HYDROMEDUSAE IN THE INDIAN MUSEUM

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INTRODUCTION

The collection of Hydromedusae dealt with in the present paper belongs to the Zoological Survey of India, Calcutta. I am greatly indebted to Dr. H. S. Rao, who begged me to work up this most interesting collection. For various reasons the final treatment has been considerably delayed, but I trust that my increasing knowledge of the medusae belonging to areas outside European waters has secured more reliable results of my investigations of the Indian collection. At least, my original notes which were made shortly after I had received the collection, have been altered to some degree during the final treatment.

Most of the specimens are preserved in alcohol; they are generally in a fairly good condition and give occasion to interesting remarks on their morphology. From a zoogeographical point of view the collection is of very considerable interest. It is mainly derived from the coastal waters around the Bay of Bengal: the east coast of India from Vizagapatam northwards to the Ganges estuary, the west coast of Burma, the Mergui Archipelago, and the Nicobar Islands. Some few samples were taken in scattered localities off other parts of the Indian coasts. Of special interest are some species taken in brackish or fresh-water, partly in the Ganges estuary, partly in the Vizagapatam Channel. Two of them, *Blackfordia virginica* and *Ostroumovia inkermanica*, are inhabitants of brackish-water swamps on the coasts of the Black Sea; *Moerisia gangetica*, which is described as a new specis, is closely related to, if not identical with, *M. lyonsi* in lake Qurun in Egypt. A tabular survey of the occurrence of the species is given at the end of the paper.

For each species are given: the most important references to previous literature[1]; previous records from Indian waters; localities where the species were taken; morphological and systematical remarks, when desired; geographical distribution. The majority of the samples were collected by the Marine Survey of India; in the list of occurrence these localities are provided with a station number.

The collection contains 37 species of Hydromedusae, viz.: 5 Anthomedusae, 19 Leptomedusae, 5 Limnomedusae, 5 Trachymedusae, and 3 Narcomedusae. Two new species are described: *Octophialucium indicum* and *Moerisia gangetica*. The types are in the Zoological Survey of India, Calcutta.

[1]For details of references cited in the synonymy the bibliography appended at the end of the paper may be consulted.

The collection of Scyphomedusae from the same investigations was orked up by H. S. Rao[1]. Some few specimens of Scyphomedusae were, however, found among the Hydromedusae sent to me; they will be briefly mentioned in some additional remarks.

Previous records of Hydromedusae from restricted parts of the Indian coasts are given by: Bigelow[2] (Maldive Islands), Browne[3] (Maldive and Laccadive Islands), Browne[4] (Ceylon), Annandale[5] (Ganges estuary), Browne[6] (Kathiawar), M. G. K. Menon[7] (Madras), Lele & Gae[8] (Bombay), M. A. S. Menon[9], and Nair[10] (Trivandrum Coast), and Bal & Pradhan[11] (Bombay).

ANTHOMEDUSAE

Euphysora bigelowi Maas

1905. *Euphysora bigelowi*, Maas, p. 7, pl. I, figs. 1-3.
1910. *Steenstrupia bigelowi*, Mayer, p. 36, fig. 9.
1928. *Euphysora bigelowi*, Kramp, p. 35, figs. 8-12.
1951. *Euphysora bigelowi*, Nair, p. 50.
1952. *Steenstrupia bigelowi*, Bal & Pradhan, p. 76.

Marine Survey. Stat. 614. Octavia Bay, Nancowry Harbour, the Nicobars. 2-5. V 1922. Surface. 1 specimen.

The specimen is 3 mm in height, 2 mm in diameter. It has no apical canal. The principal tentacle has 14 lateral nematocyst knobs and a well-marked terminal knob. The tentacle opposite the principal tentacle is much smaller than the two lateral ones, which are of equal size.

Distribution.—Widely distributed in the tropical parts of the Indian Ocean and the western parts of the Pacific Ocean; recently recorded from Chile on the west coast of South America (Kramp, 1952). Previous records from India: Trivandum Coast (Nair, 1951); Bombay (Bal & Pradhan, 1952).

Cytaeis tetrastyla Eschscholtz

Stat. 632. Off Muz, Car Nicobars. 23. II. 1922. Surface. 6 specimens.

The specimens are 3-5 mm in height. None of them carry medusa buds.

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[1]Rao, H. S., *Rec. Indian Mus.* XXXIII, pt. 1, pp. 25-62 (1931).

[2]Bigelow, H. B., *Bull. Mus. comp. Zool. Harv.* XXXIX, No. 9, pp. 245-269 (1904).

[3]Browne, E. T., *Fauna and Geography of the Maldive and Laccadive Archipelago* II, pt. iii, pp. 951-971 (1906).

[4]Browne, E. T., *Rep. Pearl Oyster Fisheries, Ceylon* XXVII, pp. 131-156 (1905).

[5]Annandale, N., *Proc. Asiat. Soc. Beng. N. S.* III, No. 2 pp. 79-81 (1907).

[6]Browne, E. T., *Rep. to the Govt. of Baroda on the Marine Zool. of Okhamandal in Kothiawar*, part ii, pp. 151-153 (1916).

[7]Menon, M. G. K., *Bull. Madras Govt. Mus. N. S.* III, No. ii, pp. 1-32 (1932).

[8]Lele, S. H. and Gae, P. B., *J. Univ. Bombay.* III, 5, pp. 90-101 (1935).

[9]Menon, M. A. S., *Proc. Indian Acad. Sci.* XXII B, 2, pp. 31-62 (1945).

[10]Nair, K. K., *Bull. Central Research Institute, Univ. Travancore, Ser. C. Nat. Sci.* II, No. i, pp. 47-75 (1951).

[11]Bal, D. V. and Pradhan, L. B., *J. Univ. Bombay. N. S.* XX, B5, p. 76 (1952).

Distribution.—Widely distributed in the tropical parts of all the oceans.—Recorded from the Trivandrum Coast by Nair (1951, p. 53).

Bougainvillia fulva Agassiz & Mayer

1899. *Bougainvillea fulva*, Agassiz & Mayer, p. 162, pl. 2, fig. 6.
1905. *Bougainvillea fulva*, Maas, p. 10, pl. 1, fig. 8 ; pl. 2, figs. 9, 10.
1910. *Bougainvillia fulva*, Mayer, p. 160.
1928. *Bougainvillia fulva*, Kramp, p. 47, figs. 21-23.
1951. *Bougainvillea fulva*, Nair, p. 54.

Stat. 461. 10°15′N. 90°15′E. 19.IV.1912. Midwater trawl. 1 specimen.

Stat. 563. 11°58′15″N. 98°21′10″E. 10-11.XI.1913. Surface. 2 specimens.

Stat. 602. 11°27′40″N. 98°36′15″E. 17-18.III.1914. 2 specimens.

Stat. 604. 11°17′20″N. 98°29′40″E. 28-30.III.1914. 1 specimen.

Stat. 606. 11°24′10″N. 98°27′50″E. 31.III.—1.IV.1914. Surface. 2 specimens.

Off Puri, Orissa Coast. 24-29.III.1916. 4-4½ fms. 18 specimens.

Stns. 563, 602, 604 and 606 are in the Mergui Archipelago. Stat. 461 is in the Sea of Bengal west of the Andaman Islands ; the specimen from this locality is infested with larvae of Narcomedusae.

Distribution.—This is a common medusa in the coastal waters of the Indian Ocean and in the western Pacific from N. E. Australia to Japan.—It is recorded from Madras (Menon, 1932) and the Trivandrum Coast (Nair, 1951).

Merga violacea (Agassiz & Mayer)

1899. *Pandea violacea*, Agassiz & Mayer, p. 160.
1910. *Pandea violacea*, Mayer, pp. 119, 490, pl. 11, fig. 7; pl. 12, fig. 1.
1913. *Merga violacea*, Hartlaub, p. 249, fig. 204.
1913. *Mergintha lobianci*, Hartlaub, p. 250, fig. 205.
1932. *Merga violacea*, Menon, p. 7, pl. 1, fig. 10.
1951. *Merga violacea*, Nair, p. 51.
1953. *Merga violacea*, Kramp, p. 265.

Stat. 614. Octavia Bay, Nancowry Harbour, Nicobars. 2-5.II.1922. Surface. 6 specimens.

The specimens are 3-4 mm in diameter ; all of them have 8 tentacles, and between two successive tentacles there are sometimes 2, but usually 3 rudimentary marginal bulbs, with ocelli.

Distribution.—Mediterranean ; Tortugas (Florida) and the Bahamas in the Atlantic ; west coast of Mexico, Fiji Islands, and N. E. Australia in the Pacific.—India : Madras (Menon, 1932), Trivandrum Coast (Nair, 1951).

Leuckartiara hoepplii Hsu

1919. *Leuckartiara octona*, Bigelow, p. 282, pl. 29, figs. 5, 6.

1928. *Leuckartiara hoepplii*, Hsu, p. 7, figs. 1-4.

1937. *Leuckartiara octona* var. *minor*, Ling, p. 353, fig. 2.

1938. *Cirrhitiara hoepplii*, Uchida, p. 144.

Stat. 632. Off Muz. Car Nicobar. 23.XII.1922. Surface. 2 specimens.

The present specimens are smaller and have fewer tentacles than the Chinese specimens described by Hsi-Fan Hsu (1928), but in all structural details they agree perfectly with the types. They are only 5 mm wide and 6-7 mm high, and the gelatinous apical projection is small and pointed, not globular as in the original specimens. The gonads have about 5 folds on either side ; the mouth rim is very complexly folded. The edges of the free portions of the radial canals are faintly serrated. There are four perradial tentacles with very large basal bulbs, laterally compressed and provided with a strongly developed, hook-like abaxial spur. The tentacles have numerous deep transversal folds and pits on their adaxial side. Four interradial marginal bulbs have a similar abaxial spur as the fully developed tentacles, but they are much smaller, and tentacles are not yet developed on these bulbs. Moreover, there are eight very small adradial rudimentary bulbs with a pointed tip and each with a distinct abaxial ocellus, whereas the four interradial bulbs and the basal bulbs of the four perradial tentacles have no ocelli but only some scattered pigment granules.

The original specimens, described by Hsu, were larger, 7-8 mm wide and 14-15 mm high, and had eight tentacles and 16-24 rudimentary bulbs, these latter with ocelli. The author emphasizes the large tentacle bulbs, "so that the tentacles appear to arise from the side of the bell partly above the bell-margin", and also that in the proximal part of the tentacles one side is "not smooth but wavy"

L. hoepplii may sometimes have been confused with the well-known and widely distributed *L. octona* but in *L. octona* the abaxial, spur-like processus of the tentacle bulbs is considerably less pronounced, and the rudimentary marginal bulbs are club-shaped. The tentacles of *L. octona* have no adaxial folds and pits. Moreover, *L. hoepplii* is characterized by the small number of gonadial folds and the extraordinarily complex folding of the mouth-rim. I consider the two species will separated from each other, and I have not the slightest doubt that the specimens from the Nicobars are younger stages of the Chinese species described by Hsu. It is also recorded from Japan (Uchida, 1938), and it seems probable that the medusa from the Chekiang Coast, China, described by Ling (1937) as *Leuckartiara octona* var. *minor* belongs to this species. Moreover, the specimens from the Philippine Islands described by Bigelow (1919) as *L. octona* undoubtedly belong to *L. hoepplii*. On the other hand, the specimens from Madras (Menon, 1932, p. 9, pl. 1, fig. 5) and the Trivandrum Coast (Nair, 1951, p. 52) were probably correctly identified as *L. octona*.

Distribution.—Amakusa, Japan (Uchida) ; Che-Kiang Coast, China (Ling) ; Amoy, China (Hsu the Philippines (Bigelow) ; the Nicobars.

LEPTOMEDUSAE

Laodicea indica Browne

1905. *Laodice indica*, Browne, p. 136, pl. 1, fig. 5; pl. 4, figs. 7-11.

1951. *Laodicea undulata* var. *indica*, Nair, p. 59.

1953. *Laodicea indica*, Kramp, p. 268.

Stat. 614. Octavia Bay, Nancowry Harbour, Nicobars. Febr. 1922. Surface. 1 specimen.

