W.
S 150 300 m. w. 1

St. 3624 10.XII.28
28°17.5′ S. 177°01′ E.
P 100 100 m. w. 1

St. 3627 14.XII.28
30°08′ S. 176°50′ W.
S 150 2000 m. w. 1
S 150 4000 m. w. 1

St. 3677 23.III.29
5°28′ S. 130°39′ E.
S 150 2000 m. w. 6

St. 3683 2.IV.29
4°30′ N. 123°26′ E.
S 150 300 m. w. 1
S 150 2000 m. w. 1
S 150 3000 m. w. 2
S 150 4000 m. w. 2

St. 3684 3.IV.29
6°37′ N. 122°24′ E.
S 150 300 m. w. 1

St. 3685 4.IV.29
7°22′ N. 121°16′ E.
S 150 2000 m. w. 1
S 150 3000 m. w. 2

St. 3686 6.IV.29
8°34′ N. 119°55′ E.
S 150 2000 m. w. 1

St. 3688 8.IV.29
6°55′ N. 114°02′ E.
S 150 2000 m. w. 2

St. 3714 20.V.29
15°22′ N. 115°50′ E.
S 150 50 m. w. 1

St. 3731 17.VI.29
14°37′ N. 119°52′ E.
S 150 2500 m. w. 2

St. 3739 2.VII.29
3°20′ N. 123°50′ E.
S 150 2000 m. w. 2

St. 3751 12.VII.29
3°40.5′ N. 137°53′ E.
S 200 50 m. w. 1

St. 3814 9.IX.29
4°38′ S. 99°24′ E.
S 200 300 m. w. 2

St. 3821 14.IX.29
0°51.5′ S. 99°24.5′ E.
S 200 300 m. w. 1
S 200 600 m. w. 2

St. 3847 11.X.29
12°02′ S. 96°43′ E.
S 150 3000 m. w. 16

St. 3903 17.XI.29
5°50′ N. 93°28′ E.
S 200 50 m. w. 1

St. 3904 18.XI.29
5°18′ N. 90°55′ E.
S 150 3000 m. w. 1

St. 3906 20.XI.29
4°26.5′ N. 85°21′ E.
S 200 100 m. w. 3
S 200 400 m. w. 1
S 200 600 m. w. 2

St. 3907 21.XI.29
3°59′ N. 82°57′ E.
S 200 300 m. w. 2

St. 3909 22.XI.29
5°21′ N. 80°38′ E.
S 150 3000 m. w. 11
S 150 4000 m. w. 1

St. 3910 23.XI.29
5°28′ N. 80°00′ E.
S 200 300 m. w. 1
S 200 600 m. w. 4

St. 3913	1.XII.29	S 200	100 m. w. **2**	St. 3934	29.XII.29	St. 3947	4.I.30
6°36′ N.	79°06′ E.	S 200	300 m. w. **1**	11°24′ S.	50°05′ E.	4°21′ S.	42°56′ E.
S 200	50 m. w. **8**			S 200	200 m. w. **1**	S 200	400 m. w. **1**
S 200	100 m. w. **6**	St. 3918	7.XII.29	S 200	400 m. w. **3**		
S 200	300 m. w. **2**	0°35′ N.	66°09′ E.			St. 3952	8.I.30
		S 200	300 m. w. **1**	St. 3935	21.XII.29	15°05′ S.	41°53′ E.
St. 3914	2.XII.29			10°50′ S.	48°30′ E.	S 200	500 m. w. **1**
4°52′ N.	77°08′ E.	St. 3919	9.XII.29	S 200	500 m. w. **1**		
S 200	600 m. w. **6**	0°07′ S.	63°56′ E.			St. 3956	10.I.30
		S 200	600 m. w. **1**	St. 3939	23.XII.29	21°13′ S.	42°26′ E.
St. 3915	3.XII.29			8°44′ S.	43°54′ E.	S 200	500 m. w. **1**
3°14′ N.	75°21′ E.	St. 3925	16.XII.29	S 200	200 m. w. **1**		
S 200	50 m. w. **1**	7°13′ S.	52°22′ E.			"Jutlandia"	
S 200	100 m. w. **6**	S 200	100 m. w. **1**	St. 3941	24.XII.29	St. 4808	2.V.34
		St. 3932	20.XII.29	7°24′ S.	41°51′ E.	36°20′ N.	143°00′ E.
St. 3916	4.XII.29	11°35′ S.	49°45′ E.	S 200	200 m. w. **1**	S 200	220 m. w. **1**
1°45′ N.	73°03′ E.	S 200	600 m. w. **1**				

This interesting and easily recognizable little medusa was originally described from a locality in the northern Atlantic south of the Newfoundland Bank, and was later found to be widely distributed in the Atlantic Ocean between about 40° N. and 40° S. Though asexual propagation is unknown in this species, it evidently has an oceanic distribution. The only previous record from waters outside the Atlantic is that of a specimen taken by the "Discovery", east of Somaliland in East Africa (KRAMP 1957 *a* p. 5). It is interesting, therefore, to find that the species, as a matter of fact, is widely distributed in the Indian Ocean, the Malayan Archipelago and the western part of the Pacific. This shows how little we have known about the pelagic fauna of these waters. In the Pacific the species was not taken further east than at Tahiti, about 150° W. St. 3570 was north of Tahiti, St. 3579 near Rarotonga, St. 3624 north of New Zealand, St. 3627 in the Kermadec Trench. These are the only localities where the species was found in the waters east of Australia. "Jutlandia" St. 4808 is east of Japan.

With the exception of St. 3903, near the Nicobar Islands, depth 1470 m, *E. furcata* was taken only in localities with depths exceeding 2000 m. It was found partly in several localities within the Indo-Malayan area, partly at most of the stations across the Bay of Bengal, from the north point of Sumatra to Ceylon, and further to the Seychelles and in the waters north and west of Madagascar. Accordingly, this species has an oceanic occurrence in the Indian as well as in the Atlantic Ocean, in contradistinction to its neritic relative, *E. bigelowi* (see above).

E. furcata has an extensive vertical distribution, being taken at all depths in hauls with from 50 to 4000 m wire out, but never close by the surface. This may explain, why it was never taken by the "Galathea". During that expedition collecting in deep water was carried out by gear of larger measure, which would hardly collect such small animals, and the 50 c. silk net, SN 50, was used only in the uppermost water layers. The number of specimens collected in the deep hauls are so considerable that there is no reason to believe that they were captured during the hauling in of the nets. Measurements of the height of the bell in all specimens taken in hauls with 100 m and with 3000 m wire out have shown that no perceptible difference exists in the size of the individuals from these depths, the range of variation being 2–5 mm in both cases, the average height being 3.2 mm in the specimens taken with 100 m wire out, 3.4 mm in those from the deep haul with 3000 m wire. We must conclude that this species is indigenous at all water levels explored by the "Dana". Daily vertical migrations through water columns of these dimensions seem to be beyond the capability of such tiny medusae.

Captures in the upper water layers are almost equally distributed within the entire area investigated. It is remarkable, on the other hand, that during the investigations from Ceylon to the Seychelles and further around Madagascar the species was never taken in hauls with more than 600 m wire out. This is easily explained, however, by the fact that at only four of the 40 stations within this range stramin nets were hauled

with more than 600 m wire out; in the 300 cm ringtrawl (E 300), which was hauled with 1000 m wire out at some of these stations, the meshes are too wide to catch these small medusae.

Distribution: Oceanic in the tropical and subtropical parts of the Atlantic and Indian Oceans and the western Pacific.

Euphysora abaxialis KRAMP.

Euphysora abaxialis KRAMP 1962 *a* p. 308, figs. 2–4.

Material:

"Galathea" St. 325. 10.V.51. Malacca Strait, 4°20′ N. 98°54′ E. Depth 46 m. SN 50. 1 specimen.
St. 373. 6–7.VI.51. Off Kerteh, Malacca, anchorage, 4°30′ N. 103°28′ E. SN 50, 4–8 m below surface. 1 specimen.
St. 428. 30–31.VII.51. Candos Bay, Mindanao, 9°36′ N. 125°46′ E. Depth 22 m. SN 50, 16 m wire. 1 specimen.

The specimens are 1–1.5 mm high and agree completely with the original specimens from Vietnam, described in the paper quoted above. The specimen from "Galathea" St. 325, which has an extended tentacle, was briefly mentioned in the same paper.

Distribution: Neritic in the Indo-Malayan region.

Gotoea similis KRAMP.

Gotoea similis KRAMP 1959 *a* p. 5, Pl. 2 fig. 1.

Material:

"Dana"
St. 3804. 30.VIII.29. 9°09′ S. 114°47′ E. S 200, 300 m. w. 2 specimens.
St. 3934. 20–21.XII.29. 11°24′ S. 50°05′ E. S 200, 500 m. w. 1 specimen.
St. 3959. 12.I.30. 23°40′ S. 43°02′ E. S 200, 300 m. w. 1 specimen.

St. 3804 is south of Bali, St. 3934 north of Madagascar, St. 3959 near the southern part of the west coast of Madagascar.

This peculiar little medusa was described from a single, well-preserved specimen, taken by the "Dana" Expedition near St. Helena in the Atlantic Ocean. The present specimens agree exactly with the type specimen; they are 3–3.2 mm high, and the tentacle is about twice as long as the height of the umbrella, stiff and thin, with an elongated conical basal bulb and a large terminal knob of nematocysts. It was with some hesitation that I described the single specimen from St. Helena as a new species, since it was rather similar to the only other species of the genus, *G. typica* Uchida, 1927, which occurs in Japanese waters; it was the great geographical distance which troubled me. Having now seen four other specimens, which are quite similar to the type, I think we should keep *Gotoea similis* distinct from *G. typica*. A deplorable error in the diagnosis of *G. similis* in the "Synopsis" (KRAMP 1961 *a* p. 41) has escaped my attention until now, for it is in *G. typica* that the marginal bulbs are small, and the tentacle short and thick; in *G. similis* the tentacle is long and thin, and the three marginal bulbs are very large, as seen in the figure which accompanied the original description. The peculiar interradial, sausage-like protuberances of the stomach, which are characteristic of the genus, are well developed in all of the new specimens.

Distribution: It is interesting that this species has now been found in three widely separated geographical areas: Central Atlantic, western part of the Indian Ocean, and in the Malayan Archipelago. The Atlantic specimen was taken in a haul with 1500 m wire out, the present specimens with only 300 or 500 m wire out.

Fam. **Zancleidae.**

Zanclea costata GEGENBAUR 1856.

Material:

"Dana"
St. 3842 8.X.29
South-west of Sumatra
8°00′ S. 99°02.5′ E.
S 200 1

St. 3903 17.XI.29
South of the Nicobars
5°50′ N. 93°28′ E.
S 200 50 m. w. 1

"Galathea"
St. 328 11.V.51
Strait of Malacca
1°35′ N. 103°01′ E.
Depth 20 m
SN 50, surface 3

St. 373 6–7.VI.51
Off Kerteh, Malacca
4°30′ N. 103°28′ E.
Depth 10 m
SN 50, 4–8 m below surface 5

St. 454 25.VIII.51
Java Sea
5°23′ S. 116°02′ E.
Depth 60 m
SN 50 2

St. 482 12.IX.51
Bali, anchorage
8°46′ S. 115°14′ E.
SN 50 16 m. w. 1

St. 512 7.X.51
Solomon Islands
9°25′ S. 160°00′ E.
Depth 29 m
SN 50 10 m. w. 6

This is a very variable medusa, which has been split up into several species, all of which, however, are probably identical. Most of the present specimens are less than 2 or 2.5 mm wide and have only two marginal tentacles; in the two specimens from "Galathea" St. 454, and in two of the six specimens from St. 512, only one tentacle is developed; on the other hand, all the three specimens from St. 328, which are only 1–1.5 mm high and wide, have four tentacles. Accordingly the number of tentacles is not merely determined by the developmental stages of the specimens. A third specimen from St. 454 was provisionally described by me as possibly belonging to a new species, *Zanclea dubia* (KRAMP 1959 *c* p. 226, fig. 4); in spite of its small size, 1.5 mm high, its gonads were fully mature, it had no tentacles at all, but two large and too very small perradial marginal bulbs. It was probably an aberrant specimen of *Z. costata*.

"Galathea" St. 512 was in the Solomon Islands, the other localities mentioned above are scattered within the Indo Malayan region, whence this species has frequently been recorded before.

Distribution: Widely distributed in the coastal waters of tropical and temperate seas, though apparently rare in the eastern Pacific and in the western part of the Indian Ocean.

Fam. **Cytaeidae.**

Cytaeis tetrastyla ESCHSCHOLTZ 1829.

Material:

"Dana"
St. 3556 14.IX.28
2°52′ N. 87°38′ W.
S 50, surface 1
S 150 50 m. w. 2
S 150 300 m. w. 1
S 150 600 m. w. 1

St. 3558 18.IX.28
0°18′ S. 99°07′ W.
S 50, surface 2

St. 3561 24.IX.28
4°20′ S. 116°46′ W.
S 150 50 m. w. 4

St. 3584 29.X.28
10°51.5′ S. 168°40′ W.
S 150 100 m. w. 1
S 150 600 m. w. 1

St. 3593 10.XI.28
17°27′ S. 179°33′ E.
S 150 100 m. w. 1
S 150 2700 m. w. 2

St. 3601 20.XI.28
18°21′ S. 178°21′ E.
S 150 50 m. w. 1

St. 3602 22.XI.28
20°00′ S. 174°29′ E.
S 150 100 m. w. 1

St. 3611 26.XI.28
20°53.2′ S. 164°03.3′ E.
S 150 50 m. w. 41
S 150 100 m. w. 3
P 100 1000 m. w. 1

St. 3626 13.XII.28
27°00′ S. 177°41′ W.
S 150 300 m. w. 2
S 150 600 m. w. 2

St. 3678 24.III.29
4°05′ S. 128°16′ E.
S 50, surface 1
S 150 50 m. w. 1
S 150 1000 m. w. 1

St. 3680 27.III.29
2°22′ S. 126°58.5′ E.
S 150 50 m. w. 1
S 150 300 m. w. 1

St. 3681 28.III.29
0°29′ N. 125°54′ E.
S 150 50 m. w. 2
S 150 600 m. w. 1

St. 3683 3.IV.29
4°08′ N. 123°00′ E.
S 150 50 m. w. 1
S 150 300 m. w. 2
S 150 600 m. w. 1

St. 3685 5.IV.29
7°22′ N. 121°16′ E.
S 150 600 m. w. 1

St. 3686 6.IV.29
8°34′ N. 109°55′ E.
S 150 1000 m. w. 1

St. 3690 10.IV.29
8°02′ N. 109°36.5′ E.
S 150 50 m. w. 1

St. 3731 17.VI.29
14°37′ N. 119°52′ E.
S 150 2500 m. w. 1

St. 3751 12.VII.29
3°40.5′ N. 137°53′ E.
S 200 50 m. w. 3
S 200 100 m. w. 1

St. 3768 25.VII.29
1°20′ S. 138°42′ E.
S 150 100 m. w. 9
S 200 300 m. w. 3
S 200 500 m. w. 1

St. 3800 18.VIII.29
7°53′ S. 116°18′ E.
S 200 300 m. w. 1

St. 3804 30.VIII.29
9°09′ S. 114°47′ E.
S 200 100 m. w. 36
S 200 300 m. w. 3

St. 3809 4.IX.29
6°22′ S. 105°12′ E.
S 200 50 m. w. 5
S 200 100 m. w. 4
S 200 300 m. w. 5

St. 3814 9.IX.29
4°38′ S. 99°24′ E.
S 200 50 m. w. 1

St. 3815 10.IX.29
3°36′ S. 97°37′ E.
S 200 100 m. w. 3
S 200 600 m. w. 1

St. 3827 17.IX.29
1°45′ N. 96°20′ E.
S 200 100 m. w. 1

St. 3828 18.IX.29
1°22′ N. 96°06.5′ E.
S 200 50 m. w. 1

St. 3893 6.XI.29
5°59′ N. 92°29′ E.
S 200 800 m. w. 1

St. 3900 9.XI.29
4°41′ N. 98°13′ E.
S 50, surface 5
S 200 50 m. w. 5

St. 3901 10.XI.29
4°20′ N. 98°47′ E.
S 50, surface 11
S 200 50 m. w. 2
S 200 100 m. w. 8

St. 3903 17.XI.29
5°50′ N. 93°28′ E.
S 200 50 m. w. 1

St. 3904 18.XI.29
5°18′ N. 90°55′ E.
S 50, surface 7
S 150 2000 m. w. 1
S 150 3000 m. w. 1

St. 3910 23.XI.29
5°28′ N. 80°00′ E.
S 200 50 m. w. 9
S 200 100 m. w. 2

St. 3911 23.XI.29
6°53′ N. 79°45′ E.
S 50, surface 2

St. 3912 24.XI.29
6°52′ N. 79°30′ E.
S 50, surface 1
S 200 300 m. w. 5

St. 3913 1.XII.29
6°36′ N. 79°06′ E.
S 50, surface 3
S 200 50 m. w. 67
S 200 100 m. w. 15
S 200 300 m. w. 14
S 200 600 m. w. 2

St. 3915 3.XII.29
3°14′ N. 75°21′ E.
S 200 100 m. w. 1
S 200 300 m. w. 1

St. 3916 4.XII.29
1°45′ N. 73°03′ E.
S 200 50 m. w. 2
S 200 300 m. w. 1
S 200 600 m. w. 1

St. 3918 7.XII.29
0°35′ N. 66°09′ E.
S 50, surface 1
S 200 300 m. w. 1
S 200 600 m. w. 1

St. 3920 9.XII.29
1°12′ S. 62°19′ E.
S 50, surface 5
S 200 50 m. w. 9
S 200 100 m. w. 2
S 200 300 m. w. 1
S 150 3500 m. w. 2

St. 3921 11.XII.29
3°36′ S. 58°19′ E.
S 50, surface 2
S 200 100 m. w. 1
S 200 200 m. w. 2

St. 3928 18.XII.29
11°20′ S. 50°10′ E.
S 200 200 m. w. 2
S 200 300 m. w. 1

St. 3933 20.XII.29
11°18′ S. 50°03′ E.
S 150 2000 m. w. 1

St. 3944 26.XII.29
4°45′ S. 40°10′ E.
S 150 100 m. w. 1

St. 3946 3.I.30
3°26′ S. 42°58′ E.
S 200 600 m. w. 1

St. 3951 7.I.30
14°16′ S. 41°48′ E.
S 200 100 m. w. 1

St. 3954 9.I.30
16°53′ S. 42°12′ E.
S 200 100 m. w. 1

St. 3955 9.I.39
18°30′ S. 42°18′ E.
S 150 50 m. w. 1
S 200 100 m. w. 1
S 200 200 m. w. 3

St. 3958 11.I.30
23°11′ S. 42°54′ E.
S 50, surface 1

St. 3964 15.I.30
25°19′ S. 36°13′ E.
S 150 50 m. w. 2
S 150 1000 m. w. 1

"Pacific"
St. 4761 19.IV.32
25°10′ N. 127°45′ E.
S 150 3

"Pacific"
St. 4772 12.IV.33
21°40′ N. 120°02′ E.
S 150 201 m. w. 1

"Selandia"
St. 4794 21.VIII.33
33°45′ N. 137°30′ W.
S 200 220 m. w. 1

St. 4796 26.X.33
31°50′ N. 136°00′ E.
S 200 220 m. w. 1

"Pacific"
St. 4798 1.I.34
21°23′ N. 119°51′ E.
S 150 201 m. w. 3

"St. Nordiske"
St. 4820 11.III.38
13°56′ N. 117°00′ E.
S 150 201 m. w. 1

"Galathea"
St. 256 22.III.51
Near Mombasa
4°05′ S. 39°41′ E.
DN, surface 1

St. 283 12.IV.51
W. of Ceylon
7°05′ N. 79°37′ E.
Depth 710 m
SN 50, near surface 1

St. 381 8.VI.51
Gulf of Siam
7°00′ N. 103°18′ E.
Depth 54 m
SN 50 5

St. 455	26.VIII.51	St. 482	12.IX.51	St. 512	7.X.51	St. 677	4.III.52
Java Sea		Bali, anchorage		Guadalcanal, Solomon Islands		Kermadec Trench	
5°32′ S.	112°41′ E.	8°46′ S.	115°14′ E.			28°38′ S.	175°53′ W.
Depth 66 m		Depth 30 m		9°25′ S.	160°00′ E.	Depth 9130 m	
SN 50	1	SN 50	16 m. w. 1	Depth 29 m		SN 50	**20**
				SN 50	10 m. w. 1		

The family Cytaeidae has recently been revised by W. J. Rees (1962), who recognizes three genera of hydroids belonging to this family, *Perarella* Stechov and *Stylactella* Haeckel with fixed gonophores, and *Cytaeis* Eschscholtz with free medusae comprising six species, in five of which the medusa is only known in newly liberated stages, or even still enclosed in the gonophores. One of these hydroids was described by Komai (1931), who thought that it might be the hydroid of the medusa described by Uchida (1927 *a*) as *Cytaeis japonica* n. sp. This medusa is, however, probably identical with *C. tetrastyla*, whereas the hydroid, according to Rees, belongs to another species redescribed by him as *Cytaeis uchidae* nov. nom. (this specific name should be altered to *uchidai*, which has been admitted by Dr. Rees in a letter to the present author). The fixed hydroid of the medusa generally named *C. tetrastyla* remains unknown (polypoid buds developed on the stomach wall of *C. tetrastyla* were described my me, 1959 *a* p. 8, Pl. 1 figs. 3–6). Rees indicates that the medusa *Cytaeis tetrastyla* as it was conceived by me in the "Synopsis" (Kramp 1961 *a* p. 63) may be an aggregate species. I do not deny the possibility, but the present material is not in such a condition that a division into separate species can be made. In the following the specific name *tetrastyla* is employed in the usual way as comprising all free-living, planktonic medusae of the genus, the Mediterranean *C. pusilla* Gegenbaur and *C. vulgaris* Agassiz & Mayer from the Fiji Islands being regarded as doubtful synonyms.

During the cruise of the "Dana" *Cytaeis tetrastyla* was taken from the Gulf of Panama far out into the Central Pacific; at some of the stations among the Polynesian Islands as far south as 27° S., near the Kermadec Islands; in many localities in the Indo-Malayan area, northwards to 14°37′ N. (west of Luzon, Philippines); in the Indian Ocean west of Sumatra, but not farther south than 4°38′ S.; across the southern part of the Bay of Bengal; at several of the stations between Ceylon and the Seychelles; north of Madagascar and off the African coast from Mombasa to Delagoa Bay; it was previously unknown off the east coast of Africa south of Somaliland. With this exception the species was previously known from all these areas. By merchant vessels it was collected around Formosa and in two localities in the north-eastern Pacific ("Selandia" St. 4794 and 4796) off San Francisco, considerably farther north than known before.

During the "Galathea" Expedition *Cytaeis tetrastyla* was taken near Mombasa in East Africa, near Ceylon, in the Gulf of Siam and the Java Sea, and near the Solomon Islands north-east of Australia; moreover in a locality (St. 677), above the deep water of the Kermadec Trench, 28°38′ S., where 20 specimens were taken near the surface by the 50 cm silk net, ten of them with medusa buds on the stomach wall. (One of the specimens from "Dana" St. 3751, north of New Guinea, with a large stomach, densely beset with medusa buds, is very similar to the well-known figure given by Haeckel of *Cytaeis "macrogaster"*).

Vertical distribution. Owing to its ability to propagate by asexual budding this species has an oceanic distribution, and it belongs to the epipelagic zone, dominating in the hauls with 50 and 100 m wire out, less frequent immediately at the surface. In hauls with more than 300 m wire seldom more than one and never more than two specimens were taken. In hauls with 200 or 300 m wire out the number was usually 1–3, rarely 5, on one occasion 14 specimens, *viz.* at St. 3913, west of Ceylon; at the same station 15 specimens were taken with 100 m wire out and no less than 67 in the haul with 50 m wire out (but only 3 in the surface-haul). We can safely presume that all specimens taken in hauls with more than 300 m and the majority of those taken with 300 m wire out, were captured at higher levels during the hauling in of the nets. The collecting from the merchant-vessels was always done in hauls with 200–220 m wire out and never yielded more than 1–3 specimens.

Distribution: This oceanic, epipelagic medusa is widely distributed in the warm parts of the Atlantic Ocean south of about 40° N., exceptionally as far south as 30° S. Mediterranean Sea. In the Indian Ocean

it was previously known only from the tropical parts, but the results of the "Dana" Expedition show that along the African coast it follows the currents into the Mozambique Channel. In Pacific waters it likewise mainly occurs within the tropical belt, penetrating northwards to southern Japan; and in the eastern Pacific it was taken by the "Selandia" as far north as 33°45′ N., probably under the influence of the eastward continuations of the Kuroshio Current.

Fam. **Clavidae.**

Turritopsis nutricula McCrady 1856.

Synonyms: *T. polycirrha* (Keferstein 1862), *T. pacifica* Maas 1909.

Material:

"Galathea"

St. 328. 11.V.51. Malacca Strait, 1°35′ N. 103°01′ E. SN 50, near surface. 2 specimens.
St. 428. 30–31.VII.51. Mindanao, Philippines, 9°40′ N. 125°55′ E. SN 50, 16 m. w. 3 specimens.
St. 645. 1.II.52. Near Horuhoru Island, Auckland, New Zealand, 36°43′ S. 175°10′ E. DN, surface. 4 specimens.

The specimens from the two first of these stations were small, 1–1.2 mm high, with 12–22 marginal tentacles. The specimens from New Zealand were considerably larger, 7.5–9 mm high, and similar to the numerous large specimens, likewise from New Zealand, recorded by me in a previous paper (Kramp 1928 p. 53); they were 4.5–11 mm high and then by me referred to *T. pacifica* Maas. Uchida (1930 p. 331) has examined the original specimens of *T. pacifica* from Japan and found that this species cannot be retained as a separate species. The large specimens from New Zealand may represent a large growth-form, occurring near the southern limit of the range of distribution of the species.

Though *Turritopsis nutricula* has frequently been recorded from the Indian Ocean and the western Pacific, it was never taken by the "Dana"; the numerous specimens which, by a superficial view, might appear to belong to *Turritopsis*, all turned out by closer examination to be badly preserved specimens of *Oceania armata*.

Distribution: Western Pacific from Japan to New Zealand; Malayan Archipelago; Bay of Bengal and central Indian Ocean; Red Sea; tropical west coast of Africa; Mediterranean; British coasts and the North Sea; east coast of North America from the West Indies to Cape Cod; Brazil. Mainly in coastal waters, but occasionally oceanic; epipelagic.

Oceania armata Kölliker 1853.

Material:

"Dana"

St. 3558 18.IX.28
0°18′ S. 99°07′ W.
S 150 100 m. w. **1**

St. 3587 2.XI.28
11°00′ S. 172°37′ W.
S 150 300 m. w. **1**

St. 3613 28.XI.28
22°43′ S. 166°05.8′ E.
P 100 300 m. w. **1**

St. 3620 7.XII.28
24°46.5′ S. 170°18.5′ E.
S 150 50 m. w. **5**
S 150 100 m. w. **1**

St. 3621 8.XII.28
25°47′ S. 172°24′ E.
S 150 1000 m. w. **1**

St. 3622 8.XII.28
25°54′ S. 172°37′ E.
S 200 100 m. w. **2**
S 200 200 m. w. **5**
S 200 300 m. w. **2**

St. 3623 9.XII.28
27°21′ S. 175°11′ E.
S 150 50 m. w. **4**
S 150 100 m. w. **1**
S 150 300 m. w. **1**

St. 3625 11.XII.28
29°40′ S. 179°34′ E.
S 150 50 m. w. **1**

St. 3626 13.XII.28
27°00′ S. 177°41′ W.
S 200 100 m. w. **2**
S 150 600 m. w. **1**

St. 3627 14.XII.28
30°08′ S. 176°50′ W.
S 150 100 m. w. **2**

St. 3631 18.XII.28
35°40′ S. 176°40′ E.
S 150 50 m. w. **1**

St. 3637 4.I.29
36°23.5′ S. 176°26′ E.
S 150 100 m. w. **1**

St. 3638 4.I.29
37°00′ S. 178°16′ E.
S 150 100 m. w. **2**

St. 3653 26.I.29
33°30.5′ S. 165°53′ E.
S 150 100 m. w. **1**

St. 3654 27.I.29
33°28′ S. 161°45′ E.
S 150 50 m. w. **2**
S 150 100 m. w. **3**

St. 3655 28.I.29
33°39.5′ S. 159°00′ E.
S 150 200 m. w. **2**

St. 3658 5.II.29
33°52′ S. 151°27′ E.
S 150 150 m. w. 1

St. 3659 17.II.29
34°20′ S. 152°46′ E.
S 150 100 m. w. 1

St. 3680 27.III.29
2°22′ S. 126°58.5′ E.
S 150 100 m. w. 2

St. 3684 3.IV.29
6°37′ N. 122°24′ E.
S 150 100 m. w. 1

St. 3723 30.V.29
25°30′ N. 125°28′ E.
S 200 300 m. w. 1

St. 3736 28.VI.29
9°17′ N. 123°58′ E.
S 200 50 m. w. 1
S 200 100 m. w. 2
S 200 300 m. w. 2

St. 3844 11.X.29
12°05′ S. 96°45′ E.
S 200 100 m. w. 1

St. 3921 11.XII.29
3°36′ S. 58°19′ E.
S 200 100 m. w. 1

St. 3932 20.XII.29
11°35′ S. 49°45′ E.
S 200 600 m. w. 1

St. 3937 22.XII.29
9°26′ S. 46°05′ E.
S 150 100 m. w. 1
S 200 200 m. w. 1

St. 3939 23.XII.29
8°44′ S. 43°54′ E.
S 200 200 m. w. 3

St. 3946 3.I.30
3°26′ S. 42°58′ E.
S 200 100 m. w. 2

St. 3953 8.I.30
16°12′ S. 42°04′ E.
S 200 200 m. w. 1

St. 3956 10.I.30
21°13′ S. 42°26′ E.
S 200 100 m. w. 2
S 200 200 m. w. 4

St. 3964 15.I.30
25°19′ S. 36°13′ E.
S 200 300 m. w. 2

"Jutlandia"
St. 4775 11.IV.33
30°20′ N. 138°00′ E.
S 200 220 m. w. 5

"Selandia"
St. 4788 17.V.33
32°50′ N. 173°10′ W.
S 200 220 m. w. 1

"Selandia"
St. 4789 28.V.33
31°40′ N. 135°30′ E.
S 200 220 m. w. 1

"Falstria"
St. 4813 5.IX.34
30°03′ N. 143°50′ W.
S 200 183 m. w.

Dr. TH. MORTENSEN, 10.IV.29. Bali, 8°01′ S. 115°02′ E. Surface. 1 specimen.

It was a great surprise to find this Mediterranean-Atlantic species widely distributed in Indo-Pacific waters. I thought at first that it was the poor state of preservation which made it impossible for me to discern the large vacuolated endoderm cells above the stomach, characteristic of *Turritopsis nutricula*, a species well known in these waters; but specimens, which were in a good condition, were unmistakably identified as *Oceania armata*; the same applies to a very fine specimen from Bali, collected by Dr. TH. MORTENSEN in 1929. I also examined specimens of *Oceania* as well as *Turritopsis* from the Mediterranean and the west coast of Africa for comparison, both richly represented in our collections. In case of doubt, when particularly poorly preserved, *Oceania* can always be recognized by the narrow base of the stomach and by the nematocyst knobs on the mouth rim being mounted on small, but distinct pedicels, whereas in *Turritopsis* they are situated directly on the very margin of the lips. As a matter of fact, *Oceania armata* has once before been recorded from the Pacific, *viz.* by UCHIDA (1927 *a* p. 219), who then expressed his surprise at finding two specimens of this medusa near Misaki in Japan.

The "Dana" collection of *Oceania armata* is mainly derived from three regions within the Indo-Pacific waters: north and west of New Zealand, the Malayan Archipelago (northwards to the Riukiu Islands), and north and west of Madagascar, but it was also taken at one station (3558) in the eastern Pacific, not very far from the Galapagos Islands, and near the Cocos Islands in the Indian Ocean, thus in areas with many islands, which indicates that it is a neritic species. By merchant vessels it was taken partly in two localities off the southern part of Japan, partly at two stations, St. 4788 and 4813, in the central part of the northern Pacific; the specimens found in these oceanic localities were of considerable size, and may have drifted for a long time, carried by the Kuroshio Current half-way or more across the ocean.

Oceania armata was never taken in great numbers by the "Dana", 5 specimens at most in one haul, and an analysis of the vertical occurrence shows that it was most frequently taken in hauls with 100 m wire out, though also in several hauls with 50, 200 and 300 m wire, but never near the surface; as in the case of *Euphysora furcata* (see above) this may explain, why it was never found by the "Galathea" Expedition. A few specimens taken in hauls with 600 and 1000 m wire out were undoubtedly caught during the hauling in of the nets through higher levels. In the Atlantic it likewise occurs in the upper water layers, though avoiding the surface, in the Mediterranean generally somewhat deeper down.

Distribution: Coastal waters in the tropical and subtropical parts of the Pacific and Indian Oceans; the Mediterranean; eastern Atlantic Ocean from Portugal to Cape Verde; the Azores; West-Indies.

Fam. **Hydractiniidae.**

Podocoryne spp. juv.

Some small, juvenile and indeterminable specimens of *Podocoryne* were collected by the "Galathea" Expedition in the following localities:

St. 373. 6–7.VI.51. Off Kerteh, Malacca, 4°30′ N. 103°28′ E. SN 50, 4–8 m below surface. 1 specimen.
St. 381. 8.VI.51. Gulf of Siam, 7°00′ N. 103°18′ E. SN 50. 1 specimen.
St. 428. 30–31.VII.51. Candos Bay, Manila, 9°56′ N. 125°46′ E. SN 50. 4 specimens.

The specimens from St. 373 and 381 are 0.8–1.0 mm high and wide, with four marginal tentacles and four well developed oral arms, without a gastric peduncle. The specimens from St. 428 are 1–1.5 mm high and wide; three of them have four marginal tentacles without pigment spots, and the stomach is mounted on a peduncle; the fourth specimen has eight marginal tentacles all alike, without ocelli, oral arms are not visible, but there are nematocysts in the margin of the mouth; the manubrium is broad and thick, without a peduncle.

Fam. **Bougainvilliidae.**

Lizzia gracilis (MAYER 1900).

Cytaeis gracilis MAYER 1900 p. 39, Pl. 36 figs. 122–124.
Podocoryne gracilis MAYER 1910 p. 141, Pl. 16 figs. 1–3.
Lizzia gracilis HARTLAUB 1911 p. 144.
Lizzia gracilis KRAMP 1928 p. 46.

Material:

"Dana" St. 3593. 10.XI.28. Fiji Islands, 17°27′ S. 179°33′ E. S 150, 100 m. w., 1 specimen; S 150, 300 m. w., 1 specimen.

"Galathea"
St. 325. 10.V.51. Strait of Malacca, 4°20′ N. 98°54′ E. Depth 46 m. SN 50, 2 specimens.
St. 428. 30–31.VII.51. Candos Bay, Mindanao, 9°40′ N. 125°55′ E. Depth 22 m. SN 50, 1 specimen.
St. 455. 28.VIII.51. Java Sea, 5°32′ S. 112°41′ E. Depth 66 m. SN 50, 1 specimen.

In full-grown specimens the umbrella is about 3 mm wide and a little broader than high, with 8 marginal tentacles, the four interradial tentacles being only about half as long as the perradial, and the mouth is surrounded by 8 unbranched oral tentacles. In young specimens there are only 4 marginal and 4 oral tentacles, and MAYER emphazises the remarkably late development of the remaining tentacles, oral as well as marginal. The present specimens are 1–2 mm high and wide; three of them have only 4 marginal tentacles, one of these with 4 and one with 8 oral tentacles. The three other specimens have 8 marginal tentacles, two of them with 6 and one with 8 oral tentacles. The specimen from "Galathea" St. 428, with 4 marginal and 4 oral tentacles, closely resembles the figure in MAYER's Pl. 16 fig. 1. The two specimens from "Dana" St. 3593 carry medusa buds on their stomachs.

Distribution: Originally described from the Tortugas, Florida (MAYER 1900 and 1910), where it was found again by VANHÖFFEN (1913 *a* p. 418). Once recorded from the Sunda Strait (KRAMP 1928), and now collected by the "Galathea" in three other localities within the Indo-Malayan region, and by the "Dana" near the Fiji Islands. It is evidently a neritic species.

Bougainvillia fulva AGASSIZ & MAYER.

Bougainvillia fulva AGASSIZ & MAYER 1899 p. 162, Pl. 2 fig. 6.
Bougainvillia fulva MAAS 1905 p. 10, Pl. 1 fig. 8, Pl. 2 figs. 9, 10.
Bougainvillia fulva KRAMP 1928 p. 47, figs. 21–23.

Material:

"Dana"

St. 3576 17.X.28
17°36.5′ S. 149°43,5′ W.
S 150 100 m. w. **1**

St. 3584 29.X.28
10°51.5′ S. 168°40′ W.
S 150 100 m. w. **2**

St. 3590 7.XI.28
13°56′ S. 172°30′ W.
S 150 150 m. w. **4**

St. 3593 10.XI.28
17°27′ S. 179°33′ E.
S 150 100 m. w. **2**
S 150 300 m. w. **1**

St. 3601 20.XI.28
18°21′ S. 178°21′ E.
S 150 50 m. w. **1**
S 150 100 m. w. **2**

St. 3602 22.XI.28
20°00′ S. 174°29′ E.
S 150 100 m. w. **4**
S 150 300 m. w. **1**

St. 3603 23.XI.28
22°00′ S. 170°26′ E.
S 150 100 m. w. **1**
S 150 300 m. w. **1**

St. 3611 26.XI.28
20°53.2′ S. 164°03.3′ E.
S 150 50 m. w. **3**
S 150 100 m. w. **2**

St. 3613 28.XI.28
22°43′ S. 166°05.8′ E.
P 100 50 m. w. **1**

St. 3641 8.I.29
43°40′ S. 176°36′ E.
S 150 100 m. w. **1**
S 150 300 m. w. **1**

St. 3663 23.II.29
33°33′ S. 154°04′ E.
S 150 100 m. w. **1**

St. 3665 25.II.29
29°37.5′ S. 156°46′ E.
S 150 50 m. w. **1**
S 150 100 m. w. **6**

St. 3668 13.III.29
21°03.5′ S. 149°45′ E.
S 150 50 m. w. **56**

St. 3683 3.IV.29
4°08′ N. 123°00′ E.
S 150 300 m. w. **4**

St. 3684 3.IV.29
6°37′ N. 122°24′ E.
S 150 50 m. w. **1**

St. 3686 6.IV.29
8°34′ N. 119°55′ E.
S 150 600 m. w. **1**

St. 3692 11.IV.29
9°59′ N. 107°23.5′ E.
S 150 50 m. w. c. **100**

St. 3714 20.V.29
15°22′ N. 115°20′ E.
S 150 100 m. w. **2**
S 150 300 m. w. **2**

St. 3715 22.V.29
18°18′ N. 119°36′ E.
S 150 300 m. w. **2**

St. 3718 25.V.29
20°04′ N. 123°59′ E.
S 150 50 m. w. **1**
S 150 100 m. w. **2**

St. 3720 25.V.29
29°10.5′ N. 124°37′ E.
S 150 100 m. w. **1**
S 200 300 m. w. **2**

St. 3722 29.V.29
25°11′ N. 122°35′ E.
S 200 100 m. w. **1**

St. 3728 12.VI.29
24°15′ N. 122°00′ E.
S 200 100 m. w. **1**

St. 3729 14.VI.29
20°03.5′ N. 120°50′ E.
E 300 1000 m. w. **1**

St. 3731 16.VI.29
14°37′ N. 119°52′ E.
S 200 50 m. w. **2**
E 300 1000 m. w. **1**
S 150 2500 m. w. **1**

St. 3768 25.VII.29
1°20′ S. 138°42′ E.
S 200 500 m. w. **3**

St. 3800 18.VIII.29
7°53′ S. 116°18′ E.
S 200 300 m. w. **10**

St. 3809 4.IX.29
6°22′ S. 105°12′ E.
S 200 50 m. w. **2**
S 200 100 m. w. **5**
S 200 600 m. w. **1**

St. 3814 9.IX.29
4°38′ S. 99°24′ E.
S 200 50 m. w. **1**

St. 3821 14.IX.29
0°51.5′ S. 99°24.5′ E.
S 200 300 m. w. **6**

St. 3828 18.IX.29
1°22′ N. 96°06.5′ E.
E 300 2000 m. w. **1**

St. 3893 6.XI.29
5°59′ N. 92°29′ E.
S 200 300 m. w. **2**

St. 3903 17.XI.29
5°50′ N. 93°28′ E.
S 200 50 m. w. **1**
S 200 600 m. w. **5**

St. 3905 19.XI.29
4°44′ N. 88°05.5′ E.
S 200 600 m. w. **3**

St. 3906 20.XI.29
4°26.5′ N. 85°21′ E.
S 200 300 m. w. **7**
S 200 600 m. w. **4**

St. 3909 22.XI.29
5°21′ N. 80°38′ E.
E 300 3500 m. w. **1**
S 150 4000 m. w. **1**
E 300 4500 m. w. **1**

St. 3910 23.XI.29
5°28′ N. 80°00′ E.
S 200 300 m. w. **2**
S 200 600 m. w. **5**
E 300 1000 m. w. **1**

St. 3913 1.XII.29
6°36′ N. 79°06′ E.
S 200 50 m. w. **8**
S 200 100 m. w. **146**
S 200 300 m. w. **13**
S 200 600 m. w. **1**

St. 3916 4.XII.29
1°45′ N. 73°03′ E.
S 200 100 m. w. **1**
S 200 300 m. w. **50**
E 300 1000 m. w. **1**

St. 3919 8.XII.29
0°07′ S. 63°56′ E.
S 200 300 m. w. **2**

St. 3924 14.XII.29
5°01′ S. 54°46′ E.
S 200 300 m. w. **6**

St. 3929 18.XII.29
12°11′ S. 50°18′ E.
S 200 500 m. w. **1**

St. 3931 19.XII.29
19°09′ S. 59°34′ E.
S 200 200 m. w. **1**

St. 3936 22.XII.29
10°28′ S. 47°30′ E.
S 200 200 m. w. **4**

St. 3952 8.I.30
15°05′ S. 41°53′ E.
S 200 400 m. w. **1**

St. 3953 8.I.30
16°12′ S. 42°04′ E.
S 150 50 m. w. **1**

St. 3954 9.I.30
16°53′ S. 42°12′ E.
S 200 200 m. w. **2**
S 200 300 m. w. **4**

St. 3955 9.I.30
18°30′ S. 42°18′ E.
S 200 100 m. w. 1
S 200 200 m. w. 3
S 200 300 m. w. 1
S 200 500 m. w. 1

St. 3957 11.I.30
21°30′ S. 42°32′ E.
S 200 300 m. w. 1

St. 3961 14.I.30
24°57′ S. 40°18′ E.
S 150 200 m. w. 4
S 150 300 m. w. 2

St. 3962 14.I.30
24°33′ S. 38°26′ E.
S 150 50 m. w. 2

St. 3963 15.I.30
24°30′ S. 37°48.5′ E.
S 200 150 m. w. 3
S 200 200 m. w. 3

St. 3964 15.I.30
25°14′ S. 36°21′ E.
E 300 3000 m. w. 1

St. 3969 27.I.30
31°33′ S. 30°07′ E.
S 200 300 m. w. 1

"Pacific"
St. 4761 19.IV.32
25°10′ N. 127°45′ E.
S 150 2

"Falstria"
St. 4797 18.I.34
30°43′ N. 136°28′ E.
S 200 201 m. w. 1

"Pacific"
St. 4798 1.I.34
21°23′ N. 119°52′ E.
S 150 201 m. w. 1

"Pacific"
St. 4799 12.III.34
19°02′ N. 119°38′ E.
S 150 201 m. w. 1

TH. MORTENSEN
16–17.I.1900
Koh Chang, Gulf of Siam 1

TH. MORTENSEN
10.IV.29
Bali
8°01′ S. 115°02′ E.
surface 1

"Galathea"
St. 283 12.IV.51
West coast of Ceylon
7°05′ N. 79°37′ E.
Depth 710 m
S 100, surface 1

St. 292 21.IV.51
Off Tranquebar
11°06′ N. 80°05′ E.
Depth 20 m
SN 50 1

St. 298 23.IV.51
Bay of Bengal
14°20′ N. 82°00′ E.
Depth 3230 m
TOT 4900 m. w. 1[1])

St. 316 4.V.51
Bay of Bengal
12°43′ N. 91°17′ E.
Depth 3170 m
TOT 4500 m. w. 1

St. 318 5.V.51
Bay of Bengal
9°02′ N. 93°07′ E.
Depth 1440 m
TOT 2800 m. w. 2

St. 326 10.V.51
Strait of Malacca
2°38′ N. 101°22′ E.
Depth 50 m
SN 50, surface 2

St. 361 31.V.51
5 miles S.W. of Sultan lighthouse, Singapore
TOT 40 m. w. 1

St. 373 7.VI.51
Off Kerteh, Malacca, anchorage
4°30′ N. 103°28′ E.
SN 50 3

St. 393 11.VI.51
Gulf of Siam
13°09′ N. 100°45′ E.
Depth 12 m
SN 50 6 m. w. 33

St. 399 21.VI.51
N.E. of Singapore
1°46′ N. 104°25′ E.
Depth 38 m
SN 50 16 m. w. 3

St. 465 5.IX.51
Sunda Trench
10°20′ S. 109°55′ E.
Depth 7000–6900 m
ST 300 10300 m.w. 1

St. 541 5.XI.51
Mouth of Moreton Bay, East Australia
S 200, surface 4

[1] The specimen was seen alive and must have been caught near surface.

Asexual propagation. Up to now asexual propagation was unknown in *Bougainvillia fulva*, but it may occur, though apparently not often; among more than 600 specimens examined by me it was observed in 16 specimens only. These were collected at various depths (with 50–500 m wire out), at different seasons (October to January and in July), and in widely separated areas: "Dana" St. 3584 and 3590 near the Samoa Islands, 3611 near New Caledonia, 3768 north of New Guinea, 3924 near the Seychelles, 3952, 3953 and 3955 in the Mozambique Channel, and at the two stations "Falstria" St. 4797 off southern Japan and "Pacific" St. 4798 near Formosa.

This asexual propagation takes place by budding of medusae directly from the external wall of the stomach in a similar way as in the Atlantic species *B. niobe*, as described by MAYER (1910 p. 166, Pl. 18 figs. 1–3). The medusa buds of *B. fulva* are collected in small clusters, and these are arranged in eight meridional rows on the stomach. Budding is mainly seen in fairly small individuals, usually 3–4 mm in diameter, but occasionally also in larger specimens. At "Dana" St. 3824 six specimens were found, five of them were 8–13 mm in diameter and had no buds, whereas the stomach of the sixth specimen, 4 mm wide, was covered by medusa buds. When budding occurs, it evidently precedes the sexual reproduction, but the eight adradial gonads, characteristic of this species, are usually discernible even in small budding individuals, and further growth of the gonads commences before the budding process is finished. In one specimen, 6 mm wide, there

are many medusa buds, and the gonads are clearly visible; in two other specimens, 6–7 mm wide, the gonads are further developed, but there are only a few medusa buds; an exceptional feature is seen in a still larger medusa, 10 mm in diameter (St. 3611), in which the eight gonads are fully developed and protruding along the adradial sides of the stomach, and still medusa buds are present in considerable numbers.

On a previous occasion (KRAMP 1957 *a* p. 9, Pl. 3 figs. 2–5) I have described the peculiar asexual propagation in *Bougainvillia platygaster*, in which polypoid structures are produced by budding from the stomach wall, and medusa buds arise from the pedicels of these polypoids. In *B. fulva* no intervening polypoid forms are developed, but the medusa buds arise directly from the stomach.

Parasitic larvae of Narcomedusae were found in six specimens of *B. fulva* from widely separated areas: "Dana" St. 3590 near the Samoa Islands, St. 3611 near New Caledonia, St. 3800 and 3809 in the Malayan Archipelago, St. 3909 near Colombo in Ceylon, and St. 3954 off Mozambique on the east coast of Africa. They are very similar to the larvae found in *Bougainvillia platygaster* (KRAMP 1957 *a* p. 90, Pl. 7 figs. 3, 4) and then with some probability referred to *Pegantha triloba*.

Bougainvillia fulva was collected by the "Dana" in numerous localities among the Polynesian and Melanesian islands as far east as Tahiti, and also east of the South Island of New Zealand and near the east coast of the Australian continent. In the Malayan Archipelago it was likewise almost generally distributed from Java to Formosa and westwards to the west coast of Sumatra. It was taken at most of the stations across the southern part of the Bay of Bengal and further from Ceylon to Madagascar and in the Mozambique Channel, whence it has followed the Agulhas Current southwards to Port St. Johns (St. 3969). Merchant vessels have taken it in some localities between the Philippines and southern Japan. The "Galathea" Expedition found it near Ceylon, in the Bay of Bengal, in the Strait of Malacca, in the Gulf of Siam and south of Java, and some specimens were also taken near Brisbane in East Australia. The known area of distribution of this species has been somewhat extended by these expeditions; in the western part of the Indian Ocean it was known from the Gulf of Aden and the Seychelles, but not from the waters around Madagascar; in the western Pacific it was previously known only as far east as the Fiji Islands, which also indicated the southern limit of its distribution, so that the occurrence off Brisbane and Sydney in Australia and off the east coast of the South Island of New Zealand means a considerable southward extension of the area of distribution. I have previously doubted the correctness of the records from Japan (UCHIDA 1927 *a* p. 221 and 1938 *a* p. 145), but I am now convinced of the reliability of these records, the more so since the "Falstria" (St. 4797) has taken a specimen east of Kiushiu in southern Japan.

B. fulva was not taken by the "Dana" in the eastern Pacific, but according to BIGELOW (1909 p. 195) it has been found at Acapulco Harbor on the Pacific coast of Mexico.

Owing to its ability to propagate by budding this species might be able to spread over great distances and obtain an oceanic distribution, like that of *B. platygaster*. As a matter of fact, however, the records of *B. fulva*, with few exceptions are from coastal waters, the exceptions being the occurrence in the middle of the southern, broad part of the Bay of Bengal ("Dana" St. 3905 and 3906) and between Ceylon and the Seychelle Islands (St. 3916 and 3919). As mentioned above, however, the asexual propagation does not seem to be a regular and common phenomenon in this species.

B. fulva was generally taken in small numbers only, but on a few occasions the nets contained a large number of individuals. Near the north-east coast of Australia (St. 3668) 56 specimens were taken in a haul with 50 m wire out, and near Saigon in Vietnam (St. 3692) about 100 specimens were collected, likewise with 50 m wire out; all these were small individuals, 1.8–3.5 mm wide. On the other hand, in a big shoal, which occurred near Colombo, Ceylon (St. 3913, 146 specimens in the haul with 100 m wire out) all sizes were represented, from 3 to 11 mm in diameter; in the open sea south-west of Ceylon (St. 3916) 50 specimens were taken in a haul with 300 m wire out. These big catches are exceptional and may be designated as accidental.

Vertical distribution. The medusa was mainly taken in hauls with 100–300 m wire out, though also rather frequently with 50 m wire and with 600 m wire out; some of the specimens taken with 600 m wire out may have been captured during the hauling in of the nets; this certainly occurs when single spec-

imens are taken in still deeper hauls. The "Dana" has not collected a single specimen in surface water hauls, whereas specimens were frequently taken near the surface by the "Galathea".

The measurements show that in hauls with a wire length of 100 m and more, specimens of all sizes were collected, from 2 or 3 mm up to 14 or 15 mm in diameter; in the hauls with only 50 m wire out almost all specimens were small, rarely more than 5 mm wide, though one single individual as large as 11 mm in diameter has been taken at this level.

Bougainvillia fulva may be said to belong to the epipelagic zone, since it is rarely taken at depths exceeding 300 or 400 m below the surface, but generally it avoids the very surface of the water. The occurrence of several young medusae in the upper water layers at some places in close vicinity to the coasts indicates that the corresponding hydroid (which is unknown) is a littoral form. The medusa may, accordingly, be designated as a neritic species.

Distribution: Tropical parts of the coastal waters in the Indian Ocean, the Malayan Archipelago, and the western and central Pacific, perhaps also in the eastern Pacific (Mexico, BIGELOW 1909). Penetrating somewhat into sub-tropical regions with the warm currents: with the Agulhas Current to South Africa, with the Kuroshio Current to Japan, and with the south-going branches of the Pacific South Equatorial Current to New Zealand and eastern Australia.

Bougainvillia platygaster (HAECKEL).

Hippocrene platygaster HAECHEL 1879 p. 91.
Bougainvillia platygaster MAYER 1910 p. 165.
Bougainvillia platygaster KRAMP 1957 *a* p. 9, Pl. 3 figs. 1–6.
Bougainvillia platygaster VANNUCCI & REES 1961 p. 78.

Material:

"Dana"

St. 3601 20.XI.28
18°21′ S. 178°21′ E.
S 150 100 m. w. **2**

St. 3800 18.VIII.29
7°53′ S. 116°18′ E.
S 200 300 m. w. **15**

St. 3814 9.IX.29
4°38′ S. 99°24′ E.
S 200 300 m. w. **2**

St. 3893 6.XI.29
5°59′ N. 92°29′ E.
S 200 800 m. w. **1**

St. 3902 17.XI.29
6°05′ N. 95°30′ E.
S 200 600 m. w. **2**

St. 3921 11.XII.29
3°36′ S. 58°19′ E.
S 200 50 m. w. **1**

St. 3952 8.I.30
15°05′ S. 41°53′ E.
S 200 500 m. w. **5**

St. 3954 9.I.30
16°53′ S. 42°12′ E.
S 200 300 m. w. **1**

St. 3958 11.I.30
23°11′ S. 42°54′ E.
S 200 200 m. w. **1**
S 300 300 m. w. **2**

St. 3964 15.I.30
25°19′ S. 36°13′ E.
S 150 1500 m. w. **2**

The known area of distribution of this medusa has been greatly extended by the "Dana" collections. The species is widely distributed in the tropical Atlantic, mainly in its western parts, and has also been found in a number of localities off the east coast of Africa (KRAMP 1957 *a*). The "Dana" has likewise taken it in the Mozambique Channel (St. 3952 to 3964) and near the Seychelles (St. 3921), but also in the Malayan Archipelago (St. 3800, 3814, 3893 and 3902) and even much farther east, near the Fiji Islands in the Pacific (St. 3601). A re-examination of the two specimens found there leaves no doubt of the correctness of the identification.

The peculiar form of asexual propagation in this species was described by me in 1957, medusa buds being developed on the pedicels of functional hydrants issuing from the stomach wall of the medusa. The same form of asexual propagation was observed in no less than 27 of the 34 specimens collected by the "Dana" in the Indo-Pacific waters, and it is characteristic that when it occurs, it occurs in all the specimens of a sample; thus all of the 15 specimens taken at St. 3800 were budding. The specimens with asexual propagation were

all fairly small, 3–5 mm in diameter, whereas specimens 6–11 mm wide had no medusa buds, but more or less well developed gonads.

Most of the specimens in the present collection were taken in hauls with 100 to 500 or 600 m wire out, a few from deeper hauls presumably captured during the hauling in of the nets. This is in accordance with previous observations of the vertical distribution in the Atlantic Ocean.

Distribution: Widely distributed in the tropical parts of the Atlantic and Indian Oceans; the Malayan Archipelago; Fiji Islands in the western tropical Pacific.

Bougainvillia ?muscoides (M. SARS).

Margelis nordgaardi BROWNE 1903 p. 14, Pl. 2 fig. 1, Pl. 3 figs. 5–6.
Bougainvillia nordgaardi MAYER 1910 p. 168, fig. 91.
Bougainvillia nordgaardi HARTLAUB 1911 p. 192, fig. 171.
Bougainvillia muscoides REES 1938 p. 2, fig. 1.
Bougainvillia nordgaardi KRAMP 1959 *a* p. 110, fig. 94.
Bougainvillia nordgaardi KRAMP 1961 *a* p. 79.
Bougainvillia muscoides VANNUCCI & REES 1961 p. 74.

Material:

"Galathea"
St. 381. 8.VI.51. Gulf of Siam, 7°00′ N. 103°18′ E. SN 50, near surface. 1 specimen.
St. 383. 9.VI.51. Gulf of Siam, 9°08′ N. 102°04′ E. SN 50, near surface. 5 specimens.
St. 390. 11.VI.51. Gulf of Siam, 13°02′ N. 100°33′ E. SN 50, 30 m wire, 2 specimens.

It is only for geographical reasons that I hesitate to refer these specimens to *B. muscoides*, which belongs to the coastal waters of north-western Europe, besides being recorded from Vancouver Island on the Pacific coast of North America (FOERSTER 1923 p. 246, Pl. 3 figs. 3–4). VANNUCCI & REES (1961) are inclined to regard this record as reliable. I have compared the present specimens with specimens from the type locality on the west coast of Norway, and I am unable to detect any structural differences.

It is true that ocelli frequently become invisible in medusae after prolonged preservation in formalin, but the specimens from the Gulf of Siam were examined in living condition, and the absence of ocelli was immediately ascertained. The only other species of *Bougainvillia* devoid of ocelli is *B. frondosa* MAYER, described from the Tortugas, Florida; it differs so much from *B. muscoides* as well as from the present specimens that an identification seems to be impossible.

The specimens are 2–2.5 mm wide, with fairly thin walls. There is a low and broad gastral peduncle; the stomach is fairly short, with four thick, interradial gonads. The marginal bulbs are narrow, globular, each with 3 to 5 or 6 tentacles; no ocelli. The oral tentacles are densely branched 3–4 times.

According to the literature, the basal trunk of the oral tentacles should be long; in the present specimens it is short, but distinct, in some of them as long as in the original drawing by BROWNE (1903), and in the Norwegian specimens examined by me the oral tentacles are so strongly contracted that the basal trunks are almost invisible, just as in some of the present specimens from the Gulf of Siam. The shortness of the basal trunks may, therefore, entirely be due to contraction and presents no objection as to an identification of the Siamese specimens with the European species *B. muscoides*.

Since REES (1938) reared the medusa *B. nordgaardi* (BROWNE 1903) from the hydroid *B. muscoides* (M. SARS 1846), the specific name of the medusa should be changed to *B. muscoides*.

Further distribution of *Bougainvillia muscoides*: North-western Europe; Vancouver on the Pacific coast of North America.

Bougainvillia ramosa (VAN BENEDEN, 1844).

For synonomy see VANNUCCI & REES 1961, p. 82.

Material:

"Galathea" St. 541. Mouth of Moreton Bay, East Australia. 26°57′ S. 153°25′ E. 5.XI.51. Depth 22 m. S 200, 3 specimens.

The specimens are about 5 mm in diameter and 4 mm in height, almost globular, the gelantinous substance very thick, the width of the subumbrella cavity being slightly more than one-third of the diameter of the umbrella. The stomach is about 1 mm broad, short; no peduncle. The gonads are interradial, cushion-like, without interradial incurvations. The oral tentacles are furcated up to six times, the basal trunk as well as the terminal branches fairly short. The marginal bulbs are thick, kidney-shaped, each with 7 tentacles with large ocelli which in one and the same individual may be round or crescent-shaped.

Distribution: This is the first time that the medusa of this widely distributed species is recorded from Indo-Pacific waters, but the hydroid occurs in coastal waters of Australia, Amboina, China and Japan. The further distribution of the medusa comprises north-western Europe, the Mediterranean, the Black Sea, Connecticut in New England, Santos in Brazil, the Cape Verde Islands, and Great Fishbay on the west coast of Africa.

Genus **Köllikerina.**

Köllikeria L. AGASSIZ 1862 p. 345.
Köllikerina KRAMP 1939 p. 511.

Diagnosis: Bougainvilliidae with eight groups of marginal tentacles; with four oral tentacles dichotomously branched; marginal tentacles with or without adaxial ocelli.

Since the original name *Köllikeria* was preoccupied for a trematode (COBB 1860), it had to be altered, and in 1939 I introduced the generic name *Köllikerina*.

Seven species of this characteristic genus have been described from widely separated geographical areas:

K. fasciculata (PÉRON & LESUEUR 1809), Mediterranean and eastern Atlantic.

K. elegans (MAYER 1900), Florida; India (?).

K. octonemalis (MAAS 1905), Ternate and Obi in Malayan Archipelago.

K. maasi (BROWNE 1910), Antarctic.

K. multicirrata (KRAMP 1928), Kei Islands in Malayan Archipelago.

K. constricta (MENON 1932), Madras in India.

K. ornata KRAMP 1959 *c*, Ceylon.

In general appearance these species are rather similar to each other, but each of them presents some characteristic distinguishing features, and I regard all of them as well-defined, separate species. Five species are represented in the "Dana" and "Galathea" collections from Indo-Pacific waters, one of them, *K. ornata*, was described as a new species in a previous paper (KRAMP 1959 *c*).

Some of the structures which have been used as distinguishing characters are variable, and some may depend on the stage of development of the specimens. The state of contraction in preserved specimens should also be considered; this mainly applies to the presence or absence or degree of development of a gelatinous apical projection and of a gastral peduncle, and to the distances between the eight marginal groups of tentacles. The number of ramifications in the oral tentacles may be more or less dependent on age, but may also, to some degree, be of specific importance.

A distinct, slender and fairly long peduncle is characteristic of two species, *elegans* and *ornata*, which also have an elongate and narrow stomach, whereas the stomach is broad and more or less flat in all the other species. A low and wide peduncle, on the other hand, mentioned in the descriptions of some species, may be seen in some specimens, but is invisible in others of the same species, which indicates that the presence or absence of such a low and wide peduncle is not a reliable distiguishing character. In a few poorly preserved specimens, in which the umbrella was turned inside out, I have seen the stomach hanging in a long and thin string of jelly, which evidently was entirely due to ill-treatment and should not be mistaken for a true peduncle.

In most instances the structure of the gonads is a reliable character for distinction of the species. In the three species, *elegans, maasi* and *octonemalis*, the gonads are interradial and smooth, though in this latter deeply longitudinally cleft in the interradii. In *fasciculata, constricta* and *ornata* they are perradial, V-shaped or horse-shoe-shaped with distinct furrows dividing the gonad into a number of transverse folds and a median

terminal fold. The number of folds varies in the different species. In *multicirrata* the gonads are described as eight adradial groups, each group consisting of three oval swellings which radiate from the upper part of the perradial edges of the stomach, the eight groups being well separated perradially as well as interradially. I shall return to this species and its gonads below.

We shall now discuss the species of *Köllikerina* represented in the present collections.

Köllikerina maasi (Browne).

Köllikeria maasi Browne 1910 p. 22, Pl. 4 figs. 1–5.
Köllikeria maasi Vanhöffen 1912 p. 361, Pl. 25 fig. 2.
Köllikerina maasi Kramp 1939 p. 512.
Köllikerina maasi Kramp 1957 *a* pp. 8, 124.
Köllikerina maasi Kramp 1961 *a* p. 85.

Material:

"Dana" St. 3957. 11.I.30. 21°30′ S. 42°32′ E. S 200, 300 m. w. 1 specimen.

The locality is near the west coast of Madagascar, far from the antarctic localities whence this species was previously recorded. The present specimen, however, agrees perfectly with the descriptions and figures given by Browne (1910) and Vanhöffen (1912) and with specimens from the Weddell Sea, formerly examined by myself (Kramp 1957 *a*).

The specimen is 8 mm in diameter and 9 mm in height, the apex evenly rounded and fairly thick. There is a slight indication of a gastral peduncle. The gonads are smooth, only with an interradial incurvation. The oral tentacles are divided 5–6 times, with a short and thick basal trunk, and the first pair of branches are likewise rather thick. The marginal epaulettes are linear, the spaces between them about half as broad. Each of the eight epaulettes carries 5 tentacles, the median tentacle being considerably larger than the others; also in this respect the specimen agrees with the former descriptions, and there are no ocelli, which is one of the most remarkable characters of *K. maasi* in contrast to all the other species of the genus.

Branches of the antarctic West Wind Drift move northwards along the western coasts of all the continents, and the Benguela Current carries several antarctic and subantarctic medusae and other pelagic animals to South Africa. In order to reach into the Mozambique Channel, however, such species would have to move against the Agulhas Current. Currents, however, are never absolutely constant in their course and velocity; swirls and eddies occasionally occur, and the occurrence of *K. maasi* on the west coast of Madagascar may be due to such irregularities of currents (see also Sverdrup, Johnson & Fleming, The Oceans, p. 696).

Further distribution: McMurdo Sound, Gauss Station, and Weddell Sea in the Antarctic.

Köllikerina octonemalis (Maas).

Rathkea octonemalis Maas 1905 p. 12, Pl. 2 figs. 11–12.
Rathkea octonemalis Mayer 1910 p. 180, fig. 95.
Bougainvillia octonemalis Hartlaub 1911 p. 156.
Köllikeria octonemalis Kramp 1928 p. 52.
Köllikerina octonemalis Kramp 1939 p. 512.
Köllikerina octonemalis Kramp 1961 *a* p. 86.

Material:

"Dana" St. 3800. 18.VIII.29. North of Lombok, 7°53′ S. 116°18′ E. S 200, 300 m. w. 3 specimens.

The locality is north of Lombok of the Sunda Islands. The species was originally described from Ternate and Obi in the Moluccas, and this is the first time it has been observed again.

The specimens are 2–3 mm in diameter and 3–4 mm in height. The apex is evenly vaulted and there is no gastral peduncle, whereas a short and wide peduncle is mentioned in the original description of the

species. The height of the stomach is about $^1/_3$ of the height of the subumbrella cavity. The gonads are interradial cushions with a deep interradial furrow, otherwise completely smooth. The oral tentacles are divided 6–7 times; their basal trunk is so short that apparently two separate oral tentacles issue from each of the four corners of the mouth, which is one of the characteristic features emphasized in the description of the species. The marginal bulbs are small and triangular, each with 2–3 large and two young and very small tentacles, all with ocelli. The triangular shape of the marginal bulbs is a feature characteristic of this species in contradistinction to *K. maasi*.

Distribution: Malayan Archipelago.

Köllikerina constricta (Menon).

Köllikeria constricta Menon 1932 p. 11, Pl. 2 fig. 11.
Köllikerina constricta Kramp 1939 p. 512.
Köllikerina constricta Kramp 1961 *a* p. 84.

Material:

"Dana" St. 3678. 24.III.29. Banda Sea, 4°05′ S. 128°16′ E. S 150, 300 m. w. 2 specimens.
"Galathea" St. 283. 12.IV.51. West coast of Ceylon, 7°05′ N. 79°37′ E. S 100, surface. 1 specimen.

This is another species with characteristic triangular marginal bulbs, but its gonads are fundamentally different from those of *K. octonemalis*. It was fairly well described by Menon (1932), and the present specimens no doubt belong to the same species, which originally was described from Madras in India.

The specimen from Ceylon ("Galathea" St. 283) is 4 mm wide; the umbrella is turned inside out, and apparently a low and broad gastral peduncle is present. The gonads are perradial, V-shaped, well separated in the interradii, each with one median fold directed downwards and three pairs of lateral folds separated by deep furrows. The oral tentacles are divided 6–7 times, the branches fairly slender and the terminal branches not particularly short. The marginal bulbs are distinctly triangular, each with 7 tentacles with large, round, reddish-brown ocelli. The space between the bulbs is twice as broad as the bulbs.

The two specimens from the Banda Sea ("Dana" St. 3678) are slightly younger, 3–4 mm wide; they have no gastral peduncle. In the smallest specimen the gonads have only two pairs of lateral folds; in both specimens the oral tentacles are divided 5–6 times, and there are only 5 tentacles on each of the marginal bulbs. The type specimen, as described by Menon, was 4 mm wide and had a short gastral peduncle, the gonads were V-shaped, "distinctly folded", and there were 8 tentacles on each of the triangular marginal bulbs.

The specific name *constricta* alludes to a characteristic constriction of the umbrella of the type specimen about $^1/_3$ of its height from the top; similar constrictions may, however, appear in many different medusae and no specific signification can be ascribed to them.

Distribution: Madras in India; Ceylon; Banda Sea.

Köllikerina multicirrata (Kramp).

Köllikeria multicirrata Kramp 1928 p. 51, fig. 24.
Köllikerina multicirrata Kramp 1939 p. 512.
Köllikerina multicirrata Kramp 1961 *a* p. 85.

Material:

"Dana"		St. 3692	11.IV.29	St. 3916	4.XII.29	St. 3966	18.I.30
St. 3684	3.IV.29	9°59′ N.	107°23.5′ E.	1°45′ N.	73°03′ E.	29°25′ S.	32°00′ E.
6°37′ N.	122°24′ E.	S 150	50 m. w. 1	S 200	600 m. w. 1	S 150	100 m. w. 2
S 150	300 m. w. 1					S 200	300 m. w. 1
		St. 3809	4.IX.29				
St. 3687	8.IV.29	6°22′ S.	105°12′ E.	St. 3922	12.XII.29	St. 3969	27.I.30
7°14′ N.	115°23′ E.	S 200	50 m. w. 1	3°45′ S.	56°33′ E.	31°33′ S.	30°07′ E.
S 150	300 m. w. 1	S 200	300 m. w. 2	S 200	100 m. w. 1	S 200	600 m. w. 1

The first four stations are in the Malayan Archipelago: St. 3684 east of Basilan Island in the Philippines, St. 3687 in the South China Sea, St. 3692 off Saigon in Vietnam, St. 3809 in the Sunda Strait between Java and Sumatra. St. 3916 is among the Maldive Islands, St. 3922 near the Seychelles, and St. 3966 and 3969 near the south-eastern coast of Africa. The species was originally described from the Kei Island; thus it seems to be widely distributed in the coastal waters of the Indian Ocean and the Malayan Archipelago, but apparently it is fairly rare, since only one or two specimens have been captured in each of these localities. Most of them were taken in hauls with 100 or 300 m wire out.

I have been somewhat in doubt as to the affinity of these specimens, because, though resembling *K. multicirrata*, they differ from the type specimen on two important points. The description of *K. multicirrata* was based on one single individual from the Kei Islands, and the species was characterized as "*Köllikeria* with numerous marginal tentacles in 8 confluent bundles; manubrium with 8 adradial groups of oval gonadial swellings".

Most of the present twelve specimens differ from this characterization in both respects, the eight groups of tentacles being more or less widely separated, and the gonads being distinctly perradial, with a median, perradial fold. This, however, mainly applies to the larger specimens, 5–6 mm in diameter, whereas small specimens, 3–4 mm wide, agree almost perfectly with the type, which likewise was of small size, 3 mm wide. An analysis of the present series of specimens lead to the conclusion that the type specimen was in a fairly young stage of development and was not representative of the species. The development, however, seems to proceed in a most peculiar and unexpected way as will appear from the following survey.

Station no.	Diameter mm	Number of tentacles in each bulb	Interspaces in proportion to width of bulbs
3969.....	6	12–13	3/2
3809.....	6	13–15	5/4
3684.....	5	15	1/1
3966.....	5	16	3/4
3966.....	5	12	3/4
3966.....	5	12–13	1/1
3809.....	c. 5	14	1/1
3809.....	c. 5	12	1/1
3922.....	5	10–12	5/6
3687.....	4	15–16	1/10–1/8
3916.....	4	12	1/10–1/5
3692.....	3	9–10	1/10–1/5
type.....	3	14–15	0

In all the specimens the oral tentacles are profusely branched, divided 6–7 times or more. The stomach is short and broad; in two specimens the stomach is attached to the subumbrella by a thread-like string of jelly, evidently due to ill-treatment during the preservation (see above), in the others there is no indication of a peduncle. The eight marginal groups of tentacles (the "epaulettes") are linear, slightly curved, carrying numerous tentacles, which evenly decrease in size towards both sides, the median one in each group not conspicuously larger than its neighbours. The adaxial ocelli are large, round, dark reddish-brown. In all these features the specimens of the "Dana" collection resemble the type specimen of *K. multicirrata*.

In small specimens, 3–4 mm in diameter, the eight marginal groups of tentacles are almost confluent as in the type specimen, or separated by quite insignificant spaces, but in the larger specimens, 5–6 mm wide, the epaulettes are more or less widely separated. The number of tentacles in each group is variable, and within the size-groups, represented in the present collection, only slightly and irregularly increasing with age. Evidently the full number of tentacles is soon attained, and in small specimens the epaulettes occupy almost the entire margin of the umbrella, but further growth of the margin mainly comprises the spaces between the epaulettes.

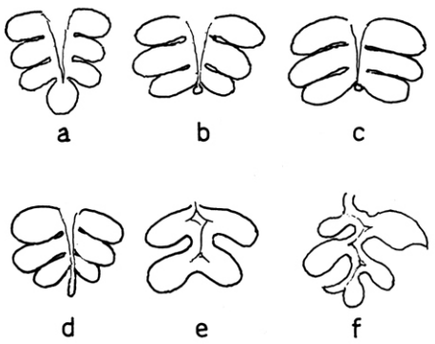


Fig. 1. Gonads of *Köllikerina multicirrata*. For explanation, see text.

In most of the specimens which are 5–6 mm wide the V-shaped gonads consist of three pairs of lateral folds and one well-developed median fold directed downwards (fig. 1 *a*), but in the specimen from St. 3922 the median fold is very small in one of the gonads (fig. 1 *b*); in the specimen from St. 3687, which is 4 mm wide, the median fold is likewise very small (fig. 1 *c*), and in the specimen from St. 3916, likewise 4 mm wide, it is somewhat elongated, but very narrow and devoid of gonadial tissues (fig. 1 *d*); in the specimen from St. 3692 a median fold is completely absent in some of the gonads (fig. 1 *e*), and one gonad is irregularly developed (fig. 1 *f*). In the type specimen of *K. multicirrata* the gonads have three pairs of lateral folds, distally connected merely by a tiny bridge of tissue which is indistinguishable from the surrounding tissues of the stomach wall; in this stage the gonads may be designated as adradial groups of swelling as in my original description of the species.

It is necessary, therefore, to give a new diagnosis of this species: *Köllikerina multicirrata* (KRAMP 1928). Up to 6 mm high and wide, with fairly thin walls, no conspicuous apical projection. Stomach short and broad, without a peduncle. With four perradial, V-shaped gonads, each consisting of three pairs of lateral folds and a median fold, separated by deep furrows, the median fold absent in young individuals. Oral tentacles divided 7 or more times. Up to 16 tentacles in each of the eight marginal groups, which are linear, confluent in young specimens, well separated in adults; tentacles each with a large, round, dark reddish-brown ocellus.

Distribution: Coastal waters of Indian Ocean and Malayan Archipelago.

Köllikerina ornata KRAMP.

Köllikerina ornata KRAMP 1959 *c* p. 229, fig. 6.

Material:

"Galathea" St. 283. 12.IV.51. West coast of Ceylon, 7°05′ N. 79°37′ E. S 100, surface. 1 specimen.

This specimen was recently described by me as a new species. It is one of the species with perradial gonads consisting of 8–10 transverse folds and one median fold. It differs from *K. multicirrata* not merely by the greater number of folds in the gonads, but also in the elongated, almost cylindrical shape of the stomach, the possession of a long and narrow mouth tube extended beyond the stomach, the presence of a slender gastral peduncle which, in this case, can hardly be due to rough treatment of the specimen, since I picked it out myself from the sample immediately after capture; moreover, the umbrella has a large, conical apical projection.

Direct comparison with the specimen of *K. constricta* (MENON), (which was taken in the same locality and has been mentioned above), and with the many specimens of *K. multicirrata* in the "Dana" collection has convinced me of the reliability of maintaining *K. ornata* as a valid species.

Fam. **Pandeidae.**

Protiara tropica BIGELOW.

Protiara tropica BIGELOW 1912 p. 253.
Protiara tropica BIGELOW 1919 p. 281, Pl. 39 figs. 1–4.
Protiara tropica KRAMP 1928 p. 54, figs. 25–26.
Protiara tropica KRAMP 1961 *a* p. 115.

Material:

"Dana" St. 3809. 4.IX.29. 6°22′ S. 105°12′ E.

S 200, 50 m. w. 16 specimens.
S 200, 100 m. w. 17 specimens.
S 200, 300 m. w. 7 specimens.

The locality is in the Sunda Strait between Java and Sumatra; the specimens are 2.5–4 mm in diameter and 5.5–6 mm in height.

This seems to be a rare species; it was originally described from the Philippines (BIGELOW 1912 and 1919). In 1922 some specimens were collected near Kei Islands by Dr. TH. MORTENSEN; they were recorded by me (KRAMP 1928) with some remarks on their morphology. An examination of the present specimens fully confirms the statements in my former remarks. It is only the third time that this species is recorded in the literature.

Distribution: Malayan Archipelago.

Genus **Zancleopsis.**

In a paper on a species of *Merga* (1960) PICARD divided the family Pandeidae into a number of natural groups and added a note on *Cnidotiara gotoi* UCHIDA, 1927, which species is characterized mainly by having a large, spherical knob of nematocysts on the adaxial side of the tentacle bulbs. PICARD rightly points out that the same characteristic feature is present in *Zancleopsis tentaculata* KRAMP, 1928, concluding that both species belong to one genus, *Cnidotiara*. Exactly the same structure of the tentacle bulbs is found, however, in *Zancleopsis dichotoma* (MAYER). This species was first described from the Tortugas, Florida, by MAYER (1900 *b* p. 35, Pl. 17 fig. 40) as *Gemmaria dichotoma*. HARTLAUB (1907 p. 115) erected a new genus, *Zancleopsis*, for this species, which was accepted by MAYER (1910 p. 91).

The characteristic shape of the tentacle bulbs was not clearly seen in MAYER's figure, which was made from a young specimen, 3 mm high and 2.5 mm wide; but a larger specimen, 20 mm high and 14 mm wide, was described from the Bermudas by BIGELOW (1938 p. 102, figs. 1–2), and in this specimen the tentacle bulbs are exactly as in *Cnidotiara gotoi* and *Zancleopsis tentaculata*. Evidently, these three species belong to one and the same genus for which, however, the generic name *Zancleopsis* HARTLAUB, 1907, takes priority over *Cnidotiara* UCHIDA, 1927 *a*.

Another question is the limitation of the species. In my paper on the Hydromedusae of the Atlantic Ocean (Dana-Rep. 46, 1959, p. 12, Pl. 1 figs. 7–8) I described four specimens of a medusa collected in the western part of the North Atlantic, and I referred them to *Cnidotiara gotoi*, expressing my surprise to find this Japanese medusa in the Atlantic; they were 3–8 mm high, the two largest specimens considerably crumpled. I have now re-examined the specimens and stated that their gonads are smooth, as in *Cnidotiara gotoi*, without the vertical folds of *Z. dichotoma* and *tentaculata*. Two opposite tentacle bulbs are smaller than the two others, the two corresponding tentacles short. So far these specimens agree with *Cnidotiara gotoi*, but in the largest specimen one of the longer tentacles has two small lateral knobs as in *Z. dichotoma* and *tentaculata*! This statement, correlated with the locality (39°31′ N. 49°39′ W.), which is not far from those of *Z. dichotoma* (Bermudas and Tortugas) makes me believe that my specimens really belonged to *Z. dichotoma*, the smooth surface of the gonads being probably due to the fact that the specimens are at a younger stage of development.

In the present collection I have seen some medusae which belong to *Zancleopsis*; they were found in scattered localities between the Samoa Islands and Madagascar. Some of them evidently belong to the same species which was described from the Kei Islands as *Zancleopsis tentaculata* (KRAMP 1928 p. 40, figs. 15–18), but they are much larger than the type-specimen; others are more like the Japanese form, *Z. gotoi*. Both forms should be compared with the Atlantic form, *Z. dichotoma*, before we can decide whether the three forms may be retained as distinct species.

