This page intentionally left blank.

UNIVERSITY OF CALIFORNIA PUBLICATIONS

IN

ZOOLOGY

WILLIAM EMERSON RITTER
AND
CHARLES ATWOOD KOFOID
EDITORS

VOLUME 6

WITH 48 PLATES

BERKELEY
THE UNIVERSITY PRESS
1908-1911

UNIVERSITY OF CALIFORNIA PUBLICATIONS

IN

ZOOLOGY

Vol. 6, No. 2, pp. 11–31, text-figures 11 February 17, 1909

CONTRIBUTIONS FROM THE LABORATORY

OF THE

MARINE BIOLOGICAL ASSOCIATION OF SAN DIEGO

XXIV

THE LEPTOMEDUSAE OF THE SAN DIEGO REGION

BY

HARRY BEAL TORREY

The Leptomedusae of the San Diego region are represented in the collections of the Marine Biological Association of San Diego by eleven species which, with one exception, *Aequorea coerulescens* (Br.), appear not to have been previously described. This unusual proportion of new species is to be accounted for largely by the fact that of the few papers concerned with Pacific Coast medusae none deal with the medusae of the San Diego region. Fewkes (1889) collected a few species at Santa Barbara, but no Leptomedusae. Chamisso (1821) collected but one medusa, *Aurelia labiata*, in California waters. Eschscholtz (1829) obtained two Leptomedusae, *Polyorchis penicillata* and *Aequorea ciliata*, on the Pacific Coast between 41° and 51° N. Lat. Agassiz (1865) found no Leptomedusae except *Polyorchis penicillata* south of the Gulf of Georgia. Murbach and Shearer (1903) described six Leptomedusae, namely, *Thaumantias cellularia*, *Polyorchis minuta*, *Proboscidactyla brevicirrata*, *Phialidium languidum*, *P. gregarium* and *Mesonema victoria*, from British Columbia. Maas (1897) recorded three Leptomedusae from the Gulf of Panama. Two of these are unknown here. The third,

Melicertum proboscidifer Maas, may be identical with a Thaumantiid in the collection of the U. S. S. *Albatross* in 1904 on the California coast, to be considered in a later paper. The *Albatross* collected at the same time three species described in the present paper as *Scrippsia pacifica, Irene mollis and Tiaropsis (Tiaropsidium) kelseyi*, extending the range of the latter to Monterey, California. The type specimens of *A. coerulescens* (Brandt, 1838) were collected by Mertens in 1827, about 1600 miles west of San Diego. Brandt's paper describing and figuring Mertens' collections completes the list of papers dealing with Pacific Coast Leptomedusae.

Among the latter, those of the San Diego region form at present a well isolated group, whose relationships to other groups will be discussed later in connection with the other medusae of the region. Following is the list of species arranged by families:

Thaumantiidae	*Ptychogena californica*, n. sp.
Polyorchidae	*Scrippsia pacifica*, n. gen., n. sp.
Mitrocomidae	*Mitrocoma discoidea*, n. sp.
	Tiaropsis (Tiaropsidium) kelseyi, n. subgen., n. sp.
Eucopidae	*Obelia purpurea*, n. sp.
	Phialium bakeri, n. sp.
	Phialidium lomae, n. sp.
	Phialopsis diegensis, n. gen., n. sp.
	Eutimalphes brownei, n. sp.
	Irene mollis, n. sp.
Aequoreidae	*Aequorea coerulescens* (Brandt).

The hydroids for none of these species are definitely known.

LEPTOMEDUSAE Haeckel, 1866.

Craspedote medusae with gonads on radial canals, sense organs usually velar statocysts, in some forms ocelli and sensory clubs or cordyli. Non-sexual generation calyptoblastic hydroids.

Fam. Thaumantiidae Gegenbaur, 1856.

Leptomedusae without statocysts; with numerous tentacles, usually bearing ocelli on their bases, cordyli (sensory clubs) between them; radial canals unbranched.

Gen. **Ptychogena** Agassiz, 1865.

Thaumantiidae with four radial canals which bear gonads in the form of transverse folds. Mouth central; no gastric peduncle. Tentacles without ocelli. Cirri absent.

Ptychogena californica, n. sp.

Figs. 1, 2.

Umbrella moderate, more than half as high as broad. Manubrium short, with thin walls; mouth large, without lobes. About 48 large tentacles with thickened, compressed bases and slender filaments. Between every two tentacles, 1-5 cordyli on prominences of varying size, resembling the bases of small tentacles.

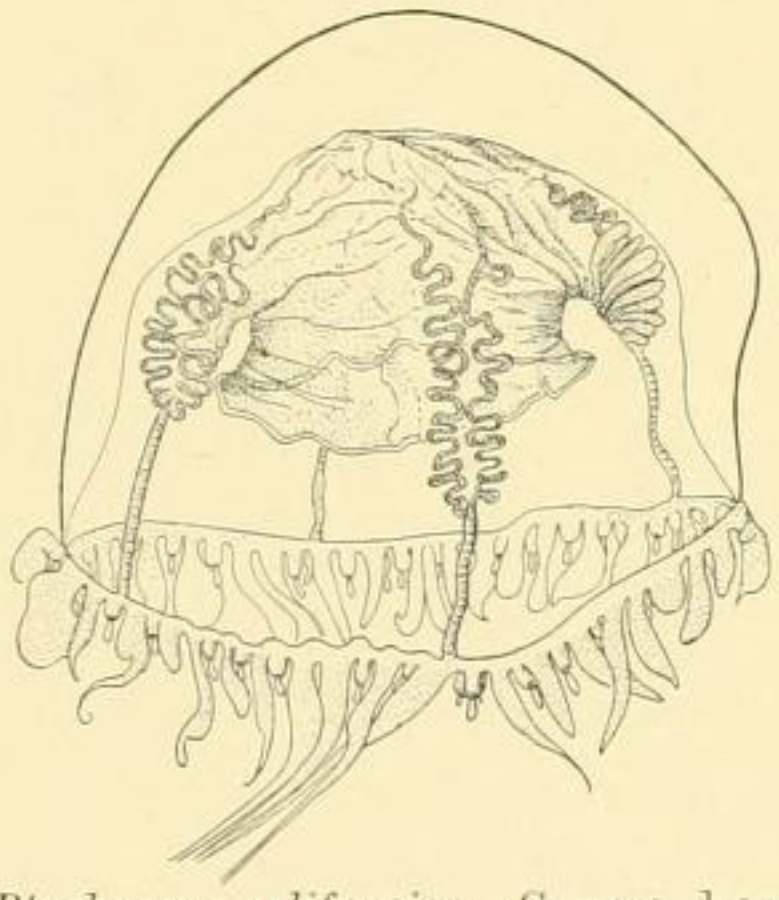

Fig. 1.—*Ptychogena californica.* Camera drawing of a preserved specimen. × 4.

Gonads with 12-14 folds in the proximal half of each canal.

Diameter 10 mm.

Distribution.—Off San Diego, May 31, 1904, in a vertical haul from 210 fathoms. Acc. No. 45.