The specimen is small, measuring 2·2 mm in diameter in its present condition with the umbrella margin turned inwards. It has about 56 tentacles, spirally coiled, and there is an adaxial ocellus on about every third of the tentacle bulbs. The cordyli are lost, but some few marginal cirri are retained. The gonads are well developed, Male.

The affinities of this and related species have been discussed earlier (Kramp, 1953).

Distribution.—Ceylon (Browne, 1905), Trivandrum Coast, India (Nair, 1951), Torres Strait (Mayer, 1915 as *L. fijiana*), N. E. Australia (Kramp, 1953). Probably also: Gulf of Aden (Vanhöffen, 1911), and in several localities in the Malayan Archipelago (Maas, 1905 and 1906).

Tiaropsidium roseum (Maas)

1905. *Tiaropsis rosea*, Maas, p. 30, pl. 7, figs. 45-47.

1916. *Tiaropsis rosea*, Browne, p. 186.

1932. *Tiaropsidium roseum*, Kramp, p. 368, text-figs. 2, 50.

Stat. 632. Off Muz. Car Nicobar. 23.XII.1922. Surface. 7 specimens.

The specimens are 5-8 mm in diameter and up to 7 mm. in height. They all have four perradial tentacles, and the number of rudimentary marginal bulbs is constantly 7 in each quadrant without regard to the size of the specimens; this is in accordance with previous statements (see Kramp 1932). The gonads are shorter in the small than in the large specimens, their proximal ends placed at a very short distance from the corners of the stomach.

Distribution.—Observed on few occasions only: Damar in the Malayan Archipelago (Maas); Mauritius in the western part of the Indian Ocean (Browne); now also taken at the Nicobars.

Blackfordia virginica Mayer

1910. *Blackfordia virginica*, Mayer, p. 277, pl. 36, figs. 3-5; pl. 37, fi ç .6.

1935. *Blackfordia virginica*, Valkanov, pp. 278, 289, pl. 5-6, figs. 14-16 (the medusa); pl. 6-8, figs. 17-27 (the hydroid).

1935. *Blackfordia virginica*, Thiel, p. 169, figs. 1-2

1910. ? *Blackfordia manhattensis*, Mayer, p. 277, pl. 36, fig. 2.

Stat. 2. Salt Lake, near Calcutta. 8.V.1926. 9 specimens.

It was a great surprise to find this species in the Ganges estuary It was first described by Mayer from Hampton Roads and Norfolk

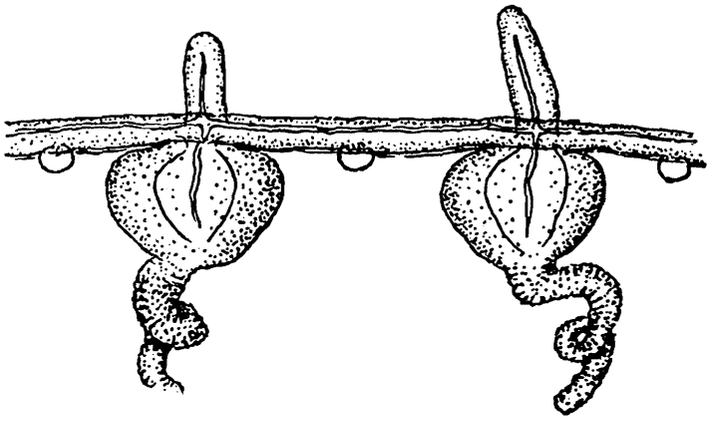
Harbour in Chesapeake Bay, Virginia, on the east coast of North America. Several large rivers are emptied through Chesapeake Bay; presumably, therefore, the medusae were taken in brackish water. Later on Valkanov (1935) found the same species in great abundance in the brackish water of the Mandra swamps on the Bulgarian coast of the Black Sea in water of 3-7 per mille salinity. Valkanov also described the corresponding hydroid, which he referred with some doubt to the hydroid genus *Campanulina* (*C. pontica*); its hydranths are provided with a web between the bases of the tentacles. Thiel (1935) examined some of the same specimens of the medusa and came to the conclusion that the occurrence of this species in an American harbour was probably due to transportation with ships from the Black Sea area, where presumably it is indigenous. This explanation seems to me very reliable, and the appearance of the medusa in the Ganges estuary, near Calcutta with its lively traffic, may presumably be explained in the same way.

I have been able to compare the specimens from the Ganges estuary with specimens from Norfolk Harbour, kindly sent to me by professor H. B. Bigelow, and professor A. Valkanov was likewise kind enough to send me several specimens from Bulgaria; there is not the slightest doubt that the specimens from the three widely separated areas all belong to the same species.

The specimens from Calcutta were sorted out from a sample containing several hundred specimens of another medusa, *Eirene menoni* (see below). Nine specimens of *Blackfordia* were found; they have the following dimensions:

Diameter of umbrella in, mm.	4	6	7	8	8	9	9	10	11
Number of tentacles . .	72	72	84	84	92	84	88	84	92

I may confirm the statement by Mayer that the peculiar finger-shaped diverticula from the tentacle bulbs into the gelatinous substance of the umbrella are purely endodermal. They are present at



TEXT-FIG. 1.—*Blackfordia virginica*. Part of umbrella margin.

the base of all the tentacles (text-fig. 1), but their shape is somewhat variable sometimes long and slender, sometimes broadly oval. There is almost always one marginal vesicle between each successive pair

of tentacles, very rarely two. There is no trace of black pigment granules adjacent to the statocysts. The gonads surround the radial canals completely and are not divided by a median line on their subumbrellar side.

In the Bulgarian specimens the endodermal diverticula from the tentacle bulbs are very variable in length and width, sometimes hardly visible; in the two American specimens, which I have seen, they are comparatively short. In the American as well as in the Bulgarian specimens the marginal vesicles alternate regularly with the tentacles, just as in the specimens from Calcutta.

Mayer described another and very similar species, *Blackfordia manhattensis,* which was taken in some localities on the coast of New Jersey. According to the description it differs from *B. virginica* by a greater number of marginal vesicles, of which there are usually two and sometimes three between each successive pair of tentacles. Mayer himself, however, emphasizes that *B. virginica* is distinguished from *B. manhattensis* by the presence of " dense-black entodermal pigment-granules adjacent to the lithocysts " in *B. virginica.* As a matter of fact, no trace of such pigment granules are seen in any of the specimens examined by me, neither in the Indian, nor in the Bulgarian or the American specimens. All these must be referred to *B. virginica,* because the number of marginal vesicles is equal to the number of tentacles; but future examination may possibly show that the two species are identical.

Distribution.—Indigenous in the brackish water swamps of the Bulgarian coast of the Black Sea; occurrence in estuaries on the east coast of North America and in the Ganges estuary presumably due to transportation with ships.

Phialucium mbenga (Agassiz and Mayer)

1899. *Mitrocoma mbenga,* Agassiz and Mayer, p. 168, pl. 8, figs. 24, 25.

1905. *Phialucium virens,* Maas, p, 32, pl. 6, figs. 36, 37.

1910. *Phialucium mbenga,* Mayer, p. 276.

1911. *Phialucium mbenga,* Vanhöffen, p. 225, pl. 22, fig. 12, text-fig. 16.

1953. *Phialucium mbenga,* Kramp, p. 275, text-fig. 1.

Stat. 614. Octavia Bay, Nancowry Harbour, the Nicobars 2-5.II.1922. Surface. 1 specimen.

Stat. 632. Off Muz, Car Nicobar. 23.XII.1922. Surface. 1 specimen.

The specimen from Stat. 614 is abnormal; it is 7 mm in diameter, the mouth is bilateral, and there are only two gonads; it has 14 tentacles and 3-6 rudimentary bulbs between successive pairs of tentacles.

The specimens from Stat. 632 all have four radial canals; one of them is only 3·5 mm. in diameter with 11 tentacles and 4-6 rudimentary bulbs between successive tentacles. The other specimens from this station vary in size from 4 to 10 mm. in diameter with 14-16 tentacles and 4-9 rudimentary bulbs between the tentacles.

The specimens recorded from the Trivandrum Coast by Nair (1951, p. 62) as *P. mbenga* probably belong to *P. carolinae*.

Phialucium mbenga differs from *P. carolinae* not merely in numerical characters, but also in the structure of the rudimentary marginal bulbs (see Kramp, 1953).

Distribution.—Fiji Islands; Malayan Archipelago; Sumatra; N. E. Australia. The records from Java Sea and Singapore (Stiasny, 1928, p. 208) are uncertain.

Phialucium carolinae (Mayer)

1900. *Oceania carolinae*, Mayer, p. 7, pl. 3, fig. 9; pl. 4, figs. 10, 11.
1905. *Octocanna polynema*, Browne, p. 144, pl. 2, figs. 8, 9, 10.
1905. *Octocanna polynema*, Maas, p. 38.
1910. *Phialucium carolinae*, Mayer, p. 275, pl. 36, fig. 1.
1911. *Phialidium heptactis*, Vanhöffen, p. 225, pl. 22, fig. 11, text-fig. 15.
1912. *Phialidium phosphoricum* forma *polynema*, Vanhöffen, p. 19.
1919. *Phialucium mbenga* var. *polynema*, Bigelow, p. 296, pl. 41, fig. 8.
1932. *Octocanna polynema*, Menon, p. 23, pl. 3, fig. 25.
1947. *Phialucium carolinae*, Uchida, p. 307.
1951. *Phialucium mbenga*, Nair, p. 62.
1952. ? *Phialucium virens*, Bal and Pradhan, p. 76.
1953. *Phialucium carolinae*, Kramp, p. 276, text-figs. 2, 3.

The complicated history of the genus *Phialucium* has recently been discussed by me (Kramp, 1953, pp. 273 ff). I found that the specimens recorded from various localities as *Phialucium virens* belong partly to *P. mbenga*, partly to *P. carolinae*. The small marginal bulbs in *P. carolinae* are not permanently rudimentary, as they are in *P. mbenga*, and in *P. carolinae* the number of radial canals is highly variable; there are usually 4, but very frequently 6, 7 or 8 canals, which have caused much confusion and induced some authors to refer their specimens to "*Octocanna*" or to describe them as new species or varieties.

The present collection contains only one specimen of this species.

Stat. 614. Octavia Bay, Nancowry Harbour, the Nicobars. February 1922. Surface. 1 specimen.

It is in a rather poor condition; the radial canals are indistinct, apparently five in number. There are about 17 fully developed tentacles.

Distribution.—Originally described from the east coast of North America: Charleston Harbour and Florida; recorded under different names from several localities in the tropical parts of the south-western Pacific: Philippine Islands; Malayan Archipelago. In Indian waters it is recorded from Madras (Menon, 1932), Ceylon (Browne, 1905), Trivandrum Coast (Nair, 1951) and probably from Bombay (Bal and Pradhan, 1952).

Octophialucium indicum, sp. nov.

1932. *Octocanna polynema*, Menon, p. 23, pl. 3, fig. 25.

1951. ? *Octocanna polynema*, Nair, p. 63.