In general appearance they are rather much alike. The umbrella is somewhat higher than wide, the lateral walls moderately thick, and there is a solid apical projection, which in all three forms may be sharply pointed, bluntly ending, or broad and vaulted according the state of contraction or preservation. Four apical pockets in the subumbrella on the interradial sides of the stomach may be distinct, but are sometimes indistinguishable. The manubrium is usually about half as long as the bell cavity, but in some specimens of *tentaculata* and *dichotoma* it was extended even to the velar level. The manubrium is divided into a broader stomachal portion, carrying the gonads, and a prismatic mouth tube; oral lips may be indicated, but are

usually indistinguishable. The radial canals are narrow and straight, in strongly contracted specimens undulating. The structure of the tentacle bulbs is exactly the same in all the three species.

In none of these respects can any specific difference be pointed out. Some other features may, however, be either of specific importance or be due to different stages of development, or to the fact that the preserved specimens are more or less damaged.

Smooth, adradial gonads are seen in the original specimen of *Cnidotiara gotoi*, which was 8 mm high, and in four Indo-West-Pacific specimens ("Dana" St. 3665, 3903 and 3954, see below), 2–5 mm high; in all these the four tentacles are short, but two opposite tentacle bulbs are somewhat larger than the two others; in some cases these tentacles have a minute but distinct terminal knob studded with nematocysts, in other cases they are apparently broken near their base, the appearance of their distal part being unknown. Smooth gonads, however, are also seen in MAYER's original, small specimens of *Z. dichotoma* from Tortugas, and in the four Atlantic specimens, described by me in 1959 and evidently belonging to *Z. dichotoma*, since one of them has lateral knobs on one of its tentacles. Gonads in 3–5 vertical folds are seen in the Atlantic specimens described by BIGELOW (20 mm high) and in four specimens from the Samoa Islands, 11–25 mm high ("Dana" St. 3584, 3587 and 3588, see below), but also in the type-specimen of *Z. tentaculata* from the Kei Islands, which was only 4.5 mm high. In all these two opposite tentacles are long and provided with a terminal and a number of lateral knobs. The two other tentacles are elongated, threadlike in BIGELOW's specimen from the Bermudas and in one of the Atlantic specimens examined by me. In the largest of the specimens, 25 mm high, from the Samoa Islands, the small tentacles likewise have a very thin prolongation; but in the other large specimens from the Samoa Islands, as well as in the small specimen from the Kei Islands, these tentacles are very small, similar to the tentacles in *Z. gotoi*.

I consider it premature to unite the three species into one; it is not certain that the differences are due to age, but future examinations of better preserved specimens may efface the differences. Also for zoogeographical reasons I prefer provisionally to retain the name of *Z. dichotoma* (MAYER) for the Atlantic form, *Z. gotoi* (UCHIDA) and *Z. tentaculata* KRAMP for the two Indo-Pacific forms.

PICARD (1960 p. 335) rightly points out that the relationship of "*Cnidotiara*" with the Pandeidae is uncertain. *Cnidotiara* was placed among the Pandeidae, *Zancleopsis* among the Zancleidae; the swollen bulbs on the tentacles of *Zancleopsis*, however, are very different from the stalked nematocyst knobs of *Zanclea* (BIGELOW 1938 p. 102). The affinity of the genus *Zancleopsis* is indeed difficult to decide. The adradial folding of the gonads and the prismatic mouth tube terminating in a quadrangular mouth, in which perradial lips may at least be indicated, places it within the definition of the Pandeidae, rather than within any other family of Anthomedusae, and I think that at present it should be referred to this family.

Zancleopsis gotoi (UCHIDA).

Cnidotiara gotoi UCHIDA 1927 *a* p. 204, fig. 33.
Cnidotiara gotoi PICARD 1960 p. 335.

"Dana" Material:

St. 3665	25.II.29	St. 3903	17.XI.29	St. 3954	29.I.30
29°37.5′ S.	156°46′ E.	5°50′ N.	93°28′ E.	16°53′ S.	42°12′ E.
S 50, surface	1	S 200	300 m. w. 1	S 200	200 m. w. 2

The affinites of this species were discussed above. Up to now it was known only from Japan, but the present material shows that it has an extensive distribution in the Indian Ocean and western Pacific, though it seems to be a rare species. St. 3665 is off Brisbane in East Australia, St. 3903 south of Great Nicobar, and St. 3954 west of Madagascar. The type specimen from Japan was 8 mm high and 4 mm wide; the present specimens vary from 2 mm to 5 mm in height. In all the specimens some of the tentacles are broken near their base, but one or two have retained a small terminal knob, and it is stated that this is studded with nematocysts. The specimens were all taken in coastal waters.

Distribution: Found in scattered localities in the warm parts of the western Pacific and the Indian Ocean.

Zancleopsis tentaculata KRAMP.

Zancleopsis tentaculata KRAMP 1928 p. 40, figs. 14–18.
Zancleopsis tentaculata BIGELOW 1938 pp. 102–104.
Cnidotiara tentaculata PICARD 1960 p. 335.
Zancleopsis tentaculata KRAMP 1961 *a* p. 56.

Material:

"Dana"		St. 3587	2.XI.28	St. 3588	3.XI.28
St. 3584	28.X.28	11°00′ S.	172°37′ W.	13°10′ S.	173°20′ W.
10°51.5′ S.	168°40′ W.	P 100	3000 m. w. 1	S 150	50 m. w. 1
S 150	300 m. w. 1	E 300	5000 m. w. 1		

The localities are among the Samoa Islands; the only previous record is that of the type-specimen, which was collected by Dr. TH. MORTENSEN near the Kei Islands in 1922; it was taken in a haul with a ringtrawl, 500 m wire out. It is curious that the present specimens were taken in hauls with very different lengths of wire, 50, 300, 3000 and 5000 m. The specimens taken in the very deep hauls at St. 3587 may have been captured during the hauling in of the nets through higher levels of water; on the other hand, these specimens are larger than the others; the possibility exists that the species has an extensive vertical distribution. The nearly related Atlantic species, *Z. dichotoma*, seems to belong to the surface water. According to MAYER (1910 p. 92) this medusa "is occasionally found at the Tortugas, Florida, from May until July. It is taken each year upon the surface, but never in large numbers". Apparently only young individuals were found. The four specimens recorded from the western Atlantic by me (KRAMP 1959 *a* p. 12) were taken in a haul with 38 m wire out, very near the surface. Unfortunately, we do not know, at what depth BIGELOW's large specimen from Bermuda was captured, since it was taken in a vertical haul from great depth to the surface (1097–0 m).

Remarks on the four specimens of *Zancleopsis tentaculata* collected among the Samoa Islands: St. 3588, 50 m wire, height 13 mm, diam. 11 mm, apical process rounded, no apical pockets in the subumbrella, mouth tube long, reaching to velar level, the adradial gonads each with 3–4 vertical folds, the ends of the tentacles are broken, but one of the large tentacles carries a few lateral knobs, while the terminal knob is lacking. St. 3584, 300 m wire, height 11 mm, diam. 8 mm, apical process high and pointed, gonads with 3–4 vertical folds, the two large tentacles 8 mm long, broken, without any knobs, the two small tentacles very short, broken. St. 3587, 3000 m wire, height 25 mm, diam. 14 mm, apical process pointed, manubrium about half as long as the bell cavity, stomachal part particularly broad, gonads with 3–4 prominent vertical folds, mouth tube with four sharp, perradial ridges, mouth with four simple, but distinct lips, the two small tentacles thread-like elongated, their tips broken, one of the large tentacles 12 mm long with two lateral knobs, 5 and 8 mm from base, the other 17 mm long, lateral knobs 5 and 7 mm from base, terminal knobs wanting. St. 3587, 5000 m wire, height 16 mm, diam. 11 mm, apical process bluntly conical, apical pockets in subumbrella distinct, mouth with four distinct lips, tentacles broken more or less short, their bases of the typical appearance. It was interesting to find these well-developed specimens and to compare them with the small type-specimen from the Kei Islands, in which the gonads were almost as well developed as in the present larger specimens, and in which the tentacles were retained in their full length.

Distribution of *Zancleopsis tentaculata*: Hitherto known only from the Kei Islands and the Samoa Islands.

Halitiara formosa FEWKES.

Halitiara formosa FEWKES 1882 *a* p. 276, Pl. 4 fig. 2.
Protiara formosa MAYER 1910 p. 107, Pl. 6 figs. 4–6, Pl. 13 figs. 1–2.
Halitiara formosa UCHIDA 1927 *a* p. 203.
Halitiara formosa MENON 1932 p. 7, Pl. 1 fig. 4.
Halitiara formosa YAMAZI 1958 p. 135.
Halitiara formosa KRAMP 1961 *a* p. 102.
Halitiara formosa KRAMP 1962 *a* p. 313.
? *Dissonema gaussi* VANHÖFFEN 1912 p. 361, Pl. 24 fig. 2.

Material:

? "Dana" St. 3641. 8.I.29. 43°40′ S. 176°36′ E. S 150, 100 m. w. 1 specimen. Determination uncertain, see below.

"Jutlandia"

St. 4775 11.IV.33
30°20′ N. 138°00′ E.
S 200 220 m. w. **25**

St. 4810 14.V.34
43°40′ N. 144°37′ W.
S 200 220 m. w. c. **1400**

"Galathea"

St. 373 6–7.VI.51
4°30′ N. 103°28′ E.
Off Kerteh, Malacca
SN 50 **73**

St. 381 8.VI.51
Gulf of Siam
7°00′ N. 103°18′ E.
SN 50 **3**

St. 383 9.VI.51
Gulf of Siam
9°08′ N. 102°04′ E.
SN 50 **2**

St. 390 11.VI.51
Gulf of Siam
13°02′ N. 100°33′ E.
SN 50 30 m. w. **1**

St. 399 21.VI.51
N.E. of Singapore
1°46′ N. 104°25′ E.
SN 50 16 m. w. **1**

St. 425 29–30.VII.51
Bucas Grande, Philipp.
9°40′ N. 125°55′ E.
SN 50 16 m. w. **4**

St. 428 30–31.VII.51
Candos Bay, Mindanao
9°36′ N. 125°46′ E.
SN 50 16 m. w. **18**

St. 446 18.VIII.51
Basilian Island,
Philippines
6°42′ N. 121°58′ E.
SN 50 **1**

St. 454 25.VIII.51
Java Sea
5°23′ S. 116°02′ E.
SN 50 **2**

St. 482 12.IX.51
Bali, anchorage
8°46′ S. 115°14′ E.
SN 50 16 m. w. **1**

This species was first described from Florida and the Bahamas (FEWKES and MAYER); a record from the Fiji Islands (MAYER) is somewhat doubtful. Later on it has been recorded from southern Japan (UCHIDA and YAMAZI), from Madras in India (MENON) and from the coast of Vietnam (KRAMP 1962 *a*). The localities, where it was collected by the "Galathea" are among the islands of the Malayan Archipelago; generally only one or two specimens were found, but at St. 373, off Kerteh, Malacca, as many as 73 in a haul near the surface above very shallow water. According to UCHIDA (1927 *a*) it was quite common near Misaki in Japan, and it is, therefore, not surprising that 25 specimens were collected by the "Jutlandia" (St. 4775) at no great distance from the coasts of southern Japan. More surprising is the occurrence of this neritic medusa in great abundance in a locality in the north-eastern Pacific far outside the American coast ("Jutlandia" St. 4810). The free-swimming medusae can hardly have been carried to this oceanic locality by the Kuroshio Current from Japan. Various other neritic medusae were, however, found in neighbouring localities, which calls for a general discussion. Possibly, these medusae were liberated from hydroids growing on sea-weed or other floating objects.

One specimen, which seems to belong to *Halitiara formosa*, was taken off the east coast of the South Island of New Zealand ("Dana" St. 3641). The specimen is 3.5 mm in diameter and 3.5 mm in height besides a pointed apical projection which (artificially, owing to the preservation) is very elongated. It has four thick interradial gonads and a fairly elongated mouth tube with folded, recurved lips; there are four large, perradial tentacles, and in each quadrant 5–6 small tentaculae. This specimen is very similar to one of the figures of "*Protiara formosa*" in MAYER 1910 (Pl. 13 fig. 1); but it also resembles the figure of "*Dissonema gaussi*" VANHÖFFEN (1912 p. 361, Pl. 24 fig. 2). It does not seem probable, however, that this antarctic medusa should occur off the east coast of New Zealand, though a north-going branch of the West Wind Drift might possibly have carried the hydroid up there, attached to floating sea weed. As, however, no description, but only a figure of the new species was given by VANHÖFFEN, an identification with the medusa from New Zealand would be out of place, and I prefer to let "*Dissonema gaussi*" remain as "a doubtful species of doubtful affinity" (KRAMP 1961 *a* p. 99); at any rate, it does not belong to the genus *Dissonema* HAECKEL.

The specimen from New Zealand differs from typical specimens of *Halitiara formosa* by the mouth lips being folded and recurved, and by the small tentacles being mere tentaculae; this, however, is also frequently seen in young specimens of *Halitiara formosa*. I am inclined, therefore, to refer the specimen to this species, though with some doubt.

Distribution of *Halitiara formosa*: tropical parts of the Indo-West Pacific region; north-eastern Pacific; Florida and the Bahamas.

Merga violacea (Agassiz & Mayer).

Pandea violacea Agassiz & Mayer 1899 p. 160.
Merga violacea Hartlaub 1913 p. 249, fig. 204.
Merga violacea Kramp 1961 *a* p. 107.

Material:

"Dana" St. 3809. 4.IX.29. Sunda Strait between Java and Sumatra, 6°22′ S. 105°12′ E. S 200, 100 m. w. 3 specimens.
"Galathea" St. 292. 21.IV.51. Off Tranquebar, 11°06′ N. 80°05′ E. SN 50. 5 specimens.

Originally described from the Fiji Islands, also recorded from Great Barrier Reef in north-eastern Australia, from the coast of Vietnam, the Nicobars, and the coasts of India.

Further distribution: Pacific coast of Mexico; Florida and the Bahamas; Mediterranean. The species thus seems to have a circumglobal, though scattered distribution in tropical and subtropical seas.

Amphinema rugosum (Mayer).

Stomotoca rugosa Mayer 1900 *a* p. 4, Pl. 2 fig. 5.
Stomotoca rugosa Uchida 1927 *a* p. 202, textfig. 32.
Stomotoca rugosa Uchida 1938 *a* p. 144.
Stomotoca rugosa Yamazi 1958 p. 136.
Amphinema rugosum var. *shantungensis* Chow & Huang 1958 p. 136.
Amphinema rugosum Kramp 1961 *a* p. 94.

Material:

"Dana"

St. 3620	7.XII.28	St. 3645	12.I.29	St. 3713	19.V.29	St. 3955	9.I.30
24°46.5′ S.	170°18.5′ E.	42°32′ S.	174°50′ E.	13°57′ N.	112°45′ E.	18°30′ S.	42°18′ E.
S 150	50 m. w. **17**	S 150	50 m. w. **1**	S 150	100 m. w. **1**	S 200	300 m. w. **1**
S 150	100 m. w. **2**						
St. 3641	8.I.29	St. 3689	9.IV.29	St. 3821	14.IX.29		
43°40′ S.	176°36′ E.	7°13.5′ N.	111°49′ E.	0°51.5′ S.	99°24.5′ E.		
S 150	100 m. w. **21**	S 150	50 m. w. **1**	S 200	600 m. w. **1**		

The somewhat complicated nomenclature of this species has been unravelled by previous authors, mainly by Russell, and is summarized by Kramp (1961).

Several specimens were taken by the "Dana" in two localities: St. 3620 south-east of New Caledonia and St. 3641 east of New Zealand, whereas only one specimen was found at each of the other stations: St. 3645 east of New Zealand, St. 3689 and 3713 in the South China Sea, St. 3821 off the west coast of Sumatra, and St. 3955 off the west coast of Madagascar.

The only previous records from Indo-West-Pacific waters were from Japan (Uchida 1927 *a* and 1938 *a*, Yamazi 1958) and from Chefoo in China (Chow & Huang 1958); the "Dana" collections show that it has an extensive distribution from New Zealand to Madagascar.

Further distribution: Caribbean Sea; east coast of north America from Florida to Cape Cod; Adriatic Sea; north-western Europe, where it is quite common.

Stomotoca pterophylla Haeckel 1879.

Material:

"Galathea" St. 727. 13.V.52. Gulf of Panama, 6°23′ N. 78°43′ W. DNLL. 11 specimens.

The specimens are 17–20 mm in diameter and very well preserved.

Distribution: This species has previously been found very near the same locality in the Gulf of Panama and on the Pacific coasts of Mexico, Colombia and Peru; Japan. Western Atlantic from the West Indies to the Gulf of Maine; Sargasso Sea; Gulf of Guinea on the west coast of Africa.

Leuckartiara octona (FLEMING 1823).

Material:

"Dana"

St. 3550 4.IX.28
7°10′ N. 78°15′ W.
S 150 300 m. w. **1**

St. 3553 5.IX.28
7°55′ N. 79°02′ W.
S 150 100 m. w. **2**

St. 3567 4.X.28
9°06′ S. 140°21.5′ W.
S 150 100 m. w. **1**

St. 3620 7.XII.28
24°46.5′ S. 170°18.5′ E.
S 150 300 m. w. **2**

St. 3645 12.I.29
42°32′ S. 174°50′ E.
S 150 50 m. w. **4**
S 150 100 m. w. **1**
S 150 300 m. w. **5**

St. 3665 25.II.29
29°37.5′ S. 156°46′ E.
S 150 300 m. w. **1**

St. 3722 29.V.29
25°11′ N. 122°35′ E.
S 200 100 m. w. **1**

St. 3739 2.VII.29
3°20′ N. 123°50′ E.
S 200 50 m. w. **1**

St. 3809 4.IX.29
6°22′ S. 105°12′ E.
S 200 50 m. w. **6**
S 200 100 m. w. **1**

St. 3900 9.XI.29
4°41′ N. 98°13′ E.
S 200 50 m. w. **11**
S 200 100 m. w. **8**

St. 3901 10.XI.29
4°20′ N. 98°47′ E.
S 200 100 m. w. **2**

St. 3906 20.XI.29
4°26.5′ N. 85°21′ E.
S 200 300 m. w. **1**
S 200 400 m. w. **1**

St. 3915 3.XII.29
3°14′ N. 75°21′ E.
S 200 50 m. w. **1**

St. 3919 8.XII.29
0°07′ S. 63°56′ E.
S 200 100 m. w. **2**

St. 3928 18.XII.29
11°20′ S. 50°10′ E.
S 200 100 m. w. **5**

St. 3941 24.XII.29
7°24′ S. 41°51′ E.
S 200 400 m. w. **1**

St. 3943 25.XII.29
5°30′ S. 40°40′ E.
S 200 200 m. w. **1**

St. 3952 8.I.30
15°05′ S. 41°53′ E.
S 200 500 m. w. **1**

St. 3964 15.I.30
25°19′ S. 36°13′ E.
S 200 300 m. w. **1**

St. 3966 18.I.30
29°25′ S. 32°00′ E.
S 150 100 m. w. **1**
S 150 200 m. w. **1**
S 200 300 m. w. **1**

St. 3969 27.I.30
31°33′ S. 30°07′ E.
S 200 300 m. w. **8**

"Jutlandia"

St. 4784 9.VIII.33
33°52′ N. 137°10′ E.
S 200 220 m. w. **1**

The frequent confounding of this species with other medusae occurring in Indo-Pacific waters have recently been discussed by the present author (KRAMP 1962 *a* p. 314).

The well-known and widely distributed medusa, *Leuckartiara octona*, was taken by the "Dana" in widely separated localities. St. 3550 and 3553 are in the Gulf of Panama, St. 3567 near the Marquesas Islands. It was also taken in some localities east of New Zealand and Australia (St. 3620–3665), in the Malayan Archipelago, and from there northwards to Formosa (St. 3722) and southern Japan ("Jutlandia" St. 4784), westwards to Ceylon (St. 3906); It was previously known from all these areas, whereas it had never been recorded from the western part of the Indian Ocean, where it was collected by the "Dana" in several localities near the Maldive Islands (St. 3915), north-east of the Seychelles (St. 3919), near the north point of Madagascar (St. 3928) and along a considerable part of the east coast of Africa.

As a rule, only one or a few specimens were taken in the hauls, the only exceptions being St. 3900 in the Malacca Strait, where 11 small specimens, 3–4 mm wide, were found, and St. 3969 on the south-east coast of Africa (8 specimens, 3–7 mm wide). The majority of the specimens collected were small, 3–5 or 7 mm wide, and none was more than 12 mm in diameter. Almost all the specimens were taken in hauls with 50, 100 or 300 m wire out, and there is only a very slight indication of difference in size between specimens from the various depths, though very small specimens mainly occurred in the upper water layers, the larger ones, 10–12 mm wide, at all levels.

Distribution: Coastal waters in the Indian Ocean from Africa to the Malayan Archipelago; western Pacific from northern Japan to Australia and New Zealand; Low Archipelago and Marquesas Islands; eastern Pacific from Vancouver to Chile. West Coast of Africa; Mediterranean; European coasts from Portugal to Norway and Iceland; North America from Florida to Labrador.

Leuckartiara nobilis Hartlaub 1913.

for references see Kramp 1961 *a* p. 104.

Material:

"Falstria" St. 4779. 19.IV.33. 30°44′ N. 145°55′ E. S 200, 183 m. wire. 1 specimen.
"Selandia" St. 4789. 28.V.33. 31°40′ N. 135°30′ E. S 200, 220 m. wire. 1 specimen.

Both localities are off the coast of southern Japan, and this is the first find of the species in the western Pacific.

The specimen from St. 4779 is 15 mm in height and 10 mm in diameter; the manubrium entirely occupies the subumbrella cavity, and the gonads are full of small, mature eggs. The specimen from St. 4789 is 16 mm high and 12 mm wide, with about 28 tentacles of different size.

Further distribution: Vancouver on the west coast of North America; north of Alaska. Mediterranean; North Atlantic, partly in the coastal waters of north-western Europe and New Foundland, partly oceanic between about 48° and 63° N.

Leuckartiara annexa Kramp.

Leukartiara annexa Kramp 1957 *a* p. 16, Pl. 2 figs. 5–6.

Material:

"Dana"

St. 3579 23.X.28
20°56′ S. 160°03′ W.
S 150 100 m. w. **1**

St. 3603 23.XI.28
22°00′ S. 170°26′ E.
S 150 100 m. w. **1**

St. 3604 24.XI.28
23°22′ S. 167°36′ E.
P 100 600 m. w. **1**

St. 3613 28.XI.28
22°43′ S. 166°05.8′ E.
P 100 300 m. w. **1**

St. 3620 7.XII.28
24°46.5′ S. 170°18.5′ E.
S 150 50 m. w. **1**

St. 3622 8.XII.28
25°54′ S. 172°36.9′ E.
S 200 100 m. w. **2**
S 200 300 m. w. **1**

St. 3654 27.I.29
33°28′ S. 161°45′ E.
S 150 50 m. w. **1**

St. 3824 5.IX.29
0°08′ S. 97°15′ E.
S 200 100 m. w. **1**

St. 3893 6.XI.29
5°59′ N. 92°29′ E.
S 200 300 m. w. **3**
S 200 600 m. w. **3**

St. 3903 17.XI.29
5°50′ N. 93°28′ E.
S 200 300 m. w. **6**
S 200 600 m. w. **1**

St. 3928 8.XII.29
11°20′ S. 50°10′ E.
S 200 600 m. w. **2**

St. 3929 18.XII.29
12°11′ S. 50°18′ E.
S 200 400 m. w. **1**
S 200 500 m. w. **3**

St. 3930 7.XII.29
11°55′ S. 49°55′ E.
S 200 600 m. w. **1**

St. 3934 20–21.XII.29
11°24′ S. 50°05′ E.
S 200 500 m. w. **5**
S 200 600 m. w. **3**

St. 3935 21.XII.29
10°50′ S. 48°30′ E.
S 200 500 m. w. **1**

St. 3939 23.XII.29
8°44′ S. 43°54′ E.
S 200 400 m. w. **1**
S 200 500 m. w. **4**

St. 3940 24.XII.29
8°24′ S. 42°54′ E.
S 200 300 m. w. **1**

St. 3941 24.XII.29
7°24′ S. 41°51′ E.
S 200 300 m. w. **1**
S 200 500 m. w. **1**

St. 3942 25.XII.29
6°47′ S. 41°27′ E.
S 200 300 m. w. **2**
S 200 400 m. w. **1**

St. 3943 25.XII.29
5°30′ S. 40°40′ E.
S 200 300 m. w. **1**
S 200 400 m. w. **1**
S 200 500 m. w. **2**

St. 3947 25.XII.29
6°47′ S. 41°27′ E.
S 200 500 m. w. **2**

St. 3948 6.I.30
10°11′ S. 41°57′ E.
S 200 500 m. w. **5**

St. 3951 7.I.30
14°16′ S. 41°48′ E.
S 200 100 m. w. **1**
S 200 600 m. w. **1**

St. 3953 8.I.30
16°12′ S. 42°04′ E.
S 200 200 m. w. **1**
S 200 500 m. w. **1**

St. 3954 9.I.30
16°53′ S. 42°12′ E.
S 200 300 m. w. **2**

St. 3956 10.I.30
21°13′ S. 42°26′ E.
S 200 200 m. w. **2**
S 200 300 m. w. **4**
S 200 500 m. w. **3**

St. 3958 11.I.30
23°11′ S. 42°54′ E.
S 200 500 m. w. **3**

St. 3962 14.I.30
24°33′ S. 38°26′ E.
S 200 600 m. w. **2**

"Falstria"

St. 4779 19.IV.33
30°44′ N. 145°55′ E.
S 200 183 m. w. **1**

This characteristic species, first described from the east coast of Africa (Kramp 1957 *a*), was collected by the "Dana" in numerous localities within an extensive part of the Indo-West-Pacific Region. The localities, however, fall into three groups in three widely separated areas. The first area extends from around the island

New Caledonia (St. 3603–3622) eastwards to Rarotonga in Polynesia (St. 3579) and southwards into the Tasmanian Sea (St. 3654); the second area is west and north-west of Sumatra (St. 3824–3903), the third off the east coast of Africa from Mombasa southwards throughout the Mozambique Channel, where it was found at 18 stations (St. 3928–3962). Moreover a specimen was taken by the "Falstria" among the Bonin Islands east of southern Japan (St. 4779); it was a fairly large specimen, 8 mm in diameter. The only locality, where the species was taken at some considerable distance from coastal waters, was at St. 3654 in the Tasmanian Sea; it was a large specimen, 13 mm high and 10 mm wide, which may have been carried out there by the current from the Australian coast.

Whithin all the areas, where the medusa was collected, the majority of the specimens were adult, and many of them in excellent condition, showing the characteristic features of the species: eight large marginal tentacles, eight small adradial tentacles, in which the narrow proximal part is adnate to the umbrella margin and continues some way upwards on the exumbrella, and moreover 16 minute rudimentary bulbs. The identification, therefore, should be beyond any doubt; it was surprising, however, that a medusa of this conspicuous size and structure had been completely overlooked except in a very small part of its extensive area of distribution, the previous observations being restricted to two specimens in two localities off the east coast of Africa, another example showing the insufficiency of our previous knowledge of the fauna in Indo-Pacific waters (see pp. 7, 13, 18, 29).

In most localities only a few specimens were caught, never more than 5 or 6 in a haul, and it is remarkable that, with very few exceptions, young specimens (less than about 6 mm in diameter) were taken only in hauls with 500 or 600 m wire out, which indicates that the unknown hydroid presumably occurs in fairly deep water.

Remarks on development: From the stations 3948 and 3958, off the African coast, a series of developmental stages is present. There are eight specimens ranging in diameter from 3 to 7 mm. Their interradial tentacles are smaller then the perradial, and the eight adradial tentacles are visible as tiny rudiments, which are hook-shaped, clasping the umbrella margin, but without a filiform, terminal prolongation. The gonads have the typical structure, but are more faintly folded than in the adult.

Distribution: Coastal waters in tropical Indian and West-Pacific waters.

Leuckartiara hoepplii Hsu 1928.

Material:

"Galathea" St. 425. Anchorage, Bucas Grande Island, Philippines, 9°40′ N. 125°55′ E. 29–30.VII.51. SN 50. 16 m. w. 1 specimen.

This young specimen was described and figured by me in a previous paper (Kramp 1959*c* p. 235, fig. 9).

Distribution: Japan, China, the Philippines, the Nicobars.

Leuckartiara gardineri Browne.

Leuckartiara gardineri Browne 1916 p. 181, Pl. 39 fig. 4.
Leuckartiara gardineri Kramp 1953 p. 267.
Leuckartiara gardineri Kramp 1961 *b* p. 198.

Material:

"Dana"					
St. 3714	20.V.29	St. 3958	11.I.30	St. 3962	14.I.30
15°22′ N.	115°20′ E.	23°11′ S.	42°54′ E.	24°33′ S.	38°26′ E.
S 150	100 m. w. 1	S 200	200 m. w. 1	S 150	50 m. w. 1
St. 3938	23.XII.29	St. 3961	14.I.30	St. 3967	18.I.30
9°10′ S.	45°17′ E.	24°57′ S.	40°18′ E.	29°44′ S.	31°18′ E.
S 200	500 m. w. 1	S 150	200 m. w. 1	S 200	100 m. w. 1

St. 3969	27.I.30	"Pacific"		"Selandia"	
31°33′ S.	30°07′ E.	St. 4772	12.IV.33	St. 4788	17.V.33
S 200	50 m. w. 1	21°40′ N.	120°02′ E.	32°50′ N.	173°10′ W.
		S 150	201 m. w. 5	S 200	220 m. w. 18

This little medusa (up to 6 mm high and 3.5 mm wide) was first described from the Amirante Islands north of Madagascar and has now been found in several other localities off the southern part of the east coast of Africa. The only other previous records are from the Great Barrier Reef in North-East Australia (KRAMP 1953 and 1961 *b*). Its area of distribution is now extended to the South China Sea ("Dana" St. 3714) and near the south point of Formosa ("Pacific" St. 4772). Very peculiar is the occurrence of several specimens in the central part of the North Pacific ("Selandia" St. 4788); these specimens are 2.5–3.5 mm wide and quite similar to specimens of corresponding size from the other localities. The medusa was mainly taken in hauls with 50–200 m wire out.

Distribution: Scattered localities in the Indian and Pacific oceans.

Leuckartiara zacae BIGELOW.

Leuckartiara zacae BIGELOW 1940 p. 284, figs. 3–5.
Leuckartiara zacae KRAMP 1961 *a* p. 106.

"Dana" Material:

St. 3556. 14.IX.28. Off Panama, 2°52′ N. 87°38′ W. S 150, 600 m. w. 1 specimen.
St. 3860. 20.X.29. West of Sumatra, 2°57′ S. 99°36′ E. S 200, 600 m. w. 1 specimen.
St. 3950. 7.I.30. Mozambique Channel, 12°23′ S. 41°43.5′ E. S 200, 300 m. w. 1 specimen.

This species is well characterized by the longitudinal ribs on the exumbrella above the tentacles and by the rate of development of the tentacles. It is evidently a rare species; up to now it has only been found in the Gulf of Panama, but the records above show that it has a much wider distribution. Apparently, it belongs to the deeper parts of the epipelagic region. The specimen from Panama (St. 3556) is 17 mm high and 12 mm in diameter; the specimen from the Mozambique Channel east of Africa (St. 3950) is 12 mm high and 9 mm wide. The specimen from St. 3860, west of Sumatra, is a young specimen, 4 mm wide, exumbrella with eight canals in sharply protruding ribs almost to the apex. The apical process is small and pointed, with an apical canal reaching almost to the top. The manubrium occupies the subumbrella cavity almost completely. There are four large perradial tentacles, and the interradial tentacles are also well developed.

Distribution: Coastal waters in tropical parts of the Pacific and Indian Oceans.

Leuckartiara sp. I.

Material:

"Dana" St. 3641. 8.I.29. East of New Zealand, 43°40′ S. 176°36′ E. S 150, 300 m. w. 4 specimens.

The specimens are 12–17 mm high and about 12 mm in diameter; they have 20–28 tentacles, all nearly of equal size and structure, each with an abaxial spur, but there are no exumbrellar canals; one small, knob-shaped rudiment between each successive pair of tentacles. The radial canals are jagged. I am not able to identify these specimens.

Leuckartiara sp. II.

Material:

"Dana" St. 3916. 4.XII.29. South-west of Ceylon, 1°45′ N. 73°03′ E.
S 200, 300 m. w., 3 specimens.
S 200, 600 m. w., 2 specimens.

The specimens are 13–15 mm in diameter. All of them have about 32 well-developed tentacles, nearly alike, and the same number of small, knob-shaped rudiments. Each of the tentacle bulbs has an abaxial spur, and from most of these a more or less well-developed canal proceeds upwards on the exumbrella. The radial canals are jagged, the ring canal smooth.

The structure of the gonads shows that these specimens belong to the genus *Leuckartiara*, but they cannot be referred to any known species within this genus. On the other hand, they agree perfectly with a medusa from the coast of Chile, described and figured by VANHÖFFEN (1913 *b*, p. 12, Pl. 1 figs. 8–10, Pl. 2 fig. 11, textfig. 3) under the name of "*Tiara pileata*"; it was evidently some species of *Leuckartiara*. According to HARTLAUB (1913 p. 292) its systematic position is uncertain.

Annatiara affinis (HARTLAUB).

Tiaranna affinis HARTLAUB 1913 p. 269, figs. 220–221.
Annatiara affinis RUSSELL 1940 p. 518.
Annatiara affinis RUSSELL 1953 p. 200, figs. 101–103.
Annatiara affinis KRAMP 1957 *b* pp. 155, 162.
Annatiara affinis KRAMP 1961 *a* p. 96.

Material:

"Dana"

St. 3626	13.XII.28	St. 3631	18.XII.28	St. 3906	20.XI.29
27°00′ S.	177°41′ W.	35°40′ S.	176°40′ E.	4°26.5′ N.	85°21′ E.
S 150	1500 m. w. 1	S 200	1000 m. w. 1	S 200	600 m. w. 1
St. 3630	17.XII.28	St. 3656	29.I.29		
34°24′ S.	178°42.5′ E.	33°26′ S.	157°02′ E.		
S 150	600 m. w. 1	S 150	1000 m. w. 1		

St. 3626–3656 are north of New Zealand and east of Australia, St. 3906 between the northern part of Sumatra and Ceylon. The specimens are 12–16 mm wide.

The only previous record from Indo-Pacific waters is from a locality in the Indian Ocean, about 45° S. and 92° E. (KRAMP 1957 *b*). The present find in the western Pacific is interesting; presumably it is generally distributed in the deep and intermediate strata of all the great oceans.

Further distribution: Atlantic Ocean from about 35° S. (off Cape of Good Hope) to 60° N. (north-west of Scotland).

Neoturris pelagica (AGASSIZ & MAYER).

Turris pelagica AGASSIZ & MAYER 1902 p. 142, Pl. 1 fig. 2.
Neoturris pelagica HARTLAUB 1913 p. 335.
Neoturris pelagica FOERSTER 1923 p. 243, Pl. 2 fig. 4.
Neoturris pelagica KRAMP 1928 p. 55.

Material:

"Jutlandia" St. 4773. 20.III.33. Off California, 32°57′ N. 128°48′ W. S 200, 220 m. w. 4 specimens.
"Falstria" St. 4777. 29.III.33. Off California, 35°59′ N. 129°25′ W. S 200, 183 m. w. 23 specimens.
"Falstria" St. 4779. 19.IV.33. East of Japan, 30°49′ N. 145°55′ E. S 200, 183 m. w. 43 specimens.

The two first localities are near the type locality, whence the species was first described; the only additional record is from South-East Australia (KRAMP 1928). It seems, therefore, to be a rare species, though it may be met with occasionally in considerable numbers.

BIGELOW (1919 p. 285) was inclined to regard *N. pelagica* as identical with *N. pileata*; this supposition has been discussed by me on a previous occasion (KRAMP 1928 p. 55).

The present specimens agree perfectly with the original description in most features, though some of them are considerably larger; in all of them the height of the umbrella is remarkably greater than the diameter, as seen below:

St. 4773, height 13–20 mm, diameter 10–17 mm.
St. 4777, height 9–23 mm, diameter 6–16 mm.
St. 4779, height up to 25 mm, diameter 8–17 mm.

As in the type specimen (which was 16 mm high and 9 mm wide) the apical process is small, in some cases entirely absent, and the lateral walls of the umbrella are thin. The manubrium is large, occupying about two-thirds of the space of the umbrella cavity. The gonads are distinctly of the *Neoturris* type, the median area sometimes broad, sometimes rather narrow, with numerous round pits, the lateral, transverse folds frequently very irregular. According to the original description the gonadial folds are provided with numerous papillae; such papillae are seen in some of the present specimens, preferably in large ones, but not in all; this character may, accordingly, be variable. The lips are complexly folded. The pink colour of the lips and stomach walls between the gonads, emphasized in the original description, is entirely absent in the present specimens, but has presumably faded during the many years' preservation in formalin; this characteristic colouration was quite distinct in the specimen from South-East Australia, when it was first examined by me (KRAMP 1928), but has now entirely disappeared as seen by recent examination.

The radial canals are broad, their margins smooth or somewhat jagged, the ring canal is smooth, narrow. In all the specimens there are about 32 marginal tentacles, the basal bulbs laterally compressed, but without a distinct abaxial spur; they have no ocelli, and there are no rudimentary bulbs between the tentacles.

N. pelagica might perhaps be compared with *N. crockeri* which was described from a single, fragmentary specimen, 28 mm high and 32 mm wide, in deep water, in the Gulf of Panama; its relative dimensions are fairly similar to those of *N. pelagica*, but its manubrium has a dense reddish-brown hue which is characteristic of many deep-sea medusae.

Distribution of *N. pelagica*: Sporadically in eastern and western parts of North Pacific; S. E. Australia.

Neoturris bigelowi KRAMP.

Neoturris pileata BIGELOW 1919 p. 285, Pl. 39 figs. 7–8, Pl. 40 fig. 1.
Neoturris bigelowi KRAMP 1959 *c* p. 237.
Neoturris bigelowi KRAMP 1961 *a* p. 108.

"Dana" Material:

St. 3602	22.XI.28	St. 3809	4.IX.29	St. 3814	9.IX.29	St. 3951	7.I.30
20°00′ S.	174°29′ E.	6°22′ S.	105°12′ E.	4°38′ S.	99°24′ E.	14°16′ S.	41°48′ E.
S 150	2000 m. w. 1	S 200	600 m. w. 8	S 200	600 m. w. 1	S 200	600 m. w. 2

"Galathea" St. 283. West coast of Ceylon, 7°05′ N. 79°37′ E. 12.IV.51. S 100, surface. 1 specimen.

St. 3602 is near the Fiji Islands, St. 3809 in the Sunda Strait between Java and Sumatra, St. 3814 west of Sumatra, St. 3951 in the Mozambique Channel. The specimen from "Galathea" St. 283 was described by me in the paper quoted above (1959 *c*).

I am somewhat in doubt as to the relationship of *Neoturris bigelowi* and *N. pileata* (FORSKÅL). Two specimens from the Philippines, referred to *N. pileata* by BIGELOW (1919), and the specimen from Ceylon mentioned above ("Galathea" St. 283) differed in some respects from the typical *N. pileata* as we know it from Atlantic waters, especially by their large number of tentacles, but also by the round pits in the interradial walls of the stomach being few and faintly developed, and by the edges of the radial canals being almost smooth, even in large specimens. These differences induced me to erect a new species, *N. bigelowi*, for these specimens. The specimens collected by the "Dana", however, show some variations which partly efface the differences between the two species. When an apical projection is present, it is narrow and pointed, never dome-shaped as is usual in *N. pileata*. The pits in the interradial walls of the stomach are very variable, numerous and distinct in the specimens from St. 3809 and 3951, few and indistinct in those from St. 3602 and 3814. Lateral diverticula from the radial canals are well developed in the largest specimens (up to 15 mm wide) from St. 3809, absent or faintly developed in the others. The number of tentacles amounts to

100 in the largest specimens from St. 3809, and in the comparatively small specimen from St. 3814 (diam. 7 mm) there are 80, as also in the larger specimens from St. 3602 (14 mm wide) and 3951 (25 mm wide). Thus the features separating *N. bigelowi* from the Atlantic *N. pileata* are well pronounced in some of the "Dana" specimens, less distinct in others, regardless of the geographical position of the localities.

Provisionally, I am inclined to retain *N. bigelowi* as a valid species, though future studies of a more extensive material may lead to the conclusion that it is merely an Indo-Pacific variety of the purely Atlantic (and Mediterranean) *N. pileata*.

Apparently, *N. bigelowi* has been collected at very different depths below the surface, though the specimen from St. 3602 (with 2000 m wire out) may have been taken during the hauling in of the net. All the localities are in immediate vicinity of the coasts.

Distribution: Coastal waters in the Indo-West-Pacific Region.

Neoturris papua (Lesson).

Turris papua Lesson 1843 p. 283.
Neoturris papua Hartlaub 1913 pp. 333, 335.
Neoturris papua Uchida 1927 *a* p. 210, fig. 36.
Neoturris papua Kramp 1928 p. 56.
Neoturris papua Ranson 1929 pp. 209–215, one fig.
Neoturris papua Chiu 1954 *b* p. 55.
Neoturris papua Kramp 1961 *a* p. 108.
Neoturris papua Kramp 1962 *a* pp. 324, 315.

Material:

"Dana"

St. 3582 27.X.28
15°36′ S. 168°57′ W.
S 150 50 m. w. **1**

St. 3584 29.X.28
10°51.5′ S. 168°40′ W.
S 150 50 m. w. **2**

St. 3590 7.XI.28
13°56′ S. 172°30′ W.
S 150 100 m. w. **1**

St. 3601 20.XI.28
18°21′ S. 178°21′ E.
S 150 100 m. w. **1**

St. 3663 23.II.29
33°33′ S. 154°04′ E.
S 150 50 m. w. **1**

St. 3676 22.III.29
5°52′ S. 131°14′ E.
S 150 50 m. w. **1**

St. 3678 24.III.29
4°05′ S. 128°16′ E.
S 150 300 m. w. **5**

St. 3680 27.III.29
2°22′ S. 126°58.5′ E.
S 150 50 m. w. **2**

St. 3684 3.IV.29
6°37′ N. 122°24′ E.
S 150 300 m. w. **2**
S 150 2000 m. w. **1**

St. 3685 5.IV.29
7°22′ N. 121°16′ E.
S 150 50 m. w. **1**
S 150 300 m. w. **1**

St. 3689 9.IV.29
7°13.5′ N. 111°49′ E.
S 150 300 m. w. **1**

St. 3714 20.V.29
15°22′ N. 115°20′ E.
S 150 50 m. w. **1**

St. 3723 30.V.29
25°30.5′ N. 125°28′ E.
S 200 50 m. w. **2**

St. 3729 14.VI.29
20°03.5′ N. 120°50′ E.
S 200 50 m. w. **1**
S 200 300 m. w. **2**

St. 3739 2.VII.29
3°20′ N. 123°50′ E.
S 200 100 m. w. **1**

St. 3751 12.VII.29
3°40.5′ N. 137°53′ E.
S 200 50 m. w. **1**
S 200 300 m. w. **1**

St. 3768 25.VII.29
1°20′ S. 138°42′ E.
S 200 600 m. w. **1**

St. 3800 18.VIII.29
7°53′ S. 116°18′ E.
S 200 50 m. w. **6**
S 200 100 m. w. **1**
S 200 300 m. w. **17**
S 200 600 m. w. **3**

St. 3809 4.IX.29
6°22′ S. 105°12′ E.
S 200 100 m. w. **2**
S 200 300 m. w. **4**

St. 3814 9.IX.29
4°38′ S. 99°24′ E.
S 200 300 m. w. **2**

St. 3817 11.IX.29
2°15′ S. 98°55.5′ E.
S 200 50 m. w. **2**

St. 3824 15.IX.29
0°08′ S. 97°15′ E.
S 200 100 m. w. **1**
S 200 300 m. w. **1**

St. 3828 18.IX.29
1°53′ N. 96°07′ E.
S 200 300 m. w. **1**

St. 3830 19.IX.29
2°36′ N. 96°31′ E.
S 200 300 m. w. **1**

St. 3833 22.IX.29
1°50′ S. 98°23′ E.
S 200 300 m. w. **1**

St. 3860 20.X.29
2°57′ S. 99°36′ E.
S 200 300 m. w. **1**
S 200 600 m. w. **1**

St. 3893 6.XI.29
5°59′ N. 92°29′ E.
S 200 300 m. w. **3**

St. 3899 9.XI.29
5°39.5′ N. 96°54′ E.
S 200 300 m. w. 1

St. 3903 17.XI.29
5°50′ N. 93°28′ E.
S 50 surface 1
S 200 50 m. w. 2

St. 3906 20.XI.29
4°26.5′ N. 85°21′ E.
S 200 300 m. w. 1

St. 3907 21.XI.29
3°59′ N. 82°57′ E.
S 200 300 m. w. 2
E 300 400 m. w. 4

St. 3908 22.XI.29
4°28′ N. 82°13′ E.
S 200 100 m. w. 2
S 200 300 m. w. 1

St. 3909 22.XI.29
5°21′ N. 80°38′ E.
S 150 3000 m. w. 1

St. 3910 23.XI.29
5°28′ N. 80°00′ E.
S 200 100 m. w. 3

St. 3913 1.XII.29
6°36′ N. 79°06′ E.
S 200 100 m. w. 2

St. 3915 3.XII.29
3°14′ N. 75°21′ E.
S 200 50 m. w. 1
S 200 100 m. w. 1
S 200 300 m. w. 3

St. 3916 4.XII.29
1°45′ N. 73°03′ E.
S 200 300 m. w. 7

St. 3924 14.XII.29
5°01′ N. 54°46′ E.
S 200 300 m. w. 2

St. 3934 20–21.XII.29
11°24′ S. 50°05′ E.
S 200 400 m. w. 1

St. 3937 22.XII.29
9°26′ S. 46°05′ E.
S 200 300 m. w. 1

St. 3938 23.XII.29
9°10′ S. 45°17′ E.
S 200 400 m. w. 1

St. 3940 24.XII.29
8°24′ S. 42°54′ E.
S 200 400 m. w. 2

St. 3947 4.I.30
4°21′ S. 42°56′ E.
S 200 400 m. w. 2

St. 3948 6.I.30
10°11′ S. 41°57′ E.
S 200 200 m. w. 2
S 200 500 m. w. 1

St. 3949 6.I.30
11°33′ S. 41°44′ E.
S 200 50 m. w. 1
S 200 300 m. w. 1

St. 3951 7.I.30
14°16′ S. 41°48′ E.
S 200 50 m. w. 1
S 200 300 m. w. 1

St. 3955 9.I.30
18°30′ S. 42°18′ E.
S 150 50 m. w. 1
S 200 100 m. w. 1

St. 3956 10.I.30
21°13′ S. 42°26′ E.
S 200 200 m. w. 3

St. 3957 11.I.30
21°30′ S. 42°32′ E.
S 200 300 m. w. 13

St. 3960 13.I.30
25°23′ S. 42°52′ E.
S 150 200 m. w. 1

St. 3964 15.I.30
25°19′ S. 36°13′ E.
S 200 100 m. w. 3

St. 3969 27.I.30
31°33′ S. 30°07′ E.
S 200 50 m. w. 2
S 200 300 m. w. 1

"Galathea"

St. 268. 28.III.51. North of the Seychelles, 3°14′ S. 54°28′ E. Depth 4046 m. TOT 1600 m. wire. 1 specimen.
St. 283. 12.IV.51. West coast of Ceylon, 7°05′ N. 79°37′ E. Depth 710 m. S 100, surface. 1 specimen.
St. 381. 8.VI.51 Gulf of Siam, 7°00′ N. 103°18′ E. Depth 54 m. SN 50, near surface. One young specimen.

Confusion of *N. papua* with various other species has been discussed by several authors (Hartlaub 1913, Uchida 1927 *a*, Kramp 1928 and 1962 *a*), and particularly by Ranson (1929) who unravelled the history of the species and gave a new description and a reliable list of synonyms and safe localities. According to Ranson's revision and later records in the literature the species has hitherto been found only in the following localities: Waigiou (= Waigeu) near the west point of New Guinea (Lesson 1843), somewhere between the island Réunion in the Indian Ocean and Cape of Good Hope (Eydoux & Souleyet 1841), Kagoshima and Misaki in Japan (Uchida 1927 *a*), a locality near the south-east coast of China (Chiu 1954 *b*) and the coast of Arabia (Ranson 1929). As seen from the list above it was taken in numerous localities by the "Dana" within an extensive area between the Polynesian Islands and the east coast of Africa.

St. 3582–3601 are near the Samoa and Fiji Islands, St. 3663 off Sydney in East Australia, St. 3676–3899 in the Malayan Archipelago, St. 3806–3915 south-east and south-west of Ceylon, St. 3924 near the Seychelles, St. 3834–3947 between northern Madagascar and Mombasa in East Africa, St. 3948–3969 in the Mozambique Channel. Moreover, a few specimens were taken by the "Galathea" Expedition near the Seychelles, near Ceylon, and in the Gulf of Siam. As a rule, only one or a few specimens were taken, the only exceptions being St. 3800 in the Flores Sea north of Lombok (17 specimens in a haul with 300 m wire out) and St. 3957 near the west coast of Mombasa (13 specimens, with 300 m wire).

It belongs to the neritic, epipelagic region; the few specimens taken in deep hauls were undoubtedly caught during the hauling in of the nets. It was almost equally common from near the surface down to depths of about 200 m, with a slightly pronounced predominance in the hauls with 300 m wire out.

Size of the specimens at different depths

Length of wire, m.	Height of individuals, mm. average	width of variation
50.....	9.8	2–19
100.....	9.7	3–17
200–400.....	7.4	3–14
500–600.....	(6.8)	3–13

The specimens taken in hauls with more than 400 m wire out are so few that average numbers are of no value; these specimens may even have been caught at higher levels during the hauling in of the nets. The other figures exhibit no evident difference in size of the individuals collected at different depths; the slightly indicated decrease in size with increasing depth may be quite accidental. It is worth mentioning that the only specimen taken immediately at the surface by the "Dana" (St. 3903) was 11 mm high and 7 mm wide; the specimen from the "Galathea" St. 283 was 8 mm high and 5 mm wide, that from St. 381 3 mm in height. This young specimen had four large tentacles and some small ones, the apical canal already distinct. A young specimen from "Dana" St. 3584 also had four tentacles; it was 1.8 mm high and 1.1 mm in diameter.

A specimen taken north of the Seychelles by the "Galathea" (St. 268) differs from the description given by RANSON in the arrangement of the narrow, yellow, longitudinal lines in the exumbrella; there are twelwe of these characteristic lines: four long interradial lines, running nearly to the apex of the umbrella, and eight somewhat shorter ones (of different length) arranged in pairs, one on each side of the perradial corners of the umbrella, but no perradial lines.

Distribution: Coastal waters in the Indo-West-Pacific Region.

Octotiara russelli KRAMP.

Octotiara russelli KRAMP 1953 p. 266, Pl. 1 figs. 1–3.
Octotiara violacea KRAMP 1959 *c* p. 234, fig. 8 a–c.
Octotiara russelli + violacea KRAMP 1961 *a* p. 111.

"Dana" Material:

St. 3651 22.I.29
35°36′ S. 171°52′ E.
E 300 2500 m. w. **1**

St. 3678 24.III.29
4°05′ S. 128°16′ E.
S 150 300 m. w. **1**
S 150 1000 m. w. **1**

St. 3684 3.IV.29
6°37′ N. 122°24′ E.
S 150 300 m. w. **1**

St. 3714 20.V.29
15°22′ N. 115°20′ E.
S 150 100 m. w. **1**

St. 3731 16.VI.29
14°37′ N. 119°52′ E.
S 200 300 m. w. **2**

St. 3768 25.VII.29
1°20′ S. 138°42′ E.
S 200 400 m. w. **1**
S 200 700 m. w. **1**

St. 3800 18.VIII.29
7°53′ S. 116°18′ E.
S 200 100 m. w. **1**
S 200 600 m. w. **1**

St. 3809 4.IX.29
6°22′ S. 105°12′ E.
S 200 50 m. w. **1**
S 200 300 m. w. **2**

St. 3817 11.IX.29
2°15′ S. 98°55.5′ E.
S 200 200 m. w. **2**

St. 3821 14.IX.29
0°51.5′ S. 99°24.5′ E.
S 200 100 m. w. **1**
S 200 600 m. w. **1**

St. 3961 14.I.30
24°57′ S. 40°18′ E.
S 150 300 m. w. **1**

St. 3969 27.I.30
31°33′ S. 30°07′ E.
S 200 50 m. w. **1**

The genus *Octotiara* was erected for Pandeidae with eight simple radial canals; with transversely folded gonads; without mesenteries (KRAMP 1953 p. 266). It comprised one species, *O. russelli*, of which a single, well preserved, specimen was found on the Great Barrier Reef in N. E. Australia. During the "Galathea" Expedition I found a similar medusa near the west coast of Ceylon and described it as a new species, *O. violacea* (KRAMP 1959 *c*). The Australian specimen of *O. russelli* had a large and broad gastral peduncle, 8 large tentacles, and 8 small rudimentary bulbs between successive tentacles; the specimen from Ceylon had no peduncle, there were 16 large tentacles and only 3–4 rudimentary bulbs between successive tentacles; in other respects the two species were very much alike.

The present extensive material shows that the two species should be united.

Peduncle. The umbrella is frequently turned inside out, and it may then be difficult to decide, whether a peduncle is present or not. Among 12 specimens with 8 tentacles (as in *russelli*) a peduncle is well developed in four specimens, slightly indicated in two, absent in two, and doubtful in four specimens; a distinct peduncle, fairly long and broad, is present in two specimens with an increased number of tentacles, about 28 and 32. Accordingly, the degree of development of a peduncle is of no specific importance.

Tentacles and rudimentary bulbs. The majority of the specimens examined have 8 tentacles, and then the number of rudimentary bulbs between successive tentacles is nearly always 8 (as in the Australian type specimen of *russelli*), with very little variation, but in one specimen (St. 3969 in S.E. Africa) there are 14; the specimens with 8 tentacles are 6–9 mm in diameter. Transitional stages between rudiments and fully developed tentacles are not observed in any of these specimens. Besides the type specimen of *O. violacea* (from Ceylon) with 16 tentacles and 3–4 rudiments between them I have seen another specimen (St. 3961 in the Mozambique Channel) with 16 tentacles, and with 6–9 intervening rudiments. The number of tentacles may, however, be considerably larger; this is seen in two specimens: St. 3817 (west of Sumatra) with about 28, and St. 3768 (north of New Guinea) with 32 tentacles; in both specimens the number of rudimentary bulbs between successive tentacles is 2–3, thus about 8 or 9 per octant. In one of these specimens (St. 3817) a few of the rudimentary bulbs are somewhat increased in size, indicating a transition into a true tentacle, the only instance of such transition observed. The specimen with 32 tentacles is comparatively large, 11 mm wide. We may state that the typical number of fully developed tentacles in *O. russelli* is 8, but during continued growth more tentacles may be developed.

Abaxial spurs. In the descriptions of the two "species" the presence of a broad abaxial spur on the tentacle bulbs of *O. violacea* is mentioned, whereas in *O. russelli* such abaxial spurs are only slightly indicated. An examination of the new material shows that this distinguishing character does not hold good.

Colour. In the preserved type specimen from Australia the stomach, gonads and tentacle bulbs were a yellowish-brown, and the specimens of the "Dana" have a similar colour. The type specimen of *O. violacea* from Ceylon, which I saw in fresh condition, had much more intensive colours; I noted them after the colour-charts by E. Séguy: Code universel des couleurs 1936, as follows: stomach between the gonads *héliotrope* (11), lips *pourpre royale* (53), gonads *acajou* (696, very dark brown), tentacles *feuille morte* (191, brown).

Occurrence. Most of the localities, where *O. russelli* was collected by the "Dana" are within the area of the Malayan Archipelago, but St. 3961 and 3969 are off the southern part of the east coast of Africa. Among the 20 specimens collected 12 were taken in hauls with 100–300 m wire out, two near the surface (50 m wire) and a few in deeper hauls, with 600–2500 m wire; these were undoubtedly caught at higher levels during the hauling in of the nets. More than one or two specimens were never taken in one haul.

Distribution: Coastal waters in the Indo-West-Pacific Region.

Pandeopsis ikarii (Uchida).

Tiaranna ikarii Uchida 1927 *a* p. 209, fig. 35.
Tiaranna ikarii Yamazi 1958 p. 136.
Pandeopsis scutigera Kramp 1959 *c* p. 232, fig. 7.
Pandeopsis scutigera Kramp 1961 *a* p. 113.
Pandeopsis ikarii Kramp 1961 *a* p. 444.

Material:

"Dana" St. 3626. 13.XII.28. North of Kermadec Islands, 27°00′ S. 177°41′ W. S 150, 1500 m. w. 1 specimen.

In a previous paper (Kramp 1959 *c*) I described a small medusa, *Pandeopsis scutigera* n.g., n.sp., from a number of locatities in the Malayan Archipelago and the Gulf of Siam, collected by the "Galathea" Expedition and examined by me in living condition. In a letter to me Dr. J. Picard expressed the opinion that this species must be identical with the Japanese medusa *Tiaranna ikarii* Uchida, but agreed with me that it represented a distinct genus of Pandeidae. In the Addenda to my "Synopsis" (1961 *a* p. 444) I accepted this view. The name of the species is therefore *Pandeopsis ikarii* (Uchida).

The Japanese type specimen was 4.2 mm wide, with 8 tentacles and 12 small marginal knobs, and the specimens collected by the "Galathea" varied between 1 and 4.5 mm, all of them with 8 tentacles and 8 rudimentary bulbs. The specimen taken by the "Dana" is only 1.8 mm wide but has about 16 tentacles and some minute bulbs; in all other structural features it agrees so well with the specimens previously examined by me that I refer it to the same species without hesitation. The locality is much farther east than the previous records; the specimen was taken in a deep haul, with 1500 m wire out, but may have been caught during the hauling in of the net.

Distribution: Japan; Gulf of Siam; Malayan Archipelago; Kermadec Islands.

Pandea conica (Quoy & Gaimard 1827).

For references see Kramp 1961 *a* p. 111.

Material:

"Dana"
St. 3579 23.X.28
20°56′ S. 160°03′ W.
S 150 50 m. w. **1**

St. 3644 11.I.29
44°40′ S. 173°35′ E.
S 150 600 m. w. **1**

St. 3663 23.II.29
33°33′ S. 154°04′ E.
S 150 300 m. w. **1**

St. 3689 9.IV.29
7°13′ N. 111°49′ E.
S 150 600 m. w. **1**

St. 3713 19.V.29
13°57′ N. 112°45′ E.
S 150 600 m. w. **1**

St. 3718 25.V.29
20°04′ N. 123°59′ E.
S 150 50 m. w. **3**

St. 3906 20.XI.29
4°26.5′ N. 85°21′ E.
S 200 400 m. w. **1**

St. 3935 21.XII.29
10°50′ S. 48°30′ E.
S 200 100 m. w. **1**

St. 3938 23.XII.29
9°10′ S. 45°17′ E.
S 200 300 m. w. **1**

St. 3959 12.I.30
23°40′ S. 43°02′ E.
S 200 500 m. w. **1**

St. 3964 15.I.30
25°19′ S. 36°13′ E.
S 150 50 m. w. **1**

"Jutlandia"
St. 4785 19.VIII.33
43°00′ N. 163°45′ W.
S 200 220 m. w. c. **100**

"Jutlandia"
St. 4786 26.VIII.33
36°30′ N. 126°30′ W.
S 200 220 m. w. **1**

"Selandia"
St. 4788 17.V.33
32°50′ N. 173°10′ W.
S 200 220 m. w. **2**

"Selandia"
St. 4789 28.V.33
31°40′ N. 135°30′ E.
S 200 220 m. w. **1**

"Jutlandia"
St. 4790 7.VII.33
35°30′ N. 145°00′ E.
S 200 220 m. w. **4**

"Jutlandia"
St. 4793 2.I.34
35°44′ N. 124°16′ W.
S 200 220 m. w. **2**

"Falstria"
St. 4797 18.I.34
30°43′ N. 136°28′ E.
S 200 201 m. w. **1**

"Pacific"
St. 4799 12.III.34
19°02′ N. 119°38′ E.
S 150 201 m. w. **15**

"Jutlandia"
St. 4808 2.V.34
36°20′ N. 143°00′ E.
S 200 220 m. w. **5**

While this species is widely distributed in the Atlantic Ocean and in the Mediterranean, the previous records from Indo-Pacific waters are very few: Misaki in Japan (Uchida 1927, Kramp 1928), Philippines (Kramp 1928) and Amoy in China (Chiu 1954 *b*). As a matter of fact, it has an extensive distribution, as seen from the above list. St. 3579 is near Rarotonga in Polynesia, St. 3644 east of New Zealand, St. 3663 off Sydney in East Australia, St. 3689–3718 in the South China Sea and S.E. of Formosa, St. 3906 south-east of Ceylon, St. 3935–3964 off the east coast of Africa, and merchant vessels have taken it in several localities in the North Pacific between Japan and San Francisco. On the other hand, it does not seem to occur in great abundance; the "Dana" never collected more than one or a few specimens in each haul (mainly fairly large specimens); the hauls made by merchant vessels also did not contain more than a few specimens, though on one occasion (St. 4785 in the Central North Pacific) about 100 young individuals were taken.

With one exception (St. 4783) the specimens taken by the merchant vessels were all young stages, 1.5–3 or 4 mm wide; they were collected during a considerable part of the year: January, March, May, July and August, which indicates that the species has a very long period of propagation in these waters. The "Dana" also found a young specimen in December (St. 3935 north-west of Madagascar). Young stages of the medusa

were described in detail by RANSON (1936 p. 84, Pl. 1 figs. 1–6), and the present material fully confirms his statements. The specimen from "Dana" St. 3935 is 4 mm high and wide, with 4 large perradial tentacles, 4 somewhat smaller interradial, and 8 adradial very small or rudimentary tentacles. PICARD (1956 pp. 1–11, figs. 1–3) found that the medusa *Pandea conica* is liberated from the hydroid *Campaniclava cleodorae* growing on the shells of the pteropod *Cleodora cuspidata*, which accounts for the oceanic distribution of this Anthomedusa.

In the Atlantic Ocean the medusa mainly occurs in the upper water layers, in the Mediterranean sometimes in rather deep water. The 13 specimens collected by the "Dana" were taken in about equal numbers at different depths, in hauls with 50–600 m wire out. Specimens taken in hauls with 50, 100 and 300 m wire varied in size between 4 and 10 mm in height of umbrella, those from deeper hauls were somewhat larger, 17–19 mm, one of them even as much as 23 mm high (St. 3713, in South China Sea, 600 m wire); the young individuals collected in the North Pacific by the merchant vessels were all taken in hauls with 201–220 m wire out. The material is, however, too scanty to draw safe conclusions as to the vertical distribution of the various stages of development. The very large specimen 23 mm high and 14 mm wide from "Dana" St. 3713, has about 32 tentacles and several minute rudimentary marginal bulbs.

Distribution: Particularly common in the Mediterranean, widely distributed in the Atlantic Ocean between about 45° S. and 40° N.; Indian Ocean; Pacific Ocean between about 45° S. and 40° N.

Pandea rubra BIGELOW.

Pandea rubra BIGELOW 1913 p. 14, Pl. 2 figs. 1–7.
Pandea rubra RUSSELL 1953 p. 211, figs. 111, 112.
Pandea rubra KRAMP 1957 *a* pp. 18, 98, 99, 126.
Pandea rubra KRAMP 1957 *b* pp. 155, 162.
Pandea rubra NAUMOV 1960 p. 190, fig. 75.
Pandea rubra KRAMP 1961 *a* p. 112.

Material:

"Dana" St. 3912. 24.XI.29. West of Ceylon, 6°52′ N. 79°30′ E. E 300, 1000 m. w. 1 specimen.
"Falstria" St. 4804. 5.III.34. Central North Pacific, 39°43′ N. 167°55′ W. S 200, 183 m. w. 60 young specimens.

The occurrence of this species in a tropical locality (St. 3912, near Ceylon) is rather surprising, though it has also been recorded from a warm-water locality in the Atlantic, near the Bermudas. The specimen from Ceylon is about 30 mm in diameter; the manubrium is somewhat damaged, but the dense network of the gonads is distinctly seen. There are about 20 marginal tentacles, and they are retained in their full length, which amounts to 60 mm or more. The identification of the specimen seems to me beyond doubt.

The numerous young specimens from "Falstria" St. 4804 in the northern Pacific are 2–3.5 mm in height and 1.5–3 mm in diameter; most of them have four, a few six fully developed tentacles and some young ones. The reason why I dare refer these small specimens to *Pandea rubra*, which is a fairly large medusa, is that they are very similar in all features to a larger specimen from north-western Pacific, which has about 16 tentacles, figured by NAUMOV (1960).

Distribution: Several localities in the North Pacific, ranging from San Francisco to Alaska, Kamchatka, and the Ochotian Sea; antarctic waters; a locality south of Africa; scattered occurrence in the North Atlantic. Mainly found in intermediate and deep water-layers.

Fam. **Calycopsidae.**

Heterotiara anonyma MAAS.

Heterotiara anonyma MAAS 1905 p. 19, Pl. 3 figs. 19–21.
Heterotiara anonyma BIGELOW 1909 p. 216, Pl. 41 figs. 12, 13.
Heterotiara anonyma VANHÖFFEN 1911 p. 211, figs. 3, 4.

Heterotiara anonyma BIGELOW 1913 p. 25.
Heterotiara anonyma KRAMP 1959 *a* p. 17, Pl. 1 fig. 10, textfig. 131.
Heterotiara anonyma KRAMP 1961 *a* p. 122.

Material:

"Dana"

St. 3678 24.III.29
4°05′ S. 128°16′ E.
S 150 600 m. w. **1**

St. 3680 27.III.29
2°22′ N. 126°58.5′ E.
S 150 1000 m. w. **3**

St. 3686 6.IV.29
8°34′ N. 119°55′ E.
S 150 600 m. w. **1**

St. 3714 20.V.29
15°22′ N. 115°20′ E.
S 150 50 m. w. **1**

St. 3800 18.VIII.29
7°53′ S. 116°18′ E.
S 200 300 m. w. **1**
S 200 600 m. w. **1**

St. 3815 10.IX.29
3°36′ S. 97°37′ E.
S 200 600 m. w. **4**

St. 3817 11.IX.29
2°15′ S. 98°55.5′ E.
S 200 300 m. w. **1**

St. 3821 14.IX.29
0°51.5′ S. 99°24.5′ E.
S 200 600 m. w. **3**

St. 3824 15.IX.29
0°08′ S. 97°15′ E.
S 200 300 m. w. **1**
S 200 600 m. w. **2**

St. 3828 18.IX.29
1°53′ N. 96°07′ E.
S 200 200 m. w. **1**
E 300 600 m. w. **1**
S 150 1500 m. w. **2**

St. 3893 6.XI.29
5°59′ N. 92°29′ E.
S 200 600 m. w. **2**
E 300 1000 m. w. **1**

St. 3902 17.XI.29
6°05′ N. 95°30′ E.
S 200 600 m. w. **1**

St. 3906 20.XI.29
4°26.5′ N. 85°21′ E.
S 200 600 m. w. **1**

St. 3924 14.XII.29
5°01′ S. 54°46′ E.
S 200 50 m. w. **1**

"Galathea"

St. 414 16–19.VII.51
Dinagat, Philippines
10°20′ N. 125°32′ E.
Depth 40 m
SN 50 16 m. w. **1**
S 100 20 m. w. **1**

The previous Pacific records of this medusa were collected within three widely separated areas: off the coast of Peru, across the northernmost part of the ocean north of 50° N., and two localities in the Malayan Archipelago. The "Dana" found it in many other Indo-Malayan localities and also near the Seychelles (St. 3924).

According to BIGELOW (1909, 1913, 1938) the number of marginal tentacles in *H. anonyma* is usually 8, varying from 6 to 12, without relation to the size of the individuals; this has previously been confirmed by me. In *H. minor* the number of tentacles is considerably larger (see below), exceptionally as few as 15. In the present material of *H. anonyma* one of the specimens from "Galathea" St. 414 has 7 tentacles, but all specimens collected by the "Dana" have eight. In the specimen from "Galathea" with 7 tentacles, which I saw alive, the terminal nematocyst knobs of the tentacles were a bright orange-red. It is characteristic of both species of *Heterotiara* (in contradistinction to most other Calycopsidae) that the tentacles with their terminal knobs are almost always retained, and even fully extended, regardless of the state of preservation of the specimens.

In the "Dana" collections *Heterotiara anonyma* was never found in any considerable number of specimens, at most four in a single haul. It was mainly taken in hauls with 600 m wire out (17 specimens in 11 hauls), though it may also occur nearer to the surface, seven specimens being found in seven hauls with 50, 200 and 300 m wire. The few specimens taken in deep hauls, with 1000 and 1500 m wire out (St. 3680 and 3828) were undoubtedly caught at higher levels during the hauling in of the nets. There is no indication of a difference in size between specimens from different depths.

Distribution: Eastern tropical Pacific; northern Pacific between the Queen Charlotte Islands and Kamchatka; Indo-Malayan waters, and near the Seychelles in the western part of the Indian Ocean. In the Atlantic it has mainly been found in the warm central and western parts, but there is also a single record from South-West Africa, which connects the Atlantic and Indian Ocean areas of distribution.

Heterotiara minor VANHÖFFEN.

Heterotiara minor VANHÖFFEN 1911 p. 212, Pl. 22 fig. 5, textfig. 8 a, b.
Heterotiara minor BROWNE 1916 p. 183.
Heterotiara minor BIGELOW 1919 p. 287, Pl. 39 fig. 9, Pl. 40 figs. 2–4.
Heterotiara minor KRAMP 1928 p. 58, figs. 27–30.

Heterotiara minor KRAMP 1953 p. 268.
Heterotiara minor KRAMP 1957 *a* p. 23.
Halitiara minor GANAPATI & NAGABHUSHANAM 1958 pp. 92, 94.
Heterotiara minor KRAMP 1961 *a* p. 123.

Material:

"Dana"

St. 3676 23.III.29
5°52′ S. 131°14′ E.
S 150 5000 m. w. **1**

St. 3677 13.III.29
5°28′ S. 130°39′ E.
S 150 1000 m. w. **19**

St. 3678 24.III.29
4°05′ S. 128°16′ E.
S 150 300 m. w. **10**

St. 3680 27.III.29
2°22′ S. 126°58.5′ E.
S 150 300 m. w. **1**
S 150 1000 m. w. **12**
S 150 2000 m. w. **1**

St. 3682 29.III.29
1°42′ N. 124°29′ E.
S 150 100 m. w. **4**

St. 3683 3.IV.29
4°08′ N. 123°00′ E.
S 150 300 m. w. **2**
S 150 600 m. w. **1**

St. 3684 4.IV.29
6°37′ N. 122°24′ E.
S 150 1000 m. w. **4**

St. 3685 5.IV.29
7°22′ N. 121°16′ E.
S 150 300 m. w. **8**
S 150 600 m. w. **2**
S 150 1000 m. w. **10**

St. 3686 6.IV.29
8°34′ N. 119°55′ E.
S 150 50 m. w. **4**
S 150 100 m. w. **5**
S 150 300 m. w. **1**
S 150 600 m. w. **1**
S 150 1000 m. w. **3**
S 150 2000 m. w. **3**

St. 3687 8.IV.29
7°14′ N. 115°23′ E.
S 150 300 m. w. **26**
S 150 600 m. w. **1**

St. 3688 8.IV.29
6°55′ N. 114°02′ E.
S 150 1000 m. w. **9**
S 150 2000 m. w. **1**
S 150 3000 m. w. **2**
S 150 3500 m. w. **1**

St. 3689 9.IV.29
7°13.5′ N. 111°49′ E.
S 150 100 m. w. **12**
S 150 600 m. w. **2**
S 150 1000 m. w. **1**
S 150 1500 m. w. **1**
S 150 2000 m. w. **2**
E 300 3000 m. w. **1**

St. 3690 10.IV.29
8°02′ N. 109°36.5′ E.
S 150 300 m. w. **2**

St. 3692 11.IV.29
9°59′ N. 107°23.5′ E.
S 150 50 m. w. **1**

St. 3712 18.V.29
12°44′ N. 110°45′ E.
S 150 300 m. w. **9**
S 150 600 m. w. **5**

St. 3713 19.V.29
13°57′ N. 112°45′ E.
S 150 300 m. w. **1**

St. 3714 20.V.29
15°22′ N. 115°20′ E.
S 150 50 m. w. **20**
S 150 100 m. w. **12**
S 150 300 m. w. **5**

St. 3715 22.V.29
18°18′ N. 119°36′ E.
S 150 300 m. w. **1**
S 150 600 m. w. **1**

St. 3722 29.V.29
25°11′ N. 122°35′ E.
S 200 100 m. w. **2**
S 200 300 m. w. **1**

St. 3729 14.VI.29
20°03.5′ N. 120°50′ E.
S 200 300 m. w. **3**
S 200 600 m. w. **4**

St. 3731 16.VI.29
14°37′ N. 119°52′ E.
S 200 100 m. w. **5**
E 300 100 m. w. **1**
S 200 300 m. w. **6**

St. 3736 28.VI.29
9°17′ N. 123°58′ E.
S 200 100 m. w. **1**
S 200 300 m. w. **6**
S 200 600 m. w. **2**
E 300 1000 m. w. **1**
S 150 2000 m. w. **1**

St. 3739 2.VII.29
3°20′ N. 123°50′ E.
S 200 300 m. w. **5**

St. 3768 25.VII.29
1°20′ S. 138°42′ E.
S 200 500 m. w. **2**
S 200 700 m. w. **11**

St. 3800 18.VIII.29
7°53′ S. 116°18′ E.
S 200 300 m. w. **22**
S 200 600 m. w. **6**

St. 3804 30.VIII.29
9°09′ S. 114°47′ E.
S 200 100 m. w. **3**
S 200 300 m. w. **1**

St. 3809 4.IX.29
6°22′ S. 105°12′ E.
S 200 50 m. w. **13**
S 200 100 m. w. **56**
S 200 300 m. w. **120**
S 200 600 m. w. **6**

St. 3814 9.IX.29
4°38′ S. 99°24′ E.
S 200 300 m. w. **2**
S 200 600 m. w. **1**

St. 3821 14.IX.29
0°51.5′ S. 99°24.5′ E.
S 200 100 m. w. c. **200**
S 200 300 m. w. c. **325**
S 200 600 m. w. c. **260**

St. 3824 15.IX.29
0°08′ S. 97°15′ E.
S 200 50 m. w. **3**
S 200 100 m. w. **3**

St. 3828 18.IX.29
1°53′ N. 96°07′ E.
S 200 300 m. w. **14**
S 150 1500 m. w. **17**
S 150 2000 m. w. **6**

St. 3830 19.IX.29
2°36′ N. 96°31′ E.
S 200 300 m. w. c. **180**

St. 3843 9.X.29
9°59′ S. 97°56′ E.
S 200 350 m. w. **1**

St. 3844 11.X.29
12°05′ S. 96°45′ E.
S 200 50 m. w. **3**
S 200 100 m. w. **4**

St. 3847 11.X.29
12°02′ S. 96°43′ E.
S 150 2000 m. w. **1**

St. 3849 13.X.29
8°11′ S. 92°41.5′ E.
S 200 600 m. w. **3**

St. 3850 14.X.29
6°01′ S. 93°12′ E.
S 200 600 m. w. **4**

St. 3851 15.X.29
5°27′ S. 93°50′ E.
S 200 300 m. w. **1**
S 200 600 m. w. **6**

St. 3860 20.X.29
2°57′ S. 99°36′ E.
S 200 300 m. w. **17**
S 200 600 m. w. **12**

St. 3893 6.XI.29
5°59′ N. 92°29′ E.
S 200 50 m. w. **3**
S 200 100 m. w. **29**
S 200 300 m. w. **40**
S 200 600 m. w. **2**
S 200 800 m. w. **1**

St. 3901 10.XI.29
4°20′ N. 98°47′ E.
S 50, surface **1**

St. 3902 17.XI.29
6°05′ N. 95°30′ E.
S 200 600 m. w. **4**

St. 3903 17.XI.29
5°50′ N. 93°28′ E.
S 200 100 m. w. **1**
S 200 300 m. w. **33**

St. 3904 18.XI.29
5°18′ N. 90°55′ E.
S 150 2000 m. w. **1**
E 300 2500 m. w. **1**
E 300 3500 m. w. **1**

St. 3905 19.XI.29
4°44′ N. 88°05.5′ E.
S 200 300 m. w. **3**
S 200 400 m. w. **11**
S 200 600 m. w. **1**

St. 3906 20.XI.29
4°26.5′ N. 85°21′ E.
S 200 100 m. w. **16**
S 200 300 m. w. **4**
S 200 400 m. w. **1**
S 200 600 m. w. **2**

St. 3908 22.XI.29
4°28′ N. 82°13′ E.
S 200 400 m. w. **2**
S 200 600 m. w. **2**

St. 3910 23.XI.29
5°28′ N. 80°00′ E.
S 200 300 m. w. **5**
S 200 600 m. w. **5**

St. 3914 2.XII.29
4°52′ N. 77°08′ E.
S 200 300 m. w. **3**
S 200 600 m. w. **1**

St. 3915 3.XII.29
3°14′ N. 75°21′ E.
S 200 100 m. w. **2**

St. 3920 9.XII.29
1°12′ S. 62°19′ E.
S 200 100 m. w. **1**

St. 3924 14.XII.29
5°01′ S. 54°46′ E.
S 200 300 m. w. **2**

St. 3931 19.XII.29
12°09′ S. 49°34′ E.
S 200 500 m. w. **1**

St. 3935 21.XII.29
10°50′ S. 48°30′ E.
S 200 200 m. w. **1**
S 200 300 m. w. **2**
S 200 400 m. w. **1**
S 200 500 m. w. **2**

St. 3937 22.XII.29
9°26′ S. 46°05′ E.
S 200 400 m. w. **1**
S 200 500 m. w. **1**

St. 3938 23.XII.29
9°10′ S. 45°17′ E.
S 200 500 m. w. **1**

St. 3939 23.XII.29
8°44′ S. 43°54′ E.
S 200 200 m. w. **1**

St. 3940 24.XII.29
8°24′ S. 42°54′ E.
S 200 300 m. w. **1**

St. 3950 7.I.30
12°23′ S. 41°43.5′ E.
S 200 200 m. w. **2**
S 200 300 m. w. **3**
S 200 500 m. w. **1**

St. 3952 8.I.30
15°05′ S. 41°53′ E.
S 200 400 m. w. **1**

St. 3953 8.I.30
16°12′ S. 42°04′ E.
S 150 50 m. w. **2**
S 200 200 m. w. **1**

St. 3955 9.I.30
18°30′ S. 42°18′ E.
S 200 100 m. w. **1**
S 200 300 m. w. **1**

St. 3961 14.I.30
24°57′ S. 40°18′ E.
S 150 300 m. w. **1**

St. 3963 15.I.30
24°30′ S. 37°48.5′ E.
S 200 200 m. w. **1**

St. 3964 15.I.30
25°19′ S. 36°13′ E.
S 200 100 m. w. **1**

"Panama"
St. 4768 22.IV.33
19°20′ N. 119°48′ E.
S 200 300 m. w. **6**

"Pacific"
St. 4799 12.III.34
19°02′ N. 119°38′ E.
S 150 201 m. w. **8**

"St. Nordiske"
St. 4820 11.III.38
13°56′ N. 117°00′ E.
S 150 201 m. w. **10**

TH. MORTENSEN 8.IV.29
Soerabaja, Java
8°02′ S. 114°58′ E.
Plankton net,
850 m. w. **3**

TH. MORTENSEN
10.IV.29
Soerabaja, Java
8°01′ S. 115°02′ E.
Plankton, net, surface **1**

"Galathea"
St. 316 4.V.51
Bay of Bengal
12°43′ N. 91°17′ E.
Depth 3170 m
TOT 4500 m. w. **1**

St. 318 5.V.51
9°02′ N. 93°07′ E.
Depth 1440 m
TOT 2800 m. w. **1**

St. 319 6.V.51
Nancowry Harbour,
Nicobars, anchorage
SN 50, surface **2**

St. 381 8.VI.51
Gulf of Siam
7°00′ N. 103°18′ E.
Depth 54 m
SN 50, near surface **2**

St. 407 3.VII.51
South China Sea
12°10′ N. 114°56′ E.
Depth 4390 m
TOT 5300 m. w. **2**

This extensive material was all collected within areas, from which *Heterotiara minor* was previously recorded, but it was found in many more localities, which shows that it is generally distributed in the entire Indo-Malayan area, across the tropical part of the Indian Ocean from Sumatra via Ceylon to the Seychelles, and in the waters north and west of Madagascar. The easternmost locality where it was taken by the "Dana" is at St. 3768 north of the western part of New Guinea; only once has it been found somewhat farther east, viz on the Great Barrier Reef in North-East Australia. The occurrence is preferably neritic, but since it was taken in several localities west and south-west of Sumatra at considerable distances from this island, the duration of its pelagic life-time existence is presumably long enough to enable it to be carried rather far away

by the currents. The distribution as it has now been stated, denotes it as a typical Indo-West-Pacific species. The localities, where this species was collected by merchant vessels and by the "Galathea" are within the same areas, where it was taken by the "Dana".

