

BULLETIN OF THE VANDERBILT MARINE MUSEUM  
VOLUME VII

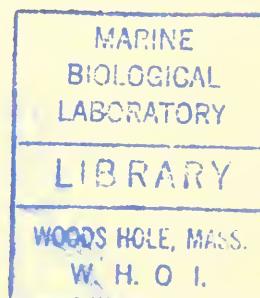
Scientific Results of the World Cruises of the yachts  
"Ara," 1928-1929, and "Alva," 1931-1932, "Alva"  
Mediterranean Cruise, 1933, and "Alva"  
South American Cruise, 1935,  
William K. Vanderbilt, Commanding

MARINE ALGAE: CHLOROPHYCEAE AND CORALLINACEAE  
COELENTERATA: HYDROIDA, LEPTOMEDUSAE, SIPHONOPHORA,  
SCYPHOMEDUSAE, ALCYONACEA, PENNATULACEA,  
ACTINARIA AND MADREPORARIA  
ANNELIDA POLYCHAETA  
ECHINODERMATA: ASTEROIDEA, CRINOIDEA, OPHIUROIDEA,  
ECHINOIDEA AND HOLOTHUROIDEA  
CRUSTACEA: ANOMURA, MACRURA, BRACHYURA, STOMATOPODA  
AND CIRRIPEDIA  
MOLLUSCA: CEPHALOPODA, AMPHINEURA, GASTROPODA,  
NUDIBRANCHIATA AND PELECYPODA

By LEE BOONE

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THE MARINE ALGAE, COELENTERATA, ANNELIDA  
POLYCHAETA, ECHINODERMATA, CRUSTACEA  
AND MOLLUSCA OF THE WORLD CRUISES OF THE  
YACHTS "ARA," 1928-1929, AND "ALVA," 1931-1932,  
"ALVA" MEDITERRANEAN CRUISE, 1933, AND  
"ALVA" SOUTH AMERICAN CRUISE, 1935,  
WILLIAM K. VANDERBILT, COMMANDING

*by*

LEE BOONE

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This Bulletin, seventh in the scientific series of the Vanderbilt Marine Museum, contains reports on six separate groups of marine organisms, namely, Marine Algae: Chlorophyceae and Corallinaeae; Coelenterata: Hydroida, Leptomedusae, Siphonophora, Scyphomedusae, Alcyonacea, Pennatulacea, Actinaria and Madreporaria; Annelida Polychaeta; Echinodermata: Asteroidea, Crinoidea, Ophuroidea, Echinoidea and Holothuroidea; Crustacea Decapoda: Anomura, Macrura, Brachyura, Stomatopoda and Cirripedia and Mollusca: Cephalopoda, Amphineura, Gastropoda, Nudibranchiata and Pelecypoda collections obtained on four separate expeditions made by Mr. William K. Vanderbilt in his yachts, "Ara" and "Alva." It is the third volume of the scientific series devoted to the Invertebrate collections obtained during the "Alva" World Cruise, 1931-1932, and contains the second report of the "Alva" Echinodermata, the third report on the Crustacea and the first reports on the Coelenterata, Annelida Polychaeta, Mollusca and Marine Algae of this cruise. In "West Made East with the Loss of a Day," a chronicle of the first circumnavigation of the globe under the United States Naval Reserve yacht pennant, July 7, 1931, to March 4, 1932,—An Account of Adventures in Navigation, Diversions, Picturesque Scenes and Every Day Life of Remote Places and the Taking of Specimens for the Vanderbilt Marine Museum, by William K. Vanderbilt in command of the Motor Ship "Alva," Mr. Vanderbilt has presented the narrative of this voyage in an exquisitely illustrated volume which includes maps of the itinerary, also many lovely color plates painted from living specimens by Mr. W. E. Belanske, under Mr. Vanderbilt's

direction. Volume V of the Bulletin series presented the Crustacea: Stomatopoda and Brachyura, and Volume VI, the Crustacea: Anomura, Macrura, Euphausiacea, Isopoda and Amphipoda and the Echinodermata: Asteroidea and Echinoidea of this "Alva" World Cruise.