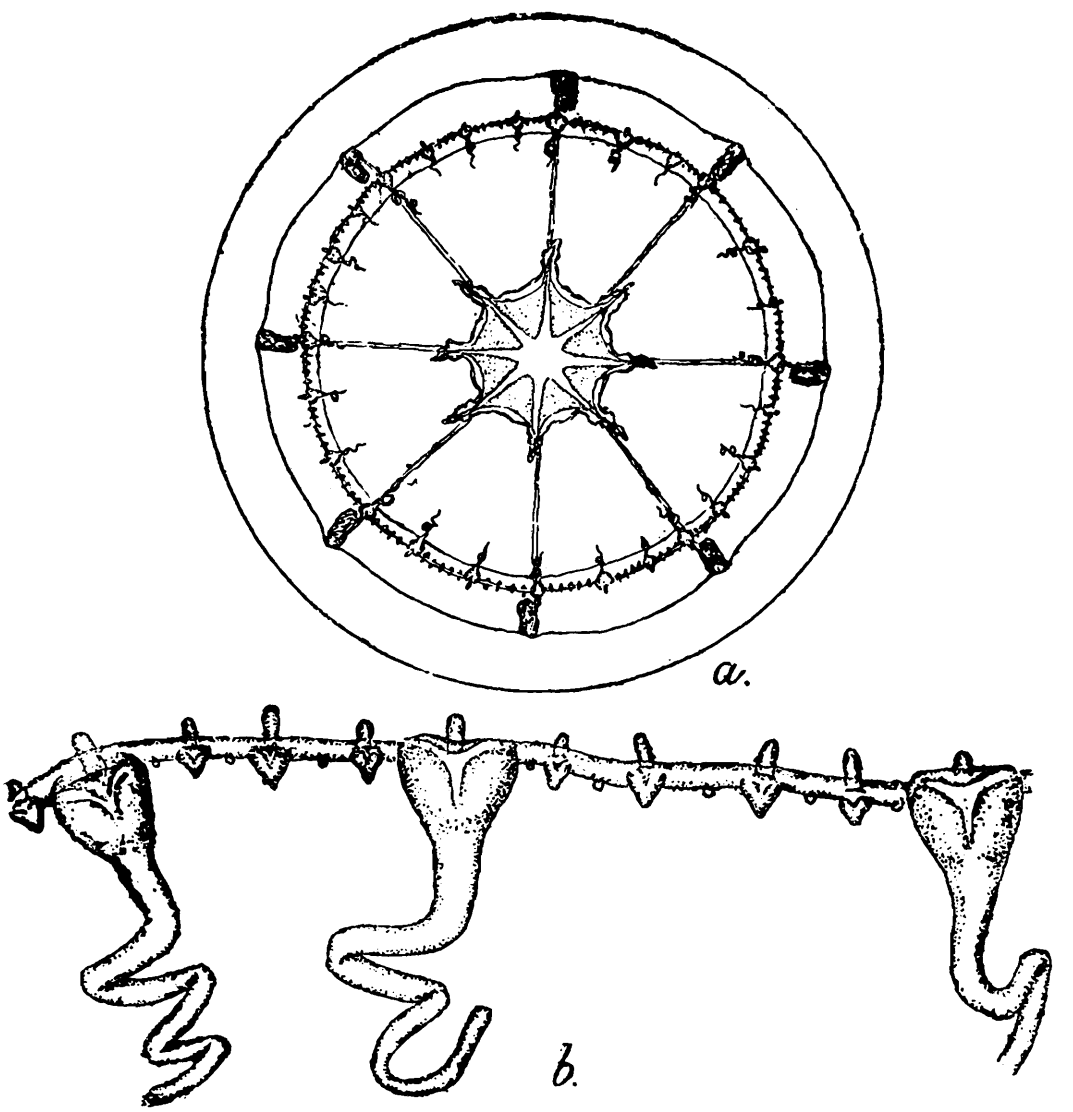
Stat. 524. 12° 29¾″N., 98° 12′E. Mergui Archipelago. 13.III.1913. Surface. 1 specimen.

Stat. 563. 11° 58′ 15″N., 98° 21′ 10″E. Mergui Archipelago. 10-11.III.1913. Surface. 2 specimens.

Stat. 691. Akyab Harbour, Burma. 7.XI.1925. Surface. 150 specimens.

One of the specimens from Stat. 691 is chosen as the *type*.

(Text-figs. 2*a*, *b*). Diameter up to 13 mm. Umbrella disk-like, gelatinous substance very thick, frequently lenticular. The base of the stomach is about 1/6 of the diameter of the umbrella. The stomach is short, the mouth provided with 8 pointed lips with crenulated margin. The number of radial canals is usually 8; they are continued inwards from the periphery of the stomach, usually almost to the centre. The canals are narrow, the gonads very short, never more than 1/5 as long as the radial canals, situated very near the umbrella



TEXT-FIG. 2.—*Octophialucium indicum*, sp. nov.
a. Oral view ; *b*. Part of umbrella margin, abaxial view.

margin. Ring-canal narrow. 19-28 tentacles, most frequently about 24 ; the tentacles are fairly short, spirally coiled and slightly flattened. Tentacle bulbs broadly conical, each with a well-developed adaxial excretory papilla which is fairly long and narrow ; no abaxial spur-like processus. Between two successive tentacles there are 3-5, most frequently 4 rudimentary marginal bulbs, all of about equal size, triangular, all with an excretory papilla of about the same length and shape as in the tentacle bulbs. There is on small marginal vesicle between each successive pair of marginal bulbs, whether those carry a tentacle or not. Velum narrow.

The majority of the specimens have 8 radial canals, but some few have more or less, varying from 6 to 11. The canals are usually regularly arranged, almost equidistant ; irregularities and abnormalities are rare. In 150 specimens I have counted the radial canals and tentacles as follows :

Number of radial canals	6	7	8	9	10	11
Number of specimens	1	10	135	2	1	1
Average number of tentacles	20	20	22	21	24	?

There is no distinct correlation between the numbers of radial canals and tentacles.

Comparison with other species

The genus *Octophialucium* was recently erected by me (Kramp, 1955). I found it necessary to regard the genus *Octocanna* Haeckel and the two species originally referred to it, *polynema* and *octonema*, as obsolete and introduce a new generic name, *Octophialucium*, for the various medusae with (normally) eight simple radial canals and eight mouth lips, and with closed marginal vesicles. Most of these medusae were previously referred to *Octocanna*, some of them to the species *O. polynema* Haeckel, others were described as separate species.

I shall briefly recapitulate the results of my revision of the species of *Octophialucium*, with addition of the new species described above.

Survey of the species of *Octophialucium*

Valid name, *Octophialucium*.	Previous name.	Diam. mm.	No. of tentacles.	Bulbs between tentacles.	Gonads in proportion to radial canals.	Distribution.
solida (Menon)	*Octocanna solida* Menon 1932.	10	4	c. 11	almost 1/1	Madras.
bigelowi Kramp	*Octocanna polynema* Bigelow 1909.	8	8	1—3	almost 1/1	Mexico. Pacific.
medium Kramp	..	17—22	16	c. 3	distal $\frac{2}{3}=\frac{2}{4}$	West Africa.
indicum Kramp	..	10—13	c. 24	c. 4	distal $\frac{1}{3}=\frac{1}{3}$	Bay of Bengal.
aphrodite (Bigelow)	*Octocanna aphrodite* Bigelow 1919.	20—25	80—100	2—3	distal $\frac{1}{3}$-$\frac{1}{2}$	Malayan Archipelago.
funerarium (Q.&G.)	*Octocanna funerarium* (Quoy and Gaimard).	36—40	64—128	0—1	distal $\frac{1}{4}$	N. E. Atlantic. Mediterranean.

Octophialucium indicum is distinguished from the first three of these species by its very short gonads and a larger number of tentacles. In *O. aphrodite* and *funerarium* the gonads are likewise short and situated lower near to the ring-canal, but their tentacles are much more numerous.

The medusae described by Menon (1932, p. 23) as *Octocanna polynema* Hckl. probably belong to *Octophialucium indicum*. They were found in great abundance near Madras ; they may grow to a somewhat larger size, 22 mm in diameter, and their gonads are slightly longer, $\frac{1}{3}$ as long as the radial canals ; the number of radial canals may be more or less than eight ; they have up to 30 tentacles (in the specimens examined by me as many as 28 were found), and the number of rudimentary bulbs between successive tentacles is 3-4. According to the text (p. 23) " both normal tentacle bulbs and the rudimentary ones have large excretion papillae ", though in the figure (Pl. III, fig. 25) no papillae are indicated on the rudimentary bulbs. The agreement between the two forms seems to me so complete that we must regard the specimens from Madras as full-grown individuals of the species which I have described above as *O. indicum*.

The three specimens from Ceylon described by Browne (1905, p. 144, Pl. II, figs. 8-10) as *Octocanna polynema* were up to 12 mm wide ; they had only 16 tentacles, and their gonads were more elongated than in *O. indicum*, situated along the distal half of the radial canals (in one specimen along the middle part of the canals). According to the description and figures this form agrees more with the West-African species *O. medium* than with *O. indicum*. I have seen one of Browne's original specimens in the British Museum in London, and it seems to me impossible to refer it to *O. indicum*. Until more material has been collected, the affinity of the Ceylonese form seems to me open to doubt.

I am also somewhat in doubt of the identification of the specimens recorded from the Trivandrum Coast in south-western India by Nair (1951, p. 63) and by him referred to *Octocanna polynema*. Detailed countings of radial canals (8-11), tentacles (7-24), rudimentary bulbs (32-106) and statocysts (54-200) are given for 6 specimens, 5-25 mm in diameter. One specimen is small (5 mm wide with 7 tentacles) ; the others are larger than those examined by me, being 14-25 mm wide, yet with a comparatively low number of tentacles :

Diam. in mm	14	15	16	18	25
Tentacles	10	24	17	14	19

The number of statocysts is considerably larger than the number of tentacles+bulbs, whereas in *O. indicum* there is nearly always only one statocyst in each space between the marginal bulbs. Unfortunately Nair gives no information of the length and situation of the gonads. It seems probable that the Trivandrum specimens belong to *O. indicum*, but I am not sure.

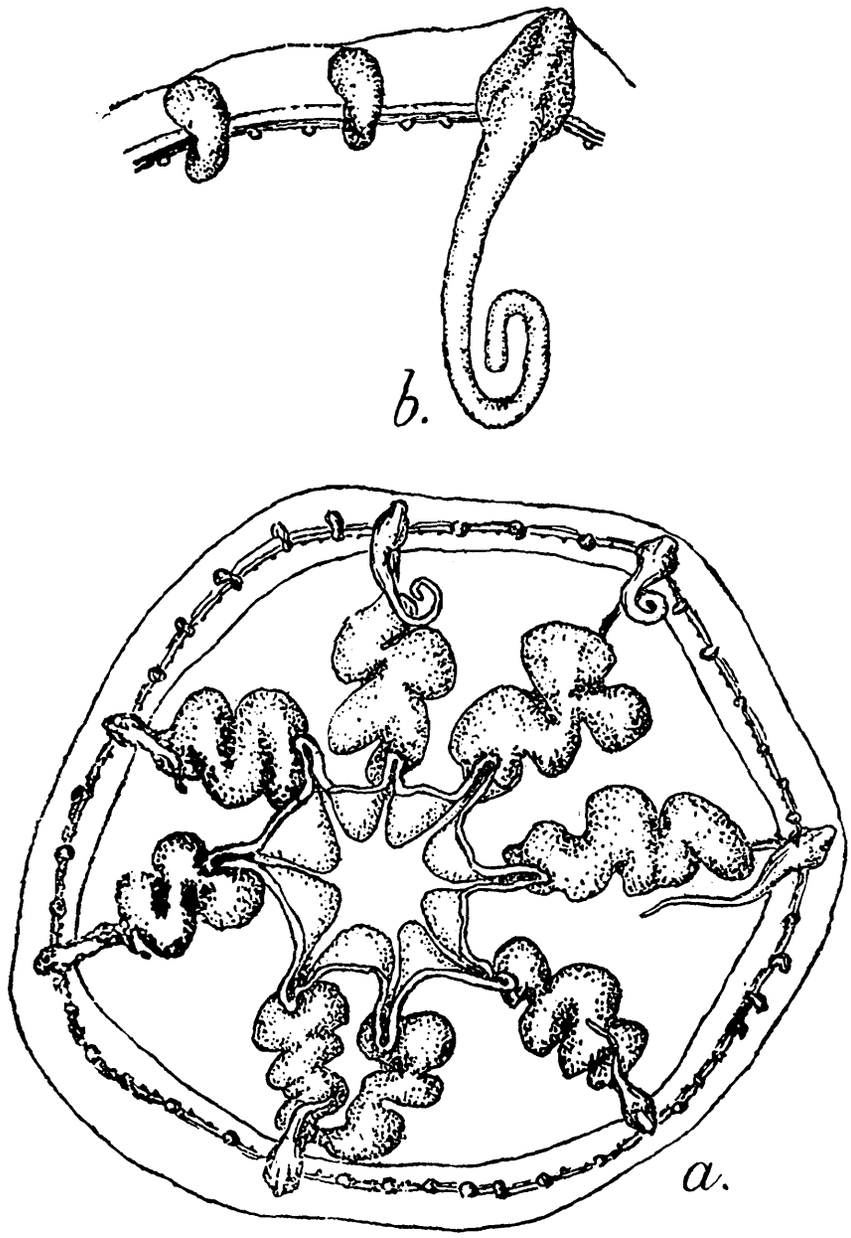
Distribution.—Abundant off the coasts of Burma and near Madras. ? Trivandrum in south-western India.