Also in this species of *Heterotiara* the tentacles with their terminal knobs of nematocysts are nearly always fully retained after preservation. In a sample picked out at random the number of tentacles varied between 14 and 24. The ratio between the number of tentacles and the size of the individuals appears from the following table:

Height of umbrella, mm	Number of tentacles width of variation	average number
4	15	15.0
5	16–20	18.0
6	16–24	19.5
7	16–24	18.5
8	14–24	18.5
9	16–24	19.5
10	18–22	21.0
11	18–22	20.5
12	17–22	19.5

The final number of tentacles thus seems to be attained at an early stage of development. There is no appreciable difference in size of specimens from different depths.

Vertical distribution: The great numbers in hauls with 100–600 m wire out are mainly due to exceptionally big catches at the two stations St. 3809 in the Sunda Strait and St. 3821 off the west coast of Sumatra. The medusa may occasionally be taken immediately at the surface, as also seen from some of the catches made by the "Galathea" and by Dr. MORTENSEN, but evidently it mainly occurs at depths between about 25 and 300 or 400 metres below the surface. The specimens taken in very deep hauls at "Galathea" St. 316, 318 and 407 were no doubt caught at much higher levels during the hauling in of the trawl, and the same presumably applies to those taken by the "Dana" in the hauls with 2000–5000 m wire out; on the other hand, a comparatively large number of specimens were taken in hauls with 1000 m wire, so many that probably the medusa sometimes descends into rather considerable depths.

Distribution: Common in the Indo-West-Pacific Region, from the east coast of Africa eastwards to N.E. Australia, northwards to Formosa. Never found in the Atlantic.

Bythotiara murrayi GÜNTHER 1903.

For references, see KRAMP 1961 *a* p. 118.

Material:

"Dana"					
St. 3627	14.XII.28	St. 3844	11.X.29	St. 3934	20–21.XII.29
30°08′ S.	176°50′ W.	12°05′ S.	96°45′ E.	11°24′ S.	50°05′ E.
S 150	300 m. w. 1	E 300	1000 m. w. 1	S 200	600 m. w. 1
St. 3821	14.IX.29	St. 3914	2.XII.29		
0°51.5′ S.	99°24.5′ E.	4°52′ N.	77°08′ E.		
S 200	600 m. w. 1	S 200	300 m. w. 1		

St. 3627 is near the Kermadec Islands north of New Zealand, St. 3821 off the west coast of Sumatra, St. 3844 near the Cocos Islands, St. 3914 south-west of Ceylon, and St. 3934 near the north point of Madagascar. This medusa has only once before been recorded from Indo-Pacific waters, viz. from Nias Island west of Sumatra (VANHÖFFEN 1911 p. 213, fig. 9 a–c), a record which has been considered doubtful, because

the locality was far from the further distribution of the species, which comprises the Mediterranean and considerable parts of the Atlantic Ocean.

In the Atlantic and Mediterranean oceans *B. murrayi* is preferably a bathypelagic medusa, but as seen from the above list, it was taken by the "Dana" in hauls with only 300 m wire out in two widely separated localities. The two specimens from the hauls with 300 m wire are small ones, 4 and 9 mm in diameter; the two specimens from the hauls with 600 m wire are 12 and 13 mm, while an adult specimen, 20 mm wide, was taken at St. 3844 with 1000 m wire. This might indicate that young individuals may ascend to higher levels from the bathypelagic region, where this medusa generally occurs.

Distribution: Mediterranean; Atlantic Ocean, mainly in its eastern parts, from about 33° S. near Tristan da Cunha to about 63° N. on the west coast of Norway; now stated to be an inhabitant of the Indian Ocean and the western Pacific.

Genus **Calycopsis.**

On a previous occasion (KRAMP 1959 *a* pp. 18 ff) I made a revision of the species belonging to the genus *Calycopsis* and discussed their geographical distribution, which gave rise to some considerations on the origin and speciation of the various species. According to our knowledge at that time each of the species occurred within a restricted area, which led me to the conclusion (p. 26) that the existing species of *Calycopsis* "all have arisen in separate geographical areas, and the division of the genus into different species is a typical geographical speciation".

Besides the three North Atlantic species, *C. simplex* KRAMP, *C. gara* PETERSEN[1] and *C. krampi* PETERSEN, each of which is known from only one or two specimens, we may still maintain that *C. typa* FEWKES is restricted to the Atlantic Ocean, *C. borchgrevinki* (BROWNE) to the antarctic waters, and *C. nematophora* BIGELOW to the northernmost part of the Pacific. The present material from the Indo-Pacific part of the "Dana" Expedition shows, however, that the remaining four species, *C. bigelowi* VANHÖFFEN, *C. simulans* (BIGELOW), *C. papillata* BIGELOW and *C. chuni* VANHÖFFEN have a far more extensive distribution than known before, so that my former view on their geographical speciation does not hold good.

Calycopsis bigelowi VANHÖFFEN.

Calycopsis bigelowi VANHÖFFEN 1911 p. 218, fig. 12.
Calycopsis bigelowi BIGELOW 1940 p. 293.
Calycopsis bigelowi KRAMP 1957 *a* p. 21.
Calycopsis bigelowi KRAMP 1959 *a* pp. 19, 25.
Calycopsis bigelowi KRAMP 1961 *a* p. 119.

"Dana" Material:

St. 3686	6.IV.29	St. 3712	18.V.29	St. 3809	4.IX.29	St. 3828	18.IX.29
8°34′ N.	119°55′ E.	12°44′ N.	110°45′ E.	6°22′ S.	105°12′ E.	1°42′ N.	96°05′ E.
S 150	100 m. w. **1**	S 150	600 m. w. **1**	S 200	600 m. w. **27**	S 150	3500 m. w. **1**
St. 3687	8.IV.29	St. 3729	14.VI.29	St. 3824	15.IX.29		
7°14′ N.	115°23′ E.	20°03.5′ N.	120°50′ E.	0°08′ S.	97°15′ E.		
S 150	600 m. w. **1**	S 200	600 m. w. **1**	S 200	300 m. w. **1**		

All the localities, where this characteristic and easily recognizable species was collected by the "Dana", are within the Malayan Archipelago; it was previously known only from the Gulf of Aden (VANHÖFFEN 1911) and near the Cape of Good Hope (KRAMP 1957 *a*). The specimen taken with 100 m wire out at St. 3686

[1] The description of *C. gara* was based on two specimens from "Dana" St. 6683, 23.VI.1947, 50°53′ N. 34°25′ W.. S 200, 100–50–25 m wire; they were 9 and 11 in height. In some additional material I found two more specimens of this species, collected by the "Dana" at St. 1349, 21.V.1922, 36°16′ N. 73°33′ W., S 200, 150 m wire, thus somewhat farther south in the Atlantic and nearer to the American coast; they are 15 and 16 mm in height of umbrella.

in the Sulu Sea is a young one, 3 mm high and 4 mm wide; the many specimens found at St. 3509, 600 m wire, in the Sunda Strait vary in size from 6 to 9 mm in height and from 5 to 12 mm in diameter. Some of the specimens are in very good condition. The specimen taken in a deep haul, with 3500 m wire, at St. 3828 west of Sumatra was undoubtedly caught at a higher level during the hauling in of the net.

Distribution: Malayan Archipelago; Gulf of Aden; Cape of Good Hope.

Calycopsis simulans (Bigelow).

Sibogita simulans Bigelow 1909 p. 213, Pl. 5 figs. 4, 5, Pl. 41 figs. 8, 9, Pl. 43 figs. 1, 2.
Calycopsis typa var. *simulans* Bigelow 1919 p. 292, Pl. 40 fig. 8, Pl. 41 fig. 1.
Calycopsis simulans Bigelow 1940 p. 293.
Calycopsis simulans Kramp 1959 *a* pp. 20–25.
Calycopsis simulans Kramp 1961 *a* p. 121.

"Dana"		Material:			
St. 3686	6.IV.29	St. 3844	11.X.29	St. 3947	4.I.30
8°34′ N.	119°55′ E.	12°05′ S.	96°45′ E.	4°21′ S.	42°56′ E.
E 300	4000 m. w. 1	S 200	600 m. w. 1	S 200	400 m. w. 1

Previously known from two localities in the eastern tropical Pacific and from the Philippines. Collected by the "Dana" near the original locality among the Philippines (St. 3686), in the Indian Ocean near the Cocos Islands (St. 3844), and off Mombasa in East Africa (St. 3947). The specimens recorded by Bigelow were taken partly near the surface, partly in vertical hauls; by the "Dana" it was taken in hauls with very different length of wire; it is difficult, therefore, to determine the normal vertical distribution of this species. It should be remarked, however, that all the localities are in immediate neighbourhood of the coasts.

The species is characterized by the possession of eight adradial centripetal canals, 12 large tentacles opposite to the canals, and occasionally some small tentacles between the canals; and this also applies to all the present specimens, though in one specimen, 14 mm high and 10 mm wide (St. 3947), there are almost as many small as large tentacles.

Distribution: Scattered localities in coastal waters in the tropical Pacific and Indian Oceans, from Central America to East Africa.

Calycopsis papillata Bigelow.

Calycopsis typa Vanhöffen 1912 p. 364.
Calycopsis papillata Bigelow 1918 p. 378, Pl. 2 figs. 1–7, Pl. 3 fig. 1.
Calycopsis papillata Kramp 1955 p. 252, Pl. 1 figs. 2, 3.
Calycopsis papillata Kramp 1959 *a* pp. 20, 25, fig. 138 a, b.
Calycopsis papillata Kramp 1961 *a* p. 120.

"Dana"		Material:	
St. 3929	18.XII.29	St. 3959	12.I.30
12°11′ S.	50°18′ E.	23°40′ S.	43°02′ E.
S 200	300 m. w. 1	S 200	200 m. w. 1

This species, which is known from several localities in the tropical Atlantic, has only once before been recorded from the Indian Ocean, somewhat east of Madagascar (Vanhöffen 1912), and this record has been regarded as doubtful, but it may have been reliable, since the "Dana" has taken two specimens in a neighbouring area, near the north point of Madagascar (St. 3929) and near the south-west coast of the same island (St. 3959); they were taken in hauls with 300 and 200 m wire respectively. The gelatinous papillae on the marginal lobes between the tentacles are distinct in both specimens. The specimen from St. 3959 is in excellent condition, 25 mm high and 19 mm wide, with 4 primary and 8 centripetal canals; the specimen from St. 3929 is 16 mm high and 12 mm wide, with 11 canals and 11 tentacles.

Distribution: Tropical Atlantic Ocean, from the west coast of Africa to the West Indies; western tropical part of the Indian Ocean.

Calycopsis chuni VANHÖFFEN.

Calycopsis typa VANHÖFFEN 1911 p. 214, Pl. 22 fig. 6.
Calycopsis chuni VANHÖFFEN 1911 p. 217, Pl. 22 fig. 8.
Calycopsis valdiviae HARTLAUB 1913 p. 360.
Calycopsis chuni KRAMP 1959 *a* pp. 23, 25, fig. 140.
Calycopsis chuni KRAMP 1961 *a* p. 119.

Material:

"Dana"

St. 3556	14.IX.28	St. 3739	2.VII.29	St. 3850	14.X.29
2°52′ N.	87°38′ W.	3°20′ N.	123°50′ E.	6°01′ S.	93°12′ E.
S 150	2000 m. w. 1	E 300	1000 m. w. 1	S 200	600 m. w. 1
				St. 3964	15.I.30
St. 3681	28.III.29	St. 3814	9.IX.29	25°19′ S.	36°13′ E.
0°29′ N.	125°54′ E.	4°38′ S.	99°24′ E.	S 150	2000 m. w. 1
S 150	600 m. w. 1	S 200	600 m. w. 1		
				"Galathea"	
				St. 551	14.XI.51
				Off Sydney, East-Australia	
St. 3731	16.VI.29	St. 3828	18.IX.29	33°42′ S.	151°51′ E.
14°37′ N.	119°52′ E.	1°53′ N.	96°07′ E.	TOT	1500 m. w. 1
E 300	600 m. w. 1	S 150	2000 m. w. 1		

It was a surprise to find this species so widely distributed in the Indian and Pacific oceans, since the only previous records outside the Atlantic were from the Gulf of Aden, the coast of Somaliland, and from the south coast of Africa. On a previous occasion (KRAMP 1959 *a*) I have shown that *C. valdiviae* HARTLAUB, which was erected as a new species to comprise the specimen from South Africa, erroneously referred to *C. typa* by VANHÖFFEN (1911), is identical with *C. chuni* VANHÖFFEN.

"Dana" St. 3556 is in the eastern Pacific between Panama and the Galapagos Islands, St. 3681–3850 in the Malayan Archipelago and west of Sumatra, St. 3964 in the Mozambique Channel near the east coast of Africa. Only one specimen was taken at each of these stations. A fine specimen was found off Sydney in Australia by the "Galathea". The depths of the hauls confirm the former statement that this medusa preferably occurs in deep and intermediate water layers.

The dimensions of the preserved specimens are as follows:

Length of wire, m	No. of station	Height of umbrella, mm	Diameter of umbrella, mm	Number of canals in peripheral part of umbrella
600.....	3681	13	9	16
600.....	3731	15	12	16
600.....	3850	22	15	16
600.....	3814	25	17	21
1000.....	3739	40	30	c. 24
2000.....	3828	c. 22	?	?
2000.....	3964	23	17	36
2000.....	3556	13	?	16
	"Galathea"			
1500.....	551	25	20	18

As seen from these figures no distinct connection between the size of the specimens and the depth at which they were collected can be pointed out.

In all specimens up to 22 mm in height the number of canals in the peripheral part of the umbrella is 16; they have 12–16 large tentacles and about the same number of very small or quite rudimentary tentacles; the rate of development of subsequent centripetal canals is variable, and the increase in size of the small and rudimentary tentacles proceeds very irregularly. The canals between the four perradial are distinctly

centripetal, issuing from the ring canal (in contradistinction to *Sibogita*, see below). In all the specimens almost all of the centripetal canals join the stomach or the upper parts of other canals; if they are particularly numerous, however, they may join each other at different levels, and form anastomoses.

The colours have usually faded away in the preserved specimens, but in the specimen from St. 3850 the stomach is brightly red, and in another specimen (St. 3964) it is a deep carmin.

Distribution: Scattered localities in warm parts of the oceans: eastern Pacific; East Australia; Malayan Archipelago; East and South Africa; off West Africa; West-Indies.

Sibogita geometrica MAAS.

Sibogita geometrica MAAS 1905 p. 17, Pl. 3 figs. 16–18.
Calycopsis geometrica BIGELOW 1918 p. 377.
Calycopsis geometrica BIGELOW 1919 p. 290, Pl. 40 figs. 5–7, Pl. 41 fig. 2.
Sibogita geometrica KRAMP 1959 *a* p. 28.
Sibogita geometrica occidentalis KRAMP 1959 *a* p. 28, Pl. 1 figs. 11, 12, Pl. 2 figs. 2, 3, textfigs. 4, 5.
Sibogita geometrica + *S. g. occidentalis* KRAMP 1961 *a* p. 124.

Material:

"Dana"					
St. 3684	3.IV.29	St. 3815	10.IX.29	St. 3917	5.XII.29
6°37′ N.	122°24′ E.	3°36′ S.	97°37′ E.	1°45′ N.	71°05′ E.
E 300	1000 m. w. **2**	S 200	300 m. w. **1**	E 300	4200 m. w. **1**
St. 3739	2.VII.29	St. 3847	11.X.29	St. 3927	17.XII.29
3°20′ N.	123°50′ E.	12°02′ S.	96°43′ E.	10°55′ S.	50°15′ E.
S 200	600 m. w. **1**	E 300	1500 m. w. **1**	S 200	600 m. w. **1**
St. 3804	30.VIII.29	St. 3915	3.XII.29	St. 3943	25.XII.29
9°09′ S.	114°47′ E.	3°14′ N.	75°21′ E.	5°30′ S.	40°40′ E.
S 200	600 m. w. **1**	S 200	600 m. w. **1**	S 200	500 m. w. **1**

These catches fill the gap between the two widely separated areas, from which this species had previously been recorded. It was originally described from Celebes (MAAS 1905), later on recorded from the Philippines (BIGELOW 1919). In 1959 I gave an account of three specimens found in the eastern Atlantic, east of the Azores (collected by the "Dana" in 1922) and in the Bay of Biscay (collected by the "Discovery II"), but I described them as belonging to a new subspecies, *occidentalis*. In the present material, comprising as many as ten specimens, this Atlantic form is connected with the typical form from Celebes and the Philippines by such transitional forms that the differences, which I thought I saw, may only be due to individual variation.

Stk. 3684 and 3739 are in the Celebes Sea, St. 3804 south of Bali, St. 3815 and 3847 between Sumatra and the Cocos Islands, St. 3915 and 3917 east and west of the Maldive Islands, St. 3927 near the north point of Madagascar, and St. 3943 off Mombasa in East Africa. The species thus seems to be generally distributed in the Indo-Malayan waters and the tropical Indian Ocean.

The medusae were collected with very different lengths of wire; the specimen taken with only 300 wire out (St. 3815) is small, 8 mm high and wide; the five specimens from the hauls with (500–) 600 m wire vary in size from 10 to 30 mm in height, and the specimens from the two deepest hauls (with 1500 and 4200 m wire) are 24 and 25 mm high, 18 and 20 mm in diameter. Two of the Atlantic specimens mentioned above were taken by the "Dana" in horizontal hauls with 600 and 1000 m wire out; the other specimens mentioned in the literature were collected in vertical hauls. Presumably, the species mainly belongs to intermediate water layers.

In my paper from 1959 I re-established the genus *Sibogita* as distinct from *Calycopsis*. The genus *Calycopsis* is characterized by the possession of four primary radial canals and a varying number of centripetal canals issuing from the ring canal; they may or may not fuse with the cruciform base of the stomach or with the radial canals. In *Sibogita*, on the other hand, the radial canals branch repeatedly at various levels, and there are no centripetal canals.

The rate of development of the canals seems to proceed rather irregularly, as seen from the following figures:

	"Dana", Indo-Pacific specimens								Kramp 1959			Maas 1905	Bigelow 1919
height of umbrella, mm	8	10	15	18	21	24	25	30	26	30	32	38	?
number of canals joining ring canal..	20	16	32	21	18	24	22	28	35	43	34	38	22

The latest developed branches of the canals are generally narrower than the others.

The branches issue at different distances from the stomach. One of the features, by which I characterized the Atlantic specimens as belonging to a distinct subspecies, was the branching of the canals: "In the Malayan specimens the four primary radial canals run straight from the manubrium to the umbrella margin sending out lateral branches towards both sides, the branches giving rise to other lateral branches of second and third order; in the Atlantic specimens the four primary radial canals are much reduced, and immediately outside the corners of the stomach they are divided into diverging branches which further down are dichotomously branched." (Kramp 1959 *a* p. 30). In the present larger collection, however, this difference is effaced. As a rule, the first lateral branches leave the primary radial canals in close vicinity to the stomach, but in one and the same invidual one or two of the radial canals proceed more or less downwards, before a lateral branch appears, and the further branching may be more or less irregular, sometimes resembling the features in the Malayan specimens of Maas and Bigelow, sometimes more like the Atlantic specimens.

The number and rate of development of large marginal tentacles opposite to the terminal ends of the canals, and small or quite rudimentary tentacles in the spaces between the canals, is likewise very variable and presents no reliable difference between Atlantic and Indo-Pacific specimens. The subspecies *occidentalis* should therefore be deleted.

Distribution: Malayan Archipelago and tropical Indian Ocean; Bay of Biscay and near the Azores in the Atlantic Ocean.

Fam. **Tiarannidae.**

Chromatonema erythrogonon (Bigelow).

Ptychogena erythrogonon Bigelow 1909 p. 150, Pl. 5 fig. 1, Pl. 38 figs. 8, 9, Pl. 39 figs. 1–7.
Chromatonema erythrogonon Kramp 1919 pp. 13–15.
Chromatonema erythrogonon Bigelow 1940 p. 297, fig. 13.
Chromatonema erythrogonon Kramp 1961 *a* p. 128.

Material:

"Dana" St. 3550. 4–5.IX.28. 7°10′ N. 78°15′ W. 600 m. w., 1 specimen, 1000 m. w.; 1 specimen.

The two specimens are rather mutilated, but have retained parts of the stomach with crenulated oral lips and four radial lobes which, however, are badly mutilated so that the structure of the gonads is indiscernible; there are several marginal tentacles, but the cordyli are lost. By comparison with Atlantic specimens of *Chromatonema rubrum* I feel convinced that the present specimens belong to the same genus. They are about 11 and 17 mm in diameter, with fairly thick jelly. In the largest specimen the number of tentacles in one quadrant amounts to eight; the total number, therefore, presumably was about 32, which corresponds to the number counted in specimens of *C. erythrogonon* of similar size, which is about twice as many as in the Atlantic species *C. rubrum*. Provisionally, therefore, I am inclined to retain *C. erythrogonon* as a separate species belonging to Pacific waters. The stomach and tentacle bulbs of the present specimens have a deep reddish-brown colour.

"Dana" St. 3550 is in the Gulf of Panama, thus within the same area, from which the species was recorded by Bigelow.

Distribution: Eastern tropical Pacific from the Gulf of California to the Gulf of Panama and off Peru, in intermediate layers of water.

II. Leptomedusae.

Fam. **Dipleurosomatidae.**

Dipleurosoma pacificum AGASSIZ & MAYER.

Dipleurosoma pacifica AGASSIZ & MAYER 1902 p. 148, Pl. 3 figs. 13, 14.
Dipleurosoma pacifica MAYER 1910 p. 225, fig. 118.
Dipleurosoma pacificum KRAMP 1961 *a* p. 134.

Material:

"Dana" St. 3576, 17.X.28, 17°35.5′ S. 149°43.6′ W. S 150, 600 m. w. 1 specimen.

The locality is near the Tahiti Islands, very near the locality, from which the species was first described, and this is the first time that it has been refound. The specimen is in a rather poor condition, but though it does not quite agree on certain points with the original description (which was based on one single individual), I feel convinced that it belongs to the same species, while it differs considerably from the other species of the genus, all of which occur in Atlantic waters only.

The original specimen was 23 mm wide, with about 100 tentacles; the present specimen likewise has about 100 tentacles, but it is only 7 mm wide, flat and thin. The surface of the exumbrella is not reticulated, as mentioned in the original description. The stomach has disappeared, but the radial canals are fairly well preserved. There are four primary radial canals; two of them are undivided and placed at right angles to each other; the third canal runs straight to the umbrella margin, but gives rise to a lateral branch; the fourth of the primary canals is divided twice into four diverging branches, all communicating with the ring canal. The gonads, which are more or less mutilated, are wavy bands extending along the greater part of the radial canals with their branches. The number of marginal tentacles is estimated at 100, most of them broken near their bases; if ocelli have been present (as described in the type specimen), they have faded away; "slender club-shaped bodies scattered between the tentacles" are seen, but they are only remnants of mutilated tentacles. The tentacle bulbs are hollow, and further out in the tentacles the endoderm consists of large, vacuolated cells, but they are not arranged in a single "chordate" row as described in the type specimen.

All these disagreements may be deceptive, and the present specimen most probably belongs to the same species as that, which was described from the same locality by AGASSIZ and MAYER.

Distribution: Tahiti Islands.

Fam. **Melicertidae.**

Netocertoides brachiatus MAYER.

Netocertoides brachiatum MAYER 1900 *b* p. 45, Pl. 18 figs. 43, 44.
Netocertoides brachiatum MAYER 1910 p. 229, Pl. 27 figs. 4–6.
Netocertoides brachiatus KRAMP 1961 *a* p. 137.

Material:

"Dana"

St. 3715 22.V.29
18°18′ N. 119°36′ W.
S 150 300 m. w. **32**

St. 3729 14.VI.29
20°03.5′ N. 120°50′ E.
S 200 300 m. w. **1**

St. 3731 16.VI.29
14°37′ N. 119°52′ W.
S 200 100 m. w. **3**

St. 3934 20–21.XII.29
11°24′ S. 50°05′ E.
S 200 500 m. w. **2**

St. 3936 22.XII.29
10°28′ S. 47°30′ E.
S 200 400 m. w. **1**

St. 3942 25.XII.20
6°47′ S. 41°27′ E.
S 200 400 m. w. **2**

St. 3948 6.I.30
10°11′ S. 41°57′ E.
S 200 200 m. w. **2**
S 200 500 m. w. **1**

St. 3950 7.I.30
12°23′ S. 41°43.5′ E.
S 200 500 m. w. **1**

St. 3952 8.I.30
15°05′ S. 41°53′ E.
S 200 200 m. w. **1**
S 200 500 m. w. **2**

St. 3953 8.I.30
16°12′ S. 42°04′ E.
S 200 500 m. w. **4**

St. 3954 9.I.30
16°53′ S. 42°12′ E.
S 200 300 m. w. **3**

St. 3955 9.I.30
18°30′ S. 42°18′ E.
S 200 500 m. w. **5**

St. 3957 11.I.30
21°30′ S. 43°32′ E.
S 200 300 m. w. **4**

The three first localities are east, west and north of the Philippines, the others are north and west of Madagascar. The condition of the specimens does not allow a morphological examination; they agree very well with the description given by MAYER; the tentacles opposite to the radial canals are, however, not conspicuously larger than the others. The species was first described from Florida and the Bahamas, and this is the first record from Indo-Pacific waters.

Distribution: Florida and the Bahamas; surroundings of Madagascar and the Philippines.

Orchistomella applanata KRAMP.

Orchistomella applanata KRAMP 1959 *c* p. 241, fig. 12.

Material:

"Galathea" St. 414. 16–19.VII.51. Dinagat, Philippines, 10°20′ N. 125°32′ E. Depth 40 m. SN 50. 1 specimen.

The description of this species was based on a single individual found in the same locality, from which another specimen has now been secured. The type specimen was 1.5 mm in diameter, the present one is slightly larger, being 2 mm wide. Opposite to the eight radial canals are 6 fully developed tentacles and two large tentacular bulbs; in the spaces between the radial canals there are 16 young marginal bulbs, eight of which are quite minute, the eight others somewhat larger. No gonads are visible. The apex of the umbrella is flat as in the type specimen, and also in the present specimen a gelatinous plug extends downwards into the centre of the stomach; this structure thus really seems to be characteristic of the species. The specimen differs from the type only in the stomach and mouth tube being somewhat shorter.

As briefly mentioned in the Addenda to my Synopsis (KRAMP 1961 *a* p. 444) Dr. J. PICARD, in a letter, accepts the species and the new genus *Orchistomella* erected for this medusa and for two species, *tentaculata* MAYER and *graeffei* NEPPI & STIASNY, formerly referred to the doubtful genus *Orchistoma*. Dr. PICARD, however, regards these two latter species as young specimens of *Aequorea*, so that *O. applanata* becomes the type and only species of the genus *Orchistomella*.

Distribution: Philippines.

Fam. **Laodiceidae.**

Laodicea indica BROWNE.

Laodice indica BROWNE 1905 *b* p. 136, Pl. 1 fig. 5, Pl. 4 figs. 7–11.
Laodice fijiana var. *indica* MAAS 1905 p. 25, Pl. 2 figs. 14, 15, Pl. 5 figs. 32–35.
Laodice fijiana MAAS 1906 *a* p. 89.
Laodice maasi BROWNE 1907 p. 266.
Laodice maasi VANHÖFFEN 1911 p. 221, textfig. 14.
Laodicia fijiana MAYER 1915 p. 200.
Laodicea undulata var. *indica* NAIR 1951 p. 59.
Laodicea indica KRAMP 1953 p. 268.
Laodicea indica KRAMP 1958 p. 343.
Laodicea indica KRAMP 1961 *a* p. 140.
Laodicea indica KRAMP 1961 *b* p. 198.
Laodicea indica KRAMP 1962 *a* p. 317.

"Dana" Material:

St. 3576	17.X.28	St. 3593	10.XI.28	St. 3611	26.XI.28	St. 3626	13.XII.28
17°36.5′ S.	149°43.6′ W.	17°27′ S.	179°33′ E.	20°53.2′ S.	164°03.3′ E.	27°00′ S.	177°41′ W.
S 150	1000 m. w. **3**	S 150	300 m. w. **1**	S 150	50 m. w. **1**	S 200	100 m. w. **1**
				P 100	1000 m. w. **1**		

St. 3657 31.I.29
33°17′ S. 152°45′ E.
S 150 100 m. w. 1

St. 3664 24.II.29
31°42.5′ S. 156°09′ E.
S 150 100 m. w. 1

St. 3678 24.III.29
4°05′ S. 128°16′ E.
S 150 300 m. w. 1

St. 3683 2.IV.29
4°03, N. 123°26′ E.
S 150 4000 m. w. 1

St. 3684 3.IV.29
6°37′ N. 122°24′ E.
S 150 50 m. w. 2

St. 3685 5.IV.29
7°22′ N. 121°16′ E.
S 150 100 m. w. 2
S 150 3000 m. w. 1

St. 3714 20.V.29
15°22′ N. 115°20′ E.
S 150 100 m. w. 3

St. 3722 29.V.29
25°11′ N. 122°35′ E.
S 200 50 m. w. 1

St. 3723 30.V.29
25°30.5′ N. 125°28′ E.
S 200 50 m. w. 5
S 200 100 m. w. 4
S 200 300 m. w. 6
S 200 600 m. w. 19

St. 3731 16.VI.29
14°37′ N. 119°52′ E.
S 200 50 m. w. 1

St. 3748 10.VII.29
3°48′ N. 133°35′ E.
S 200 150 m. w. 1

St. 3800 18.VIII.29
7°53′ S. 116°18′ E.
S 200 300 m. w. 1
S 200 600 m. w. 1

St. 3809 4.IX.29
6°22′ S. 105°12′ E.
S 200 300 m. w. 1

St. 3814 9.IX.29
4°38′ S. 99°24′ E.
S 200 50 m. w. 12
S 200 100 m. w. 11
S 200 300 m. w. 3

St. 3817 11.IX.29
2°15′ S. 98°55.5′ E.
S 200 100 m. w. 3
S 200 200 m. w. 2
S 200 300 m. w. 2

St. 3821 14.IX.29
0°51.5′ S. 99°24.5′ E.
S 200 100 m. w. 1
S 200 600 m. w. 3

St. 3824 15.IX.29
0°08′ S. 97°15′ E.
S 200 300 m. w. 2

St. 3844 11.X.29
12°05′ S. 96°45′ E.
S 200 600 m. w. 1

St. 3851 15.X.29
5°27′ S. 93°50′ E.
S 200 600 m. w. 2

St. 3860 20.X.29
2°57′ S. 99°36′ E.
S 200 50 m. w. 1
S 200 600 m. w. 1

St. 3893 6.XI.29
5°59′ N. 92°29′ E.
S 200 600 m. w. 1

St. 3931 19.XII.29
12°09′ S. 49°34′ E.
S 200 600 m. w. 1

St. 3932 20.XII.29
11°35′ S. 49°45′ E.
S 200 600 m. w. 1

St. 3937 22.XII.29
9°26′ S. 46°05′ E.
S 200 400 m. w. 1

St. 3946 3.I.30
3°26′ S. 42°58′ E.
S 200 100 m. w. 2
S 200 600 m. w. 1

St. 3958 11.I.30
23°11′ S. 42°54′ E.
S 200 500 m. w. 1

St. 3972 30.I.30
36°09′ S. 21°52′ E.
S 200 50 m. w. 1

"Pacific"
St. 4815 10.I.35
15°55′ N. 112°55′ E.
S 150 201 m. w. 1

"Galathea"
St. 286 20.IV.51
Ceylon
7°50′ N. 81°43′ E.
SN 50 20 m. w. 2

St. 399 21.VI.51
N.E. of Singapore
1°46′ N. 104°25′ E.
SN 50, near surface 1

St. 425 29–30.VII.51
Bucas Grande Island
9°40′ N. 125°55′ E.
SN 50 16 m. w. 1

St. 446 18–19.VIII.51
Basilan Island, Philippines
6°42′ N. 121°58′ E.
SN 50, near surface 8

St. 512 7.X.51
Solomon Islands
9°25′ S. 160°00′ E.
SN 50 10 m. w. 3

St. 536 4.XI.51
N.E. Australia
22°07′ S. 153°55′ E.
SN 50 3

Dr. Th. Mortensen
Puerto Galero 1.II.14
Surface 1

2.5 miles E. by S. of Zamboanga, Philippines 3.III.14
Near bottom, depth about 375 m 1

S.E. Australia 17.IX.14
38°21′ S. 149°36′ E.
Ringtrawl, 1000 m. w. 1

On several occasions I have discussed the affinites of this medusa, and I am still of the opinion that *Laodicea indica* Browne is a distinct species different from the Atlantic species *L. undulata*, especially since I saw living specimens while on board the "Galathea"; I also maintain that *L. maasi* Browne is identical with *L. indica*.

The adult medusa is more than 20 mm in diameter (some of the present specimens from the "Dana" collection even up to 27 mm), but the development of the gonads may be far advanced in much younger stages; the two specimens taken at "Galathea" St. 286 were 3 and 3.5 mm wide, one male and one female, and both had fully mature gonads. Well-developed gonads were also seen in a specimen, 7 mm wide, from St. 399, whereas the gonads were faintly developed in another specimen of similar size (St. 425); among the eight specimens taken at St. 446, 2–5 mm wide, gonads were more or less distinctly seen, except in the

smallest individual. In such small specimens the tentacles are provided with a basal, abaxial spur (see KRAMP 1962 *a* p. 318). One of the specimens 7 mm wide ("Galathea" St. 425) had about 90 tentacles, the other (St. 399) about 125; a distinct black ocellus was seen almost on every second tentacle, cordyli were almost regularly alternating with the tentacles, and a few marginal cirri could be discerned in some of these specimens when examined in living condition. Many of the specimens collected by the "Dana" were measured, but owing to the poor state of preservation I have not tried to count their tentacles. Measurements of the diameter, however, have given interesting results, which are discussed below.

The present material shows that *L. indica* is generally distributed in the coastal waters of the warm parts of the Indo-West-Pacific Region. It was previously recorded from N.E. Australia, several localities in the Malayan Archipelago, the Nicobars, Ceylon, southern India, and from the Gulf of Aden. Most of the localities, where it was collected by the "Dana" and the "Galathea", are in the Malayan Archipelago, extending northwards to Formosa, but it was also taken along the entire east coast of Australia and in several localities among the Melanesian and Polynesian Islands, as far east as Tahiti ("Dana" St. 3576); it was found at many stations west and south-west of Sumatra and off the east and south coast of Africa.

Vertical distribution. Immediately at the surface it was taken only a few times by the "Galathea", and by Dr. TH. MORTENSEN. Specimens taken in very deep hauls, with 1000–4000 m wire out, were presumably caught at higher levels during the hauling in of the nets. On the other hand, though the medusa was mainly taken in hauls with 50–300 m wire, it is evidently not rare somewhat deeper down. The comparatively great number taken in hauls with 600 m wire was mainly obtained in one haul (St. 3723, east of Formosa, 19 specimens); at this station the hauls through the upper layers (with 50, 100 and 300 m wire) contained much smaller numbers. We may state that the vertical distribution of *L. indica* normally comprises at least the upper 300–400 metres of water, and measurements of the specimens show that it is mainly the older individuals which sink into deeper layers, as seen from the following table:

m wire out	Diameter of specimens, mm	
	width of variation	average
50.....	3– 5	4.4
100.....	2–10	5.0
300.....	3–18	7.0
600.....	2–27	12.3

Small individuals were found at all depths, large specimens, more than 20 mm wide, only in hauls with 600 m wire, and the maximal as well as the average size increased evenly with the depth below the surface of the water.

Distribution: Coastal waters in the warm parts of the Indo-West-Pacific Region, from the east coast of Africa to Tahiti in Polynesia.

Melicertissa sp., juv.

Material:

"Galathea" St. 328. 11.V.51. Malacca Strait, 1°35′ N. 103°01′ E. Depth 20 m. SN 50, surface. 1 specimen.

The specimen is 2 mm wide, and as broad as high. The stomach is broadly attached to the subumbrella, without a central star-shaped figure; eight oral lips are faintly indicated; gonads small, oval, in the proximal parts of the eight radial canals. There are 7 fully developed marginal tentacles and 5 tentacular bulbs, all with a basal black ocellus; moreover, there are 10 club-shaped cordyli, each with a distal cluster of nematocysts.

On a previous occasion (KRAMP 1961 *b* pp. 198 ff.) I have described a new species of *Melicertissa* (*M. occidentalis*) and discussed this genus and its species, with the following remark: "Examination of a greater number of specimens may reveal a variability which makes it necessary to regard them all as local forms

of one species, *M. clavigera*". The present young specimen does not contribute to a solution of the problem of the limitation of the species, but rather complicates the matter. Dr. J. PICARD found that *M. adriatica* Neppi is identical with *Octogonade mediterranea* Zoja, which belongs to the Mitrocomidae. The other species may be arranged according to their number of tentacles as follows:

Species	Diam. mm	No. of tentacles	No. of cordyli	Distribution
clavigera HAECKEL ...	10	8	24	Canary Islands, India
platygastra NAIR	7	8	40	India
"Galathea".....	2	12	10	Malacca Strait
mayeri KRAMP[1])	7	16	16	Florida
orientalis KRAMP.....	11	17	c. 32	Australia
malaica MAAS	32	160	irreg.	Malayan Archipelago

[1] new name for *M. clavigera* from Florida in MAYER 1910.

None of the species has been observed in any great number of specimens, and they are recorded from widely separated geographical areas. *M. malaica* is at once distinguishable by its large size and great number of tentacles. The numerical differences between the other species might possibly be due partly to stage of development of the individuals described, partly to geographical speciation. There are, however, certain structural features, which seem to characterize some of the species. The only species which has long and lanceolate oral lips is *M. platygastra*; it also has a particularly great number of cordyli (NAIR 1951 p. 60, Pl. 1 figs. 16, 17). A star-shaped figure in the centre of the aboral wall of the stomach is very pronounced in *M. orientalis* (KRAMP 1961 *b* p. 198, figs. 1, 2) and also seems to be present in *M. clavigera*, but apparently not in *M. mayeri* and *platygastra*; in the present specimen the stomach is attached to the subumbrella by its entire aboral wall. Oral lips are only faintly indicated in this specimen as also in *M. clavigera*. Nematocysts in the cordyli are apparently absent in *M. clavigera* and *mayeri*, but are present in *M. occidentalis* as well as in the present specimen. The proximal position of the gonads in this specimen may be due to its young stage of development; in all the other species (except *M. malaica*) the gonads occupy the middle portion of the radial canals.

Therefore I do not venture to refer this young medusa to any one of the species hitherto described.

Staurodiscus tetrastaurus HAECKEL.

Staurodiscus tetrastaurus MAYER 1910 p. 214, Pl. 22 figs. 7, 8, Pl. 25 fig. 5, Pl. 26 figs. 10, 11.
Staurodiscus tetrastaurus MENON 1932 p. 14, Pl. 2 figs. 14, 19.
Staurodiscus tetrastaurus NAIR 1951 p. 60.
Staurodiscus tetrastaurus GANAPATI & NAGABHUSHANAM 1958 pp. 92, 94.
Staurodiscus tetrastaurus KRAMP 1961 *a* p. 148.

Material:

"Galathea" St. 338. 19.V.51. Off Singapore. SN 50, 15 m wire. 1 specimen.

The specimen is 2 mm in diameter and typical in every respect, though it has not attained its full number of tentacles and cordyli. There are 4 perradial tentacles with very large basal bulbs, 4 interradial young tentacles, and 8 large adradial cordyli. All tentacles and cordyli with ocelli. This medusa may be up to 6 mm wide. It was originally described from the Canary Islands, later on recorded from the Tortugas, Florida (MAYER 1910) and from three localities on the coasts of India: Trivandrum Coast (NAIR), Madras (MENON) and the Vizagapatam Coast (GANAPATI & NAGABHUAHANAM). Now also found near Singapore.

Distribution: Scattered localities in tropical coastal waters in the Atlantic and Indian oceans.

Staurodiscus gotoi (Uchida).

Staurodiscoides gotoi Uchida 1927 *c* pp. 165–168, figs. 1–2.
Staurodiscus gotoi Kramp 1961 *a* p. 147.

Material:

"Dana" St. 3809, Sunda Strait between Java and Sumatra, 6°22′ S. 105°12′ E. S 200, 100 m wire. 1 specimen.

The refind of this interesting medusa makes it possible to confirm every detail in the description given by Uchida (1927 *c*). This description was based on a single individual, collected at Shimizu Bay in Japan; it was slightly larger than the present specimen, being 25 mm wide and with a somewhat greater number of cordyli (88); in all structural details the specimen from Sunda Strait agrees with the type specimen. It is 20 mm wide and 12 mm high, the stomach is narrow, 8 mm long. Each of the four primary radial canals carries two pairs of lateral branches, one of them with a trace of a third branch; the lateral branches are placed opposite to each other. The gonads form continuous, folded bands along the primary radial canals and their branches, from their points of origin almost to their terminal ends. It is of particular interest to state that none of the lateral branches of the canals communicate with the ring canal, exactly as described by Uchida and further confirmed by him in a letter to the present author. There are eight hollow marginal tentacles, and as in the type specimen two opposite perradial tentacles are considerably larger than all the others, but the eight smaller tentacles are almost equal in size. There are 64 club-shaped cordyli, eight between every successive pair of tentacles, each of the cordyli situated on a prominent wart-like protuberance. Ocelli cannot be seen, they probably disappeared due to the preservation in formalin for many years.

I have previously described another species, *S. vietnamensis* (Kramp 1962 *a* p. 319, fig. 6), which was very similar to *S. gotoi*, though with a greater number of tentacles (12 fully developed and 4 young bulbs) and a smaller number of cordyli (about 48), but it is of more importance that the distal ends of the canal-branches communicated with the ring canal. Now that I have been able to compare that species with an undoubted specimen of *S. gotoi*, I think that *S. vietnamensis* should be retained as a separate species.

Distribution: Japan; Sunda Strait in the Malayan Archipelago.

Toxorchis polynema Kramp.

Toxorchis polynema Kramp 1959 *a* p. 34, Pl. 1 fig. 13, Pl. 2 fig. 4.
Toxorchis polynema Kramp 1959 *c* p. 242.
Toxorchis polynema Kramp 1961 *a* p. 150.

"Dana" Material:

St. 3578 20.X.28
20°19′ S. 157°20′ W.
S 150 50 m. w. **2**

St. 3579 23.X.28
20°56′ S. 160°03′ W.
S 150 100 m. w. **1**

St. 3591 8.XI.28
15°03′ S. 175°30′ W.
S 150 300 m. w. **1**

St. 3642 9.I.29
46°43′ S. 176°08.5′ E.
S 150 1500 m. w. **2**

St. 3644 11.I.29
44°40′ S. 173°39′ E.
S 150 300 m. w. **2**

St. 3690 10.IV.29
8°02′ N. 109°36.5′ E.
S 150 300 m. w. **1**

St. 3809 4.IX.29
6°22′ S. 105°12′ E.
S 200 300 m. w. **1**

St. 3847 11.X.29
12°02′ S. 96°43′ E.
S 150 3000 m. w. **2**

St. 3860 20.X.29
2°57′ S. 99°36′ E.
S 200 600 m. w. **1**

St. 3906 20.XI.29
4°26.5′ N. 85°21′ E.
S 200 300 m. w. **23**
S 200 400 m. w. **1**
S 200 600 m. w. **1**

St. 3912 24.XI.29
6°52′ N. 79°30′ E.
S 200 300 m. w. **1**

St. 3914 2.XII.29
4°52′ N. 77°08′ E.
S 200 300 m. w. **1**

St. 3915 3.XII.29
3°14′ N. 75°21′ E.
S 200 300 m. w. **1**

St. 3917 5.XII.29
1°45′ N. 71°05′ E.
S 150 3700 m. w. **2**

St. 3934 20–21.XII.29
11°24′ S. 50°05′ E.
S 200 600 m. w. **1**

St. 3948 6.I.30
10°11′ S. 41°57′ E.
S 200 500 m. w. **2**

St. 3952 8.I.30
15°05′ S. 41°53′ E.
S 200 500 m. w. **1**

This is another example of a species, which is more widely distributed than known before; it was originally described from the eastern Atlantic, off Angola on the west coast of Africa, and then recorded from the Nicobar Islands in the Indian Ocean. It was collected by the "Dana" near the Society Islands in Polynesia (St. 3578 and 3579), near Samoa (St. 3591) and off the east coast of New Zealand (St. 3642 and 3644). St. 3690 is in the South China Sea, St. 3809 in the Sunda Strait between Java and Sumatra, St. 3847 near the Cocos Islands, St. 3860 off the west coast of Sumatra. Also taken S.E. (St. 3906) and S.W. of Ceylon (St. 3912–3917), near the north point of Madagascar (St. 3934) and off Zanzibar (St. 3948 and 3952). Thus this characteristic species is widely distributed in the coastal waters of the Indo-West-Pacific Region. Two specimens were taken near the Nicobar Islands by the "Galathea" (St. 318); they are described in a previous paper (KRAMP 1959 *c* p. 242–243).

The medusa does not seem to be common anywhere within the extensive area of its distribution, only one or two specimens being caught in a single haul, except at St. 3906, south-east of Ceylon, where 23 specimens were taken in the haul with 300 m wire. The specimens taken in hauls with 1500–3700 m wire (St. 3642, 3847 and 3917) were undoubtedly caught at higher levels during the hauling in of the nets; the other specimens were collected in hauls with 50–600 m wire out, mainly with 300 m wire; there is no distinct difference in size of the individuals from different depths. The majority of the specimens are less than 20 mm in diameter, but some are considerably larger, up to 30 mm wide; in some of the best preserved of these large specimens I have counted the following numbers of tentacles (approximately):

Diameter of umbrella, mm.....	23	24	25	26	28	30	30	30
Approximate number of tentacles.	245	275	280	350	340	320	350	380

The number of radial canals running to the ring canal is almost always 16 (4×4), but occasionally a fifth branch issues from one or two of the four groups of four canals.

Distribution: Off the tropical west coast of Africa; coastal waters in the Indo-West-Pacific Region from East Africa eastwards to the Polynesian Islands.

Fam. **Mitrocomidae.**

Mitrocomella grandis n. sp.

Material:

South Africa, without further details, 1 specimen, *legit* O. CARLGREN.

This medusa was given to me by Professor O. CARLGREN (Lund in Sweden) on his return from South Africa in 1937. The specimen is in a fairly good condition.

Description (figs. 2–3): Umbrella watchglass-shaped, 50 mm in diameter, gelatinous substance thin in pheripheral part, but the central part is very thick, almost forming a peduncle, 20 mm broad and 10 mm high. Velum fairly broad. Stomach cruciform, with four perradial, funnel-shaped, fairly narrow extensions, its perradial diameter 9 mm, the interradial 5 mm; mouth with four large, pointed lips, mouth rim densely crenulated. Gonads linear, along greater part of the radial canals (considerably shrunk in the present specimen). Radial canals and ring canal narrow. About 220 marginal tentacles, all alike, with long, tapering bulbs; between adjacent tentacles 5–8 cirri, which may coil spirally, about as long as the tentacle bulbs or somewhat longer; older cirri issue from the exumbrella at a short distance from the margin, but never above the ring canal. The open marginal vesicles are broad, 16 in number.

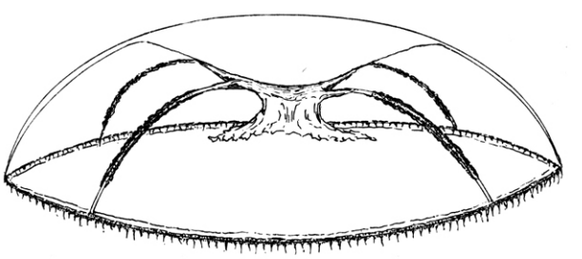


Fig. 2. *Mitrocomella grandis* n. sp.

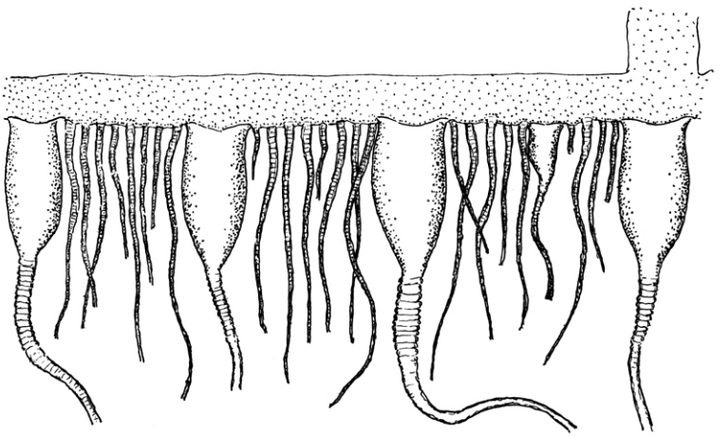


Fig. 3. *Mitrocomella grandis* n. sp. Part of bell margin with tentacles and cirri.

In most details this medusa is similar to *Mitrocomella polydiademata* (ROMANES); nevertheless it must be described as a new species, owing to its considerable size and great number of tentacles. *M. polydiademata* occurs in coastal waters of north-western Europe and adjacent arctic waters (Barents Sea and Kara Sea), Gulf of Maine on the American coast, and the west coast of Greenland; adult specimens are usually 12–22 mm wide, exceptionally 30 mm, European specimens with 36–48 tentacles, American specimens with up to 64. A medusa 50 mm wide and with 220 tentacles could hardly be referred to that species. *M. grandis* might also be compared with the antarctic species *M. frigida*, which has been found in a neighbouring locality, west of the Cape of Good Hope, but that is also a much smaller species, 13–17 mm wide, with 32–72 tentacles; I have seen most of the available specimens (KRAMP 1932 p. 345, 1948 p. 4, 1957 *a* p. 30) and stated that it has only eight marginal vesicles.

Tiaropsis sp., juv.

Material:

"Galathea" St. 482. 12.IX.51. Bali, anchorage, 8°46′ S. 115°14′ E. Depth 30 m. SN 50, 16 m wire. 1 specimen.

The specimen is a young stage, 1 mm in diameter, 1.2 mm in height, with a large, swollen stomach; no gonads; four large and four small tentacles; eight marginal vesicles, each with a black ocellus. The specimen is too young for identification.

Tiaropsidium japonicum KRAMP.

Tiaropsidium japonicum KRAMP 1932 p. 370, figs. 1, 24, 36, Pl. 10 figs. 1–2.

Material:

"Galathea" St. 629. 24.I.52. East of Cook Strait, 41°46′ S. 175°48′ E. TOT 1700 m wire. 1 specimen.

The specimen is 34 mm wide, 16 mm high, watchglass-shaped; stomach square, 8 mm in diameter, with a short mouth-tube; mouth-rim with turned-up edge, smooth. Gonads male, along the four radial canals, 2 mm from the stomach to about 3 mm from the ring canal. The umbrella margin is badly mutilated; only scanty remnants of the large tentacles are left, and some small tentaculae, tenon-like, as characteristic of the genus *Tiaropsidium*. Five marginal vesicles are retained, typical, each with a black ocellus; two of the marginal vesicles are rather close together, indicating that the number has been more than eight, presumably 16; this induces me to refer the specimen to *T. japonicum*, which is characterized by the possession of 16 marginal vesicles in contradistinction to all the other species of the genus. The specimen might also be compared with the Californian species *T. kelsey* TORREY which, however, has only 8 marginal vesicles and is also characterized by curtain-like gonads. The number of tentaculae in the present specimen cannot be determined, but apparently they have not been situated as close together as in *T. kelsey*.

Distribution: Japan; Cook Strait.

Tiaropsidium roseum (Maas).

Tiaropsis rosea Maas 1905 p. 30, Pl. 7 figs. 45–47.
Tiaropsis rosea Browne 1916 p. 186.
Tiaropsidium roseum Kramp 1932 p. 368, figs. 2, 50.
Tiaropsidium roseum Kramp 1958 p. 343.
Tiaropsidium roseum Kramp 1961 *a* p. 159.

Material:

"Dana" St. 3663. 23.II.29. Off Sydney, 33°33′ S. 154°04′ E. S 150, 3000 m. wire. 1 specimen.

The specimen is 7 mm wide, badly preserved but showing the characteristic features of the species, with four perradial tentacles, a number of tentaculae, and eight marginal vesicles with ocelli.

Previously recorded from Damar in the Banda Sea (Maas 1905), the Nicobars (Kramp 1958) and Mauritius in the western part of the Indian Ocean. The medusae, recorded from the Tortugas, Florida by Mayer (1910 p. 260, Pl. 31 figs. 1–4, as *Tiaropsis rosea*) are evidently young specimens of a *Tiaropsis*, and do not belong to the genus *Tiaropsidium*. The previous records are from the surface layers, and the present specimen, taken in a haul with 3000 m wire out, was most probably caught during the hauling in of the net.

Distribution: Scattered localities in the Indo-West-Pacific Region.

Tiaropsidium polyradiatum n. sp.

Material:

"Dana" St. 3893. 6.XI.29. Nicobars, 5°59′ N. 92°29′ E. S 200, 800 m wire. 1 specimen.

The specimen is badly damaged, but the presence of marginal vesicles with ocelli and small, tenon-like tentaculae between the large tentacles places it in the genus *Tiaropsidium*. It differs from all other species of this genus by possessing a much greater number of radial canals, presumably 16, while four is the number found in the species described up to now.

Description (fig. 4): Umbrella thin and flat, about 30 mm in diameter. Stomach fairly broad, mouth with folded and crenulated lips. Only four radial canals are fully retained, and their position indicates that the complete number has been about 16. Traces of female gonads are seen along the entire length of the radial canals. Apparently there have been about 24–32 large tentacles, each with a longitudinal furrow as seen in other species of the genus. Between the tentacles are several small, tenon-like tentaculae and some marginal vesicles, each with a basal, black ocellus; their position shows that their number has been more than eight.

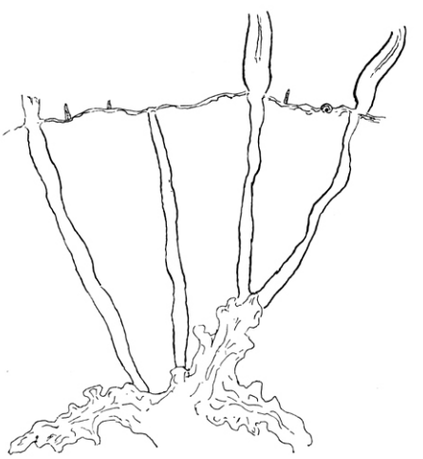


Fig. 4. *Tiaropsidium polyradiatum* n. sp. Portion of the medusa, oral view, showing stomach, four radial canals, tentacles, tentaculae, and one marginal vesicle.

Fam. Campanulariidae.

Obelia spp.

Material:

"Galathea"

St. 319. 6.V.51. Nancowry Harbour, Nicobars. SN 50, surface. 3 specimens.
St. 338. 19.V.51. Off Singapore. SN 50, 15 m. w. 1 specimen.
St. 362. 31.V.51. Selat Sembulan, Singapore. SN 50. 8 specimens.
Th. Mortensen. 20.IV.14. Misaki, Japan. 4 specimens.

Remarks on the specimens:

	Diam. mm	Number of tentacles	Gonads	
			shape	distance from stomach
St. 319.....	0.5	c. 40	small, spherical	1/2 r. c.
	1.2	c. 80	thick, oval	3/4 r. c.
	1.2	c. 80	thick, oval	3/4 r. c.
St. 338.....	1.0	c. 80	thick, spherical	1/2 r. c.
St. 362.....	1–1.2	up to 56	thick, spherical	1/2 r. c.
Misaki.....	0.8–1.8	c. 50–100		1/2 r. c.

Apparently these specimens do not all belong to the same species.

Genus **Phialidium** Leuckart 1856.

A complete revision of this genus is still premature. Some of the species are easily recognizable, others are insuffiently described, and others are so variable, structurally as well as numerically, that it is difficult to separate them from each other. I have discussed some of the species in earlier papers (Kramp 1953 pp. 271, 311, 1957 *a* p. 33, 1962 *b* pp. 324–329, 1962 *a* pp. 25–29). In the present material at least five species are represented, but many specimens are in a more or less poor state of preservation, which greatly impedes the determination, and several must be left as indeterminable. Most of the medusae resembling *Phialidium*, but with supernumerary radial canals ("*Pseudoclytia*") or stomachs ("*Gastroblasta*") are abnormal specimens of *Phialidium*, but it is not always possible to refer them to a certain species.

Phialidium hemisphaericum (L.).

For references see Kramp 1961 *a* p. 167.

Material:

"Dana"

St. 3641 8.I.29
43°40′ S. 176°36′ E.
S 150 100 m. w. **12**
S 150 300 m. w. **3**

St. 3654 27.I.29
33°28′ S. 161°45′ E.
S 150 600 m. w. **1**

St. 3714 20.V.29
15°22′ N. 115°20′ E.
S 150 50 m. w. **1**

St. 3809 4.IX.29
6°22′ S. 105°12′ E.
S 200 300 m. w. **1**

St. 3814 9.IX.29
4°38′ S. 99°24′ E.
S 200 100 m. w. **1**

St. 3903 17.XI.29
5°50′ N. 93°28′ E.
S 200 100 m. w. **1**

St. 3906 20.XI.29
4°26.5′ N. 85°21′ E.
S 200 400 m. w. **1**

St. 3936 22.XII.29
10°28′ S. 47°30′ E.
S 200 100 m. w. **1**
S 200 400 m. w. **2**

St. 3942 25.XII.29
6°47′ S. 41°27′ E.
S 200 300 m. w. **1**

St. 3950 7.I.30
12°23′ S. 41°43.5′ E.
S 200 300 m. w. **1**
S 200 400 m. w. **2**

St. 3955 9.I.30
18°30′ S. 42°18′ E.
S 200 200 m. w. **1**

"Galathea"

St. 319 6.V.51
Nancowry Harbour, Nicobars
SN 50, surface **1**

St. 373 7.VI.51
Off Kerteh, Malacca
4°30′ N. 103°28′ E.
SN 50 **4**

St. 381 8.VI.51
Gulf of Siam
7°00′ N. 103°18′ E.
SN 50 **c. 60**

St. 383 9.VI.51
Gulf of Siam
9°08′ N. 102°04′ E.
SN 50 **4**

St. 399 21.VI.51
N.E. of Singapore
1°46′ N. 104°25′ E.
SN 50 **10**

St. 414 17.VI.51
Dinagat, Philippines
10°20′ N. 125°32′ E.
SN 50 **26**

St. 425 29–30.VII.51
Bucas Grande Isl., Philippines
9°40′ N. 125°55′ E.
SN 50 **11**

St. 428 30–31.VII.51
Candos Bay, Mindanao
9°36′ N. 125°46′ E.
SN 50 **4**

St. 512 7.X.51
Solomon Islands
9°25′ S. 160°00′ E.
SN 50 10 m. w. **3**

Dr. Th. Mortensen
Toeal, Kei Island 3.IV.22
Surface **c. 175**

As previously stated (KRAMP 1953 p. 271 and 1962 *b* p. 324) most of the specimens of *Phialidium* found in North-East Australia and near the coast of Vietnam are indistinguishable from the common N.W. European and East Atlantic *Ph. hemisphaericum*, and this also applies to the numerous specimens listed above. The species has also been recorded from the coasts of India by other authors (Trivandrum Coast by NAIR 1951 p. 61, Vizagapatam Coast by GANAPATI & NAGABHUSHANAM 1958 pp. 92, 93); more doubtful is the record from China by CHIU (1954 *b* pp. 49, 51, 52). The supposition that *Ph. hemisphaericum* might also occur at the Pacific coast of North America has not been confirmed (ROOSEN-RUNGE 1962 pp. 15–24, comp. KRAMP 1962 *b* p. 28), and the present collection does not contain any East-Pacific specimens which may be referred to this species.

The individuals which I believe to be undoubted specimens of *Ph. hemisphaericum* were collected by the "Dana" east of New Zealand (St. 3641), in the Tasman Sea (St. 3654), at some stations in the Malayan Archipelago (St. 3714, 3809, 3814 and 3903), south-east of Ceylon (St. 3906) and in the waters north-west and west of Madagascar (St. 3936–3955), usually in small numbers only. Most of the localities, where it was collected by the "Galathea", are in the Malayan Archipelago, but it was also taken as far east as among the Solomon Islands (St. 512); in some of these localities it occurred in fairly large numbers. Finally, in a sample from the surface water near the Kei Island collected in 1922 by Dr. TH. MORTENSEN, this medusa occurred in great abundance together with several other species. Since this medusa belongs to the neritic region it was mainly taken close to the coasts; the few specimens found at any considerable distance from land (St. 3654 in the Tasman Sea, St. 3714 in the South China Sea, St. 3906 between the Nicobars and Ceylon) were all fairly large and may have been carried out from the coasts by the currents.

The individual variation is rather considerable, but as mentioned before (KRAMP 1962 *a* p. 325) the large growth-form, predominating during the cold season in North-European waters, rarely appears in tropical seas. The variation in the specimens of the present collection partly comprises the shape and position of the gonads, partly the number of tentacles in proportion to the size of the individuals. The specimens vary from 0.5 to 12 mm in diameter. In most of them the gonads are short and oval, elongated gonads being less frequently observed. In very small specimens the gonads appear as tiny dots in the middle of the radial canals, gradually displaced outwards towards the bell margin, but very irregularly, being situated near the margin even in several rather young individuals. In the great sample from "Galathea" St. 381, 1–5 mm in diameter, a considerable variation in length and position of the gonads was observed, apparently irrespective of the size of the individuals. The number of tentacles according to size was likewise very variable. Among four young stages, 0.5 mm in diameter, one has only four tentacles, one has four tentacles and four young bulbs, another has five tentacles and two young bulbs, and one has already obtained nine well-developed tentacles. The number of 16 tentacles are seen in specimens 3.5–6 mm wide, in most specimens more than 5 mm wide the number of tentacles is more than 20, and as many as 32 or 35 are counted in specimens from 6 up to 12 mm in diameter. Owing to the state of preservation it has rarely been possible to count the total number of marginal vesicles, but in the majority of the specimens I have been able to state that two marginal vesicles are present at least in some of the spaces between successive tentacles, which is one of the determining features of this species.

Distribution: Coastal waters in the eastern Atlantic from Iceland and northern Norway to the Cape of Good Hope; Mediterranean; the Indo-West-Pacific Region from East-Africa to New Zealand.

Phialidium rangiroae (AGASSIZ & MAYER).

Epenthesis rangiroae AGASSIZ & MAYER 1902 p. 145, Pl. 1 fig. 4.
Clytia rangiroae MAYER 1910 p. 265.
Phialidium rangiroae KRAMP 1953 p. 273.
Phialidium rangiroae KRAMP 1961 *a* p. 171.

"Galathea" Material:

St. 425	30.VII.51	St. 428	30–31.VII.51	St. 446	18–19.VIII.51	St. 532	1.X.51
Bucas Grande Island, Philippines		Candos Bay, Mindanao		Basilan Island, Philippines		Bay of Port Moresby, Papua	
9°40′ N.	125°55′ E.	9°36′ N.	125°46′ E.	6°42′ N.	121°58′ E.	SN 50	1
SN 50	1	SN 50	16 m. w. 2	SN 50	2		

This species differs from *Ph. hemisphaericum* by having only one marginal vesicle between successive tentacles, and is further characterized by the small, oval gonads containing only very few eggs which are large and prominent. The original description was based on a single individual from the lagoon of Rangiroa, Paumotus in Polynesia, and the species has been observed only once since then, at the Great Barrier Reef in N.E. Australia (KRAMP 1953), until six specimens were found by the "Galathea" in the localities mentioned above, among the Philippine Islands and on the south coast of New Guinea. The specimens agree with the type specimen in the two characteristic features noted above, but they differ in a few respects which, however, do not prevent me from referring them to the same species. The bell walls are not thin and flexible, but fairly thick and rigid; the tentacle bulbs are large, but almost globular, not conical as in the type; the number of tentacles may exceed 16 as in the type and increase up to 26.

In all the specimens the gonads are short and oval; in the smallest specimen, 1 mm wide, they are placed in the middle of the radial canals but they are gradually displaced outwards and situated near the ring canal in specimens 4–5 mm wide. The number of tentacles is variable; they are counted as follows:

Diam., mm	1	1.8	2	4	4	5
Number of tentacles	15	22	c. 14	11	c. 26	22
Number of young bulbs...	2	0	5	5	0	2

The specimens were all collected with the silk net near the surface of the water in sheltered localities.
Distribution: Philippines, New Guinea, N.E. Australia, Polynesian Islands.

Phialidium malayense KRAMP.

Phialidium pacificum MAAS 1906 *a* p. 91, Pl. 2 fig. 7.
Phialidium pacificum MAYER 1915 p. 201, Pl. 2 fig. 3.
Phialidium pacificum CHIU 1954 *b* p. 55.
Phialidium malayense nov. nom. KRAMP 1961 *a* p. 170.
Phialidium malayense KRAMP 1962 *a* p. 327.

"Galathea" Material:

St. 381	8.VI.51	St. 414	16–19.VII.51	St. 512	7.X.51	Dr. TH. MORTENSEN	
Gulf of Siam		Dinagat, Philippines		Solomon Islands		3 miles S.W. of Tucuran, Philippines	
7°00′ N.	103°18′ E.	10°20′ N.	125°32′ E.	9°25′ S.	160°00′ E.	7°80′ N.	123°30′ E.
SN 50	2	SN 50	16 m. w. 2	SN 50	10 m. w. 2	10.III.14	
				St. 611	18–19.I.52	Ringtrawl, 300 m. w. 1	
St. 399	21.VI.51	St. 446	19.VIII.51	Near south point of New Zealand			
N.E. of Singapore		Basilan, Philippines		44°37′ S.	167°55′ E.		
1°46′ N.	104°25′ E.	6°42′ N.	121°58′ E.	SN 50	1		
SN 50	7 m. w. 2	SN 50	2				

This is a well characterized species and distinguishable at once by its large, globular stomach, four prominent oral lips, large oval or cylindrical gonads, and large conical or nearly cylindrical tentacle bulbs; the number of marginal vesicles is variable, 0–3 between successive tentacles. The present specimens all agree with the available descriptions.

The species was first described from Amboina by MAAS (1906), who erroneously referred his only specimen to *Ph. pacificum* (AGASSIZ & MAYER); it has been necessary, therefore, to change the name (KRAMP 1961 *a*).

Later on it is recorded from the Torres Strait (MAYER 1915), Vietnam (KRAMP 1962 *a*) and from somewhere in China (CHIU 1954 *b*); some specimens were collected by the "Galathea" Expedition: in the Gulf of Siam, near Singapore, in two localities among the Philippines, among the Solomon Islands, and near the south point of New Zealand. Dr. TH. MORTENSEN found a single specimen at the Philippines.

In the youngest individual observed, 1.2 mm wide (St. 512) the gonads are tiny dots in the middle of the radial canals; during growth they are displaced outwards to near the margin of the umbrella. Tentacles are counted as follows:

Diam., mm	1.2	1.3	1.8	2	3	6	7	7
Tentacles	12	13	14	14–19	22	c. 40	22	32

In previous records:

Vietnam, KRAMP 1962	diam. 3.5 mm	24 tentacles.
Torres Str., MAYER 1915	diam. 4–5 mm	c. 43 tentacles.
Amboina, MAAS 1906	diam. 5 mm	32 tentacles.

In well-developed specimens the tentacles are rather densely set on the bell margin.

Distribution: Malayan Archipelago; Torres Strait; Melanesia; New Zealand.

Phialidium lomae TORREY.

Phialidum lomae TORREY 1909 p. 22, fig. 8.
i. p. *Phialidium languidum* MAYER 1910 p. 495.
Phialidium lomae KRAMP 1962 *b* pp. 25 ff.

Material:

Strait of Georgia, Pacific coast of North America, July 17th and 19th 1915, plankton net in deep water. TH. MORTENSEN.
4 specimens.

Remarks on the specimens: 1) diam. 3 mm, 16 tentacles and about 16 small, young bulbs, gonads about half as long as radial canals, not quite reaching ring canal. 2) diam. 4 mm, 32 tentacles, gonads along outer $^3/_4$ of radial canals. 3) diam. 8 mm, 32 tentacles, gonads along outer two-thirds of radial canals. 4) diam. 8 mm, 32 tentacles, gonads somewhat sinuated, along outer three-fourths of radial canals.

I have previously discussed the affinities of this species. It was described from San Diego in California (TORREY 1909) and has later on been recorded from San Juan Island, Washington (KRAMP 1962 *b*); from this latter locality several specimens were sent to me for identification.

Distribution: Vancouver Island region, Pacific coast of America.

Phialidium simplex BROWNE.

Phialidium simplex BROWNE 1902 p. 282.
Phialidium simplex BROWNE & KRAMP 1939 p. 299, Pl. 17 figs. 5–9.
Phialidium lomae KRAMP 1952 p. 7, figs. 3–5.
Phialidium simplex KRAMP 1953 p. 272.
Phialidium simplex KRAMP 1957 *a* p. 33.

Material:

"Dana"		St. 3860	20.X.29	St. 3902	17.XI.29	St. 3906	20.XI.29
St. 3824	15.IX.29	2°57′ S.	99°36′ E.	6°05′ N.	95°30′ E.	4°26.5′ N.	85°21′ E.
0°08′ S.	97°15′ E.	S 200	100 m. w. **4**	S 200	600 m. w. **1**	S 200	600 m. w. **1**
S 200	100 m. w. **5**	S 200	300 m. w. **5**				
S 200	600 m. w. **1**	S 200	600 m. w. **2**				
				St. 3903	17.XI.29	St. 3907	21.XI.29
St. 3830	19.IX.29	St. 3893	6.XI.29	5°50′ N.	93°28′ E.	3°59′ N.	82°57′ E.
2°36′ N.	96°31′ E.	5°59′ N.	92°29′ E.	S 200	100 m. w. **8**	S 200	300 m. w. **1**
S 200	300 m. w. **1**	S 200	100 m. w. **1**	S 200	600 m. w. **1**	S 200	400 m. w. **1**

St. 3910 23.XI.29
5°28′ N. 80°00′ E.
S 200 300 m. w. 4

St. 3914 2.XII.29
4°52′ N. 77°08′ E.
S 200 50 m. w. 1
S 200 100 m. w. 1

St. 3921 11.XII.29
3°36′ S. 58°19′ E.
S 200 200 m. w. 1

St. 3929 18.XII.29
12°11′ S. 50°18′ E.
S 200 200 m. w. 1

St. 3934 20–21.XII.29
11°24′ S. 50°05′ E.
S 200 300 m. w. 1
S 200 500 m. w. 1

St. 3935 21.XII.29
10°50′ S. 48°30′ E.
S 200 500 m. w. 1

St. 3936 22.XII.29
10°28′ S. 47°30′ E.
S 200 500 m. w. 1

"Galathea"

St. 328 11.V.51
Strait of Malacca
1°35′ N. 103°01′ E.
SN 50, near surface 1

St. 390 11.VI.51
Gulf of Siam
13°02′ N. 100°33′ E.
SN 50 30 m. w. 1

St. 580 30.XII.51
Campbell Isl.
52°33′ S. 169°09′ E.
SN 50 1

St. 596 5.I.52
Campbell Isl.
SN 50 1

All the localities, where this species was collected by the "Dana", are in the Indian Ocean between Sumatra and Madagascar, but the "Galathea" found a specimen in the Strait of Malacca and one in the Gulf of Siam. It was previously recorded from a locality in Indochina (exact position unknown, KRAMP 1962 *b*) and from the Great Barrier Reef in N.E. Australia. This latter locality bridges the gap between the Indo-West-Pacific records and the occurrence near the Campbell Islands south of New Zealand, where the medusa was taken on two occasions by the "Galathea". The occurrence at these southern islands is not very surprising, since it is very common at the Falkland Islands in about the same southern latitude in the Atlantic. The species was first described from the Falkland Islands (BROWNE 1902 and BROWNE & KRAMP 1939), later on recorded from the southern part of the coast of Brazil (VANNUCCI 1951) and from the south coast of Africa (KRAMP 1957 *a*).

Most of the specimens collected by the "Dana" were taken in hauls with 100 m wire out, but several were also taken with 200–600 m wire. The size of the specimens varies between 7 and 16 mm in diameter, independent of the depth below the surface of the water. The medusa may attain a diameter of 22 mm, and the number of tentacles in adult specimens is generally 64–85; the present material shows that the full number of tentacles is obtained at a diameter of about 7 mm. The two specimens from the Campbell Islands are 12 and 14 mm wide with about 60 and 70 tentacles. Abnormal specimens with three, five or six radial canals have occasionally been observed, at the Great Barrier Reef as well as at the Falkland Islands; in the present collection one specimen ("Dana" St. 3934, north of Madagascar) has five radial canals, three of them in almost normal position, 90° apart, the fifth dividing one of the quadrants into two equal parts.

Distribution: Tropical parts of the Indo-West-Pacific Region; coast of Chile[1]; South Africa; Brazil; the subantarctic islands Campbell Islands in the Pacific; Falkland Islands in the Atlantic.

Phialidium gregarium (L. AGASSIZ).

Oceania gregaria L. AGASSIZ 1862 p. 353.
Phialidium gregarium MAYER 1910 p. 272.
Phialidium gregarium KRAMP 1962 *b* pp. 25–28.

Material:

Dr. TH. MORTENSEN. Nanaimo, Puget Sound, surface, June 1915, 1 specimen.

This species may occur in Puget Sound in enormous quantities. The specific name is discussed in KRAMP, 1962 *b*.

Distribution: Coasts of California.

Pseudoclytia and **Gastroblasta.**

I maintain my former view that the various medusae, which have been described as "species" of the so-called genera *Pseudoclytia* (*Phialidium*-like with five or six radial canals) or *Gastroblasta* (with supernumerary stomachs) are abnormal individuals of various four-radiated species of *Phialidum*. In the collec-

[1] Specimens from Chile were formerly erroneously referred to *P. lomae* (in KRAMP 1952).

tion from Vietnam (KRAMP 1962 *a*) specimens of "*Pseudoclytia*" were particularly common, and I was inclined to regard them as abnormal specimens of *Ph. hemisphaericum*. Four similar specimens were taken at "Galathea" St. 512, near the Solomon Islands, 7.VIII.51, 9°25′ S. 160°00′ E.; they are 2–4 mm in diameter with 5–6 radial canals, 9–16 tentacles and 9–12 young marginal bulbs, gonads as tiny dots in the middle of the radial canals. I am not sure of the specific determination of these specimens, because they have only one marginal vesicle between successive tentacles, which does not indicate a reference to *Ph. hemisphaericum*. Another specimen, badly mutilated, was taken by the "Dana" at St. 3668 in N.E. Australia, 21°03.5′ S. 149°45′ E., 13.III.29, S. 150, 50 m wire; it is 9 mm wide, with five radial canals which are not equidistant.

As far as *Gastroblasta* is concerned, one species, *G. timida* KELLER, 1883, from the Red Sea may be retained as a valid species owing to the presence of centripetal canals from the ring canal; all the others are abnormal specimens of *Phialidium*. Dr. TH. MORTENSEN has collected six peculiar small medusae at Misaki in Japan, 26.IV.1914. They bear some resemblance to *Gastroblasta raffaeli* var. *chengshanensis* LING, 1937, which repeatedly has been recorded from China and Japan. Two of the specimens found by Dr. MORTENSEN have only one stomach each, but in other features they are rather like the four others. The specimens are described as follows:

Diam. 1 mm, one central stomach, three fully developed radial canals and one blind, 6 tentacles, 5 large and 8 small marginal bulbs.

Diam. 1.2 mm, two stomachs, two radial canals, 3 tentacles and 6 young bulbs, irregularly distributed.

Diam. 1.5 mm, one central stomach, three radial canals, 5 tentacles and 12 young bulbs.

Diam. 2 mm, two stomachs, three radial canals oblique, 5 tentacles and about 24 bulbs of very different sizes.

Diam. 2.8 mm, three radial canals, one small stomach situated on one of the radial canals, 14 tentacles, 35 bulbs of very different sizes.

Diam. 3 mm, three stomachs connected by canals, 7 canals opening into the ring canal, 22 tentacles, about 26 bulbs of very different sizes.

No trace of gonads is seen in any of the specimens; this in connection with the very irregular distribution of fully developed tentacles and young bulbs of highly different size indicate that these medusae are abnormalities and do not represent a proper species; the marginal vesicles are likewise irregularly distributed.

Fam. **Phialellidae.**

Phialella quadrata (FORBES).

Thaumantias quadrata FORBES 1848 p. 43, Pl. 9 fig. 2.
Phialidium cymbaloideum BROWNE 1896 p. 491, Pl. 17 figs. 1–2.
Eucope fragilis UCHIDA 1938 *c* p. 51, fig. 4.
Phialella quadrata REES 1939 p. 440.
Phialella quadrata KRAMP 1955 p. 255.
Campanulina quadrata NAUMOV 1960 p. 310, fig. 201.
Phialella quadrata KRAMP 1961 *a* p. 180.
Phialella quadrata KRAMP 1962 *a* p. 329.

Material:

"Dana"

St. 3634 2.I.29
36°31′ S. 174°50.5′ E.
P 50, surface **9**

St. 3645 12.I.29
42°32′ S. 174°50′ E.
S 150 600 m. w. **7**

St. 3683 3.IV.29
4°08′ N. 123°00′ E.
S 150 50 m. w. **1**

St. 3814 9.IX.29
4°38′ S. 99°24′ E.
S 200 50 m. w. **1**

"Galathea"

St. 319 6.V.51
Nancowry Harbour, Nicobars
SN 50, surface **1**

St. 327 11.V.51
Malacca Strait
1°55′ N. 102°27′ E.
SN 50, surface **2**

St. 425 29–30.VII.51
Bucas Grande Island, Philippines
9°40′ N. 125°55′ E.
SN 50 16 m. w. **2**

St. 428 30–31.VII.51
Candos Bay, Mindanao
9°36′ N. 125°46′ E.
SN 50 **4**

Dr. TH. MORTENSEN
7.XII.14
Off Bare Island, New Zealand **6** specimens

It was indeed a great surprise, when this medusa, well known and very common in north-western Europe, was recorded from New Zealand (RUSSELL 1953 p. 320, note); later on it was recorded from the Gulf of Guinea on the west coast of Africa (KRAMP 1955) and from the coast of Vietnam in Indochina (KRAMP 1962 *a*). During the "Dana" Expedition it was once more found at New Zealand (St. 3634 and 3645) and also in the Celebes Sea (St. 3683) and off the west coast of Sumatra (St. 3814). The "Galathea" collected it in a number of localities: the Nicobars, the Strait of Malacca, and among the Philippines. Dr. TH. MORTENSEN had found some specimens on the east coast of New Zealand in 1914.