The itinerary of this circumnavigation of the globe, a cruise of 28,182 miles, which began at Northport, Long Island, New York, thence to the "Alva" Base, Fisher Island, Miami, Florida, was via Cuba, and Jamaica, through the Panama Canal to the Perlas Islands, out to the Galapagos, then the Marquesas, Tamotu and Society Archipelagoes, Samoa, Fiji, New Caledonia and Great Palm Island, Australia, then leaving the Pacific, through Torres Straits, to Flores Strait, Sumbawa, Bali, Java, through the Banka and Malacca Straits, Indian Ocean and Arabian Sea to Aden, through the Suez Canal to the Mediterranean Sea, France, Spain, Gibraltar, Morocco, out to the Canaries and Cape Verde Islands, across the Atlantic via Porto Rico, home to Miami. The collections herein discussed were made in the beauteous coral reefs and fascinating tidal zone of the above archipelagoes and localities of the littoral zone of the Indo-Pacific region, that part of the world, oldest in human history, yet still a mystery even to students of science, who have spent their lives in research. The major deep-sea dredgings were made at stations in the Dutch East Indies, off the New Hebrides and off Marquesas Islands, in the Pacific, and off the Canaries, in the Atlantic Ocean and along the continental shelf of the southeastern United States.

The first reports on the same groups of Invertebrates, obtained during the World Cruise of the yacht "Ara," 1928-1929, is also incorporated in the present Bulletin. The journal of this voyage: "Taking One's Own Ship Around the World, a Journal descriptive of scenes and incidents together with observations from the log book recorded on the Voyage Around the World, October 25, 1928, to May 16, 1929, of the yacht "Ara," commanded by the author, has been delightfully told by Mr. Vanderbilt, in an exquisitely illustrated volume, which includes maps of the voyage and numerous color plates of the living specimens, painted by Mr. W. E. Belanske. The "Ara's" route via the Panama Canal traversed some of the most fascinating areas of the Pacific, the Hawaiian, Marshall, Caroline and Philippine Archipelagoes, thence returned home via Cochin China, the Straits Settlements, India, the Suez Canal, Greece, Italy and France, a voyage of 28,738 miles, during which explorations the sea yielded rich harvest of countless rare

and new marine specimens, whose living bodies bear palimpsest of an immemorial past. The principal deep-sea stations made by the "Ara" were in the south China Sea and regions adjacent to the Mindanao coast in Philippine waters. The scientific treasures of this cruise, which are discussed in detail, in the foreword of the respective systematic divisions of the reports, may be summarized by stating that rare species and new ones are of common occurrence, but common species are exceedingly rare.

Material secured by the "Alva" Mediterranean Cruise, 1933, which sailed from the "Alva" Base, Fisher Island, Miami, Florida, via the Bermuda Islands, across the Atlantic to the Mediterranean Sea, making collections at Santander and Almeria, Spain, Naples, and Venice, Italy, and Casa Blanca, Morocco, is also included in this Bulletin.

The "Alva" South American Cruise, 1935, left from her Base, Miami, made important deep-sea stations along the margin of the Pourtale Plateau, securing several hundred valuable specimens, many of which establish second records of Dr. Alexander Agassiz's Echinoderm types, also of Dr. Alphonse Milne Edwards' Crustacean types first collected by the United States Coast Survey steamer "Blake," thence proceeded through the Panama Canal to the Perlas Islands, where valuable specimens of Invertebrates were taken, then swung south, in the path of the Humboldt Current, exploring Ecuadorean, Peruvian and Chilean waters, which investigations yielded countless marine Invertebrate rarities, including the rediscovery of several of "lost" species of Crustacea, established by the Abbé Don Juan Molina, 1782, but so seldom represented in northern museum collections that they have been unrecognized by modern students. Other forgotten species rediscovered by the "Alva" include Anomuran Crustaceans, collected in the Chiloe Archipelago, Chile, first described by M. Guérin de Méneville, in his report on the "Crustaces du Voyage de la Favorite" (1835, also 1838). Brandt's rare Leptoline Medusa, taken only twice since he described it a hundred years ago in the "Mémoires de l'Académie impériale des Sciences de St. Petersbourg" from a station off the northwestern trend of the Humboldt Current, was found lazily drifting in Valparaiso Harbor, Chile, gigantic specimens, their crystalline blue bodies repeating the beauties of Merton's exquisite color-plate. From the muddy bottom of Reloncavi Inlet, Bahia de Cochamo, Chile, Dr. Alexander Agassiz's rare *Brisaster moseleyi*, first dredged by H.M.S. "Challenger," was taken in abundance by the "Alva."