Octocannoides ocellata Menon

1932. *Octocannoides ocellata,* Menon, p. 21, pl. III, figs. 27, 28.

Stat. 604. 11° 17′ 20″N., 98° 29′ 40″E. Mergui Archipelago. 28-30 III.1914. 1 specimen.

The specimen (text-fig. 3*a*) is 6 mm in diameter, 3·5 mm in height ; the gelatinous substance is fairly thick,the umbrella margin somewhat inward turned. The stomach is short and broad, 2 mm in diameter, star-shaped, deeply incurvated in the eight interradii, mouth with 8 lips, fairly short, with faintly crenulated margins and a deep ventral groove. There are 8 narrow radial canals ; the 8 gonads are very



Text-fig. 3.—*Octocannoides ocellata* Menon.
a. Oral view. *b*. Part of umbrella margin.

thick, wavy, situated along the proximal half of the radial canals ; the gonads completely surround the radial canals. Ring.-canal narrow. The tentacles are 8 in number, opposite the radial canals ; they are spirally coiled, in extended condition hardly more than half as long as the radius of the umbrella. The tentacle bulbs are pear-shaped each with a well developed, broad, spur-like abaxial processus with

distinct median keel (Text-fig. 3*b*). Between successive tentacles are 3-6 (altogether 28) rudimentary bulbs each consisting of a small, adaxial knob and a large abaxial spur broadening outwards and grasping over the margin of the umbrella. Excretory papillae seem to be absent. In each space between marginal bulbs are 2 small marginal vesicles. Velum fairly narrow.

In all essential features this specimen agrees perfectly with the description and figures of *Octocannoides ocellata* as described by Menon (1932). However, no black pigment is found on the marginal bulbs, and the gonads are not divided into two halves as stated by Menon. Nevertheless the two forms are so much alike that I feel sure they belong to the same species.

Distribution.—Madras (Menon) ; Mergui Archipelago.

Eirene tenuis (Browne)

1904. *Phialidium tenue,* Browne, p. 730, pl. 54, fig. 4; pl. 57, fig. 16.

Stat. 614. Octavia Bay, Nancowry Harbour, Nicobars. 2-5.II.1922. 2 specimens.

The identity of "*Phialidium tenue*" Browne may now at last be determined ; the present specimens agree perfectly with the original description of this species, which has been much discussed.

The description of "*Phialidium tenue*" was based on one single specimen, 15 mm wide, from the Maldive Islands. It was distinguished from other species of *Phialidium* by the stomach being "situated on a semi-globular thickening of the umbrella", *i.e.*, it had a short, but distinct gastric peduncle. In his paper on medusae from Ceylon (Browne 1905, p. 143) the author himself regarded *P. tenue* as an abnormal specimen of *Irenopsis hexanemalis* with only four instead of six radial canals. In this supposition he was followed by Mayer (1910, p. 310), whereas Maas (1905, p. 32, 1906, p. 93 and 1909, p. 23) and Bigelow (1909, p. 158) were inclined to refer it to the genus *Phialucium* (*P. virens*). I have recently stated (Kramp, 1953, p. 275) that "*Phialidium tenue*" does not belong to *Phialucium*, but I expressed no definite opinion of its affinities.

The present specimens settle the question. The species, as described by Browne, must be retained, but referred to the genus *Eirene*. One of the specimens is 10 mm wide and 4 mm high, the gelatinous substance moderately thick. The gastric peduncle is short and broad, 4 mm at its base, sharply set off from the subumbrella. Stomach cruciform, mouth with four crenulated lips. The gonads are straight, 2·5 mm long, situated 1·5 mm from the base of the peduncle, 1 mm from the umbrella margin, female with ripe eggs. There are 32 tentacles, spirally coiled, sharply set off from the bulbs, which are somewhat broader than long and provided with a small adaxial papilla. Some of the tentacles are extended and almost as long as the radius of the umbrella. The distance between the tentacles is somewhat variable, in each space between the tentacles are 1-3 very small rudimentary bulbs ; when there are three, the middle one is somewhat larger

than the others; usually four small statocysts between successive tentacles. The other specimen is 8 mm wide. Its gastric peduncle is somewhat more slender than in the above specimen, being 2 mm long and 2 mm wide at its base. The gonads are male, situated as in the female specimen. 24 fully developed tentacles. Six of the young bulbs are fairly large, but still without a pointed tip.

These specimens are certainly not young ones, their gonads being well developed. They are quite distinct from small specimens of *Eirene hexanemalis*, also such with only four radial canals, of which I have seen several specimens. *Eirene tenuis* is a distinct species; it bears some resemblance to *E. palkensis* in which, however, the peduncle is longer and more slender, it has a larger number of tentacles, and the tentacle bulbs are narrower, more conical and with longer excretory papillae; moreover, its gonads are longer than in *E. tenuis*.

Distribution.—Ceylon (Browne); Nicobar Islands.

Eirene palkensis Browne

1905. *Irene palkensis*, Browne, p. 141, pl. 3, figs. 12-16.
1910. *Phortis palkensis*, Mayer, p. 309.
1936. *Eirene palkensis*, Kramp, p. 250 (all previous literature).
1953. *Eirene palkensis*, Kramp, p. 283.

Stat. 606. 11° 24′ 10″N., 98° 27′ 50″E. Mergui Archipelago. 30.I.1914. Surface. 2 specimens.

The two specimens are 4-11 mm in diameter. The gastric peduncle is short, transversally wrinkled, evidently strongly contracted. The tentacles are in different stages of development; in the middle of the space between two fully developed tentacles is one half-developed tentacle and between this and the adjacent tentacle usually a very small or quite rudimentary tentacle. The complete number therefore amounts to 35-40 in each quadrant, about the same number as in the type specimen described by Browne. The excretory papillae are very distinct.

Distribution.—Ceylon (Browne); according to Vanhöffen also found at the Nicobar Islands, near Amoy and Hong Kong, and at Port Natal in East Africa; North-East Australia (Kramp). Now also taken in the Mergui Archipelago.

Eirene ceylonensis Browne

1905. *Irene ceylonensis*, Browne, p. 140, pl. 3, figs. 9-11.
1910. *Phortis ceylonensis*, Mayer, p. 309.
1919. *Phortis ceylonensis*, Bigelow, p. 304.
1928. *Phortis ceylonensis*, Stiasny, p. 209.
1936. *Eirene ceylonensis*, Kramp, p. 249 (all previous literature).
1951. *Phortis ceylonensis* Bal and Pradhan, p. 76.
1951. *Eirene ceylonensis*, Nair, p. 64 (part).
1953. *Eirene ceylonensis*, Kramp, p. 285.

Stat. 563. 11°58'15"N. 98°21'10"E. Mergui Archipelago. 10-11.XI. 1913. Surface. 1 specimen.

Stat. 614. Octavia Bay, Nancowry Harbour, the Nicobars. 26-27. X.1921. 1 specimen.

Stat. 614. Same locality. February 1922. Surface. 20 specimens.

Stat. 632. Off Muz, Car Nicobar. 23.XII.1922. 1 specimen.

Stat. 691. Akyab harbour, Burma. 7.XI.1925. Surface. 16 specimens.

In a small creek at low water near ferry, Vizagapatam. May-June 1926. Rao and Varugis leg. 1 specimen.

The specimen from Stat. 563 is very small, 2 mm wide, with 32 tentacles. Another young specimen was taken at stat. 632 ; it is 3·5 mm wide, the peduncle is very small, there are 31 tentacles all alike and about 31 statocysts. The specimens from the other localities vary in size between 4 and 14 mm in diameter and are typical in every respect.

According to Nair (1951) *E. ceylonensis* is represented on the Trivandrum Coast by two distinct types of specimens. The "bigger type" undoubtedly belongs to *E. ceylonensis*, but the "smaller type", which Nair has compared with the specimens recorded by Menon (1932, p. 18) as *Phortis* sp. from Madras, should probably, like these latter, be referred to the species described by me (1953) as *Eirene menoni* (see below). The same probably applies to the specimens found in brackish-water ponds in the Ganges estuary and recorded as *Irene ceylonensis* by Annandale (1907).

Distribution.—Ceylon (Browne, 1905) ; Trivandrum Coast (Nair, 1951); Bombay (Bal & Pradhan, 1951) ; Java Sea (Stiasny, 1928) ; Philippine Islands (Bigelow, 1919) ; N. E. Australia (Kramp, 1953). Now also found in several localities in the eastern part of the Sea of Bengal and at Vizagapatam on the east coast of India.

Eirene menoni Kramp

1907*a*. *Irene ceylonensis*, Annandale, p. 79, pl. 2, fig. 5 ; 1907 *b*, pp. 36, 38 ; 1907*c* pp. 139,.142, fig. 4.

1932. *Phortis* sp., Menon, p. 18.

1937. *Phortis lactea*, Ling, p. 357, figs. 9-10.

1951. *Eirene ceylonensis*, "smaller type", Nair, p. 64.

1953. *Eirene menoni*, Kramp, p. 286, pl. 2, fig. 6.

Off Puri, Orissa Coast, 4-4½ fms. 70 specimens.

Shambazar Khal, Dakhnidari Canal, near Calcutta. 13.V.1926. Thousands of specimens.

In the collection of medusae from the Great Barrier Reef off north-eastern Australia (Kramp, 1953) I found a single specimen of a medusa which I described as a new species of *Eirene*. Since it agreed perfectly with the unnamed species, which was described by Menon (1932) as *Phortis* sp., I named it *E. menoni*. I also identified it with the species recorded from the Chekiang Coast, China by Ling (1937) and by him

referred to *Phortis lactea* Mayer, a species formerly described from Florida on the Atlantic coast of North America. The "smaller type" of *Eirene ceylonensis* found off the Trivandrum Coast (Nair 1951) undoubtedly also belongs to the same species. By further consideration it likewise seems to me most probable that the "*Irene ceylonensis*" Annandale (1907) must be referred to *Eirene menoni* ; it was found in great abundance in the same area (the Ganges estuary), from which the present collection contains an enormous number of specimens.

The Australian type specimen of *Eirene menoni* was characterized as follows : Umbrella 12 mm wide and 5 mm high, evenly rounded ; jelly fairly thin ; gastric peduncle slender, slightly widened at the base, its length somewhat less than the height of the umbrella cavity. Stomach short, mouth with four-pointed, frilled lips. Gonads linear, somewhat sinuous, from the base of the peduncle almost to the ring-canal. 46 tentacles with conical bulbs and two young marginal bulbs. No excretory papillae. The tentacles are all of nearly the same size, but the distance between them is variable ; 1-3 statocysts between successive tentacles, dependent on the distance between them.

This is one of those species of *Eirene* in which every newly developed tentacle quickly attains full size, so that in any stage of development of the medusa none or very few young bulbs are seen between the fully developed tentacles. The 70 specimens from the Orissa Coast are 4-10 mm wide, and almost all of them have about 48 tentacles. A representative sample of the numerous specimens from near Calcutta shows the following numbers of tentacles according to the size of the specimens :

Diam. mm .	1	2	3	4	5	6	7	8	9	10	11	12	13
Average number of tentacles	16		28	32	38	44	48	56	60	62	64	..	72

In this sample the number of tentacles was accordingly evenly increasing with age. In structural details the specimens are in perfect agreement with all the medusae which I have referred to *Eirene menoni*.

Distribution.—Southern part of the west coast of India ; Madras, Vizagapatam, and the Ganges estuary on the east coast ; Chekiang Coast in China ; north-eastern coast of Australia.

Eirene hexanemalis (Goette)

1886. *Irenopsis hexanemalis*, Goette, p. 832.