The specimens collected by the "Galathea" are small, but in good condition; they represent a developmental series from 0.6 to 2.5 mm in diameter; the development of tentacles and gonads proceeds in a way similar to that described in specimens from the British coasts by RUSSELL (1953); the number of 16 fully developed tentacles is attained, when the medusa is 2 mm wide. The specimen from "Galathea" St. 319 is interesting, in so far as the gonads are unequally developed; two gonads, opposite in position, are spherical and placed in the middle of the radial canals, the two others are elongated and very thick, placed along the distal two-thirds of the radial canals, thus showing a variation within the same individual. In the somewhat larger specimens, up to 17 mm wide, taken by the "Dana", the gonads are usually elongated, more or less thickened by the contents of sexual products.

Two species, *Eucope annulata* from New Zealand and *Eucope hyalina* from Sydney in Australia, described and figured by VON LENDENFELD (1884), may perhaps belong to *Phialella quadrata*, but the descriptions are insufficient, and the two species are regarded as obsolete.

On the other hand, after having seen the present specimens of *Phialella quadrata* from Indo-Pacific waters, I feel sure that *Eucope fragilis*, found in Japan and well described by UCHIDA (1938 *c*), belongs to the same species. This was indicated as a possibility by RUSSELL (1953 p. 320), and NAUMOV (1960 p. 310) simply placed it as a synonym of *Ph. quadrata*, in which I fully agree with him.

Distribution: Coastal waters in north-western Europe; Gulf of Guinea; Malayan Archipelago; Japan; New Zealand.

Fam. **Lovenellidae.**

Lovenella cirrata (HAECKEL).

Mitrocomium cirratum HAECKEL 1879 p. 182, Pl. 11 figs. 9–11.
Mitrocoma cirrata MAYER 1910 p. 288, figs. 153, 154.
Eucheilota multicirrata THIEL 1938 p. 330, fig. 8.
Eucheilota cirrata KRAMP 1955 p. 254.
Lovenella cirrata KRAMP 1961 *a* p. 177.

Material:

"Dana" St. 3800. 18.VIII.29. 7°53′ S. 116°18′ E. S 200, 600 m wire. 1 specimen.

The locality is north of Lombok in the Java Sea. The specimen is 10 mm wide; the stomach is fairly large with a cruciform base; there are only small remnants of gonads. The tentacles are lost, but there are eight large tentacle bulbs, each flanked by several cirri, about seven pairs on each of the perradial and about five pairs on the interradial bulbs. In each octant between the tentacle bulbs are 4–5 small, round marginal warts studded with nematocysts. The marginal vesicles are large, eight in number. As a rule the number of marginal vesicles is 16 in this species, but occasionally the number is reduced; in our collection from the Mediterranean I have seen specimens with only eight marginal vesicles. I do not hesitate, therefore, to refer the present specimen to *Lovenella cirrata*, though this is the first time that the species has been found in waters outside the Atlantic Ocean and the Mediterranean.

Distribution: Mediterranean; west coast of Africa; Brazil; Malayan Archipelago.

Eucheilota ventricularis McCrady.

Eucheilota ventricularis Mayer 1910 p. 282, Pl. 37 fig. 5, Pl. 38 fig. 1.
Eucheilota ventricularis Kramp 1959 *c* p. 244.
Eucheilota ventricularis Kramp 1961 *a* p. 176.
Eucheilota ventricularis Kramp 1962 *a* p. 331.

Material:

"Dana" St. 3821. 14.IX.29. 0°51.5′ S. 99°24.5′ E. S 200, 300 m. wire, 7 specimens.
Dr. Th. Mortensen. 3.IV.22. Toeal, Kei Islands. 15 specimens.

Several species of *Eucheilota* were collected by the "Galathea" Expedition; they are mentioned and partly described as new species in an earlier paper (Kramp 1962 *a* pp. 244–250), with a remark that "*Eucheilota* is a difficult genus which needs a revision". Until such a revision has been made the distinction should be retained between the two genera with lateral cirri on the marginal bulbs, *Eucheilota* with a fixed number of marginal vesicles, and *Lovenella* in which the number is indefinite and increasing with age. The present seven specimens from "Dana" St. 3821, west of Sumatra, are in a rather poor condition, but among the many species of the genus I think they cannot be referred to any other species than *E. ventricularis*, which in the paper quoted above is mentioned as taken by the "Galathea" in the Strait of Malacca, the Gulf of Siam, and near the Solomon Islands.

The specimens collected by the "Dana" are about 5 mm wide, the number of tentacles + young bulbs amounts to about 32, very few cirri are left; the number of marginal vesicles, when retained, seems to be eight; the few remnants of gonads are linear. Dr. Th. Mortensen found some small specimens, 1–2.5 mm wide, at the Kei Islands.

Distribution: Coastal waters in the southern parts of the east coast of North America; Brazil; west coast of Africa; the Red Sea; Chagos Islands in the Indian Ocean; the Malayan Archipelago; the Solomon Islands in Melanesia.

Eucheilota paradoxica Mayer.

Eucheilota paradoxica Mayer 1910 p. 285, Pl. 37 figs. 3–3″.
Eucheilota paradoxica Uchida 1938 *a* p. 146.
Eucheilota paradoxica Uchida 1938 *b* p. 41.
Eucheilota paradoxica Yamazi 1958 p. 136.
Eucheilota paradoxica Kramp 1959 *c* p. 245.
Eucheilota paradoxica Kramp 1962 *a* p. 331.

Material:

Dr. Th. Mortensen. 3.IV.22. Toeal in the Kei Islands, one specimen.

The "Galathea" found some specimens of this interesting budding medusa in the Strait of Malacca and near Bali; they are mentioned in an earlier paper (1959 *c*). Dr. Th. Mortensen found a single specimen during his stay at the Kei Islands in 1922.

Distribution: Florida and the Bahamas; Japan; Malayan Archipelago.

Eucheilota tropica Kramp.

Eucheilota sp. I. Menon 1932 p. 17, Pl. 1 fig. 6.
Eucheilota tropica Kramp 1959 *c* p. 259 fig. 13.
Eucheilota tropica Kramp 1962 *a* p. 330.

Material:

Dr. Th. Mortensen. 26.IV.1914. Misaki, Sagami Bay in Japan, surface. 1 specimen.

It is interesting that this species has been found in Japan. It was first recorded from Madras in India as *Eucheilota* sp. I (Menon 1932); more advanced stages were described and figured by me (Kramp 1959 *c*) as occurring among the Nicobar and Philippine Islands, where it was taken by the "Galathea", and it was

further recorded from Nhatrang in Vietnam (KRAMP 1962 *a*). The present specimen from Japan is 3 mm wide and 1.5 mm high. The umbrella has a similar conical shape as in the type specimen figured by me; the gonads, male, are linear, extending along the entire length of the radial canals. There are four large perradial tentacles, each with three pairs of lateral cirri; in each quadrant 5 small marginal bulbs, the median one larger than the others and provided with 2–3 pairs of cirri, the smaller ones with one pair or a single cirrus; there are 8 large marginal vesicles.

The specimen differs from the original description by having more than one pair of cirri on the marginal bulbs; nevertheless, it most probably belongs to the same species.

Distribution: India; Malayan Archipelago; Japan.

Cirrholovenia polynema KRAMP.

Cirrholovenia polynema KRAMP 1959 *c* p. 251, fig. 16 *a–c*.
Cirrholovenia polynema KRAMP 1962 *a* p. 329.

Material:

"Dana"

St. 3576 17.X.28
17°36.5′ S. 149°43.6′ W.
S 150 50 m. w. **9**
S 150 2000 m. w. **1**

St. 3601 20.XI.28
18°21′ S. 178°21′ E.
S 150 50 m. w. **1**
S 150 100 m. w. **1**
S 150 300 m. w. **1**

St. 3611 26.XI.28
20°53.2′ S. 164°03.3′ E.
S 150 100 m. w. **2**

St. 3626 13.XII.28
27°00′ S. 177°41′ W.
S 150 300 m. w. **1**

St. 3641 8.I.29
43°40′ S. 176°36′ E.
S 150 300 m. w. **1**

St. 3665 25.II.29
29°37.5′ S. 156°46′ E.
S 150 50 m. w. **5**
S 150 100 m. w. **2**

St. 3668 13.III.29
21°03.5′ S. 149°45′ E.
S 150 50 m. w. **21**

St. 3680 27.III.29
2°22′ S. 126°58.5′ E.
S 150 100 m. w. **1**

St. 3683 3.IV.29
4°08′ N. 123°00′ E.
S 150 600 m. w. **1**

St. 3684 3.IV.29
6°37′ N. 122°24′ E.
S 150 100 m. w. **1**

St. 3686 6.IV.29
8°34′ N. 119°55′ E.
S 150 50 m. w. **1**

St. 3723 30.V.29
25°30.5′ N. 125°28′ E.
S 200 600 m. w. **1**

St. 3731 16.VI.29
14°37′ N. 119°52′ E.
S 200 50 m. w. **5**

St. 3748 10.VII.29
3°48′ N. 133°35′ E.
S 200 150 m. w. **1**

St. 3814 9.IX.29
4°38′ S. 99°24′ E.
S 200 300 m. w. **17**

St. 3821 14.IX.29
0°51.5′ S. 99°24.5′ E.
S 200 300 m. w. **5**

St. 3828 18.IX.29
1°22′ N. 96°06.5′ E.
S 200 50 m. w. **1**

St. 3844 10.X.29
12°05′ S. 96°45′ E.
S 200 250 m. w. **3**

St. 3856 17.X.29
4°45.5′ S. 98°28′ E.
S 200 300 m. w. **1**

St. 3860 20.X.29
2°57′ S. 99°36′ E.
S 200 600 m. w. **1**

St. 3903 17.XI.29
5°50′ N. 93°28′ E.
S 200 50 m. w. **1**

St. 3907 21.XI.29
3°59′ N. 82°57′ E.
S 200 300 m. w. **1**

St. 3913 1.XII.29
6°36′ N. 79°06′ E.
S 200 50 m. w. **2**

St. 3917 5.XII.29
1°45′ N. 71°05′ E.
S 200 100 m. w. **1**
S 200 300 m. w. **1**

St. 3955 9.I.30
18°30′ S. 42°18′ E.
S 150 50 m. w. **1**

St. 3963 15.I.30
24°30′ S. 37°48.5′ E.
S 200 150 m. w. **1**
S 200 250 m. w. **1**

"Jutlandia"

St. 4775 11.IV.33
30°20′ N. 138°00′ E.
S 200 220 m. w. **1**

"Selandia"

St. 4789 28.V.33
31°40′ N. 135°30′ E.
S 200 220 m. w. **1**

"Pacific"

St. 4815 10.I.35
15°55′ N. 112°55′ E.
S 150 201 m. w. **4**

"Galathea"

St. 399 21.VI.51
N.E. of Singapore
1°46′ N. 104°25′ E.
SN 50 16 m. w. **1**

Dr. TH. MORTENSEN

Philippines,
7°12′ N. 123° E.
11.III.14, 1 specimen

Off Jolo, Philippines
17.III.14, surface,
1 specimen

North of Sulu Islands,
Philippines
27.III.14, 1 specimen

While I was on board the "Galathea" in 1951 I saw some small Leptomedusae which at once attracted my attention owing to the presence of true marginal cirri on their umbrella margin between the tentacles. The medusae had four radial canals, small closed marginal vesicles, and they had no gastral peduncle; they accordingly belonged to the superfamily Eucopida, among which marginal cirri were unknown. In other respects they resembled the Lovenellidae, the only family among the Eucopida, in which cirri are present, but as "lateral" cirri attached to the tentacle bulbs. On closer consideration I referred the specimens to the Lovenellidae as representatives of a new genus, *Cirrholovenia*, with the diagnosis: Lovenellidae with marginal cirri, without lateral cirri. There were two species, *C. polynema* with up to 20 or 24 tentacles (the type species of the genus) and *C. tetranema* with only 4 tentacles. Both are discussed and figured in a preliminary paper (KRAMP 1959 *c* pp. 251–254). *C. tetranema* was taken by the "Galathea" in six localities between the Strait of Malacca and the Solomon Islands but has not turned up in the "Dana" collection; *C. polynema* was found in only two localities (near Basilan Island in the Philippines and in the Java Sea), to which may now be added St. 399 near Singapore; one more specimen is recorded from Nhatrang in Vietnam (KRAMP 1962 *a* p. 329).

As a matter of fact, this medusa has an extensive distribution in the coastal waters of the Indo-West-Pacific Region, as seen from the above list, once again an example demonstrating our deficient knowledge of the pelagic fauna in these waters. The species was met with by the "Dana" already at St. 3576 near Tahiti; further near the Fiji and Kermadec Islands and New Caledonia and off the east coast of Australia; the southernmost locality was St. 3641 off the east coast of New Zealand, 43°40′ S. It was also taken in several localities within the Malayan Archipelago and northwards to the Riukiu Islands (St. 3723) and in the waters west and south-west of Sumatra as far south as the Cocos Islands (St. 3844), between the Nicobars and Ceylon, and near the Maldive Islands (St. 3917); finally a few specimens were found in two localities between Madagascar and the African coast. The merchant vessels found it in the South China Sea (St. 4815) and in two localities among the islands east of the southern part of Japan (St. 4775 and 4789). During his Pacific Expedition in 1914 Dr. TH. MORTENSEN had collected some specimens of this species in three localities among the Philippines; they have remained unnoticed in our collections until now. The medusa was usually taken in small numbers only.

Cirrholovenia polynema is a decidedly neritic medusa. The majority of the specimens collected by the "Dana" were taken in hauls with 50 m wire, but several also with 100 or 300 m wire; the three specimens taken in hauls with 600 m wire were probably caught at higher levels during the hauling in of the nets, and this certainly applies to the specimen from St. 3576, 2000 m wire. The "Galathea" and Dr. TH. MORTENSEN found it near the surface.

Most of the specimens are less than 10 mm in diameter, though a few were as much as 11 or 12 mm wide; there is no distinguishable difference in size between specimens from different depths. One particularly large individual was taken at St. 3917, west of the Maldive Islands, 300 m wire; it is 15 mm wide, parts of the umbrella margin is in good condition, but the tentacles cannot be counted. In mature specimens of medium size the number of tentacles may amount to about 40.

Distribution: Widely distributed in the coastal waters of the Indo-West-Pacific Region, from East Africa to Tahiti, northwards to southern Japan, southwards to New Zealand.

Fam. **Phialuciidae.**

The family Phialuciidae was erected by me (KRAMP 1955 p. 262) to comprise the genera *Phialucium* MAAS 1905, *Octocannoides* MENON 1932 and *Octophialucium* KRAMP 1955. I had previously discussed and revised the species of *Phialucium* (KRAMP 1953 pp. 273 ff), and later on a survey of the species of *Octophialucium* was given (KRAMP 1955 p. 260 and 1958 p. 348). It was shown that one of the species, which were referred to *Phialucium* by MAAS (1905), belongs to the Eirenidae (*Eirene tenuis* (BROWNE)), and specimens of *Phialucium virens* (BIGELOW 1904) from various localities partly belong to *P. mbenga*, partly to *P. carolinae*. The genus *Phialucium* comprises five species. *P. taeniogonia* CHOW & HUANG, 1958, from Chefoo in China, may or

may not be a valid species; *P. multitentaculatum* MENON, 1932, has been found in only two localities, Madras in India (MENON 1932) and Gulf of Tongking (KRAMP 1962 *a*); the three other species are represented in the present collections.

Most of the species, which I have collected in the genus *Octophialucium*, were formerly referred to *Octocanna*, HAECKEL 1879, but as stated by me (KRAMP 1955 pp. 258 ff) this generic name should be deleted, and it is sometimes difficult to state the specific identity of the various medusae mentioned in the literature as belonging to "*Octocanna*".

Phialucium mbenga (AGASSIZ & MAYER).

Mitrocoma mbenga AGASSIZ & MAYER 1899 p. 168, Pl. 8 figs. 24, 25.
Oceania virens BIGELOW 1904 p. 252, Pl. 1 figs. 3, 4.
Phialucium virens MAAS 1905 p. 32, Pl. 6 figs. 36, 37.
Phialucium mbenga MAYER 1910 p. 276.
Phialucium mbenga VANHÖFFEN 1911 p. 225, Pl. 22 fig. 12, textfig. 16.
Phialucium mbenga KRAMP 1953 p. 275, fig. 1.
Phialucium mbenga KRAMP 1961 *a* p. 186 (further references).

Material:

"Dana"
St. 3590 7.XI.28
13°56′ S. 172°30′ W.
S 150 15 m. w. **1**

St. 3591 8.XI.28
15°03′ S. 175°30′ W.
S 150 100 m. w. **1**

St. 3593 10.XI.28
17°27′ S. 179°33′ E.
S 150 300 m. w. **1**

St. 3611 26.XI.28
20°53.2′ S. 164°03.3′ E.
S 150 300 m. w. **3**

St. 3627 14.XII.28
30°08′ S. 176°50′ W.
S 200 600 m. w. **1**

St. 3678 24.III.29
4°05′ S. 128°16′ E.
S 150 1000 m. w. **1**

St. 3692 11.IV.29
9°59′ N. 107°23.5′ E.
S 150 50 m. w. **4**

St. 3712 18.V.29
12°44′ N. 110°45′ E.
S 150 300 m. w. **2**

St. 3860 20.X.29
2°57′ S. 99°36′ E.
S 200 300 m. w. **1**

St. 3955 9.I.30
18°30′ S. 42°18′ E.
S 200 300 m. w. **1**

St. 3956 10.I.30
21°13′ S. 42°26′ E.
S 200 300 m. w. **1**

"Galathea"
St. 328 11.V.51
Strait of Malacca
1°35′ N. 103°01′ E.
SN 50, surface **1**

This species was collected by the "Dana" in several localities, partly among the Melanesian Islands (St. 3590–3627), partly in the Malayan Archipelago and South China Sea (St. 3678–3860) and also in the Mozambique Channel between Madagascar and the east coast of Africa (St. 3955–3959); it had not previously been found further west than the Maldive Islands. It was taken in small numbers only, most of them in hauls with 300 m wire out, but some specimens were also found nearer to the surface. The specimen from St. 3678, 1000 m wire, was undoubtedly caught at a higher level during the hauling in of the net. The specimens vary in diameter from 4 to 10 mm, regardless of the depths in which they were collected. The only specimen collected by the "Galathea" was taken near the surface in the Strait of Malacca; it was 10 mm wide.

Distribution: Coastal waters in the Indo-West-Pacific Region, from East Africa to the Melanesian Islands.

Phialucium carolinae (MAYER).

Oceania carolinae MAYER 1900 *a* p. 7, Pl. 3 fig. 9, Pl. 4 figs. 10, 11.
Phialucium carolinae MAAS 1905 p. 32.
Octocanna polynema MAAS 1905 p. 38.
Phialucium carolinae MAYER 1910 p. 275, Pl. 36 figs. 1′–1″.
Phialidium heptactis VANHÖFFEN 1911 p. 225, Pl. 22 fig. 11, textfig. 15.
Phialucium carolinae KRAMP 1953 p. 276, figs. 2, 3.
Phialucium carolinae KRAMP 1961 *a* p. 185 (all references).

Material:

"Dana"
St. 3678 24.III.29
4°05′ S. 128°16′ E.
S 150 50 m. w. 1

St. 3715 22.V.29
18°18′ N. 119°36′ E.
S 150 300 m. w. 1

St. 3828 18.IX.29
1°42′ N. 96°05′ E.
S 150 2000 m. w. 1

St. 3963 15.I.30
24°30′ S. 37°48.5′ E.
S 200 200 m. w. 1

"Galathea"
St. 305 26.IV.51
Bay of Bengal
20°51′ N. 87°58′ E.
SN 50, surface 2

St. 328 11.V.51
Strait of Malacca
1°35′ N. 103°01′ E.
SN 50, near surface 1

St. 361 31.V.51
Singapore
TOT 40 m. w. 12

St. 381 8.VI.51
Gulf of Siam
7°00′ N. 103°18′ E.
SN 50 11

St. 383 9.VI.51
Gulf of Siam
9°08′ N. 102°04′ E.
SN 50 3

St. 390 11.VI.51
Gulf of Siam
13°02′ N. 100°33′ E.
SN 50 30 m. w. 1

St. 425 29–30.VII.51
Bucas Grande Island, Philippines
9°40′ N. 125°55′ E.
SN 50 16 m. w. 1

St. 541 5.XI.51
Moreton Bay, East Australia
26°57′ S. 153°25′ E.
S 200 near surface 3

Only four specimens of *P. carolinae* were taken by the "Dana", in scattered localities: Banda Sea (St. 3678), South China Sea (St. 3715), west of Sumatra (St. 3828) and in the Mozambique Channel (St. 3963); this latter occurrence is noteworthy, since the species has not previously been found further west in the Indian Ocean than on the coasts of India. Several specimens were collected by the "Galathea", mainly in the Bay of Bengal, the Strait of Malacca and the Gulf of Siam, but a few were also found among the Phillippines and on the east coast of Australia. The species was formerly known from about the same geographical areas, but also as far north as Chefoo in China and on the western coasts of India. It seems to be somewhat more strictly neritic than *P. mbenga*.

The normal number of radial canals in *P. carolinae* is four, but specimens with other numbers have frequently been observed; apparently, such irregularities occur particularly often in certain geographical areas. Among 253 specimens from Great Barrier Reef in Australia only 65 % had the normal number of four radial canals, the numbers in the others varying from two to nine (KRAMP 1953 pp. 276 ff, fig. 3). A detailed examination of this Australian collection was carried out, with the result that supernumerary canals mainly occur in larger individuals; while the majority of the specimens retain the number of four canals throughout their life, in some of them additional canals are developed during the growth of the individuals; the development of the additional canals usually proceeds irregularly. It was also found that the number of fully developed marginal tentacles in relation to the size of the individuals was independent of the number of radial canals. Specimens with about eight radial canals might be mistaken for *Octophialucium indicum*, which occurs within the same areas (see below), but the configuration of the rudimentary marginal bulbs between the tentacles is different in the two species, and moreover the unequal distances between the supernumerary radial canals in *P. carolinae* may serve as a distinguishing character. In a collection from Vietnam (KRAMP 1962 *a* p. 332) I likewise found several abnormal specimens of *P. carolinae*, and considerable variation of this species was also observed in specimens from the Philippines (BIGELOW 1919 p. 293). In the present collection one specimen was found with only three radial canals ("Galathea" St. 381), one with five (St. 283) and one with seven (St. 361).

Distribution: This species has a peculiar distribution. It was originally described from North Carolina and Florida on the east coast of North America, but it is undoubtedly the same species which is common and widely distributed in the coastal waters of the Indo-West-Pacific Region from East Australia to Chefoo in China and westwards to East Africa.

Phialucium condensum KRAMP.

Phialucium condensum KRAMP 1953 p. 279, Pl. 1 fig. 4, textfig. 4.

Material:

Toeal, Kei Islands, 3.IV.1922, about 5° S. 133° E. TH. MORTENSEN. 1 specimen.

The description of this species was based on five specimens from the Great Barrier Reef in North-East Australia; they were 5–7 mm in diameter and had about 12 marginal tentacles. The configuration of the rudimentary bulbs between the fully developed tentacles is similar to that in *P. carolinae*, but the species is well characterized by the proximal position of the gonads on the radial canals.

The present specimen from the Kei Islands is 3.5 mm wide and 3 mm high; it has only four fully developed, perradial tentacles; in each quadrant there is one large and one somewhat smaller marginal bulb, presumably developmental stages of tentacles, besides a few minute wart-like rudiments. In this species the development of the marginal tentacles thus seems to proceed in duodecimal succession, the final number obtained being twelve as found in the original specimens from the Great Barrier Reef. The stomach of the specimen from the Kei Islands is broad and quadrangular, and oval gonads are placed on the radial canals in close vicinity to the corners of the stomach.

Distribution: North-East Australia; Kei Islands in the Banda Sea.

Genus **Octophialucium.**

As briefly mentioned above this genus was established (KRAMP 1955 p. 256) to comprise a number of eight-radiated medusae, most of which had previously been recorded as belonging to the genus *Octocanna* HAECKEL and partly even referred to HAECKEL's own two species, *O. octonema* and *polynema*, both of which are obsolete. The history of the genus and its relation to *Phialucium* was dealt with at some length in the paper quoted above. Among the six species of *Octophialucium* now recognized three occur in the Indo-West-Pacific Region. *O. funerarium* (QUOY & GAIMARD 1827) is a large medusa (30–40 mm wide, with numerous tentacles) occurring in deep and intermediary water in the Mediterranean and north-western Europe; *O. medium* KRAMP 1955 has been recorded twice from the west coast of Africa; *O. bigelowi* KRAMP 1955 was described by BIGELOW (1909) as *Octocanna polynema* from the Pacific coast of Mexico, in the present collection found again in the Gulf of Panama. A mutilated specimen of an undetermined species has been found in the West-Indies (KRAMP 1959 *a*). Among the three Indo-West-Pacific forms *O. aphrodite* (BIGELOW 1919) is distinguished by its large number of tentacles, 80–100. The two others, *O. solidum* (MENON 1932) and *O. indicum* KRAMP 1958 will be discussed below; both were first referred to "*Octocanna polynema*" by K. S. MENON (1931) and M. G. K. MENON (1932).

Octophialucium indicum KRAMP.

Octocanna polynema MENON 1932 p. 23, Pl. 3 fig. 25.
Octocanna polynema CHIU 1954 *a*, pp. 41, 45, Pl. 4 fig. 14.
Octophialucium indicum KRAMP 1958 p. 347, fig. 2 *a*, *b*.
Octophialucium indicum KRAMP 1961 *a* p. 184.
Octophialucium indicum KRAMP 1962 *a* p. 334.

Doubtful records:

Octocanna polynema NAIR 1951 p. 63. Trivandrum Coast, India.
Octocanna polynema GEORGE 1953 p. 82. Calicut, India.
Octocanna polynema GANAPATI & NAGABHUSHANAM 1958 pp. 92, 94. Vizagapatam Coast, India.
Octocanna polynema CHOW & HUANG 1958 pp. 184, 189. Chefoo, China.

Material:

"Dana"

St. 3576 17.X.28
17°36.5′ S. 149°43.6′ W.
S 150 1000 m. w. **1**

St. 3645 12.I.29
42°32′ S. 174°50′ E.
S 150 100 m. w. **2**
S 150 300 m. w. **1**

St. 3729 14.VI.29
20°03.5′ N. 120°50′ E.
S 200 600 m. w. **1**

St. 3736 28.VI.29
9°17′ N. 123°58′ E.
S 200 300 m. w. **1**

St. 3844 11.X.29
12°05′ S. 96°45′ E.
E 300 1000 m. w. **1**

St. 3955 9.I.30
18°30′ S. 42°18′ E.
S 200 200 m. w. **3**

"Galathea"
St. 530 24.X.51
Fairfax Harbour Bay, Port Moresby, New Guinea
SN 50 5 m. w. 1

Dr. TH. MORTENSEN
Near Koh Samit, Gulf of Siam
1.II.1900 1
Off Krakatau, Sunda Strait 4.VIII.22 1

Java Sea
8°02′ S. 114°58′ E.
8.IV.29. Planktonnet,
850 m. w. 2

The "Dana" found this species in some scattered localities: near Tahiti (St. 3576), east of New Zealand (St. 3645), north of Luzon in the Philippines (St. 3729), in the Sulu Sea (St. 3736), near the Cocos Islands (St. 3844) and west of Madagascar (St. 3955). The "Galathea" found it in only one locality, on the south coast of New Guinea. Dr. TH. MORTENSEN had collected it in the Gulf of Siam and near the coasts of Java; one of his specimens has nine radial canals. Most of the specimens are in a bad condition, some of them larger than known before, being up to 25 mm in diameter ("Dana" St. 3736).

The species was formerly known with certainty from the coasts of India, Burma and Vietnam and from Amoy in China. The known area of distribution has been considerably extended, eastwards to Tahiti, southwards to New Zealand, westwards to Madagascar, by the present collections.

Distribution: Coastal waters in the Indo-West-Pacific Region.

Octophialucium bigelowi KRAMP.

Octocanna polynema BIGELOW 1909 p. 169, Pl. 6 figs. 6, 10, Pl. 38 figs. 1–3.
Octophialucium bigelowi KRAMP 1955 p. 259.
Octophialucium bigelowi KRAMP 1961 *a* p. 183.

Material:

TH. MORTENSEN. 25.I.16. Off San José, Pearl Islands, Gulf of Panama. Surface. 1 specimen.

The specimen is 6.5 mm wide, the jelly is flat and fairly thick, the stomach broad, with a star-shaped base. There are seven radial canals and seven well-developed tentacles, between successive tentacles about three small marginal warts, triangular and densely beset with nematocysts. The gonads are somewhat mutilated.

The specimen agrees perfectly with the description and figures by BIGELOW (apart from the number of radial canals which was eight in his two specimens from Acapulco Harbor, Mexico). As emphasized by BIGELOW, there is no evidence that any of the rudimentary marginal bulbs are developing into tentacles; this, in connection with their triangular shape, is characteristic of the species.

Distribution: Pacific coast of Central America.

Octophialucium solidum (MENON).

Octocanna polynema K. S. MENON 1931 p. 503.
Octocanna solida M. G. K. MENON 1932 p. 22, Pl. 3 fig. 26.
Octophialucium solidum KRAMP 1955 p. 259.
Octocannoides ocellata KRAMP 1958 p. 350, fig. 3 *a*, *b*.
Octophialucium solidum KRAMP 1961 *a* p. 184.

Material:

"Dana"
St. 3809 4.IX.29
6°22′ S. 105°12′ E.
S 200 50 m. w. 2
S 200 100 m. w. 1

The locality is in the Sunda Strait between Java and Sumatra.

I have been somewhat in doubt as to the identification of these three specimens. MENON (1932) has described two new species of octoradiate medusae from Madras in India. "*Octocanna solida*" was structurally like all other species of what we now call *Octophialucium*, but had only four tentacles. The other species, which had eight tentacles, was named *Octocannoides ocellata*, representing a new genus resembling *Octophialucium*, but differing from this genus, as well as from *Phialucium*, by two important features, expressly pointed out by the author: the gonads were longitudinally divided, consisting of two lateral halves, and the marginal bulbs were provided with conspicuous abaxial ocelli. In an earlier paper (KRAMP 1958 p. 350, fig. 3 *a*, *b*) I described and figured a medusa from the Mergui Archipelago very much resembling *Octocannoides ocellata*, and I referred it to this species, pointing out, however, that the gonads were not longitudinally divided, and that there was no black pigmentation on the marginal bulbs. The same also applies to the present specimens from the Sunda Strait. When seen in transparency, however, the lumen of the radial canals inside the gonads appears as a translucent, light line, giving the impression that the gonad is divided though, as a matter of fact, it completely envelops the canal, and the rudimentary marginal bulbs appear very dark, almost black which, however, is solely due to refraction in the dense collection of nematocysts. One might be tempted, therefore, to suppose that MENON was mistaken in his description of the gonads and ocelli in *Octocannoides*. Since this author, however, has seen both species side by side and has emphasized the structural difference between them, it may be permissible to presume that his description was correct, and to retain *Octocannoides ocellata* as a valid genus and species. If so, the specimen from the Margui Archipelago should be removed from *Octocannoides* and referred to *Octophialucium*.

The present specimens from the Sunda Strait are 5.5–6.5 mm wide; the stomach is 2.5–3 mm wide, with a star-shaped base; the eight gonads are fairly thick, oval, extending from near the eight corners of the stomach half-way or slightly more outwards along the radial canals. There are four tentacles with large basal bulbs with excretory papillae and exumbrellar clasps and about 20 marginal warts; numerous marginal vesicles, which cannot be counted exactly. Most of the marginal warts are small and round, but some of them are slightly elongated, about as figured by MENON in *O. solidum*. The only point in which these specimens differ from the description of *Octophialucium solidum* is that the gelatinous substance of the umbrella is not thick and vaulted, but thin and flat; this is however not a reliable specific character, but may depend on the state of contraction during the preservation.

In structural details the specimen from the Mergui Archipelago, formerly referred by me to *Octocannoides ocellata* (KRAMP 1958) is very similar to the present specimens, except that the jelly is fairly thick, the gonads somewhat longer and wavy, and it has seven large tentacles opposite to the eight radial canals (one tentacle is depressed, because two of the radial canals are united in their distal ends). In the present specimens, which have only four tentacles, however, the rudimentary bulbs opposite to radial canals are distinctly larger than those in the spaces between the canals and may be expected to develop into tentacles; this also applies to MENON's original specimens of *O. solidum*. I feel sure that the specimen from the Mergui Archipelago denotes a further advanced stage of development of *O. solidum* with a fully developed tentacle off each of the radial canals.

Distribution: Madras; Mergui Archipelago; Sunda Strait.

Fam. **Eirenidae.**

Eirene ceylonensis BROWNE.

Irene ceylonensis BROWNE 1905 *b* p. 140, Pl. 3 figs. 9–11.
Eirene ceylonensis BIGELOW 1909 pp. 160, 161, 164.
Phortis ceylonensis MAYER 1910 p. 309.
Eirene ceylonensis KRAMP 1936 p. 249.
Eirene ceylonensis KRAMP 1961 *a* p. 187 (all references).

Material:

"Dana"

St. 3645 12.I.29
42°32′ S. 174°50′ E.
S 150 600 m. w. **1**

St. 3712 18.V.29
12°44′ N. 110°45′ E.
S 150 600 m. w. **1**

St. 3722 29.V.29
25°11′ N. 122°35′ E.
S 200 100 m. w. **1**

St. 3934 20.XII.29
11°24′ S. 50°05′ E.
S 200 600 m. w. **1**

St. 3956 10.I.30
21°13′ S. 42°26′ E.
S 200 200 m. w. **1**

St. 3966 18.I.30
29°25′ S. 32°00′ E.
S 150 100 m. w. **5**
S 200 300 m. w. **1**

"Pacific"

St. 4761 19.IV.32
25°10′ N. 127°45′ E.
S 150 **1**

"Galathea"

St. 292 21.IV.51
Off Tranquebar, India
11°06′ N. 80°05′ E.
SN 50, near surface **5**

St. 319 6.V.51
Nancowry Harbour
Nicobars
SN 50 **7**

St. 327 11.V.51
Strait of Malacca
1°55′ N. 102°27′ E.
SN 50, surface **1**

St. 328 11.V.51
Strait of Malacca
1°35′ N. 103°01′ E.
SN 50 near surface **1**

St. 333 15.V.51
Off Singapore
SN 50, near surface **3**

St. 390 11.VI.51
Gulf of Siam
13°02′ N. 100°33′ E.
SN 50 30 m. w. **11**

St. 541 5.XI.51
Mouth of Moreton Bay,
East Australia
26°57′ S. 153°25′ E.
S 200 **1**

Dr. Th. Mortensen
Near Koh Samit, Siam,
1.II.1900, 1 specimen
Off Krakatau, Sunda
Strait, 4.VIII.22.
Surface. 2 specimens

This is the most common and widely distributed Indo-Pacific species of *Eirene*. The "Dana" collected it east of New Zealand (St. 3645), in the South China Sea (St. 3712), east of Formosa (St. 3722), where it was also taken by one of the merchant vessels (St. 4761), and in three localities near Madagascar and off Durban on the African coast (St. 3934, 3956, 3966). Some of these localities are rather far outside the previously known area of distribution, which was extended from North-East Australia to the west coast of India, including the Malayan Archipelago and the Bay of Bengal. The "Galathea" has taken it on the coast of India, at the Nicobar Islands, in the Gulf of Siam, in the Malacca Strait, and on the south coast of New Guinea. Dr. Th. Mortensen found it in the Gulf of Siam and in the Sunda Strait. The specimens collected by the "Galathea" were all taken near the surface of the water; by the "Dana" it was taken at different depths, with 100–600 m wire out. It was never taken in considerable numbers. The specimens vary in size between 5 and 17 mm; one specimen ("Galathea" St. 327) has 5 radial canals.

Distribution: Coastal waters in the Indo-West-Pacific Region from East Africa to New Zealand.

Eirene palkensis Browne.

Irene palkensis Browne 1905 *b* p. 141, Pl. 3 figs. 12–16.
Phortis palkensis Mayer 1910 p. 309.
Eirene palkensis Kramp 1936 p. 250 (bibliography).
Eirene palkensis Kramp 1961 *a* p. 190 (all references).
Eirene palkensis Kramp 1962 *a* p. 335.

Material:

"Dana"

St. 3768 24.VII.29
1°20′ S. 138°42′ E.
E 300 2500 m. w. **1**

St. 3903 17.XI.29
5°50′ N. 93°28′ E.
S 200 600 m. w. **1**

"Galathea"

St. 292 21.IV.51
Off Tranquebar, India
11°06′ N. 80°05′ E.
SN 50, near surface **1**

St. 327 11.V.51
Strait of Malacca
1°55′ N. 102°27′ E.
SN 50, surface **1**

St. 390 11.VI.51
Gulf of Siam
13°02′ N. 100°33′ E.
SN 50 30 m. w. **3**

St. 393 11.VI.51
Gulf of Siam
13°09′ N. 100°45′ E.
SN 50 6. m. w. **1**

Dr. Th. Mortensen
Toeal, Kei Islands
3.IV.22, surface,
c. **130** specimens
Near Koh Samit, Siam
1.II.1900, **2** specim.

The specimens taken in deep-sea hauls by the "Dana" were undoubtedly caught at higher levels during the hauling in of the nets; the localities were north of New Guinea (St. 3768) and south of the Nicobars (St. 3903). The localities listed above are all within the previously known area of distribution, which comprises the waters from North-East Australia through the Malayan Archipelago to Amoy in China and westwards to Ceylon, besides a single record from Natal on the south-east coast of Africa.

The specimens vary in diameter from 4 to 19 mm. On one occasion the medusa was taken in great abundance, *viz.* when about 130 specimens were collected in a surface-water haul near the Kei Islands by Dr. TH. MORTENSEN; several of these specimens were abnormal, one or two of their radial canals being bifurcated or even divided into three diverging branches.

Distribution: Coastal waters in the Indo-West-Pacific Region from East Africa to North-East Australia.

Eirene menoni KRAMP.

Irene ceylonensis ANNANDALE 1907 p. 79, Pl. 2 fig. 5.
Phortis sp. MENON 1932 p. 18.
Phortis lactea LING 1937 p. 357, figs. 9, 10.
Eirene ceylonensis,"smaller type" NAIR 1951 p. 64.
Eirene menoni KRAMP 1953 p. 286, Pl. 2 fig. 6.
? *Phortis lactea* CHIU 1954 *b* pp. 52, 59.
Eirene menoni KRAMP 1958 p. 353.
Eirene menoni KRAMP 1961 *a* p. 189.
Eirene menoni KRAMP 1962 *a* p. 336.

Material:

"Dana"

St. 3578 20.X.28
20°19′ S. 157°20′ W.
S 150 300 m. w. 1

St. 3658 5.II.29
33°52′ S. 151°27′ E.
S 150 150 m. w. 1

St. 3919 8.XII.29
0°07′ S. 63°56′ E.
S 200 50 m. w. 1

St. 3966 18.I.30
29°25′ S. 32°00′ E.
S 150 100 m. w. 1

"Galathea"

St. 327 11.V.51
Strait of Malacca
1°55′ N. 102°27′ E.
SN 50, surface 5

St. 328 11.V.51
Strait of Malacca
1°35′ N. 103°01′ E.
SN 50, surface 12

St. 333 15.V.51
Off Singapore
SN 50 30 m. w. 3

St. 381 8.VI.51
Gulf of Siam
7°00′ N. 103°18′ E.
SN 50 1

Dr. TH. MORTENSEN
Koh Chang, Siam, 16–17.I.1900, 2 specimens

The four localities, where this species was collected by the "Dana", are in very distant geographical areas, *viz* near Tahiti in Polynesia (St. 3578), near Sydney in Australia (St. 3658), between the Maldives and the Seychelles in the Indian Ocean (St. 3919), and off Durban in South-East Africa (St. 3966). On the other hand, the "Galathea" found it only within a restricted area, the Malacca Strait and the Gulf of Siam, where it had also been found by Dr. TH. MORTENSEN. It was previously known from the coasts of India and Vietnam and from the Chekiang Coast in China. It was always taken in the upper water layers and in small numbers only.

In the well-preserved specimens from the "Galathea" the tentacles are counted as follows:

Diameter, mm	4	5	6	7	8	9	10	11
	31	33	36	33	41–46	39–41	38–42	31

Within these size-limits, accordingly, no remarkable increase takes place in the number of tentacles, which is in accordance with the fact that young bulbs are rarely seen between the fully developed tentacles.

A somewhat similar medusa was taken by the "Galathea" on the east coast of Malaya and described in a preliminary paper (KRAMP 1959 *c* p. 255, fig. 18) as *Eirene brevigona*; the holotype was 6 mm wide and had 24 tentacles and 7 young bulbs; the species was mainly characterized by its remarkably short, oval gonads situated in the middle portion of the radial canals. As in *E. menoni* the tentacle bulbs are destitute of

excretional papillae. In the present collection of *E. menoni* I have not seen any specimens which might indicate a transition between the two species. One of the two specimens taken by Dr. TH. MORTENSEN in the Gulf of Siam, is a typical *E. menoni*, 8 mm wide, with 44 tentacles and elongated gonads; the other is a young individual, 5 mm wide with 30 tentacles; its gonads are short and placed in the middle portion of the radial canals, but they are tender and linear, evidently in a juvenile stage of development, thus quite distinct from the gonads of *E. brevigona*. Moreover both specimens possess the long and prominent, pointed mouth lips with crenulated margin characteristic of *E. menoni* in contradistinction to the short and simple lips in *E. brevigona*. I feel sure, therefore, that these two species should be kept separate.

Distribution: Coastal waters in the Indo-West-Pacific Region from East Africa to Polynesia.

Eirene mollis TORREY.

Irene mollis TORREY 1909 p. 26, fig. 11.
partim Eirene viridula MAYER 1910 p. 311.
Eirene mollis FOERSTER 1923 p. 262.
Eirene mollis KRAMP 1936 p. 250 (bibliography).
Eirene mollis KRAMP 1961 *a* p. 189.

Material:

Dr. TH. MORTENSEN: Strait of Georgia in the Vancouver Island region, west coast of North America. June 1915, surface, **1** specimen. 19.VII.1915, in deep water, **1** specimen.

The specimen taken at the surface is 12 mm wide and has about 60 tentacles and as many marginal vesicles; the specimen which was taken "in deep water" (but probably caught at higher levels) is 17 mm wide. I agree with FOERSTER (1923) that this is a valid species. It was first described from San Diego in California and has now for the first time been observed again, in a locality considerably farther north on the American coast.

Distribution: Pacific coast of North America, San Diego to the Vancouver Island region.

Eirene hexanemalis (GOETTE).

Irenopsis hexanemalis GOETTE 1886 p. 832.
Irenopsis hexanemalis MAYER 1910 p. 310, fig. 171.
Eirene hexanemalis KRAMP 1936 p. 248 (bibliography).
Eirene hexanemalis KRAMP 1961 *a* p. 188 (all references since 1910).
Eirene hexanemalis KRAMP 1961 *b* p. 201.
Eirene hexanemalis KRAMP 1962 *a* p. 337.

Material:

"Dana"
St. 3900 9.XI.29
4°41′ N. 98°13′ E.
S 200 50 m. w. **70**
S 200 100 m. w. **29**

St. 3913 1.XII.29
6°36′ N. 79°06′ E.
S 200 100 m. w. **1**

St. 3966 18.I.30
29°25′ S. 32°00′ E.
S 150 100 m. w. **1**
S 150 200 m. w. **1**

St. 3972 30.I.30
36°09′ S. 21°52′ E.
S 200 50 m. w. **1**

"Galathea"
St. 325 10.V.51
Strait of Malacca
4°30′ N. 98°54′ E.
SN 50, near surface **3**

St. 326 10.V.51
Strait of Malacca
2°38′ N. 101°22′ E.
SN 50, near surface **5**

St. 328 11.V.51
Strait of Malacca
1°35′ N. 103°01′ E.
SN 50, near surface **1**

St. 361 31.V.51
Near Singapore
TOT 40 m. w. **4**

St. 373 7.VI.51
Off Kerteh, Malacca, anchorage
4°30′ N. 103°28′ E.
SN 50 **1**

St. 381 8.VI.51
Gulf of Siam
7°00′ N. 103°18′ E.
SN 50 **1**

St. 390 11.VI.51
Gulf of Siam
13°02′ N. 100°33′ E.
SN 50 50 m. w. **5**

St. 399 21.VI.51
N.E. of Singapore
1°46′ N. 104°25′ E.
SN 50 16 m. w. **6**

St. 425 29–30.VII.51
Bucas Grande Island, Philippines
9°40′ N. 125°55′ E.
SN 50 16 m. w. **11**

St. 428 30–31.VII.51
Candos Bay, Mindanao
9°36′ N. 125°46′ E.
SN 50 16 m. w. **77**

St. 436 9.VIII.51
E. of Cebu, Philippines
10°12′ N. 124°14′ E.
S 100 **1**

St. 442 16.VIII.51
Bugo, Cagayan, Mindanao
8°01′ N. 124°44′ E.
SN 50 **1**

St. 454 25.VIII.51
Java Sea
5°23′ S. 116°02′ E.
SN 50 15 m. w. **3**

St. 512 7.X.51
Solomon Islands
9°25′ S. 160°00′ E.
SN 50 10 m. w. **1**

St. 514 8.X.51
Solomon Islands
9°25′ S. 160°00′ E.
SN 50 12 m. w. **1**

St. 536 4.XI.51
N.E. Australia
22°07′ S. 153°55′ E.
SN 50 **1**

St. 541 5.XI.51
Moreton Bay, East Australia
26°57′ S. 153°25′ E.
S 200 **1**

Dr. TH. MORTENSEN
Samboanga, Philippines
7°25′ N. 123°14′ E.
9.III.14, surface, **6** specimens

Corea Strait, Japan
34°10′ N. 129°09′ E.
17.V.14, **1** specimen

Toeal, Kei Islands, about 5° S. 133° E.
3.IV.22, **109** specimens

Off Leiden Island, Batavia Bay, Java.
26.VII.22, **2** specimens

Java Sea
8°01′ S. 115°02′ E.
10.IV.29, surface, **1** specimen

This is a very common medusa in the Indo-West-Pacific Region, up to now recorded from many localities between the Maldive Islands and North-East Australia and northwards to southern Japan and Chefoo in China. Besides in numerous localities within the same regions it has now been found on the southern coasts of Africa ("Dana" St. 3966 and 3972), somewhat more southerly than known before, off the east coast of Australia ("Galathea" St. 536 and 541), and among the Solomon Islands in Melanesia ("Galathea" St. 512 and 514). It was always taken in the upper water layers, frequently very near the surface. As a rule, only one or a few specimens were found, but occasionally great quantities were taken in a single haul, and in such case all stages of development were represented, from very young to nearly or fully adult individuals. This applies to the samples taken by the "Dana" St. 3900 in the Macassar Strait (about 70 specimens, 4–8 mm wide, in November), "Galathea" St. 428 in the Philippines (77 specimens, 1–16 mm wide, in July), and by Dr. TH. MORTENSEN at the Kei Islands (109 specimens, 3–12 mm wide, in April). Apparently, the occurrence of such big shoals of individuals in different developmental stages is independent of the seasons of the year, at least in these truly tropical waters.

The most remarkable feature of this species is that the number of radial canals is normally six, but with considerable variation; in almost all records in the literature this variability is mentioned. E. T. BROWNE, who gave a detailed description of this medusa (1905 pp. 142–144, Pl. 1 fig. 4, Pl. 3 figs. 5–8), rightly remarked: "When a medusa has normally six radial canals, a variation in number may be expected", and among 27 specimens he found 21 with the normal number of six radial canals, the others showing a numerical variation from 4 to 11. In the extensive material from the Great Barrier Reef (KRAMP 1953 p. 281), comprising 224 specimens 2–22 mm in diameter, I found the following numbers of radial canals:

Number of radial canals ..	4	5	6	7	8
Number of specimens	2	16	186	19	1
% number of specimens...	0.9	7.1	83.0	8.5	0.4

I also called attention to the remarkable fact that the variants were grouped very regularly towards both sides, in contrast to the variation in *Phialucium carolinae*, where the curve of variation has two summits, and I stated that there is no correlation between the number of radial canals and the size of the specimens, except that in very young stages, less than 2 mm wide, the number is always four. These observations are fully confirmed by the present material.

In a particularly fine sample from the Philippines ("Galathea" St. 428), comprising 77 specimens, 0.8–16 mm wide, the whole development could be followed; it is illustrated in the adjacent figures (figs. 5 *a–i*).

In very young stages the umbrella is higher than broad and has a very thick gelatinous substance, the apical jelly representing more than half the entire height of the umbrella, usually somewhat pear-shaped, later on

more broadly rounded (fig. 5 *a* and *b*); during the further development the umbrella is gradually more expanded. The stomach is short and prismatic with four prominent perradial ridges, the four oral lips already remarkably prominent and pointed, in contrast e.g. to young stages of *Phialidium*. A low and broad gastric peduncle begins to appear when the specimen is about 2 mm wide (fig. 5 *b*). While only 1 mm wide the medusa has four perradial tentacles, two opposite each other being somewhat larger than the two others (fig. 5 *c*), but very soon four interradial tentacles are developed, and tiny knob-shaped rudiments appear in the middle of the spaces between adjacent tentacles (fig. 5 *d* and *e*). The development of the two additional radial canals takes place, when the medusa is 1.5–2 mm wide, issuing as interradial outgrowths from the upper part of the stomach wall, proceeding outwards towards the bell margin, and it is remarkable that they are

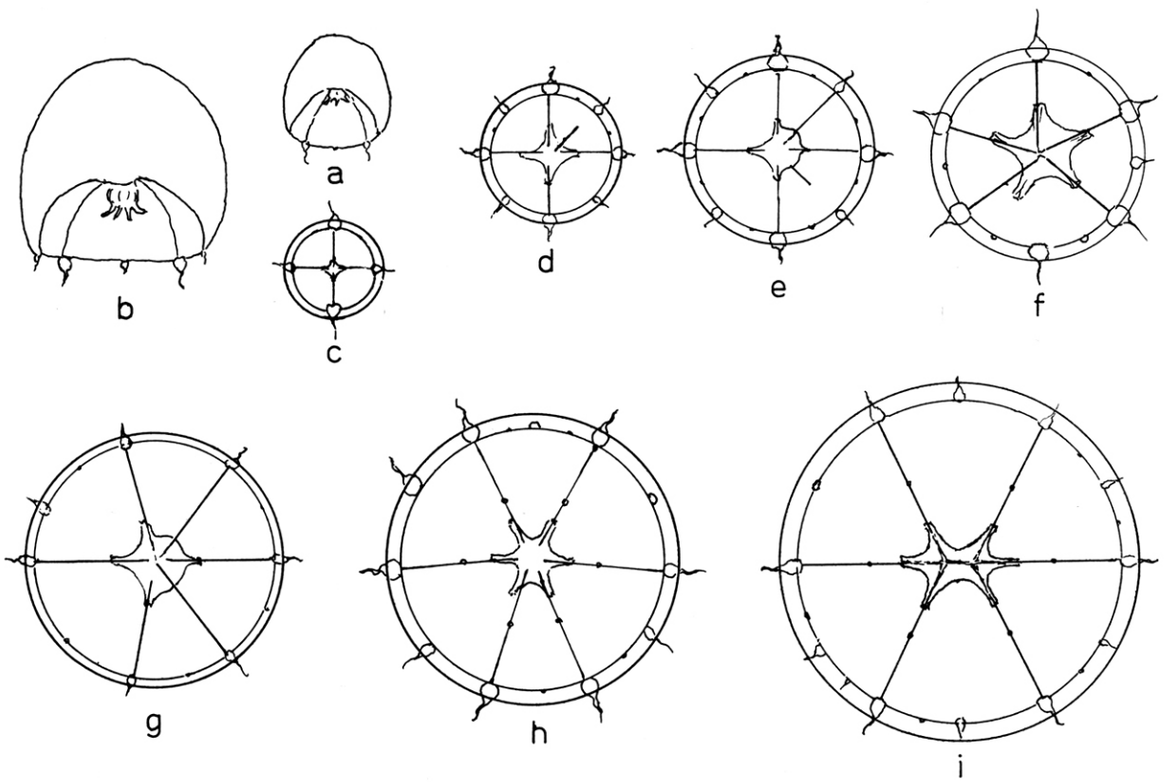


Fig. 5. Developmental stages of *Eirene hexanemalis*. For explanation, see text.

formed in two neighbouring quadrants, not opposite each other (fig. 5 *d* and *e*). One of them is developed before the other, and during the development of these canals the corresponding sides of the stomach wall are bulging out (fig. 5 *e* and *g*), a process finally to result in the formation of two longitudinal ridges as sharp as the four primary ridges of the stomach wall (fig. 5 *h* and *i*). Fig. 5 *f* is of an abnormal individual, 2 mm wide, with five ridges in the stomach, five radial canals, but with six fully developed tentacles. When the final number of (normally) six radial canals has been obtained, the distance between the canals is gradually regulated, until they are about equidistant (fig. 5 *i*); fig. 5 *g* shows a transitional stage towards this condition in a specimen, 2.5 mm wide. An examination of several samples has shown that the development of additional canals beyond the original four takes place before the diameter of the medusa is 4 mm; in specimens above this size the final number has been obtained, and if another number than six is stated, this indicates individual variation.

Even in specimens with the normal number of six radial canals irregularities may occur in the position of the canals, in so far as they are not equidistant, as expressed by the number of tentacles between adjacent canals, as in the following examples:

Diam. mm	Number of tentacles in each section						Total
6	3	3	3	1	3	3	16
6	5	5	4	7	4	3	28
10	9	5	4	6	7	6	37
10	7	7	6	7	6	9	42
11	7	9	7	6	3	2	34
11	5	3	4	7	5	6	30
14	4	6	8	6	7	5	36
15	10	7	10	5	4	3	39

In a specimen with 5 radial canals, 6 mm wide, the distribution of the tentacles was: 6 5 4 1 3, and in another with 7 radial canals: 3 2 5 5 4 5 7; in this specimen the stomach was rather asymmetrical.

The total number of fully developed tentacles in relation to diameter of umbrella is somewhat variable; in a number of specimens picked out at random I have counted:

Diam. mm	Number of tentacles
6	16–28
7	17–36
9	23–28
10	26–42
11	22–34
14–15	32–40

When the medusa is about 3.5 mm wide the gonads make their first appearance as tiny dots in the middle points of the radial canals (fig. 5 *h*); during further growth they are gradually displaced towards the umbrella margin. When the diameter is 8–9 mm, the gonads have attained an oval shape and are situated at a distance from the stomach of $^2/_3$ to $^3/_4$ of the length of the radial canals, at a diameter of about 15 mm they are linear, 2.5 mm long and placed in the distal parts of the radial canals, very near the ring canal.

The general features of this medusa are well known from former descriptions and need no further comments in this place, but I have been fortunate enough to possess an extensive material, in which it was possible to follow the development of the medusa from very young stages to the adult age. It would be desirable also to find the corresponding hydroid, which evidently must have a strictly littoral habitat.

Distribution: Coastal waters in the Indo-West-Pacific Region from South and East Africa to Australia and Melanesia; southern China and Japan.

Genus **Helgicirrha.**

The genus *Helgicirrha* was established in a short note by HARTLAUB (1909 *a*) as distinct from *Eirene*, Eschscholtz, 1829, *Helgicirrha* being provided with cirri at the base of the tentacle bulbs, whereas true cirri are absent in *Eirene*. Subsequent authors, however, continually confounded the two genera, until KÜNNE (1934) called attention to HARTLAUB's note and further elucidated the matter, especially referring to the two North-European species, *Eirene viridula* (PÉRON & LESUEUR) and *Helgicirrha schultzei* HARTLAUB. This induced me to take up a discussion of all the species which might be referred to the two genera and unravel their complicated history (KRAMP 1936); a complete bibliography was given for each species. In my "Synopsis" (KRAMP 1961 *a*) only papers published later than 1910 are quoted.

We may now recognize five species of *Helgicirrha*. Two of them, *H. cari* (HAECKEL) and *H. schultzei* HARTLAUB, occur in the Mediterranean and the eastern Atlantic. *H. medusifera* (BIGELOW) was described from the Pacific coast of Mexico and has now been found again in the Gulf of Panama (see below). *H. danduensis* (BIGELOW) seems to be a rare species, described from the Maldive Islands and found again at the Nicobars by the "Galathea" (KRAMP 1959 *c*), perhaps also on the coast of Vietnam (KRAMP 1962 *a* p. 338), but *H. malayensis* (STIASNY) is widely distributed in the Indo-West-Pacific Region. The species belonging to this genus thus are inhabitants of three widely separated geographical areas.

Helgicirrha medusifera (BIGELOW).

Eirene medusifera BIGELOW 1909 p. 161, Pl. 37 figs. 1–8.
Helgicirrha medusifera KRAMP 1936 p. 255 (bibliography).

Material:

Taboquilla, Panama, 3.I.1916, surface. TH. MORTENSEN. 5 specimens.

The specimens are 7–13 mm in diameter; the peduncle is slender, about as long as the radius of the umbrella; the stomach is short, the oral lips fairly large and folded. Gonads along the distal one-third of the radial canals. There are about 16 fully developed tentacles with swollen basal bulbs, and in the spaces between successive tentacles 3–5 small bulbs, the median one larger than the others, indicating that it may be developed into a tentacle; cirri are present on some of the young bulbs as well as on the bulbs of the fully developed tentacles. The specimens agree quite well with the description of *Helgicirrha medusifera*, and I refer them to this species, though in their present condition they carry no medusa buds.

Distribution: Pacific coast of Central America.

Helgicirrha malayensis (STIASNY).

Eirene malayensis STIASNY 1928 p. 210, fig. 1.
Eirene malayensis MENON 1932 p. 20, Pl. 3 fig. 23
Eirene madrasensis MENON 1932 p. 20, Pl. 3 fig. 24.
Helgicirrha malayensis KRAMP 1936 p. 255.
Helgicirrha malayensis CHOW & HUANG 1958 pp. 183, 189, Pl. 3 figs. 29, 30.
Helgicirrha malayensis KRAMP 1961 *a* p. 192 (all references).
Helgicirrha malayensis KRAMP 1962 *a* p. 338.

Material:

"Dana"
St. 3809 4.IX.29
6°22′ S. 105°12′ E.
S 200 300 m. w. **1**

"Galathea"
St. 305 26.IV.51
Bay of Bengal
20°51′ N. 87°58′ E.
S 100, 10 m below surface **1**

St. 390 11.VI.51
Gulf of Siam
13°02′ N. 100°33′ E.
SN 50 30 m. w. **3**

St. 399 21.VIII.51
N.E. of Singapore
1°46′ N. 104°25′ E.
SN 50 7 m. w. **1**

Muskat on the Arabian coast of Gulf of Oman, one specimen belonging to the British Museum, collected by R. KIRKPATRICK.

"Dana" St. 3809 is in the Sunda Strait between Java and Sumatra; the specimen is 7 mm wide and has about 22 tentacles. The specimen from "Galathea" St. 305 is 12 mm wide, those from St. 390 3, 4 and 11 mm; the two small ones are not determined with certainty. The specimen from St. 399 is abnormal, and I am not sure of its identification; it is 7 mm in diameter and has 6 radial canals, 9 tentacles and 28 young bulbs, with cirri; no gonads.

The figures by STIASNY and MENON show only part of the bell margin; the only existing figure of the whole medusa is that given by CHOW & HUANG in Acta Zoologica Sinica, vol. 10. I therefore add some figures drawn by me after a specimen from Muskat in the Gulf of Oman, borrowed from the British Museum. The specimen (fig. 6) is remarkably well preserved, 23 mm in diameter; it has 38 fully developed tentacles, well

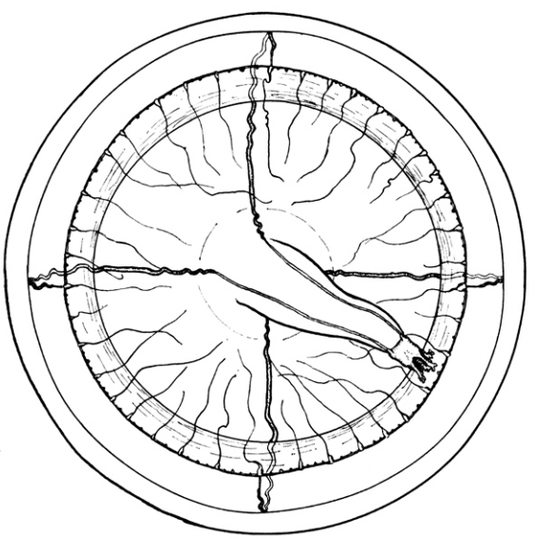


Fig. 6. *Helgicirrha malayensis*.
Specimen in the British Museum (Nat. Hist.), London.

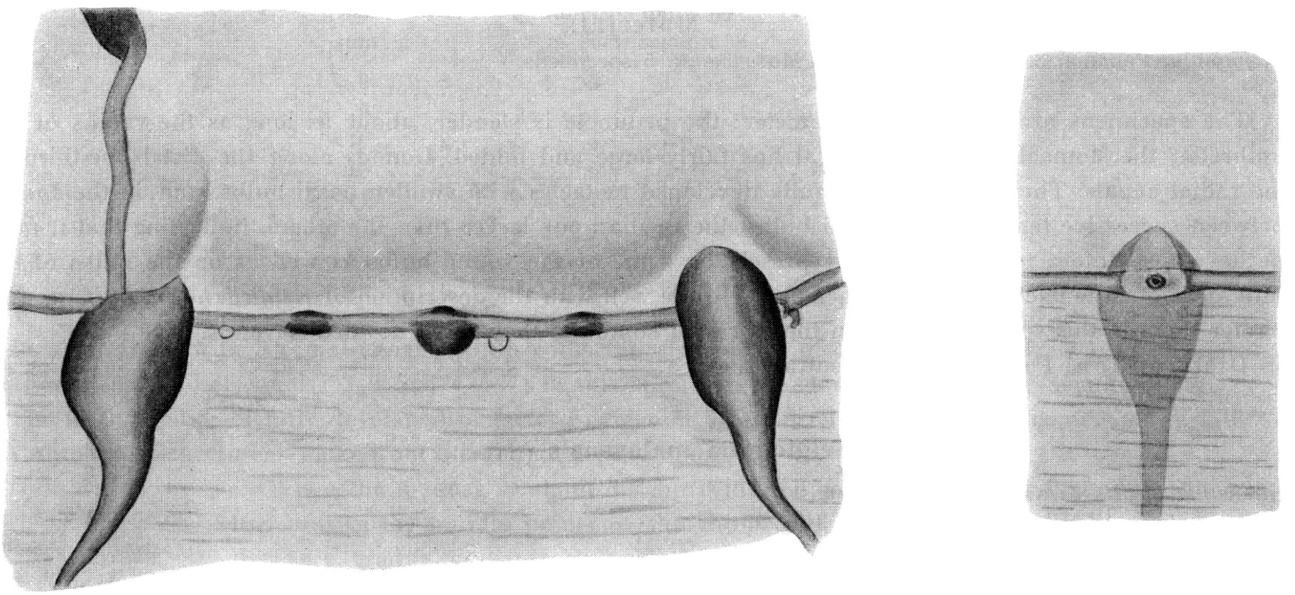


Fig. 7. Marginal organs of *Helgicirrha malayensis*. *a* abaxial view, showing tentacle bulbs (one with a lateral cirrus), three rudimentar bulbs, and two marginal vesicles. *b* adaxial view of tentacle bulb, showing excretional pore.

extended; between each successive pair of tentacles there is usually one small marginal bulb, occasionally three, and if so the median one is somewhat larger than the others (fig. 7 *a*); one or two marginal vesicles between the tentacles. As seen in fig. 7 *a* the abaxial side of the tentacle bulb protrudes somewhat upwards on the exumbrella, forming a short abaxial spur. Fig. 7 *b* presents an adaxial view of a tentacle bulb showing the excretorial pore, which is not mounted on a distinct papilla. The figure of the whole medusa (fig. 6) also shows the narrow, linear gonads extending from very near the ring canal continuing along the uppermost part of the peduncle.

Counts of tentacles and rudimentary bulbs and their succession of development, based on extensive collections from the Great Barrier Reef in N.E. Australia and from the Mergui Archipelago, are given in two earlier papers (KRAMP 1953 p. 286 and 1958 p. 355).

Distribution: Coastal waters in the Indo-West-Pacific Region from Arabia to N.E. Australia and Chefoo in China.

Phialopsis diegensis TORREY.

Phialopsis diegensis TORREY 1909 p. 23, fig. 9.
Phialopsis diegensis RUSSELL 1953 p. 333, Pl. 20 fig. 5, textfigs. 213, 214.
Phialopsis diegensis KRAMP 1957 *a* pp. 35, 125 (map of distribution).
Phialopsis diegensis KRAMP 1961 *a* p. 193 (all references).

Material:

"Dana" St. 3966, off Durban, S.E. Africa, 29°25′ S. 32°00′ E. 18.I.30. S 150, 100 m. w. 1 specimen.

The specimen is 10 mm wide and has 16 tentacles.

The distribution of this species is interesting. It was originally described from San Diego in California, but the only subsequent record from the Pacific is from a locality south-west of the Galapagos Islands (BIGELOW 1909 p. 163, as *Eirene viridula*). On the other hand, it is widely distributed in the Atlantic Ocean, mainly in its eastern parts, from about 35° S. to 60° N. It evidently has its principal occurrence in the Atlantic, where it is not restricted to the coastal waters, and from the Atlantic its area of distribution has been extended, partly to the eastern Pacific, partly to the western part of the Indian Ocean, where it has been found

in a few localities south-east of South Africa and off Somali Land (KRAMP 1957 *a*, map fig. 7), and now we can add one more locality off the east coast of Africa, near Durban.

Distribution: Atlantic Ocean from about 35° S. to 60° N.; eastern Pacific; western part of Indian Ocean; partly oceanic.

Fam. **Eutimidae.**

Genus **Eutima.**

This is an interesting genus from a zoogeographical point of view. Apart from two doubtful species (*E. gentiana* HAECKEL 1879 and *E. cuculata* BROOKS 1883) the species are well characterized, and if they are tolerably well preserved the identification is not difficult. Eleven species are known, and the occurrence of five species is entirely restricted to the Atlantic and adjacent waters, while six species belong to the Indo-West-Pacific Region; none is common to both areas, and no species of *Eutima* is recorded with certainty from the eastern Pacific. *E. levuca* (AGASSIZ & MAYER), it is true, was recorded from the Pacific coast of Mexico (BIGELOW 1909 p. 165, Pl. 5 figs. 2, 3, Pl. 35 figs. 1, 2), but as stated by FOERSTER (1923 p. 261) and KRAMP (1953 p. 288) the young medusae observed by BIGELOW in this locality cannot be referred to this species. The possibility exists, however, that they were young stages of some other species of *Eutima*, perhaps the West-Indian *E. variabilis* MCCRADY; if this be the case this is one among many other instances of Atlantic-Pacific faunistic communication during an earlier period, when the isthmus of Panama had not been formed, and when there was direct communication between the two oceans. Apparently, none of the Indo-West-Pacific species of *Eutima* has extended its distribution to the eastern Pacific.

Four of the Indo-West-Pacific species of *Eutima* are represented in the present collections.

Eutima levuca (AGASSIZ & MAYER).

Eutimeta levuca AGASSIZ & MAYER 1899 p. 163, Pl. 9 figs. 30, 31.
Eutimeta lactea BIGELOW 1904 p. 253, Pl. 2 figs. 7, 8.
Eutima levuca MAYER 1910 p. 301.
Eutima levuca KRAMP 1953 p. 288.
Eutima levuca KRAMP 1961 *a* p. 197 (all references since 1910).
Eutima levuca KRAMP 1962 *a* p. 339.

Material:

"Dana"

St. 3678 24.III.29
4°05′ S. 128°16′ E.
S 150 50 m. w. 1
S 150 300 m. w. 18
S 150 600 m. w. 2
S 150 1000 m. w. 2

St. 3722 29.V.29
25°11′ N. 122°35′ E.
S 200 100 m. w. 1

St. 3739 2.VII.29
3°20′ N. 123°50′ E.
S 200 300 m. w. 1

St. 3751 12.VII.29
3°40.5′ N. 137°53′ E.
S 200 300 m. w. 5

St. 3768 24.VII.29
1°20′ S. 138°42′ E.
S 200 700 m. w. 1

St. 3809 4.IX.29
6°22′ S. 105°12′ E.
S 200 300 m. w. 2

St. 3817 11.IX.29
2°15′ S. 98°55.5′ E.
S 200 300 m. w. 1

St. 3844 11.X.29
12°05′ S. 96°45′ E.
S 200 50 m. w. 1

St. 3953 8.I.30
16°12′ S. 42°04′ E.
S 200 100 m. w. 1

St. 3967 18.I.30
29°44′ S. 31°18′ E.
S 200 100 m. w. 1

"Galathea"

St. 319 6.V.51
Nancowry Harbour, Nicobars
SN 50 2

St. 428 30–31.VII.51
Candos Bay, Mindanao
9°36′ N. 125°46′ E.
SN 50 1

St. 541 5.XI.51
Off Brisbane, East-Australia
26°57′ S. 153°25′ E.
S 200 surface 1

The "Dana" collected this species in some scattered localities within the Malayan Archipelago and also as far north as near the north point of Formosa (St. 3722), and near the Cocos Islands south-west of Sumatra; further at two stations off the east coast of Africa (St. 3953 and 3967). The "Galathea" found it at the Nico-

bars and the Philippines; it was previously known from the Great Barrier Reef in North-East Australia and was now taken further south, off Brisbane. It was usually taken in small numbers only and apparently mainly at some distance below the surface, though the specimens from the two deepest hauls at "Dana" St. 3678 were undoubtedly caught at higher levels during the hauling in of the nets; it was fairly common in the hauls with 300 m wire at the same station. The medusa may be up to 15 mm wide, but almost all the specimens in the present collections are less than 7 mm in diameter; it is characteristic that the gonads are as a rule well developed, even in small individuals 3 mm wide. The gonads on the subumbrella are developed before those on the peduncle.

Distribution: Coastal waters in the Indo-West-Pacific Region, from East Africa to the Fiji Isles, northwards to Formosa; east coast of Australia.

Eutima orientalis (Browne).

Octorchis orientalis Browne 1905 *b* p. 139, Pl. 3 fig. 4.
Eutima orientalis Mayer 1910 p. 299.
Eutima orientalis Kramp 1961 *a* p. 198 (all references).
Eutima orientalis Kramp 1962 *a* p. 340.

Material:

"Dana"						"Galathea"	
St. 3634	2.I.29	St. 3689	9.IV.29	St. 3958	11.I.30	St. 414	17.VII.51
36°31′ S.	174°50.5′ E.	7°13.5′ N.	111°49′ E.	23°11′ S.	42°54′ E.	Dinagat, Philippines	
P 50	200 m. w. 1	S 150	300 m. w. 1	S 200	500 m. w. 1	10°20′ N.	125°32′ E.
St. 3680	27.III.29	St. 3722	29.V.29			SN 50	16 m. w. 1
2°22′ S.	126°58.5′ E.	25°11′ N.	122°35′ E.			S 100	20 m. w. 4
S 150	50 m. w. 1	S 200	100 m. w. 1				

Vanhöffen (1913 *b* p. 23) considered this species identical with the West-Atlantic *E. mira* McCrady, and since then the two species have frequently been confounded; their history is dealt with in an earlier paper (Kramp 1958 p. 357). It is known from a number of localities on the coasts of India and Ceylon and the Nicobars, and has recently been recorded from the coast of Vietnam (Kramp 1962 *a*). The "Dana" has taken it in the South China Sea (St. 3689), near the north point of Formosa (St. 3522), near Amboina (St. 3680) and in a locality much farther east, near the north coast of New Zealand (St. 3634), and also much farther west, on the west coast of Madagascar (St. 3958), never more than one specimen in each haul. The "Galathea" collected some specimens in the Philippines. It was taken in the upper water layers. The specimens varied from 4 to 6 mm in diameter.

Distribution: Coastal waters in the Indo-West-Pacific Region, from Africa to New Zealand, northwards to Formosa.

Eutima curva Browne.

Eutima curva Browne 1905 *b* p. 138, Pl. 3 figs. 1–3.
Eutima curva Mayer 1910 p. 300.
Eutima australis Mayer 1915 p. 201, Pl. 3 fig. 5.
Eutima curva Kramp 1953 pp. 288, 311.
Eutima curva Kramp 1961 *a* p. 195.
Eutima curva Kramp 1961 *b* p. 201.

Material:

"Dana"		"Pacific"		"Galathea"			
St. 3921	11.XII.29	St. 4815	10.I.35	St. 319	6.V.51	St. 446	18.VIII.51
3°36′ S.	58°19′ E.	15°55′ N.	112°55′ E.	Nancowry Harbour,		Basilan, Philippines	
S 200	100 m. w. 1	S 150	201 m. w. 2	Nicobars, anchorage		6°42′ N.	121°58′ E.
				SN 50	2	SN 50	7

This species was previously recorded from three localities only: Ceylon (BROWNE 1905 *b*), the Torres Strait (MAYER 1915), and on two occasions from the Great Barrier Reef in north-eastern Australia (KRAMP 1953 and 1961 *b*). The "Galathea" found it near the Nicobars and the Philippines, and two specimens were taken in the South China Sea by the merchant vessel "Pacific" (St. 4815), connecting the localities whence the species was recorded before; the "Dana" collected it farther west, near the Seychelles (St. 3921).

Distribution: Coastal waters in the Indo-West-Pacific Region from the Seychelles to N.E. Australia.

Eutima japonica UCHIDA.

Eutima japonica UCHIDA 1925 p. 93, fig. 17.
Eutima japonica YAMASI 1958 p. 136.
Eutima japonica KRAMP 1961 *a* p. 197.

Material:

"Falstria" St. 4804, 5.VI.34. 39°43′ N. 167°55′ W. S 200, 183 m. w. 1 specimen.

This characteristic species is recorded from three localities in southern Japan: Misaki, Yunahama, and Tanabe Bay. It is interesting that it was taken by the merchant vessel "Falstria" (St. 4804) in the central part of the North Pacific, far away from any coastal areas. The specimen is 7 mm wide; the four gonads are well developed, extending from near the ring canal to a short distance down the basal part of the peduncle, just as described and figured by UCHIDA.

Distribution: Japan; central part of North Pacific.

Fam. **Aequoreidae.**

Genus **Aequorea.**

Apart from a few unidentifiable medusae, which have been referred to this genus, most of the many species of *Aequorea* are now well characterized and may be identified without much hesitation, if the specimens are in a tolerably good condition. Doubt may arise, of course, mainly due to their considerable variability, and for some of the species it is difficult to state their geographical distribution, because certain references in the literature are open to doubt. It is necessary, e.g., to disregard most of the records given by VANHÖFFEN, because he regarded several species as synonyms of *A. pensilis*. I also regret that F. S. RUSSELL, up to 1953, regarded *A. macrodactyla* as a variety of *A. pensilis*; the two species are quite distinct (KRAMP 1953 pp. 294–298). Both are richly represented in the "Dana" collections and confirm my view in this respect.

For the identification of the species the numbers of radial canals and tentacles are of great importance, but numerical overlapping frequently occurs. In case of doubt, however, the configuration of the tentacle bulbs may be decisive, as also the degree of development of excretory papillae. In some cases the relative width of the stomach is a characteristic feature. In the "Dana" collection some of the samples contain only the stomachs of the medusae, the peripheral portions of the umbrella with the marginal organs being completely destroyed; in this case it seems risky to say anything definite about the specific affinity. The numerical variations have been dealt with by several authors, and some examples are given in the following. The examination of the extensive and generally well preserved collection from the Great Barrier Reef (KRAMP 1953) has made me so well acquainted with several Indo-Pacific species of *Aequorea* that I was seldom in doubt as to the identification of the species in the "Dana" collection, provided that the characteristic features were more or less distinguishable. Seven species are represented, most of them in considerable numbers. Some of the species have an extensive distribution in the three great oceans, others are distinctly Indo-West-Pacific.

Aequorea coerulescens (BRANDT).

Zygodactyla (*Mesonema*) *coerulescens* BRANDT 1838 p. 360.
Aequorea coerulescens BIGELOW 1909 p. 177, Pl. 4 fig. 4, Pl. 35 figs. 3–8.
Aequorea coerulescens UCHIDA 1927 *b* p. 222, fig. 2.
Aequorea coerulescens KRAMP 1957 *a* pp. 40, 97, 124.
Aequorea coerulescens KRAMP 1961 *a* p. 205 (all references since 1910).

Material:

"Dana"

St. 3585 31.X.28
7°46′ S. 167°10′ W.
S 150 300 m. w. **7**
P 100 400 m. w. **26**
S 150 600 m. w. **3**
S 150 3000 m. w. **1**

St. 3800 18.VIII.29
7°53′ S. 116°18′ E.
S 200 300 m. w. **1**

St. 3809 4.IX.29
6°22′ S. 105°12′ E.
S 200 50 m. w. **2**
S 200 300 m. w. **1**

St. 3844 11.X.29
12°05′ S. 96°45′ E.
S 200 50 m. w. **10**
S 200 300 m. w. **4**

St. 3860 20.X.29
2°57′ S. 99°36′ E.
S 200 600 m. w. **1**

St. 3937 22.XII.29
9°26′ S. 46°05′ E.
S 200 400 m. w. **2**

St. 3950 7.I.30
12°23′ S. 41°43.5′ E.
S 200 300 m. w. **1**

St. 3966 18.I.30
29°25′ S. 32°00′ E.
S 150 200 m. w. **1**

"Galathea"

St. 313 2.V.51
Bay of Bengal
19°53′ N. 89°05′ E.
S 100, 5–10 m below surface, **1** specimen

St. 541 5.XI.51
Moreton Bay, off Brisbane
26°57′ S. 153°25′ E.
S 200 surface **2**

TH. MORTENSEN
Philippines
7°25′ N. 123°14′ E.
10.III.14. Ringtrawl, 300 m. w. **1** specimen

? Misaki, Japan. 20.VI.14. Surface. **1** specimen

This is one of the species which occurs in all of the three great oceans, though in the Atlantic it has only been found in two localities in the southern parts, South-West Africa (RANSON 1949 p. 128) and at the Falkland Islands (KRAMP 1957 *a* p. 40); it is generally distributed in the coastal waters of the Indian Ocean, and in the Pacific it occurs in the eastern as well as in the western parts. As a matter of fact, the previous records in the literature are rather few, comprising four localities on the Pacific coast of South America, one in the central North Pacific, some in Japan, and Chefoo in China. It has never before been found within the extensive area, where it was collected by the "Dana" and the "Galathea". The "Dana" found a considerable number of specimens at different depths at St. 3585 in Polynesia, in some localities around Java and Sumatra (St. 3800–3860), and at three stations off the east coast of Africa (St. 3937–3966). With the exception of St. 3585 it was taken in small numbers only. The "Galathea" found a few specimens in the Bay of Bengal and near the east coast of Australia, and one was taken by Dr. TH. MORTENSEN in the Sulu Sea, Philippines.

Most of the specimens were small ones, some of them no more than 3 mm in diameter; only occasionally were larger ones observed (25 mm, St. 3585, or 40 mm, St. 3809 and 3966). In all stages, however, this species may be distinguished from all other Indo-Pacific species of *Aequorea* by its numerous tentacles. According to the literature adult specimens are generally 60–80 mm wide, but exceptionally they may attain a size of 145 mm.

Evidently, this species belongs to the coastal waters, and most specimens were taken in the upper water layers, in hauls with 50 to 300 or 400 m wire. There is no indication of difference in size of the individuals in relation to depth.