Two specimens only have been collected; they are of the same size, with immature gonads. The cordyli resemble club-shaped filaments of tentacles in an arrested state of development (fig. 2). Each cordylus arises from a base of varying height somewhat within the row of tentacles, yet between the latter. Neither tentacles nor tentacle filaments are in good histological condition. The former, however, appear to be typical, with large, non-

pigmented endoderm cells and no nematocysts in the ectoderm, presenting a definite contrast with the tentacles in these respects. The cordylar bases grade in shape and structure into tentacle bases, and are grouped according to size like developing ten-

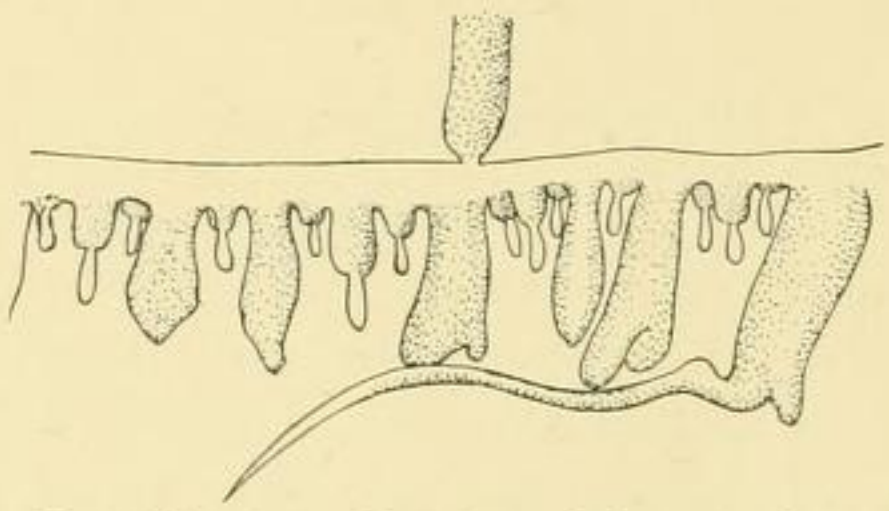

Fig. 2.—*P. californica.* Portion of the margin enlarged, showing tentacle bases and cordyli.

tacles, the middle one of a group of three being the largest. The cordyli spring from the inner angle of their rather obtuse distal ends, like tentacle filaments. Structurally I have not been able to establish a transition between them and the latter.

The presence of raised bases for the cordyli in *P. californica* is exceptional among the species of *Ptychogena*. The resemblance of these bases to tentacle bases suggests a comparison with *Staurophora*, where, according to Hartlaub (1897), the cordyli develop into tentacles.

Fam. POLYORCHIDAE A. Ag., 1862, *s. em.*

Leptomedusae with deep bells, four radial canals with numerous blind lateral branches, some or all of which may project as long tubular gonads into the subumbrellar cavity; tentacles numerous, hollow; ocelli present.

Gen. **Scrippsia,** n. gen.

Polyorchidae with gastric peduncle, lateral branches of the radial canals in the form of numerous long tubular gonads from the peduncular portion of each radial canal; tentacles numerous in several cycles.

This genus may be distinguished from its nearest relative, *Polyorchis*, by the gastric peduncle and the absence of pinnately arranged branches of the radial canals distal to the gonads.

Scrippsia pacifica, n. sp.

Fig. 3.

Umbrella deep, bell-shaped, with slight apical prominence, about as broad as high, broadest near margin. Gastric peduncle moderate. Tentacles long, highly contractile, in 7 cycles: 4, 4, 8, 16, 32, 64, 128; those of first cycle leaving exumbrella about stout, broadly conical, more than half the height of the subumbrellar cavity. Manubrium short, with moderate, frilled lips. Gonads 30 to 60 on each radial canal, long, narrow. Velum

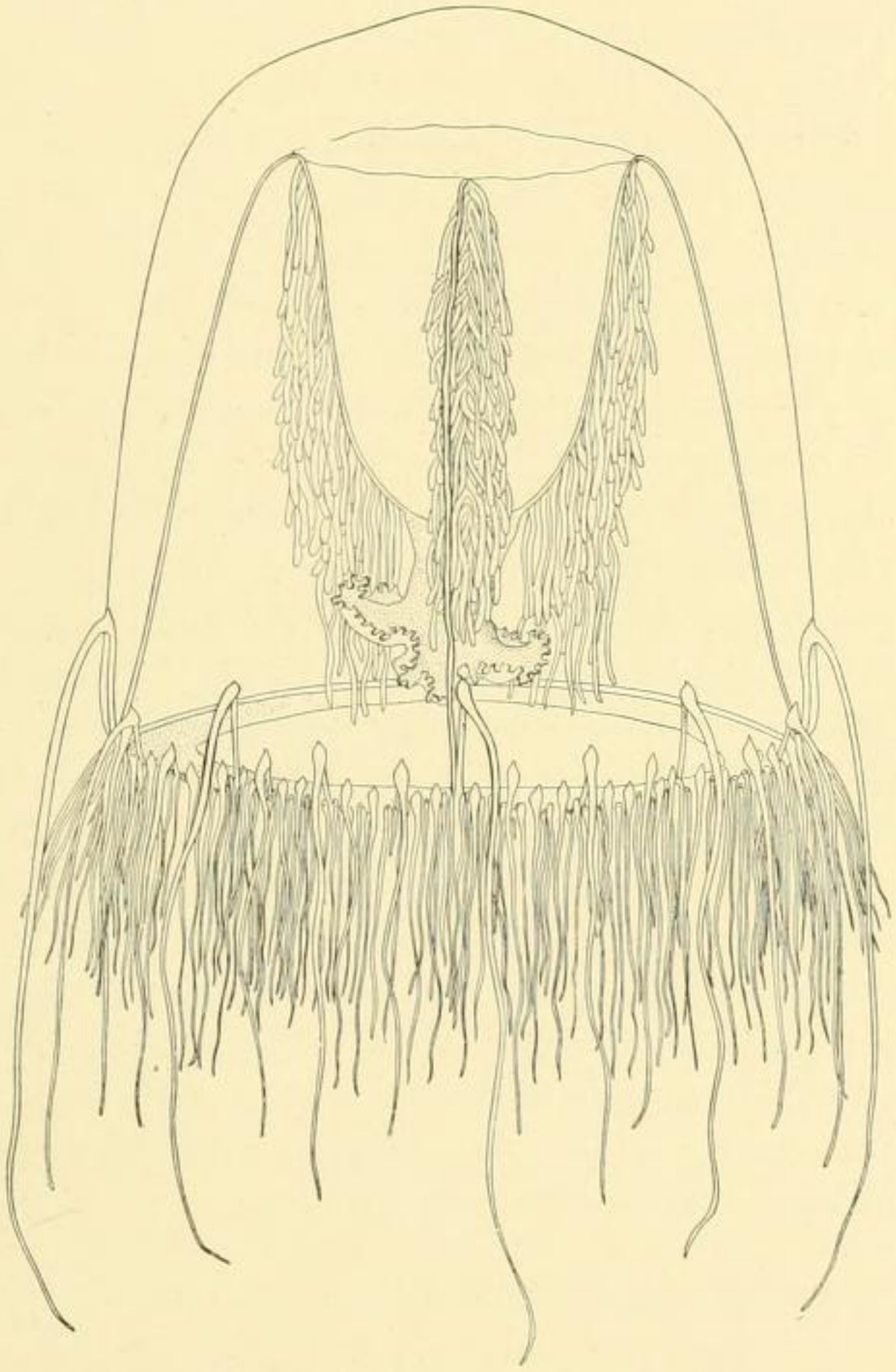

Fig. 3.—*Scrippsia pacifica.* × 1.

one-fifth the distance to apical pole from margin, other cycles successively nearer margin. Ocelli on bases of the tentacles of the last two cycles. Manubrium, gonads and tentacles pale yellow; canals yellow, occasionally carmine.

Full-grown individuals about 75 mm. high.

Distribution.—Surface at La Jolla, California. Acc. No. 1279. California coast to San Francisco.