1905. *Irenopsis hexanemalis*, Browne, p. 142, pl. 1; fig. 4; pl. 3, figs. 5-8.

1911. *Irenopsis hexanemalis*; Vanhöffen, p. 229, text-fig. 19.

1932. *Irenopsis hexanemalis*, Menon, p. 19.

1936. *Eirene hexanemalis*, Kramp, p. 248 (all previous literature).

1951. *Eirene hexanemalis*, Nair, p. 63.

1953. *Eirene hexanemalis* Kramp, p. 281, fig. 5.

Stat. 524. 12°29¾'N. 98°12'E. Mergui Archipelago. 13.III.1913. Surface. 1 specimen.

Stat. 563. 11°58'15"N. 98°21'10"E. Mergui Archipelago. 10-11.XI. 1913. Surface. 1 specimen.

Stat. 606. 11°24'10"N. 98°27'50"E. Mergui Archipelago. 31.I.1914. Surface. 2 specimens.

Stat. 614. Octavia Bay, Nancowry Harbour, the Nicobars. 26-27. XI.1921. 18 specimens.

Stat. 614. Same locality. February 1922. Surface. 22 specimens.

The variation of this well-known species was dealt with by me (Kramp 1953). I found that among numerous specimens from north-eastern Australia 83 per cent had 6 radial canals, but the number varied from 4 to 8 ; newly liberated specimens have only four radial canals. In the present collection I found the following variation, independent of the size of the specimens which varied between 3 and 10 mm in diameter :

Number of radial canals	5	6	7
Number of specimens	5	31	3

Thus 79·5 per cent have six radial canals.

Distribution.—Widely distributed in the Indian Ocean from the east coast of Africa eastwards and in the tropical parts of the western Pacific. In Indian waters it is recorded from the Trivandrum Coast (Nair), Ceylon (Browne), Madras (Menon), and the Nicobar Islands (Vanhöffen). Now it has been found again at the Nicobars and also in the Mergui Archipelago.

Helgicirrha malayensis (Stiasny)

1928. *Eirene malayensis*, Stiasny, p. 210, fig. 1.
1932. *Eirene malayensis*, Menon, p. 20, pl. 3, fig. 23.
1932. *Eirene madrasensis*, Menon, p. 20, pl. 3, fig. 24.
1936. *Helgicirrha malayensis*, Kramp, pp. 255, 257.
1936. *Helgicirrha madrasensis*, Kramp, p. 256.
1951. *Helgicirrha malayensis*, Nair, p. 64.
1951. *Helgicirrha madrasensis*, Nair, p. 65.
1953. *Helgicirrha malayensis*, Kramp, p. 286.

Stat. 571. Jack Island, Mergui Archipelago. 29.XI—10.XII.1913. Numerous specimens.

Stat. 614. Octavia Bay, Nancowry Harbour, the Nicobars. February 1922. Surface. 2 specimens.

In my paper on the medusae of the Great Barrier Reef, Australia (Kramp, 1953) I expressed the opinion that *H. madrasensis* (Menon) was identical with *H. malayensis* (Stiasny). The present specimens confirm that supposition. Menon found a distinguishing feature in the presence of lateral cirri on young marginal bulbs as well as on the bulbs of fully developed tentacles in *madrasensis*, whereas in *malayensis* the rudimentary bulbs do not carry any cirri. The cirri are, however,

readily lost in preserved specimens ; in the present specimens only some few cirri are retained, but in some of the Australian specimens of *malayensis*, which were in a particularly good state of preservation, I found cirri also on the young bulbs. In *H. malayensis* the tentacle bulbs are provided with a short, but distinct abaxial "spur" grasping around the umbrella margin ; on a previous occasion (Kramp 1936, p. 257) I called attention to the probability that Menon, as well as Stiasny, had mistaken these abaxial processes for excretory papillae, which were said to be "prominent" in *malayensis* but absent in *madrasensis*. As a matter of fact the excretory papillae, which always are adaxial in position are small and inconspicuous in *H. malayensis*.

As far as the number of marginal organs are concerned the specimens from the Mergui Archipelago fall within the same limits of variation as the Australian specimens examined by me. It is characteristic of *H. malayensis* that the succession of development of the tentacles proceeds very irregularly, so that the relative numbers of fully developed and young tentacles and rudimentary bulbs are subject to considerable variation. I called attention to this fact in 1953 (p. 287), and the following countings of tentacles and bulbs in a number of specimens picked out at random from the great quantity taken at Stat. 571 likewise show a considerable variation in this respect :

Diam. mm.	Tentacles large	small	rudimentary	total number
11	62	48	18	128
12	36	56	24	116
12	36	64	24	124
12	72	44	20	136
13	36	32	16	84
13	60	68	0	128
13	66	52	40	158
14	36	52	42	120
14	32	54	40	126
14	60	52	24	136
15	32	40	28	100
15	36	36	32	104
16	60	40	28	128
16	56	40	48	144

Average number of tentacles+bulbs 124.

As a rule there is one statocyst in each space between the marginal tentacles and bulbs, but also in this respect irregularities are sometimes observed.

Distribution.—Java Sea (Stiasny) ; Trivandrum Coast (Nair) ; Madras (Menon) ; N.E. Australia (Kramp). Now also found in the Mergui Archipelago and at the Nicobars.

Eutima orientalis (Browne)

1905. *Octorchis orientalis*, Browne, p. 139, pl. 3, fig. 4.
1910. *Eutima orientalis*, Mayer, p. 299.
1912. *Eutima mira*, Vanhöffen, 1912 *b*, p. 23 (in part).
1932. *Eutima mira*, Menon, p. 18.
1951. *Eutima mira*, Nair, p. 63.

Stat. 614. Octavia Bay, Nancowry Harbour, the Nicobars. February 1922. Surface. 3 specimens.

Vizagapatam Channel. V-VI.1926. Rao and Varugis leg. 1 specimen.

The specimens are 8-9 mm in diameter, the gastric peduncle 7-14 mm long. The four gonads on the peduncle are well developed, extending almost throughout the length of the peduncle, exactly as in Browne's figure. The gonads of the subumbrella are thin and juvenal, but distinct, situated along the middle one-third of the subumbrellar parts of the radial canals. The four tentacle bulbs are slightly laterally compressed, but they do not grasp around the margin of the umbrella, as they do in *Eutima curva*. About 20 rudimentary bulbs in each quadrant. No adaxial papillae. The specimens agree perfectly with the description given by Browne, and since I have seen the original specimens in the British Museum I can state that the description is absolutely reliable.

Menon found this species near Madras, but he refers it to *Eutima mira* McCrady, because Vanhöffen "has shown that *E. orientalis* is not different from *E. mira*" Nair (1951) who found the species off the Trivandrum Coast likewise follows Vanhöffen and mentions his specimens as *E. mira*. Vanhöffen, however, has shown nothing of the kind. In his usual superficial way and regardless of structural differences he has united all the species of *Eutima* with four tentacles (10 species), besides *levuka* which has eight, into one species under the name of *E. mira* (Vanhöffen, 1912) ; it is correct in some few instances, but quite irrelevant in others. I will not deny that, according to the descriptions of *E. mira* available up to now, this East-American species is rather like *E. orientalis* in the Indian waters, but I do not take their identity for granted because Vanhöffen says so, and not until we know more about the structural details of *E. mira*. In the paper quoted above (1912) Vanhöffen records "*E. mira*" from two new localities ; the specimen from Ceylon presumably belongs to *E. orientalis*, whereas the identity of the two small specimens from Amoy is less certain.

Distribution.—Indian coasts : Trivandrum, Ceylon, Madras, Vizagapatam ; Nicobar Islands.

Eutima hartlaubi, nom. nov.

1909. *Octorchandra orientalis,* Hartlaub, p. 456, pl. 20, figs. 11-15.
1910. *Eutima campanulata.* (?), Mayer, p. 495.

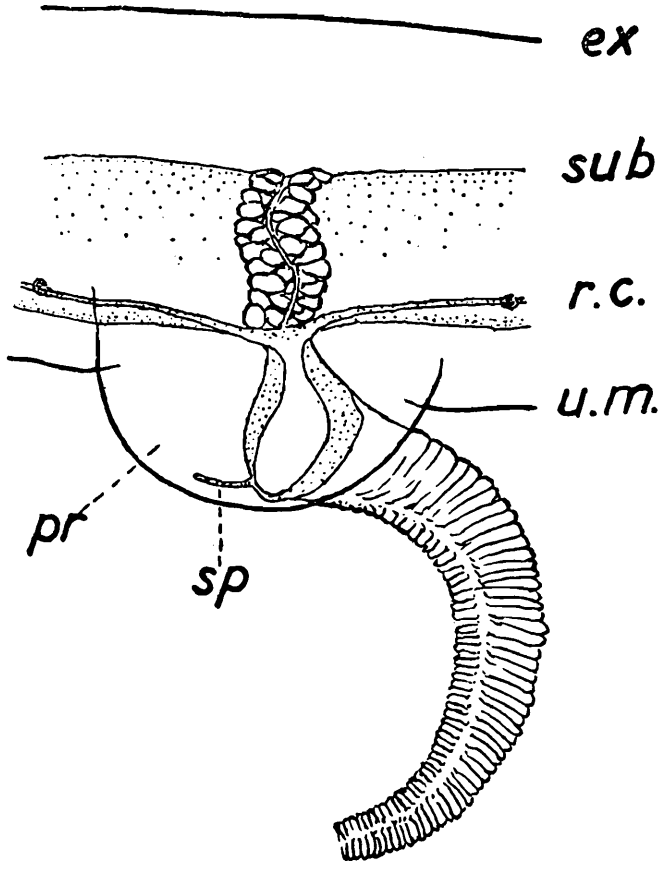
Stat. 614. Octavia Bay, Nancowry Harbour, the Nicobars. February 1922. Surface. 1 specimen.

This species undoubtedly belongs to *Eutima,* but since the specific name *orientalis* has been applied to another species of the same genus (Browne, 1905), the present form must be provided with a new name, and I propose to name it after Cl. Hartlaub, who gave the first description of it (1909).

The genus *Eutima* comprises several species ; not all of them are equally well defined, and a revision is desirable. It is not sufficient, however, to characterize the species merely by numerical features ; structural details must also be taken into consideration, and *E. hartlaubi* presents certain morphological structures which have not been observed in other species of the genus. It seems to me, therefore, that we must retain it as a distinct species, at least provisionally.