One large medusa, taken by Dr. TH. MORTENSEN near Misaki in Japan, may belong to *A. coerulescens*. It is about 120 mm wide, disk-shaped with inturned margin and with a thick and rather soft jelly (thus quite different from *A. pensilis* which has a remarkably firm jelly); the stomach is about 65 mm in diameter, and there are about 120 radial canals with very thick and undulating gonads. Unfortunately, the marginal organs have entirely disappeared, so that it is impossible to decide, whether the tentacles have been numerous or few. I am inclined to think that the specimen belongs to *A. coerulescens*, which has frequently been recorded from Japan, but without knowing the number of tentacles it cannot be identified with certainty.

Distribution: Coastal waters in the warm parts of the eastern and western Pacific, the Indian Ocean and southern Atlantic.

Aequorea macrodactyla (Brandt).

Mesonema macrodactylum Brandt 1835 p. 21.
Aequorea maldivensis Browne 1905 *a* p. 732, Pl. 56 figs. 4–12.
Mesonema macrodactylum Maas 1905 p. 40, Pl. 8 figs. 51, 54.
Aequorea macrodactylum Bigelow 1909 p. 174, Pl. 36.
Aequorea macrodactylum Bigelow 1919 p. 313, Pl. 43 fig. 7.
Aequorea macrodactyla Kramp 1953 pp. 294, 297.
Aequorea pensilis Russell 1953 p. 355, Pl. 33 figs. 1–5.
Aequorea macrodactyla Kramp 1957 *a* pp. 38, 97, 124.
Aequorea macrodactyla Kramp 1961 *a* p. 207 (all reference since 1910).
Aequorea macrodactyla Kramp 1961 *b* p. 202, fig. 4.
Aequorea macrodactyla Kramp 1962 *a* p. 340.

"Dana" Material:

St. 3550 4–5.IX.28
7°10′ N. 78°15′ W.
S 150 600 m. w. **1**
S 150 1000 m. w. **10**

St. 3556 14.IX.28
2°52′ N. 87°38′ W.
S 150 600 m. w. **1**
S 150 1000 m. w. **1**
S 150 2000 m. w. **4**

St. 3558 18.IX.28
0°18′ S. 99°07′ W.
S 150 2000 m. w. **16**
S 150 3000 m. w. **21**

St. 3582 27.X.28
15°36′ S. 168°57′ W.
S 150 50 m. w. **1**
S 150 300 m. w. **1**

St. 3588 3.XI.28
13°10′ S. 173°20′ W.
S 150 300 m. w. **1**

St. 3591 8.XI.28
15°03′ S. 175°30′ W.
S 150 300 m. w. **1**

St. 3602 22.XI.28
20°00′ S. 174°29′ E.
S 150 2000 m. w. **1**

St. 3611 26.XI.28
20°53.2′ S. 164°03.3′ E.
S 150 50 m. w. **16**
S 150 100 m. w. **1**
S 150 600 m. w. **1**

St. 3613 28.XI.28
22°43′ S. 166°05.8′ E.
P 100 2000 m. w. **1**

St. 3621 8.XII.28
25°47′ S. 172°24′ E.
S 150 2000 m. w. **4**
S 150 4000 m. w. **3**

St. 3620 7.XII.28
24°46.5′ S. 170°18.5′ E.
Dip-net, surface **26**
S 150 50 m. w. **205**
S 150 100 m. w. **174**
S 150 300 m. w. **159**
S 150 600 m. w. **279**
E 300 1000 m. w. **27**

St. 3622 8.XII.28
25°54′ S. 172°36.9′ E.
S 200 100 m. w. **1**
S 200 200 m. w. **2**

St. 3623 9.XII.28
27°21′ S. 175°11′ E.
S 50 surface **3**
S 150 50 m. w. **16**
S 150 100 m. w. **9**
P 100 200 m. w. **5**
S 150 300 m. w. **3**
S 150 600 m. w. **4**
P 100 800 m. w. **3**

St. 3624 10.XII.28
28°19.5′ S. 176°56′ E.
28°17.6′ S. 177°01′ E.
P 100 100 m. w. **1**
E 300 1000 m. w. **1**
P 100 4000 m. w. **1**

St. 3625 11.XII.28
29°40′ S. 179°34′ E.
S 150 100 m. w. **1**

St. 3627 14.XII.28
30°08′ S. 176°50′ W.
S 200 600 m. w. **1**
S 150 2000 m. w. **25**

St. 3641 8.I.29
43°40′ S. 176°36′ E.
S 150 100 m. w. **2**

St. 3653 26.I.29
33°30.5′ S. 165°53′ E.
S 150 50 m. w. **1**
S 150 100 m. w. **3**
S 150 300 m. w. **4**
S 150 600 m. w. **1**

St. 3654 27.I.29
33°28′ S. 161°45′ E.
S 150 100 m. w. **1**

St. 3656 29.I.29
33°26′ S. 157°02′ E.
S 150 2000 m. w. **6**
S 150 3000 m. w. **1**

St. 3663 23.II.29
33°33′ S. 154°04′ E.
S 150 3000 m. w. **4**
S 150 4000 m. w. **1**

St. 3664 24.II.29
31°42.5′ S. 156°09′ E.
S 150 800 m. w. **1**

St. 3692 11.IV.29
9°59′ N. 107°23.5′ E.
S 150 50 m. w. **1**

St. 3728 12.VI.29
24°15′ N. 122°00′ E.
S 200 100 m. w. **1**

St. 3731 17.VI.29
14°37′ N. 119°52′ E.
E 300 2000 m. w. **1**

St. 3736 28.VI.29
9°17′ N. 123°58′ E.
S 150 2000 m. w. **1**

St. 3800 18.VIII.29
7°53′ S. 116°18′ E.
S 200 600 m. w. **1**

St. 3809 4.IX.29
6°22′ S. 105°12′ E.
S 200 50 m. w. **5**
S 200 300 m. w. **2**

St. 3814 9.IX.29
4°38′ S. 99°24′ E.
S 200 300 m. w. **2**

St. 3817 11.IX.29
2°15′ S. 98°55.5′ E.
S 200 100 m. w. **3**
S 200 300 m. w. **3**

St. 3824 15.IX.29
0°08′ S. 97°15′ E.
S 200 600 m. w. **1**

St. 3851 15.X.29
5°27′ S. 93°50′ E.
S 200 300 m. w. **8**

St. 3854 16.X.29
5°31′ S. 96°35′ E.
S 200 300 m. w. **2**

St. 3901 10.XI.29
4°20′ N. 98°47′ E.
S 200 50 m. w. **1**

St. 3917 5.XII.29
1°45′ N. 71°05′ E.
S 200 100 m. w. **1**

St. 3919 8.XII.29
0°07′ S. 63°56′ E.
S 200 50 m. w. **3**

St. 3924 14.XII.29
5°01′ S. 54°46′ E.
S 200 300 m. w. **1**

St. 3926 16.XII.29
8°27′ S. 50°54′ E.
S 200 600 m. w. **2**

St. 3933 20.XII.29
11°18′ S. 50°03′ E.
S 150 2500 m. w. **1**
E 300 3000 m. w. **1**

St. 3934 20–21.XII.29
11°24′ S. 50°05′ E.
S 200 300 m. w. **1**

St. 3935 21.XII.29
10°50′ S. 48°30′ E.
S 200 400 m. w. **1**

St. 3937 22.XII.29
9°26′ S. 46°05′ E.
S 200 200 m. w. **1**
S 200 500 m. w. **3**

St. 3948 6.I.30
10°11′ S. 41°57′ E.
S 200 200 m. w. **1**
S 200 300 m. w. **2**

St. 3949 6.I.30
11°33′ S. 41°44′ E.
S 200 300 m. w. **1**

St. 3951 7.I.30
14°16′ S. 41°48′ E.
S 200 50 m. w. **2**
S 200 100 m. w. **2**
S 200 300 m. w. **1**

St. 3953 8.I.30
16°12′ S. 42°04′ E.
S 200 500 m. w. **1**

St. 3954 9.I.30
16°53′ S. 42°12′ E.
S 200 300 m. w. **1**

St. 3955 9.I.30
18°30′ S. 42°18′ E.
S 200 300 m. w. **2**
S 200 500 m. w. **2**

St. 3956 10.I.30
21°13′ S. 42°26′ E.
S 200 500 m. w. **1**

St. 3958 11.I.30
23°11′ S. 42°54′ E.
S 200 200 m. w. **1**

St. 3959 12.I.30
23°40′ S. 43°02′ E.
S 200 500 m. w. **1**

St. 3964 15.I.30
25°19′ S. 36°13′ E.
S 200 300 m. w. **3**
E 300 3000 m. w. **2**

St. 3966 18.I.30
29°25′ S. 32°00′ E.
S 150 200 m. w. **3**

St. 3969 27.I.30
31°33′ S. 30°07′ E.
S 200 300 m. w. **1**

St. 3972 30.I.30
36°09′ S. 21°52′ E.
S 200 50 m. w. **1**

"Panama"
St. 4763 24.II.33
39°26′ S. 47°49′ E.
S 200 293 m. w. **38**

"Galathea"
St. 217 27.II.51
Mozambique Channel
14°20′ S. 45°09′ E.
DNLL, surface **1**

St. 218 28.II.51
Mozambique Channel
13°41′ S. 46°40′ E.
DNLL, surface **4**

St. 219 1.III.51
Off Cape Amber, Madagascar
11°43′ S. 49°09′ E.
TOT 300 m. w. **1**

St. 263 24.III.51
Off Mombasa, E. Africa
4°14′ S. 44°52′ E.
DNLL, surface **3**

St. 327 11.V.51
Strait of Malacca
1°55′ N. 102°27′ E.
SN 50, surface **1**

St. 328 11.V.51
Strait of Malacca
1°35′ N. 103°01′ E.
SN 50, surface **1**

St. 360 31.V.51
near Singapore
TOT 40 m. w. **2**

St. 373 6–7.VI.51
Off Kerteh, Malacca, anchorage
4°30′ N. 103°28′ E.
SN 50 **1**

St. 381 8.VI.51
Gulf of Siam
7°00′ N. 103°18′ E.
SN 50 **1**

St. 390 11.VI.51
Gulf of Siam
13°02′ N. 100°33′ E.
SN 50 **4**

St. 536 4.XI.51
Off Townsend, N.E. Australia
22°07′ S. 153°55′ E.
SN 50 **2**

St. 552 2.XII.51
Tasman Sea
36°00′ S. 150°29′ E.
S 100 **19**

St. 553 4.XII.51
Bass Strait
39°03′ S. 144°04′ E.
Dip-net, surface **7**
SN 50 **7**

Dr. Th. Mortensen
S. E. Australia
38°05′ S. 149°45′ E., 11.IX.14
surface, **2** specimens
38°12′ S. 149°40′ E., 16.IX.14
surface, **4** specimens

Aequorea macrodactyla has a very extensive, though somewhat scattered, geographical distribution, and its occurrence is not restricted to coastal waters. As demonstrated below its vertical distribution is also very extensive. In the eastern Atlantic it occurs near the south-western coasts of the British Isles and off the west coast of Africa, in the western Atlantic it is recorded from the West-Indies and from the southern parts of South America. In the Pacific it occurs in the eastern tropical parts and from Japan to Australia. It has been found in several localities in the Malayan Archipelago, in the central part of the Indian Ocean, and south-east of Africa.

The "Dana" collected several specimens in the eastern Pacific from the Gulf of Panama and westwards (St. 3550–3558) and found it at numerous stations within an extensive area, from which it was entirely unknown before, *viz.* among the Melanesian Islands and east of New Zealand, and in the Tasman Sea; the

"Galathea" also found a few specimens off the north-east coast of Australia, and Dr. TH. MORTENSEN took it as far south as at the entrance to Bass Strait where numerous specimens were also collected by the "Galathea" (St. 552 and 553, see below). By the "Dana" the species was also collected in the Malayan Archipelago, northwards to Formosa, and in some off-shore localities south-west of Sumatra. It was taken at three stations from the Maldive Islands to the Seychelles (St. 3917 to 3924). The occurrence in numerous localities north and west of Madagascar, where the species had not been observed before is of particular interest; it was also taken near Durban and above the Agulhas Bank south of Africa (St. 3972). The merchant vessel "Panama" collected several specimens at a considerable distance from S.E. Africa (St. 4763). In the waters east of Africa it was also taken by the "Galathea", and this expedition found it at particularly many stations in the Strait of Malacca and in the Gulf of Siam. The known area of distribution of this species has been greatly augmented by the "Dana" collections, and we may say that it is generally distributed in the coastal waters as well as at some distance from the coasts, from East Africa to Samoa; but there is still a peculiar interruption in its Pacific occurrence, in so far as it seems to be completely absent among the Polynesian Islands, though it is common in Melanesia and also within an extensive area west of South America.

Though *A. macrodactyla* was collected in a very large number of localities by the "Dana" and the "Galathea", it was usually taken in small numbers only. In some localities, however, several specimens were captured, and these localities are very scattered. The list above shows that the stations, where more than five specimens were taken in a single haul, are: two stations outside Panama (St. 3550 and 3558), five stations in the area east of Australia (St. 3611, 3620, 3623, 3727, and 3626), one station west of Sumatra (St. 3851), and St. 4763 south-east of Africa.

Aequorea macrodactyla has an extensive vertical distribution. There is no reason to believe that specimens taken in deep hauls were captured at higher levels during the hauling in of the nets; the medusa is evidently almost equally common at all depths from the surface down to at least 2000 metres. I especially wish to call attention to St. 3623, north of New Zealand, where specimens were taken in every haul (except in one with the large, open-meshed ringtrawl, E 300, with 1000 m wire out). At St. 3558 in the eastern Pacific several specimens were taken in the hauls with 2000 and 3000 m wire, none in any of the many hauls at higher levels; a similar example is presented at St. 3627 in the Kermadec Trench.

As far as the size of the specimens is concerned there is a remarkable similarity at different depths as seen from the following table, based on measurements of a great number of specimens from samples, which may be regarded as representative.

Size of specimens taken at different depths:

m wire out	Diameter of specimens, mm	
	width of variation	average
0–5	3–35	15
100	3–46	14
200–400	2–45	14
500–600	5–28	14
800–1000	4–18	11
2000	6–37	14
3000–4000	6–13	11

As seen from these figures young stages as well as adult medusae were taken at all depths, and the average size was about the same. The specimens collected in the 50 cm silk net by the "Galathea" were mainly small ones, but large specimens, 50–74 mm wide, were taken in dip-nets (DNLL) at St. 217, 218 and 263 off the east coast of Africa. Some remarks on these specimens are given below.

A particularly interesting catch was made at "Dana" St. 3620, south-east of New Caledonia. No less than 880 specimens of *A. macrodactyla* were taken in six hauls at different depths.

The size of the specimens in these samples was as follows:

m wire out	Gear	Number of specimens	Diameter mm
surface	dip-net	26	7–56
50	S 150	205	2–25
100	S 150	174	3–23
300	S 150	159	3–30
600	S 150	279	4–29
1000	E 300	27	10–38

The surface sample was taken with the dip-net, and as in the samples from the "Galathea" mentioned above particularly large specimens were collected by this appliance. The other samples confirm the above statements that the medusa was about equally common at all depths, and the specimens were of about equal size at any depth.

Individual variation. A representative sample comprising 60 specimens from "Dana" St. 3620 and the total number of 30 specimens from "Galathea" St. 552 and 553 near the coast of S.E. Australia have been measured with the following results:

"Dana" St. 3620

Diameter of umbrella mm	Width of stomach mm	Number of radial canals width of variation	Number of radial canals average	Number of tentacles width of variation	Number of tentacles average
4– 5.....	1.5–3	21–37	31	3–4	3.5
7–10.....	3–7	31–41	36	4–6	3.7
11–15.....	7–9	35–58	46	4–6	5
16–20.....	8–15	32–56	45	4–10	7
21–25.....	11–14	35–56	45	6–10	7.2
25–30.....	11–16	35–58	49	7–11	8.5
31–50.....	15–28	41–61	53	8–20	16
51–61.....	21–28	31–56	47	12–19	15

"Galathea" St. 552 and 553

Diameter of umbrella mm	Width of stomach mm	Number of radial canals width of variation	Number of radial canals average	Number of tentacles width of variation	Number of tentacles average
7–10.....	3.5–7	33–63	43	4–17	7.3
12–19.....	7–10	38–127	73	4–13	8.5
21–30.....	14–19	54–114	71	9–35	18
31–39.....	20–24	38–100	68	11–25	18.5
44–48.....	19–21	86–118	102	35	35

As far as the number of radial canals is concerned there is a remarkable difference between these two samples. I therefore re-examined the samples and found that the identification of the species is beyond any doubt. For comparison I collected all available records in the literature and measurements of specimens from scattered localities in the "Dana" and "Galathea" collections. Let it first be remarked that no noticeable differences may be pointed out in material from different geographical regions, except that the radial canals seem to be particularly numerous in specimens of the isolated population in north-eastern Atlantic (by RUSSELL, 1953, referred to *A. pensilis*), but everywhere the variations are very considerable. When all available data are collected (those from N.E. Atlantic excluded), the figures are as follows:

Diameter of umbrella mm	Number of radial canals	Number of tentacles
5–10.....	21–42	4–18
10–20.....	27–100	5–23
20–30.....	23–103	7–29
30–40.....	52–105	12–30
40–50.....	69–93	17–34
50–60.....	70–106	17–24
60–70.....	83–118	17–22

In the table from "Dana" St. 3620 the variations in numbers of radial canals as well as of tentacles are within these same limits. In the table for "Galathea" St. 552 and 553 the same applies to the variations in number of tentacles, but as far as the radial canals are concerned the minimum as well as maximum numbers are considerably greater; the average numbers, however, fall within the limits of variation in material from other parts of the world. New radial canals (and tentacles) are continually added during the growth of the individuals, and at any stage of growth a number of the radial canals actually present may be distinguished as recent additions, being much narrower than the older ones and still destitute of gonads, sometimes even ending blindly at some distance from the stomach. It should be remarked that such recently developed radial canals are present in particularly great numbers in the specimens from "Galathea" St. 552 and 553. We may suggest, perhaps, that these specimens, which were collected in a shallow-water area very near the coast (of southern Australia), were living under especially favourable food-conditions, which may have accelerated the formation of additional canals leading from the stomach to the ring canal.

Some young stages, by transitions connected with larger ones. The very young medusae have a thick jelly and are more or less highly vaulted. The young specimens were all collected by the "Galathea". As seen from the following survey the development of tentacles and radial canals proceeds rather irregularly even in such young stages. A particularly interesting series of four specimens, 1.1–1.9 mm in diameter, was taken at St. 390 in the Gulf of Siam; they are described as follows:

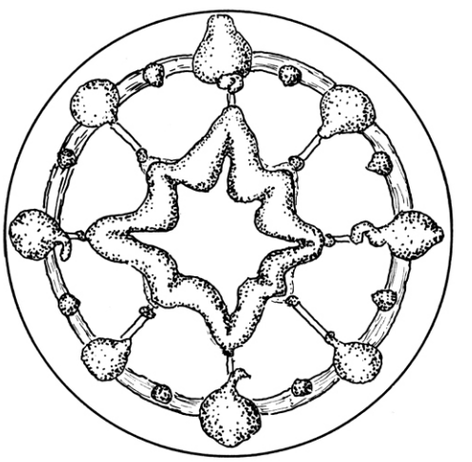


Fig. 8. *Aequorea macrodactyla.* Young stage, 1.7 mm wide, oral view.

Diam. 1.1 mm, 4 tentacles with large basal bulbs (perradial) and 4 large young bulbs without tentacles (interradial), no more young bulbs present; mouth with 4 broad lips; 4 radial canals leading to the four tentacles.

Diam. 1.7 mm (fig. 8), 8 tentacles, four of them with somewhat larger basal bulbs than the others, and 8 young bulbs (adradial), all fairly large and of equal size; 8 radial canals, from stomach to margin, each of them with a tiny vestige of gonad immediately outside the lobes of the octagonal stomach; mouth-opening broad, with 8 broad lips, four of them (opposite to the four largest tentacles) larger than the four others.

Diam. 1.8 mm, height 1.5 mm, of which the apical jelly represents the half; 8 tentacles with large, broad basal bulbs and 4 very small young bulbs; 8 complete radial canals, each with a basal tiny vestige of gonad; mouth with 8 large lips.

Diam. 1.9 mm, height 2 mm, the apical jelly making $^2/_3$ of the total height; 8 tentacles and 4 very small young bulbs; 8 radial canals, no gonads visible; mouth with 8 lips, four of which are larger than the others.

Slightly older stages show remarkable numerical variations:

Station no.	Diam. mm	Radial canals	Tentacles fully developed	Young tentacle bulbs
373.....	2	12	7	9 of different sizes
327.....	2.5	4 complete, 4 blind, $^1/_2$–$^3/_4$ r, interradial, and one very short, adradial	2	2 large perradial, 4 smaller interradial, 8 very small adradial
381.....	4.5	56, some of them very narrow	8	45 of different sizes
328.....	6	10, with young gonads, two of them narrow	8	24, in each octant three, the median one slightly larger than the two others

In specimens up to 4 or 5 mm wide marginal vesicles generally alternate with the marginal bulbs.

Colours of some large specimens seen alive. The specimens were taken in the dip-net while floating at the surface, 24.III.1951 by night, "Galathea" St. 263 off Mombasa in East Africa. They were 55, 60 and 68 mm in diameter. The walls of the stomach were pink, the gonads greyish-blue or violet, the ring canal and the tentacle bulbs greyish-pink, the filiform portions of the well-extended and very long tentacles greyish-violet. The largest of these specimens, 68 mm wide, had about 118 radial canals and 22 tentacles of different size (irregularly distributed) ; the stomach was 45 mm wide.

Distribution: Eastern tropical Pacific; Melanesian Islands and the Tasman Sea; Indo-Malayan coastal waters, Formosa, Japan; western parts of the Indian Ocean from the Maldive Islands to Madagascar and the east coast of Africa; off south-eastern Africa. Within the Atlantic area the occurrence seems to be somewhat scattered: off the west coast of Africa; off the southern part of the east coast of South America; the Caribbean Sea; an isolated population occurs off the south-western coasts of the British Isles.

Aequorea pensilis (Eschscholtz).

Medusa non descripta Forskål 1776, Pl. 28 fig. B.
Medusa coelum pensile Modeer 1791 p. 32.
Mesonema coelum pensile Eschscholtz 1829 p. 112.
Mesonema pensile Haeckel 1879 p. 226.
Mesonema pensile Browne 1905 *a* p. 733, Pl. 55 fig. 4, Pl. 57 figs. 2–9.
Mesonema pensile Maas 1905 p. 42, Pl. 8 fig. 52.
Mesonema pensile Bigelow 1909 p. 173.
Aequorea pensilis Mayer 1910 p. 333.
Aequorea pensile Bigelow 1919 p. 311, Pl. 42 figs. 3, 4.
Aequorea pensilis Kramp 1961 *a* p. 208 (all references since 1910).
Aequorea pensilis Kramp 1961 *b* p. 202.
Aequorea pensilis Kramp 1962 *a* p. 340.

"Dana" Material:

St. 3679	26.III.29	St. 3800	18.VIII.29	St. 3824	15.IX.29	St. 3854	16.X.29
Amboina harbour		7°53′ S.	116°18′ E.	0°08′ S.	97°15′ E.	5°31′ S.	96°35′ E.
surface	1	S 200	300 m. w. 1	S 200	100 m. w. 1	S 200	400 m. w. 1
				St. 3828	18.IX.29		
St. 3692	11.IV.29	St. 3815	10.IX.29	1°53′ N.	96°07′ E.	St. 3860	20.X.29
9°59′ N.	107°23.5′ E.	3°36′ S.	97°37′ E.	S 200	100 m. w. 2	2°57′ S.	99°36′ E.
S 150	50 m. w. 3	S 200	300 m. w. 2	S 200	300 m. w. 2	S 200	300 m. w. 1
				S 150	2000 m. w. 1		
St. 3731	16.VI.29	St. 3821	14.IX.29	St. 3830	19.IX.29	St. 3893	6.XI.29
14°37′ N.	119°52′ E.	0°51.5′ S.	99°24.5′ E.	2°36′ N.	96°31′ E.	5°59′ N.	92°29′ E.
E 300	300 m. w. 1	S 200	100 m. w. 2	S 200	300 m. w. 1	S 200	300 m. w. 2

St. 3900 9.XI.29
4°41′ N. 98°13′ E.
S 200 100 m. w. **3**

St. 3902 17.XI.29
6°05′ N. 95°30′ E.
E 300 1000 m. w. **1**

St. 3905 19.XI.29
4°44′ N. 88°05.5′ E.
S 200 300 m. w. **1**

St. 3910 23.XI.29
5°28′ N. 80°00′ E.
S 200 300 m. w. **1**
S 200 600 m. w. **1**

St. 3913 1.XII.29
6°36′ N. 79°06′ E.
S 200 600 m. w. **1**

St. 3914 2.XII.29
4°52′ N. 77°08′ E.
S 200 600 m. w. **1**

St. 3922 12.XII.29
3°45′ S. 56°33′ E.
S 200 100 m. w. **2**

St. 3926 16.XII.29
8°27′ S. 50°54′ E.
S 200 600 m. w. **1**

St. 3933 20.XII.29
11°18′ S. 50°03′ E.
S 150 3500 m. w. **1**

St. 3951 7.I.30
14°16′ S. 41°48′ E.
S 200 300 m. w. **3**

St. 3966 18.I.30
29°25′ S. 32°00′ E.
S 150 200 m. w. **1**

St. 3967 18.I.30
29°44′ S. 31°18′ E.
S 200 100 m. w. **2**

St. 3972 30.I.30
36°09′ S. 21°52′ E.
S 200 50 m. w. **1**
S 200 100 m. w. **2**

St. 3973 30.I.30
35°53′ S. 20°50′ E.
S 200 50 m. w. **1**

"Galathea"

St. 298 23.IV.51
Bay of Bengal
14°20′ N. 82°00′ E.
TOT 4900 m. w. **1**

St. 299 24.IV.51
Bay of Bengal
17°10′ N. 84°30′ E.
HOT 5300 m. w. **1**

St. 305 26.IV.51
Bay of Bengal
20°51′ N. 87°58′ E.
HOT 250 m. w. **1**

St. 446 18.VIII.51
Basilan Island, Philippines
6°42′ N. 121°58′ E.
Dip-net, surface **1**

St. 541 5.XI.51
Mouth of Moreton Bay, off Brisbane
26°57′ S. 153°25′ E.
S 200 surface **15**

Dr. TH. MORTENSEN

Koh Samit, Gulf of Siam 9.II.1900, **3** specimens

Amboina, Febr. 1922, surface, **26** specimens

Amboina, May 1922, fragments of a large specimen

Some historical remarks. The first who saw this medusa was P. FORSKÅL, who made an excellent drawing of it, published after his death by C. NIEBUHR (1776), without name or description. ESCHSCHOLTZ (1829) gave a description based on this drawing and introduced the name *Mesonema coelum pensile*, adopted from a somewhat remote work by MODEER (1791), adding that the medusa was probably derived from the Mediterranean. As a matter of fact, this species does not occur in the Mediterranean at all. FORSKÅL, it is true, collected several animals in the Mediterranean during his journey to Arabia, but he also made extensive collecting in the Red Sea, and it is much more probable that the medusa figured by him in Pl. 28 of the "Icones" was found in the Red Sea, where the species actually occurs. Unfortunately HAECKEL (1879) without reservation gave the place of origin of FORSKÅL's medusa as the Mediterranean, but as synonyms he included the obsolete Mediterranean species *Mesonema coerulescens* and *Stmobrachium mirabile* KÖLLIKER, 1853; for this combination he introduced the name *Mesonema pensile*, and since then HAECKEL has generally been quoted as the author of this specific name. As correctly pointed out by BROWNE, however (1905*a* p. 733) "HAECKEL's description of *Mesonema pensile* is based upon the description of three species, and consequently is of little value". Since the first adequate description based upon FORSKÅL's drawing is due to ESCHSCHOLTZ, I prefer to regard him as the author, in spite of the polynominal form of the name, which he adopted from MODEER. Later on the genus *Mesonema* ESCHSCHOLTZ, 1829, has been included in *Aequorea* PÉRON & LESUEUR, 1809, which was erected for *Medusa aequorea* FORSKÅL, 1775.

The first who have actually seen *Aequorea pensilis* since the days of FORSKÅL and given adequate descriptions and figures of it, are BROWNE (1905 *a*, from the Maldive Islands) and MAAS (1905, from Amboina). BIGELOW (1909 p. 173) briefly mentioned *Mesonema pensile*, and unfortunately he referred *Polycanna purpurostoma* AGASSIZ & MAYER (1899, from Fiji Islands, 1902 from Society Islands) and *Rhegmatodes lacteus* AGASSIZ & MAYER (1902, from Tahiti) to the same species, which is repeated by MAYER (1910 p. 333). Later on BIGELOW (1919) corrected this view, having seen *Aequorea pensilis* himself (from among the Philippines). As demonstrated below *A. pensilis* has never been observed further east than on the east coast of Australia.

The distribution of *Aequorea pensilis* is restricted to the coastal waters of the Indo-West-Pacific Region; up to now it was recorded from the Red Sea, the Iranian Gulf, the Maldives and the Chagos Islands, the coasts of India, the Mergui Islands, Vietnam, Japan, the Philippines, Amboina, and on the Great Barrier Reef in north-eastern Australia. The "Dana" has collected it at some scattered localities in the Malayan Archipelago and at numerous stations north and west of Sumatra, near Ceylon, and at several stations in an area, from which this species was unknown before, *viz* north and west of Madagascar and near the coast of South Africa off Durban and on the Agulhas Bank south of Africa; it was always taken in small numbers only. The "Galathea" found it at some localities in the Bay of Bengal and at the Philippines and also in the easternmost locality, from which this species has been observed, near Brisbane on the east coast of Australia, where 15 specimens were taken in a haul with the stramin net (see below). Dr. TH. MORTENSEN found it in the Gulf of Siam in 1900, and in 1922 he collected numerous specimens near Amboina, mainly large ones; they were particularly well preserved and will be further discussed below.

The "Dana" Expedition took this species mainly in hauls with 50, 100 and 300 m wire out. i. e. in the uppermost 200 m of water; evidently, the few specimens taken in deep hauls were captured at higher levels during the hauling in of the nets, and this probably also applies to the specimens taken by the "Galathea" in deep hauls with the large trawls in the Bay of Bengal; these appliances were difficult to handle and were frequently dragged for some time through the surface water alongside the ship before taken in. As a matter of fact, the medusa may be found swimming immediately at the surface as seen from the two big samples, "Galathea" St. 541 near Brisbane and the many specimens collected by Dr. MORTENSEN near Amboina.

There is no appreciable difference in size of the individuals from different depths, as summarized in the following figures derived from the "Dana" collection:

	Diameter of specimens	
m wire out	width of variation	average
0.....	52	52
50.....	13–65	31
100.....	9–90	32
200–400.....	10–55	32
600.....	23–52	35

The two samples collected near Amboina by Dr. TH. MORTENSEN and near Brisbane by the "Galathea" (St. 541) deserve special attention, most of the specimens being in a good state of preservation. The dimensions of the best preserved specimens are given in the following two tables; unfortunately, in some of the specimens from Brisbane it was impossible to count the tentacles exactly. In both tables the figures show a considerable individual variation. Comparison with the corresponding tables for the dimensions of *A. macrodactyla* confirm previous statements that numerical overlapping between the two species may occur, but in case of doubt the configuration of the tentacle bulbs is always of decisive importance. In *A. pensilis* the gelatinous substance is generally thick and rigid, more or less lense-shaped; in the larger specimens in the collection from Brisbane the jelly is up to 20 mm thick, and the umbrella margin is somewhat inward bent, which may influence the calculation of the relative width of the stomach and the umbrella; the measurements of the diameter of the umbrella in the tables comprise the actual diameter of the disk, including the mass of jelly which in the present state of contraction is beyond the inturned umbrella margin. The average width of the stomach in proportion to the umbrella diameter in the two samples is 0.63 in the sample from Brisbane, 0.65 in the sample from Amboina, thus a very good agreement.

Dimensions of specimens from Brisbane, "Galathea" St. 541:

diameter of umbrella, mm	diameter of stomach, mm	number of radial canals	number of tentacles
25	17	66	19
33	22	124	16
40	25	130	13
42	24	90	?
47	26	87	?
53	29	98	?
55	36	98	17
58	34	115	?
58	39	131	?
58	37	120	9
75	51	153	21
75	46	154	16
76	51	135	21

Dimensions of specimens from Amboina, TH. MORTENSEN.

diameter of umbrella mm	diameter of stomach mm	number of radial canals	number of tentacles
10	7	64	7
16	10	71	8
22	14	68	8
26	18	115	11
33	21	90	10
42	25	110	10
45	27	126	11
56	37	178	12
60	41	155	15
65	43	168	16
70	42	184	17
75	48	171	17

Distribution: Coastal waters of the Indo-West-Pacific Region from South and East Africa to the east coast of Australia.

Aequorea aequorea (FORSKÅL).

Medusa aequorea FORSKÅL 1775 p. 110.
Aequorea forskalea PÉRON & LESUEUR 1809 p. 336.
Aequorea aequorea KRAMP 1961 *a* p. 203 (all references since 1910).

Material:

"Dana"

St. 3623 9.XII.28 27°21′ S. 175°11′ E. E 300 1000 m. w. **1**

St. 3665 25.II.29 29°37.5′ S. 156°46′ E. S 150 100 m. w. **1**

St. 3957 11.I.30 21°30′ S. 42°32′ E. S 200 300 m. w. **1**

St. 3966 18.I.30 29°25′ S. 32°00′ E. S 150 100 m. w. **2**

St. 3969 27.I.30 31°33′ S. 30°07′ E. S 200 300 m. w. **1**

Dr. TH. MORTENSEN

Nanaimo, Puget Sound, Vancouver, June1915, surface, **10** specimens

Ruxton Passage, Vancouver Isl. 16.VII.15, surface, **2** specimens

I have always with some scepticism looked upon the records from Pacific waters of this medusa, which is widely distributed in the Atlantic and the Mediterranean, but I admit that it does occur in the Pacific as well as in the Indian Ocean, though it is far from being generally distributed in these oceans. It was recorded from the Vancouver Island region on the Pacific coast of North America (BIGELOW 1913 p. 38, FRASER 1916 p. 99, FOERSTER 1923 p. 263), and I have seen a specimen from the Iranian Gulf (KRAMP 1956 *b* p. 235). The present material comprises several specimens from Vancouver, collected by Dr. TH. MORTENSEN, and the "Dana" found a few specimens in five localities in southern latitudes in two widely separated areas: partly east of Australia (St. 3623 and 3665), partly in the waters off south-eastern Africa (St. 3957 on the west coast of Madagascar, St. 3966 and 3969 off Durban and Port St. Johns). The specimen from St. 3623, north of New Zealand, was taken in a haul with 1000 m wire out, but probably captured at higher levels during the hauling in of the net, in the other localities the medusa was taken in hauls with 100 or 300 m wire.

Aequorea aequorea is generally distributed in the coastal waters of the eastern Atlantic from Norway to South Africa, and evidently it has invaded the Indian Ocean south of Africa, following the West Wind Drift and its northward off-shoots, possibly by transportation of the hydroid attached to floating seaweed, but it has not yet been observed north of 20° southern latitude; it may be due to the swirl in the Tasman Sea that the medusa has been found north of New Zealand and off Brisbane in Australia.

For comparison with Atlantic and Mediterranean populations I give the dimensions of the present specimens. In all geographical regions this species is very variable, especially in number of tentacles, varying from half to twice as many as radial canals. When compared with the survey given by RUSSELL (1953 pp. 346 ff) the numerical dimensions of the present specimens, from the southern waters as well as from the Vancouver Island region, agree quite well with observations from other parts of the world, as seen from the following table. (In specimens less than about 20 mm wide some of the radial canals are narrow and destitute of gonads):

Locality	Diameter of umbrella mm	Diameter of stomach mm	Number of radial canals	Number of tentacles
"Dana" St. 3769.....	30	13	55	?
"Dana" St. 3623.....	30	15	35	?
"Dana" St. 3957.....	35	18	60	70
"Dana" St. 3665.....	43	?	80	35
"Dana" St. 3966.....	45	22	60	40
Vancouver, TH. M....	7	4	31	20
Vancouver, TH. M....	11	5	34	30
Vancouver, TH. M....	11	4	31	25
Vancouver, TH. M....	20	8	53	32
Vancouver, TH. M....	20	7	43	32
Vancouver, TH. M....	21	10	50	35
Vancouver, TH. M....	60	27	64	62

Distribution: Western Atlantic from Cape Cod to Florida and in Patagonia; eastern Atlantic generally distributed from Norway to South Africa; Mediterranean; South-East Africa and Madagascar; east coast of Australia and north of New Zealand; north-eastern Pacific.

Aequorea australis UCHIDA.

Aequorea australis UCHIDA 1947 *a* p. 307, fig. 8.
Aequorea australis KRAMP 1953 p. 290, fig. 7.
Aequorea australis CHOW & HUANG 1958 pp. 184, 189, Pl. 4 figs. 33, 34.
Aequorea australis KRAMP 1961 *a* p. 205.
Aequorea australis KRAMP 1961 *b* p. 202.

Material:

"Dana"

St. 3576 17.X.28
17°36.5′ S. 149°43.6′ W.
S 150 600 m. w. 1

St. 3582 27.X.28
15°36′ S. 168°57′ W.
S 150 100 m. w. 2
S 150 600 m. w. 1

St. 3587 2.XI.28
11°00′ S. 172°37′ W.
P 100 400 m. w. 1

St. 3590 7.XI.28
13°56′ S. 172°30′ W.
S 150 150 m. w. 2

St. 3601 20.XI.28
18°21′ S. 178°21′ E.
S 150 100 m. w. 3

St. 3602 22.XI.28
20°00′ S. 174°29′ E.
S 150 100 m. w. 1

St. 3611 26.XI.28
20°53.2′ S. 164°03.3′ E.
S 150 100 m. w. 14
S 150 300 m. w. 2
S 150 600 m. w. 2

St. 3678 24.III.29
4°05′ S. 128°16′ E.
S 150 50 m. w. 2

St. 3682 29.III.29
1°42′ N. 124°29′ E.
S 150 300 m. w. 1

St. 3683 3.IV.29
4°08′ N. 123°00′ E.
S 150 50 m. w. 1
S 150 100 m. w. 1

St. 3715 22.V.29
18°18′ N. 119°36′ E.
S 150 300 m. w. 1

St. 3731 17.VI.29
14°37′ N. 119°52′ E.
S 150 2500 m. w. 1

St. 3768 24.VII.29
1°20′ S. 138°42′ E.
S 200 700 m. w. 4

St. 3814 9.IX.29
4°38′ S. 99°24′ E.
S 200 300 m. w. 1

St. 3817 11.IX.29
2°15′ S. 98°55.5′ E.
S 200 600 m. w. 2

St. 3821 14.IX.29
0°51.5′ S. 99°24.5′ E.
S 200 100 m. w. 5
S 200 300 m. w. 10

St. 3824 15.IX.29
0°08′ S. 97°15′ E.
S 200 100 m. w. 1
S 200 300 m. w. 1

St. 3912 24.XI.29
6°52′ N. 79°30′ E.
E 300 1000 m. w. 1

St. 3929 18.XII.29
12°11′ S. 50°18′ E.
S 200 500 m. w. 1

St. 3937 22.XII.29
9°26′ S. 46°05′ E.
S 200 200 m. w. 1

St. 3938 23.XII.29
9°10′ S. 45°17′ E.
S 200 400 m. w. 2

St. 3939 23.XII.29
8°44′ S. 43°54′ E.
S 200 300 m. w. 1

St. 3944 26.XII.29
4°45′ S. 40°10′ E.
S 200 300 m. w. 1

St. 3948 6.I.30
10°11′ S. 41°57′ E.
S 200 200 m. w. 2
S 200 300 m. w. 1

St. 3950 7.I.30
12°23′ S. 41°43.5′ E.
S 200 200 m. w. 2
S 200 400 m. w. 1

St. 3953 8.I.30
16°12′ S. 42°04′ E.
S 200 200 m. w. 1

St. 3955 9.I.30
18°30′ S. 42°18′ E.
S 200 500 m. w. 1

St. 3956 10.I.30
21°13′ S. 42°26′ E.
S 200 200 m. w. 1
S 200 500 m. w. 3

St. 3964 15.I.30
25°19′ S. 36°13′ E.
S 200 300 m. w. 1

St. 3966 18.I.30
29°25′ S. 32°00′ E.
S 200 300 m. w. 1

St. 3972 30.I.30
36°09′ S. 21°52′ E.
S 200 100 m. w. 3

"Pacific"

St. 4772 12.IV.33
21°40′ N. 120°02′ E.
S 150 201 m. w. 1

"Galathea"

St. 536 4.XI.51
off Townsend, N.E. Australia
22°07′ S. 153°55′ E.
SN 50 1

Up to now this species was known from a few localities only: first described from the north coast of Australia and south coast of New Guinea (Uchida 1947 *a*), later on recorded from Chefoo in China (Chow & Huang 1958) and on two occasions from the Great Barrier Reef in North-East Australia (Kramp 1953 and 1961 *b*). As a matter of fact, the species has an extensive distribution in the coastal waters of the Indo-West Pacific Region. The "Dana" collected it at several stations among the Polynesian and Melanesian Islands, from Tahiti (St. 3576) to New Caledonia (St. 3611), in some scattered localities in the Malayan Archipelago (St. 3678–3768), west of Sumatra (St. 3814–3824), near Colombo (St. 3914), and it was found in numerous localities off the east coast of Africa from Mombasa to Durban (St. 3929–3966) and on the Agulhas Bank south of Africa (St. 3972). One of the merchant vessels found a specimen near the south point of Formosa, and one specimen was taken off North-East Australia by the "Galathea".

The medusa was usually taken in small numbers only (with two exceptions, St. 3611 and St. 3821); the majority were collected in hauls with 100 or 300 m wire out, but there were also several specimens in hauls with 500–600 m wire, which indicates that the vertical distribution of this species comprises the upper 300 m of the water layers or slightly more; the two specimens taken in very deep hauls at St. 3731 and 3912 were

presumably captured at higher levels. There is an indication of an increase in size of the individuals with increasing depth, as seen from the following table, but the differences may be more or less accidental:

m wire out	Diameter of specimens, mm: width of variation	Diameter of specimens, mm: average
50.....	5–9	(6)
100(–150)	3–46	12
200–300.....	8–38	15.5
400–700.....	12–42	17
1000.....	21	(21)
2500.....	31	(31)

All previous records are from shallow-water areas.

Some of the specimens are larger than seen before in this species; the original specimens described by UCHIDA were up to 25 mm in diameter, in the large collection from the Great Barrier Reef I saw them up to 33 mm wide; in the present collection three specimens are still larger, being 38, 42 and 46 mm wide. The two largest specimens have the following dimensions:

Diam. of umbrella, mm	Diam. of stomach, mm	Number of radial canals	Number of tentacles
42	20	c. 30	c. 30
46	20	c. 50	c. 40

Dimensions of specimens of other sizes were given in an earlier paper (KRAMP 1953 pp. 292–293), where I also made a comparison with *A. globosa*, the only species which from numerical aspects might be confounded with *A. australis*, and it was pointed out that in cases of doubt the distal position of the gonads and the presence of distinct excretory papillae in *A. australis* at once separate this species from *A. globosa*, in which such papillae are entirely absent. The comparatively small stomach and the number of tentacles being equal to or slightly smaller than that of the radial canals are characteristic features of *A. australis*. It was interesting to see that it has a far more extensive distribution than imagined before.

Distribution: Coastal waters in the Indo-West-Pacific Region, from East Africa to Tahiti, northwards to Chefoo in China, southwards to north-eastern Australia.

Aequorea globosa ESCHSCHOLTZ.

Aequorea globosa ESCHSCHOLTZ 1829 p. 110, Pl. 10 fig. 2.
Aequorea globosa MAAS 1905 p. 43, Pl. 8 figs. 48–50.
Aequorea globosa STIASNY 1928 p. 214.
Aequorea globosa KRAMP 1953 p. 293.
Aequorea globosa KRAMP 1961 *a* p. 206.
Aequorea globosa KRAMP 1962 *a* p. 341.

Material:

"Dana"		"Galathea"	
St. 3955	9.I.30	St. 512	7.X.51
18°30′ S.	42°18′ E.	Solomon Islands	
S 200	500 m. w. 1	9°25′ S.	160°00′ E.
		SN 50	10 m. w. 1

Up to now this characteristic species was known only from the Malayan Archipelago; it is interesting, therefore, that the "Galathea" found it among the Solomon Islands north-east of Australia, and a large specimen, 35 mm wide, was taken by the "Dana" in the Mozambique Channel, between Madagascar and the

east coast of Africa. This specimen is somewhat mutilated; the specimen from the Solomon Islands is 9 mm wide, with a very thick jelly, the stomach is 4 mm wide and has 25 distinct oral lips; there are 24 marginal tentacles with broad, almost globular basal bulbs, and 8 small, young bulbs; as previously stated, the tentacle bulbs of this species have no excretory papillae, in contradistinction to *A. australis* (KRAMP 1953); there are 13 radial canals with thick, cylindrical gonads along the greater part of their length. In young specimens of *A. globosa*, in which the gonads are still rather short, their position is adjacent to the stomach, another feature distinguishing this species from *A. australis* (KRAMP 1962 *a*).

A. globosa seems to be a somewhat rare species, but apparently it has an extensive distribution within the tropical parts of the Indo-West-Pacific Region.

Distribution: East coast of Africa; Malayan Archipelago; the Melanesian Islands.

Aequorea conica BROWNE.

Aequorea conica BROWNE 1905 *b* p. 145, Pl. 1 fig. 2, Pl. 2 figs. 16–18.
Aequorea conica KRAMP 1953 p. 289.
Aequorea conica KRAMP 1961 *a* p. 206 (all references).

Material:

"Dana"		"Galathea"	
St. 3967	18.I.30	St. 505	28.IX.51
29°44′ S.	31°18′ E.	Near Cape York, N. Australia	
S 200	100 m. w. **3**	10°35′ S.	142°09′ E.
		SN 50	**1**

The locality, where this species was collected by the "Dana", is near Durban on the south-east coast of Africa, far west of its previously known area of distribution; it was recorded from the coasts of India, some localities in the Malayan Archipelago, Amoy in China, and the Great Barrier Reef in north-eastern Australia; the "Galathea" found it near Cape York in North Australia.

I have previously dealt with this species at some length (KRAMP 1953); it is a small medusa, up to 9 mm wide, with a conical, very thick apical mass of jelly. A very characteristic feature is the shape of the gonads, which are strongly laterally compressed, leaf-shaped; it is also characteristic that the oral lips are long and pointed.

The present specimens are 5–6 mm in diameter and have 10–16 radial canals. In the Australian specimen there are 24 marginal bulbs of different size, those opposite the 16 radial canals being larger than the others. One of the specimens from Durban, 6 mm wide, has 21 tentacles and about 10 young bulbs; in the other specimens most of the tentacles are lost.

Distribution: Mozambique Channel; coastal waters of India and the Malayan Archipelago; Amoy in China; North Australia.

Aequorea sp.

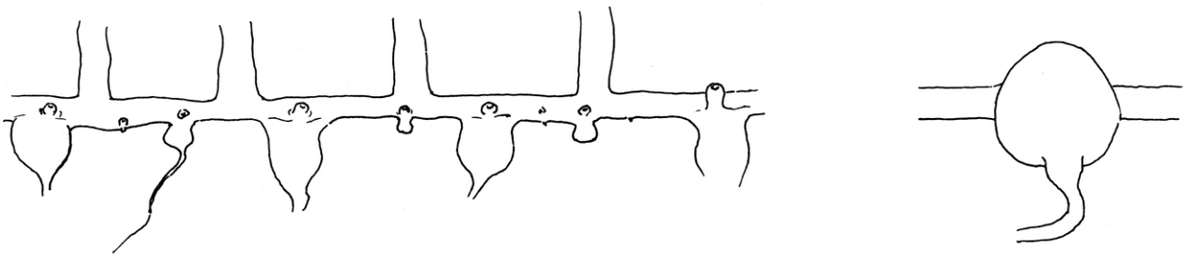
Material:

"Galathea" St. 470, 9.IX.51. Sunda Trench, 11°04′ S. 113°34′ E. Depth 5200 m. ST 300[1], 8000 m wire. **2** specimens.

I cannot refer these specimens to any known species of *Aequorea*, but shall give a short description of them accompanied by a figure (fig. 9).

One of the specimens is 77 mm in diameter, its stomach 50 mm, and it has 121 radial canals; the other specimen is 105 mm wide, its stomach 60 mm, and there are 136 radial canals. The gelatinous substance of the umbrella is thick, mainly in the central part, gradually thinner towards the margin; the mouth rim is mutilated, no oral lips are retained. In both specimens there are about as many tentacles as radial canals.

[1] ST 300, sledge trawl, 3 m wide.



a *b*

Fig. 9. *Aequorea* sp., Sunda Strait. *a* part of bell margin, adaxial view, showing excretory papillae. *b* tentacle bulb, abaxial view.

The tentacle bulbs are thick, almost globular, each with a broad, rounded abaxial "spur" grasping around the umbrella margin (fig. 9 *b*), but there is no trace of an abaxial keel. Between successive fully developed tentacles there is almost always a small, round rudimentary bulb; at the base of these as well as of the fully developed tentacles there is a prominent adaxial excretory papilla. I cannot count the statocysts. The gonads are too multilated to be described.

Zygocanna vagans Bigelow.

Zygocanna vagans Bigelow 1912 p. 255.
Zygocanna vagans Bigelow 1919 p. 315, Pl. 42 figs. 5–7, Pl. 43 fig. 6.
Zygocanna vagans Bigelow 1940 p. 299, fig. 14.
Zygocanna vagans Kramp 1957 *a* pp. 40, 97, 105, 124.
Zygocanna vagans Kramp 1959 *a* pp. 39, 168 ff, figs. 7, 238.
Zygocanna vagans Kramp 1961 *a* p. 211.

Material:

"Dana"

St. 3556 14.IX.28
2°52′ N. 87°38′ W.
S 150 600 m. w. 1

St. 3558 18.IX.28
0°18′ S. 99°07′ W.
S 150 100 m. w. 1
S 150 300 m. w. 3
S 150 600 m. w. 3
S 150 2000 m. w. 1

St. 3576 17.X.28
17°36.5′ S. 149°43.6′ W.
S 150 1000 m. w. 9
S 150 2000 m. w. 1

St. 3602 22.XI.28
20°00′ S. 174°29′ E.
S 150 1000 m. w. 1

St. 3620 7.XII.28
24°46.5′ S. 170°18.5′ E.
E 300 1000 m. w. 1

St. 3621 8.XII.28
25°47′ S. 172°24′ E.
S 150 1000 m. w. 1

St. 3663 23.II.29
33°33′ S. 154°04′ E.
S 150 600 m. w. 1
S 150 1000 m. w. 1

St. 3665 25.II.29
29°37.5′ S. 156°46′ E.
S 150 600 m. w. 1

St. 3687 8.IV.29
7°14′ N. 115°23′ E.
S 150 300 m. w. 1
S 150 600 m. w. 1

St. 3690 10.IV.29
8°02′ N. 109°36.5′ E.
S 150 300 m. w. 1

St. 3714 20.V.29
15°22′ N. 115°20′ E.
S 150 300 m. w. 1

St. 3723 30.V.29
25°30.5′ N. 125°28′ E.
S 200 600 m. w. 1

St. 3731 16.VI.29
14°37′ N. 119°52′ E.
S 200 100 m. w. 1

St. 3800 18.VIII.29
7°53′ S. 116°18′ E.
S 200 600 m. w. 1

St. 3809 4.IX.29
6°22′ S. 105°12′ E.
S 200 300 m. w. 4

St. 3821 14.IX.29
0°51.5′ S. 99°24.5′ E.
S 200 600 m. w. 1

St. 3850 14.X.29
6°01′ S. 93°12′ E.
S 200 600 m. w. 1

St. 3906 20.XI.29
4°26.5′ N. 85°21′ E.
S 200 400 m. w. 1

St. 3908 22.XI.29
4°28′ N. 82°13′ E.
S 200 300 m. w. 1
S 200 400 m. w. 1

St. 3921 11.XII.29
3°36′ S. 58°19′ E.
S 200 300 m. w. 1
S 200 400 m. w. 2

St. 3925 16.XII.29
7°13′ S. 52°22′ E.
S 200 600 m. w. 1

St. 3929 18.XII.29
12°11′ S. 50°18′ E.
S 200 500 m. w. 1

St. 3932 20.XII.29
11°35′ S. 49°45′ E.
S 200 600 m. w. 1

St. 3949 6.I.30
11°33′ S. 41°44′ E.
S 200 300 m. w. 1
S 200 600 m. w. 1

St. 3954 9.I.30
16°53′ S. 42°12′ E.
S 200 300 m. w. 1

St. 3957	11.I.30	St. 3962	14.I.30	St. 3966	18.I.30	St. 3969	27.I.30
21°30′ S.	42°32′ E.	24°33′ S.	38°26′ E.	29°25′ S.	32°00′ E.	31°33′ S.	30°07′ E.
S 200	500 m. w. **2**	S 200	600 m. w. **1**	S 200	300 m. w. **2**	S 200	300 m. w. **2**

Zygocanna vagans was first described from the Philippines by BIGELOW (1912 and 1919), who was inclined to think that the "Aequoride juv.", described from the Malayan Archipelago by MAAS (1905 p. 44, Pl. 4 figs. 22, 23, Pl. 8 fig. 53) belonged to the same species. It seems to me more probable, however, that this has been a *Toxorchis*. Later on *Z. vagans* was recorded from the coasts of Panama and Colombia (BIGELOW 1940), and it also occurs in the Atlantic, west of the Cape of Good Hope and near the Azores (KRAMP 1957 *a* and 1959 *a*). To these few records from widely separated areas we may now add numerous localities, where this species was collected by the "Dana", extending from Panama across the Pacific and Indian oceans to East Africa. St. 3556 and 3558 are east and west of the Galapagos Islands, St. 3576 near Tahiti, St. 3602–3665 among the Melanesian Islands and in the Tasman Sea, St. 3687–3714 in the South China Sea, St. 3723 east of Formosa, St. 3731 on the coast of Luzon, St. 3800 in the Java Sea north of Lombok, St. 3809 in the Sunda Strait, St. 3821–3908 between Sumatra and Ceylon, St. 3921–3969 from the Seychelles through the Macassar Strait to S.E. Africa. Thus the "Dana" Expedition has shown that this medusa has a very extensive geographical distribution. It was mainly found in coastal waters, but may also occur in off-shore areas. As a rule only one specimen was taken in each haul, sometimes two or three, on only one occasion as many as nine (St. 3576, near Tahiti, 1000 m wire).

The vertical distribution seems mainly to comprise the upper parts of the intermediate water layers. BIGELOW's specimens from the Philippines were taken in vertical hauls 100–0, 215–0 and 225–0 m, those from the eastern tropical Pacific in 1200–0 m; west of the Cape of Good Hope the medusa was taken in a haul 1200–0 m, near the Azores in a horizontal haul with 300 m wire out. In the present material the vast majority of the specimens were taken in hauls with 300–600 m wire out, several also with 1000 m wire, while only two specimens were taken as high up as in two hauls with 100 m wire, none still nearer to the surface.

There is an indication of increasing size of the individuals with increasing depth, as follows:

	Diameter of specimens	
m wire out	width of variation	average
100.....	10–33	(21)
300.....	7–40	20
(4–)600.....	9–55	22
1000–2000.....	9–60	33

Young specimens are found at any depth, but the largest specimens were taken in deeper hauls.

Distribution: Warm parts of the Pacific and Indian Oceans, from Central America to East Africa, northwards to Formosa, southwards to Sydney in East Australia; in the Atlantic west of the Cape of Good Hope and near the Azores.

Zygocanna buitendijki STIASNY.

Zygocanna buitendijki STIASNY 1928 p. 218, figs. 5 *a–e*, 6, 7.
Zygocanna buitendijki MENON 1932 p. 25, Pl. 3 figs. 34, 35.
Zygocanna buitendijki KRAMP 1958 p. 363.
Zygocanna buitendijki GANAPATI & NAGABHUSHANAM 1958 pp. 92, 94.

Material:

"Galathea" St. 305. 26.IV.51. Bay of Bengal, 20°51′ N. 87°58′ E. HOT 250 m wire, 1 specimen.

The specimen is 65 mm in diameter, the stomach 20 mm; the radial canals are branched as is typical in this species, about 120 canals opening into the ring canal. Radial ribs on the exumbrella, as described by STIASNY, cannot be discerned in this specimen, which is larger than any seen before. Previously recorded from the Java Sea, two localities on the east coast of India, and from the Mergui Archipelago.

Distribution: Indo-Malayan coastal waters.

III. Limnomedusae.

Fam. Olindiadidae.

Olindias singularis Browne.

Olindias singularis Browne 1905 *a* p.737, Pl. 56 fig. 2, Pl. 57 fig. 1.
Olindias singularis Bigelow 1909 p. 109, Pl. 4 fig. 1, Pl. 31 figs. 1–10, Pl. 32 fig. 8.
Olindias singularis Kramp 1961 *a* p. 228 (all references).
Olindias singularis Kramp 1961 *b* p. 203.

Material:

"Dana"
St. 3809 4.IX.29
6°22′ S. 105°12′ E.
S 200 100 m. w. 1

"Galathea"
St. 319 6.V.51
Nancowry Harbour, Nicobars, anchorage
SN 50 1

St. 446 18.VIII.51
Basilan, Philippines, anchorage
SN 50 2

St. 451 23.VIII.51
Macassar Strait
1°25′ S. 117°05′ E.
ST 300 200 m. w. 1

St. 541 5.XI.51
Mouth of Moreton Bay, East Australia
26°57′ S. 153°25′ E.
S 200 surface 3

"Dana" St. 3809 is in the Sunda Strait between Java and Sumatra. This is the common Indian form of *Olindias*, previously found in several localities between the Iranian Gulf and the Philippines, on the Great Barrier Reef in N.E. Australia, and in the Low Archipelago in the far East; most of the localities listed above are within the Malayan Archipelago, "Galathea" St. 541 is near Brisbane on the east coast of Australia, the southernmost locality where the species has been found up to now.

The specimen from "Dana" St. 3809 is 7 mm wide, it has 3 centripetal canals in each quadrant and 16 primary tentacles. The three specimens from Brisbane ("Galathea" St. 541) are in good condition and have the following dimensions (some of the tentacles, especially of the secondary series, are undoubtedly lost):

Diam., mm	7	9	10
Centripetal canals per quadrant	3–7	5–6	6–7
Primary tentacles	c. 20	12	c. 24
Secondary tentacles	10	6	1
Marginal clubs	c. 24	?	c. 36

The specimens from "Galathea" St. 319 and 446 are interesting young stages, which I was able to study alive (fig. 10). They are 0.9, 1.1 and 2 mm high and wide, almost globular, with very thick walls, equally thick throughout, the whole surface of the exumbrella with scattered nematocysts, not collected in groups. Velum broad; the bell cavity fairly spacious. The stomach is low and broad, quadrangular with rounded corners, the mouth opening small. The four radial canals are very narrow. In all of the three specimens examined there are 4 perradial and 4 interradial tentacles and 8 adradial round marginal bulbs without tentacles, and there are 4 statocysts placed immediately beside the bases of the interradial tentacles. The perradial tentacles are alike in all the specimens, their basal part is narrow, adnate; in extended condition (as seen in the living specimens) these tentacles were three times as long as the height of the umbrella, very thin, with many scattered groups of nematocysts, in the largest specimen (2 mm) up to 35 groups in one tentacle. The groups of nematocysts may be round, but most of them are transverse clasps, none or very few in the basal portion of the tentacles, gradually more densely placed but diminishing again towards the tip, which carries a terminal knob of nematocysts, fairly large in the two smallest specimens, very small in the largest. In the two youngest stages from Basilan Island, 0.9 and 1.1 mm wide, the four interradial tentacles are similar in structure and

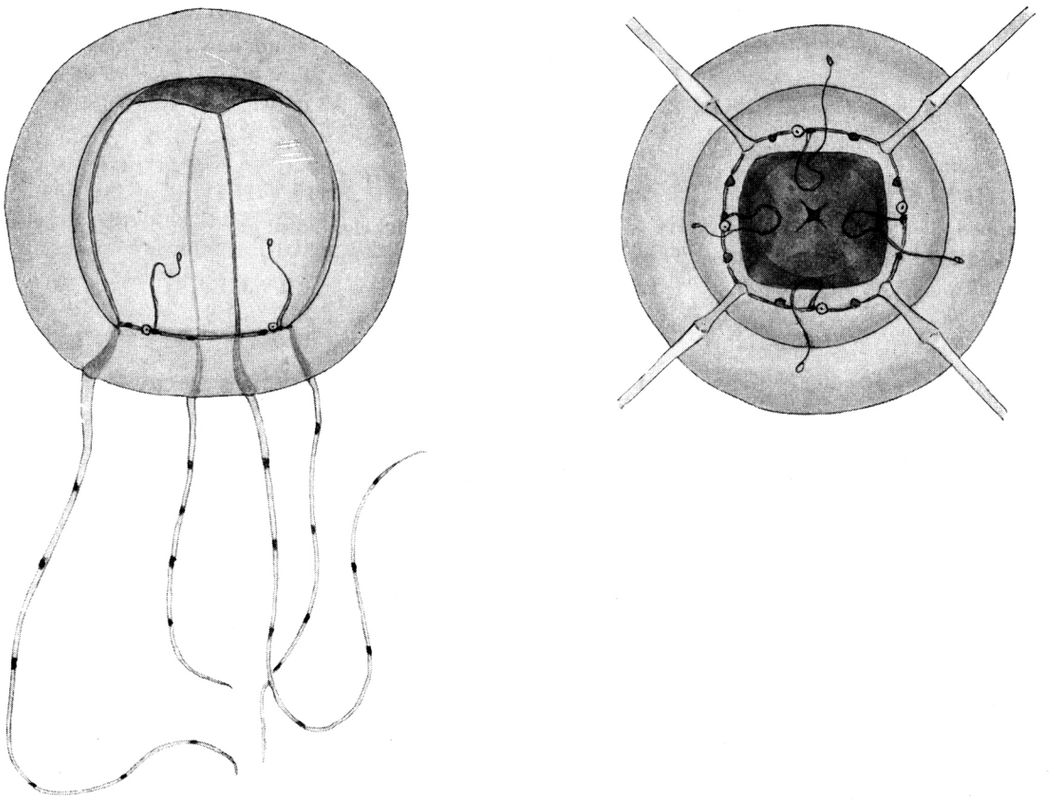


Fig. 10. *Olindias singularis*, young stage, 2 mm wide. left, lateral view. right, oral view, drawn from life.

almost as long as the perradial; all these are "primary" tentacles, and the specimens are very similar to the young stages of *O. tenuis* described and figured by MAYER (1910 p. 355, Pl. 47 figs. 8 and 9), but in the somewhat larger specimen from the Nicobars, 2 mm wide, the four interradial tentacles are small, about half as long as the radius of the umbrella, very thin and destitute of nematocyst groups, except a terminal knob, and their base is not adnate.

A very pretty sight was the colours of the specimen from the Nicobars: in the living medusa the eight adradial bulbs were a scarlet red, and in each of the four long tentacles there were up to seven scarlet-red spots, evenly dispersed through the entire length of the tentacle (indicated in fig. 10 *a*).

Distribution: Tropical coasts of the Indo-West-Pacific Region, from the Gulf of Iran to the Philippines, east coast of Australia, and Low Archipelago in the central Pacific.

Proboscidactyla ornata (McCRADY).

Willsia ornata McCRADY 1857 p. 149, Pl. 9 figs. 9–11.
Proboscidactyla ornata BROWNE 1905 *a* p. 726.
Proboscidactyla ornata KRAMP 1961 *a* p. 235 (all references since 1910).
Proboscidactyla ornata KRAMP 1962 *a* p. 342, figs. 7–10.

Material:

"Galathea"
St. 256 22.III.51
Near Mombasa
4°05′ S. 39°41′ E.
SN 50 1

St. 283 12.IV.51
West coast of Ceylon
7°05′ N. 79°37′ E.
SN 50 1

St. 319 6.V.51
Nancowry Harbour, Nicobars
SN 50 3

St. 373 6–7.VI.51
Off Kerteh, Malacca, anchorage
4°30′ N. 103°28′ E.
SN 50 1

St. 381 8.VI.51
Gulf of Siam
7°00′ N. 103°18′ E.
SN 50 **5**

St. 399 21.VI.51
N.E. of Singapore
1°46′ N. 104°25′ E.
SN 50 16 m. w. **1**

St. 410 6.VII.51
Chamilla Bay, near Manila
14°32.3′ N. 120°46.2′ E.
SN 50 **4**

St. 425 29–30.VII.51
Bucas Grande Isl., Philippines
9°40′ N. 125°55′ E.
SN 50 **1**

St. 428 30–31.VII.51
Candos Bay, Mindanao
9°36′ N. 125°46′ E.
SN 50 16 m. w. **135**

St. 446 18–19.VIII.51
Off Isabela, Basilan, Philippines
6°42′ N. 121°58′ E.
SN 50 **2**

St. 482 12.IX.51
Bali, anchorage
8°46′ S. 115°14′ E.
SN 50 **1**

St. 532 27.X.51
Bay of Port Moresby, New Guinea
SN 50 **1**

This small medusa is strictly neritic and has a circumglobal distribution in warm coastal waters. As seen from the above list it was collected by the "Galathea" in many localities during the voyage from Mombasa in East Africa to New Guinea, always in the small silk net and always very near the coasts, usually while the vessel was anchored. The species has been divided into several races or even species according to the position of medusa buds, or absence of medusa buds. During the cruise of the "Galathea" I had ample opportunity to confirm previous statements that the position of the medusa buds is of no systematical importance. This was particularly evident, when I examined the 135 specimens collected at St. 428 in Candos Bay, Mindanao. I made the following notes on board: All developmental stages, some newly liberated, with only four tentacles, some without medusa buds ("*ornata*"), many with buds on the radial canals ("*tropica*"), or on the lateral walls of the stomach ("*gemmifera*").

In spite of the extensive material, which was at my disposal during this expedition, I never saw anything like the peculiar development of polypoid buds on the stomach wall, which I found later in a specimen from Nhatrang (KRAMP 1962 *a*).

Distribution: Circumglobal in warm coastal waters.

Proboscidactyla abyssicola UCHIDA.

Proboscidactyla abyssicola UCHIDA 1947 *b* p. 335, fig. 3.

Material:

"Dana"

St. 3680 27.III.29
2°22′ S. 126°58.5′ E.
S 150 1000 m. w. **4**

St. 3682 29.III.29
1°42′ N. 124°29′ E.
S 150 300 m. w. **11**
E 300 1000 m. w. **1**

This is the largest species of *Proboscidactyla* and very characteristic; it was described from a single specimen, 20 mm wide, taken in Sagami Bay, Japan (UCHIDA 1947 *b*), and up to now it had not been observed elsewhere. It is interesting, therefore, that several specimens were collected by the "Dana" in two localities north and east of Celebes. The specimens are typical and agree with the type-specimen in all details. Those from St. 3680 are 15–17 mm wide, those from St. 3682 16–26 mm.

Distribution: Japan; Ceram Sea and Celebes Sea in the Malayan Archipelago.

IV. Trachymedusae.

Fam. **Halicreatidae.**

Halicreas minimum Fewkes.

Halicreas minimum Fewkes 1882 *b* p. 306.
Halicreas papillosum Vanhöffen 1902 p. 68, Pl. 9 figs. 7, 8, Pl. 11 fig. 30.

Material:

"Dana"

St. 3556 14.IX.28
2°52'N 87°38' W.
E 300 2500 m. w. **10**

St. 3558 18.IX.28
0°18' S. 99°07' W.
S 150 3000 m. w. **1**

St. 3561 24.IX.28
4°20' S. 116°46' W.
S 150 2000 m. w. **4**
S 150 3000 m. w. **3**
S 150 4000 m. w. **5**
E 300 5000 m. w. **13**

St. 3576 17.X.28
17°36.5' S. 149°43.6' W
E 300 3000 m. w. **1**

St. 3577 19.X.28
18°49' S. 153°10' W.
S 150 4000 m. w. **1**

St. 3587 2.XI.28
11°00' S. 172°37' W.
P 100 2000 m. w. **1**
S 150 4000 m. w. **1**

St. 3613 28.XI.28
22°43' S. 166°05.8' E.
P 100 2000 m. w. **1**
E 300 4000 m. w. **1**

St. 3621 8.XII.28
25°47' S. 172°24' E.
S 150 4000 m. w. **1**
E 300 5000 m. w. **3**

St. 3624 10.XII.28
28°17.6' S. 177°01' E.
P 100 4000 m. w. **1**

St. 3626 13.XII.28
27°00' S. 177°41' W.
E 300 1000 m. w. **1**

St. 3640 7.I.29
41°47' S. 176°55' E.
S 150 2500 m. w. **1**

St. 3642 9.I.29
46°43' S. 176°08.5' E.
S 150 1000 m. w. **10**
S 150 1500 m. w. **21**
S 150 2000 m. w. **31**
S 150 2500 m. w. **12**
E 300 3000 m. w. **29**

St. 3651 22.I.29
35°36' S. 171°52' E.
S 150 2000 m. w. **9**

St. 3653 26.I.29
33°30.5' S. 165°53' E.
E 300 4000 m. w. **2**

St. 3656 29.I.29
33°26' S. 157°02' E.
E 300 5000 m. w. **4**

St. 3663 23.II.29
33°33' S. 154°04' E.
S 150 2000 m. w. **2**
S 150 3000 m. w. **1**

St. 3676 23.III.29
5°52' S. 131°14' E.
S 150 3000 m. w. **5**
S 150 4000 m. w. **1**
S 150 5000 m. w. **2**

St. 3677 23.III.29
5°28' S. 130°39' E.
S 150 2000 m. w. **2**
S 150 4000 m. w. **3**

St. 3678 24.III.29
4°05' S. 128°16' E.
S 150 2000 m. w. **1**
S 150 3000 m. w. **4**
S 150 4000 m. w. **8**
E 300 5000 m. w. **5**

St. 3680 27.III.29
2°22' S. 126°58.5' E.
S 150 2000 m. w. **3**
S 150 3000 m. w. **1**
S 150 4000 m. w. **1**
E 300 5000 m. w. **4**

St. 3683 2.IV.29
4°03' N. 123°26' E.
S 150 3000 m. w. **1**
S 150 4000 m. w. **3**
E 300 5000 m. w. **3**

St. 3684 4.IV.29
6°37' N. 122°24' E.
S 150 2000 m. w. **1**
E 300 3000 m. w. **6**

St. 3688 8.IV.29
6°55' N. 114°02' E.
S 150 2000 m. w. **3**
S 150 3000 m. w. **1**
S 150 3500 m. w. **4**
E 300 4000 m. w. **5**

St. 3689 9.IV.29
7°13.5' N. 111°49' E.
S 150 2000 m. w. **2**
S 150 2500 m. w. **2**
E 300 3000 m. w. **3**

St. 3739 2.VII.29
3°20' N. 123°50' E.
S 150 2000 m. w. **3**
E 300 5000 m. w. **2**

St. 3751 12.VII.29
3°40.5' N. 137°53' E.
E 300 2500 m. w. fragm.
E 300 4000 m. w. **2**

St. 3768 24.VII.29
1°20' S. 138°42' E.
E 300 2500 m. w. **1**
S 150 3500 m. w. **2**
E 300 4000 m. w. **14**

St. 3804 30.VIII.29
9°09' S. 114°47' E.
S 200 600 m. w. **1**

St. 3824 15.IX.29
0°08' S. 97°15' E.
S 200 600 m. w. **12**

St. 3828 18.IX.29
1°53' N. 96°07' E.
S 150 2000 m. w. **7**
S 150 3500 m. w. **1**

St. 3847 11.X.29
12°02' S. 96°43' E.
E 300 1500 m. w. **2**
S 150 2000 m. w. **8**
E 300 2500 m. w. **11**
S 150 3000 m. w. **5**
E 300 3500 m. w. **7**

St. 3902 17.XI.29
6°05' N. 95°30' E.
E 300 1000 m. w. **2**

St. 3904 18.XI.29
5°18' N. 90°55' E.
S 150 2000 m. w. **4**
E 300 2500 m. w. **12**
S 150 3000 m. w. **6**
E 300 3500 m. w. **4**

St. 3909 22.XI.29
5°21' N. 80°38' E.
S 150 3000 m. w. **3**
E 300 4500 m. w. **1**

St. 3915 3.XII.29
3°14' N. 75°21' E.
E 300 1000 m. w. **3**

St. 3917 5.XII.29
1°45' N. 71°05' E.
S 150 2200 m. w. **8**
E 300 3200 m. w. **7**
S 150 3700 m. w. **1**

St. 3919 8.XII.29
0°07′ S. 63°56′ E.
E 300 1000 m. w. **1**

St. 3920 9.XII.29
1°06′ S. 62°25′ E.
S 150 2000 m. w. **3**
S 150 2500 m. w. **5**
S 150 3500 m. w. **3**
E 300 4000 m. w. **5**

St. 3921 11.XII.29
3°36′ S. 58°19′ E.
E 300 1000 m. w. **1**

St. 3922 12.XII.29
3°45′ S. 56°33′ E.
E 300 1000 m. w. **2**

St. 3933 20.XII.29
11°18′ S. 50°03′ E.
E 300 3000 m. w. **23**
E 300 4000 m. w. **1**

St. 3934 20–21.XII.29
11°24′ S. 50°05′ E.
S 200 600 m. w. **1**

St. 3964 15.I.30
25°19′ S. 36°13′ E.
E 300 3000 m. w. **1**

"Galathea"

St. 194 7.II.51
Off Durban
34°09′ S. 30°45′ E.
Depth 4360 m
SOT[1] 7500 m. w. **1**

St. 200 18.II.51
Off Natal
29°39′ S. 37°01′ E.
Depth 5110 m
HOT 7400 m. w. **15**

St. 263 24.III.51
Off Mombasa
4°14′ S. 44°52′ E.
Depth 4620–4680 m
TOT 3000 m. w. **1**

St. 266 27.III.51
3°38′ S. 52°43′ E.
Depth 4700–4970 m
TOT 7000 m. w. **13**

St. 298 23.IV.51
Bay of Bengal
14°20′ N. 82°00′ E.
Depth 3230 m
TOT 4900 m. w. **1**

St. 301 25.IV.51
Bay of Bengal
19°30′ N. 86°32′ E.
Depth 1110 m
TOT 2100 m. w. **1**

St. 316 4.V.51
Bay of Bengal
12°43′ N. 91°17′ E.
Depth 3170 m
TOT 4500 m. w. **7**

St. 318 5.V.51
Bay of Bengal
9°02′ N. 93°07′ E.
Depth 1440 m
TOT 2800 m. w. **8**

St. 406 2.VII.51
South China Sea
10°34′ N. 112°51′ E.
Depth 2310 m
TOT 4500 m. w. **4**

St. 409 5.VII.51
South China Sea
13°44′ N. 118°56′ E.
Depth 3780–3850 m
TOT 2900 m. w. **4**

St. 448 20.VIII.51
Celebes Sea
2°54′ N. 120°04′ E.
Depth 4600 m
TOT 4200 m. w. **3**

St. 465 5.IX.51
Sunda Trench
10°20′ S. 109°55′ E.
Depth 7000–6900 m
ST 300 10300 m. w. **3**

St. 472 10.IX.51
Sunda Trench
10°24′ S. 114°07′ E.
Depth 2250–2030 m
HOT 3600 m. w. **7**

St. 474 11.IX.51
Sunda Trench
9°79′ S. 114°13′ E.
Depth 3840–3810 m
ST 300 6100 m. w. **1**

St. 574 18.XII.51
Tasman Sea
39°45′ S. 159°39′ E.
Depth 4850 m
ST 600[2] 4800 m. w. **1**

St. 656 20.II.52
Kermadec Trench
35°20′ S. 178°55′ W.
Depth 7830 m
ST 600 10600 m. w. **1**

This widely distributed bathypelagic medusa was taken by the "Dana" in scattered localities from the Gulf of Panama to Tahiti; in several places in the Melanesian and Malayan Archipelagos; east of New Zealand as far south as 46°43′ S. (St. 3642) and there in considerable numbers; in the Tasman Sea; at almost all stations from Ceylon to the Seychelles and Madagascar; finally in Delagoa Bay, south-east Africa. The "Galathea" found several specimens within the same areas and also in the Bay of Bengal. It may be accidental that it has not previously been found in Melanesia, around New Zealand, and in the Bay of Bengal.

As many as 418 specimens were taken by the "Dana" in 88 hauls with 600–5000 m wire out, on only three occasions, however, with as less as 600 m wire (St. 3804, 3824 and 3534, see below), otherwise only with 1000 m wire or more.

Vertical distribution. An analysis of the catches shows that the medusa occurs in about the same density at all depths, where hauls were made with 2000–5000 m wire, in less numbers at higher levels. It was taken by the "Galathea" at still greater depths, with up to 10600 m wire out. The numbers of specimens collected in the Indian and Pacific oceans are generally considerably smaller than corresponding numbers in collections from the Atlantic, especially when compared with the area off the west coast of Africa (see KRAMP 1959*a* p. 42).

The material from St. 3642, 3804, 3824 and 3934 calls for some special remarks.

St. 3642, where numerous specimens of *Halicreras minimum* were taken in all depths, in hauls with 1000–3000 m wire out, is east of the southern point of New Zealand, depth of the bottom 2060 m, thus above not

[1] SOT, shrimp otter trawl.
[2] ST 600, sledge trawl with two bags.

particularly deep water, but in a region where the South Pacific Basin forms an inlet, a kind of "fjord", between two shallow-water areas extending from the coast of New Zealand eastwards to Chatham Islands in the north and Bounty Islands in the south. Also other bathypelagic medusae were found in considerable numbers in this locality which, therefore, will be further discussed in the General Section of this paper.

St. 3804 is south of Bali, depth 2160 m, on the slope to the eastern part of the Sunda Trench, where the "Galathea" collected several specimens in hauls with 3600–10300 m wire. The only specimen found by the "Dana" was taken in a haul with only 600 m wire, while none was taken with 1000 m wire out.

St. 3824 is off the middle part of the west coast of Sumatra, depth 4020–4090 m; several hauls were taken, but *Halicreas* was found only in the haul with 600 m wire, 12 specimens. The locality is just outside the chain of small islands along the coast of Sumatra.

St. 3934 is the third station, where *Halicreas* was taken with 600 m wire; the locality is between the north point of Madagascar and the Farquhar Islands, depth 3490–3640 m; no deep hauls were taken, but one specimen of *Halicreas* was collected with 600 m wire out.

All of the three localities, where *Halicreas minimum* was found so high up in the water masses as in hauls with 600 m wire, about 400 m below the surface, are above continental slopes not far from the coasts, which may indicate that the ascending of this bathypelagic medusa into comparatively high levels is due to upwelling of water from deeper strata.

Measurements of specimens was usually not carried out on the material from the "Dana", because the state of preservation would make measurements unreliable. Notes made during the sorting, however, confirm former remarks on material of *Halicreas* from the Atlantic (KRAMP 1959 *a* p. 43) to the effect that specimens taken in hauls with 600 or 1000 m wire were all fairly small, while in greater depths, with 2000 m wire or more, all sizes were represented, small as well as large specimens.

Distribution: Bathypelagic, generally distributed in all the great oceans, except in the Mediterranean and the arctic regions.

Haliscera bigelowi KRAMP.

Homoeonema alba BIGELOW 1909 p. 142, Pl. 3 figs. 1, 2, Pl. 33 figs. 6, 11, Pl. 34 fig. 9.
Haliscera bigelowi KRAMP 1947 p. 8, Pl. 1 figs. 5–8, Pl. figs. 1, 2.
Haliscera bigelowi RUSSELL 1953 p. 456, Pl. 27 fig. 2, textfigs. 301, 302.
Haliscera bigelowi KRAMP 1961 *a* p. 246 (further references).