This is one of the largest and most beautiful of the Hydromedusae. The closeness of its relationship to *Polyorchis* is shown not only by the character of the gonads and occasional traces of lateral branches of the radial canals distal to the gonads, but by the presence of an individual in the collection with well-developed lateral branches on each radial canal between margin and gonads, showing that this *Polyorchis* character may be perfectly adopted by a sudden individual variation. Such a variation is, however, exceedingly rare. It may be interpreted as the appearance of a latent rather than a new character.

The gastric peduncle is well developed in the smallest individuals (8 mm. high) in the collection. There is, however, a gradual increase in its size with the growth of the individual and a corresponding shortening and thickening of the manubrium, which is long and slender in the 8 mm. individuals where it may project from the bell cavity. The general resemblance to *Polyorchis* is especially striking in these young forms.

In 1894, a single large individual was collected at the surface in the harbor of Oakland, California, where *Polyorchis penicillata* was formerly common. The U. S. S. *Albatross* obtained a considerable number of large specimens in 1904 from Monterey Bay, in dredge hauls from 19 to 86 fathoms.

Fam. Mitrocomidae Haeckel, 1880, *sens. em.*

sens. Lafoeidae Maas. 1905.

Leptomedusae with large open statocysts.

Metschnikoff (1886) obtained from the eggs of both *Laodice* and *Mitrocoma* very similar hydroids with the characters of *Cuspidella* Hincks. For this reason, he regarded both genera of medusae as Lafoeidae, the family in which, according to Hincks, *Cuspidella* should be placed. Owing to the striking differences

between their marginal sense organs, however, such an association of these genera appears to be rather artificial. Recognizing this fact, Maas has removed *Laodice* to the Thaumantiidae. He has retained the family Lafoeidae, but redefined it so as to include all Leptomedusae with large open statocysts, *viz.*, *Mitrocoma* Haeckel, *Tiaropsis* Ag., *Phialis* Haeckel and *Halopsis* Ag.

This group of genera appears to be natural, but to refer it to the family Lafoeidae is open to objections. (1) That family is based on a genus of hydroids that produces no free medusae, hence does not possess the characters of the family as defined by Maas. (2) It is not clear that *Cuspidella* is as closely related to *Lafoea* as it is to *Calycella* and *Campanulina*, members of another family of hydroids; the discovery of its hydroid form, therefore, does not serve to place *Mitrocoma* definitely among the Lafoeidae. (3) Both *Laodice* and *Mitrocoma* produce generically identical hydroids. Yet they are placed in different families by Maas, as, in my judgment also, they should be.

In the light of these facts, a new family is needed for the four genera under discussion, with a genus of medusae, not hydroids that lack medusae, as type.

As such a genus, *Mitrocoma* appears to be unobjectionable, the family name becoming Mitrocomidae. Haeckel (1880) used this designation in a schema on p. 163 for all his Eucopidae without gastric peduncles, which artificial group contained *Tiaropsis*, *Phialis* and *Mitrocoma*. The existing term, then, removed from the Eucopidae with the genera just mentioned, seems, with a new characterization, to satisfy the present requirements.

Gen. **Mitrocoma** Haeckel, 1864.

Mitrocomidae with numerous open statocysts, numerous tentacles and marginal cirri, and four radial canals; no gastric peduncle.

Mitrocoma discoidea, n. sp.

Fig. 4.

Umbrella flat, three to four times as broad as high. Manubrium small and short, with four narrow, ruffled oral lobes. Tentacles 180-240, swollen at the base. Statocysts 20-60, scattered, with numerous statoliths in 2-3 rows. Marginal cirri

readily lost, may be as numerous as tentacles. Gonads narrow, almost entire length of radial canals from margin. Ring canal yellow-green; bases of tentacles purple; edges of lips with a single row of delicate purple spots.

Largest 45 mm. in diameter.

Distribution.—In numerous surface hauls off San Diego, May-July.

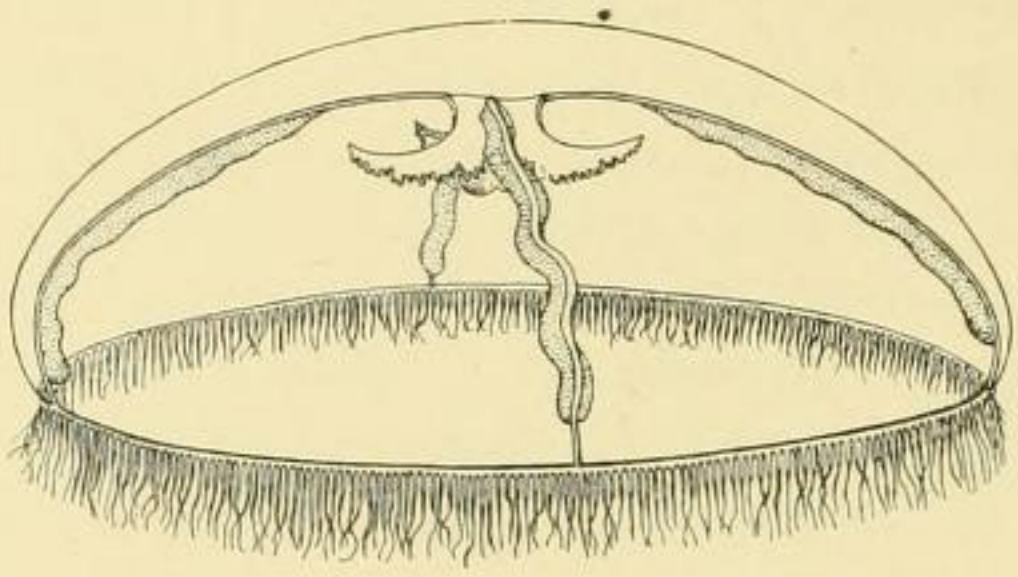

Fig. 4.—*Mitrocoma discoidea.* Slightly enlarged.

The cirri vary greatly in number, being rather more numerous in the young. Medusae with 32 tentacles may have two cirri between adjoining tentacles, though usually but one. In well-grown individuals they are usually fewer in number than the tentacles, and in many adults almost entirely wanting.

The statocysts vary much in number, but never exceed sixty and are usually nearer twenty. Occasionally two are found side by side, dividing between them the usual number of statocysts, apparently a result of fission.

Gen. **Tiaropsidium,** n. gen.

With 8 open statocysts, each with an ocellus at its base; with two kinds of tentacles; without marginal cirri and gastric peduncle.

Maas (1905) has called attention to the fact that the existing species of *Tiaropsis* are not of equal value. *T. diademata* Ag., *T. multicirrata* Sars and *T. Davisii* Browne are characterized by tentacles of but one kind. *T. mediterranea* Metsch., *T. punctata* Mayer, *T. rosea* Ag. & M., Maas' species (which he identifies provisionally with *T. rosea*) and the San Diego species are all characterized by tentacles of two kinds, four or eight large and a varying number of much smaller, more or less rudimentary tentacles between them.

I believe these clearly marked groups should be distinguished provisionally as genera. The first will then retain the name of the original genus. For the second, the name *Tiaropsidium* is proposed, *T. kelseyi* to be its type.

Tiaropsidium kelseyi,[1] n. sp.

Fig. 5.