"*Octorchandra orientalis*" was well described and figured by Hartlaub after two specimens from Djibuti on the east coast of Africa, and it has not been observed again until now. The largest of the two specimens from Djibuti was about 15 mm in diameter, the peduncle about as long as the radius of the bell, tapering in thickness from the base towards the stomach, which is small, with four short lips. The four radial canals are somewhat dilatated towards the umbrella margin. There are four gonads on the subumbrella, situated along the radial canals almost from the base of the peduncle to the ring-canal, and four tiny, oval gonads in the middle part of the peduncle. There are 13 fully developed tentacles and 2 young ones ; the tentacles are strong, densely transversely wrinkled and, as emphasized by the author, without swollen basal bulbs. The marginal warts are few in number and very small, developed only on the exumbrellar side of the ring-canal (in contradistinction to *E. gegenbauri,* in which the warts are developed on both sides of the ring-canal). Cirri were not seen in the large specimen, but in the smaller one some few cirri were present on the lateral sides of some of the marginal warts. A very characteristic feature in the medusa from Djibuti is a large, almost spherical, gelatinous protuberance vaulting from the umbrella margin over the base of each tentacle (see Hartlaub Pl. 20, fig. 12). These protuberances are also present in the specimen from the Nicobars, and I have not seen them in any other species of *Eutima.*

In general appearance the present specimen is very like that described and figured by Hartlaub, but it is smaller, only 8 mm in diameter and 2·5 mm in height, the gelatinous substance is fairly thick, evenly vaulted, the margin somewhat inward bent. The peduncle is small, 2 mm long and 2 mm wide at its base, conical, the stomach very small, mouth with four very short, simple lips. No gonads are developed on the peduncle ; this may be due to the specimen being in a younger stage of development than the type (similar delay in the development of one group of the gonads is also known in other species of *Eutima*). The gonads on the subumbrellar parts of the radial canals occupy the distal two-thirds of the canals, touching the ring-canal ; one of them is well developed, somewhat sinuous, with numerous large eggs (text-fig. 4) the three other gonads are of the same length but thin and immature. In one of the quadrants the umbrella margin is mutilated ; the three others contain the following number of tentacles and minute marginal warts : I : 2 tentacles, 3+3+6 warts ; II : 3 tentacles (one of them very small), 2+2+1+3 warts ; III : 3 tentacles, 4+1+2+2 warts. With addition of the four perradial tentacles the total number of tentacles thus has been about 14. Each of the marginal warts is provided with one or two small lateral cirri, whereas no cirri are seen on the tentacle bulbs. There are two statocysts in each quadrant. The tentacles are



TEXT-FIG. 4.—*Eutima hartlaubi* Kramp, nom. nov. Base of tentacle.
ex., exumbrella ; *pr.*, gelatinous protuberance ; *r. c.*, ring canal ; *sp.*, abaxial spur; *sub.*, subumbrella ; *u.m.*, umbrella margin.

about as long as the radius of the umbrella ; they are fairly thick, evenly tapering in thickness outwards, with densely set transverse wrinkles which are interrupted on the abaxial side by a narrow line throghout

the length of the tentacle (text-fig 4). The tentacles have no swollen basal bulbs ; the base of each tentacle is adnate to the lower surface of a vaulted gelatinous protuberance of the umbrella margin (fig. 4' A very narrow spur-like processus issues from the abaxial side of the tentacle-base ; this tiny "spur" is purely ectodermal, embedded in a shallow, narrow groove in the gelatinous protuberance. This spur-like structure is not mentioned by Hartlaub in his description of the medusa from Djibuti, but it is so tiny that it may have been overlooked. Apart from this point the present specimen agrees so well with Hartlaub's specimens in all essential features that I do not hesitate to refer it to the same species, which seems to me to present sufficiently distinguishing structures as to allow us to regard it as a valid species, *Eutima hartlaubi*.

Distribution.—Djibuti in Gulf of Aden ; Nicobar Islands.

Aequorea conica Browne

1905. *Aequorea conica*, Browne, p. 145, pl. 1, fig. 2; pl. 2, figs. 16, 17, 18.
1928. *Aequorea conica*, Stiasny, p. 213.
1951. *Aequorea conica*, Nair, p. 68.
1953. *Aequorea conica*, Kramp, p. 289.

Stat. 563. 11°58′15″N. 98°21′10″E. Mergui Archipelago. 10-11. XI. 1913. Surface. 1 specimen.

The specimen is 4 mm. wide and 1·2 mm high, jelly fairly thick in the central part, with flattened top ; the subumbrellar side of the umbrella is convex. Stomach 1·2 mm. wide, with 16 pointed, slightly crenulated lips. 8 radial canals, with thick, mature, female gonads in their proximal one-third. The dorsal wall of the stomach has no radiating grooves. There are 19 fully developed tentacles up to twice as long as the radius of the umbrella, and 4 young tentacles, the tentacle bulbs pear-shaped with a faintly heart-shaped base ; no excretory papillae. Between successive tentacles usually one, but sometimes two or three very small rudimentary bulbs and one or two small statocysts.

Apart from the lower shape of the umbrella this specimen agrees well with the description of *A. conica* as given by Browne (1905). The original specimens had 16 radial cannals ; in the present specimen only 8 canals are developed ; in a small specimen from the Great Barrier Reef, Australia (Kramp, 1953, p. 289) with 15 radial canals gonads were only developed on 7 of the canals, whereas the remaining eight canals were thin and destitute of gonads.

Distribution.—Ceylon (Browne) ; Trivandrum Coast (Nair) ; Singadore and Java Sea (Stiasny) ; north-eastern Australia (Kramp) ; now also taken in the Mergui Archipelago.

Aequorea pensilis (Haeckel)

1879. *Mesonema pensile*, Haeckel, p. 226.
1904. *Mesonema pensile*, Browne, p. 733, pl. 55, fig. 4; pl. 57, figs. 2-9.
1905. *Mesonema pensile*, Browne, p. 147, pl. II, figs. 11-15.
1910. *Aequorea pensilis*, Mayer, p. 333.
1916*a*. *Mesonema pensile*, Browne, p. 188.
1932. *Aequorea pensile*, Menon, p. 24.
1951. *Aequorea pensile*, Nair, p. 67.
1953. *Aequorea pensilis*, Kramp, p. 295.

Stat. 604. 11°17'20"N. 98°29'40"E. Mergui Archipelago. 28-30. III. 1914. 1 specimen.

Off Puri, Orissa Coast. 4-4½ fms. 24-29. III. 1916. 1 specimen. Sandheads, mouth of River Hoogly, Ganges estuary. 4th November 1922. R. Smyth leg. Fragments.

Vizagapatam. In small creeks at low water near ferry. May-June 1926. Rao and Varugis leg. 1 specimen.

Bay of Bengal, 17°34'N. 89°59½'E. (Date not stated). 2 fragmentary specimens.

The relation between *A. pensilis* and *macrodactyla* has recently been dealt with by me (Kramp, 1953). Most of the present specimens are small, 20-25 mm. in diameter and more or less badly preserved. The specimen from Vizagapatam is 57 mm. wide, biconvex, the stomach 35 mm. It has about 120 or 125 radial canals, about five times as many radial canals than tentacles ; 3-7 marginal warts between successive tentacles. The tentacle bulbs are of the pensilis-type, with long lateral extensions and no abaxial keel.

Distribution.—Widely distributed in the tropical parts of the Indian and Pacific Oceans. Records from the Atlantic are doubtful. Records from Indian waters : Maldive Islands (Browne, 1904), Ceylon (Browne, 1905), Madras (Menon, 1932), Trivandrum Coast (Nair, 1951). Now also found in three localities further north on the east coast of India, in the central part of the Bay of Bengal, and in the Mergui Archipelago.

Aequorea macrodactyla (Brandt)

1838. *Mesonema macrodactylum*, Brandt, p. 359, pl. 4.
1904. *Aequorea maldivensis*, Browne, p. 732, pl. 56, figs. 4-12.
1910. *Aequorea macrodactyla*, Mayer, p. 333.
1916*a*. *Aequorea macrodactyla*, Browne, p. 189.
1932. *Aequorea macrodactyla*, Menon, p. 23.
1953. *Aequorea macrodactyla*, Kramp, p. 294.

Stat. 580. Celerity Passage. 1 specimen.

Stat. 602. 11°27'40"N. 98°36'15"E. Mergui Archipelago. 17-18. III. 1914. 1 specimen.

Stat. 632. Off Muz, Car Nicobar, 23rd December 1922. Surface. 23 specimens.

In all these specimens the tentacle bulbs are provided with the abaxial keel and clasp characteristic of *A. macrodactyla*. The specimens have the following dimensions :

Stat. 580. Diameter about 60 mm. (somewhat crumpled), stomach about 30 mm., about 80 radial canals, number of tentacles uncertain.

Stat. 602. Diameter 9 mm., badly preserved, number of radial canals uncertain, about 20 tentacles.

Stat. 632. 23 specimens, diameter 7-28 mm.

Diam. of umbrella, mm	Diam. of stomach, mm	Number of radial canals	Number of tentacles
7	3·5	31	13
8	4	c. 26	11
8	4	42	c. 15
9	4	c. 24	c. 12
9	4·5	c. 24	c. 10
9	4·5	c. 36	c. 12
10	5	c. 40	18
11	5	27	15
11	6	c. 34	c. 18
12	8	40	14
13	6	30	17
13	7	34	17
13	6	c. 34	c. 13
13	7	34	17
14	6	c. 35	17
14	6	34	14
16	8	31	c. 15
17	11	30	16
18	11	35	c. 20
19	9	38	c. 23
21	12	40	20
23	12	c. 42	c. 22
28	12	c. 23	c. 21

The number of tentacles and radial canals are variable as in all other localities within the areas of distribution of this species. In the present specimens there are, on an average, about half as many tentacles as radial canals.

Distribution.—Widely distributed in the warm parts of the Indian and Pacific Oceans from East-Africa to America; it also occurs in the Atlantic, mainly in the southern parts. Indian records: Maldive Islands (Browne 1904), Madras (Menon 1932). Now also found in the Mergui Archipelago and at Car Nicobar.

Zygocanna buitendijki Stiasny

1928. *Zygocanna buitendijki*, Stiasny, p. 218, text-figs. 5a-e, 6, 7.

1932. *Zygocanna buitendijki*, Menon, p. 25, pl. 3, figs. 34, 35.

Stat. 597. 11°09′05″N. 98°55′07″E. Mergui Archipelago. 11th March 1914. Surface. 1 specimen.

The specimen is small, but typical in structure ; 11 mm. in diameter (the margin somewhat inward bent) ; stomach 6 mm. wide. There are 12 primary radial canals issuing from the periphery of the stomach, dividing so that the number of terminal branches is 75. The number of tentacles has apparently been about 16, but some of them are lost.

Stiasny's original specimens were up to 33 mm. wide, but one of the specimens recorded by Menon was more than 100 mm. in diameter.

Distribution.—Java Sea (Stiasny) ; Madras (Menon) ; Mergui Archipelago. An undetermined species of *Zygocanna* is recorded from the Trivandrum Coast by Menon (1945, p. 41).

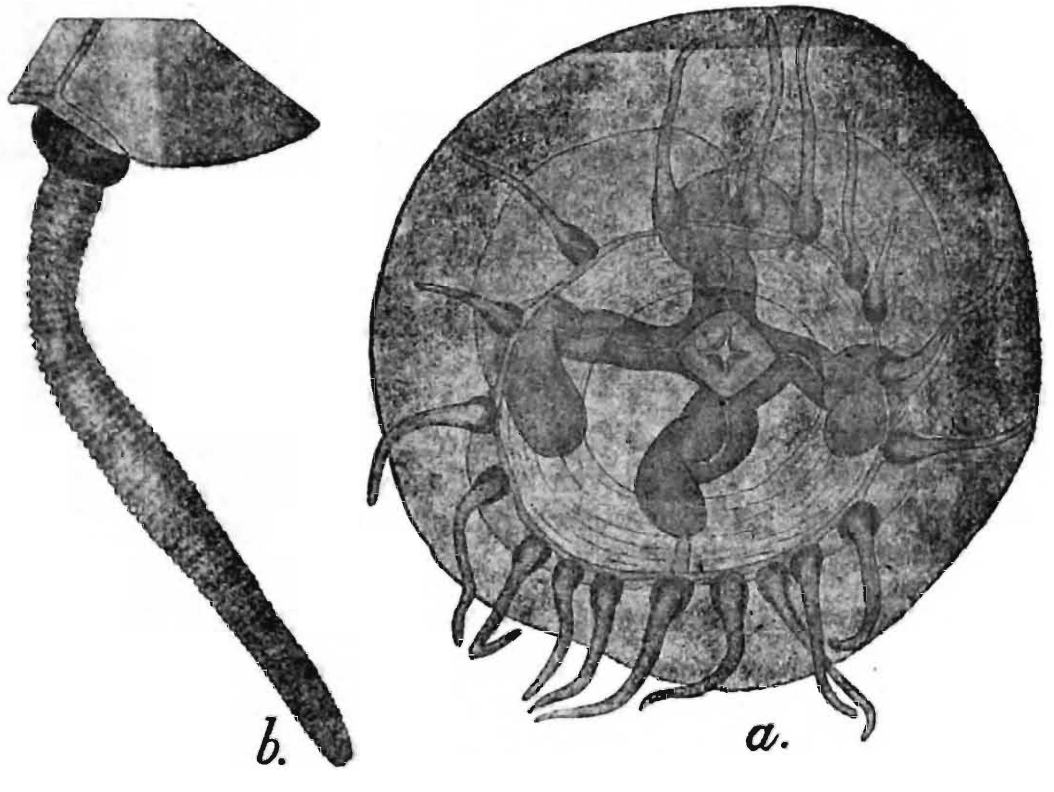
LIMNOMEDUSAE

Moerisia gangetica, sp. nov.