Material:

"Dana"			St. 3642	9.I.29	
St. 3627	14.XII.28		46°43′ S.	176°08.5′ E.	
30°08′ S.	176°50′ W.		S 150	1000 m. w.	**1**
S 150	2000 m. w.	**4**	S 150	1500 m. w.	**15**
			S 150	2000 m. w.	**3**

On previous occasions, mainly in 1947 (pp. 6 ff) I have discussed the state of confusion, into which VANHÖFFEN has brought the classification of the Halicreatidae, especially of the genus *Haliscera*. Some of these medusae are of a so delicate structure that they are easily destroyed and may be unrecognizable when in a poor state of preservation. There may have been many more specimens of *H. bigelowi* in the "Dana" collection, but the majority of them are in a condition which does not allow a determination; they are listed below as indeterminable species. The specimens mentioned above, have retained a few remnants of structural features which suggest that they belong to *H. bigelowi*; they have a number of about 96 tentacles, which is characteristic of this species. The occurrence of this species in two localities east and north of New Zealand is indeed remarkable, but if some of the "indeterminable" specimens belong to the same species, it has an extensive distribution in the Pacific and Indian oceans.

Further distribution: Bathypelagic in the eastern tropical Pacific and the Atlantic Ocean from West Africa to Iceland. Very peculiar is a record by NAUMOV (1960 p. 563) from the central Polar basin.

Haliscera racovitzae Maas.

Homoeonema racovitzae Maas 1906 *b* p. 10, Pl. 1 figs. 3, 4, Pl. 2 fig. 13.
Haliscera racovitzae Kramp 1961 *a* p. 247 (all references).

Material:

"Dana"			St. 3642	9.I.29	
St. 3627	14.XII.28		46°43′ S.	176°08.5′ E.	
30°08′ S.	176°50′ W.		S 150	1500 m. w.	**11**
S 150	3000 m. w.	**1**	S 150	2000 m. w.	**7**
			S 150	2500 m. w.	**1**

Some of the specimens are in a fairly good state of preservation and have retained many of their tentacles in extended condition; they are very long and thin, the tentacles opposite the eight radial canals being up to twice as long as the diameter of the umbrella. The only previous record of this species from the Pacific was from the south-eastern part, west of Graham Land, where the original specimen was found and described by Maas (1906 *b*); other records are from the Atlantic sector of antarctic and subantarctic waters. The present specimens confirm my former statements (Kramp 1947 p. 6, 1957 *a* p. 49) that *H. racovitzae* is a valid species.

Distribution: Bathypelagic in antarctic and subantarctic waters, now also taken east and north of New Zealand.

Indeterminable Halicreatidae,

probably belonging to the genus *Haliscera*.

"Dana"
St. 3604. 24.XI.28, 23°22′ S. 167°36′ E. P 100, 1000 m. w.
St. 3641. 8.I.29, 43°40′ S. 176°36′ E. S 150, 300 m. w.
St. 3642. 9.I.29, 46°43′ S. 176°08.5′ E. S 150, 600 m. w.
St. 3645. 12.I.29, 42°32′ S. 174°50′ E. S 150, 100 m. w.
St. 3651. 22.I.29, 35°36′ S. 171°52′ E. S 150, 1500 and 2000 m. w.
St. 3656. 29.I.29, 33°26′ S. 157°02′ E. S 150, 2000 m. w.
St. 3663. 23.II.29, 33°33′ S. 154°04′ E. S 150, 2000, 3000 and 4000 m. w.
St. 3715. 22.V.29, 18°18′ N. 119°36′ E. E 300, 1000 m. w.
St. 3917. 5.XII.29, 1°45′ N. 71°05′ E. E 300, 1000 m. w.
St. 3918. 7.XII.29, 0°35′ N. 66°09′ E. E 300, 1000 m. w.
St. 3964. 15.I.30, 25°19′ S. 36°13′ E. S 150, 1000 m. w.

Botrynema brucei Browne.

Botrynema brucei Browne 1908 p. 239, Pl. 1 figs. 8, 9, Pl. 2 fig. 1.
Botrynema brucei Kramp 1961 *a* p. 244 (all references).

Material:

"Dana"			St. 3642	9.I.29	
St. 3624	10.XII.28		46°43′ S.	176°08.5′ E.	
28°17.6′ S.	177°01′ E.		S 150	2000 m. w.	**2**
P 100	4000 m. w.	**3**	S 150	2500 m. w.	**10**

Even badly preserved specimens of this medusa can nearly always be recognized by means of the distinct and sharply defined apical knob of the umbrella, which is thick and rather firm, in conjunction with the characteristic arrangement of the marginal tentacles in sixteen groups, which are nearly always discernible. The present specimens vary in diameter from 6 to 16 mm.

The localities are north and west of New Zealand. The species was previously recorded from South-East Australia and from the northern part of the Pacific; it is widely distributed in the Indian and Atlantic oceans.

Distribution: Bathypelagic, cosmopolitan except in the Mediterranean and in arctic seas, where it is replaced by *B. ellinorae*.

Halitrephes maasi Bigelow.

Halitrephes maasi Bigelow 1909 p. 146, Pl. 33 figs. 1–5, 7, 10; Pl. 45 fig. 13.
Halitrephes valdiviae Vanhöffen 1912 p. 384.
Halitrephes medius Kramp 1948 *a* p. 7, fig. 1.
Halitrephes maasi Kramp 1961 *a* p. 247 (all references).

Material:

"Dana"

St. 3556 14.IX.28
2°52′ N. 87°38′ W.
S 150 2000 m. w. **3**
E 300 2500 m. w. **3**

St. 3561 24.IX.28
4°20′ S. 116°46′ W.
S 150 2000 m. w. **1**

St. 3593 10.XI.28
17°27′ S. 179°33′ E.
E 300 3200 m. w. **1**

St. 3613 28.XI.28
22°43′ S. 166°05.8′ E.
P 100 2000 m. w. **3**
E 300 4000 m. w. **1**

St. 3621 8.XII.28
25°47′ S. 172°24′ E.
S 150 2000 m. w. **1**

St. 3629 16.XII.28
33°36.5′ S. 179°10′ W.
E 300 1000 m. w. **2**

St. 3630 17.XII.28
34°24′ S. 178°42.5′ E.
S 200 2000 m. w. **14**

St. 3640 7.I.29
41°47′ S. 176°55′ E.
S 150 2000 m. w. **1**

St. 3642 9.I.29
46°43′ S. 176°08. 5′E.
S 150 300 m. w. **6**
S 150 1000 m. w. **1**
E 300 1000 m. w. **3**
E 300 3000 m. w. **5**

St. 3644 11.I.29
44°40′ S. 173°38′ E.
S 150 300 m. w. **5**
S 150 600 m. w. **2**
E 300 1000 m. w. **2**

St. 3677 23.III.29
5°28′ S. 130°39′ E.
S 150 4000 m. w. **1**

St. 3683 3.IV.29
4°08′ N. 123°00′ E.
E 300 1000 m. w. **1**

St. 3688 8.IV.29
6°55′ N. 114°02′ E.
S 150 2000 m. w. **1**

St. 3768 24.VII.29
1°20′ S. 138°42′ E.
E 300 2000 m. w. **1**
E 300 2500 m. w. **1**
E 300 3000 m. w. **2**
E 300 4000 m. w. **1**

St. 3804 30.VIII.29
9°09′ S. 114°47′ E.
E 300 1000 m. w. **1**

St. 3814 9.IX.29
4°38′ S. 99°24′ E.
S 200 600 m. w. **2**

St. 3828 18.IX.29
1°22′ N. 96°06.5′ E.
S 150 1500 m. w. **3**

St. 3847 11.X.29
12°02′ S. 96°43′ E.
E 300 1500 m. w. **1**

St. 3893 6.XI.29
5°59′ N. 92°29′ E.
S 200 600 m. w. **2**

St. 3903 17.XI.29
5°50′ N. 93°28′ E.
E 300 1000 m. w. **1**

St. 3907 21.XI.29
3°59′ N. 82°57′ E.
E 300 1000 m. w. **2**

St. 3908 22.XI.29
4°28′ N. 82°13′ E.
S 200 400 m. w. **2**
E 300 1000 m. w. **1**

St. 3909 22.XI.29
5°21′ N. 80°38′ E.
E 300 3500 m. w. **1**

St. 3914 2.XII.29
4°52′ N. 77°08′ E.
E 300 1000 m. w. **3**

St. 3915 3.XII.29
3°14′ N. 75°21′ E.
S 200 600 m. w. **3**
E 300 1000 m. w. **1**

St. 3917 5.XII.29
1°45′ N. 71°05′ E.
S 200 600 m. w. **4**
S 150 1200 m. w. **3**
S 150 2200 m. w. **3**
S 150 3700 m. w. **1**

St. 3920 9.XII.29
1°06′ S. 62°25′ E.
S 150 2000 m. w. **2**

St. 3964 15.I.30
25°19′ S. 36°13′ E.
S 150 2500 m. w. **2**

"Galathea"

St. 200 17.II.51
Off Natal, E. Africa
29°39′ S. 37°01′ E.
HOT 7400 m. w. **2**

St. 241 15.III.51
Off Mombasa
4°00′ S. 41°27′ E.
HOT 3400 m. w. **1**

St. 263 24.III.51
Off Mombasa
4°14′ S. 44°52′ E.
TOT 3000 m. w. **1**

St. 298 23.IV.51
Bay of Bengal
14°20′ N. 82°00′ E.
TOT 4900 m. w. **2**

St. 301 25.IV.51
Bay of Bengal
19°30′ N. 86°32′ E.
TOT 2100 m. w. c. 50

St. 314 3.V.51
Bay of Bengal
15°54′ N. 90°17′ E.
HOT 4800 m. w. **1**

St. 316 4.V.51
Bay of Bengal
12°43′ N. 91°17′ E.
TOT 4500 m. w. **1**

St. 575 19.XII.51
Tasman Sea
40°11′ S. 163°35′ E.
SOT 7500 m. w. **1**

St. 634 25.I.52
East of North Isl., New Zealand
39°05′ S. 178°20′ E.
TOT 1700 m. w. **1**

St. 656 20.II.52
Kermadec Trench
35°20′ S. 178°55′ W.
ST 600 10600 m. w. **3**

It has been known for some time that there is only one species of *Halitrephes* (discussed in KRAMP 1957 *a* p. 52 and 1959 p. 45). This medusa is much larger than any other species of the Halicreatidae, and it has several (16–20) radial canals; but it is particularly soft and brittle, and when dragged up from the abyssal region, where it mainly occurs, the specimens are generally in a very poor condition. This also applies to the numerous specimens collected by the "Dana" and "Galathea" Expeditions; as a rule, they only consist of a thin and soft gelatinous disk without any other structural organs than the basal stumps of the tentacles, and frequently some of the characteristic sensory clubs, which are remarkably resistent, occasionally also with faint traces of radial canals. They may, however, frequently be identified by their size, and by the distance between the tentacle stumps being greater than in other members of the family.

While in the Atlantic Ocean *H. maasi* is generally distributed in the deep parts from about 50° S. to 30° N., the previous records of its occurrence in the Indian and Pacific oceans were rather scattered, comprising some localities in the eastern Pacific off Peru (BIGELOW's original specimens), one isolated locality in the southern Pacific, some in the waters south of Australia, one near Ceylon, one off Somaliland in East-Africa, and one S.E. of Madagascar. The "Dana" and "Galathea" Expeditions have collected it in numerous localities from outside the Gulf of Panama to the east coast of Africa, southwards as far as at St. 3642 east of the southern part of New Zealand, the latter being a station of great interest. From the waters around New Zealand it was found to be generally distributed through Melanesia, the Malayan Archipelago, the Bay of Bengal, S.E. and S.W. of Ceylon to the waters off the African coast between Mombasa and Natal. On one occasion ("Galathea" St. 301 in the Bay of Bengal) it was taken in great abundance, specimens up to 50 or 60 mm wide.

The vertical distribution is not entirely restricted to the abyssal region, though the majority of the specimens were taken in hauls with 1000–4000 m wire out, by the "Galathea" even up to 10600 m wire. Some specimens were, however, also taken at higher levels, in hauls with 600 or 300 m wire. These catches at comparatively high levels took place at St. 3642 and 3644 not far from the east coast of New Zealand, St. 3814 and St. 3893 near the west coast of Sumatra, St. 3908 south-east of Ceylon, and St. 3915 and 3917 closely east and west of the Maldive Islands; upwelling of water from deep strata may have taken place in these areas, a problem which I hope to discuss later on in the Zoogeographical Section.

Distribution. Circumglobal in the warm and temperate parts of the oceans, mainly abyssal.

Fam. **Rhopalonematidae.**

Rhopalonema velatum GEGENBAUR.

Material:

"Dana"

St. 3556 14.IX.28
2°52′ N. 87°38′ W.
S 50, surface **2**
S 150 100 m. w. **9**
S 150 600 m. w. **1**

St. 3558 18.IX.28
0°18′ S. 99°07′ W.
S 50, surface **9**
S 150 100 m. w. **20**
S 150 300 m. w. **7**
S 150 600 m. w. **18**
S 150 1000 m. w. c. **90**

St. 3561 24.IX.28
4°20′ S. 116°46′ W.
S 150 50 m. w. **8**
S 150 100 m. w. **18**
S 150 1000 m. w. c. **150**
S 150 2000 m. w. **4**
S 150 4000 m. w. **1**

St. 3563 29.IX.28
7°45.5′ S. 131°22′ W.
S 50 200–0 m **2**
S 150 50 m. w. **29**
S 150 100 m. w. **64**
S 150 300 m. w. **13**
S 150 600 m. w. **3**

St. 3567 4.X.28
9°06′ S. 140°21.5′ W.
S 150 100 m. w. **4**
S 150 300 m. w. **10**

St. 3569 6.X.28
12°19′ S. 145°35′ W.
S 150 50 m. w. **8**
S 150 100 m. w. **15**
S 150 300 m. w. **18**
S 150 600 m. w. **7**

St. 3576 17.X.28
17°36.5′ S. 149°43.6′ W.
S 150 300 m. w. **1**
S 150 600 m. w. **1**
S 150 2000 m. w. **1**

St. 3577 19.X.28
18°49′ S. 153°10′ W.
S 150 600 m. w. **8**
S 150 1000 m. w. **35**

St. 3578 20.IX.28
20°19′ S. 157°20′ W.
S 150 100 m. w. **1**
S 150 300 m. w. **4**
S 150 600 m. w. **2**

St. 3579 23.X.28
20°56′ S. 160°03′ W.
S 50, surface **1**
S 150 300 m. w. **3**

St. 3580 25.X.28
18°53′ S. 163°02.5′ W.
S 150 50 m. w. **6**
S 150 300 m. w. **17**
S 150 600 m. w. **2**
S 150 1000 m. w. **15**
S 150 2000 m. w. **1**

St. 3581 26.X.28
17°02.5′ S. 166°18′ W.
S 150 50 m. w. **20**
S 150 100 m. w. **24**
S 150 600 m. w. **7**

St. 3582 27.X.28
15°36′ S. 168°57′ W.
S 150 50 m. w. **1**
S 150 300 m. w. **3**

St. 3583 28.X.28
13°14′ S. 169°51′ W.
S 150 50 m. w. **3**
S 150 100 m. w. **28**
S 150 300 m. w. **35**
S 150 600 m. w. **3**
P 100 1000 m. w. **2**

St. 3584 29.X.28
10°51.5′ S. 168°40′ W.
S 150 50 m. w. **1**
S 150 100 m. w. **5**
P 100 200 m. w. **6**
S 150 600 m. w. **2**

St. 3585 31.X.28
7°46′ S. 167°10′ W.
S 150 50 m. w. **35**
S 150 100 m. w. **25**
S 150 300 m. w. **18**
P 100 400 m. w. **4**
S 150 600 m. w. **1**
P 100 800 m. w. **3**
S 150 1000 m. w. **6**

St. 3586 1.XI.28
9°43′ S. 170°40′ W.
S 150 100 m. w. **21**
S 150 300 m. w. **1**

St. 3587 2.XI.28
11°00′ S. 172°37′ W.
S 150 300 m. w. **1**

St. 3588 3.XI.28
13°10′ S. 173°20′ W.
S 150 50 m. w. **2**
S 150 100 m. w. **7**
S 150 300 m. w. **55**

St. 3590 7.XI.28
13°56′ S. 172°30′ W.
S 150 150 m. w. **9**
S 150 200 m. w. **4**

St. 3591 8.XI.28
15°03′ S. 175°30′ W.
S 150 300 m. w. **44**
S 150 600 m. w. **4**

St. 3593 10.XI.28
17°27′ S. 179°33′ E.
S 150 50 m. w. **1**
S 150 300 m. w. **6**

St. 3603 23.XI.28
22°00′ S. 170°26′ E.
S 150 300 m. w. **21**

St. 3604 24.XI.28
23°22′ S. 167°36′ E.
S 150 50 m. w. **4**
S 150 100 m. w. **2**
S 150 200 m. w. **6**
S 150 300 m. w. **9**
P 100 600 m. w. **7**
P 100 1000 m. w. **2**

St. 3611 26.XI.28
20°53.2′ S. 164°03.3′ E.
S 150 300 m. w. **6**
S 150 600 m. w. **5**
P 100 1000 m. w. **2**

St. 3613 28.XI.28
22°43′ S. 166°05.8′ E.
P 100 50 m. w. **4**
P 100 100 m. w. **3**
P 100 300 m. w. **12**
P 100 600 m. w. **6**
P 100 1000 m. w. **17**
P 100 2000 m. w. **3**
P 100 3000 m. w. **9**
P 100 3500 m. w. **10**

St. 3620 7.XII.28
24°46.5′ S. 170°18.5′ E.
S 150 100 m. w. **3**
S 150 600 m. w. **26**

St. 3621 8.XII.28
25°47′ S. 172°24′ E.
S 150 2000 m. w. **1**

St. 3622 8.XII.28
25°54′ S. 172°37′ E.
S 200 100 m. w. **1**
S 200 200 m. w. **15**
S 200 300 m. w. **48**

St. 3623 9.XII.28
27°21′ S. 175°11′ E.
P 100 200 m. w. **23**
S 150 300 m. w. **67**
S 150 600 m. w. **6**
P 100 800 m. w. **3**

St. 3624 10.XII.28
28°17.6′ S. 177°01′ E.
P 100 100 m. w. **4**
P 100 300 m. w. **3**
P 100 600 m. w. **10**
P 100 1000 m. w. **9**
P 100 4000 m. w. **1**

St. 3625 11.XII.28
29°40′ S. 179°34′ E.
P 100 200 m. w. **27**
S 150 600 m. w. **2**
P 100 800 m. w. **2**

St. 3626 13.XII.28
27°00′ S. 177°41′ W.
S 200 200 m. w. **2**
S 150 300 m. w. **1**
S 150 1000 m. w. **1**
S 150 1500 m. w. **7**

St. 3627 14.XII.28
30°08′ S. 176°50′ W.
S 150 50 m. w. **3**
S 150 100 m. w. **16**
S 150 300 m. w. **7**
S 200 600 m. w. **1**
S 150 2000 m. w. **3**
S 150 3000 m. w. **5**
S 150 4000 m. w. **2**

St. 3629 16.XII.28
33°36.5′ S. 179°10′ W.
S 150 600 m. w. **16**

St. 3630 17.XII.28
34°24′ S. 178°42.5′ E.
S 150 50 m. w. **6**
S 150 100 m. w. **1**
S 150 300 m. w. **3**
S 200 1000 m. w. **4**

St. 3637 4.I.29
36°23.5′ S. 176°26′ E.
S 150 50 m. w. **5**
S 150 100 m. w. **1**

St. 3638 4.I.29
37°00′ S. 178°16′ E.
S 150 100 m. w. **6**
S 150 600 m. w. **19**

St. 3639 5.I.29
39°19′ S. 179°18′ E.
S 150 300 m. w. **2**

St. 3640 7.I.29
41°47′ S. 176°55′ E.
S 150 600 m. w. **3**

St. 3641 8.I.29
43°40′ S. 176°36′ E.
S 150 300 m. w. **2**

St. 3642 9.I.29
46°43′ S. 176°08.5′ E.
S 150 300 m. w. **13**
S 150 600 m. w. **6**
S 150 1000 m. w. **2**

St. 3643 10.I.29
46°58′ S. 172°14′ E.
S 150 50 m. w. **7**
S 150 300 m. w. **21**

St. 3644 11.I.29
44°40′ S. 173°39′ E.
S 150 300 m. w. **10**
S 150 600 m. w. **6**

St. 3645 12.I.29
42°32′ S. 174°50′ E.
S 150 300 m. w. **5**

St. 3651 22.I.29
35°36′ S. 171°52′ E.
S 150 300 m. w. **5**
S 150 600 m. w. **1**
S 150 1000 m. w. **3**
S 150 1500 m. w. **3**

St. 3654 27.I.29
33°28′ S. 161°45′ E.
S 150 50 m. w. **34**

St. 3655 28.I.29
33°39.5′ S. 159°00′ E.
S 150 200 m. w. **63**
S 150 800 m. w. **1**

St. 3656 29.I.29
33°26′ S. 157°02′ E.
S 150 100 m. w. **25**
S 150 600 m. w. **4**
S 150 1000 m. w. **2**

St. 3657 31.I.29
33°17′ S. 152°45′ E.
S 150 100 m. w. **5**
S 150 300 m. w. **1**

St. 3658 5.II.29
33°52′ S. 151°27′ E.
S 150 150 m. w. **36**

St. 3663 23.II.29
33°33′ S. 154°04′ E.
S 150 50 m. w. **15**
S 150 100 m. w. **12**
S 150 300 m. w. **15**
S 150 1000 m. w. **6**
S 150 3000 m. w. **2**
S 150 4000 m. w. **2**

St. 3664 24.II.29
31°42.5′ S. 156°69′ E.
S 150 100 m. w. **6**

St. 3665 25.II.29
29°37.5′ S. 156°46′ E.
S 150 50 m. w. **4**
S 150 100 m. w. **6**
S 150 300 m. w. **6**

St. 3677 23.III.29
5°28′ S. 130°39′ E.
S 150 1000 m. w. **2**
S 150 2000 m. w. **6**
S 150 4000 m. w. **2**

St. 3678 24.III.29
4°05′ S. 128°16′ E.
S 50, surface **1**
S 150 50 m. w. **92**
S 150 100 m. w. **80**
S 150 300 m. w. **1**
S 150 600 m. w. **3**
S 150 1000 m. w. **2**

St. 3680 27.III.29
2°22′ S. 126°58.5′ E.
S 150 50 m. w. **50**
S 150 100 m. w. **70**
S 150 300 m. w. **9**
S 150 600 m. w. **3**
S 150 1000 m. w. **1**
S 150 2000 m. w. **1**
S 150 3000 m. w. **3**

St. 3681 28.III.29
0°29′ N. 125°54′ E.
S 150 50 m. w. **37**

St. 3682 29.III.29
1°42′ N. 124°29′ E.
S 150 50 m. w. **7**
S 150 300 m. w. **1**

St. 3683 3.IV.29
4°08′ N. 123°00′ E.
S 150 50 m. w. **10**
S 150 300 m. w. **31**
S 150 600 m. w. **2**
S 150 1000 m. w. **35**
S 150 4000 m. w. **4**

St. 3684 3.IV.29
6°37′ N. 122°24′ E.
S 150 100 m. w. **1**
S 150 300 m. w. **3**
S 150 600 m. w. **1**
S 150 2500 m. w. **1**

St. 3685 5.IV.29
7°22′ N. 121°16′ E.
S 150 50 m. w. **10**
S 150 100 m. w. **5**
S 150 600 m. w. **2**
S 150 1000 m. w. **4**
S 150 3000 m. w. **2**

St. 3686 6.IV.29
8°34′ N. 119°55′ E.
S 50, surface **3**
S 150 50 m. w. **11**
S 150 100 m. w. **40**
S 150 300 m. w. **14**
S 150 600 m. w. **16**
S 150 1000 m. w. **9**

St. 3687 8.IV.29
7°14′ N. 115°23′ E.
S 150 50 m. w. **9**
S 150 100 m. w. **2**

St. 3688 8.IV.29
6°55′ N. 114°02′ E.
S 150 2000 m. w. **2**
S 150 3000 m. w. **1**

St. 3689 9.IV.29
7°13.5′ N. 111°49′ E.
S 150 50 m. w. **2**
S 150 100 m. w. **8**
S 150 300 m. w. **7**
S 150 1000 m. w. **4**

St. 3712 18.V.29
12°44′ N. 110°45′ E.
S 150 100 m. w. **10**
S 150 300 m. w. **13**
S 150 600 m. w. **1**

St. 3714 20.V.29
15°22′ N. 115°20′ E.
S 150 100 m. w. **6**

St. 3715 22.V.29
18°18′ N. 119°36′ E.
S 150 100 m. w. **6**
S 150 300 m. w. **10**

St. 3718 25.V.29
20°04′ N. 123°59′ E.
S 150 50 m. w. **1**
S 150 100 m. w. **25**

St. 3720 25.V.29
21°10.5′ N. 124°37′ E.
S 150 50 m. w. **45**
S 150 100 m. w. **9**
S 200 300 m. w. **13**

St. 3722 29.V.29
25°11′ N. 122°35′ E.
S 200 50 m. w. **11**
S 200 100 m. w. **12**
S 200 300 m. w. **7**

St. 3723 30.V.29
25°30.5′ N. 125°28′ E.
S 50, surface **1**
S 200 50 m. w.
S 200 100 m. w. **3**
S 200 300 m. w. **4**
S 200 600 m. w. **10**

St. 3728 12.VI.29
24°15′ N. 122°00′ E.
S 200 50 m. w. **27**
S 200 100 m. w. **2**

St. 3729 14.VI.29
20°03.5′ N. 120°50′ E.
S 200 50 m. w. **5**
S 200 600 m. w. **4**

St. 3731 16.VI.29
14°37′ N. 119°52′ E.
S 200 50 m. w. c. **225**
S 200 100 m. w. **4**
S 200 600 m. w. **2**
S 200 1000 m. w. **5**
S 150 2500 m. w. **3**

St. 3736 28.VI.29
9°17′ N. 123°58′ E.
S 200 100 m. w. **2**
S 200 300 m. w. **2**
S 150 2000 m. w. **3**

St. 3739 2.VII.29
3°20′ N. 123°50′ E.
S 200 300 m. w. **33**

St. 3748 10.VII.29
3°48′ N. 133°35′ E.
S 200 150 m. w. **33**

St. 3751 12.VII.29
3°40.5′ N. 137°53′ E.
S 50, surface ***6**
S 200 50 m. w. **105**
S 200 100 m. w. **84**
S 200 300 m. w. **16**
S 200 600 m. w. **55**

St. 3768 25.VII.29
1°20′ S. 138°42′ E.
S 150 100 m. w. **12**

St. 3800 18.VIII.29
7°53′ S. 116°18′ E.
S 200 50 m. w. **5**
S 200 300 m. w. **1**
S 200 600 m. w. **5**

St. 3804 30.VIII.29
9°09′ S. 114°47′ E.
S 200 100 m. w. **10**
S 200 300 m. w. **2**
S 200 600 m. w. **2**

St. 3809 4.IX.29
6°22′ S. 105°12′ E.
S 200 50 m. w. **9**
S 200 100 m. w. **3**
S 200 300 m. w. **7**

St. 3814 9.IX.29
4°38′ S. 99°24′ E.
S 200 50 m. w. **21**
S 200 100 m. w. **32**
S 200 300 m. w. c. **120**

St. 3815 10.IX.29
3°36′ S. 97°37′ E.
S 200 50 m. w. **4**
S 200 100 m. w. **1**
S 200 600 m. w. **3**

St. 3817 11.IX.29
2°15′ S. 98°55.5′ E.
S 200 50 m. w. **10**
S 200 100 m. w. **15**
S 200 200 m. w. **16**
S 200 300 m. w. **14**
S 200 600 m. w. **2**

St. 3821 14.IX.29
0°51.5′ S. 99°24.5′ E.
S 200 100 m. w. **1**
S 200 600 m. w. **10**

St. 3824 15.IX.29
0°08′ S. 97°15′ E.
S 200 50 m. w. **2**

St. 3828 18.IX.29
1°22′ N. 96°06.5′ E.
S 200 50 m. w. **12**
S 150 2000 m. w. **1**

St. 3830 19.IX.29
2°36′ N. 96°31′ E.
S 200 300 m. w. c.**130**

St. 3843 9.X.29
9°59′ S. 97°56′ E.
S 200 300 m. w. c.**300**
S 200 350 m. w. c.**370**

St. 3844 11.X.29
12°05′ S. 96°45′ E.
S 200 50 m. w. c.**800**
S 200 100 m. w. c.**300**
S 200 200 m. w. c.**400**
S 200 250 m. w. c.**600**
S 200 300 m. w. c.**400**
S 200 600 m. w. **21**

St. 3847 11.X.29
12°02′ S. 96°43′ E.
S 150 2000 m. w. **3**
S 150 3000 m. w. **6**

St. 3849 13.X.29
8°11′ S. 92°41.5′ E.
S 50, surface **1**
S 200 250 m. w. c.**100**
S 200 300 m. w. c.**110**
S 200 600 m. w. **4**

St. 3850 14.X.29
6°01′ S. 93°12′ E.
S 200 100 m. w. **20**
S 200 200 m. w. c. **50**
S 200 300 m. w. **9**

St. 3851 15.X.29
5°27′ S. 93°50′ E.
S 200 100 m. w. c.**150**
S 200 200 m. w. c.**150**
S 200 300 m. w. c. **80**
S 200 600 m. w. **4**

St. 3854 16.X.29
5°31′ S. 96°35′ E.
S 200 100 m. w. **9**
S 200 300 m. w. **5**
S 200 400 m. w. **6**

St. 3855 17.X.29
5°17′ S. 97°06′ E.
S 200 100 m. w. **19**
S 200 300 m. w. **20**

St. 3856 17.X.29
4°45.5′ S. 98°28′ E.
S 50, surface **1**
S 200 100 m. w. c.**500**
S 200 300 m. w. c.**175**

St. 3858 18.X.29
3°28′ S. 99°58.5′ E.
S 50, surface **2**

St. 3860 20.X.29
2°57′ S. 99°36′ E.
S 200 50 m. w. c.**150**
S 200 100 m. w. c. **75**
S 200 300 m. w. c.**270**
S 200 300 m. w. **55**
S 200 600 m. w. **40**

St. 3865 23.X.29
2°24′ S. 97°27′ E.
S 50, surface **1**

St. 3893 6.XI.29
5°59′ N. 92°29′ E.
S 200 300 m. w. **5**

St. 3899 9.XI.29
5°39.5′ N. 96°54′ E.
S 50, surface **1**

St. 3902 17.XI.29
6°05′ N. 95°30′ E.
S 200 50 m. w. **2**
S 200 100 m. w. **3**

St. 3903 17.XI.29
5°50′ N. 93°28′ E.
S 200 50 m. w. c. **85**
S 200 100 m. w. c. **40**
S 200 300 m. w. **2**
S 200 600 m. w. **3**

St. 3905 19.XI.29
4°44′ N. 88°05.5′ E.
S 200 100 m. w. **2**

St. 3906 20.XI.29
4°26.5′ N. 85°21′ E.
S 200 100 m. w. c. **70**
S 200 300 m. w. **1**
S 200 600 m. w. **8**

St. 3907 21.XI.29
3°59′ N. 82°57′ E.
S 200 100 m. w. **1**
S 200 300 m. w. **5**
S 200 400 m. w. **5**

St. 3909 22.XI.29
5°21′ N. 80°38′ E.
S 150 3000 m. w. **10**

St. 3910 23.XI.29
5°28′ N. 80°00′ E.
S 200 50 m. w. **10**
S 200 300 m. w. **8**

St. 3912 24.XI.29
6°52′ N. 79°30′ E.
S 200 300 m. w. **1**

St. 3913 1.XII.29
6°36′ N. 79°06′ E.
S 200 50 m. w. **4**
S 200 100 m. w. **1**
S 200 300 m. w. **25**
S 200 600 m. w. **3**

St. 3914 2.XII.29
4°52′ N. 77°08′ E.
S 200 50 m. w. **5**

St. 3915 3.XII.29
3°14′ N. 75°21′ E.
S 200 50 m. w. **25**
S 200 100 m. w. **8**
S 200 300 m. w. **28**
S 200 600 m. w. **25**

St. 3916 4.XII.29
1°45′ N. 73°03′ E.
S 200 50 m. w. c. **60**
S 200 300 m. w. **1**

St. 3917 5.XII.29
1°45′ N. 71°05′ E.
S 200 50 m. w. **1**
S 200 100 m. w. **1**

St. 3918 7.XII.29
0°35′ N. 66°09′ E.
S 200 50 m. w. c. **60**
S 200 100 m. w. c.**1200**
S 200 300 m. w. **7**

St. 3919 8.XII.29
0°07′ S. 63°56′ E.
S 200 50 m. w. c. **90**
S 200 100 m. w. c.**120**
S 200 300 m. w. **14**
S 200 600 m. w. **1**

St. 3920 9.XII.29
1°12′ S. 62°19′ E.
S 200 50 m. w. c.**160**
S 200 100 m. w. c.**200**
S 150 2000 m. w. **4**
S 150 2500 m. w. **3**

St. 3921 11.XII.29
3°36′ S. 58°19′ E.
S 200 50 m. w. c.**110**
S 200 100 m. w. c.**280**
S 200 200 m. w. c. **50**
S 200 400 m. w. **3**

St. 3922 12.XII.29
3°45′ S. 56°33′ E.
S 200 50 m. w. c.**100**
S 200 100 m. w. **10**
S 200 300 m. w. **1**
S 200 600 m. w. **1**

St. 3924 14.XII.29
5°01′ S. 54°46′ E.
S 200 50 m. w. c.**115**
S 200 100 m. w. **12**
S 200 300 m. w. **16**

St. 3925 16.XII.29
7°13′ S. 52°22′ E.
S 200 50 m. w. c.**220**
S 200 100 m. w. **23**

St. 3926 16.XII.29
8°27′ S. 50°54′ E.
S 150 50 m. w. c. **120**
S 200 100 m. w. c. **340**
S 200 200 m. w. c. **360**
S 200 300 m. w. c. **245**

St. 3927 17.XII.29
10°55′ S. 50°15′ S.
S 200 100 m. w. **24**
S 200 200 m. w. **15**
S 200 300 m. w. **8**

St. 3928 18.XII.29
11°20′ S. 50°10′ E.
S 150 50 m. w. **1**
S 200 200 m. w. c. **50**
S 200 300 m. w. **45**
S 200 600 m. w. **25**

St. 3929 18.XII.29
12°11′ S. 50°18′ E.
S 200 100 m. w. **1**
S 200 200 m. w. **8**
S 200 300 m. w. **11**
S 200 400 m. w. **13**
S 200 400 m. w. **2**
S 200 500 m. w. **15**

St. 3930 19.XII.29
11°55′ S. 49°55′ E.
S 200 200 m. w. **7**
S 200 300 m. w. **35**
S 200 600 m. w. **32**

St. 3931 19.XII.29
12°09′ S. 49°34′ E.
S 200 200 m. w. **60**
S 200 300 m. w. c. **100**
S 200 500 m. w. **5**
S 200 600 m. w. **8**

St. 3932 20.XII.29
11°35′ S. 49°45′ E.
S 200 400 m. w. **12**
S 200 500 m. w. **3**
S 200 500 m. w. **2**

St. 3934 20–21.XII.29
11°24′ S. 50°05′ E.
S 200 200 m. w. c. **40**
S 200 300 m. w. c. **70**
S 200 400 m. w. c. **160**
S 200 500 m. w. **40**
S 200 600 m. w. **21**

St. 3935 21.XII.29
10°50′ S. 48°30′ E.
S 200 100 m. w. **11**
S 200 200 m. w. **28**
S 200 300 m. w. **25**
S 200 400 m. w. c. **150**
S 200 500 m. w. **28**

St. 3936 22.XII.29
10°28′ S. 47°30′ E.
S 200 100 m. w. **3**
S 200 200 m. w. **1**
S 200 300 m. w. **17**
S 200 400 m. w. c. **155**
S 200 500 m. w. **63**

St. 3937 22.XII.29
9°26′ S. 46°05′ E.
S 150 100 m. w. c. **40**
S 200 200 m. w. c. **50**
S 200 300 m. w. c. **450**
S 200 400 m. w. c. **800**
S 200 500 m. w. c. **230**

St. 3938 23.XII.29
9°10′ S. 45°17′ E.
S 200 500 m. w. **6**

St. 3939 23.XII.29
8°44′ S. 43°54′ E.
S 200 200 m. w. **8**
S 200 300 m. w. c. **80**
S 200 400 m. w. c. **130**
S 200 500 m. w. c. **150**

St. 3940 24.XII.29
8°24′ S. 42°54′ E.
S 200 200 m. w. **1**
S 200 300 m. w. c. **150**
S 200 400 m. w. c. **300**
S 200 500 m. w. c. **280**

St. 3941 24.XII.29
7°24′ S. 41°51′ E.
S 200 500 m. w. **4**

St. 3942 25.XII.29
6°47′ S. 41°27′ E.
S 200 300 m. w. c. **45**

St. 3943 25.XII.29
5°30′ S. 40°40′ E.
S 150 100 m. w. c. **40**
S 200 200 m. w. **16**
S 200 300 m. w. c. **40**
S 200 400 m. w. c. **250**
S 200 500 m. w. **4**

St. 3944 26.XII.29
4°45′ S. 40°10′ E.
S 50 surface **1**
S 150 100 m. w. **3**
S 200 200 m. w. **10**
S 200 300 m. w. **40**
S 200 400 m. w. c. **250**
S 200 500 m. w. **12**

St. 3946 3.I.30
3°26′ S. 42°58′ E.
S 200 300 m. w. **4**

St. 3947 4.I.30
4°21′ S. 42°56′ E.
S 200 400 m. w. **2**

St. 3948 6.I.30
10°11′ S. 41°57′ E.
S 200 500 m. w. c. **200**

St. 3950 7.I.30
12°23′ S. 41°43.5′ E.
S 200 200 m. w. **22**
S 200 300 m. w. **9**
S 200 400 m. w. **2**
S 200 500 m. w. **8**

St. 3952 8.I.30
15°05′ S. 41°53′ E.
S 200 200 m. w. **5**
S 200 300 m. w. **5**
S 200 400 m. w. **9**
S 200 500 m. w. **7**

St. 3953 8.I.30
16°12′ S. 42°04′ E.
S 200 300 m. w. **2**

St. 3954 9.I.30
16°53′ S. 42°12′ E.
S 150 50 m. w. **13**
S 200 100 m. w. **2**
S 200 200 m. w. **1**

St. 3955 9.I.30
18°30′ S. 42°18′ E.
S 200 200 m. w. **3**
S 200 300 m. w. **22**
S 200 500 m. w. **3**

St. 3956 10.I.30
21°13′ S. 42°26′ E.
S 200 200 m. w. **3**
S 200 300 m. w. **8**
S 200 500 m. w. **5**

St. 3957 11.I.30
21°30′ S. 42°32′ E.
S 150 50 m. w. **3**
S 200 100 m. w. **3**
S 200 300 m. w. **29**
S 200 500 m. w. **4**

St. 3958 11.I.30
23°11′ S. 42°54′ E.
S 200 200 m. w. c. **40**
S 200 300 m. w. **4**
S 200 500 m. w. **20**

St. 3959 12.I.30
23°40′ S. 43°02′ E.
S 150 100 m. w. **14**
S 200 200 m. w. **10**
S 200 300 m. w. **19**
S 200 500 m. w. **12**

St. 3960 13.I.30
25°23′ S. 42°52′ E.
S 150 200 m. w. **1**

St. 3961 14.I.30
24°57′ S. 40°18′ E.
S 150 200 m. w. **16**
S 150 300 m. w. **35**

St. 3962 14.I.30
24°33′ S. 38°26′ E.
S 200 300 m. w. **3**

St. 3963 15.I.30
24°30′ S. 37°48.5′ E.
S 200 150 m. w. **2**
S 200 200 m. w. **5**
S 200 250 m. w. **5**

St. 3964 15.I.30
25°19′ S. 36°13′ E.
S 150 50 m. w. **4**
S 200 100 m. w. **24**
S 200 300 m. w. **4**
S 200 600 m. w. **9**
S 150 1500 m. w. **2**
S 150 2000 m. w. **5**
S 150 2500 m. w. **1**

St. 3966 18.I.39
29°25′ S. 32°00′ E.
S 150 100 m. w. **5**
S 150 200 m. w. **6**
S 200 300 m. w. **40**

St. 3967 18.I.30
29°44′ S. 31°18′ E.
S 200 100 m. w. **9**

St. 3969 27.I.30
31°33′ S. 30°07′ E.
S 200 50 m. w. **2**

St. 3970 28.I.30
34°09′ S. 27°38′ E.
S 200 200 m. w. **1**
S 200 300 m. w. **19**

"Pacific"
St. 4760 8.I.29
13°28′ N. 144°31′ E.
S 150 137 m. w. **11**

St. 4761 19.IV.32
25°10′ N. 127°45′ E.
S 150 c. **300**

"Panama"
St. 4763 24.II.33
39°26′ S. 47°49′ E.
S 200 293 m. w. **2**

"Panama"
St. 4764 28.II.33
39°21′ S. 69°59′ E.
S 200 293 m. w. **2**

"Panama"
St. 4765 8.III.33
40°06′ S. 112°57′ E.
S 200 293 m. w. c. **45**

"Fernmoor"
St. 4771 28.II.33
37°05′ N. 160°08′ E.
S 150 91–110 m. w. **2**

"Pacific"
St. 4772 12.IV.33
21°40′ N. 120°02′ E.
S 150 200 m. w. **19**

"Jutlandia"
St. 4774 29.III.33
31°10′ N. 171°35′ W.
S 200 c. 220 m. w. **25**

"Jutlandia"
St. 4775 11.IV.33
30°20′ N. 138°00′ E.
S 200 c.220 m. w. c. **250**

"Falstria"
St. 4778 7.IV.33
32°13′ N. 167°25′ W.
S 200 183 m. w. c. **100**

"Falstria"
St. 4781 3.VII.33
32°43′ N. 135°02′ W.
S 200 183 m. w. **3**

"Jutlandia"
St. 4782 17.VI.33
31°28′ N. 125°50′ W.
S 200 220 m. w. **9**

"Jutlandia"
St. 4783 27.VI.33
39°30′ N. 166°50′ W.
S 200 220 m. w. **12**

"Jutlandia"
St. 4784 9.VIII.33
33°52′ N. 137°10′ E.
S 200 220 m. w. **17**

"Jutlandia"
St. 4786 26.VIII.33
36°30′ N. 126°30′ W.
S 200 220 m. w. **8**

"Selandia"
St. 4789 28.V.33
31°40′ N. 135°30′ E.
S 200 220 m. w. **11**

"Jutlandia"
St. 4790 7.VII.33
35°30′ N. 145°00′ E.
S 200 220 m. w. **14**

"Jutlandia"
St. 4792 24.XII.33
41°24′ N. 170°00′ W.
S 200 220 m. w. **7**

"Jutlandia"
St. 4793 2.I.34
35°44′ N. 124°16′ W.
S 200 220 m. w. **20**

"Falstria"
St. 4797 18.I.34
30°43′ N. 136°28′ E.
S 200 c. 200 m. w. **31**

"Pacific"
St. 4799 12.III.34
19°02′ N. 119°38′ E.
S 150 200 m. w. c. **220**

"Falstria"
St. 4803 25.V.34
30°37′ N. 134°25′ E.
S 200 183 m. w. c. **250**

"Falstria"
St. 4804 5.VI.34
39°43′ N. 167°55′ W.
S 200 183 m. w. c. **200**

"Jutlandia"
St. 4807 12.II.34
32°56′ N. 131°50′ W.
S 200 220 m. w. **2**

"Jutlandia"
St. 4808 2.V.34
36°20′ N. 143°00′ E.
S 200 220 m. w. **35**

"Jutlandia"
St. 4810 14.V.34
43°40′ N. 144°37′ W.
S 200 220 m. w. **5**

"Falstria"
St. 4812 24.VIII.34
29°57′ N. 170°50′ W.
S 200 183 m. w. **37**

"Pacific"
St. 4815 10.I.35
15°55′ N. 112°55′ E.
S 150 c. 200 m. w. c. **150**

"St. Nordiske"
St. 4818 22.VIII.36
18°25′ N. 117°02′ E.
S 150 201 m. w. c. **80**

"St. Nordiske"
St. 4820 11.III.38
13°56′ N. 117°00′ E.
S 150 200 m. w. **37**

"Galathea"
St. 305 26.IV.51
Bay of Bengal
20°51′ N. 87°58′ E.
Depth 43–52 m
SN 50 near surface **1**

St. 313 2.V.51
Bay of Bengal
19°53′ N. 89°05′ E.
Depth 1520 m
S 100, 5–10 m below surface **25**

St. 319 6.V.51
Nancowry Harbour, Nicobars
SN 50 **1**

St. 414 16.VII.51
Tabajon Bay, Dinagat, Philippines
10°20′ N. 125°32′ E.
Depth 40 m
SN 50 16 m. w. **4**

St. 446 18–19.VIII.51
Off Isabela, Basilan Island, Philippines
6°42′ N. 121°58′ E.
SN 50 **2**

St. 482 12.IX.51
Bali, anchorage
8°46′ S. 115°14′ E.
SN 50 **1**

St. 512 7.X.51
Solomon Islands
9°25′ S. 160°00′ E.
SN 50 **1**

This widely distributed and very common oceanic medusa was taken at almost all the stations during the cruise of the "Dana" from the Gulf of Panama to South Africa, except along the north-east coast of Australia, frequently in considerable numbers. The merchant vessels found it in several localities across the

North Pacific between America and Japan, in a belt about 30°–44° N.; also across the southern part of the Indian Ocean, about 40° S., and in some scattered localities in the South China Sea and near the Palao Islands. The "Galathea" found it in the Bay of Bengal, in some localities in the Malayan Archipelago, and near the Solomon Islands. It was formerly unknown among the Melanesian islands and around New Zealand, where it was taken at several stations by the "Dana". It may be accidental that it has not previously been recorded from these waters.

In my treatment of the medusae from the Atlantic part of the "Dana" Expedition (KRAMP 1959 *a* p. 49) I called attention to the remarkable variation in number of specimens of this species taken in different parts of the eastern Atlantic. As seen from the above list of stations similar remarkable variations in quantity are observed in the Pacific and the Indian Ocean. The medusa was not taken in particularly great numbers during the voyage from the Gulf of Panama to Australia. In the Malayan Archipelago it was abundant at three stations, St. 3678 in the Banda Sea, St. 3731 off Manila, and St. 3751 north of New Guinea, thus in scattered localities among the numerous stations, where it was taken in rather small numbers within this area. In the area west of Sumatra the species was found at 20 stations, usually in comparatively small numbers, but it occurred in great abundance at eight stations, and these stations are rather uniformly scattered within the extensive area off the southern part of Sumatra, partly rather near to the coast, partly at considerable distances from the island; the quantity was particularly large at two stations near the Cocos Islands (St. 3843 and 3844). It is remarkable that in most of these localities the great catches were not restricted to one single depth, but were taken at different levels within the uppermost 200 m. It may perhaps be of some importance that these eight stations were all within the range of the Equatorial Counter Current. The medusa was also very common at almost all stations between the Maldive Islands and the Seychelles (see especially St. 3918, where no less than 1200 specimens were taken in a haul with 100 m wire), decreasing in number from the Seychelles towards Madagascar, but again very abundant at most of the stations between the north point of Madagascar and Mombasa on the east coast of Africa. On the other hand, the species was comparatively rare at the stations in the Mozambique Channel and further south along the African coast. The question, whether the prevailing currents may explain these facts will be discussed in the General Section in comparison with the occurrence of other species.

Vertical distribution. *Rhopalonema velatum* is rarely met with immediately at the surface, and it occurs in great abundance in hauls with 50–500 m wire out, decreases rapidly in number in hauls with 600 m wire or more, though it may occasionally be taken deeper down. Comparatively large numbers were taken in hauls with 1000 m wire out at three stations: St. 3558 and 3561 in the eastern Pacific, and St. 3577 near Tahiti; none of the hauls taken at higher levels at these stations contained any noteworthy number of specimens, so that the medusa evidently occurred in considerable numbers at the depth, where hauls with 1000 m wire were taken in these three localities. As a rule the species is rare at such great depths.

Distribution: Oceanic, preferably epipelagic; generally distributed in the warm and temperate parts of the great oceans and in the Mediterranean.

Rhopalonema funerarium VANHÖFFEN.

Rhopalonema funerarium VANHÖFFEN 1902 p. 61, Pl. 9 fig. 2, Pl. 10 fig. 17, Pl. 11 fig. 31.
Rhopalonema funerarium KRAMP 1961 *a* p. 261 (all references since 1910).

Material:

"Dana"							
St. 3642	9.I.29	St. 3677	23.III.29	St. 3678	24.III.29	St. 3684	4.IV.29
46°43′ S.	176°08.5′ E.	5°28′ S.	130°39′ E.	4°05′ S.	128°16′ E.	6°37′ N.	122°24′ E.
S 150	1000 m. w. **3**	S 150	1000 m. w. **5**	S 150	1000 m. w. **1**	S 150	1000 m. w. **7**
		S 150	4000 m. w. **1**				

St. 3686	6.IV.29
8°34′ N.	119°55′ E.
S 150	600 m. w. **9**
S 150	1000 m. w. **4**

St. 3688	8.IV.29
6°55′ N.	114°02′ E.
S 150	1000 m. w. **3**

St. 3689	9.IV.29
7°13′ N.	111°49′ E.
S 150	600 m. w. **4**

St. 3800	18.VIII.29
7°53′ S.	116°18′ E.
S 200	600 m. w. **2**

St. 3804	30.VIII.29
9°09′ S.	114°47′ E.
S 200	600 m. w. **3**

St. 3828	18.XI.29
1°22′ N.	96°06.5′ E.
S 150	1500 m. w. **1**

St. 3893	6.XI.29
5°59′ N.	92°29′ E.
S 200	400 m. w. **2**

St. 3919	8.XII.29
0°07′ S.	63°56′ E.
S 200	600 m. w. **3**

St. 3921	11.XII.29
3°36′ S.	58°19′ E.
S 200	300 m. w. **6**
S 200	600 m. w. **2**

St. 3922	12.XII.29
3°45′ S.	56°33′ E.
S 200	600 m. w. **1**

St. 3924	14.XII.29
5°01′ S.	54°46′ E.
S 200	600 m. w. **1**

While this species is recorded from numerous localities in the Atlantic Ocean, mainly in its eastern parts from the Cape of Good Hope to the waters west of the British Isles, the previous records from the Indian and Pacific oceans are rather few, comprising some localities in the eastern tropical Pacific (BIGELOW 1909 p. 132), and two localities in the Indian Ocean: near St. Paul (VANHÖFFEN 1902 p. 61) and between Kerguelen Island and S.W. Australia (KRAMP 1957*b* pp. 158, 162). The "Dana", however, collected it at several stations in the Malayan Archipelago, west of Sumatra, and near the Nicobars (St. 3677–3893) and in the western part of the ocean, between the Maldives and Madagascar. The only locality, where it was found in the Pacific, was at St. 3642, east of the southern part of New Zealand. It was mainly taken in hauls with 1000 or 600 m wire, on two occasions at somewhat higher levels, with 400 and 300 m wire (St. 3893 near the Nicobars, St. 3921 near the Seychelles). This is in accordance with previous statements, to the effect that this medusa mainly occurs in the deep and intermediate strata, though it occasionally ascends towards higher levels.

Distribution: Widely distributed in the Atlantic and Indian oceans, apparently somewhat more scattered in the Pacific.

Pantachogon haeckeli MAAS.

Pantachogon haeckeli MAAS 1893 p. 17, Pl. 1 fig. 2.
Pantachogon rubrum VANHÖFFEN 1902 p. 63, Pl. 9 fig. 9, Pl. 10 figs. 19, 20, Pl. 11 fig. 25.

"Dana" Material:

St. 3613	28.XI.28
22°43′ S.	166°05.8′ E.
P 100	3000 m. w. **2**
P 100	3500 m. w. **1**

St. 3621	8.XII.28
25°47′ S.	172°24′ E.
S 150	2000 m. w. **1**
S 150	4000 m. w. **4**

St. 3624	10.XII.28
28°17.6′ S.	177°01′ E.
P 100	3000 m. w. **2**
P 100	4000 m. w. **2**

St. 3627	14.XII.28
30°08′ S.	176°50′ W.
S 150	2000 m. w. **2**
S 150	3000 m. w. **39**
S 200	4000 m. w. **17**

St. 3640	17.I.29
41°47′ S.	176°55′ E.
S 150	2500 m. w. **21**

St. 3642	9.I.29
46°43′ S.	176°08.5′ E.
S 150	1500 m. w. **13**
S 150	2000 m. w. **11**
S 150	2500 m. w. **17**

St. 3653	26.I.29
33°30.5′ S.	165°53′ E.
S 150	3500 m. w. **12**

St. 3656	29.I.29
33°26′ S.	157°02′ E.
S 150	3000 m. w. **11**
S 150	4000 m. w. **5**

St. 3663	23.II.29
33°33′ S.	154°04′ E.
S 150	3000 m. w. **1**
S 150	4000 m. w. **4**

St. 3676	23.III.29
5°52′ S.	131°14′ E.
S 150	3000 m. w. **2**
S 150	4000 m. w. **3**

St. 3677	23.III.29
5°28′ S.	130°39′ E.
S 150	1000 m. w. **1**
S 150	2000 m. w. **16**
S 150	3000 m. w. **1**
S 150	4000 m. w. **9**
E 300	5000 m. w. **1**

St. 3678	24.III.29
4°05′ S.	128°16′ E.
S 150	2000 m. w. **1**
S 150	3000 m. w. **4**
S 150	4000 m. w. **2**

St. 3680	27.III.29
2°22′ S.	126°58.5′ E.
S 150	3000 m. w. **4**

St. 3731	17.VI.29
14°37′ N.	119°52′ E.
S 150	2500 m. w. **1**

St. 3847	11.X.29
12°02′ S.	96°43′ E.
S 150	2000 m. w. **5**
S 150	3000 m. w. **22**

St. 3909	22.XI.29
5°21′ N.	80°38′ E.
S 150	4000 m. w. **1**

St. 3920 9.XII.29
1°06′ S. 62°25′ E.
S 150 2500 m. w. c. **55**
S 150 3500 m. w. **14**

"Galathea"
St. 465 5.IX.51
Sunda Trench
10°20′ S. 109°55′ E.
Depth 7000–6900 m
ST 300 10300 m. w. **3**

St. 470 9.IX.51
Sunda Trench
11°04′ S. 113°34′ E.
Depth 5210–5130 m
ST 300 8000 m. w. **2**

St. 471 10.IX.51
Sunda Trench
10°26′ S. 114°15′ E.
Depth 2990–2810 m
ST 300 4900 m. w. **1**

St. 472 10.IX.51
Sunda Trench
10°24′ S. 114°07′ E.
Depth 2250–2030 m
HOT 3600 m. w. **9**

St. 494 21.IX.51
Banda Trench
5°36′ S. 131°01′ E.
Depth 7280 m
ST 300 10300 m. w. **1**

Considering its general distribution in the deep parts of the Atlantic Ocean, where this bathypelagic medusa is frequently very common, its apparently scanty occurrence in the Pacific Ocean is remarkable. According to the literature it is common only in the northernmost part of this ocean (Ochotian Sea, Bering Sea, and off the Canadian coasts). The only other previous Pacific records are from south-eastern Australia and from a single locality in the southern Pacific, about 70° S. In the "Dana" collection it was never found in the eastern and central Pacific, but it was taken at several stations north and east of New Zealand (a. o. at the rich station 3642) and between New Zealand and East-Australia. It was also found at a number of stations in the Banda Sea and Ceram Sea (St. 3676–3680) and at St. 3781 in the South China Sea. It was found by the "Galathea" in the Banda Trench and in four localities in the Sunda Trench in very deep hauls, with 3600–10300 m wire out. In the Indian Ocean it is generally distributed from the tropical regions right down to the continental slope of the antarctic continent, but by the "Dana" it was taken in three localities only: St. 3847 near the Cocos Islands, St. 3909 near Ceylon, and St. 3920 between Ceylon and the Seychelles.

It was taken in hauls with up to 5000 m wire out, and never with less than 1000 m wire, and the only catch, when it was taken with 1000 m wire out, was at St. 3677 in the Banda Sea, where one specimen was found in this haul, whereas a haul with 2000 m wire at the same station contained 16 specimens.

The "Galathea" took it at still greather depths, with up to 10300 m wire out.

Distribution: Widely distributed in the deep parts of the oceans from the antarctic slope to the Bering Sea in the Pacific and to the North-Atlantic Transversal Ridge in the Atlantic; hitherto unknown in the central and eastern Pacific. It does not occur in the Mediterranean.

Colobonema sericeum VANHÖFFEN.

Material:

"Dana"
St. 3550 5.IX.28
7°10′ N. 78°15′ W.
E 300 1000 m. w. **1**

St. 3556 14.IX.28
2°52′ N. 87°38′ W.
E 300 2500 m. w. **5**

St. 3558 18.IX.28
0°18′ S. 99°07′ W.
S 150 2000 m. w. **19**
E 300 4000 m. w. **1**

St. 3561 24.IX.28
4°20′ S. 116°46′ W.
S 150 2000 m. w. **14**
E 300 5000 m. w. **2**

St. 3570 7.X.28
14°01′ S. 141°51.5′ W.
E 300 4000 m. w. **1**

St. 3580 25.X.28
18°53′ S. 163°02.5′ W.
S 150 2000 m. w. **1**

St. 3585 31.X.28
7°46′ S. 167°10′ W.
E 300 4000 m. w. **1**

St. 3604 24.XI.28
23°22′ S. 167°36′ E.
E 300 1500 m. w. **4**

St. 3611 26.XI.28
20°53.2′ S. 164°03.3′ E.
P 100 1000 m. w. **1**
E 300 1500 m. w. **9**

St. 3613 28.XI.28
22°43′ S. 166°05.8′ E.
P 100 2000 m. w. **1**
P 100 3000 m. w. **1**
P 100 3500 m. w. **1**

St. 3621 8.XII.28
25°47′ S. 172°24′ E.
S 150 2000 m. w. **3**

St. 3623 9.XII.28
27°21′ S. 175°11′ E.
E 300 1000 m. w. **4**

St. 3626 13.XII.28
27°00′ S. 177°41′ W.
E 300 2000 m. w. **4**

St. 3627 14.XII.28
30°08′ S. 176°50′ W.
S 150 3000 m. w. **5**
S 150 4000 m. w. **1**
E 300 5000 m. w. **2**

St. 3629 16.XII.28
33°36.5′ S. 179°10′ W.
E 300 1000 m. w. **1**

St. 3630 17.XII.28
34°24′ S. 178°42.5′ E.
S 200 2000 m. w. **16**
E 300 3000 m. w. **26**

St. 3640 7.I.29
41°47′ S. 176°55′ E.
S 150 2000 m. w. **4**
E 300 3000 m. w. **4**

St. 3642 9.I.29
46°43′ S. 176°08.5′ E.
S 150 1500 m. w. **2**
S 150 2000 m. w. **7**
S 150 2500 m. w. **5**
E 300 3000 m. w. **3**

St. 3651 22.I.29
35°36′ S. 171°52′ E.
S 150 1500 m. w. **20**
S 150 2000 m. w. **5**
E 300 2500 m. w. **24**

St. 3653 26.I.29
33°30.5′ S. 165°53′ E.
S 150 2000 m. w. **17**
S 150 3500 m. w. **1**
E 300 4000 m. w. **3**

St. 3656 29.I.29
33°26′ S. 157°02′ E.
S 150 2000 m. w. **9**
S 150 3000 m. w. **5**
S 150 4000 m. w. **2**
E 300 5000 m. w. **8**

St. 3663 23.II.29
33°33′ S. 154°04′ E.
S 150 2000 m. w. **14**
S 150 3000 m. w. **1**
S 150 4000 m. w. **4**
E 300 5000 m. w. **5**

St. 3676 22.III.29
5°52′ S. 131°14′ E.
E 300 1000 m. w. **3**
S 150 3000 m. w. **1**
S 150 4000 m. w. **1**
S 150 5000 m. w. **1**
E 300 6000 m. w. **5**

St. 3677 23.III.29
5°28′ S. 130°39′ E.
S 150 2000 m. w. **16**
S 150 3000 m. w. **4**
S 150 4000 m. w. **1**
E 300 5000 m. w. **5**

St. 3678 24.III.29
4°05′ S. 128°16′ E.
E 300 1000 m. w. **10**
S 150 2000 m. w. **13**
S 150 3000 m. w. **5**
E 300 5000 m. w. **5**

St. 3680 27.III.29
2°22′ S. 126°58.5′ E.
E 300 1000 m. w. **13**
S 150 2000 m. w. **2**
E 300 5000 m. w. **1**

St. 3683 2.IV.29
4°03′ N. 123°26′ E.
S 150 2000 m. w. **5**
S 150 4000 m. w. **2**
E 300 5000 m. w. **2**

St. 3684 3.IV.29
6°37′ N. 122°24′ E.
E 300 1000 m. w. **1**
S 150 2000 m. w. **2**

St. 3685 5.IV.29
7°22′ N. 121°16′ E.
E 300 1000 m. w. **5**
S 150 1000 m. w. **8**
S 150 2000 m. w. **1**
S 150 4000 m. w. **1**

St. 3686 6.IV.29
8°34′ N. 119°55′ E.
E 300 1000 m. w. **8**
E 300 4000 m. w. **1**

St. 3688 8.IV.29
6°55′ N. 114°02′ E.
S 150 2000 m. w. **6**
S 150 3000 m. w. **4**
E 300 4000 m. w. **2**

St. 3689 9.IV.29
7°13.5′ N. 111°49′ E.
E 300 1000 m. w. **1**
S 150 1500 m. w. **20**
S 150 2000 m. w. **18**
S 150 2500 m. w. **5**
E 300 3000 m. w. **1**

St. 3712 18.V.29
12°44′ N. 111°45′ E.
E 300 1000 m. w. **2**

St. 3714 20.V.29
15°22′ N. 115°20′ E.
E 300 1000 m. w. **11**
E 300 6000 m. w. **7**

St. 3716 22.V.29
19°18.5′ N. 120°13′ E.
E 300 2000 m. w. **37**
E 300 3000 m. w. **10**
E 300 4000 m. w. **1**

St. 3728 12.VI.29
24°15′ N. 122°00′ E.
E 300 1000 m. w. **1**

St. 3731 16.VI.29
14°37′ N. 119°52′ E.
E 300 1000 m. w. **1**
E 300 1000 m. w. **3**
E 300 3000 m. w. **54**

St. 3736 28.VI.29
9°17′ N. 123°58′ E.
E 300 1000 m. w. **6**
S 150 2000 m. w. **2**

St. 3768 24.VII.29
1°20′ S. 138°42′ E.
E 300 2000 m. w. **24**
E 300 2500 m. w. **5**
E 300 3000 m. w. **16**
S 150 3500 m. w. **2**
E 300 4000 m. w. **2**

St. 3800 18.VIII.29
7°53′ S. 116°18′ E.
E 300 1000 m. w. **1**

St. 3804 30.VIII.29
9°09′ S. 114°47′ E.
E 300 1000 m. w. **8**

St. 3824 15.IX.29
0°08′ S. 97°15′ E.
S 200 600 m. w. **14**

St. 3828 18.IX.29
1°22′ N. 96°06.5′ E.
E 300 1000 m. w. **12**
S 150 2000 m. w. **6**

St. 3844 11.X.29
12°05′ S. 96°45′ E.
E 300 1000 m. w. **5**

St. 3847 11.X.29
12°02′ S. 96°43′ E.
S 150 2000 m. w. **23**
S 150 3000 m. w. **25**
E 300 3500 m. w. **3**

St. 3893 6.XI.29
5°59′ N. 92°29′ E.
S 200 800 m. w. **2**
E 300 1000 m. w. **5**

St. 3902 17.XI.29
6°05′ N. 95°30′ E.
S 200 600 m. w. **1**
E 300 1000 m. w. **15**

St. 3903 17.XI.29
5°50′ N. 93°28′ E.
S 200 600 m. w. **3**
E 300 1000 m. w. **1**

St. 3904 18.XI.29
5°18′ N. 90°55′ E.
S 150 1500 m. w. **15**
S 150 2000 m. w. **15**
E 300 2500 m. w. **6**
S 150 3000 m. w. **1**
E 300 3500 m. w. **3**

St. 3906 20.XI.29
4°26.5′ N. 85°21′ E.
S 200 600 m. w. **1**
E 300 1000 m. w. **7**

St. 3907 21.XI.29
3°59′ N. 82°57′ E.
E 300 1000 m. w. **1**

St. 3908 22.XI.29
4°28′ N. 82°13′ E.
E 300 1000 m. w. **1**

St. 3909 22.XI.29
5°21′ N. 80°38′ E.
S 150 3000 m. w. **4**
E 300 3500 m. w. **4**
E 300 4500 m. w. **3**

St. 3914 2.XII.29
4°52′ N. 77°08′ E.
E 300 1000 m. w. **5**

St. 3917 5.XII.29
1°45′ N. 71°05′ E.
S 150 1200 m. w. **4**
S 150 2200 m. w. **5**
S 150 3700 m. w. **4**

St. 3918 7.XII.29
0°35′ N. 66°09′ E.
S 200 600 m. w. **1**
E 300 1000 m. w. **1**

St. 3919 8.XII.29
0°07′ S. 63°56′ E.
E 300 1000 m. w. **16**

St. 3920 9.XII.29
1°06′ N. 62°25′ E.
S 150 2000 m. w. **1**

St. 3922 12.XII.29
3°45′ S. 56°33′ E.
E 300 1000 m. w. **3**

St. 3933 20.XII.29
11°18′ S. 50°03′ E.
E 300 3000 m. w. **4**

St. 3964 15.I.30
25°19′ S. 36°13′ E.
S 150 2000 m. w. **2**
S 150 2500 m. w. **8**
E 300 3000 m. w. **12**

"Galathea"

St. 180 25.I.51
34°36′ S. 36°31′ E.
Depth 5220 m
ST 300 7500 m. w. **7**
diam. 15–30 mm

St. 194 7.II.51
Off Durban
34°09′ S. 30°45′ E.
Depth 4360 m
SOT 7500 m. w. **3**
diam. 28–30 mm

St. 198 15.II.51
30°32′ S. 34°27′ E.
ST 300 2850 m. w. **1**
diam. 23 mm

St. 200 17–18.II.51
Off Natal
29°39′ S. 37°01′ E.
Depth 5110 m
ST 300 7400 m. w. **5**
HOT 7400 m. w. **38**
diam. 22–43 mm.

St. 220 1.III.51
11°43′ S. 49°09′ E.
Depth 1070–1360 m
TOT 2000 m. w. **5**
diam. 23–31 mm.

St. 266 27.III.51
3°38′ S. 52°43′ E.
Depth 4700–4970 m
TOT 7000 m. w. **2**
diam. 30–32 mm.

St. 280 9.IV.51
1°56′ N. 77°05′ E.
Depth 4350 m
SOT 5800 m. w. **1**

St. 316 4.V.51
Bay of Bengal
12°43′ N. 91°17′ E.
Depth 3170 m
TOT 4500 m. w. **1**

St. 406 2.VII.51
South China Sea
10°34′ N. 112°51′ E.
Depth 2310 m
TOT 4500 m. w. **3**
diam. c. 30 mm.

St. 407 3.VII.51
South China Sea
12°10′ N. 114°56′ E.
Depth 4390 m
TOT 4390 m. w. **4**
diam. 30–35 mm.

St. 408 4.VII.51
South China Sea
12°47′ N. 116°24′ E.
Depth 4330 m
ST 300 6600 m. w. **1**
diam. 30 mm.

St. 409 5.VII.51
South China Sea
13°44′ N. 118°56′ E.
Depth 3780–3850 m
TOT 2900 m. w. **5**
diam. 22–36 mm.

St. 472 10.IX.51
Sunda Trench
10°24′ S. 114°07′ E.
Depth 2250–2030 m
HOT 3600 m. w. **9**
diam. 25–35 mm.

St. 474 11.IX.51
Sunda Trench
9°49′ S. 114°13′ E.
Depth 3840–3810 m
ST 300 6100 m. w. **1**
diam. 26 mm.

St. 489 13.IX.51
Bali Sea
7°38′ S. 116°08′ E.
Depth 1160 m
ST 300 1950 m. w. **5**
diam. 30–37 mm.

St. 494 21.IX.51
5°36′ S. 131°01′ E.
Banda Trench
Depth 7280 m
ST 300 10300 m. w. **5**
diam. 30–37 mm.

St. 495 22.IX.51
Banda Trench
5°26′ S. 130°58′ E.
Depth 7290–7250 m
HOT 11200 m. w. **3**
diam. 28–30 mm.

St. 551 14.XI.51
Off Sydney
33°42′ S. 151°51′ E.
Depth 700 m
TOT 1500 m. w. **7**

St. 629 24.I.52
East of Cook Strait
41°46′ S. 175°48′ E.
Depth c. 2000 m
TOT 1700 m. w. **1**

St. 634 25.I.52
39°05′ S. 178°20′ E.
Depth 1400 m
TOT 1700 m. w. **3**

St. 656 20.II.52
Kermadec Deep
35°20′ S. 178°55′ W.
Depth 7830 m
ST 600 10600 m. w. **3**

St. 668 29.II.52
36°23′ S. 177°41′ E.
Depth 2700 m
HOT 5000 m. w. **2**

In the Pacific this bathypelagic medusa was previously known only from the eastern tropical part and, in the West, from southern Japan to S.E. Australia. It was taken by the "Dana" in a number of localities in the eastern and central Pacific and among the Polynesian Islands (St. 3570, 3580, 3586), at several stations east and north of New Zealand and in the Tasman Sea, and throughout the Malayan Archipelago, northward as far as Formosa (St. 3728); furthermore, west of Sumatra, at most of the stations from Sumatra via Ceylon to the Seychelles (St. 3902–3922), near the north point of Madagascar (St. 3933) and in the Mozambique Channel (St. 3964); always above deep water.

By the "Galathea" it was collected (besides at some stations west of Africa) from S.E. Africa to Ceylon, in the Bay of Bengal, in the Malayan Archipelago, and east and north of New Zealand. These expeditions,

thus, have extended the known area of distribution by the central Pacific, Polynesia, Melanesia, and New Zealand.

Vertical distribution. The medusa was taken only exceptionally with less than 1000 m wire, while it was fairly abundant in hauls with 1000 m wire and more. The few hauls, in which the species was taken with 600–800 m wire, call for special attention:

St. 3824, west of Sumatra, 600 m wire, 14 specimens.
St. 3893, south-west of the Nicobars, 800 m wire, 2 specimens.
St. 3902, near the north point of Sumatra, 600 m wire, 1 specimen (15 with 1000 m wire).
St. 3903, south of the Nicobars, 600 m wire, 3 specimens.
St. 3906, between the Nicobars and Ceylon, 600 m wire, 1 specimen (7 with 1000 m wire).
St. 3918, between Ceylon and the Seychelles, above the Carlsberg Ridge, 600 m wire, 1 specimen.

The first-named four of these stations are above the continental slopes, St. 3918 above a narrow, submarine ridge with very deep water on both sides; it seems probable that the catches so high up in the water layers in these localities were due to upwelling of water from greater depths.

During the "Galathea" Expedition this species was never taken in hauls with less than 1500 m wire, but frequently in much greater depths than collected by the "Dana", thus in four hauls with 7500 m wire and in three hauls with 10300–11200 m wire, on one occasion (St. 200, off Natal) even in considerable numbers (38 specimens by the Herring Otter Trawl, HOT, but only 5 by the 3 m Sledge Trawl at the same depth).

The number of specimens caught at different depths by the "Galathea" are as follows:

m wire out	Number of hauls	Number of specimens
1500– 2000....	5	21
2850– 3600....	3	15
4500– 5000....	4	10
5800– 7000....	4	5
7280– 7500....	4	53
10300–11200....	3	11

As to the size of the specimens collected at different depths, an increase with increasing depth is slightly indicated, in so far as specimens 45 mm in diameter were only taken in hauls with more than 5000 m wire, whereas small specimens were mainly taken at higher levels (with 1000–1500 m wire), though they might also occur at greater depths. On one occasion only a specimen as large as 39 mm in diameter was taken in a haul with 1000 m wire ("Dana" St. 3680 in the Banda Sea); the twelwe other specimens in this sample were smaller.

Distribution: Bathypelagic in the deep parts of the oceans, except in the Mediterranean and the arctic and antarctic seas; it does not approach the antarctic continent, in the Atlantic it occurs as far north as to the North-Atlantic Transverse Ridge, in the Pacific it has not been found further north than off Japan.

Colobonema igneum (VANHÖFFEN).

Agliscra ignea VANHÖFFEN 1902 p. 76, Pl. 9 fig. 10.
Aglantha ignea MAYER 1910 p. 405, fig. 256.
Aglantha ignea RANSON 1932 p. 16.
Aglantha ignea RANSON 1936 p. 176.
Aglantha ignea KRAMP 1961 *a* p. 250.

Material:

"Dana" St. 3558. 18.IX.28. 0°18′ S. 99°07′ W. S 150, 3000 m. wire, 1 specimen.

The present specimen should be referred to the same species which was described from deep water in the western part of the Indian Ocean (4°39′ S. 51°17′ E. and 5°42′ S. 43°36′ E.) by VANHÖFFEN (1902) under the name *Agliscra ignea*; it has not been observed since then. The genus *Agliscra* was erected by HAECKEL (1879 p. 276) for Aglauridae with eight gonads attached to the radial canals and with 16 marginal sense-organs (in contrast to *Aglantha* with only 8 sense-organs). In both species, *A. elata* and *elongata*, the gonads were sausage-shaped, pendent as in *Aglantha digitale*, but in *A. ignea* VANHÖFFEN the gonads were closely attached to the radial canals throughout their entire length, and sense-organs were not observed; its affinity to "*Agliscra*", therefore, was not very obvious. MAYER (1910) referred *A. ignea* to *Aglantha*; RANSON (1932 and 1936) showed the untenability of this view; in my "Synopsis" (1961) the species is retained among the species of *Aglantha*, but with the remark "systematic position doubtful".

The condition of the present specimen is not very good, but a description is possible, and I refer it without any doubt to the genus *Colobonema* in spite of its remarkable height in proportion to the diameter; a medusa with a similar shape was described from deep water in the North Atlantic by RUSSELL (1961 pp. 1–3, fig. 1 A–C) as *Colobonema apicatum*. If the specimen has had a fiery-red colour (as in the beautiful figure of *A. ignea* VANHÖFFEN) this has entirely faded away.

Description of the specimen: Height of bell 12 mm, diameter 5 mm in lower part, slightly conical, without an apical projection; the umbrella walls are thin, but the musculature is remarkably strong. No gastric peduncle. The stomach is fairly broad, short, about one-fourth as long as the height of the bell cavity, with longitudinal furrows; oral lips cannot be seen. There are eight narrow male gonads along the eight radial canals from near their base to about 2 mm from the bell margin; the radial canals and ring canal are narrow, the velum very broad and projecting beyond the bell margin. The basal parts of eight large marginal tentacles are retained; they are thick, conical, somewhat outwards and upwards protruding, very much resembling the corresponding eight large tentacles in *A. ignea* VANHÖFFEN. The only feature by which this specimen disagrees with *A. ignea* is the absence of any trace of small tentacle stumps in the spaces between the large tentacles; this may either be due to the specimen being in a somewhat younger stage of development (height 12 mm against 14 mm in VANHÖFFEN's specimens), or the "Stummel" observed by VANHÖFFEN simply being irregularities of the bell margin. Marginal sense-organs were not seen in VANHÖFFEN's medusae, but in the present specimen one sense-organ is retained in the middle point between two tentacles (fig. 11); it is a typical free sensory club like that seen by RUSSELL in *C. apicatum*. This latter species differs from the present form by the possession of 32 small uniform tentacles, those opposite the radial canals being similar to all the others and not large and prominent as in the two specimens seen by VANHÖFFEN and in the present specimen from the eastern tropical Pacific.

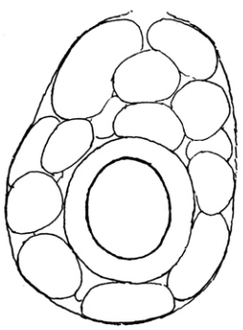


Fig. 11. Marginal sense club of *Colobonema igneum* (VANH.).

Distribution: VANHÖFFEN's original specimens were derived from deep water in the western part of the Indian Ocean, while the specimen taken by the "Dana" was found in the eastern Pacific. It is reasonable to presume that the species has an extensive distribution in the abyssal region, where an inconspicuous creature like this medusa may easily escape the attention.

Sminthea eurygaster GEGENBAUR.

Sminthea eurygaster GEGENBAUR 1856 p. 245, Pl. 9 figs. 14, 15.
Sminthea eurygaster KRAMP 1961 *a* p. 264 (all references since 1910).

"Dana" — Material:

St. 3556	14.IX.28	St. 3626	13.XII.28	St. 3627	14.XII.28	St. 3642	9.I.29
2°52′ N.	87°38′ W.	27°00′ S.	177°41′ W.	30°08′ S.	176°50′ W.	46°43′ S.	176°08.5′ E.
S 150	300 m. w. **4**	S 150	600 m. w. **1**	S 200	600 m. w. **7**	S 150	1500 m. w. **2**
S 150	600 m. w. **26**			S 200	4000 m. w. **1**	S 150	2000 m. w. **2**
S 150	1000 m. w. **2**					S 150	2500 m. w. **3**

St. 3651 22.I.29
35°36′ S. 171°52′ E.
S 150 300 m. w. **4**
S 150 600 m. w. **1**
S 150 1000 m. w. **5**
S 150 1500 m. w. **3**

St. 3654 27.I.29
33°28′ S. 161°45′ E.
S 150 300 m. w. **9**
S 150 600 m. w. **7**

St. 3655 28.I.29
33°39.5′ S. 159°00′ E.
S 150 400 m. w. **1**
S 150 500 m. w. **1**
S 150 800 m. w. **2**

St. 3656 29.I.29
33°26′ S. 157°02′ E.
S 150 600 m. w. **9**

St. 3663 23.II.29
33°33′ S. 154°04′ E.
S 150 300 m. w. **23**
S 150 1000 m. w. **3**

Apart from St. 3556, which is in the eastern Pacific, outside the Gulf of Panama, the localities where this medusa was collected by the "Dana", are concentrated in the waters around New Zealand and in the Tasman Sea; the only previous record from the Pacific is from a locality off south-eastern Australia (BLACKBURN 1955 p. 415), and there are likewise very few records from the Indian Ocean: west of Ceylon (KRAMP 1958 p. 368) and near the Chagos Islands and the Amirante Islands (BROWNE 1916 p. 194). The species is widely distributed in the warm and temperate parts of the Atlantic from about 45° S. northwards into the Bay of Biscay, and in the Mediterranean. Most of the specimens were taken in hauls with 300–600 m wire, but several were collected in deeper hauls; the species evidently belongs to the intermediate layers and the upper part of the abyssal region.

Distribution: The warm and temperate parts of the oceans; Mediterranean; in deep and intermediate water layers.

Amphogona apsteini (VANHÖFFEN).

Pantachogon apsteini VANHÖFFEN 1902 p. 65, Pl. 10 fig. 18, Pl. 11 fig. 28.
Amphogona apsteini BROWNE 1905 *a* p. 740, Pl. 54 fig. 5, Pl. 56 fig. 1, Pl. 57 figs. 10–15.
Amphogona apsteini BIGELOW 1909 p. 126, Pl. 2 figs. 1, 2, Pl. 34 figs. 12–15, Pl. 45 fig. 10.
Amphogona apsteini KRAMP 1961 *a* p. 252 (all references since 1910).
Amphogona apsteini KRAMP 1962 *a* p. 350.