Umbrella moderate, about three times as broad as high. Manubrium small, short, with thin walls and slightly frilled lips. Four large perradial and 4 similar interradial tentacles with

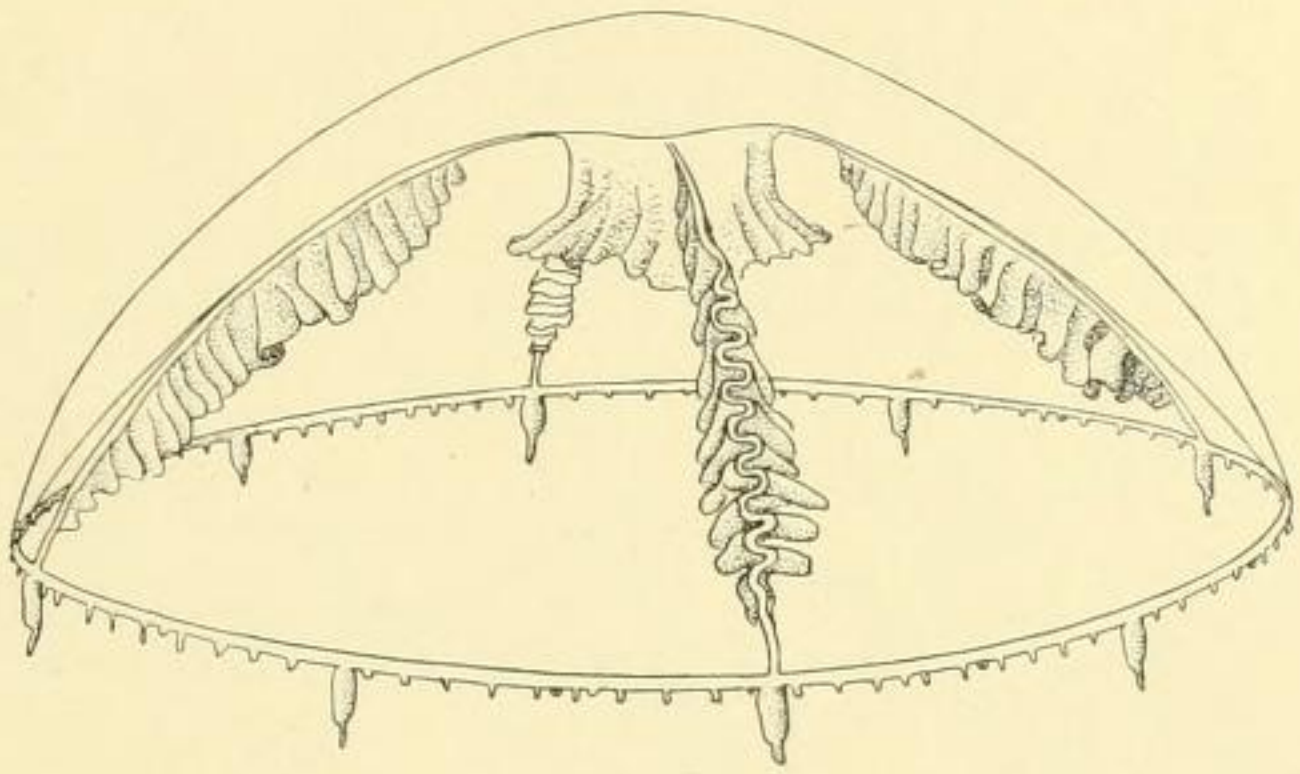

Fig. 5.—*Tiaropsidium kelseyi.* Slightly enlarged.

bulbous bases. Between each adradial sense-organ and the adjoining large tentacle on either side, 3-5 small tentacles. Gonads narrow, much folded in larger specimens, along entire length of radial canals. Umbrella colorless, transparent; manubrium, canals, gonads and tentacles a faint yellow.

Diameter 50 mm. in larger adults.

Distribution.—Single individual obtained in vertical haul from 200 fathoms, July 12, 1905, off San Diego. Acc. No. 1005, 30 mm. diam. A much damaged individual 45 mm. diam. obtained June 19, 1908, in trawl, from 50-100 fathoms. Many individuals, most of them badly damaged, obtained in numerous deep dredge hauls between San Diego and Monterey, California, by U. S. S. *Albatross* in 1904. The largest of these specimens are

[1] Named for Mr. F. W. Kelsey of San Diego, Secretary of the Marine Biological Association.

about 50 mm. in diameter. The gonads may fold transversely in a manner to suggest the gonads of *Ptychogena*.

Fam. Eucopidae Gegenbaur, 1856.

Leptomedusae with closed statocysts and 4, rarely 5 or 6, unbranched radial canals.

Gen. **Obelia** Per. & Les., 1809.

Eucopidae with many short, non-contractile tentacles; eight statocysts on the inner side of the bases of adradial tentacles; gastric peduncle and marginal cirri wanting; velum rudimentary.

Obelia purpurea, n. sp.

Fig. 6.

Umbrella very thin and flat. Manubrium small, cylindrical or angular according to state of contraction, with four simple

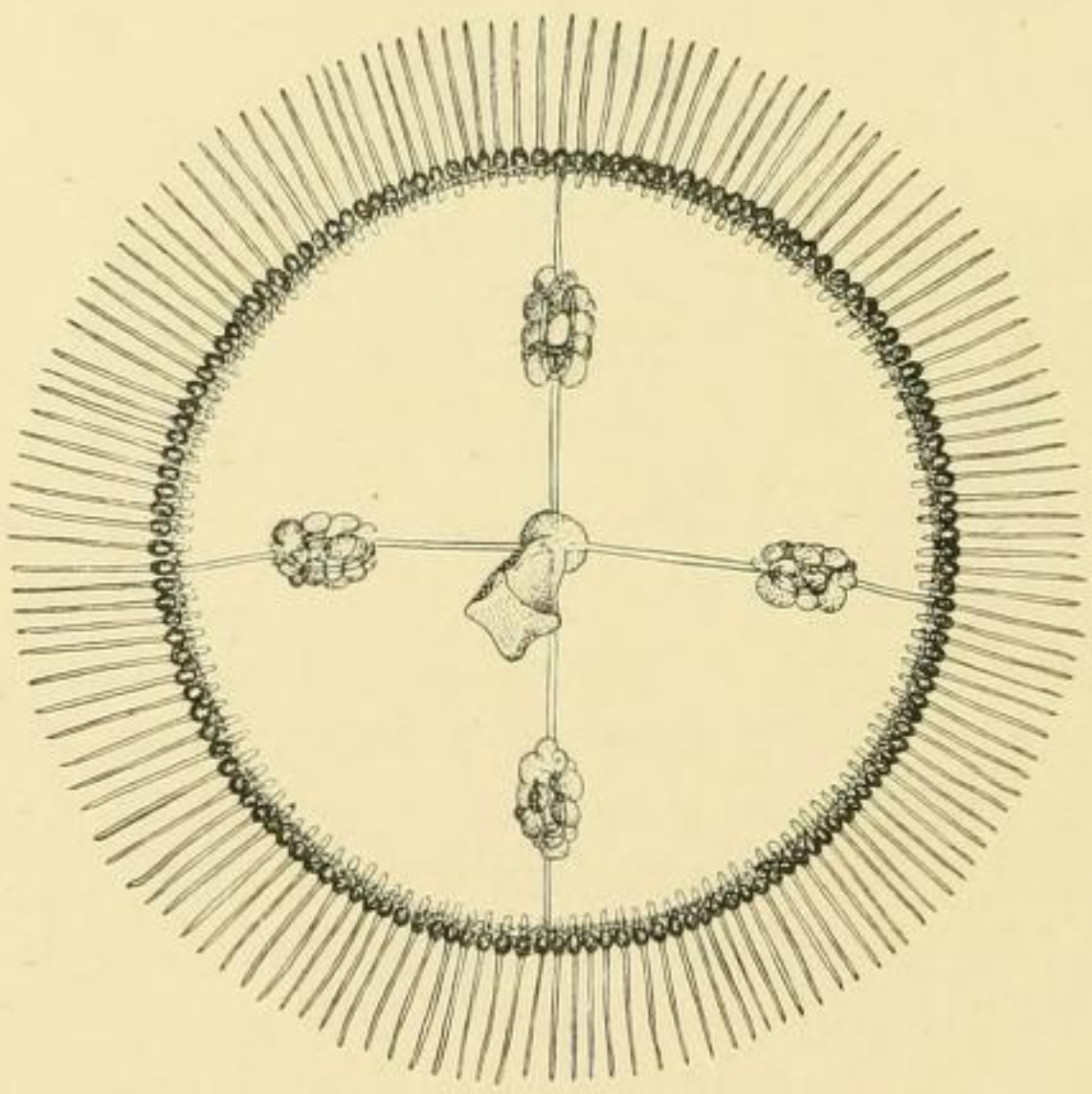

Fig. 6.—*Obelia purpurea.* × 18.