The fresh-water Crustacean fauna of Peru is represented by one species of prawn which is also one of the oldest described Chilean crustacea, the "mason crab," *Cancer cementarius*, described in the Abbé Don Molina's "Natural History of Chile." (1776, anonymously, 1782 signed).

The annotated discussion of the species is presented with reference to their systematic classification. Geographical and bathymetrical distribution of the species is also given. The greater portion of the "Ara" and "Alva" Invertebrates herein discussed are very rare specimens, not at all, or very sparsely represented in any American museum, being hitherto known only from the types or a few specimens variously fifty to a hundred years old or even older, scattered in the museums of Asia, Australia, Oceania, Europe, Africa, South and North America. In addition to these rarities, numerous new species in several groups of Invertebrates were taken by the "Ara" and "Alva" and are deposited in the type series of the Vanderbilt Marine Museum. Concise discussion of the more significant rarities is given in the synopses of the respective systematic divisions of Invertebrates reported.

P A R T I I  
COELENTERATA

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PART II  
COELENTERATA

The Coelenterata presented in this Bulletin of the Vanderbilt Marine Museum, seventh in the scientific series, are part of the collections obtained by Mr. William K. Vanderbilt in a series of cruises in his yachts "Ara" and "Alva," during the years 1928 to 1935. These explorations included the World Cruise of the "Ara," 1928-1929, the World Cruise of the "Alva," 1931-1932, and the "Alva" South American Cruise of 1935. Although numerically small, the collection is surprisingly rich in the number of new and rare species it contains, and in the related extension of knowledge of their geographical and bathymetrical distribution and of their anatomy, as presented in the systematic discussion.

**Hydroida**

The Hydroida are represented by only one species, *Corydendrium splendidum* Boone, from Oahu, Hawaii, a new Gymnoblastea, possessing stages of development seldom found. These were collected by the "Ara" World Cruise, 1928-1929.

**Leptomedusae**

The Leptomedusae are represented by two exceptionally large specimens of the exceedingly rare *Aequorea coerulescens* (Brandt) which were collected in Valparaiso, Chile, by the "Alva" South American Cruise of 1935.

**Siphonophorae**

The Siphonophorae obtained by the "Alva" World Cruise of 1931-32 consist of eight species, the record of each of which contributes something of value to our knowledge of this group of miraculously beautiful ocean dwellers.

The "Alva's" deep-sea station in the Atlantic Ocean, off Fuerte Ventura, Puerto Cabras, Canary Islands, depth 250 fathoms, yielded four species, namely: A series of specimens of *Doromasia picta* Chun, of especial interest in being from Chun's type locality;

a series including both the Eudoxid and polygastric generation of *Cubooides vitreous* Quoy and Gaimard, originally taken near the Straits of Gibraltar; a series of the nearly circumtropic *Hippopodius hippopus* (Forskal) and representatives of the widely distributed *Agalma okeni* Eschscholtz.

The comparatively rare *Amphicaryon acaule* Chun is represented by a single colony from the "Alva" deep-sea station in the Pacific Ocean, north of Nuka Hiva Island, Marquesas Islands, depth 150 fathoms. Likewise a series of specimens of *Abylopsis tetragona* (Otto) was taken here.

A new locality was established for the widely distributed *Diphyes bojani* (Chun) by the netting of a series of specimens in the Flores Straits, in a depth of 140 fathoms.

The several specimens of *Porpema prunella* (Haeckel), also taken in the Pacific north of Nuka Hiva Island, give the third record of this curious species, from a point intermediate between the widely separated type-locality, in the Pacific, north of New Guinea, established by the "Challenger" and the more recent "Albatross" record of it from the tropical eastern Pacific, off the west coast of Peru.