1908. ? *Moerisia lyonsi*, Boulenger, p. 357, pl. 22-23.

Shambazar Khal, Dakhnidar, near Calcutta, low tide. 13th May 1926. 1 specimen.

Description.—(text-fig. 5*a*, *b*) : Umbrella 3 mm. in diameter, 2 mm. high, gelatinous substance very thick, almost spherical. Manubrium very small, quadrangular, with a simple cross-shaped mouth-opening without lips. Four radial canals and ring-canal narrow. There is



TEXT-FIG. 5.—*Moerisia gangetica*, sp. nov.
a. Oral view ; *b*. Tentacle, lateral view.

one cross-shaped gonad, completely encircling the manubrium, with prolongations out along the four radial canals almost to the ring-canal. In the proximal part of each radial canal the gonad is interrupted in a narrow median line on the subumbrellar side, but in the distal part the gonad completely encircles the radial canal and the distal portion of the gonad hangs freely into the bell cavity as a broadly rounded sack. In the present specimen there are 19 marginal tantacles, all of about the same size, fairly short in their contracted state. Each tentacle has a short, almost semiglobular basal bulb ; on the abaxial side of the bulb is a small reddish ocellus. The tentacles are hollow ; their nematocysts are arranged in numerous complete rings which in the contracted tentacles are closely set, but very distinct. Velum broad. Apart from the ocelli the preserved medusa is colourless.

It is mainly for zoogeographical reasons that I describe this little medusa as a new species. If in future more specimens are fonnd in the same or neighbouring localities, it may possibly prove to be identical with *Moerisia lyonsi* which has only been found in Lake Qurun in Egypt. The majority of the numerouss pecimens of *M. lyonsi* examined by Boulenger have only four marginal tentacles, but occasionally as many as 22 may occur. Apparently the narrow median lines dividing the proximal parts of the gonadial lobes in *M. gangetica* into two lateral halves are not present in *M. lyonsi*. Moreover, in *M. gangetica* the lobes of the gonads are much longer, and the sack-like, pendent distal prolongations seem to be far more strongly developed than in *M. lyonsi*. Thus certain morphological differences really seem to exist between the two species.

There is also the possibility that the specimen from the Ganges estuary may belong to *Moerisia pallasi* Derzhavin, which occurs in the Caspian Sea. A modern description of this species is needed. According to the original description and figures of "*Caspionema*" *pallasi* given by Derzhavin (1912, p. 390, figs. 1-5) it has up to 32 tentacles, which are of very unequal length, and the radial lobes of its gonad are much shorter than in *M. gangetica* and not pendent. Remarks on the morphology of *M. pallasi* are given by Valkanov (1938), but his paper is written in the Bulgarian language ; according to one of his figures (fig. 3*a*) the lobes of the gonad reach only about half-way down the radial canals, whereas in *M. gangetica* they reach almost to the ring-canal. The specimens from Cette in France, recorded by Hartlaub (1913, pp. 238, 247, 248) as *Moerisia pallasi*, belong to *Odessia maeotica* (Ostroumoff.). A useful preliminary revision of the Moerisiidae is given by Picard (1951) ; I look forward to the forthcoming complete revision of this interesting family of Limnomedusae by Dr. Picard.

Ostroumovia inkermanica (Paltschikowa-Ostroumova)

1925. *Moerisia inkermanica*, Paltschikowa-Ostroumova, p. 273, figs. 1-3.

1928. *Ostroumovia inkermanica*, Hadzi, p. 39.

1938. *Ostroumovia inkermanica*, Valkanov, p. 309, figs.

1938. *Ostroumovia inkermanica*, Kramp, pp. 45-60, pl. figs. 1-6; text figs. 1-5.

1951. *Ostroumovia inkermanica*, Picard, p. 7.

Vizagapatam Channel. May-June 1926. Rao and Varugis leg. 1. specimen.

It was this interesting brackish-water medusa from the Black Sea which induced me to erect the Limnomedusae as a new suborder of the Leptolina, first in a preliminary account in the Zoologischer Anzeiger, vol. 122, 1938, and then in the paper quoted above, in which I gave a thorough description of the medusa. Its systematic position has been the subject of much discussion between professor Valkanov in Bulgaria and me, and Valkanov's latest contribution (1954), which has recently come into my hands, is not suitable for an elucidation of the qusteion.

The present specimen from Vizagapatam agrees in every respect with the Bulgarian specimens previously examined by me. It is a comparatively large specimen, 8 mm wide and 6 mm high, with a fairly thick jelly. The stomach is prismatic, half as long as the height of the umbrella cavity. The mouth-rim is provided with small, wart-like protuberances studded with nematocysts. The gonads are male, wavy, situated along the distal three-fourth of the radial canals, their distal portions sack-like, pendent ; there are no gonads in the walls of the stomach. There are about 32 long tentacles with numerous, distinct rings of nematocysts completely encircling the tentacles ; the largest tentacles issue at some distance above the umbrella margin.

When I observed the nematocysts in the mouth-rim in this specimen I re-examined the specimens from the Bulgarian swamps and found, in contradiction to my previous statement (1938 p. 47), that also in these medusae the mouth-rim contains numerous nematocysts, though they are not collected in wart-like protuberances as in the present specimen. This may possibly be due to the Indian specimen being in a far advanced stage of development, which is also evident from the fact that its gonads have lost every connection with the walls of the stomach.

Distribution.—From a zoogeographical point of view it is very interesting that this species has now been found in a locality, presumably with brackish water, on the east coast of India. It was originally described from the Bay of Sevastopol, later found in great abundance in the brackish-water swamps on the Bulgarian coast of the Black Sea.

Scolionema suvaensis (Agassiz & Mayer)

1899. *Gonionemus suvaensis*, Agassiz & Mayer, p. 164, pl. 5, figs. 14-16.
1904. *Gonionemus pelagicus*, Bigelow, p. 256, pl. 4, figs. 12-14.
1905. *Gonionemus hornelli*, Browne, p. 149, pl. 1, fig. 6; pl. 2, fig. 4.
1910. *Scolionema gemmifera*, Kishinouye, p. 31, pl. 5, figs. 32, 33.
1932. *Gonionemus suvaensis*, Menon, p. 26, pl. 2, figs. 20, 21.
1951. *Gonionemus suvaensis*, Nair, p. 68.
1951. *Scolionema suvaensis*, Picard, p. 44.

Stat. 614. Octavia Bay, Nancowry Harbour, the Nicobars. February 1922. Surface. 1 specimen.

The specimen is very similar to that described from Gulf of Manaar by Browne (1905) as *Gonionemus hornelli*, a small medusa only 6 mm. wide ; the present specimen is in a still younger stage being only 2 mm. in diameter.

The synonomy of this species is finally stated by several authors. Picard (1951) regards it as generically distinct from *Gonionemus* and refers it to the genus *Scolionema* Kishinouye, and I think he is right in this respect.

Distribution.—Japan ; Low Archipelago east of New Guinea ; Fiji Islands ; Bermuda in the Atlantic ; Villefranche on the Mediterranean coast of France. Indian records : Maldive Islands (Bigelow), Trivandrum Coast (Nair), Gulf of Manaar, Ceylon (Browne), Madras (Menon) (see the map in Picard 1951). Now also found at the Nicobar Islands.

Olindias singularis Browne

1904. *Olindias singularis*, Browne, p. 737, pl. 56, fig. 2; pl. 57, fig. 1.
1909. *Olindias singularis*, Bigelow, p. 109, pl. 4, fig. 1; pl. 31, figs. 1-10 ; pl. 32, fig. 8.
1916. *Olindias singularis*, Browne, p. 192.
1932. *Olindias singularis*, Menon, p. 27.
1945. *Olindias singularis*, Menon, p. 41.
1951. *Olindias singularis*, Nair, p. 69.
1953. *Olindias singularis*, Kramp, p. 298.

Karachi, near the mouth of River Indus. February 1917. C. R. Stevens legit. 1 very large specimen.

Stat. 614. Octavia Bay, Nancowry Harbour, the Nicobars. 26-27th. October 1921, 1 specimen ; February 1922, 8 specimens ; 16-17th November 1922, 1 specimen.

The specimen from Karachi is very large, somewhat mutilated, about 40 mm in diameter. The specimens from the Nicobars are fairly small, up to 15 mm wide, some of them quite juvenile. One very young stage is of particular interest ; it is only 2 mm wide and high, dome-shaped with almost perpendicular lateral sides. The base of the stomach is as broad as the umbrella cavity, and its entire upper surface is attached to the subumbrella ; the stomach is broadly conical with a very short, square mouth-tube, oral lips are not yet indicated. The radial canals and ring-canal are broad, gonads not developed ; one very short, broadly triangular centripetal canal in each interradius. There are four very large perradial primary tentacles, more than one and a half times as long as the height of the umbrella, issuing at some distance from the bell-margin, with closely set transversal clasps of nematocysts, adhesive pads just indicated. Moreover, in each quadrant one very small interradial tentacle, two tiny adradial rudiments and two thick and broad marginal " clubs " There is a single statocyst at the base of each of the perradial and interradial tentacles. Velum broad. This young specimen is very similar to the young stage of *Olindias tenuis* figured by Mayer (1910, pl. 47, fig. 9).

Distribution.—Olindias singularis is widely distributed in the tropical parts of the Indo-West-Pacific region. Indian records : Maldive Islands (Bigelow), Trivandrum Coast (Menon 1945, Nair 1951), Madras (Menon 1932). Now also found at the Nicobar Islands and near Karachi in the Arabian Sea.

Proboscidactyla ornata (McCrady)

1857. *Willsia ornata*, McCrady, p. 47, pl. 9, figs. 9-11.
1904. *Proboscidactyla ornata*, Browne, p. 726.
1904. *Proboscidactyla gemmifera*, Browne, p. 727.
1904. *Proboscidactyla tropica*, Browne, p. 727.
1904. *Proboscidactyla varians*, Browne, p. 728, pl. 54, figs. 1, 2.
1905. *Proboscidactyla flavicirrata* var. *stolonifera*, Maas, p. 21, pl. 4, figs. 24-28.
1909. *Proboscidactyla ornata* var. *stolonifera*, Bigelow, p. 220, pl. 6, figs. 1, 2; pl. 41, figs. 1-7.
1932. *Proboscidactyla ornata*, Menon, p. 12, pl. 2, fig. 18.
1932. *Proboscidactyla conica*, Menon, p. 13, pl. 2, figs. 12, 13.
1951. *Proboscidactyla ornata*, Nair, p. 57.
1951. *Proboscidactyla mutabilis*, Nair, p. 57.

Stat. 614. Octavia Bay, Nancowry Harbour, the Nicobars. February 1922. 2 specimens.

The various species and varieties mentioned in the above list of synonyms are mainly separated from each other by the situation of their medusa buds, or by absence of medusa buds. While on the Danish Galathea expedition in 1951 I found, however, numerous specimens representing all possible combinations in one sample taken at the Philippine Islands. I can state, therefore, that the situation or absence of medusa buds present no specific characters, and none of the morphological characters indicated by various authors are reliable as distinguishing features; they are all due to individual variation or different stages of development.

The present specimens are 3 mm in diameter with 15—18 tentacles some few of which are smaller than the others; the gonads follow the proximal branching of the radial canals. The intertentacular nematocyst tracks are dissolved into small, round clusters forming meridional lines right up to the top of the umbrella. The specimens are very similar to *P. varians* Browne (from the Maldive Islands), but they have no medusa buds. *P. conica* Menon is remarkable by its high shape and comparatively large number of tentacles, but this can hardly be specific characters; I have seen specimens with very different forms of the umbrella from several localities. Nair (1951) is inclined to regard *P. conica* as an irregular form of the subantarctic species *P. mutabilis* Browne; it is true that I have previously been of the same opinion (Browne & Kramp, 1939), but since I have had the opportunity to study numerous specimens of *P. ornata*, partly in living condition, I have altogether left that supposition; *P. mutabilis* is a distinct species, and *P. conica* is a synonym of *P. ornata*.