oral lobes. Tentacles 110-160, one-fourth to one-third the diameter of the umbrella in length. Statocysts each with single otocyst. Gonads broadly ovate, one near middle of each radial canal, usually in distal half. Manubrium, canals and gonads yellow, bases of tentacles violet-purple.

Diameter 3-4 mm.

Distribution.—Off San Diego in winter and summer, at the surface and in vertical hauls from various depths to 160 fathoms.

This species resembles *O. dichotoma* and may prove to be the medusa from the hydroid in this region that I have identified with the European *O. dichotoma*.

Gen. **Phialium** Haeckel, 1880.

Eucopidae with 12 statocysts, 4 perradial tentacles with basal cirri, gastric peduncle wanting.

Phialium bakeri, n. sp.

Fig. 7.

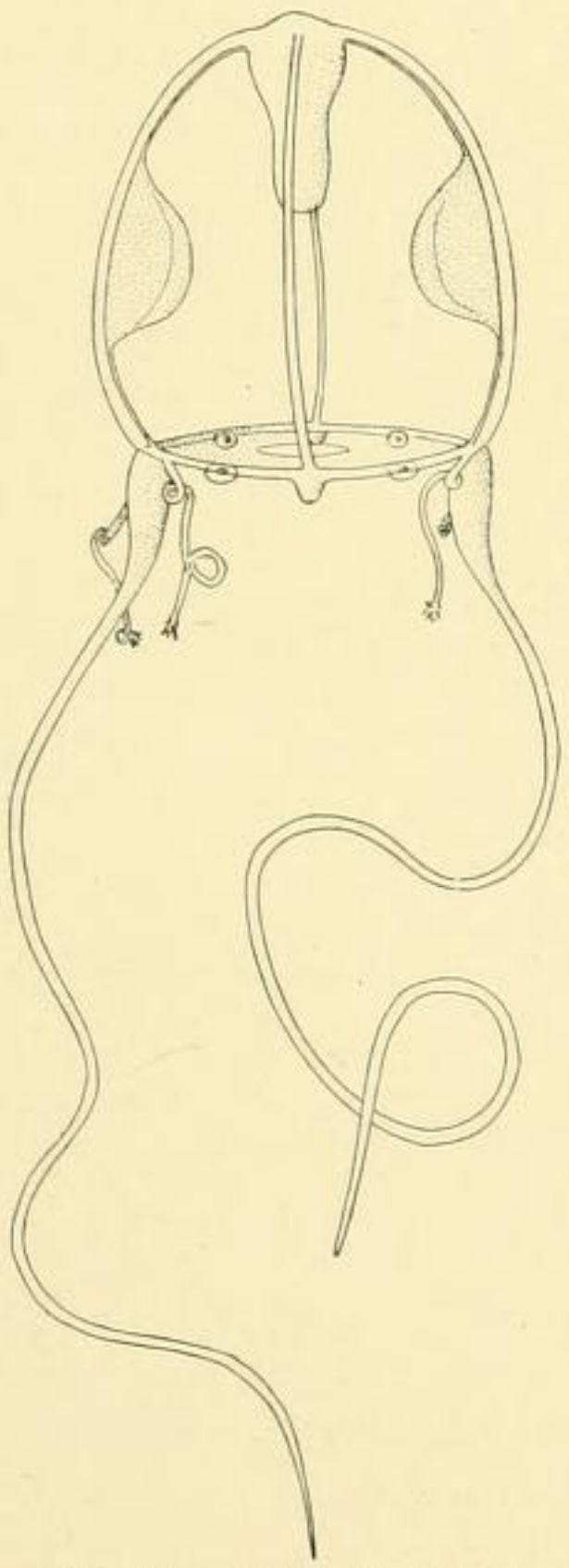

Fig. 7.—*Phialium bakeri.* × 82.

In an earlier paper (1904, p. 16), I described from preserved material, under the name of *Clytia bakeri*, a hydroid whose gonophores within the gonangia were seen to possess two tentacles and the stumps of two more (though owing to an oversight in reading proof the gonophores were described as sporosacs). The next summer, colonies of this species discharged, in the laboratory, medusae of the following description:

Umbrella longer than broad, very thin, without gastric peduncle. Manubrium moderate, tapering, without oral lobes. Two tentacles 3-4 times the length of umbrella, with bulbous bases, at ends of opposite radial canals, each with a pair of long basal cirri; tentacular fundaments in connection with other radial canals. Four interradial statocysts, each with a single statolith. Broad velum. Ovate gonad from about the middle of each of the canals associated with the longer tentacles.

I have not been able to connect this immature medusa definitely with any adult of these waters. It is almost identical with Fewkes' (1882) description and figures (19 and 20) of the young of *Phialium duodecimale* Haeckel. The chief difference consists in the presence of two gonads in the San Diego form. Specimens of adult *Phialium* have not yet been found near San Diego. The interradial position of the statocysts of the young prevents an easy transition to *Euchilota*, or the medusa suggested as a young *Phialopsis brownei*.

The hydroid is known from Oceano and San Diego, both on the coast of Southern California. It is found attached to the shells of mollusks, mainly clams (*Tivela stultorum* at Oceano, *Donax laevigata* at San Diego), that inhabit flat, sandy, ocean beaches.

Gen. **Phialidium** Leuckart, 1856.

Eucopidae with numerous tentacles and at least as many statocysts lying between them; gastric peduncle and marginal cirri wanting.

Phialidium lomae,[2] n. sp.

Fig. 8.

Umbrella thin, about four times as broad as high. Manubrium short, with slightly frilled lips. Tentacles 28-34, rarely more.

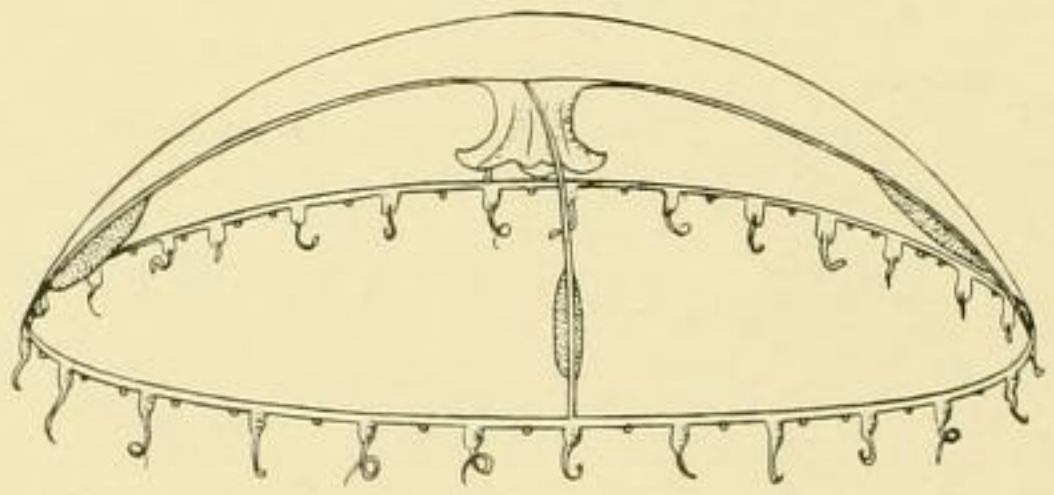

Fig. 8.—*Phialidium lomae.* × 6.