Material:

"Dana"

St. 3689 9.IV.29
7°13.5′ N. 111°49′ E.
S 150 1000 m. w. **1**

St. 3922 12.XII.29
3°45′ S. 56°33′ E.
S 200 300 m. w. **1**

"Galathea"

St. 399 21.VI.51
N.E. of Singapore
1°46′ N. 104°25′ E.
SN 50 7–16 m wire **3**

St. 428 30–31.VII.51
Candos Bay, Mindanao
9°36′ N. 125°46′ E.
SN 50 16 m. w. **21**

St. 446 18–19.VIII.51
Off Isabela, Basilan, Philippines
6°42′ N. 121°58′ E.
SN 50 **1**

St. 454 25.VIII.51
Java Sea
5°23′ S. 116°02′ E.
SN 50 **1**

St. 713 3.V.52
Off Acapulco Harbor, Mexico
16°51′ N. 99°55′ W.
SN 50 **1**

TH. MORTENSEN. Toeal, Kei Islands, 3.IV.22.
5 specimens.

The two localities, where the medusa was found by the "Dana", are in the South China Sea and near the Seychelles; the "Galathea" found it in four localities in the Malayan Archipelago and on the Pacific coast of Mexico, very near the locality, where it was found and thoroughly described by BIGELOW (1909). The previous records of this species are rather scattered: north of the Galapagos Islands, N.E. Australia, Palao Islands, Japan, Vietnam, Sumatra, the Maldive Islands, Kathiawar on the coast of Pakistan, and north of Madagascar. Also found in the Gulf of Guinea on the west coast of Africa.

Amphogona apsteini is a small medusa, up to 6 mm in diameter, and it occurs mainly in the upper water layers, frequently near the surface; the specimen taken in a haul with 1000 m wire out at "Dana" St. 3689 was undoubtedly caught during the hauling in of the net. The characteristic feature of the eight oval gonads being of unequal size, alternately very small and somewhat larger, is seen in all the specimens collected by the "Galathea".

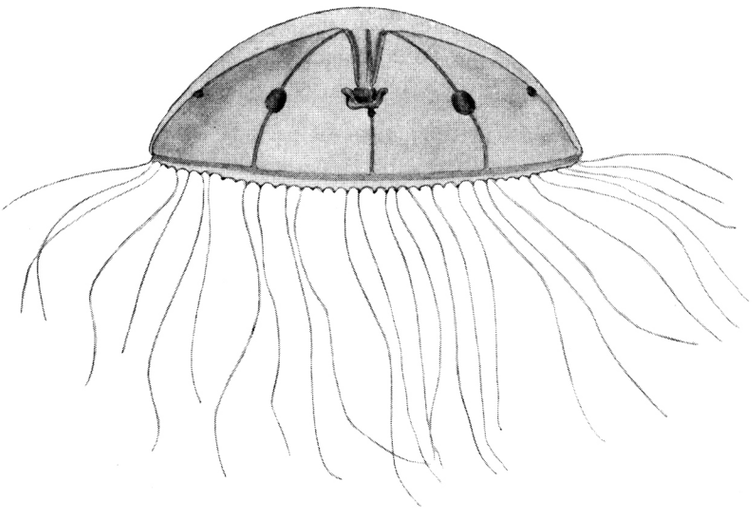


Fig. 12. *Amphogona apsteini.* The medusa as seen alive.

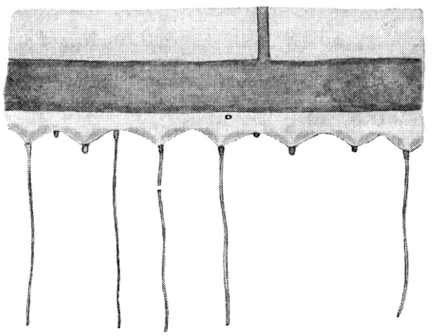


Fig. 13. *Amphogona apsteini.* Part of bell margin as seen in a living specimen, showing extended and completely retracted tentacles. In the middle of the figure one of the very small marginal sense organs.

One of the many specimens from St. 428 was for some time studied alive (figs. 12, 13). It was 4 mm in diameter and had about 80 tentacles; in extended condition they were longer than the diameter of the umbrella and extremely thin, but when completely retracted the tentacle is seen only as a tiny knob; I saw them repeatedly retract and extend themselves and immediately made a sketch of this pretty sight. When the medusa was rapidly transferred to BOUIN's fluid, the tentacles retained their extended condition.

Distribution: Scattered localities in the tropical parts of the eastern and western Pacific; the Malayan Archipelago; the Indian Ocean from Sumatra to Madagascar; Gulf of Guinea on the Atlantic coast of Africa. Epipelagic.

Amphogona apicata KRAMP.

Amphogona apicata KRAMP 1957 *a* p. 59, Pl. 5 fig. 7.
Amphogona apicata KRAMP 1959 *a* p. 54, fig. 281.

Material:

"Dana" St. 3642. 9.I.29. 46°43′ S. 176°08.5′ E. S 150, 1000 m. w. 1 specimen.

It was a surprise to find this species east of New Zealand, but there is no doubt about the correctness of the determination. It was previously known from the Mozambique Channel, from the west coast of Africa, and from the south-western Atlantic. Always taken in deep water.

Amphogona pusilla HARTLAUB.

Amphogona pusilla HARTLAUB 1909 p. 462, Pl. 21 fig. 27.

Material:

"Galathea" St. 373. 6–7.VI.51. Off Kerteh, Malacca, 4°30′ N. 103°28′ E. SN 50, 4–8 m below surface. 1 specimen.

This is a small medusa, 1.5 mm wide, and it differs from the other species of the genus by having only 16 tentacles. It has not been observed, since it was first described from Djibuti in East Africa, but the present specimen, which is 2 mm in diameter, agrees so well with the description and figure of the original specimen that it should be referred to the same species.

Persa incolorata McCrady.

Persa incolorata McCrady 1857 p. 206, Pl. 12 fig. 3.
Persa incolorata Mayer 1910 p. 408, figs. 261, 262.
Persa incolorata Kramp 1961 *a* p. 260 (all references since 1910).

Material:

"Dana"

St. 3809 4.IX.29
6°22′ S. 105°12′ E.
S 200 50 m. w. **1**
S 200 300 m. w. **1**

The locality is in the Sunda Strait between Java and Sumatra; the only previous record from waters outside the Atlantic and the Mediterranean is from South-East Australia (Blackburn 1955 p. 418). This medusa is distinguished by the possession of only two, opposite gonads, oval or sausage-shaped, pendent. The present two specimens are 3–3.5 mm wide, somewhat crumpled, but easily recognizable.

Distribution: Widely distributed in warm and temperate parts of the Atlantic Ocean and in the Mediterranean; S.E. Australia and Sunda Strait in the Malayan Archipelago.

Crossota brunnea Vanhöffen.

Crossota brunnea Vanhöffen 1902 p. 73, Pl. 9 figs. 11–13, Pl. 12 figs. 34–38 and 43–47.
Crossota brunnea Bigelow 1909 p. 135, Pl. 2 fig. 7, Pl. 45 fig. 9.
Crossota brunnea Mayer 1910 p. 396, fig. 249.
Crossota brunnea Kramp 1961 *a* p. 256 (all references since 1910).

Material:

"Dana"

St. 3561 24.IX.28
4°20′ S. 116°46′ W.
E 300 5000 m. w. **1**

St. 3640 7.I.29
41°47′ S. 176°55′ E.
S 150 2500 m. w. **2**

St. 3653 26.I.29
33°30.5′ S. 165°53′ E.
E 300 4000 m. w. **2**

St. 3656 29.I.29
33°26′ S. 157°02′ E.
S 150 3000 m. w. **1**
S 150 4000 m. w. **1**

St. 3676 23.III.29
5°52′ S. 131°14′ E.
S 150 3000 m. w. **1**

St. 3677 23.III.29
5°28′ S. 130°39′ E.
S 150 4000 m. w. **2**

St. 3680 27.III.29
2°22′ S. 126°58.5′ E.
S 150 3000 m. w. **1**

St. 3683 2.IV.29
4°03′ N. 123°26′ E.
S 150 4000 m. w. **2**

St. 3688 8.IV.29
6°55′ N. 114°02′ E.
S 150 3000 m. w. **6**
S 150 3500 m. w. **2**

St. 3731 17.VI.29
14°37′ N. 119°52′ E.
E 300 2000 m. w. **1**

St. 3768 24.VII.29
1°20′ S. 138°42′ E.
S 150 3500 m. w. **1**

St. 3844 11.X.29
12°05′ S. 96°45′ E.
E 300 1000 m. w. **3**

St. 3847 11.X.29
12°02′ S. 96°43′ E.
S 150 3000 m. w. **3**

"Galathea"

St. 200 17.II.51
Off Natal, E. Africa
29°39′ S. 37°01′ E.
HOT 7400 m. w. **2**

St. 607 17.I.52
Tasman Sea
44°18′ S. 166°46′ E.
HOT 6600 m. w. **1**

St. 668 29.II.52
Kermadec Trench
36°23′ S. 177°41′ E.
HOT 5000 m. w. **1**

The "Dana" found this bathypelagic medusa in one locality in the eastern Pacific (St. 3561) and in two areas, whence it was not recorded before: east and west of New Zealand and among the islands of the Malayan Archipelago and near the Cocos Islands S.W. of Sumatra. The "Galathea" found it off Natal in S.E. Africa and in two localities north and west of New Zealand. The species was previously recorded from several localities in the Indian Ocean, but in the Pacific only from the eastern part off the coasts of South America, besides an isolated record from Japan (Uchida 1947 *b* p. 338). The distribution of this species was almost

entirely restricted to the southern hemisphere in all the three great oceans, until it was found off the southern parts of the Japanese coasts (UCHIDA 1947 *b* p. 338), which was very surprising. Some of the localities, where it was collected by the "Dana" are, however, so far north (14°37′ N. at St. 3731 off the northern part of the Philippines) that to some degree they may form a link with their occurrence in Japan.

Crossota brunnea is a well-marked bathypelagic medusa; most of the specimens collected by the "Dana" were taken in hauls with 2500–5000 m wire out, on only one occasion with as less as 1000 m wire (St. 3844 near the Cocos Islands in the Indian Ocean); the "Galathea" collected it at still greater depths. One of the specimens taken by the "Galathea" (St. 668) was unusually large, being 40 mm wide.

Distribution: Generally distributed in the deep parts of all the great oceans from the slope of the Antarctic Continent to slightly north of the equator; an exceptional occurrence off southern Japan. Bathypelagic.

Crossota alba BIGELOW.

Crossota alba BIGELOW 1913 p. 49, Pl. 3 figs. 9–12.
Crossota alba NAUMOV 1950 p. 559, fig. 450.
Crossota alba KRAMP 1961 *a* p. 256 (all references until 1959).

Material:

"Dana"					
St. 3602	22.XI.28	St. 3627	14.XII.28	St. 3677	23.III.29
20°00′ S.	174°29′ E.	30°08′ S.	176°50′ W.	5°28′ S.	130°39′ E.
S 150	3000 m. w. 1	S 150	2000 m. w. 1	S 150	2000 m. w. 1

St. 3602 is near New Caledonia in the Melanesian Archipelago, St. 3627 in the Kermadec Trench north of New Zealand, St. 3677 in the Banda Sea. The only previous records from Pacific waters are from Japan. The further distribution comprises the eastern parts of the Atlantic Ocean from off the southern part of West-Africa to the Bay of Biscay. It is a bathypelagic medusa, well characterized by the position of the gonads, pendent from about the middle points of the eight radial canals. The chocolate-brown, almost black colour of the stomach is retained in all the present specimens; the umbrella is colourless in this species; *C. alba* also differs from the other species of *Crossota* by the tubular shape and narrow base of the stomach. The specimens found by the "Dana" are rather small, about 11 mm wide and 13 mm high.

Distribution: Bathypelagic in the western Pacific and the eastern Atlantic.

Aglantha digitale (O. F. MÜLLER 1776).

Aglantha digitale KRAMP 1961 *a* p. 248 (all references 1910–1959).
Aglantha digitale HANSEN 1960 p. 43.
Aglantha digitale NAUMOV 1960 p. 560, Pl. 30, fig. 31, textfigs. 43, 451.
Aglantha digitale var. *camtschatica* HAND & KAN 1961 p. 11.
Aglantha digitale KÜHL 1962 p. 228.

Material:

"Fernmoor"		"Jutlandia"		"Jutlandia"	
St. 4771	28.II.33	St. 4783	27.VI.33	St. 4791	16.XII.33
37°05′ N.	160°08′ W.	39°30′ N.	166°50′ W.	37°42′ N.	147°25′ E.
S 150	91–100 m. w. 2	S 200	220 m. w. 1	S 200	220 m. w. 4

"Jutlandia"		"Jutlandia"		"Falstria"	
St. 4775	11.IV.33	St. 4785	19.VIII.33	St. 4804	5.VI.34
30°20′ N.	138°00′ E.	43°00′ N.	163°45′ W.	39°43′ N.	167°55′ W.
S 200	220 m. w. 19	S 200	220 m. w. 4	S 200	183 m. w. 13

Aglantha digitale belongs to the northern waters, being generally distributed in the Polar Sea and the northern parts of the Atlantic and Pacific Oceans, in the Atlantic penetrating southwards to the Bay of Biscay, the Azores, and Chesapeake Bay on the American coast, in the eastern Pacific to the Vancouver Island region, in the western Pacific to Japan. It is an oceanic medusa, but all the previous records from the Pacific are from coastal waters. The merchant vessels mentioned above, however, have collected it in some localities in the central part of the North Pacific (St. 4783, 4785 and 4804); the other localities are in the western Pacific, east of Japan.

The specimens vary from 2 to 16 mm in height. Gonads may appear as minute dots at an umbrella height of 3–4 mm, but even in specimens up to 13 mm high the gonads are no more than 1 mm in length, in specimens 14 mm high usually 2–3 mm.

Distribution: Generally distributed and very common in all arctic and subarctic seas, penetrating into the boreal regions of the Pacific as well as Atlantic Oceans, mainly in the uppermost 200 metres of water.

Aglaura hemistoma Péron & Lesueur.

Material:

"Dana"

St. 3556 14.IX.28
2°52′ N. 87°38′ W.
S 50, surface **1**

St. 3563 29.IX.28
7°45.5′ S. 131°22′ W.
S 150 300 m. w. **1**

St. 3569 6.X.28
12°19′ S. 145°35′ W.
S 150 300 m. w. **1**

St. 3584 29.X.28
10°51.5′ S. 168°40′ W.
P 100 200 m. w. **2**

St. 3611 26.XI.28
20°53.2′ S. 164°03.3′ E.
S 150 50 m. w. **7**
S 150 100 m. w. **2**
S 150 300 m. w. **1**
S 150 600 m. w. **4**
P 100 1000 m. w. **34**

St. 3613 28.XI.28
22°43′ S. 166°05.8′ E.
P 100 50 m. w. **3**
P 100 300 m. w. **2**
P 100 600 m. w. **1**
P 100 1000 m. w. **26**
P 100 2000 m. w. **4**
P 100 3000 m. w. **7**
P 100 3500 m. w. **8**

St. 3624 10.XII.28
28°17.6′ S. 177°01′ E.
P 100 4000 m. w. **3**

St. 3627 14.XII.28
30°08′ S. 176°50′ W.
S 150 100 m. w. **1**
S 200 600 m. w. **2**

St. 3642 9.I.29
46°43′ S. 176°08.5′ E.
S 150 2000 m. w. **1**

St. 3651 22.I.29
35°36′ S. 171°52′ E.
S 150 2000 m. w. **1**

St. 3677 23.III.29
5°28′ S. 130°39′ E.
S 150 4000 m. w. **1**

St. 3680 27.III.29
2°22′ S. 126°58.5′ E.
S 150 50 m. w. **2**
S 150 100 m. w. **35**
S 150 600 m. w. **2**
S 150 3000 m. w. **2**

St. 3683 3.IV.29
4°08′ N. 123°00′ E.
S 150 50 m. w. **4**
S 150 600 m. w. **1**
S 150 4000 m. w. **1**

St. 3685 5.IV.29
7°22′ N. 121°16′ E.
S 150 600 m. w. **2**

St. 3686 6.IV.29
8°34′ N. 119°55′ E.
S 150 600 m. w. **1**
S 150 1000 m. w. **1**

St. 3692 11.IV.29
9°59′ N. 107°23.5′ E.
S 150 50 m. w. **2**

St. 3751 12.VII.29
3°40.5′ N. 137°53′ E.
S 200 600 m. w. **6**

St. 3847 11.X.29
12°02′ S. 96°43′ E.
S 150 3000 m. w. **1**

St. 3860 20.X.29
2°57′ S. 99°36′ E.
S 200 100 m. w. **5**
S 200 300 m. w. **53**
S 200 600 m. w. **3**

St. 3910 23.XI.29
5°28′ N. 80°00′ E.
S 200 300 m. w. **1**

St. 3913 1.XII.29
6°36′ N. 79°06′ E.
S 200 50 m. w. **1**

St. 3922 12.XII.29
3°45′ S. 56°33′ E.
S 200 300 m. w. **1**

St. 3925 16.XII.29
7°13′ S. 52°22′ E.
S 200 100 m. w. **3**

St. 3926 16.XII.29
8°27′ S. 50°54′ E.
S 200 200 m. w. **1**

St. 3931 19.XII.29
12°09′ S. 49°34′ E.
S 200 300 m. w. **1**

St. 3934 20–21.XII.29
11°24′ S. 50°05′ E.
S 200 400 m. w. **1**

"Pacific"

St. 4761 19.IV.32
25°10′ N. 127°45′ E.
S 150 137 m. w. **12**

"Jutlandia"

St. 4775 11.IV.33
30°20′ N. 138°00′ E.
S 200 220 m. w. c. **100**

"Jutlandia"

St. 4786 26.VIII.33
36°30′ N. 126°30′ W.
S 200 220 m. w. c. **240**

"Jutlandia"

St. 4793 2.I.34
35°44′ N. 124°16′ W.
S 200 220 m. w. **3**

"Falstria"

St. 4797 18.I.34
30°43′ N. 136°28′ E.
S 200 201 m. w. **2**

"Pacific"

St. 4798 1.I.34
21°23′ N. 119°51′ E.
S 150 201 m. w. c. **125**

"Pacific"
St. 4799 12.III.34
19°02′ N. 119°38′ E.
S 150 201 m. w. **8**

"Pacific"
St. 4815 10.I.35
15°55′ N. 112°55′ E.
S 150 201 m. w. **11**

"St. Nordiske"
St. 4818 22.VIII.36
18°25′ N. 117°02′ E.
S 150 201 m. w. **2**

"St. Nordiske"
St. 4820 11.III.38
13°56′ N. 117°00′ E.
S 150 201 m. w. **15**

"Galathea"
St. 277 7.IV.51
Near Maldive Islands
0°14′ S. 73°38′ E.
Depth 2160–2370 m
S 200, c. 15 m below surface **2**

St. 286 20.IV.51
East coast of Ceylon
7°50′ N. 81°43′ E.
Depth 28 m
SN 50 20 m. w. **c. 25**

St. 292 21.IV.51
Off Tranquebar
11°06′ N. 80°05′ E.
Depth 20 m
SN 50 **1**

St. 305 26.IV.51
Bay of Bengal
20°51′ N. 87°58′ E.
Depth 43–52 m
SN 50 near surface **3**

St. 313 2.V.51
Bay of Bengal
19°53′ N. 89°05′ E.
Depth 1520 m
SN 50 near surface **3**

St. 319 6.V.51
Nancowry Harbour, Nicobars, anchorage
SN 50 **3**

St. 325 10.V.51
Strait of Malacca
4°20′ N. 98°54′ E.
Depth 46 m
SN 50 **17**

St. 326 10.V.51
Strait of Malacca
2°38′ N. 101°22′ E.
Depth 50 m
SN 50 **c. 100**

St. 327 11.V.51
Strait of Malacca
1°55′ N. 102°27′ E.
Depth 45 m
SN 50, surface **4**

St. 328 11.V.51
Strait of Malacca
1°35′ N. 103°01′ E.
Depth 20 m
SN 50, surface **1**

St. 383 9.VI.51
Gulf of Siam
9°08′ N. 102°04′ E.
SN 50 **5**

St. 399 21.VI.51
N.E. of Singapore
1°46′ N. 104°25′ E.
Depth 38 m
SN 50 16 m. w. **6**

St. 410 6.VII.51
Chamilla Bay, near Manila
14°32.3′ N. 120°46.2′ E.
SN 50 **1**

St. 414 16–17.VII.51
Tabajon Bay, Dinagat, Philippines
10°20′ N. 125°32′ E.
Depth 40 m
SN 50 **22**

St. 425 29–30.VII.51
Bucas Grande Isl., Philippines
9°40′ N. 125°55′ E.
Depth 50 m
SN 50 16 m. w. **1**

St. 428 30–31.VII.51
Candos Bay, Mindanao
9°36′ N. 125°46′ E.
Depth 22 m
SN 50 16 m. w. **1**

St. 442 16.VIII.51
Bugo, Cagayan, Mindanao
8°01′ N. 124°44′ E.
SN 50 **2**

St. 446 18–19.VIII.51
Off Isabela, Basilan Isl., Philippines
6°42′ N. 121°58′ E.
SN 50 **14**

St. 455 26.VIII.51
Java Sea
5°32′ S. 112°41′ E.
Depth 66 m
SN 50 **14**

St. 482 12.IX.51
Bali, anchorage
8°46′ S. 115°14′ E.
Depth 30 m
SN 50 16 m. w. **18**

St. 512 7.X.51
Solomon Islands
9°25′ S. 160°00′ E.
SN 50 **c. 25**

St. 540 5.XI.51
East Australia
26°50′ S. 153°27′ E.
SN 50 **1**

St. 549 11.XI.51
East Australia
30°05′ S. 154°33′ E.
SN 50 **1**

St. 550 12.XI.51
East Australia
31°27′ S. 153°33′ E.
SN 50 **9**

St. 574 18.XII.51
Tasman Sea
39°45′ S. 159°39′ E.
SN 50 **6**

St. 575 19.XII.51
Tasman Sea
40°11′ S. 163°35′ E.
SN 50 **10**

St. 680 7.III.52
23°24′ S. 175°01′ W.
SN 50 **1**

St. 697 24.III.52
21°17′ N. 158°55′ W.
SN 50 **1**

St. 713 3.V.52
16°51′ N. 99°55′ W.
SN 50 **1**

St. 748 18.V.52
Gulf of Panama
6°35′ N. 80°48′ W.
SN 50 **1**

Aglaura hemistoma was collected by the "Dana" in scattered localities between Panama and the Polynesian Islands, at St. 3642 east of the southern part of New Zealand, in scattered localities among the Melanesian Islands, and at several stations within the Indo-Malayan region; in the Indian Ocean it was taken at St. 3847 near the Cocos Islands, at St. 3860 west of Sumatra, near Ceylon (St. 3910 and 3913), and between The Seychelles and Madagascar (St. 3922–3934). It was taken by merchant vessels north of Madagascar, near Ceylon, in several localities in the South China Sea and northwards to southern Japan, and also at two stations off San Francisco on the American coast. By the "Galathea" it was found near the Maldive Islands,

in the Bay of Bengal, in many Indo-Malayan localities, near the Solomon Islands, in the Tasman Sea, and at the Tonga Islands; also near Hawaii (St. 697), near the Pacific coast of Mexico (St. 713) and in the Gulf of Panama (St. 748). The localities are partly in the open sea and partly in coastal waters.

The species was previously known from all these areas, though not so far north off the American coast. In the Atlantic it is likewise generally distributed in the warm and temperate parts, from the Cape of Good Hope to the Bay of Biscay; in none of the oceans does it approach the antarctic waters, hardly penetrating beyond 40° S.; it was recorded from S.E. Australia and Tasmania, and "Dana" St. 3642, 46°43′ S., marks the southernmost point, at which it has been found up to now.

This small, widely distributed, oceanic medusa was taken by the "Dana" at all depths, near the surface as well as in hauls with 4000 m wire. By the "Galathea" it was only taken near the surface, by the merchant vessels almost always in hauls with 200–220 m wire out. It was usually found in small numbers only, but occasionally in great abundance. This applies to the following stations:

"Dana" St. 3611, New Caledonia, 1000 m wire, 34 specimens.
"Dana" St. 3613, New Caledonia, 1000 m wire, 26 specimens.
"Dana" St. 3680, near Amboina, 100 m wire, 35 specimens.
"Dana" St. 3860, west of Sumatra, 300 m wire, 53 specimens.
"Jutlandia" St. 4775, S.E. of Japan, 220 m wire, about 100 specimens.
"Jutlandia" St. 4786, off San Francisco, 220 m wire, about 240 specimens.
"Pacific" St. 4798, south of Formosa, 201 m wire, about 125 specimens.

By the "Galathea" the species was only collected with small applicances near the surface; on one occasion about 100 specimens were taken in a single haul in the Macassar Strait (St. 326). Occurrence in great numbers was thus stated in widely separated geographical areas.

Vertical distribution. *Aglaura hemistoma* is generally considered predominantly epipelagic; during the "Dana" Expedition it was, however, taken in as many deep hauls as in hauls in the upper strata. It is hardly conceivable that all, or nearly all, of the specimens from the deep hauls have been caught during the hauling in of the nets through higher layers of water; presumably *Aglaura hemistoma* has an extensive vertical distribution, though it mainly occurs in the epipelagic zone.

Distribution: Widely distributed in the warm and temperate parts of all the oceans, including the Mediterranean, between about 40° N. and 40° S.

Fam. **Geryonidae.**

Liriope tetraphylla (Chamisso & Eysenhardt).

Material:

"Dana"

St. 3550 4–5.IX.28
7°10′ N. 78°15′ W.
S 150 50 m. w. **5**

St. 3553 5.IX.28
7°55′ N. 79°02′ W.
S 150 50 m. w. **9**
S 150 100 m. w. **5**

St. 3556 14.IX.28
2°52′ N. 87°38′ W.
S 50, surface **2**
S 150 50 m. w. c. **300**
S 150 100 m. w. **110**
S 150 300 m. w. **12**
S 150 600 m. w. **6**
S 150 1000 m. w. **25**

St. 3558 18.IX.28
0°18′ S. 99°07′ W.
S 50, surface **1**
S 150 100 m. w. **110**
S 150 300 m. w. **65**
S 150 600 m. w. **35**
S 150 1000 m. w. **22**
S 150 3000 m. w. **1**

St. 3561 24.IX.28
4°20′ S. 116°46′ W.
S 150 50 m. w. **11**
S 150 100 m. w. **58**
S 150 300 m. w. **100**
S 150 600 m. w. **1**
S 150 1000 m. w. **19**
S 150 4000 m. w. **1**

St. 3563 29.IX.28
7°45.5′ S. 131°22′ W.
S 150 50 m. w. **7**
S 150 100 m. w. **3**
S 150 300 m. w. **3**
S 150 600 m. w. **1**

St. 3567 4.X.28
9°06′ S. 140°21.5′ W.
S 150 50 m. w. **11**
S 150 100 m. w. **10**
S 150 300 m. w. **1**

St. 3569 6.X.28
12°19′ S. 145°35′ W.
S 150 50 m. w. **4**
S 150 300 m. w. **3**

St. 3579 23.X.28
20°56′ S. 160°03′ W.
S 150 50 m. w. **2**
S 150 100 m. w. **4**
S 150 300 m. w. **6**

St. 3584 29.X.28
10°51.5′ S. 168°40′ W.
S 150 100 m. w. **3**

St. 3585 31.X.28
7°46′ S. 167°10′ W.
S 150 300 m. w. **1**

St. 3587 2.XI.28
11°00′ S. 172°37′ W.
P 100 1000 m. w. **1**

St. 3588 3.XI.28
13°10′ S. 173°20′ W.
S 150 100 m. w. **1**
S 150 300 m. w. **5**

St. 3591 8.XI.28
15°03′ S. 175°30′ W.
S 150 100 m. w. **1**

St. 3593 10.XI.28
17°27′ S. 179°33′ E.
S 150 50 m. w. **5**
S 150 100 m. w. **11**
S 150 300 m. w. **4**

St. 3601 20.XI.28
18°21′ S. 178°21′ E.
S 50, surface **2**
S 150 50 m. w. **7**
S 150 100 m. w. **2**
S 150 300 m. w. **2**

St. 3602 22.XI.28
20°00′ S. 174°29′ E.
S 150 50 m. w. **2**

St. 3603 23.XI.28
22°00′ S. 170°26′ E.
S 150 300 m. w. **5**

St. 3604 24.XI.28
23°22′ S. 167°36′ E.
S 150 50 m. w. **1**
P 100 600 m. w. **1**

St. 3611 26.XI.28
20°53.2′ S. 164°03.3′ E.
S 150 50 m. w. **55**
S 150 100 m. w. **43**
S 150 300 m. w. **4**
S 150 600 m. w. **5**
P 100 1000 m. w. **2**

St. 3613 28.XI.28
22°43′ S. 166°05.8′ E.
P 100 50 m. w. **23**
P 100 300 m. w. **7**
P 100 2000 m. w. **3**
P 100 3500 m. w. **2**

St. 3620 7.XII.28
24°46.5′ S. 170°18.5′ E.
S 150 100 m. w. **2**
S 150 600 m. w. **2**

St. 3626 13.XII.28
27°00′ S. 177°41′ W.
S 150 300 m. w. **1**
S 150 1000 m. w. **1**

St. 3638 4.I.29
37°00′ S. 178°16′ E.
S 150 600 m. w. **1**

St. 3653 26.I.29
33°30.5′ S. 165°53′ E.
S 150 100 m. w. **1**

St. 3654 27.I.29
33°28′ S. 161°45′ E.
S 150 50 m. w. **42**
S 150 100 m. w. **12**
S 150 300 m. w. **1**
S 150 600 m. w. **2**

St. 3655 28.I.29
33°39.5′ S. 159°00′ E.
S 150 200 m. w. **1**

St. 3656 29.I.29
33°26′ S. 157°02′ E.
S 150 100 m. w. **65**
S 150 300 m. w. **5**
S 150 600 m. w. **3**
S 150 1000 m. w. **1**
S 150 3000 m. w. **1**

St. 3657 31.I.29
33°17′ S. 152°45′ E.
N 50, surface **1**
S 150 50 m. w. **1**
S 150 100 m. w. **5**
S 150 300 m. w. **1**

St. 3658 5.II.29
33°52′ S. 151°27′ E.
S 150 50 m. w. **21**
S 150 150 m. w. **9**

St. 3663 23.II.29
33°33′ S. 154°04′ E.
S 150 50 m. w. **2**
S 150 100 m. w. **13**
S 150 300 m. w. **1**
S 150 600 m. w. **1**
S 150 4000 m. w. **2**

St. 3664 24.II.29
31°42.5′ S. 156°69′ E.
S 150 100 m. w. **9**

St. 3665 25.II.29
29°37.5′ S. 156°46′ E.
S 50, surface **1**
S 150 50 m. w. **106**
S 150 100 m. w. **54**
S 150 300 m. w. **1**
S 150 600 m. w. **1**

St. 3668 13.III.29
21°03.5′ S. 149°45′ E.
S 150 50 m. w. **4**

St. 3673 19.III.29
9°52′ S. 138°39′ E.
S 150 25 m. w. **15**
S 150 75 m. w. **17**

St. 3676 23.III.29
5°52′ S. 131°14′ E.
S 150 3000 m. w. **2**

St. 3677 23.III.29
5°28′ S. 130°39′ E.
S 150 1000 m. w. **6**
S 150 4000 m. w. **5**

St. 3678 14.III.29
4°05′ S. 128°16′ E.
S 50, surface **20**
S 150 50 m. w. c.**135**
S 150 100 m. w. **60**
S 150 300 m. w. **4**
S 150 600 m. w. **6**
S 150 1000 m. w. **2**
S 150 2000 m. w. **2**
S 150 3000 m. w. **1**

St. 3680 27.III.29
2°22′ S. 126°58.5′ E.
S 150 50 m. w. **40**
S 150 100 m. w. **180**
S 150 300 m. w. **5**
S 150 1000 m. w. **5**
S 150 2000 m. w. **7**
S 150 3000 m. w. **7**
S 150 4000 m. w. **2**

St. 3681 28.III.29
0°29′ N. 125°54′ E.
S 50, surface **1**
S 150 50 m. w. **30**
S 150 100 m. w. **28**

St. 3682 29.III.29
1°42′ N. 124°29′ E.
S 50, surface **1**
S 150 50 m. w. c. **100**
S 150 100 m. w. **65**
S 150 300 m. w. **61**
S 150 600 m. w. **2**

St. 3683 2–3. IV.29
4°03′ N. 123°26′ E.
4°08′ N. 123°00′ E.
S 150 50 m. w. c. **80**
S 150 300 m. w. **30**
S 150 600 m. w. **6**
S 150 1000 m. w. **2**
S 150 2000 m. w. **6**
S 150 3000 m. w. **2**
S 150 4000 m. w. **1**

St. 3684 3–4.IV.29
6°37′ N. 122°24′ E.
S 50, surface **1**
S 150 50 m. w. **6**
S 150 100 m. w. **7**
S 150 600 m. w. **4**
S 150 1000 m. w. **2**
S 150 2500 m. w. **1**

St. 3685 5.IV.29
7°22′ N. 121°16′ E.
S 150 50 m. w. **60**
S 150 100 m. w. **60**
S 150 300 m. w. **1**
S 150 600 m. w. **2**
S 150 1000 m. w. **7**
S 150 2000 m. w. **16**
S 150 3000 m. w. **5**
S 150 4000 m. w. **5**

St. 3686 6.IV.29
8°34′ N. 119°55′ E.
S 50, surface 9
S 150 50 m. w. c. 300
S 150 100 m. w. 120
S 150 300 m. w. 10
S 150 600 m. w. 15
S 150 1000 m. w. 7
S 150 2000 m. w. 6
S 150 3000 m. w. 1

St. 3687 8.IV.29
7°14′ N. 115°23′ E.
S 150 50 m. w. 11
S 150 100 m. w. 3

St. 3688 8.IV.29
6°55′ N. 114°02′ E.
S 150 1000 m. w. 8
S 150 2000 m. w. 25
S 150 3000 m. w. 6
S 150 3500 m. w. 7

St. 3689 9.IV.29
7°13.5′ N. 111°49′ E.
S 50, surface 20
S 150 100 m. w. 18
S 150 300 m. w. 27
S 150 600 m. w. 4
S 150 1000 m. w. 5
S 150 1500 m. w. 6
S 150 2000 m. w. 13
S 150 2500 m. w. 8

St. 3690 10.IV.29
8°02′ N. 109°36.5′ E.
S 50, surface 1
S 150 50 m. w. 30
S 150 300 m. w. 1

St. 3692 11.IV.29
9°59′ N. 107°23.5′ E.
S 150 50 m. w. 5

St. 3712 18.V.29
12°44′ N. 110°45′ E.
S 150 100 m. w. 1

St. 3713 19.V.29
13°57′ N. 112°45′ E.
S 50, surface 3
S 150 50 m. w. 7
S 150 100 m. w. 2
S 150 300 m. w. 5

St. 3714 20.V.29
15°22′ N. 115°20′ E.
S 50, surface 18
S 150 50 m. w. 77
S 150 100 m. w. 65
S 150 300 m. w. 4

St. 3715 22.V.29
18°18′ N. 119°36′ E.
S 150 50 m. w. 1

St. 3718 25.V.29
20°04′ N. 123°59′ E.
S 150 300 m. w. 1

St. 3720 25.V.29
21°10.5′ N. 124°37′ E.
S 150 50 m. w. 18
S 150 100 m. w. 7
S 200 300 m. w. 8

St. 3722 29.V.29
25°11′ N. 122°35′ E.
S 50, surface 4
S 200 50 m. w. 24
S 200 100 m. w. 45
S 200 300 m. w. 7
S 200 600 m. w. 6

St. 3723 30.V.29
25°30.5′ N. 125°28′ E.
S 50, surface 1
S 200 50 m. w. 14
S 200 100 m. w. 5
S 200 300 m. w. 8
S 200 600 m. w. 4

St. 3724 1.VI.29
28°31′ N. 125°05.5′ E.
S 200 50 m. w. 2
S 200 100 m. w. 3

St. 3729 14.VI.29
20°03.5′ N. 120°50′ E.
S 200 50 m. w. 7
S 200 100 m. w. 3
S 200 600 m. w. 4

St. 3731 16.VI.29
14°37′ N. 119°52′ E.
S 200 100 m. w. 30
S 200 600 m. w. 1
S 200 1000 m. w. 1

St. 3736 28.VI.29
9°17′ N. 123°58′ E.
S 50, surface 2
S 200 50 m. w. 1
S 200 100 m. w. 28
S 200 300 m. w. 2
S 200 600 m. w. 3
S 150 1000 m. w. 1
S 150 2000 m. w. 2

St. 3739 2.VII.29
3°20′ N. 123°50′ E.
S 200 50 m. w. c. 90
S 200 100 m. w. 33
S 200 300 m. w. 1
S 200 600 m. w. 5

St. 3748 10.VII.29
3°48′ N. 133°35′ E.
S 200 150 m. w. 34

St. 3751 12.VII.29
3°40.5′ N. 137°53′ E.
S 50, surface 1
S 200 50 m. w. 160
S 200 100 m. w. 102
S 200 300 m. w. 20
S 200 600 m. w. 8

St. 3768 25.VII.29
1°20′ S. 138°42′ E.
S 150 100 m. w. 6
S 200 300 m. w. 3
S 200 500 m. w. 3
S 200 700 m. w. 7

St. 3800 18.VIII.29
7°53′ S. 116°18′ E.
S 200 50 m. w. c. 60
S 200 100 m. w. 37
S 200 300 m. w. 48
S 200 600 m. w. 36

St. 3804 30.VIII.29
9°09′ S. 114°47′ E.
S 50, surface 1
S 200 100 m. w. c. 280
S 200 300 m. w. 6
S 200 600 m. w. 16

St. 3809 4.IX.29
6°22′ S. 105°12′ E.
S 200 50 m. w. 35
S 200 100 m. w. 22
S 200 300 m. w. 7
S 200 600 m. w. 3

St. 3814 9.IX.29
4°38′ S. 99°24′ E.
S 200 50 m. w. c. 40
S 200 100 m. w. c. 30
S 200 300 m. w. 3

St. 3815 10.IX.29
3°36′ S. 97°37′ E.
S 200 50 m. w. 2
S 200 100 m. w. 2

St. 3817 11.IX.29
2°15′ S. 98°55.5′ E.
S 200 50 m. w. c. 25
S 200 100 m. w. 8
S 200 200 m. w. 16

St. 3821 14.IX.29
0°51.5′ S. 99°24.5′ E.
S 200 100 m. w. 37
S 200 300 m. w. 7
S 200 600 m. w. 4

St. 3824 15.IX.29
0°08′ S. 97°15′ E.
S 200 50 m. w. 9
S 200 100 m. w. 3
S 200 600 m. w. 2

St. 3828 18.IX.29
1°22, N. 96°06.5′ E.
S 200 50 m. w. 1
S 200 100 m. w. 3

St. 3830 19.IX.29
2°36′ N. 96°31′ E.
S 200 300 m. w. 3

St. 3843 9.X.29
9°59′ S. 97°56′ E.
S 200 300 m. w. 13
S 200 350 m. w. 21

St. 3844 11.X.29
12°05′ S. 96°45′ E.
S 200 50 m. w. c. 75
S 200 100 m. w. 9
S 200 200 m. w. 40
S 200 250 m. w. 20
S 200 300 m. w. 20
S 200 600 m. w. 1

St. 3847 11.X.29
12°02′ S. 96°43′ E.
S 150 2000 m. w. 5
S 150 3000 m. w. 10

St. 3849 13.X.29
8°11′ S. 92°41.5′ E.
S 200 200 m. w. 6
S 200 300 m. w. 4

St. 3850 14.X.29
6°01′ S. 93°12′ E.
S 200 100 m. w. c. 40
S 200 200 m. w. 29
S 200 300 m. w. 8
S 200 600 m. w. 11

St. 3851 15.X.29
5°27′ S. 93°50′ E.
S 200 200 m. w. 5
S 200 300 m. w. 1
S 200 600 m. w. 3

St. 3855 17.X.29
5°17′ S. 97°06′ E.
S 200 100 m. w. 9
S 200 300 m. w. 3

St. 3856 17.X.29
4°45.5′ S. 98°28′ E.
S 200 100 m. w. 6
S 200 300 m. w. 2

St. 3860 19–20.X.29
2°57′ S. 99°36′ E.
S 50, surface 3
S 200 50 m. w. 27
S 200 100 m. w. 35
S 200 300 m. w. 170
S 200 300 m. w. 170
S 200 600 m. w. 9

St. 3866 23.X.29
1°53′ S. 98°39′ E.
S 50, surface 2

St. 3867 23.X.29
2°07′ S. 98°26′ E.
S 50, surface 1

St. 3893 6.XI.29
5°59′ N. 92°29′ E.
S 200 50 m. w. 9
S 200 100 m. w. 12
S 200 300 m. w. 23
S 200 800 m. w. 2

St. 3900 9.XI.29
4°41′ N. 98°13′ E.
S 50, surface 1
S 200 50 m. w. 27
S 200 100 m. w. 2

St. 3901 10.XI.29
4°20′ N. 98°47′ E.
S 50, surface 3
S 200 50 m. w. 56
S 200 100 m. w. c. 50

St. 3902 17.XI.29
6°05′ N. 95°30′ E.
S 200 100 m. w. 1

St. 3903 17.XI.29
5°50′ N. 93°28′ E.
S 50, surface 8
S 200 50 m. w. c. 25
S 200 100 m. w. 20
S 200 300 m. w. 7
S 200 600 m. w. 7

St. 3905 19.XI.29
4°44′ N. 88°05.5′ E.
S 200 100 m. w. 1

St. 3907 21.XI.29
3°59′ N. 82°57′ E.
S 200 300 m. w. 6
S 200 400 m. w. 2

St. 3910 23.XI.29
5°28′ N. 80°00′ E.
S 200 50 m. w. 9
S 200 100 m. w. 10
S 200 300 m. w. 2
S 200 600 m. w. 2

St. 3912 24.XI.29
6°52′ N. 79°30′ E.
S 200 300 m. w. 2

St. 3913 1.XII.29
6°36′ N. 79°06′ E.
S 50, surface 1
S 200 50 m. w. 40
S 200 100 m. w. 12
S 200 300 m. w. 2
S 200 600 m. w. 1

St. 3914 2.XII.29
4°52′ N. 77°08′ E.
S 200 50 m. w. 4
S 200 100 m. w. 55
S 200 300 m. w. 3
S 200 600 m. w. 1

St. 3915 3.XII.29
3°14′ N. 75°21′ E.
S 200 50 m. w. c. 35
S 200 100 m. w. 50
S 200 300 m. w. 4
S 200 600 m. w. 1
E 300 1000 m. w. 1

St. 3916 4.XII.29
1°45′ N. 73°03′ E.
S 200 50 m. w. c. 60
S 200 100 m. w. 19
S 200 300 m. w. c. 140
S 200 600 m. w. c. 20

St. 3917 5.XII.29
1°45′ N. 71°05′ E.
S 200 50 m. w. 42
S 200 100 m. w. 21
S 200 300 m. w. 8
S 200 600 m. w. 6
S 150 1200 m. w. 3
S 150 2200 m. w. 9
S 150 3700 m. w. 5

St. 3918 7.XII.29
0°35′ N. 66°09′ E.
S 50, surface 7
S 200 50 m. w. c. 140
S 200 100 m. w. c. 280
S 200 300 m. w. 19
S 200 600 m. w. 20

St. 3919 8.XII.29
0°07′ S. 63°56′ E.
S 200 50 m. w. c. 200
S 200 100 m. w. c. 400
S 200 300 m. w. c. 80
S 200 600 m. w. c. 30

St. 3920 9.XII.29
1°12′ S. 62°19′ E.
S 200 50 m. w. c. 100
S 200 100 m. w. c. 500
S 200 300 m. w. 10
S 200 600 m. w. 7
S 150 1000 m. w. 4
S 150 2500 m. w. 5
S 150 3500 m. w. 5

St. 3921 11.XII.29
3°36′ S. 58°19′ E.
S 50, surface 9
S 200 50 m. w. c. 450
S 200 100 m. w. c. 700
S 200 300 m. w. c. 30
S 200 400 m. w. c. 70
S 200 600 m. w. c. 40

St. 3922 12.XII.29
3°45′ S. 56°33′ E.
S 200 50 m. w. 35
S 200 600 m. w. 1

St. 3924 14.XII.29
5°01′ S. 54°46′ E.
S 50, surface 7
S 200 50 m. w. 15
S 200 100 m. w. 18
S 200 600 m. w. 2

St. 3925 16.XII.29
7°13′ S. 52°22′ E.
S 50, surface 1
S 200 50 m. w. c. 100
S 200 100 m. w. c. 50
S 200 300 m. w. 4

St. 3926 16.XII.29
8°27′ S. 50°54′ E.
S 50, surface 1
S 150 50 m. w. 3
S 200 100 m. w. 7
S 200 200 m. w. c. 40
S 200 300 m. w. 16

St. 3927 17.XII.29
10°55′ S. 50°15′ E.
S 200 100 m. w. 7
S 200 200 m. w. 6
S 200 300 m. w. 2

St. 3928 18.XII.29
11°20′ S. 50°10′ E.
S 150 50 m. w. 10
S 200 100 m. w. 10
S 200 200 m. w. 19
S 200 300 m. w. 10
S 200 600 m. w. 1

St. 3929 18.XII.29
12°11′ S. 50°18′ E.
S 200 200 m. w. 1

St. 3930 19.XII.29
11°55′ S. 49°55′ E.
S 150 100 m. w. 5
S 200 600 m. w. 1

St. 3931 19.XII.29
12°09′ S. 49°34′ E.
S 200 200 m. w. 86
S 200 300 m. w. 78
S 200 500 m. w. 14
S 200 600 m. w. 11

St. 3932 20.XII.29
11°35′ S. 49°45′ E.
S 200 400 m. w. **2**

St. 3934 20–21.XII.29
11°24′ S. 50°05′ E.
S 200 200 m. w. **5**
S 200 300 m. w. **54**
S 200 400 m. w. **31**
S 200 600 m. w. **3**

St. 3935 21.XII.29
10°50′ S. 48°30′ E.
S 200 100 m. w. **2**
S 200 200 m. w. **10**
S 200 300 m. w. **8**
S 200 400 m. w. **20**
S 200 500 m. w. **9**

St. 3936 22.XII.29
10°28′ S. 47°30′ E.
S 200 100 m. w. **13**
S 200 300 m. w. **5**
S 200 400 m. w. **39**
S 200 500 m. w. **6**

St. 3937 22.XII.29
9°26′ S. 46°05′ E.
S 50, surface **4**
S 150 100 m. w. c.**100**
S 200 200 m. w. c. **85**
S 200 300 m. w. c. **65**
S 200 400 m. w. **37**

St. 3938 23.XII.29
9°10′ S. 45°17′ E.
S 50, surface **3**
S 200 200 m. w. **54**
S 200 300 m. w. **26**
S 200 400 m. w. **26**
S 200 500 m. w. **7**

St. 3939 23.XII.29
8°44′ S. 43°54′ E.
S 50, surface **1**
S 150 100 m. w. **5**
S 200 200 m. w. **9**
S 200 400 m. w. **2**

St. 3940 24.XII.29
8°24′ S. 42°54′ E.
S 50, surface **3**
S 150 100 m. w. **43**
S 200 200 m. w. c. **60**
S 200 300 m. w. **25**
S 200 400 m. w. **50**
S 200 500 m. w. **45**

St. 3941 24.XII.29
7°24′ S. 41°51′ E.
S 50, surface **5**
S 150 100 m. w. **34**
S 200 300 m. w. **2**

St. 3942 25.XII.29
6°47′ S. 41°27′ E.
S 200 200 m. w. **1**
S 200 300 m. w. **16**
S 200 400 m. w. **3**

St. 3943 25.XII.29
50°30′ S. 40°40′ E.
S 150 100 m. w. c. **10**
S 200 200 m. w. **1**
S 200 300 m. w. **8**
S 200 400 m. w. **10**
S 200 500 m. w. **4**

St. 3944 26.XII.29
4°45′ S. 40°10′ E.
S 150 100 m. w. **22**
S 200 200 m. w. **10**
S 200 300 m. w. **2**
S 200 400 m. w. **13**
S 200 500 m. w. **4**

St. 3946 3.I.30
3°26′ S. 42°58′ E.
S 200 100 m. w. c. **400**
S 200 300 m. w. **10**
S 200 600 m. w. c. **180**

St. 3947 4.I.30
4°21′ S. 42°56′ E.
S 200 100 m. w. **4**
S 200 200 m. w. **2**
S 200 400 m. w. **5**

St. 3948 6.I.30
10°11′ S. 41°57′ E.
S 200 200 m. w. **14**
S 200 300 m. w. **2**
S 200 500 m. w. **24**

St. 3949 6.I.30
11°33′ S. 41°44′ E.
S 200 50 m. w. **75**
S 200 100 m. w. c. **40**
S 200 300 m. w. **20**
S 200 600 m. w. **5**

St. 3950 7.I.30
12°23′ S. 41°43.5′ E.
S 50, surface **1**
S 200 200 m. w. **5**
S 200 300 m. w. **3**
S 200 400 m. w. **4**
S 200 500 m. w. c. **35**

St. 3951 7.I.30
14°16′ S. 41°48′ E.
S 200 50 m. w. **2**
S 200 100 m. w. **1**

St. 3953 8.I.30
16°12′ S. 42°04′ E.
S 150 50 m. w. **18**
S 200 100 m. w. **5**
S 200 300 m. w. **1**

St. 3954 9.I.30
16°53′ S. 42°12′ E.
S 50, surface **1**
S 150 50 m. w. **27**
S 200 100 m. w. **8**
S 200 200 m. w. **39**
S 200 300 m. w. **13**
S 200 500 m. w. **2**

St. 3955 9.I.30
18°30′ S. 42°18′ E.
S 50, surface **5**
S 150 50 m. w. c. **80**
S 200 100 m. w. **25**
S 200 200 m. w. c. **35**
S 200 300 m. w. **14**
S 200 500 m. w. **5**

St. 3956 10.I.30
21°13′ S. 42°26′ E.
S 150 50 m. w. **50**
S 200 100 m. w. **7**
S 200 200 m. w. **48**
S 200 300 m. w. **4**
S 200 500 m. w. **8**

St. 3957 11.I.30
21°30′ S. 42°32′ E.
S 150 50 m. w. c. **60**
S 200 100 m. w. c. **50**
S 200 300 m. w. **35**
S 200 500 m. w. **7**

St. 3958 11.I.30
23°11′ S. 42°54′ E.
S 50, surface **1**
S 200 200 m. w. c. **215**
S 200 300 m. w. c. **90**
S 200 500 m. w. **20**

St. 3959 12.I.30
23°40′ S. 43°03′ E.
S 150 100 m. w. **66**
S 200 200 m. w. **25**
S 200 300 m. w. c. **85**
S 200 500 m. w. **8**

St. 3960 13.I.30
25°23′ S. 42°52′ E.
S 150 200 m. w. **31**

St. 3961 14.I.30
24°57′ S. 40°18′ E.
S 150 200 m. w. c.**125**
S 150 300 m. w. c. **50**

St. 3962 14.I.30
24°33′ S. 38°26′ E.
S 150 50 m. w. **50**
S 200 100 m. w. **14**

St. 3963 15.I.30
24°30′ S. 37°48.5′ E.
S 200 150 m. w. **20**
S 200 200 m. w. **46**
S 200 250 m. w. **15**

St. 3964 15.I.30
25°19′ S. 36°13′ E.
S 150 50 m. w. **20**
S 200 100 m. w. **46**
S 200 300 m. w. **7**
S 150 1000 m. w. **2**
S 150 1500 m. w. **2**
S 150 2000 m. w. **1**
S 150 2500 m. w. **2**

St. 3965 17.I.30
28°18′ S. 33°49′ E.
S 150 200 m. w. **18**

St. 3966 18.I.30
29°25′ S. 32°00′ E.
S 150 100 m. w. **70**
S 150 200 m. w. **12**
S 200 300 m. w. **22**

St. 3967 18.I.30
29°44′ S. 31°18′ E.
S 200 100 m. w. c. **75**

St. 3969 27.I.30
31°33′ S. 30°07′ E.
S 200 50 m. w. **52**
S 200 300 m. w. **4**
S 200 600 m. w. **9**

St. 3970 28.I.30
34°09′ S. 27°38′ E.
S 200 200 m. w. **40**
S 200 300 m. w. **12**

St. 3972 30.I.30
36°09′ S. 21°52′ E.
S 200 50 m. w. **10**
S 200 100 m. w. **21**

"Pacific"
St. 4761 19.IV.32
25°10′ N. 127°45′ E.
S 150 **29**

"Panama"
St. 4768 22.IV.33
19°20′ N. 119°48′ E.
S 200 293 m. w. **5**

"Pacific"
St. 4772 12.IV.33
21°40′ N. 120°02′ E.
S 150 201 m. w. c. **300**

"Jutlandia"
St. 4773 20.III.33
32°57′ N. 128°48′ W.
S 200 220 m. w. **1**

"Jutlandia"
St. 4775 11.IV.33
30°20′ N. 138°00′ E.
S 200 220 m. w. **14**

"Falstria"
St. 4779 19.IV.33
30°44′ N. 145°55′ E.
S 200 183 m. w. **7**

"Jutlandia"
St. 4782 17.VI.33
31°28′ N. 125°50′ W.
S 200 220 m. w. **9**

"Jutlandia"
St. 4784 9.VIII.33
33°52′ N. 137°10′ E.
S 200 220 m. w. **18**

"Selandia"
St. 4789 28.V.33
31°40′ N. 135°30′ E.
S 200 220 m. w. **18**

"Jutlandia"
St. 4790 7.VII.33
35°30′ N. 145°00′ E.
S 150 220 m. w. **133**

"Jutlandia"
St. 4791 16.XII.33
37°42′ N. 147°25′ E.
S 200 220 m. w. **4**

"Selandia"
St. 4794 21.VIII.33
33°45′ N. 137°30′ W.
S 200 220 m. w. **14**

"Falstria"
St. 4797 18.I.34
30°43′ N. 136°28′ E.
S 200 201 m. w. **2**

"Pacific"
St. 4798 1.I.34
21°23′ N. 119°51′ E.
S 150 201 m. w. c. **200**

"Pacific"
St. 4799 12.III.34
19°02′ N. 119°38′ E.
S 150 201 m. w. c. **250**

"Falstria"
St. 4803 25.V.34
30°37′ N. 134°25′ E.
S 200 183 m. w. **1**

"Selandia"
St. 4806 23.III.34
36°43′ N. 134°03′ W.
S 200 220 m. w. **2**

"Jutlandia"
St. 4807 12.II.34
32°56′ N. 131°50′ W.
S 200 220 m. w. **5**

"Jutlandia"
St. 4808 2.V.34
36°20′ N. 143°00′ E.
S 200 220 m. w. **18**

"Falstria"
St. 4812 24.VIII.34
29°57′ N. 170°50′ W.
S 200 183 m. w. **1**

"Selandia"
St. 4814 11.X.34
26°37′ N. 145°00′ W.
S 200 220 m. w. **4**

"Pacific"
St. 4815 10.I.35
15°55′ N. 112°55′ E.
S 150 201 m. w. c. **250**

"St. Nordiske"
St. 4818 22.VIII.36
18°25′ N. 117°12′ E.
S 150 201 m. w. c. **30**

"Pacific"
St. 4819 22.VI.37
12°10′ N. 111°38′ E.
S 150 201 m. w. **3**

"St. Nordiske"
St. 4820 11.III.38
13°56′ N. 117°00′ E.
S 150 201 m. w. **49**

"Galathea"
St. 277 7.IV.51
Near Maldive Islands
0°14′ S. 73°38′ E.
Depth c. 2200 m
S 200, about 15 m below surface **17**

St. 292 21.IV.51
Off Tranquebar
11°06′ N. 85°05′ E.
Depth 20 m
SN 50, near surface **1**

St. 305 26.IV.51
Bay of Bengal
20°51′ N. 87°58′ E.
SN 50, near surface **9**
S 100, about 10 m below surface **55**

St. 313 2.V.51
Bay of Bengal
19°53′ N. 89°05′ E.
Depth 1520 m
S 100, 5–10 m below surface **23**

St. 319 6.V.51
Nancowry Harbour, Nicobar Islands, anchorage
SN 50 **15**

St. 325 10.V.51
Strait of Malacca
4°20′ N. 98°54′ E.
Depth 46 m
SN 50 **14**

St. 326 10.V.51
Strait of Malacca
2°38′ N. 101°22′ E.
Depth 50 m
SN 50 **23**

St. 327 11.V.51
Strait of Malacca
1°55′ N. 102°27′ E.
Depth 45 m
SN 50 **1**

St. 328 11.V.51
Strait of Malacca
1°35′ N. 103°01′ E.
Depth 20 m
SN 50 **6**

St. 333 15.V.51
Off Singapore
SN 50 30 m. w. **1**

St. 361 31.V.51
5 miles S.W. of Sultan Shoal lighthouse, Singapore
Depth 28–32 m
TOT 40 m. w. **11**

St. 373 6–7.VI.51
Off Kerteh, Malacca, anchorage
4°30′ N. 103°28′ E.
SN 50, 4–8 m below surface **5**

St. 381 8.VI.51
Gulf of Siam
7°00′ N. 103°18′ E.
SN 50 **40**

St. 383 9.VI.51
Gulf of Siam
9°08′ N. 102°04′ E.
SN 50 **12**

St. 390 11.VI.51
Gulf of Siam
13°02′ N. 100°33′ E.
Depth 22 m
SN 50 30 m. w. 9

St. 393 11.VI.51
Gulf of Siam
13°09′ N. 100°45′ E.
Depth 12 m
SN 50 6 m. w.

St. 399 21.VI.51
N.E. of Singapore
1°46′ N. 104°25′ E.
Depth 38 m
SN 50 16 m. w. 2

St. 410 6.VII.51
Chamilla Bay near Manila, anchorage
14°32.3′ N. 120°46.2′ E.
SN 50 1

St. 414 16–17.VII.51
Tubajon Bay, Dinagat, Philippines, anchorage
10°20′ N. 125°32′ E.
Depth 40 m
SN 50 3

St. 425 29–30.VII.51
Bucas Grande Island, Philippines, anchorage
9°40′ N. 125°55′ E.
Depth 50 m
SN 50 16 m. w. 8

St. 442 16.VIII.51
Cagayan, Mindanao
8°01′ N. 124°44′ E.
SN 50 1

St. 446 18–19.VIII.51
Basilan Island, Philippines
6°42′ N. 121°58′ E.
SN 50 7

St. 454 25.VIII.51
Java Sea
5°23′ S. 116°02′ E.
Depth 60 m
SN 50 6

St. 455 26.VIII.51
Java Sea
5°32′ S. 112°41′ E.
Depth 66 m
SN 50 7

St. 482 12.IX.51
Bali, anchorage
8°46′ S. 115°14′ E.
Depth 30 m
SN 50 15

St. 494 21.IX.51
Banda Trench
5°36′ S. 131°01′ E.
Depth 7280 m
ST 300 10300 m. w. 1

St. 512 7.X.51
Solomon Islands, anchorage
9°25′ S. 160°00′ E.
SN 50 29 m. w. 2

St. 523 19.X.51
Off Port Moresby, Papua
9°35′ S. 147°05′ E.
SN 50 10 m. w. 2

St. 531 25.X.51
1 mile S. of Port Moresby
SN 50 10 m. w. 2

St. 536 4.XI.51
Coral Sea
22°07′ S. 153°55′ E.
SN 50 2

St. 540 5.XI.51
Coral Sea
26°50′ S. 153°27′ E.
SN 50 5

St. 541 5.XI.51
Moreton Bay, East Australia
26°57′ S. 153°25′ E.
SN 50 1
S 200, surface c. 400

St. 549 11.XI.51
Coral Sea
30°05′ S. 154°33′ E.
SN 50 2

St. 550 12.XI.51
Tasman Sea
31°27′ S. 153°33′ E.
SN 50, surface 1

St. 551 13.XI.51
Off Sydney
33°42′ S. 151°51′ E.
SN 50 1

St. 552 2.XII.51
Tasman Sea
36°00′ S. 150°29′ E.
SN 50 1
S 100 4

St. 695 23.III.52
16°00′ N. 159°00′ W.
SN 50 1

St. 700 4.IV.52
34°00′ N. 134°24′ W.
SN 50 1

St. 708 25.IV.52
Off Californian peninsula
22°50′ N. 110°06′ W.
SN 50 1

St. 713 3.V.52
Acapulco Harbour, Mexico
16°51′ N. 99°55′ W.
SN 50 1

St. 720 11.V.52
Gulf of Panama
5°36′ N. 79°31′ W.
SN 50 1

Liriope tetraphylla, the only species of the genus, is one of the most abundant and widely distributed species among the oceanic medusae; in the boundary areas of its distribution it is a valuable indicator of sea-currents. It was collected by the "Dana" Expedition almost everywhere during the passage from Panama to South Africa (except around New Zealand), but it was found nowhere outside its previously known areas of distribution. By the merchant vessels it was taken in many localities in the South China Sea, between Formosa and Japan, east of Japan, north-west of the Hawaiian Islands (St. 4812), and off California.

The "Galathea" likewise found it in many localities, mainly in hauls with small nets near the surface. The first specimens were taken near the Maldive Islands (St. 277), and it occurred at many stations in the Bay of Bengal and in the Malayan Archipelago, and also along the east coast of Australia, where a particularly great catch was made in the mouth of Moreton Bay, near Brisbane, by the 2 m stramin net (St. 541); about 400 specimens were taken in this haul, measuring 4–24 mm in diameter. A few specimens were also found south-west of the Hawaiian Islands (St. 695), off California (St. 700 and 708), in Acapulco Harbour, Mexico (St. 713) and in the Gulf of Panama (St. 720).

The numbers of specimens caught by the expeditions were very variable, and sometimes the medusa was taken in great abundance. If we jot down on a map the localities, where more than 100 specimens were taken in a single haul, we find that these localities are scattered irregularly over very different and widely separated areas, neither preferably in coastal waters, nor in open-sea areas. Numerous specimens occurred at three stations in the eastern tropical Pacific, at St. 4790 east of Japan, in many Indo-Malayan localities, around Madagascar, and particularly between the Maldive Islands and the Seychelles (St. 3916–3921), where great quantities were taken, mainly in hauls with 100 m wire out. Also some other oceanic, epipelagic medusae (e.g. *Rhopalonema velatum* and *Solmundella bitentaculata*) were especially common at some of these stations; these finds will call for special consideration to be specially discussed in the General Section of the present paper. The mass occurrence in some localities near others, where only a few specimens were met with under apparently similar conditions, seems accidental and difficult to explain.

A total of about 13800 specimens of *Liriope* were collected by the "Dana" in Indo-Pacific waters, and 88 % of the specimens were taken in hauls with 50–300 m wire out, i.e. from 20 towards 200 m below the surface; the numbers are evenly decreasing further down to about 400 m below the surface (600 m wire), to be followed by a sudden fall in the numbers taken in still deeper hauls. We may conclude that the vast majority of the medusae inhabit the levels from 20 towards 200 m below the surface, they occasionally appear close by the surface, and some may descend towards depths of about 400 m; but most of the specimens taken in hauls with 500–600 m wire and all from still deeper hauls are presumably caught during the hauling in of the nets through higher levels. Specimens of every size may be found at any depth.

Distribution: Generally distributed in the warm parts of all the oceans, including the Mediterranean. In the Pacific it occurs between 40° S. and 40° N., in the Indian Ocean north of 40° S. In the Atlantic it likewise occurs mainly between 40° S. and 40° N., but in the eastern parts it penetrates somewhat farther north, into the English Channel.

Geryonia proboscidalis (Forskål).

Material:

"Dana"

St. 3556 14.IX.28
2°52′ N. 87°38′ W.
S 150 300 m. w. **1**

St. 3558 18.IX.28
0°18′ S. 99°07′ W.
S 150 1000 m. w. **1**

St. 3561 24.IX.28
4°20′ S. 116°46′ W.
S 150 50 m. w. **1**

St. 3563 29.IX.28
7°45.5′ S. 131°22′ W.
S 150 100 m. w. **4**

St. 3567 4.X.28
9°06′ S. 140°21.5′ W.
S 150 100 m. w. **32**
S 150 300 m. w. **4**

St. 3569 6.X.28
12°19′ S. 145°35′ W.
S 150 600 m. w. **1**

St. 3570 7.X.28
14°01′ S. 147°51.5′ W.
S 150 2000 m. w. **1**

St. 3579 23.X.28
20°56′ S. 160°03′ W.
S 150 100 m. w. **1**

St. 3582 27.X.28
15°36′ S. 168°57′ W.
S 150 100 m. w. **1**

St. 3584 29.X.28
10°51.5′ S. 168°40′ W.
S 150 50 m. w. **3**
S 150 100 m. w. **3**

St. 3585 31.X.28
7°46′ S. 167°10′ W.
S 150 1000 m. w. **1**

St. 3586 1.XI.28
9°43′ S. 170°40′ W.
S 150 50 m. w. **1**
S 150 300 m. w. **1**

St. 3587 2.XI.28
11°00′ S. 172°37′ W.
S 150 50 m. w. **2**
S 150 300 m. w. **2**

St. 3593 10.XI.28
17°27′ S. 179°33′ E.
S 150 50 m. w. **1**

St. 3603 23.XI.28
22°00′ S. 176°26′ E.
S 150 50 m. w. **1**

St. 3604 24.XI.28
23°22′ S. 167°36′ E.
S 150 50 m. w. **1**
S 150 100 m. w. **2**
S 150 300 m. w. **1**

St. 3611 26.XI.28
20°53.2′ S. 164°03.3′ E.
S 150 50 m. w. **1**
S 150 100 m. w. **2**
S 150 300 m. w. **1**

St. 3613 28.XI.28
22°43′ S. 166°05.8′ E.
P 100 50 m. w. **1**
P 100 100 m. w. **1**

St. 3620 7.XII.28
24°46.5′ S. 170°18.5′ E.
S 150 50 m. w. **33**
S 150 100 m. w. **3**

St. 3622 8.XII.28
25°54′ S. 172°37′ E.
S 200 100 m. w. **12**
S 200 200 m. w. **4**
S 200 300 m. w. **4**

St. 3625 11.XII.28
29°40′ S. 179°34′ E.
S 150 50 m. w. **1**

St. 3626 13.XII.28
27°00′ S. 177°41′ E.
S 50, surface **1**
S 200 50 m. w. **7**
S 200 100 m. w. **2**
S 200 200 m. w. **1**
S 150 600 m. w. **2**

St. 3653 26.I.29
33°30.5′ S. 165°53′ E.
S 150 50 m. w. 1
S 150 100 m. w. 1

St. 3654 27.I.29
33°28′ S. 161°45′ E.
S 150 50 m. w. 2

St. 3656 29.I.29
33°26′ S. 157°02′ E.
S 150 100 m. w. 1

St. 3658 5.II.29
33°52′ S. 151°27′ E.
S 150 150 m. w. 1

St. 3663 23.II.29
33°33′ S. 154°04′ E.
S 150 50 m. w. 2

St. 3664 24.II.29
31°42.5′ S. 156°69′ E.
S 150 100 m. w. 2

St. 3665 25.II.29
29°37.5′ S. 156°46′ E.
S 150 50 m. w. 9
S 150 100 m. w. 18

St. 3678 24.III.29
4°05′ S. 128°16′ E.
S 150 100 m. w. 8
S 150 300 m. w. 2

St. 3680 27.III.29
2°22′ S. 126°58.5′ E.
S 150 100 m. w. 7

St. 3681 28.III.29
0°29′ N. 125°54′ E.
S 150 300 m. w. 1
E 300 1000 m. w. 1

St. 3682 29.III.29
1°42′ N. 124°29′ E.
S 150 100 m. w. 2

St. 3683 2.IV.29
4°03′ N. 123°26′ E.
S 150 1000 m. w. 1

St. 3684 3.IV.29
6°37′ N. 122°24′ E.
S 150 100 m. w. 1
S 150 1000 m. w. 1
E 300 3000 m. w. 1

St. 3685 5.IV.29
7°22′ N. 121°16′ E.
S 150 50 m. w. 2

St. 3686 6.IV.29
8°34′ N. 119°55′ E.
S 50, surface 2
S 150 50 m. w. 18
S 150 100 m. w. 1
S 150 300 m. w. 1

St. 3687 8.IV.29
7°14′ N. 115°23′ E.
S 150 50 m. w. 4

St. 3712 18.V.29
12°44′ N. 110°45′ E.
S 150 300 m. w. 2

St. 3713 19.V.29
13°57′ N. 112°45′ E.
S 150 300 m. w. 1
S 150 600 m. w. 1

St. 3714 20.V.29
15°22′ N. 115°20′ E.
S 150 50 m. w. 3

St. 3715 22.V.29
18°18′ N. 119°36′ E.
S 150 300 m. w. 2

St. 3722 29.V.29
25°11′ N. 122°35′ E.
S 200 50 m. w. 8
S 200 100 m. w. 3

St. 3731 16.VI.29
14°37′ N. 119°52′ E.
S 200 100 m. w. 5
E 300 300 m. w. 1
S 200 600 m. w. 1

St. 3739 2.VII.29
3°20′ N. 123°50′ E.
S 200 100 m. w. 1

St. 3751 12.VII.29
3°40.5′ N. 137°53′ E.
S 200 50 m. w. 11
S 200 100 m. w. 1
S 200 600 m. w. 4

St. 3768 25.VII.29
1°20′ S. 138°42′ E.
S 200 500 m. w. 1

St. 3800 18.VIII.29
7°53′ S. 116°18′ E.
S 200 300 m. w. 2

St. 3809 4.IX.29
6°22′ S. 105°12′ E.
S 200 100 m. w. 4
S 200 300 m. w. 2

St. 3814 9.IX.29
4°38′ S. 99°24′ E.
S 200 100 m. w. 3
S 200 300 m. w. 2

St. 3815 10.IX.29
3°36′ S. 97°37′ E.
S 200 50 m. w. 1
S 200 100 m. w. 1

St. 3824 15.IX.29
0°08′ S. 97°15′ E.
S 200 100 m. w. 7

St. 3828 18°IX.29
1°53′ N. 96.07′ E.
S 200 50 m. w. 1
S 200 100 m. w. 14
S 200 300 m. w. 1

St. 3843 9.X.29
9°59′ S. 97°56′ E.
S 200 300 m. w. 5
S 200 350 m. w. 4

St. 3844 11.X.29
12°05′ S. 96°45′ E.
S 200 50 m. w. 1
S 200 100 m. w. 1

St. 3849 13.X.29
8°11′ S. 92°41.5′ E.
S 200 300 m. w. 1

St. 3851 15.X.29
5°27′ S. 93°50′ E.
S 200 100 m. w. 8
S 200 200 m. w. 2
S 200 300 m. w. 3

St. 3854 16.X.29
5°31′ S. 96°35′ E.
S 200 300 m. w. 6

St. 3855 17.X.29
5°17′ S. 97°06′ E.
S 200 100 m. w. 3

St. 3856 17.X.29
4°45.5′ S. 98°28′ E.
S 200 100 m. w. 2
S 200 300 m. w. 2

St. 3893 6.XI.29
5°59′ N. 92°29′ E.
S 200 50 m. w. 6
S 200 300 m. w. 1
S 200 800 m. w. 1

St. 3899 9.XI.29
5°39.5′ N. 96°54′ E.
S 200 100 m. w. 1

St. 3900 9.XI.29
4°41′ N. 98°13′ E.
S 200 100 m. w. 2

St. 3902 17.XI.29
6°05′ N. 95°30′ E.
S 200 50 m. w. 1

St. 3903 17.XI.29
5°50′ N. 93°28′ E.
S 200 50 m. w. 1

St. 3910 23.XI.29
5°28′ N. 80°00′ E.
S 200 300 m. w. 1

St. 3915 3.XII.29
3°14′ N. 75°21′ E.
S 200 50 m. w. 2
S 200 100 m. w. 2

St. 3916 4.XII.29
1°45′ N. 73°03′ E.
S 200 50 m. w. 3

St. 3918 7.XII.29
0°35′ N. 66°09′ E.
S 200 300 m. w. 2

St. 3920 9.XII.29
1°12′ S. 62°19′ E.
S 200 100 m. w. 7

St. 3921 11.XII.29
3°36′ S. 58°19′ E.
S 200 100 m. w. 1
S 200 200 m. w. 1

St. 3922 12.XII.29
3°45′ S. 56°33′ E.
S 200 100 m. w. 1
E 300 1000 m. w. 1

St. 3926 16.XII.29
8°27′ S. 50°54′ E.
S 200 300 m. w. 1

St. 3927 17.XII.29
10°55′ S. 50°15′ E.
S 200 200 m. w. 2

St. 3928 18.XII.29
11°20′ S. 50°10′ E.
S 150 50 m. w. c. 22
S 200 100 m. w. 10
S 200 200 m. w. 3
S 200 300 m. w. 15
S 200 600 m. w. 1

St. 3929 18.XII.29
12°11′ S. 50°18′ E.
S 200 200 m. w. 11
S 200 300 m. w. 1

St. 3930 19.XII.29
11°55′ S. 49°55′ E.
S 150 100 m. w. 5
S 200 200 m. w. 6
S 200 300 m. w. 2

St. 3931 19.XII.29
12°09′ S. 49°34′ E.
S 200 200 m. w. 2
S 200 300 m. w. 1
S 200 500 m. w. 1
S 200 600 m. w. 3

St. 3932 20.XII.29
11°35′ S. 49°45′ E.
S 200 300 m. w. 4
S 200 400 m. w. 1

St. 3934 20–21.XII.29
11°24′ S. 50°05′ E.
S 200 200 m. w. 5
S 200 300 m. w. 5
S 200 400 m. w. 4
S 200 600 m. w. 1

St. 3935 21.XII.29
10°50′ S. 48°30′ E.
S 200 100 m. w. 5

St. 3936 22.XII.29
10°28′ S. 47°30′ E.
S 200 100 m. w. 1
S 200 200 m. w. 2
S 200 300 m. w. 1

St. 3937 22.XII.29
9°26′ S. 46°05′ E.
S 200 400 m. w. 1
S 200 500 m. w. 1

St. 3947 4.I.30
4°21′ S. 42°56′ E.
S 200 100 m. w. 1
S 200 200 m. w. 2

St. 3948 6.I.30
10°11′ S. 41°57′ E.
S 200 200 m. w. 2

St. 3949 6.I.30
11°33′ S. 41°44′ E.
S 200 50 m. w. 4
S 200 600 m. w. 1

St. 3950 7.I.30
12°23′ S. 41°43.5′ E.
S 200 500 m. w. 1

St. 3951 7.I.30
14°16′ S. 41°48′ E.
S 200 100 m. w. 3
S 200 300 m. w. 1

St. 3952 8.I.30
15°05′ S. 41°53′ E.
S 200 300 m. w. 2
S 200 400 m. w. 1
S 200 500 m. w. 1

St. 3953 8.I.30
16°12′ S. 42°04′ E.
S 200 100 m. w. 3

St. 3954 9.I.30
16°53′ S. 42°12′ E.
S 200 100 m. w. 1
S 200 300 m. w. 1
S 200 500 m. w. 1

St. 3955 9.I.30
18°30′ S. 42°18′ E.
S 200 200 m. w. 2
S 200 500 m. w. 1

St. 3956 10.I.30
21°13′ S. 42°26′ E.
S 200 300 m. w. 1

St. 3957 11.I.30
21°30′ S. 42°32′ E.
S 200 100 m. w. 3

St. 3958 11.I.30
23°11′ S. 42°54′ E.
S 200 300 m. w. 2
S 200 500 m. w. 3

St. 3959 12.I.30
23°40′ S. 43°02′ E.
S 200 200 m. w. 1

St. 3960 13.I.30
25°23′ S. 42°52′ E.
S 150 200 m. w. 2

St. 3961 14.I.30
24°57′ S. 40°18′ W.
S 150 200 m. w. 4

St. 3962 14.I.30
24°33′ S. 38°26′ E.
S 150 50 m. w. 2
S 200 100 m. w. 8
S 200 300 m. w. 1

St. 3963 15.I.30
24°30′ S. 37°48.5′ E.
S 200 150 m. w. 8
S 200 200 m. w. 10
S 200 250 m. w. 3

St. 3964 15.I.30
25°19′ S. 36°13′ E.
S 150 50 m. w. 5
S 200 100 m. w. 21
S 200 300 m. w. 4
S 200 600 m. w. 1

St. 3969 27.I.30
31°33′ S. 30°07′ E.
S 200 50 m. w. 1

St. 3970 28.I.30
34°09′ S. 27°38′ E.
S 200 300 m. w. 3

"Jutlandia"
St. 4773 20.III.33
32°57′ N. 128°48′ W.
S 200 220 m. w. 1

"Falstria"
St. 4777 29.III.33
35°59′ N. 129°25′ W.
S 200 183 m. w. 3 fragments

"Jutlandia"
St. 4784 9.VIII.33
33°52′ N. 137°10′ E.
S 200 ca. 220 m. w. 2

"Selandia"
St. 4787 9.V.33
33°15′ N. 135°31′ W.
S 200 220 m. w. 1

"Selandia"
St. 4794 21.VIII.33
33°45′ N. 137°30′ W.
S 200 220 m. w. 3

"Pacific"
St. 4798 1.I.34
21°23′ N. 119°51′ E.
S 150 201 m. w. 1

St. 4799 12.III.34
19°02′ N. 119°38′ E.
S 150 201 m. w. 2

"Falstria"
St. 4802 7.IV.34
32°13′ N. 145°25′ E.
S 200 183 m. w. 1

"St. Nordiske"
St. 4818 22.VIII.36
18°25′ N. 117°12′ E.
S 150 201 m. w. 1

"Galathea"
St. 277 7.IV.51
0°14′ S. 73°38′ E.
Near Maldive Islands
Depth c. 2200 m
S 200, about 15 m below surface 1 specimen

St. 298 23.IV.51
Bay of Bengal
14°20′ N. 82°00′ E.
Depth 3230 m
TOT 4900 m.w. 1 spec., diam. 32 mm

St. 406 2.VII.51
South China Sea
10°34′ N. 112°51′ E.
Depth 2310 m
TOT 4500 m.w. 4 spec., diam. 20, 23, 34, 40 mm

Geryonia proboscidalis, which is generally distributed in tropical and subtropical waters, was collected by the "Dana" at numerous stations within the investigated areas throughout the Pacific and Indian oceans, except in the waters around New Zealand, which were south of its general area of distribution. It was taken in the Tasman Sea, and the cause why it was lacking at the stations along the north-eastern and northern coasts of Australia may be that all these stations (3666–3674) were in shallow-water areas, with depths between 13 and 66 metres. As a rule, only a few specimens were taken in each haul, but at the following stations the medusa was found in great abundance: St. 3567 near the Marquesas Islands (100 m wire), St. 3620 in the New Hebrides Basin south-east of New Caledonia (50 m wire), St. 3928 north of Madagascar (50 m wire), and St. 3934 off the coast of Mozambique (100 m wire), thus in widely separated areas. By merchant vessels it was found in some localities off northern California and off Japan. The "Galathea" found a few specimens near the Maldive Islands, in the Bay of Bengal, and in the South China Sea.

The medusa mainly belongs to the upper water layers, it was occasionally taken immediately at the surface and in numerous hauls with 50–300 m wire out, to be followed by an abrupt fall towards greater depths; from this we may conclude that most of the specimens taken in deeper hauls were caught at higher levels during the hauling in of the nets. The "Galathea" took some specimens in very deep hauls by the large otter-trawl, while on only one occasion the species was observed in the surface waters; this may be due to this fairly large medusa escaping the small nets, which were generally used for collecting in the upper water layers.