Distribution.—*P. ornata* is widely distributed in the coastal areas of all the oceans. Indian records: Maldive Islands (Browne), Trivandrum Coast (Nair), Madras (Menon). Now also found at the Nicobar Islands.

TRACHYMEDUSAE

Halicreas minimum Fewkes

1882. *Halicreas minimum*, Fewkes, p. 306.

1902. *Halicreas papillosum*, Vanhöffen, p. 68, pl. 9, figs. 7, 8 ; pl. 11, fig. 30.

Stat. 670. 5°56'N. 76°22 'E. West of Ceylon. 23.IV.1924. 200 fms. to surface. 1 specimen.

Distribution.—Widely distributed in the deep parts of all the oceans, except in the arctic seas and the Mediterranean.

Halitrephes maasi Bigelow

Stat. 670. 5°56'N. 76°22'E. 23.IV.1924. 200 fms. to surface. 2 specimens.

The specimens are in a very poor condition, no traces of stomach, radial canals and gonads are left. Some club-shaped statocysts are retained, showing that the specimens belong to the family Halicreidae ; their umbrellas are thin and disk-like, one of them is 28 mm in diameter with 36 tentacles, the other 33 mm with 45 tentacles. The sizes indicate that they belong to the genus *Halitrephes* of which probably only one species exists, *H. maasi* Bigelow (1909, p. 146, pl. 33, figs. 1—5, 7, 10 ; pl. 45, fig. 13).

Distribution.—Probably widely distributed in the deep parts of all the oceans.

Rhopalonema velatum Gegenbaur

Stat. 614. Octavia Bay, Nancowry Harbour, the Nicobars. 2-5. II.1922. 1 specimen.

Distribution.—Generally distributed and very common in the warm parts of all the oceans, including the Mediterranean.

Sminthea eurygaster Gegenbaur

1856. *Sminthea eurygaster*, Gegenbaur, p. 245, pl. 9, figs. 14, 15.

Stat. 670. 5°56'N. 76°22'E. West of Ceylon. 23.IV.1924. 200 fms. to surface. 1 specimen, 15 mm wide.

Distribution.—Mediterranean ; warm parts of the Atlantic Ocean. In the surroundings of the Amirante and Chagos Islands in the Indian Ocean.

Liriope tetraphylla (Chamisso & Eysenhardt)

1904. *Liriope indica*, Bigelow, p. 258. pl. 5, figs. 17, 18.

1916. *Liriope tetraphylla*, Browne, p. 198.

1932. *Liriope tetraphylla*, Menon, p. 28.

1935. *Liriope tetraphylla*, Lele & Gae, p. 97.

1945. *Liriope tetraphylla*, Menon, p. 41.

1951. *Liriope tetraphylla*, Nair, p. 70.

1952. *Liriope tetraphylla*, Bal & Pradhan, p. 76.

Stat. 614. Octavia Bay, Nancowry Harbour, the Nicobars. 2-5. II. 1922. 3 specimens.

Stat. 524. 12°29¾'N. 98°12'E. Mergui Archipelago. 13.III.1913. Surface. 1 specimen.

Stat. 563. 11°58'15"N. 98°21'10"E. Mergui Archipelago. 10-11.XI. 1913. Surface. 9 specimens.

Stat. 602. 11°27'40"N. 98°36'15"E. Mergui Archipelago. 17-18. III.1914. 18 specimens.

Stat. 604. 11°17'20"N. 98°29'40"E. Mergui Archipelago. 28-30. III. 1914. 3 specimens.

Stat. 606. 11°24'10"N. 98°27'50"E. Mergui Archipelago. 31.III-1.IV.1914. Surface. 14 specimens.

Off Puri, Orissa Coast. 24-29.III.1916. S. W Kemp legit. 17 specimens.

Stat. 614. Octavia Bay, Nancowry Harbour, the Nicobars. 26-27.X. 1921. 14 specimens.

Stat. 632. Off Muz, Car Nicobar. 23.XII.1922. Surface. 6 specimens.

Bottom of channel, Vizagapatam. May-June 1926. Rao and Varugis leg. 1 specimen.

Channel, Vizagapatam. May-June 1926. Rao and Varugis leg. 1 specimen.

In small creek at low water near ferry, Vizagapatam. May-June 1926. Rao and Varugis leg. 1 specimen.

Most of the specimens are small, less than 10 mm in diameter, only some few reach a size of 12-14 mm. The specimen from the last-mentioned locality, however, is 21 mm wide, its gastric peduncle 17 mm long, its gonads are mutilated.

Distribution.—L. tetraphylla, the only species of the genus, is generally distributed in the warm parts of all the oceans. Previous Indian records : Maldive Islands (Bigelow), Bombay (Lele & Gae, Bal & Pradhan),Trivandrum Coast (Menon, Nair), Madras (Menon).

NARCOMEDUSAE

Solmundella bitentaculata (Quoy & Gaimard)

1916. *Solmundella bitentaculata*, Browne, 1916 *b*, p. 152.
1932. *Solmundella bitentaculata*, Menon, p. 28.
1935. *Solmundella bitentaculata*, Lele & Gae, p. 99.
1951. *Solmundella bitentaculata*, Nair, p. 70.
1945. *Solmundella bitentaculata*, Menon, p. 41.
1952. *Solmundella bitentaculata*, Bal & Pradhan, p. 76.

Stat. 606. 11°24'10"N. 98°27'50"E. Mergui Archipelago 31.III-1.IV.1914. Surface. 2 specimens.

Stat. 614. Octavia Bay, Nancowry Harbour, the Nicobars. February 1922. 29 specimens.

Off Puri, Orissa Coast. 24-29.III.1916. S. W Kemp legit. 110 specimens.

Distribution.—Widely distributed in all the oceans, particularly common in the southern hemisphere. Previous Indian records : Kathiawar (Browne), Bombay (Lele & Gae, Bal & Pradhan), Trivandrum Coast (Menon, Nair), Madras (Menon).

Aegina citrea Eschscholtz

Stat. 614. Octavia Bay, Nancowry Harbour, the Nicobars. February 1922. Surface. 1 specimen.

The specimen is only 4 mm in diameter and has four marginal lappets and tentacles.

Distribution.—*Aegina citrea* is widely distributed in the warm parts of all the oceans, where it may be met with at all depths ; it also penetrates into colder areas, but there it occurs only in deep water. No previous records from Indian waters.

Cunina octonaria McCrady

1857. *Cunina octonaria*, McCrady, p. 109, pl. 12, figs. 4, 5.
1879. *Cunoctantha octonaria*, Haeckel, p. 316.
1932. *Cunoctantha octonaria*, Menon, p. 29.
1951. *Cunoctantha octonaria*, Nair, p. 71.
1953. *Cunina octonaria*, Kramp, 1953, p. 304.

Stat. 606. 11°24′10″N. 98°27′50″E. Mergui Archipelago. 31.III-1.IV.1914. 4 specimens.

Distribution.—Widely distributed in the warm parts of all the oceans including the Mediterranean. Indian records : Trivandrum Coast (Nair), Madras (Menon). Now also found in the Mergui Arehipelago.

Distribution of the species within the areas investigated

Species	East coast of India	Burma	Mergui Archipelago	Nicobar Islands	Other localities
Anthomedusae					
Euphysora bigelowi	..	..	..	X	..
Cytaeis tetrastyla	..	..	..	X	..
Bougainvillia fulva	X	..	X	..	X
Merga violacea	..	..	..	X	..
Leuckartiara hoepplii	..	..	..	X	..
Leptomedusae					
Laodicea indica	..	..	..	X	..
Tiaropsidium roseum	..	..	..	X	..
Blackfordia virginica	X	...	...	...	...
Phialucium mbenga	..	..	..	X	..
Phialucium carolinae	..	..	..	X	..

Distribution of the species within the areas investigated—*contd*.

Species	East coast of India	Burma	Mergui Archipelago	Nicobar Islands	Other localities
Leptomedusae					
Octophialucium indicum	..	X	X	..	..
Octocannoides ocellata	..	..	X	..	..
Eirene tenuis	..	..	..	X	..
Eirene palkensis	..	..	X	..	..
Eirene ceylonensis	X	X	X	X	..
Eirene menoni	X	..	..	..	..
Eirene hexanemalis	..	..	X	X	..
Helgicirrha malayensis	..	..	X	X	..
Eutima orientalis	X	..	..	X	..
Eutima hartlaubi	..	..	..	X	..
Aequorea conica	..	..	X	..	..
Aequorea pensilis	X	..	X	..	X
Aequorea macrodactyla	X	..	X	X	..
Zygocanna buitendijki	..	..	X	..	..
Limnomedusae					
Moerisia gangetica	X	..	..	..	..
Ostroumovia inkermanica	X	..	..	..	..
Scolionema suvaensis	..	..	..	X	..
Olindias singularis	..	..	..	X	X
Proboscidactyla ornata	..	..	..	X	..
Trachymedusae					
Halicreas minimum	..	..	..	..	X
Halitrephes maasi	..	..	..	..	X
Rhopalonema velatum	..	..	..	X	..
Sminthea eurygaster	..	..	..	..	X
Liriope tetraphylla	X	..	X	X	..
Narcomedusae					
Solmundella bitentaculata	X	..	X	X	..
Aegina citrea	..	..	..	X	..
Cunina octonaria	..	..	X	..	..
Number of species	118	2	14	22	6

Additional Notes on SCYPHOMEDUSAE

Tamoya bursaria Haeckel

1880. *Tamoya bursaria*, Haeckel, p. 444.
1919. *Tamoya bursaria*, Stiasny, p. 38, figs. 6-11.
1931. *Tamoya alata*, Rao, p. 27.
1938. *Tamoya gargantua*, Bigelow, p. 151.

Puri Coast. June 1909. P. C. Singh legit. Fragments of one large specimen.

Stat. 524. 12°29¾′N. 98°12′E. 13.III.1913. Surface. 1 specimen.

Stat. 597. 11°09′05″N. 98°55′07″E. 11.III.1914. Surface. 1 specimen.

Stat. 602. 11°27′40″N. 98°36′15″E. 17-18.III.1914. 3 specimens.

Stat. 604. 11°17′20″N. 98°29′40″E. 28-30.III.1914. 6 specimens.

The four last-mentioned localities are in the Mergui Archipelago, and the specimens from these localities are all young stages 4-11 mm high. In all these young specimens the exumbrella carries warts of nematocysts, more or less numerous. Mesenteries are not yet developed, and there are only about four velar canals in each quadrant. The scales above as well as below the sensory niches have an entire margin, which is characteristic of both species of *Tamoya* in contradistinction to *Carybdea*.

Distribution.—Widely distributed in the tropical parts of the Indian Ocean and western Pacific. It is recorded from several Indian localities by Rao (1931, p. 27) as *Tamoya alata* and *Tamoya* sp.

Chrysaora quinquecirrha (Desor)

1862. *Dactylometra quinquecirrha*, L. Agassiz, pp. 124, 166.

1910. *Dactylometra quinquecirrha*, Mayer, p. 585, pl. 62, 63, 64, 64A.

1955. *Chrysaora quinquecirrha*, Kramp, p. 297.

Puri Coast. June 1909. 1 specimen, 70 mm. wide.

This species is recorded from the same locality by Rao (1931, p. 30) as *Chrysaora helvola*, and some specimens from the Bay of Bengal, identified as *C. melanaster* (Rao, 1931, p. 31) probably belong to the same species. Other Indian records: Madras (Menon, 1930, Gravely, 1941), Travancore (Nair, 1946), Karwar Coast (Patil, 1951), all as *Dactylometra quinquecirrha*; Trivandrum Coast (Nair, 1951) as *Chrysaora melanaster*.

As recently stated by me (Kramp, 1955) there is no reason why to keep *Dactylometra* and *Chrysaora* apart as two distinct genera.

Cephea sp.

Stat. 632. Off Muz, Car Nicobar. 23.XII.1922. 1 specimen (juvenile).

Diameter 13 mm. the centre of the disk with about seven large flattened warts surrounded by several smaller ones. The canals as in *Cephea cephea*, 4-5 canal roots between successive rhopalar canals. Oral arms with numerous filaments, all very small. Eight marginal lappets per octant.

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