One, occasionally two, statocysts with single statoliths between adjoining tentacles. Gonads narrow in adult, confined to distal half of radial canals. Gonads, canals, tentacles and manubrium faint yellow, umbrella very transparent.

[2] Named for Point Loma, San Diego.

Diameter 9-12 mm., rarely 14 mm.

Distribution.—Common in surface hauls off San Diego, during June and July.

This species is closely related to the species aggregated by Haeckel under the name *Phialidium variabile*. One specimen of 14 mm. diameter possessed 66 tentacles and about as many statocysts. Young forms are found with ovate gonads and 16-20 tentacles, *Epenthesis* stages.

Gen. **Phialopsis,** n. gen.

Eucopidae with a small number of long tentacles (16-32), numerous rudimentary tentacles (marginal papillae), and cirri; numerous large statocysts with several statoliths; gastric peduncle feebly developed.

This genus differs essentially from *Phialucium* Maas, recently defined as a subgenus under *Phialidium*, in possessing numerous marginal cirri. These organs are, however, readily lost (*vid. Mitrocoma discoidea* and *Eutimalphes diegensis*). And so closely does the San Diego species resemble in all other respects the East Indian *P. virens* (Bigelow) and *P. tenue* Browne, and the Fijian *Mitrocoma mbenga* Ag. & M., that a question is raised as to whether cirri may not ultimately be discovered in the latter species. In any case, the combination of two sorts of tentacles, marginal cirri and large statocysts with numerous statoliths seems to be adequate basis for a distinct genus, for which the name *Phialopsis* may be used until it becomes apparent that the type species of *Phialucium* Maas also possesses marginal cirri.

Phialopsis diegensis, n. sp.

Fig. 9.

Umbrella three to four times as broad as high, moderately thick, with a slight central swelling into the subumbrella cavity (rudimentary gastric peduncle). Manubrium short, with a cruciform base and broad fluted oral folds. Tentacles 16-28, well developed and regularly placed. Between adjoining tentacles, 5-9 rudimentary tentacles or marginal papillae, the largest always median in each group. Cirri, usually more numerous than the marginal papillae, scattered, 2-5 statocysts (usually 4 in

larger specimens) between adjoining tentacles, each with 2-6 statoliths. Velum moderately well developed. Gonads linear, on the outer three-fourths of the radial canals, reaching margin, sinuous in contraction of bell.

Diameter of largest specimen 23 mm.

Distribution.—Taken, during May, June and July, in the vicinity of San Diego, at the surface and in vertical hauls to 160 fathoms. Acc. Nos. 6-11, 752, 959, 1382, 1398, 1402.

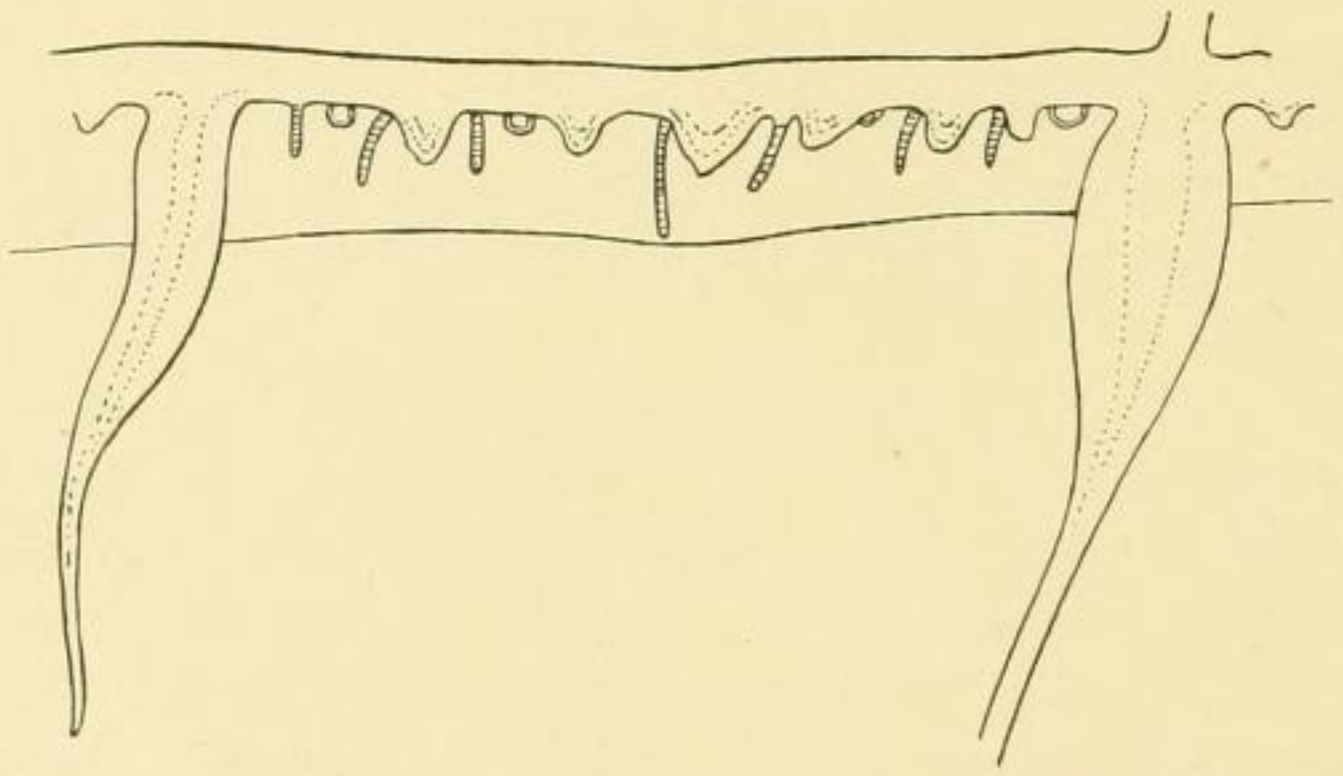

Fig. 9.—*Phialopsis diegensis.* Portion of margin. Much enlarged.

There is a tendency among the larger specimens to slight irregularities in the position of radial canals and gonads.

A single, small medusa that may prove to be an immature specimen of this species was obtained in a vertical haul from 100 fathoms, July 11, 1905, off San Diego; Acc. No. 995. The bell is hemispherical, as high as broad, without gastric peduncle, with well-developed manubrium of the *Phialopsis* type. Eight tentacles, 4 larger perradial and 4 smaller interradial, each flanked by 2 cirri. Between adjoining tentacles two marginal papillae, probably beginnings of tentacles. Between and adjoining these papillae a statocyst (8 in all) with 2 statoliths. Gonads immature, developing on the radial canals about three-fourths the length of the latter from the margin.

This individual resembles *Euchilota* more closely than it resembles *Phialopsis*. As no adults of the former genus have been obtained, it is placed provisionally under *Phialopsis*.

Gen. **Eutimalphes** Haeckel, 1880.

Eucopidae with 8 adradial statocysts and numerous tentacles, between which are numerous cirri; gastric peduncle well defined.