Most of the individuals collected by the "Dana" as well as by the other expeditions were fairly small, but now and again large specimens were found, and frequently in company with small ones, apparently irrespective of the depth of the hauls, some very large specimens being found even in hauls with only 50 and 100 m wire out.

Distribution: Generally distributed in the tropical and subtropical parts of all the great oceans, including the Mediterranean.

V. Narcomedusae.

Fam. **Aeginidae.**

Aegina citrea Eschscholtz.

Aegina citrea Eschscholtz 1829 p. 113, Pl. 11 fig. 4.
Aegina rosea Eschscholtz 1829 p. 115, Pl. 10 fig. 3.
Aegina rhodina Haeckel 1879 p. 338, Pl. 20 figs. 11–15.
Aegina citrea Kramp 1961 *a* p. 266 (all references since 1910).

"Dana"

Material:

St.			
3556	14.IX.28	2°52′ N.	87°38′ W.
E 300	1000 m. w.	**2**	
E 300	2500 m. w.	**1**	
3561	24.IX.28	4°20′ S.	116°46′ W.
S 150	3000 m. w.	**1**	
E 300	5000 m. w.	**1**	
3563	29.IX.28	7°45.5′ S.	131°22′ W.
S 150	50 m. w.	**1**	
E 300	1000 m. w.	**1**	
3576	17.X.28	17°36.5′ S.	149°43.6′ W.
S 150	300 m. w.	**3**	
S 150	600 m. w.	**1**	
S 150	1000 m. w.	**1**	
3582	27.X.28	15°36′ S.	168°57′ W.
S 150	50 m. w.	**1**	
S 150	100 m. w.	**1**	
3584	29.X.28	10°51.5′ S.	168°40′ W.
S 150	50 m. w.	**1**	
3586	1.XI.28	9°43′ S.	170°40′ W.
S 150	100 m. w.	**1**	
3588	3.XI.28	13°10′ S.	173°20′ W.
S 150	100 m. w.	**1**	
3602	22.XI.28	20°00′ S.	174°29′ E.
S 150	50 m. w.	**1**	
3620	7.XII.28	24°46.5′ S.	170°18.5′ E.
S 150	50 m. w.	**3**	
3621	8.XII.28	25°47′ S.	172°24′ E.
E 300	5000 m. w.	**2**	
3626	13.XII.28	27°00′ S.	177°41′ W.
E 300	2000 m. w.	**1**	
3627	14.XII.28	30°08′ S.	176°50′ W.
S 150	2000 m. w.	**2**	
S 150	3000 m. w.	**4**	
3630	17.XII.28	34°24′ S.	178°42.5′ E.
S 200	2000 m. w.	**1**	

St. 3640 7.I.29
41°47′ S. 176°55′ E.
E 300 3000 m. w. 1

St. 3642 9.I.29
46°43′ S. 176°08.5′ E.
S 150 2500 m. w. 1

St. 3653 26.I.29
33°30.5′ S. 165°53′ E.
S 150 50 m. w. 1

St. 3654 27.I.29
33°28′ S. 161°45′ E.
S 150 50 m. w. 1

St. 3658 5.II.29
33°52′ S. 151°27′ E.
S 150 50 m. w. 2

St. 3663 23.II.29
33°33′ S. 154°04′ E.
S 150 3000 m. w. 1

St. 3676 23.III.29
5°52′ S. 131°14′ E.
S 150 5000 m. w. 2
E 300 6000 m. w. 1

St. 3677 23.III.29
5°28′ S. 130°39′ E.
S 150 2000 m. w. 1
S 150 4000 m. w. 4
E 300 5000 m. w. 5

St. 3678 24.III.29
4°05′ S. 128°16′ E.
E 300 1000 m. w. 1
S 150 2000 m. w. 1
S 150 3000 m. w. 15
E 300 5000 m. w. 2

St. 3680 27.III.29
2°22′ S. 126°58.5′ E.
S 150 3000 m. w. 1

St. 3686 6.IV.29
8°34′ N. 119°55′ E.
S 150 100 m. w. 1

St. 3688 8.IV.29
6°55′ N. 114°02′ E.
S 150 3000 m. w. 1
S 150 3500 m. w. 4

St. 3689 9.IV.29
7°13.5′ N. 111°49′ E.
E 300 1000 m. w. 2
E 300 1500 m. w. 2
E 300 3000 m. w. 2

St. 3722 29.V.29
25°11′ N. 122°35′ E.
S 200 300 m. w. 1
S 200 600 m. w. 1

St. 3723 30.V.29
25°30.5′ N. 125°28′ E.
S 200 50 m. w. 1

St. 3731 16.VI.29
14°37′ N. 119°52′ E.
S 200 100 m. w. 1
S 150 2500 m. w. 1

St. 3768 24.VII.29
1°20′ S. 138°42′ E.
S 200 700 m. w. 2
E 300 4000 m. w. 1

St. 3815 10.IX.29
3°36′ S. 97°37′ E.
S 200 300 m. w. 3

St. 3821 14.IX.29
0°51.5′ S. 99°24.5′ E.
S 200 300 m. w. 1

St. 3824 15.IX.29
0°08′ S. 97°15′ E.
S 200 300 m. w. 2

St. 3847 11.X.29
12°02′ S. 96°43′ E.
E 300 3500 m. w. 3

St. 3851 15.X.29
5°27′ S. 93°50′ E.
S 200 200 m. w. 3
S 200 600 m. w. 1

St. 3854 16.X.29
5°31′ S. 96°35′ E.
S 200 100 m. w. 1

St. 3855 17.X.29
5°17′ S. 97°06′ E.
S 200 300 m. w. 1

St. 3893 6.XI.29
5°59′ N. 92°29′ E.
E 300 1000 m. w. 1

St. 3899 9.XI.29
5°39.5′ N. 96°54′ E.
S 200 300 m. w. 1

St. 3902 17.XI.29
6°05′ N. 95°30′ E.
E 300 1000 m. w. 1

St. 3904 18.XI.29
5°18′ N. 90°55′ E.
E 300 3500 m. w. 1

St. 3912 24.XI.29
6°52′ N. 79°30′ E.
S 200 300 m. w. 1

St. 3929 18.XII.29
12°11′ S. 50°18′ E.
S 200 200 m. w. 5

St. 3931 19.XII.29
19°09′ S. 49°34′ E.
S 200 200 m. w. 2

St. 3950 7.I.30
12°23′ S. 41°43.5′ E.
S 200 200 m. w. 1

St. 3955 9.I.30
18°30′ S. 42°18′ E.
S 200 100 m. w. 1

St. 3957 11.I.30
21°30′ S. 42°32′ E.
S 200 300 m. w. 2

St. 3962 14.I.30
24°33′ S. 38°26′ E.
S 150 50 m. w. 1

St. 3963 15.I.30
24°30′ S. 37°48.5′ E.
S 200 250 m. w. 1

"Galathea"

St. 110 19.XII.50
South-west Africa
18°05′ S. 13°08′ E.
Depth 975 m
ST 300 1800 m. w. 1

St. 277 7.IV.51
Near Maldive Islands
0°14′ S. 73°38′ E.
Depth c. 2200 m
S 200 c. 15 m below surface 2

St. 409 5.VII.51
South China Sea
13°44′ N. 118°56′ E.
Depth 3780–3850 m
TOT 2900 m. w. 1

St. 464 4.IX.51
Sunda Trench
10°18′ S. 109°38′ E.
Depth 7150–6200 m
ST 300 10200 m. w. 1

St. 472 10.IX.51
Sunda Trench
10°24′ S. 114°07′ E.
Depth 2250–2030 m
HOT 3600 m. w. 6

St. 489 13.IX.51
Bali Sea
7°38′ S. 116°08′ E.
Depth 1160 m
ST 300 1950 m. w. 1

St. 494 21.IX.51
Banda Trench
5°36′ S. 131°01′ E.
Depth 7280 m
ST 300 10300 m. w. 2

St. 495 22°IX.51
Banda Trench
5°26′ S. 130°58′ E.
Depth 7290–7250 m
HOT 11200 m. w. 1

St. 552 2.XII.51
East Australia
36°00′ S. 150°29′ E.
S 100 1

St. 678 5.III.52
28°57′ S. 175°36′ W.
Depth 6300 m
SN 50 3

Aegina citrea was collected by the "Dana" in scattered localities during the voyage through the Pacific from Panama to the Marquesas Islands, at several stations among the Polynesian and Melanesian islands, and east of New Zealand, also at the interesting station 3642, off the southernmost part of New Zealand; it was likewise taken between northern New Zealand and Sydney in Australia, and in several places within the Indo-Malayan region, northwards to Formosa and the Kurile Islands, west and south-west of Sumatra, near Ceylon, and north and west of Madagascar. By the "Galathea" it was also found in several localities: near the Maldive Island, in the Sunda Trench, the Banda Trench, the South China Sea and Bali Sea, off south-eastern Australia, and in the Kermadec Trench north of New Zealand.

This oceanic medusa is widely distributed in the warm and temperate parts of the oceans, but up to now it was almost unknown in the central Pacific and had never been recorded from the waters between the Polynesian and Melanesian islands or around New Zealand. On the other hand, it has frequently been observed in the marginal zones of the ocean off the continental coasts, from Peru to Alaska and the Aleutian Islands and from South-East Australia to Kamchatka; also once recorded from the Indian sector of the Antarctic. The known area of distribution in the Pacific has, accordingly, been considerably extended by the "Dana" Expedition. In the Malayan Archipelago and the Indian Ocean it was well known before.

As to its vertical distribution the collections of the "Dana" and Galathea" Expeditions confirm our previous view that it is very extensive, though the medusa mainly occurs in the deep and intermediate water layers.

Here as elsewhere this medusa was taken in small numbers only; as many as 15 specimens were, however, taken by the "Dana" in one haul with 3000 m wire out (St. 3678 in the Banda Sea); a few specimens were taken in hauls with 1000, 2000 and 5000 m wire out, at the same station. By the "Galathea" it was found at depths far exceeding those known before, in hauls with up to 10200 m wire (St. 464 in the Sunda Trench), and 10300 to 11200 in the Banda Trench (St. 494 and 495).

Small specimens were collected by the "Dana" at very different depths, with 50, 200, 300 and 1000 m wire out. The specimens taken near the surface by the "Galathea" were all fairly small, 6–14 mm wide, probably because larger specimens escaped the small nets used in these hauls; in the deep hauls with larger appliances the size of the individuals varied between 14 and 35 mm in diameter.

Among the 115 specimens collected by the "Dana" only four were found with 5 tentacles and marginal lappets, and one with 6; among the 18 specimens taken by the "Galathea" two had 5 tentacles and marginal lappets. It is now generally accepted that no distinction can be made between different species of *Aegina* by the colour of the individuals; at the "Galathea" St. 494 a bright yellow and a bright red specimen were taken in one and the same haul with 10300 m wire out; it was a beautiful sight.

Distribution: An oceanic species, widely distributed in the warm and temperate parts of the oceans, in the Pacific as far north as the Aleutian Islands and southwards to Peru and southern Australia, in the Atlantic from South Georgia to Iceland; it does not occur in the Mediterranean. Apart from a single record near the Antarctic Continent (KRAMP 1957 *b* p. 57) the records from the Indian Ocean are all from the areas north of 40° N.

Aeginura grimaldii MAAS 1904.

For references see KRAMP 1961 *a* p. 269.

Material:

"Dana"							
St. 3558	18.IX.28	St. 3663	23.II.29	St. 3768	24.VII.29	St. 3917	5.XII.29
0°18′ S.	99°07′ W.	33°33′ S.	154°04′ E.	1°20′ S.	138°42′ E.	1°45′ N.	71°05′ E.
S 150	3000 m. w. **1**	E 300	5000 m. w. **1**	E 300	2500 m. w. **1**	S 150	3700 m. w. **2**
St. 3640	7.I.29	St. 3683	2.IV.29	St. 3909	22.XI.29	St. 3920	9.XII.29
41°47′ S.	176°55′ E.	4°03′ N.	123°26′ E.	5°21′ N.	80°38′ E.	1°06′ S.	62°25′ E.
S 150	2500 m. w. **1**	S 150	3000 m. w. **1**	E 300	3500 m. w. **1**	S 150	3500 m. w. **3**

"Galathea"

St. 263	24.III.51	St. 266	27.III.51	St. 407	3.VII.51	St. 472	10.IX.51
Off Mombasa, E. Africa		Near the Seychelles		South China Sea		Sunda Trench	
4°14′ S.	44°52′ E.	3°38′ S.	52°43′ E.	12°10′ N.	114°56′ E.	10°24′ S.	114°07′ E.
TOT	3000 m. w. 1	TOT	7000 m. w. 2	TOT	4390 m. w. 2	HOT	3600 m. w. 3

This widely distributed bathypelagic medusa, which may be collected in great numbers in the deep parts of the Atlantic Ocean, seems to be less common in the Pacific and Indian oceans. It is recorded from the eastern tropical Pacific, from the Bering Sea and the Ochotian Sea, and from a number of localities off the coasts of Japan and China, but never from the central parts of the ocean; the only previous record from the Malayan Archipelago is from one locality east of Celebes (Maas 1905 p. 77, as *A. weberi* n. sp.). In the Indian Ocean it has been recorded from a number of localities off the northern part of the east coast of Africa (Vanhöffen 1908 and Kramp 1957 *a*). The "Dana" and "Galathea" Expeditions have collected this medusa in scattered localities, partly in areas where it was unknown before, never more than 1–3 specimens in a single haul. The "Dana" found it in the eastern Pacific (St. 3558), east of New Zealand and off the east coast of Australia (St. 3640 and 3663), in the Celebes Sea (St. 3683) and north of New Guinea (St. 3768), and at three stations between Ceylon and the Seychelles (St. 3909–3920). By the "Galathea" it was taken off the African coast, south of Java and in the South China Sea. All the specimens were taken in deep hauls with at least 2500 m wire out. The present collections show that the species is more evenly distributed in Indo-Pacific waters than known before, but it is still unknown in the central parts of the Pacific Ocean.

Distribution: Widely distributed in the deep layers of all the oceans except in the Mediterranean and in arctic and antarctic waters.

Solmundella bitentaculata (Quoy & Gaimard 1833).

For references see Kramp 1961 *a* p. 270.

"Dana"

St. 3553	5.IX.28
7°55′ N.	79°02′ W.
S 150	50 m. w. c.100
S 150	100 m. w. c.120

St. 3556	14.IX.28
2°52′ N.	87°38′ W.
S 150	100 m. w. 3
S 150	300 m. w. 1
S 150	1000 m. w. 2

St. 3563	29.IX.28
7°45.5′ S.	131°22′ W.
S 150	50 m. w. 1

St. 3584	29.X.28
10°51.5′ S.	168°40′ W.
S 150	50 m. w. 19
S 150	100 m. w. 18
S 150	600 m. w. 1

St. 3586	1.XI.28
9°43′ S.	170°40′ W.
S 150	100 m. w. 1

Material:

St. 3641	8.I.29
43°40′ S.	176°36′ E.
S 150	50 m. w. 6

St. 3642	9.I.29
46°43′ S.	176°08.5′ E.
S 150	2000 m. w. 1

St. 3676	22.III.29
5°52′ S.	131°14′ E.
S 150	50 m. w. 1

St. 3677	23.III.29
5°28′ S.	130°39′ E.
S 150	4000 m. w. 1

St. 3678	24.III.29
4°05′ S.	128°16′ E.
S 150	100 m. w. 2

St. 3680	27.III.29
2°22′ S.	126°58.5′ E.
S 150	100 m. w. 6
S 150	1000 m. w. 3

St. 3682	29.III.29
1°42′ N.	124°29′ E.
S 150	50 m. w. 4

St. 3683	3.IV.29
4°08′ N.	123°00′ E.
S 150	50 m. w. 20
S 150	300 m. w. 2
S 150	1000 m. w. 3

St. 3684	3.IV.29
6°37′ N.	122°24′ E.
S 150	50 m. w. 3

St. 3685	4–5.IV.29
7°22′ N.	121°16′ E.
S 150	50 m. w. 50
S 150	1000 m. w. 1
S 150	2000 m. w. 5
S 150	3000 m. w. 4
S 150	4000 m. w. 2

St. 3686	6.IV.29
8°34′ N.	119°55′ E.
S 150	50 m. w. 28
S 150	100 m. w. 5
S 150	300 m. w. 1
S 150	600 m. w. 2
S 150	1000 m. w. 13
S 150	2000 m. w. 1

St. 3688	8.IV.29
6°55′ N.	114°02′ E.
S 150	2000 m. w. 1
S 150	3500 m. w. 1

St. 3689	9.IV.29
7°13.5′ N.	111°49′ E.
S 50,	surface 4
S 150	50 m. w. 2
S 150	100 m. w. 1
S 150	300 m. w. 3
S 150	1500 m. w. 3
S 150	2000 m. w. 2

St. 3690	10.IV.29
8°02′ N.	109°36.5′ E.
S 150	50 m. w. 1

St. 3692 11.IV.29
9°59′ N. 107°23.5′ E.
S 150 50 m. w. c.**115**

St. 3694 19.IV.29
8°13′ N. 105°12.5′ E.
S 50, surface **1**

St. 3715 22.V.29
18°18′ N. 119°36′ E.
S 150 300 m. w. **1**

St. 3722 29.V.29
25°11′ N. 122°35′ E.
S 200 50 m. w. **11**
S 200 100 m. w. **5**

St. 3731 16.VI.29
14°37′ N. 119°52′ E.
S 200 100 m. w. **2**

St. 3736 28.VI.29
9°17′ N. 123°58′ E.
S 200 600 m. w. **2**
S 150 1000 m. w. **2**
S 150 2000 m. w. **6**

St. 3739 2.VII.29
3°20′ N. 123°50′ E.
S 200 50 m. w. **1**
S 200 100 m. w. **6**

St. 3751 12.VII.29
3°40.5′ N. 137°53′ E.
S 200 100 m. w. **3**
S 200 300 m. w. **3**
S 200 600 m. w. **3**

St. 3800 18.VIII.29
7°53′ N. 116°18′ E.
S 200 300 m. w. **3**

St. 3804 30.VIII.29
9°09′ S. 114°47′ E.
S 200 100 m. w. **1**

St. 3809 4.IX.29
6°22′ S. 105°12′ E.
S 200 50 m. w. **17**
S 200 100 m. w. **9**
S 200 300 m. w. **1**

St. 3821 14.IX.29
0°51.5′ S. 99°24.5′ E.
S 200 100 m. w. **11**

St. 3828 18.IX.29
1°53′ N. 96°07′ E.
S 150 2000 m. w. **1**

St. 3844 11.X.29
12°05′ S. 96°45′ E.
S 200 50 m. w. **1**
S 200 250 m. w. **1**

St. 3847 11.X.29
12°02′ S. 99°43′ E.
S 150 2000 m. w. **1**
S 150 3000 m. w. **1**

St. 3850 14.X.29
6°01′ S. 93°12′ E.
S 200 200 m. w. **1**
S 200 300 m. w. **2**

St. 3860 19–20.X.29
2°57′ S. 99°36′ E.
S 200 50 m. w. **2**
S 200 300 m. w. **3**
S 200 300 m. w. **2**

St. 3893 6.XI.29
5°59′ N. 92°29′ E.
S 200 800 m. w. **1**

St. 3900 9.XI.29
4°41′ N. 98°13′ E.
S 200 50 m. w. **2**
S 200 100 m. w. **1**

St. 3903 17.XI.29
5°50′ N. 93°28′ E.
S 50, surface **1**
S 200 50 m. w. **18**
S 200 100 m. w. **6**
S 200 300 m. w. **6**

St. 3909 22.XI.29
5°21′ N. 80°38′ E.
S 50, surface **1**

St. 3910 23.XI.29
5°28′ N. 80°00′ E.
S 200 600 m. w. **1**

St. 3913 1.XII.29
6°36′ N. 79°06′ E.
S 200 50 m. w. **2**

St. 3916 4.XII.29
1°45′ N. 73°03′ E.
S 200 50 m. w. **4**

St. 3918 7.XII.29
0°35′ N. 66°09′ E.
S 50, surface **3**
S 200 50 m. w. c.**280**
S 200 100 m. w. c.**500**
S 200 300 m. w. **49**
S 200 600 m. w. c. **60**

St. 3919 8.XII.29
0°07′ S. 63°56′ E.
S 200 50 m. w. c.**300**
S 200 100 m. w. c.**160**
S 200 300 m. w. c. **30**
S 200 600 m. w. c. **25**

St. 3920 9.XII.29
1°12′ S. 62°19′ E.
S 200 50 m. w. c.**300**
S 200 100 m. w. c.**350**
S 200 600 m. w. **2**
S 150 1000 m. w. **2**
S 150 2000 m. w. **3**
S 150 2500 m. w. **2**
S 150 3500 m. w. **7**

St. 3921 11.XII.29
3°36′ S. 58°19′ E.
S 200 50 m. w. **10**
S 200 100 m. w. **28**
S 200 200 m. w. **1**

St. 3924 14.XII.29
5°01′ S. 54°46′ E.
S 200 50 m. w. **2**

St. 3925 16.XII.29
7°13′ S. 52°22′ E.
S 200 50 m. w. **20**
S 200 100 m. w. **5**

St. 3926 16.XII.29
8°27′ S. 50°54′ E.
S 150 50 m. w. **6**
S 200 100 m. w. **5**
S 200 200 m. w. **6**

St. 3928 18.XII.29
11°20′ S. 50°10′ E.
S 150 50 m. w. **1**
S 200 100 m. w. **1**
S 200 300 m. w. **1**

St. 3931 19.XII.29
12°09′ S. 49°34′ E.
S 200 200 m. w. **3**
S 200 300 m. w. **2**
S 200 500 m. w. **2**
S 200 600 m. w. **1**

St. 3937 22.XII.29
9°26′ S. 46°05′ E.
S 150 100 m. w. **1**
S 200 200 m. w. **4**

St. 3940 24.XII.29
8°24′ S. 42°54′ E.
S 200 200 m. w. **2**
S 200 300 m. w. **3**
S 200 400 m. w. **2**

St. 3943 25.XII.29
5°30′ S. 40°40′ E.
S 150 100 m. w. **3**

St. 3946 3.I.30
3°26′ S. 42°58′ E.
S 200 100 m. w. c. **70**
S 200 300 m. w. **6**
S 200 600 m. w. **13**

St. 3948 6.I.30
10°11′ S. 41°57′ E.
S 200 200 m. w. **1**

St. 3950 7.I.30
12°23′ S. 41°43.5′ E.
S 200 200 m. w. **1**
S 200 400 m. w. **1**
S 200 500 m. w. **4**

St. 3953 8.I.30
16°12′ S. 42°04′ E.
S 150 50 m. w. **11**
S 200 100 m. w. **1**

St. 3955 9.I.30
18°30′ S. 42°18′ E.
S 150 50 m. w. **4**

St. 3957 11.I.30
21°30′ S. 42°32′ E.
S 150 50 m. w. **1**
S 200 100 m. w. **2**

St. 3959 12.I.30
23°40′ S. 43°02′ E.
S 150 100 m. w. **1**

St. 3962 14.I.30
24°33′ S. 38°26′ E.
S 150 50 m. w. **1**

St. 3963 15.I.30
24°30′ S. 37°48.5′ E.
S 200 250 m. w. **1**

St. 3964 15.I.30
25°19′ S. 36°13′ E.
S 150 50 m. w. **3**

St. 3966 18.I.30
29°25′ S. 32°00′ E.
S 150 100 m. w. **9**
S 150 200 m. w. **5**
S 200 300 m. w. **6**

St. 3967 18.I.30
29°44′ S. 31°18′ E.
S 200 100 m. w. **5**

St. 3969 27.I.30
31°33′ S. 30°07′ E.
S 200 50 m. w. **23**
S 200 300 m. w. **13**
S 200 600 m. w. **25**

St. 3972 30.I.30
36°09′ S. 21°52′ E.
S 200 50 m. w. **5**
S 200 100 m. w. **16**

"Pacific"
St. 4772 12.IV.33
21°40′ N. 120°02′ E.
S 150 201 m. w. **1**

"Pacific"
St. 4798 1.I.34
21°23′ N. 119°51′ E.
S 150 201 m. w. **1**

"St. Nordiske"
St. 4818 22.VIII.36
18°25′ N. 117°02′ E.
S 150 201 m. w. **1**

"Galathea"
St. 292 21.IV.51
Off Tranquebar, India
11°06′ N. 80°05′ E.
Depth 20 m
SN 50 **4**

St. 305 26.IV.51
Bay of Bengal
20°51′ N. 87°58′ E.
Depth 43–52 m
S 100, c. 10 m below surface **3**
SN 50, surface **2**

St. 319 6.V.51
Nancowry Harbour, Nicobars, anchorage
SN 50 **1**

St. 325 10.V.51
Strait of Malacca
4°20′ N. 98°54′ E.
Depth 46 m
SN 50 **1**

St. 326 10.V.51
Strait of Malacca
2°38′ N. 101°22′ E.
Depth 50 m
SN 50 **2**

St. 327 11.V.51
Strait of Malacca
1°55′ N. 102°27′ E.
Depth 45 m
SN 50, surface **2**

St. 328 11.V.51
Strait of Malacca
1°35′ N. 103°01′ E.
Depth 20 m
SN 50, surface **31**

St. 373 6–7.VI.51
Off Kerteh, anchorage
4°30′ N. 103°28′ E.
SN 50 4–8 m below surface **43**

St. 390 11.VI.51
Gulf of Siam
13°02′ N. 100°33′ E.
Depth 22 m
SN 50 30 m. w. **8**

St. 393 11.VI.51
Gulf of Siam
13°09′ N. 100°45′ E.
Depth 12 m
SN 50 6 m. w. **1**

St. 399 21.VI.51
N.E. of Singapore
1°46′ N. 104°25′ E.
Depth 38 m
SN 50 7 m. w. **1**

St. 410 6.VII.51
Chamilla Bay near Manila, anchorage
SN 50 **1**

St. 414 16.VII.51
Tabajon Bay, Dinagat, Philippines, anchorage
Depth 40 m
SN 50 **5**

St. 425 29–30.VII.51
Buca Grande Isl., Philippines, anchorage.
Depth 50 m
SN 50 16 m. w.1 larva

St. 446 18–19.VIII.51
Off Isabela, Basilan Isl., Philippines
SN 50 **3**

St. 454 25.VIII.51
Java Sea
5°23′ S. 116°02′ E.
Depth 60 m
SN 50 **3**

St. 455 26.VIII.51
Java Sea
5°32′ S. 112°41′ E.
Depth 66 m
SN 50 **6**

St. 482 12.IX.51
Bali, anchorage
8°46′ S. 115°14′ E.
Depth 30 m
SN 50 16 m. w. **3**

St. 713 3.V.52
Apaculpo Harbour, Mexico
16°57′ N. 99°55′ W.
SN 50 **2**

This little epipelagic medusa is widely distributed from the antarctic waters far northwards in the oceans, though predominantly occurring in the southern hemisphere; in the Pacific its distribution is extended as far north as to southern California and to Japan; in the Indian Ocean it occurs throughout the tropical part. During the Pacific sector of the "Dana" Expedition it was found only in a few scattered localities in the eastern and central parts and off the south-eastern coasts of New Zealand, while it occurred everywhere in the Malayan Archipelago and in the entire range from Ceylon to Madagascar and South-Africa. Merchant vessels took it in three localities between the Philippines and Formosa, and it was collected by the "Galathea" in many localities in the Malayan Archipelago and the Bay of Bengal, and at one station near the coast of Mexico.

As a rule, the nets contained only some few specimens of this medusa, but sometimes it was taken in large numbers. This applies to three stations in coastal areas: St. 3553 in the Gulf of Panama, St. 3692 near the coast of Vietnam, and St. 3946 off Mombasa in East Africa; but it occurred in particularly great abundance in the open sea midway between the Maldives and the Seychelles, at St. 3918, 3919 and 3920.

Vertical distribution. By far the greatest density of specimens was found in hauls with 50 and 100 m wire out, about 25–50 m below the surface. Specimens were, however, also taken in many hauls with 300 m

wire (about 175–200 m below the surface), though usually in small numbers only, from which we may conclude that at least some of these specimens did occur at this level and perhaps slightly deeper; but specimens from still deeper hauls were probably all caught during the hauling in of the nets through the upper water layers.

Comparatively large numbers were taken in hauls with 600 m wire and with 300 m wire out, at two stations, St. 3918 and 3919, where the medusa was found in particularly great numbers in the hauls with 50 and 100 m wire out; the nets from the deeper hauls at these stations, accordingly, have passed through a densely populated higher layer of water while hauled in.

Distribution: Widely distributed and very common in the oceans; in the Pacific its northward distribution is extended to Japan and southern California; in the Atlantic it is common everywhere south of 20° N., while there are only a few scattered records from the North Atlantic farther north, as far as 40° N.; very common in the Mediterranean. Circumpolar in antarctic seas.

Fam. **Solmarisidae.**

Genus **Pegantha.**

Since the last revision (KRAMP 1957 *a* pp. 65 ff) seven species of *Pegantha* have been recognized as valid, though two of them have not been observed since they were described by HAECKEL (1879). Among the other five species *P. rubiginosa* (KÖLLIKER) is known with certainty only from Atlantic and Mediterranean waters, where it is very common (until 1955 generally referred to the genus *Cunina*); a single record from S.E. Australia (BLACKBURN 1955, p. 423) seems open to doubt; at least, in the comprehensive material collected by the "Dana" none of the specimens resembled this species. The four other species of *Pegantha* are widely distributed in the three great oceans, but do not occur in the Mediterranean; they are all represented in the "Dana" collection, and it applies to all of them that the material collected by the "Dana" has considerably extended their known areas of distribution in the Indian and Pacific oceans.

With the exception of *P. triloba*, in which the gelatinous substance is rather firm and resistant, the medusae of this genus are remarkably soft and brittle and easily destroyed by a more or less rough handling during and after preservation. The distinguishing characters are rather conspicuous, provided that the state of preservation is tolerably good, and I think that I have been able to identify the majority of the numerous specimens collected by the "Dana", but several specimens were completely indeterminable. In the "Galathea" collection *Pegantha* is represented by only three specimens, belonging to three species, all taken near the surface of the water, and a few indeterminable specimens from deep hauls.

Pegantha martagon HAECKEL.

Pegantha martagon HAECKEL 1879 p. 332.
Pegantha martagon BIGELOW 1909 p. 83, Pl. 18 figs. 1–8.
Pegantha martagon MAYER 1910 p. 443, figs. 295, 296.
Pegantha martagon KRAMP 1957 *a* p. 67, Pl. 6 fig. 1.
Pegantha martagon KRAMP 1961 *a* p. 274 (all references since 1910).

"Dana" Material:

St. 3556	14.IX.28	St. 3611	26.XI.28	St. 3623	9.XII.28	St. 3626	13.XII.28
2°52′ N.	87°38′ W.	20°53.2′ S.	164°03.3′ E.	27°21′ S.	175°11′ E.	27°00′ S.	177°41′ W.
S 150	600 m. w. 1	S 150	100 m. w. 1	S 150	50 m. w. 2	S 200	100 m. w. 4
				S 150	100 m. w. 2	St. 3627	14.XII.28
St. 3604	24.XI.28	St. 3620	7.XII.28	St. 3625	11.XII.28	30°08′ S.	176°50′ W.
23°32′ S.	167°36′ E.	24°45.5′ S.	170°18.5′ E.	29°40′ S.	179°34′ E.	S 50, surface	1
S 150	300 m. w. 1	S 150	50 m. w. 1	E 300	1000 m. w. 2	S 150	50 m. w. 2

St. 3631 18.XII.28
35°40′ S. 176°40′ E.
S 150 50 m. w. **2**

St. 3643 10.I.29
46°58′ S. 172°14′ E.
S 150 50 m. w. **1**

St. 3654 27.I.29
33°28′ S. 161°45′ E.
S 150 50 m. w. **20**

St. 3664 24.II.29
31°42.5′ S. 156°09′ E.
S 150 200 m. w. **1**

St. 3714 20.V.29
15°22′ N. 115°20′ E.
S 150 100 m. w. **3**

St. 3718 25.V.29
20°04′ N. 123°59′ E.
S 150 50 m. w. **1**
S 150 100 m. w. **1**

St. 3844 10.X.29
12°05′ S. 96°45′ E.
S 200 250 m. w. **1**

St. 3907 21.XI.29
3°59′ N. 82°57′ E.
S 200 400 m. w. **3**

St. 3916 4.XII.29
1°45′ N. 73°03′ E.
S 200 50 m. w. **1**

St. 3921 11.XII.29
3°36′ S. 58°19′ E.
S 200 100 m. w. **1**

St. 3924 14.XII.29
5°01′ S. 54°46′ E.
S 200 300 m. w. **1**

St. 3931 19.XII.29
12°09′ S. 49°34′ E.
S 200 500 m. w. **3**

St. 3932 20.XII.29
11°35′ S. 49°45′ E.
S 200 400 m. w. **1**

St. 3937 22.XII.29
9°26′ S. 46°05′ E.
S 200 400 m. w. **2**

St. 3956 10.I.30
21°13′ S. 42°26′ E.
S 200 300 m. w. **1**

St. 3969 27.I.30
31°33′ S. 30°07′ E.
S 200 600 m. w. **1**

"Panama"
St. 4763 24.II.33
39°26′ S. 47°49′ E.
S 200 293 m. w. **1**

"Pacific"
St. 4771 28.II.33
37°05′ N. 160°08′ E.
S 150 91–110 m. w.

"Jutlandia"
St. 4774 29.III.33
31°10′ N. 171°35′ W.
S 200 220 m. w. **24**

"Jutlandia"
St. 4791 16.XII.33
37°42′ N. 147°25′ E.
S 200 220 m. w. **1**

"Falstria"
St. 4803 25.V.34
30°37′ N. 134°25′ E.
S 200 183 m. w. **1**

"Galathea"
St. 727 13.V.52
Gulf of Panama
6°23′ N. 78°43′ W.
DNLL, surface **1**

This medusa, which is widely distributed in the Atlantic Ocean between about 55° S. and 40° N., has also been collected in numerous localities in the eastern tropical Pacific, off the coasts of Colombia and Peru, but other records from Indo-Pacific waters are few and scattered. It was first described from the South China Sea (HAECKEL 1879), then recorded from the Maldive Islands (BIGELOW 1904, as *P. simplex*) and from a few localities off the east coast of Africa (KRAMP 1957 *a*). Moreover, it has been found in antarctic and subantarctic waters in the southern Pacific. As a matter of fact, it has an extensive distribution in the Pacific and Indian oceans, as seen from the above list. It was found in and just outside the Gulf of Panama by the "Galathea" (St. 727) and the "Dana" (St. 3556), and it was collected in many localities east, west, and north of New Zealand ("Dana" St. 3604–3664). St. 3714 is in the South China Sea, St. 3718 north of Luzon, St. 3844 near the Cocos Islands in the Indian Ocean. The medusa was also found in several localities during the voyage from Ceylon to Madagascar (St. 3907–3956) and near Port Stepstone in South-East Africa (St. 3969). One of the merchant vessels found it at a station (St. 4763) far south-east of Africa. Finally, it was found by other merchant vessels in four localities between Japan and the central part of the North Pacific, considerably farther north than hitherto known in the Pacific. As a rule, only a few specimens were taken in each haul, with only two exceptions, when 20 specimens were taken in the middle of the Tasman Sea in a haul with 50 m wire out (St. 3654), and in the central North Pacific, where the "Jutlandia" found 24 specimens in a haul with 220 m wire out (St. 4774).

Pegantha martagon mainly belongs to the epipelagic region; most of the specimens were taken in hauls with 50 or 100 m wire out, some also with 200–400 m wire or slightly deeper, and some of these may have been caught during the hauling in of the nets. It may occasionally be taken immediately at the surface ("Dana" St. 3627 above deep water in the Kermadec Trench, and "Galathea" St. 727 in the Gulf of Panama).

Distribution: Generally distributed in the upper layers of the great oceans; apparently it does not occur north of about 40° N., but southwards it approaches the Antarctic Continent.

Pegantha laevis H. B. Bigelow.

Pegantha laevis H. B. Bigelow 1909 p. 97, Pl. 16 fig. 1, Pl. 20 figs. 4–6, Pl. 27 figs. 1–7.
Pegantha laevis Mayer 1910 p. 444.
Pegantha laevis Kramp 1957 *a* p. 70, Pl. 6 fig. 2.
Pegantha laevis Kramp 1961 *a* p. 273 (all references).

Material:

"Dana"
St. 3623 9.XII.28
27°21′ S. 175°11′ E.
S 150 50 m. w. **4**
P 100 200 m. w. **4**
E 300 1000 m. w. **5**

St. 3626 13.XII.28
27°00′ S. 177°41′ W.
S 200 50 m. w. **10**
S 200 100 m. w. **1**

St. 3627 14.XII.28
30°08′ S. 176°50′ W.
S 150 100 m. w. **4**

St. 3904 18.XI.29
5°18′ N. 90°55′ E.
E 300 2500 m. w. **2**
E 300 3500 m. w. **2**

"Panama"
St. 4763 24.II.33
39°26′ S. 47°49′ E.
S 200 293 m. w. **3**

"Jutlandia"
St. 4783 27.VI.33
39°30′ N. 166°50′ W.
S 200 220 m. w. **1**

"Falstria"
St. 4803 25.V.34
30°37′ N. 134°25′ E.
S 200 183 m. w. **1**

"Selandia"
St. 4806 23.III.34
36°43′ N. 134°03′ W.
S 200 220 m. w. **1**

"Falstria"
St. 4812 24.VIII.34
29°57′ N. 170°50′ W.
S 200 183 m. w. **2**

"Galathea"
St. 176 21.I.51
Off Port Elisabeth, South Africa
35°12′ S. 27°35′ E.
DNLL, surface **1**

In the Atlantic this species is widely distributed, though not very common, from about 50° S. northwards to the Azores and the Bay of Biscay, while the previous records from the Pacific and Indian oceans are few and scattered. It was originally described from Hawaii and two localities in the eastern tropical Pacific (Bigelow 1909), later on recorded from two localities south-east of Africa (Kramp 1957 *a*). The "Dana" found it at three stations north of New Zealand (St. 3623–3627) and west of the north point of Sumatra (St. 3904). Merchant vessels collected it in the North Pacific between southern Japan and San Francisco; "Panama" St. 4763 is south-east of Africa at a considerable distance from the coast, and a specimen was taken in the dip-net at the surface near the south coast of Africa; it is a fairly large specimen, 33 mm in diameter, and with 20 tentacles and marginal lappets; each of the marginal lappets has about 7 otoporpae, the exumbrella is smooth apart from 20 faintly visible radial ribs issuing from the tentacles; the gonads are well developed sacs, each with about five distinct, oval diverticulae. While this specimen was in a good state of preservation, all the others, which were taken in horizontal hauls with large stramin nets, are rather mutilated. The specimen taken at St. 4806, off San Francisco, is 35 mm wide, others are either smaller or fragmentary. As seen from the list above, most of the specimens were taken in the upper water layers; the few exceptions (St. 3623 and 3904) were undoubtedly caught during the hauling in of the nets.

Distribution: Widely distributed, but not very common, in the warm and temperate parts of the oceans, mainly epipelagic.

Pegantha clara R. P. Bigelow.

Pegantha clara R. P. Bigelow 1909 p. 80, 2 figs.
Pegantha smaragdina H. B. Bigelow 1909 p. 90, Pl. 14 figs. 1–2, Pl. 19 figs. 1–9, Pl. 22–26.
Pegantha clara H. B. Bigelow 1918 p. 397.
Pegantha clara Kramp 1957 *a* p. 73, Pl. 6 fig. 3.
Pegantha clara Kramp 1961 *a* p. 272 (all references).

Material:

"Dana"
St. 3561 24.IX.28
4°20′ S. 116°46′ W.
S 150 50 m. w. **1**

St. 3613 28.XI.28
22°43′ S. 166°05.8′ E.
P 100 2000 m. w. **1**

St. 3620 7.XII.28
24°46.5′ S. 170°18.5′ E.
S 150 50 m. w. **13**

St. 3622 8.XII.28
25°54′ S. 172°37′ E.
S 200 100 m. w. **11**
S 200 200 m. w. **40**

St. 3623 9.XII.28
27°21′ S. 175°11′ E.
S 150, surface 4
S 150 50 m. w. 4
S 150 100 m. w. 10
S 150 600 m. w. 1

St. 3624 10.XII.28
28°17.6′ S. 177°01′ E.
P 100 4000 m. w. 1

St. 3626 13.XII.28
27°00′ S. 177°41′ W.
S 200 200 m. w. 3
S 150 300 m. w. 3
E 300 1000 m. w. 1
E 300 2000 m. w. 1

St. 3627 14.XII.28
30°08′ S. 176°50′ W.
S 150 2000 m. w. 1
S 150 3000 m. w. 1

St. 3631 18.XII.28
35°40′ S. 176°40′ E.
S 150 50 m. w. 3

St. 3638 4.I.29
37°00′ S. 178°16′ E.
S 50, surface 1
S 150 100 m. w. 4

St. 3639 5.I.29
39°19′ S. 179°18′ E.
S 50, surface 1

St. 3682 29.III.29
1°42′ N. 124°29′ E.
S 150 50 m. w. 1

St. 3893 6.XI.29
5°59′ N. 92°29′ E.
S 200 300 m. w. 3

St. 3905 19.XI.29
4°44′ N. 88°05.5′ E.
S 200 100 m. w. 3
S 200 600 m. w. 1

St. 3906 20.XI.29
4°26.5′ N. 85°21′ E.
S 200 100 m. w. 11

St. 3907 21.XI.29
3°59′ N. 82°57′ E.
S 200 400 m. w. 1

St. 3913 1.XII.29
6°36′ N. 79°06′ E.
S 200 100 m. w. 1

St. 3915 3.XII.29
3°14′ N. 75°21′ E.
S 200 50 m. w. 1

St. 3949 6.I.30
11°33′ S. 41°44′ E.
S 200 100 m. w. 1

St. 3961 14.I.30
24°57′ S. 40°18′ E.
S 150 200 m. w. 1

"Jutlandia"
St. 4775 11.IV.33
30°20′ N. 138°00′ E.
S 200 220 m. w. 1

"Selandia"
St. 4794 21.VIII.33
33°45′ N. 137°30′ W.
S 200 220 m. w. 1

"Jutlandia"
St. 4807 12.II.34
32°56′ N. 131°50′ W.
S 200 220 m. w. 1

"Selandia"
St. 4814 11.X.34
26°37′ N. 145°00′ W.
S 200 220 m. w. 4

Pegantha clara, one of the largest species of the genus, is widely distributed in the Atlantic Ocean from about 40° S. to about 50° N., and the "Dana" collections show that it also has an extensive distribution in the Pacific and Indian oceans. The previous records from these waters are few and scattered. It was described as *P. smaragdina* from the eastern tropical Pacific, off Colombia, Ecuador and Peru, by H. B. Bigelow (1909). A single specimen taken somewhat further south, off the northern part of Chile, and another from a locality in the central Pacific, between Hawaii and the Caroline Islands, were erroneously referred to *Polycolpa forskali* Haeckel by Vanhöffen (1913 *b* p. 32). These are all the Pacific records up to now; in the Indian Ocean it has been collected only by the "Discovery", 1934 and 1936, in four localities off the east coast of Africa and one in the central part of the ocean, between South Africa and Australia (Kramp 1957 *a*).

The "Dana" found a specimen in the eastern tropical Pacific (St. 3561), and the species was collected in several localities north and north-west of New Zealand, partly in considerable numbers (St. 3613–3639). St. 3682 is north of Celebes, St. 3893–3915 between the north point of Sumatra and the Maldive Islands. Finally it was taken in the Mozambique Channel (St. 3949 and 3961). A few specimens were collected by merchant vessels: off southern Japan (St. 4775) and in the eastern part of the North Pacific, off California (St. 4794, 4807 and 4814). The species thus seems to be almost generally distributed in the Indian and Pacific oceans within the same latitudes as in the Atlantic.

The majority of the specimens were taken in hauls with 50–300 m wire out, some even close by the surface; presumably those found in the deep hauls, with 600–4000 m wire out, were all caught at higher levels during the hauling in of the nets. This is in accordance with previous statements.

A young specimen, taken at the surface at St. 3638, is identified by means of its long otoporpae, which is a characteristic feature of *P. clara*; it is 5 mm wide and has 12 marginal lappets and tentacles. Almost all the specimens are in a poor condition; a few large ones had the following measurements: 32 mm wide, with 48 marginal lappets and tentacles (St. 3561, 50 m wire); 32 mm wide, with 26 marginal lappets and tentacles (St. 4794, 220 m wire). The largest specimen observed is 39 mm wide (St. 3907, 400 m wire).

Distribution: Widely distributed in the three great oceans, between 40° S. and 40–50° N., mainly in the epipelagic region.

Pegantha triloba HAECKEL.

Pegantha triloba HAECKEL 1879 p. 333, Pl. 19 figs. 4–7.
Pegantha triloba H. B. BIGELOW 1909 p. 87, Pl. 14 fig. 3, Pl. 16 fig. 3, Pl. 20 figs. 1–3, Pl. 45 figs. 1–2.
Pegantha triloba MAYER 1910 p. 443, figs. 293, 294, 297.
Pegantha triloba KRAMP 1957 *a* p. 77; discussion of synonyms p. 66.
Pegantha triloba KRAMP 1961 *a* p. 276 (all references since 1910).

Material:

"Dana"

St. 3550 4.IX.28
7°10′ N. 78°15′ W.
S 150 300 m. w. **3**

St. 3556 14.IX.28
2°52′ N. 87°38′ W.
S 150 600 m. w. **1**
S 150 1000 m. w. **2**
E 300 1000 m. w. **1**
E 300 2500 m. w. **1**

St. 3558 18.IX.28
0°18′ S. 99°07′ W.
S 150 600 m. w. **1**
E 300 1000 m. w. **2**
E 300 4000 m. w. **1**

St. 3604 24.XI.28
23°32′ S. 167°36′ E.
P 100 600 m. w. **1**

St. 3623 9.XII.28
27°21′ S. 175°11′ E.
S 150 100 m. w. **1**

St. 3626 13.XII.28
27°00′ S. 177°41′ W.
S 200 100 m. w. **1**
E 300 2000 m. w. **1**

St. 3627 14.XII.28
30°08′ S. 176°50′ W.
E 300 5000 m. w. **1**

St. 3918 7.XII.29
0°35′ N. 66°09′ E.
S 200 300 m. w. **2**

St. 3937 22.XII.29
9°26′ S. 46°05′ E.
S 200 500 m. w. **1**

St. 3944 26.XII.29
4°45′ S. 40°10′ E.
S 200 200 m. w. **1**

St. 3947 4.I.30
4°21′ S. 42°56′ E.
S 200 200 m. w. **1**

St. 3948 6.I.30
10°11′ S. 41°57′ E.
S 200 300 m. w. **1**

St. 3950 7.I.30
12°23′ S. 41°43.5′ E.
S 200 500 m. w. **1**

St. 3957 11.I.30
21°30′ S. 42°32′ E.
S 200 500 m. w. **2**

St. 3963 15.I.30
24°30′ S. 37°48.5′ E.
S 200 150 m. w. **1**

"Jutlandia"

St. 4774 29.III.33
31°10′ N. 171°35′ W.
S 200 220 m. w. **13**

"Falstria"

St. 4812 24.VIII.34
29°57′ N. 170°50′ W.
S 200 183 m. w. **1**

"Galathea"

St. 326 10.V.51
Strait of Malacca
2°38′ N. 101°22′ E.
SN 50, near surface **1**

This species is conspicuous by the rigidity of its gelatinous substance and by the presence of radiating furrows and ridges in the exumbrella; it is rather resistant, and most of the present specimens are in a fairly good condition. It is widely distributed in the Atlantic Ocean south of about 30° N., penetrating southwards to about 50° S. Previous records from the Pacific and Indian oceans are rather few, but evenly distributed. The distribution, however, cannot be stated exactly, partly owing to several doubtful synonyms, partly because the records by VANHÖFFEN (1908, 1912, 1913 *b*) from many localities are open do doubt, mainly those from antarctic seas and from the Mediterranean.

The "Dana" has collected it in and outside the Gulf of Panama (St. 3550–3558), between New Caledonia and Kermadec (St. 3604–3627), west of the Maldive Islands (St. 3918) and off the east coast of Africa from Mombasa to Cape Corrientes. Merchant vessels have found it in the central North Pacific, about 30° N. The only locality, where it was taken in any considerable number, is at "Jutlandia" St. 4774 in the North Pacific. The specimen taken by the "Galathea" (St. 326 in the Strait of Malacca) is a young stage, 2 mm wide, with 9 marginal lappets and tentacles, recognizable by conspicuous radiating ridges in the exumbrella.

Pegantha triloba seems to have a very extensive vertical distribution. In the material collected by the "Dana" 11 specimens were taken in 8 hauls with 100–300 m wire out, 12 specimens in 9 hauls with 500–1000 m wire, and 4 specimens in four still deeper hauls, with 2000–5000 m wire out. There is no reason to suppose that the many specimens taken in these deep hauls should all have been caught at higher levels during the hauling in of the nets. In the Atlantic part of the "Dana" Expedition (KRAMP 1959) it was taken in hauls with 300, 600, 1000 and 5000 m wire out. BIGELOW (1909) records it from surface water in the eastern tropical Pacific, and it has also been taken near the surface in the Atlantic (by the "Discovery", KRAMP 1957). As mentioned above, a young specimen was taken near the surface in the Strait of Malacca by the "Galathea".

Distribution: Widely distributed in the three great oceans between about 30° N. and 30° S.; a single locality at about 50° S. in the Atlantic. Vertical distribution extensive.

Genus **Solmaris.**

The genus *Solmaris* comprises six valid species, four of which belong to Atlantic and Mediterranean waters, though one of them, *S. corona*, which is widely distributed in the Atlantic Ocean from Norway to the Cape of Good Hope, has once been recorded from Durban in South-East Africa. The remaining two species, *S. rhodoloma* and *lenticula*, are restricted to Indo-Pacific waters. Both are small medusae, up to 7 mm wide, and all records are from coastal waters. They were not collected by the "Dana", but were found in a few localities by the "Galathea".

Solmaris rhodoloma (BRANDT).

Aequorea rhodoloma BRANDT 1838 p. 357, Pl. 3 figs. 1–5.
Solmaris rhodoloma MAAS 1909 p. 39, Pl. 3 fig. 20.
Solmaris rhodoloma KRAMP 1953 p. 302 (discussion of species).
Solmaris rhodoloma KRAMP 1961 *a* p. 279 (all references).
Solmaris rhodoloma KRAMP 1962 *a* p. 353.

"Galathea" Material:

St. 373. 6.VII.51. Off Kerteh, Malacca, 4°30′ N. 103°28′ E. SN 50, near surface. 2 specimens.
St. 549. 11.XI.51. Coral Sea, 30°05′ S. 154°33′ E. SN 50, near surface. 2 specimens.

The specimens from St. 373 are young stages, 1 mm in diameter, they have 16 marginal lappets and tentacles; the two specimens from St. 549 are 2.2 and 3 mm wide with 23 and 25 lappets and tentacles respectively.

This is the type species of the genus *Solmaris*. It was first described from Concepcion Bay on the coast of Chile (BRANDT 1838) and was not observed again, until new descriptions were given by MAAS (1909 p. 39) and UCHIDA (1928 p. 85), based on specimens from Japan. Its affinity has been discussed. HAECKEL (1879) referred it to his new genus *Solmaris*; MAYER (1910 p. 437) was inclined to regard it as a synonym of *S. corona* (KEFERSTEIN & EHLERS, 1861), and he pointed out *L. leucostyla* (WILL, 1844) as the type species, because it was "probably" the longest known species of the genus. This species is, however, imperfectly described and may have been a juvenile specimen of some other species. In the collection from the Great Barrier Reef in Australia I was able to examine numerous specimens (KRAMP 1953 p. 302), which convinced me of the validity of the species *S. rhodoloma*, and gave me occasion to discuss the affinities of the species. My review was confirmed by the examination of hundreds of specimens from Indochina (KRAMP 1962 *a* p. 253). Since the validity of *S. rhodoloma* thus is established, and since this is the longest-known species of the genus, it can safely be designated as the type species of *Solmaris*.

Previous records of *S. rhodoloma* comprise: the coast of Chile (BRANDT 1838), Central Pacific near the Marquesas Islands (KRAMP 1956 *a* p. 4), southern Japan (MAAS 1909, UCHIDA 1928, YAMAZI, 1958), Indochina (KRAMP 1962 *a*), N.E. Australia (KRAMP 1953) and S.E. Australia (BLACKBURN 1955). It has now been found in a new locality on the east coast of Australia and on the east coast of the Malacca Peninsula.

Distribution: coastal waters in warm and temperate parts of eastern, central, and western Pacific; epipelagic.

Solmaris lenticula HAECKEL.

Solmaris lenticula HAECKEL 1879 p. 357.
Solmaris lenticula MAYER 1910 p. 438.
Solmaris lenticula NAIR 1951 p. 70.
Solmaris lenticula KRAMP 1953 p. 303.
Solmaris lenticula GANAPATI & NAGABHUSHANAM 1958 pp. 93, 94.
Solmaris lenticula KRAMP 1961 *a* p. 278.

"Galathea" Material:

St. 328 11.V.51
Strait of Malacca
1°35′ N. 103°01′ E.
SN 50, near surface 1

St. 442 16.VIII.51
Bugo, Mindanao
8°01′ N. 124°44′ E.
SN 50 1

St. 514 8.X.51
Guadalcanal, Solomon Islands
9°25′ S. 160°00′ E.
SN 50 5 m. w. 12

St. 429 30–31. VII.51
Candos Bay, Mindanao
9°40′ N. 125°55′ E.
SN 50 16 m. w. 1

St. 512 7.X.51
Guadalcanal, Solomon Islands
9°25′ S. 160°00′ E.
SN 50 29 m. w. 14

St. 541 5.XI.51
Moreton Bay, E. Australia
26°57′ S. 153°25′ E.
SN 50 2

MAYER (1910) regarded this species as an immature form. It was described by HAECKEL from somewhere in the Indian Ocean and was not seen again, until it was recorded from the Trivandrum Coast in India by NAIR (1951) and from the Vizagapatam Coast by GANAPATI & NAGABHUSHANAM (1958), in both cases without commentary notes. While on board the "Galathea" I saw the specimens which were taken at the first three stations in the list above and was inclined to refer them to *S. lenticula* (briefly mentioned in my paper on the Great Barrier Reef collection, KRAMP 1953), and an examination of the numerous specimens collected at the Solomon Islands and near the east coast of Australia, St. 512, 514 and 541, after I had left the expedition, has convinced me of the validity of this species.

According to HAECKEL the medusa is 5 mm wide and at that size has 16 tentacles and marginal lappets; he emphazises the width of the gonad, which is a wide annulus on nearly the entire subumbrellar wall of the stomach. In this respect the present specimens show a considerable variation; in some specimens the gonad is just as described by HAECKEL, in others it is only a narrow ring, and all transitional stages between these extremities are found, evidently merely dependent on the degree of contraction of the stomach wall.

The specimen from St. 541 is only 1.2 mm wide and has 6 tentacles. The others vary in diameter from 1.3 to 3 mm; only two of them have as many as 16 tentacles, the majority have 13, the number varying from 11 to 14. The species thus differs from *S. rhodoloma* by its smaller number of tentacles and marginal lappets. In the specimen from St. 442, which is 3 mm wide, I was able to see the statocysts; there was one on each of the marginal lappets, but it was not placed exactly in the middle of the lappet, which indicates that one or two more may be present; in the living specimen the statocyst was red.

Distribution: Coastal waters in India, Australia and the Malayan Archipelago.

Fam. **Cuninidae.**

Genus **Cunina.**

As many as 20 species of *Cunina* and 6 species of *Cunoctantha* have been described; the two genera should be united, and among the many species only eight can be recognized as valid. One species, *C. proboscidea* METSCHIKOFF occurs only in the Mediterranean, *C. fowleri* BROWNE has not been observed, since it was described from the Bay of Biscay; *C. tenella* BIGELOW is a Pacific species, recorded from off the Pacific coast of Mexico and from the Okhotian Sea; it was not found by the "Dana" Expedition. The five others are more or less widely distributed in the three great oceans, and all of them are represented in the present collections by which their known range of distribution have been greatly extended.

Cunina octonaria McCRADY.

Cunina octonaria McCRADY 1857 p. 109, Pl. 12 figs. 4, 5.
Cunoctantha octonaria HAECKEL 1879 p. 316.
Cunoctantha parasitica METSCHNIKOFF 1881 p. 437, Pl. 28 figs. 7–16.

Cunoctantha octonaria BIGELOW 1909 p. 52, Pl. 14 fig. 4, Pl. 15 figs. 5–6, Pl. 17 figs. 2, 4, 5.
Cunina octonaria KRAMP 1961 *a* p. 282 (all references since 1910).
Cunina octonaria KRAMP 1962 *a* p. 353.

Material:

"Dana"
St. 3558 18.IX.28
0°18′ S. 99°07′ W.
S 150 100 m. w. **1**

St. 3921 11.XII.29
3°36′ S. 58°19′ E.
S 200 100 m. w. **2**

"Jutlandia"
St. 4783 27.VI.33
39°30′ N. 166°50′ W.
S 200 220 m. w. **1**

"St. Nordiske"
St. 4818 22.VIII.36
18°25′ N. 117°02′ E.
S 150 201 m. w. **1**

"Galathea"
St. 319 6.V.51
Nancowry Harbour, Nicobars
SN 50, surface **4**

St. 328 11.V.51
Malacca Strait
1°35′ N. 103°01′ E.
SN 50, surface **4**

St. 373 6–7.VI.51
Off Kerteh, Malaya
4°30′ N. 103°28′ E.
SN 50 10 m. w. **1**

St. 381 8.VI.51
Gulf of Siam
7°00′ N. 103°18′ E.
SN 50 **3**

St. 390 11.VI.51
Gulf of Siam
13°02′ N. 100°33′ E.
SN 50 22 m. w. **8**

St. 428 30–31.VII.51
Candos Bay, Mindanao
9°36′ N. 125°46′ E.
SN 50 **1**

St. 482 12.IX.51
Bali, anchorage
8°46′ S. 115°14′ E.
SN 50 16 m. w. **3**

St. 512 7.X.51
Guadalcanal Solomon Islands
9°25′ S. 160°00′ E.
SN 50 29 m. w. **1**

St. 552 2.XII.51
S.E. Australia
36°00′ S. 150°29′ E.
S 100 **1**

This is a small medusa, which may explain why it was taken by the "Dana" in only two localities; St. 3558 is in the eastern Pacific, west of the Galapagos Islands; St. 3921 is in the western part of the Indian Ocean, near the Seychelles. "Jutlandia" St. 4783 is in the central North Pacific, an isolated occurrence far from any other records of this species in Pacific waters, all of which are south of 20° N. All the other localities, listed above, are within areas, from which the medusa was known before, also "Galathea" St. 552 on the south-east coast of Australia. In the Atlantic Ocean this species is widely distributed from about 40° N. to about 40° S., and it also occurs in the Mediterranean. The specimens collected by the "Galathea" are 1–5 mm in diameter.

Distribution: Widely distributed in the warm parts of the oceans; epipelagic.

Cunina peregrina BIGELOW.

Cunina peregrina BIGELOW 1909 p. 59, Pl. 1 fig. 6, Pl. 15 figs. 1–2, Pl. 28 figs. 1–7, Pl. 45 fig. 8.
Cunina peregrina KRAMP 1961 p. 283 (all references).
Cunina peregrina KRAMP 1962 p. 354.

Material:

"Dana"
St. 3561 24.IX.28
4°20′ S. 116°46′ W.
S 50, surface **1**
S 150 600 m. w. **1**

St. 3620 7.XII.28
24°46.5′ S. 170°18.5′ E.
S 150 50 m. w. **1**

St. 3749 13.X.29
8°11′ S. 92°41.5′ E.
S 200 200 m. w. **1**

St. 3921 11.XII.29
3°36′ S. 58°19′ E.
S 200 100 m. w. **18**

St. 3926 16.XII.29
8°27′ S. 50°54′ E.
S 200 200 m. w. **1**

St. 3956 10.I.30
21°13′ S. 42°26′ E.
S 200 200 m. w. **1**

St. 3966 18.I.30
29°25′ S. 32°00′ E.
S 200 300 m. w. **3**

"Galathea"
St. 326 10.V.51
Malacca Strait
2°38′ N. 101°22′ E.
SN 50, surface **6**

St. 383 9.VI.51
Gulf of Siam
9°08′ N. 102°04′ E.
SN 50 **2**

St. 390 11.VI.51
Gulf of Siam
13°02′ N. 100°33′ E.
SN 50 30 m. w. **3**

St. 410 6.VII.51
Near Manila, Philippines
14°32.3′ N. 120°46.2′ E.
SN 50 **43**

This medusa is widely distributed in the Atlantic Ocean between about 40° N. and 35° S. It was, however, first described from the eastern tropical Pacific, where it was found in several localities; other Pacific records are from coastal waters in southern Japan and from Vietnam; the only previous records from the Indian Ocean are from the Mozambique Channel and off South-East Africa. "Dana" St. 3561 is in the eastern tropical Pacific, St. 3620 is south-east of New Caledonia, St. 3849 west of Sumatra, St. 3921 near the Seychelles, St. 3926 and 3956 north and west of Madagascar, and St. 3966 near the south-west coast of Africa. The localities, where the species was collected by the "Dana" are thus scattered over a great distance between South America and East Africa; the only locality, where more than a few specimens were taken, is at St. 3921, near the Seychelles. The "Galathea" found it in four localities in the Indo-Malayan area, at one station (St. 410, near Manila) in great numbers. The medusa may be up to 14 mm in diameter, but the specimens collected by the "Galathea", in hauls with the small silk net, were small, 1–4 mm wide; medusa-buds in the stomach pouches were observed in some of the specimens, 2–2.5 mm wide, at St. 390 and 410.

This medusa evidently belongs to the upper water layers and may even be found immediately at the surface.

Distribution: Widely distributed in the warm parts of the great oceans; epipelagic.

Cunina frugifera KRAMP.

Cunina frugifera KRAMP 1948 *b* p. 18, Pl. 1 figs. 1–6.
Cunina frugifera KRAMP 1961 *a* p. 281 (all references).

Material:

"Dana"

St. 3620 7.XII.28
24°45.5′ S. 170°18.5′ E.
S 150 50 m. w. 1

St. 3623 9.XII.28
27°21′ S. 175°11′ E.
S 150, surface 2
S 150 50 m. w. 4
S 150 100 m. w. 6
S 150 300 m. w. 3
S 150 600 m. w. 1

St. 3626 13.XII.28
27°00′ S. 177°41′ W.
S 200 50 m. w. 1

St. 3627 14.XII.28
30°08′ S. 176°50′ W.
S 150 100 m. w. 1

St. 3654 27.I.29
33°28′ S. 161°45′ E.
S 150 50 m. w. 1

St. 3678 24.III.29
4°05′ S. 128°16′ E.
S 150 300 m. w. 2

St. 3843 9.X.29
9°59′ S. 97°56′ E.
S 200 350 m. w. 2

St. 3906 20.XI.29
4°26.5′ N. 85°21′ E.
S 200 100 m. w. 6

St. 3907 21.XI.29
3°59′ N. 82°57′ E.
S 200 300 m. w. 3

St. 3916 4.XII.29
1°45′ N. 73°03′ E.
S 200 100 m. w. 1

St. 3921 11.XII.29
3°36′ S. 58°19′ E.
S 200 100 m. w. 1
S 200 200 m. w. 1
S 200 300 m. w. 1

St. 3956 10.I.30
21°13′ S. 42°26′ E.
S 200 200 m. w. 1

St. 3958 11.I.30
23°11′ S. 42°54′ E.
S 200 300 m. w. 1

St. 3962 14.I.30
24°33′ S. 38°26′ E.
S 200 300 m. w. 2

St. 3964 15.I.30
25°19′ S. 36°13′ E.
S 200 300 m. w. 1

"Jutlandia"

St. 4784 9.VIII.33
33°52′ N. 137°10′ E.
S 200 220 m. w. 1

"Jutlandia"

St. 4807 12.II.34
32°56′ N. 131°50′ W.
S 200 220 m. w. 1

"Pacific"

St. 4815 10.I.35
15°55′ N. 112°55′ E.
S 150 201 m. w. 1

The most interesting feature of this species is the asexual propagation by medusa buds developing on the subumbrellar side of the stomach pouches, not inside the pouches as e.g. in *C. peregrina*. In this respect it resembles *C. fowleri* (BROWNE) in which, however, peripheral canals are absent, whereas broad and flat peripheral canals are present in the marginal lappets of *C. frugifera* (easily seen even in poorly preserved specimens). There is also a difference in the configuration of the stomach pouches, which are spindle-shaped in *C. fowleri*, triangular in *C. frugifera*.

The first description of *C. frugifera* was based on a single individual, taken in the Cadiz Bay by the "Michael Sars" (KRAMP 1948); later on it was found to be widely distributed in the Atlantic Ocean between about 40° N. and 35° S. It was also taken in a few localities south-east of Africa and off Somali in East Africa

(by the "Discovery", KRAMP 1957 *a*). The present collections, listed above, show that, as a matter of fact, it is widely distributed also in the Indian and Pacific Oceans.

St. 3620–3654 are north and west of New Zealand, St. 3678 in the Banda Sea, St. 3843 near the Cocos Islands in the Indian Ocean. St. 3906–3907 are south-east of Ceylon, St. 3916 near the Maldive Islands, St. 3921 near the Seychelles, and St. 3956–3964 in the Mozambique Channel. Merchant vessels found a few specimens in the South China Sea (St. 4815), near southern Japan (St. 4784) and in the north-eastern Pacific, off California (St. 4807). The medusa evidently belongs to the epipelagic region.

Most of the specimens have medusa buds, and as mentioned in an earlier paper (KRAMP 1955 p. 285) the presence or absence of medusa buds is independent of the number of stomach pouches and marginal lappets being 7, 8 or 9, and of the size of the individuals.

Distribution: Widely distributed in the warm parts of the great oceans; epipelagic.

Cunina globosa ESCHSCHOLTZ.

Cunina globosa ESCHSCHOLTZ 1829 p. 117, Pl. 9 figs. 3 *a–c*.
Cunina globosa BIGELOW 1909 p. 57, Pl. 15 figs. 3, Pl. 17 figs. 3, 8.
Cunina globosa NAUMOV 1960 p. 567, fig. 458.
Cunina globosa KRAMP 1961 *a* p. 281 (all references up to 1959).

Material:

"Dana"

St. 3623	9.XII.28	
27°21′ S.	175°11′ E.	
S 150	50 m. w.	2
S 150	100 m. w.	1

This seems to be a rare species. It was first described from the Gilbert Islands in the tropical Pacific (ESCHSCHOLTZ 1829); a new description was given by BIGELOW (1909) of specimens found near the Pacific coast of Mexico, and later on it has been recorded from the Sea of Japan (NAUMOV 1960 p. 567), from near the Cape of Good Hope (KRAMP 1957 *a* pp. 81, 83, with discussion of its affinities), and from the North Atlantic west of the English Channel (PETERSEN 1957), thus from widely separated areas. The locality, where it was found by the "Dana", is north of New Zealand.

Distribution: Scattered localities in the Pacific and Atlantic Oceans; epipelagic.

Cunina duplicata MAAS.

Cunina duplicata MAAS 1893 p. 52, Pl. 5 figs. 9–10.
Cunina duplicata KRAMP 1957 *a* p. 86, Pl. 6 fig. 5, Pl. 7 figs. 1–2.
Cunina duplicata KRAMP 1961 *a* p. 280 (all references).

"Dana" Material:

St. 3623	9.XII.28	St. 3665	25.II.29	St. 3844	11.X.29	St. 3932	20.XII.29
27°21′ S.	175°11′ E.	29°37.5′ S.	156°46′ E.	12°05′ S.	96°45′ E.	11°35′ S.	49°45′ E.
S 150	600 m. w. 1	S 150	50 m. w. 1	S 200	50 m. w. 1	S 50, surface	1
				S 200	250 m. w. 1		

This is one of the largest species of *Cunina*; it may be up to 58 mm in diameter, but is very soft and brittle. Its affinity has been discussed, before a new description was given, based on several well-preserved specimens in the "Discovery" collections (KRAMP 1957 *a*). Up to now it has been recorded from several localities in the Atlantic Ocean between about 40° N. and 50° S. It was also found by the "Discovery" in two localities off East Africa, and it is recorded from S.E. Australia (BLACKBURG 1955 p. 423).

The present specimens were taken in four widely separated localities. St. 3623 and 3665 are north and north-west of New Zealand, St. 3844 near the Cocos Islands in the Indian Ocean, and St. 3932 near the north point of Madagascar. Only one of the specimens is in such a condition that it could be measured (St. 3623); it is a small individual, 9 mm wide, with about 16 marginal lappets; all the other specimens are fragmentary, mainly larger specimens, recognizable by the gastric pouches being narrow, tongue-shaped, equal in width to, or even narrower than the spaces between them, and by the considerable width of the lateral parts of the peripheral canals in the marginal lappets. The small specimen taken in a haul with 600 m wire out (St. 3623) was presumably caught at a higher level during the hauling in of the net; the medusa evidently belongs to the upper water layers.

Distribution: Widely distributed in the Atlantic and Indian oceans, scattered localities in the western Pacific; epipelagic.

Genus **Solmissus.**

The genus *Solmissus* comprises three valid species. One of them, *S. albescens* (GEGENBAUR), which is the type-species of the genus, has never been found outside the Mediterranean, where it is very common, mainly in deep water; the two others, *S. incisa* (FEWKES) and *S. marshalli* AGASSIZ & MAYER, are widely distributed in the oceans, but do not occur in the Mediterranean; both are represented in the "Dana" collections. These medusae are particularly soft and brittle, and almost all the present specimens are in a fragmentary condition. They are, however, easily recognizable by the outlines of their stomach pouches, which are square and closely set in *S. marshalli*, tongue-shaped and well separated in *S. incisa*.

Solmissus incisa (FEWKES).

Solmaris incisa FEWKES 1886 p. 954, Pl. 9.
Solmissus incisa BIGELOW 1909 p. 67, Pl. 21 figs. 1–3, 5.
Solmissus incisa MAYER 1910 p. 483.
Solmissus incisa KRAMP 1961 *a* p. 286 (all references since 1910).

"Dana"		Material:	
St. 3642	9.I.29	St. 3910	23.XI.29
46°43′ S.	176°08.5′ E.	5°28′ N.	80°00′ E.
S 150	2000 m. w. **2**	S 200	600 m. w. **1**

In the Atlantic this species is widely distributed from the Cape of Good Hope to the waters west of Scotland and off the Atlantic coast of North America; in the Pacific it has been found in the eastern tropical parts, in the northern parts between British Columbia and Kamchatka, and south-east of Japan. The "Dana" has taken it east of the South-Island of New Zealand (St. 3642) and near Ceylon (St. 3910); this latter locality is noteworthy, being the first record from the Indian Ocean.

Distribution: Widely distributed in the Atlantic and Pacific oceans between about 45° S. and 60° N., in the Indian Ocean observed only once, near Ceylon. Mainly found in deep water layers.

Solmissus marshalli AGASSIZ & MAYER.

Solmissus marshalli AGASSIZ & MAYER 1902 p. 151, Pl. 5 figs. 23–25.
Solmissus marshalli BIGELOW 1909 p. 64, Pl. 16 figs. 5–6, Pl. 21 figs. 4, 6–8.
Solmissus marshalli KRAMP 1961 *a* p. 286 (all references since 1910).

Material:

"Dana"

St. 3563 29.IX.28
7°45.5′ S. 131°22′ W.
S 150 600 m. w. fragm.

St. 3613 28.XI.28
22°43′ S. 166°05.8′ E.
E 300 1000 m. w. fragm.

St. 3622 8.XII.28
25°54′ S. 172°36.9′ E.
S 50, surface **2**

St. 3623 9.XII.28
27°21′ S. 175°11′ E.
S 150 50 m. w. ca. **8**
S 150 100 m. w. fragm.
E 300 1000 m. w. fragm.

St. 3626 13.XII.28
27°00′ S. 177°41′ W.
S 200 50 m. w. fragm.
S 200 100 m. w. **2**
S 200 200 m. w. **1**
E 300 2000 m. w. fragm.

St. 3627 14.XII.28
30°08′ S. 176°50′ W.
S 50, surface **1**
S 150 50 m. w. fragm.
S 150 100 m. w. fragm.
E 300 1000 m. w. **1**
E 300 5000 m. w. **1**

St. 3629 16.XII.28
33°36.5′ S. 179°10′ W.
E 300 1000 m. w. **1**

St. 3631 18.XII.28
35°40′ S. 176°40′ E.
S 150 50 m. w. **1**

St. 3642 9.I.29
46°43′ S. 176°08.5′ E.
S 150 1500 m. w. fragm.

St. 3653 26.I.29
33°30.5′ S. 165°53′ E.
S 150 600 m. w. **1**

St. 3665 25.II.29
29°37.5′ S. 156°46′ E.
E 300 1000 m. w. **1**

St. 3685 5.IV.29
7°22′ N. 121°16′ E.
S 150 3000 m. w. **1**

St. 3686 6.IV.29
8°34′ N. 119°55′ E.
S 150 300 m. w. fragm.
E 300 4000 m. w. fragm.

St. 3687 8.IV.29
7°14′ N. 115°23′ E.
S 150 600 m. w. fragm.

St. 3714 20.V.29
15°22′ N. 115°20′ E.
E 300 6000 m. w. **1**

St. 3722 29.V.29
25°11′ N. 122°35′ E.
S 200 300 m. w. fragm.

St. 3723 30.V.29
25°30.5′ N. 125°28′ E.
E 300 1000 m. w. **1**

St. 3736 28.VI.29
9°17′ N. 123°58′ E.
S 200 600 m. w. fragm.
E 300 1000 m. w. **1**

St. 3737 30.VI.29
7°23′ N. 121°29′ E.
E 300 1000 m. w. fragm.

St. 3821 14.IX.29
0°51.5′ S. 99°24.5′ E.
S 200 300 m. w. fragm.
S 200 600 m. w. **1**

St. 3850 14.X.29
6°01′ S. 93°12′ E.
S 200 600 m. w. fragm.

St. 3902 17.XI.29
6°05′ N. 95°30′ E.
S 200 600 m. w. **1**

St. 3906 20.XI.29
4°26.5′ N. 85°21′ E.
S 200 400 m. w. **1**
S 200 600 m. w. **1**

St. 3912 24.XI.29
6°52′ N. 79°30′ E.
E 300 1000 m. w. **1**

St. 3913 1.XII.29
6°36′ N. 79°06′ E.
E 300 1000 m. w. **1**

St. 3914 2.XII.29
4°52′ N. 77°08′ E.
S 200 600 m. w. fragm.

St. 3917 5.XII.29
1°45′ N. 71°05′ E.
S 150 1200 m. w. fragm.

St. 3918 7.XII.29
0°35′ N. 66°09′ E.
S 200 300 m. w. **1**

St. 3921 11.XII.29
3°36′ S. 58°19′ E.
S 200 300 m. w. **1**

St. 3929 18.XII.29
12°11′ S. 50°18′ E.
S 200 300 m. w. fragm.
S 200 400 m. w. fragm.
S 200 500 m. w. **1**
S 200 600 m. w. **1**

St. 3934 20–21.XII.29
11°24′ S. 50°05′ E.
S 200 400 m. w. **1**

St. 3951 7.I.30
14°16′ S. 41°48′ E.
S 200 300 m. w. **1**

St. 3954 9.I.30
16°53′ S. 42°12′ E.
S 200 300 m. w. **1**

St. 3956 10.I.30
21°13′ S. 42°26′ E.
S 200 500 m. w. fragm.

St. 3957 11.I.30
21°30′ S. 42°32′ E.
S 200 500 m. w. fragm.

St. 3958 11.I.30
23°11′ S. 42°54′ E.
S 200 500 m. w. fragm.

St. 3959 12.I.30
23°40′ S. 43°02′ E.
S 200 200 m. w. **1**
S 200 300 m. w. fragm.

St. 3964 15.I.30
25°19′ S. 36°13′ E.
S 200 600 m. w. **1**

St. 3966 18.I.30
29°25′ S. 32°00′ E.
S 150 100 m. w. c. **25**
S 150 200 m. w. num.
S 200 300 m. w. fragm.

"Pacific"

St. 4761 19.IV.32
25°10′ N. 127°45′ E.
S 150 fragm.

"Panama"

St. 4768 22.IV.33
19°20′ N. 119°48′ E.
S 200 293 m. w. fragm.

"Fernmoor"

St. 4771 28.II.33
37°05′ N. 160°08′ E.
S 150 91–110 m. w. fragm.

"Falstria"

St. 4779 19.IV.33
30°44′ N. 145°55′ E.
S 200 183 m. w. c. **40**

"Selandia" 28.V.33
31°40′ N. 135°30′ E.
S 200 220 m. w. fragm.

"Falstria"

St. 4797 18.I.34
30°43′ N. 136°28′ E.
S 200 201 m. w. fragm.

"Falstria"

St. 4812 24.VIII.34
29°57′ N. 170°50′ W.
S 200 183 m. w. **1**

"Galathea"

St. 176 21.I.51
off south coast of Africa
35°12′ S. 27°35′ E.
dip-net, surface **1**

St. 282 11.IV.51
west of Ceylon
5°32′ N. 78°41′ E.
HOT 6800 m. w. **1**

Solmissus marshalli is widely distributed in the Atlantic Ocean, mainly in the eastern parts, from South Africa to the Bay of Biscay. This species too has an extensive distribution in the Pacific and Indian Oceans, and most of the numerous localities listed above are within areas, from which the medusa was known before. It was known from several localities in the eastern tropical Pacific, and the "Dana" found it somewhat farther west, at some distance east of the Marquesas Islands (St. 3563). It was recorded from East Australia and Tasmania, but not from the waters around New Zealand, where the "Dana" found it at several stations (St. 3613–3642, and St. 3653 and 3665, which are between New Zealand and Australia). It was known from the Philippines, the South China Sea and southern Japan, and in these waters it was also found by the "Dana" (St. 3685–3737) and by two merchant vessels (St. 4761 and 4768). On the other hand, it was not previously known in the area, where it was collected by some of the merchant vessels, from southern Japan eastwards to the central North Pacific (St. 4771, 4779, 4789, 4797, 4812). The "Dana" found it west of Sumatra and during the voyage from Ceylon to Madagascar (St. 3821–3934) and in the Mozambique Channel (St. 3951–3964). St. 3966 is off Durban; this was the only station at which the medusa was found in considerable numbers. It was previously known off the African coast from South Africa to the Gulf of Aden. The "Galathea" found it near the south coast of Africa (St. 176) and west of Ceylon (St. 282).

The vertical distribution of this medusa is very extensive. Most of the specimens collected by the "Dana" were taken in hauls with 300, 600 and 1000 metres of wire out; a few were taken in still deeper hauls, with 2000–6000 m wire out, and many were collected in the upper water layers, in some cases even near the surface; the numerous specimens found at St. 3966 off Durban were taken in hauls with 100 and 200 m wire out. The two specimens found by the "Galathea" denote the extremes: at St. 176 south of Africa a specimen was taken in the dip-net immediately at the surface, while the length of wire in the haul, in which a specimen was taken at St. 282 west of Ceylon, was 6800 metres. Previous experience has shown that the medusa has a similar extensive vertical distribution in the Atlantic Ocean.

The specimen taken at the surface at "Galathea" St. 176 is 35 mm wide and has 15 tentacles and marginal lappets; the specimen from the deep haul at St. 282 is 50 wide with 16 tentacles and marginal lappets. These specimens are rather well preserved and are completely like BIGELOW's figure (1909 Pl. 16 fig. 5). One of the specimens from "Dana" St. 3622 is about 30 mm wide and has 15 tentacles and marginal lappets; it was taken at the surface.

Distribution: Widely distributed in the great oceans, in warm and temperate waters; almost equally common at all depths, from the surface into the abyssal region.

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