Eutimalphes brownei, n. sp.[3]

Fig. 10.

Umbrella almost hemispherical, rather thick centrally and produced into a broad-based gastric peduncle about as long as the subumbrellar cavity is deep. Manubrium short and broad, hanging from a short, cruciform base, made by the junction of

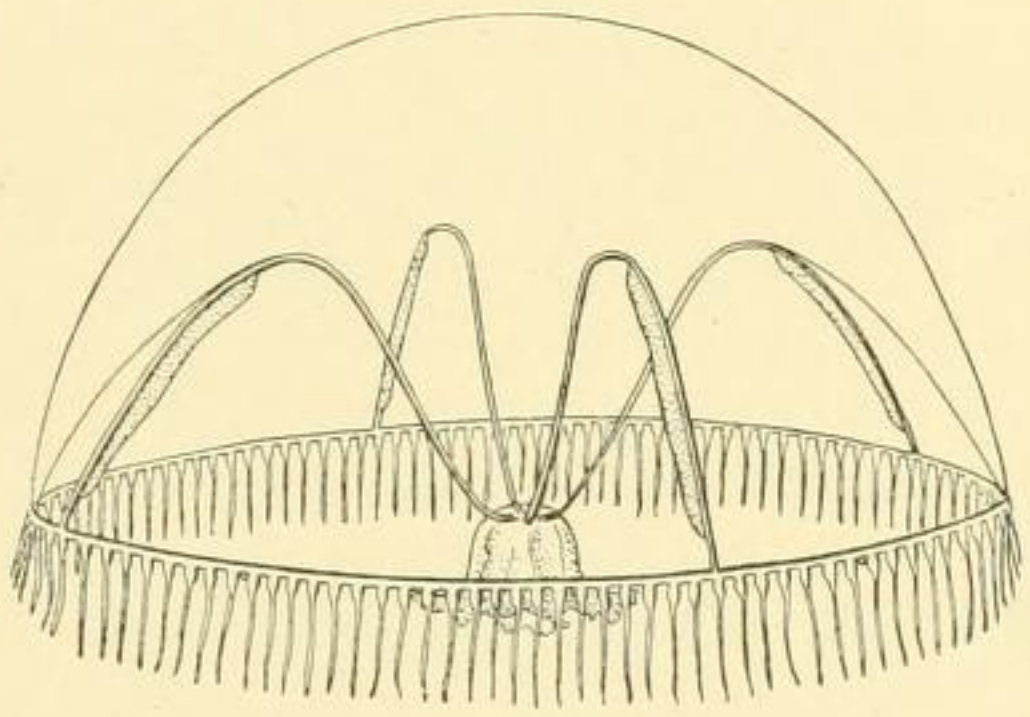

Fig. 10.—*Eutimalphes brownei.* × 3.

the radial canals, and expanding distally into a wide and much frilled mouth. Tentacles short, with bulbous bases, about 130 in larger individuals, 1 to 3 pairs of long slender cirri flanking each tentacle. Marginal papillae wanting. Statocysts large, regularly placed between the tentacles, with 6 to 13 statoliths in each. Gonads narrow bands, hanging by one edge from the outer half of each radial canal, almost reaching the margin. The umbrella is colorless, the gonads with straw-yellow endoderm and turquoise-blue ectoderm, the tentacles with red-brown endoderm, turquoise-blue ectoderm.

The largest individuals are about 15 mm. in diameter.

Distribution.—Taken at the surface in the vicinity of San

[3] Named for the well-known medusologist, Mr. E. T. Browne, of University College, London.

Diego, in June and July. Acc. Nos. 77 (type), 902, 959, 966, 1246, 1379, 1391, 1393, 1398, 1402.

Among 90 individuals, only 10 possessed cirri. In three of these (Acc. No. 77), the cirri are as described, in excellent condition. In the remaining seven (Acc. Nos. 1246, 1379) a few scattered stumps and rudiments are to be found. The 80 non-cirrate individuals are of all sizes and conditions of preservation. Assuming the cirrate form to be typical, it would appear that the absence of cirri may be due (1) to accidents of environment and (2) to spontaneous variation. The cirrate and non-cirrate forms might perhaps be regarded as distinct species—even genera, were the frequent practice of authors to be followed. Hartlaub (1897) distinguished *Eutonina* from *Eutimalphes* on essentially this basis, though he also considered the size of the stomach. For the present, however, this does not seem to me to be the wisest course to adopt with the San Diego material, as careful comparisons of cirrate and non-cirrate individuals has failed to reveal any other difference, even in the smallest details. Further, in the typically cirrate *Mitrocoma discoidea*, there is a large range of variation in the number of cirri.

The gonads arise as linear bodies along the radial canals, each with one end resting on the base of the gastric peduncle, the other half-way to the margin. The growth is therefore centrifugal.

Gen. **Irene** Eschscholtz, 1829.

Eucopidae with numerous tentacles, statocysts and marginal cirri; gastric peduncle short; gonads not occupying the entire length of the radial canals.

The following species has been placed here provisionally only, since the presence of cirri has not been demonstrated. In all other respects, however, it is a typical *Irene*, and there is a strong probability that the cirri may have once been present (cf. *Mitrocoma discoidea* and *Eutimalphes brownei*).

Irene mollis, n. sp.

Fig. 11.

Umbrella about twice as broad as high, jelly thin and soft, gastric peduncle moderate. Manubrium short, with thin walls

folded into four prominent frilled lobes about a large mouth. Tentacles 150 to 180. Statocysts small, 1 (or 2) between adjacent tentacles, about 200 in all. Gonads narrow vertical bands along half the length of each radial canal from the margin. Gonads, canals and manubrium faint yellow; bulbs of tentacles brick-red.

Diameter of umbrella 15 to 20 mm.

Distribution.—At the surface in the vicinity of San Diego, during June and July. Acc. Nos. 77, 962, 966, 1379, 1382.

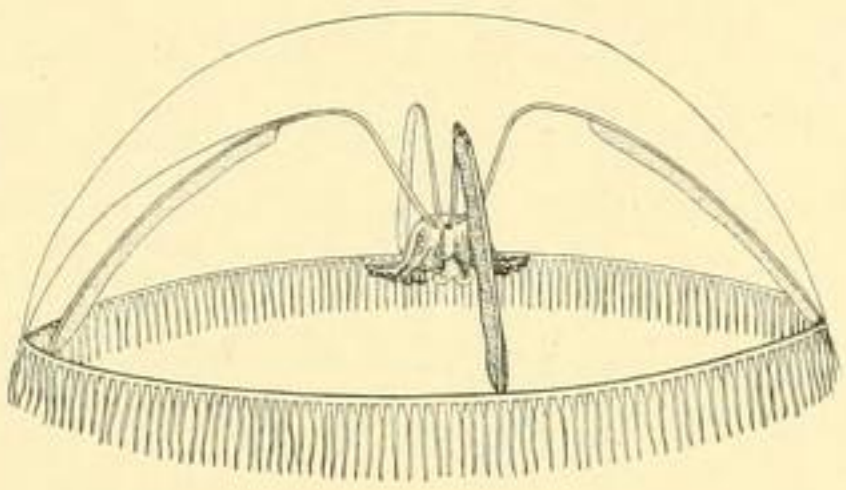

Fig. 11.—*Irene mollis.* × 3.

This species is easily mistaken at first glance for *Eutimalphes brownei*, with which it occurs, but is less robust. It resembles in general *I. coerulea* Agassiz, from which it may be distinguished at once by the position of the gonads. Further, the gastric peduncle is not so tapering, the tentacles are more numerous, and the diameter is less than in the eastern species.

Fam. Aequoreidae Eschscholtz, 1829.

Leptomedusae with numerous closed statocysts and numerous radial canals which bear the linear gonads; manubrium with broad base and thin walls.

Gen. **Aequorea** Per. & Les., 1809.

With the characters of the family.

Browne (1904) and Maas (1905) rely upon the form of the manubrium to distinguish between *Aequorea* and *Mesonema*. My observations on the living *Mesonema coerulescens* Brandt in the Northern Pacific confirm those of Claus (1883), and I agree with him that this character is of no practical value.

In a discussion in connection with *Mesonema pensile*, Browne (1904, p. 734) says: "The stomach is quite rudimentary and is practically absent, as its lower wall is only about 2 mm. in length, so that the mouth must always remain wide open." This is not a necessary conclusion. I have seen the lower wall of the manubrium of *M. coerulescens* Br. contract to such a size and present every appearance of being then in its normal permanent condition; and I have also seen the same manubrium extend readily and the wide mouth narrow and completely close by a constriction above the oral fimbriations.

Since the character on which Eschscholtz based his separation of *Aequorea* and *Mesonema* is no longer considered adequate for the purpose, the foregoing facts, taken in connection with the admirable observations of Claus, would appear to argue conclusively for the abandonment of *Mesonema*, along with the no more happily conceived *Rhegmatodes* and *Polycanna*.

Aequorea coerulescens (Brandt).

Mesonema (*Zygodactyla*) *coerulescens*, Brandt, 1835, p. 21; Brandt, 1838, p. 360, pl. 5.

Zygodactyla coerulescens, A. Agassiz, 1865, p. 108.

Mesonema coerulescens, Haeckel, 1880, p. 228.

Umbrella thick, three times as broad as high, with a central, broad swelling into the gastric cavity. Manubrium with a very broad base and about 60 oral fimbriations; its wall highly contractile, mouth readily closed. Tentacles more numerous than the radial canals, which number about 120. Velum narrow. Gonads along nearly the entire length of the radial canals. Bases of tentacles a bright blue, umbrella faintly bluish.

Diameter may exceed 190 mm.

Distribution.—Taken at the surface, in June and July, in the vicinity of San Diego (Acc. Nos. 999, 1357, 1379). Mertens obtained the type specimens about 1600 miles to the west of San Diego. I met with it at Unalaska Island, in May, 1906.

The northern specimens were larger than those taken by Mertens. The San Diego individuals are much smaller, respectively 4 mm., 15 mm. and 55 mm. in diameter. In the last specimen there are but 90 radial canals, with indications of a some-

what larger number of tentacles on the damaged margin, and 30 oral fimbriations. There are signs of new canals and new tentacles. The gonads are immature.

In spite of the imperfect margin, which leaves undetermined the number of statocysts, and the absence in the preserved specimens of the blue color so characteristic of the species, I do not doubt that this San Diego form belongs with those taken by Mertens to the westward.

La Jolla, Cal.,
June, 1908.

BIBLIOGRAPHY.

Agassiz, A.

1865. North American Acalephae. Ill. Cat. 2, Harv. Mus. Comp. Zool., 234 pp., 360 figs.

Agassiz, L.

1849. Contributions to the History of the Acalephae of North America. Mem. Amer. Ac., IV.

1862. Contributions to the Natural History of the United States, IV.

Agassiz, A. and Mayer, A. G.

1899. Acalephs from the Fiji Islands. Bull. Harv. Mus. Comp. Zool., XXXII, pp. 157-189, pls. 1-17.

Bigelow, H. B.

1904. Medusae from the Maldive Islands. Bull. Harv. Mus. Comp. Zool., XXXIX, pp. 245-269, pls. 1-9.

Brandt, J. F.

1835. Prodromus Descriptionis Animalium, etc. St. Petersburg.

1838. Ausführliche Beschreibung der von C. H. Mertens aus seiner Weltumsegelung beobachteten Schirmquallen, etc. Mém. Ac. St. Petersb., Sér. Sci. Math. Phys. et Nat., IV, pp. 237-411, 27 pls.

Browne, E. T.

1904. Hydromedusae, with a Revision of the Williadae and Petasidae. Fauna and Flora Mald. and Lacc. Arch., II, Pt. 3, p. 721.

1907. A Revision of the Medusae belonging to the Family Laodiceidae. Ann. Mag. Nat. Hist., (7) XX, pp. 457-480.

Chamisso et Eisenhardt.

1820. De animalibus quibusdam e classe vermium. Nova Acta Physicomed., Ac. Leop., XII, T. I., Bonn.

Claus, C.

1883. Untersuchungen über die Organization und Entwicklung der Medusen. Prag und Leipzig. 96 pp., 26 pls.

Eschscholtz, Fr.

1829. System der Acalephen. Berlin. 190 pp., 16 pls.

Forskål, P.

1775. Descriptiones Animalium, etc. Copenhagen. xxxiv + 164 pp., pp. 1 pl.

Gegenbaur, C.

1856. Versuch eines Systems der Medusen. Z. w. Z., VIII, H. 2.

Haeckel, E.

1864. Beschreibung neuer Craspedoter Medusen aus dem Golfe von Nizza. Jen. Zeitschr., I, p. 332.

1880. Das System der Medusen. Jena.

1882. Deep Sea Medusae. Chall. Rep. Zool., IV, cv + 154 pp., 32 pls.

Hartlaub, C.

1897. Die Hydromedusen Helgolands. Wissensch. Meeresuntersuchungen. Kiel, II, pp. 449-512, pls. 14-23.

Hincks, T.

1868. A History of the British Hydroid Zoophytes. 2 v. London.

Leuckart, R.

1856. Beiträge zur Kenntniss der Medusen Fauna von Nizza. Arch. f. Naturges., XXII, pp. 1-40.

Maas, O.

1893. Die Craspedoten Medusen. Ergeb. der Plankton Exp., II, k. c., 107 pp., 8 pls.

1897. Die Medusen. Mem. Harv. Mus. Comp. Zool., XXIII, No. 1, 89 pp., 15 pls.

1904. Bemerkungen zum System der Medusen. Revision der Cannotiden Haeckels. Sitzb. Kgl. Bay. Ak. Wiss., XXXIV, pp. 421-445.

1904*a*. Méduses provenant des campagnes des yachts *Hirondelle* et *Princesse-Alice* (1886-1903). Monaco.

1905. Die Craspedoten Medusen der Siboga Expedition. Leyden. 84 pp., 14 pls.

Mayer, A. G.

1906. Medusae of the Hawaiian Islands collected by the Steamer *Albatross* in 1902. Bull. U. S. Fish Comm. for 1903, pt. 3, pp. 1131-43, pls. 1-3.

Metschnikoff, E.

1886. Medusologische Mittheilungen. Arb. Zool. Inst. Wien.

1886*a*. Embryologische Studien an Medusen. Wien. vi + 159 pp., 12 pls.

Murbach, L. and Shearer, C.

1902. Preliminary Report on a Collection of Medusae from the Coast of British Columbia and Alaska. Ann. M. Nat. Hist., (7) IX, pp. 71-73.

1903. On Medusae from the Coast of British Columbia and Alaska. Proc. Zool. Soc. Lond., II, pp. 164-192, pls. 17-22.

Peron et Lesueur.

1809. Tableau des charactères generiques et specifiques, etc. Ann. Mus. Hist. Nat., XIV.

Torrey, H. B.

1904. The Hydroids of the San Diego Region. Univ. Calif. Publ. Zool., II, pp. 1-43, 23 text-figs.