### Scyphomedusae

The Scyphomedusae collection of the "Alva" World Cruise, 1931-32, contains only five species, but includes in these the remarkable, gigantic *Versura palmata* Haeckel. Four of these species are members of the *Rhizostomae*, two of which, *Versura palmata* Haeckel and the exquisite small *Mastigias papua* (Lesson) were taken in Banka Straits, off Muntok Island. The specimens of *Versura palmata* are much the largest recorded of this magnificent species and are apparently the only specimens of it in an American museum.

*Cephea cephea* (Forskal) from the Pacific Ocean, north of the Marquesas Islands, is represented by a valuable series of young specimens, which establish a new locality for the species and the second deposit of it in an American museum.

*Stomolophus meleagris* (L. Agassiz) from Conway Bay, Galapagos Islands, is of exceptional interest, since it is the first record of an adult from this Archipelago, from which locality Haeckel (1880) described a solitary larval specimen. The species, rather scarce on the West Coast of the Americas, and more abundantly

known on the southeastern coast of the United States and in Caribbean waters, is one of those highly specialized *Rhizostomata* that has not changed since the two oceans became separated by the elevation of the Isthmus.

The fifth medusa, *Pelagia noctiluca* (Forskal), a member of the *Semaeostomeae*, was taken in the Atlantic Ocean, near the Canary Islands.

The species of medusa are distributed as follows:

*Pelagia noctiluca* (Forskal), Atlantic Ocean, off Canary Islands.

*Cephea cephea* (Forskal), Pacific Ocean, north of Nuka Hiva Island, Marquesas Islands.

*Mastigias papua* (Lesson), Muntok, Banka Island, Banka Straits, Dutch East Indies.

*Versura palmata* (Haeckel), Muntok, Banka Island, Banka Straits, Dutch East Indies.

*Stomolophus meleagris* (L. Agassiz), Conway Bay, Galapagos Islands.

### Alcyonacea

The Alcyonacea are represented by four species of exceptional interest. *Lobularia ceylonicum* (Pratt) discovered by the Ceylon Pearl Oyster Fisheries Investigations of the Gulf of Manaar, and recorded only once since then, when it was taken by the "Siboga" at Jeden Island, Dutch East Indies, was taken by the "Alva" on Teviatoa Reef, Raiatea Island, Society Islands, in abundance, this material being the first deposited in an American museum. The geographic range of the species is extended by several thousand miles.

Three large colonies of *Alcyonium confertum* (Dana) were taken in the Fiji Islands and appear to be the first record of this interesting species, since Prof. Dana secured his type in this archipelago nearly a hundred years ago.

The "Ara" World Cruise obtained two new species of Alcyonacea. These include a new *Sarcophytum* unique in its spiculation, *Sarcophytum reticulatum* Boone from the littoral zone of Pulo Condore, Anambas Islands, and a new *Dendronephthya*, also from the south China Sea. *Dendronephthya rosamondae* Boone was dredged off Terampa Cove, Siantan Island, in 33 fathoms, a magnificent colony, remarkably beautiful.

### Pennatulacea

There is but a single species present of the Pennatulacea; this was taken by the "Ara" World Cruise in Manila Bay, Philippine Islands. It is a magnificent colony more than a foot long, representing a new species, *Veretillum vanderbilti* Boone, a remarkable and somewhat perplexing species that contains characters hitherto found only in the genotype, a Mediterranean-Atlantic species, combining these with characters heretofore considered distinctive for several separate Indo-Pacific species.

### Actinaria

The Actinaria are represented in the collections of the "Alva" World Cruise of 1931-32 by two littoral species, one of which, *Gemmaria marquesana* Boone, a colony of approximately two hundred polyps attached to volcanic rock, taken in Anaho Bay, Nuka Hiva Island, is new to science. The second species, *Palythoa tuberculosa* (Esper), from the tidal zone of the Society Islands, is represented by an exceptionally fine colony of polyps. Although widely distributed in the Indo-Pacific, this primitive coral, which possesses such intensely interesting anatomy, appears to be very sparsely represented in museum collections. The "Ara" World Cruise, 1928-1929, also took this species in Kaneohe Bay, Hawaii.

The "Alva" World Cruise also secured a remarkably interesting series of fifty-odd specimens of the larval stages of *Peponactis aequatorialis* van Beneden in a deep-sea haul made north of the Marquesas Islands.

### Madreporaria

Both the "Ara" World Cruise of 1928-1929 and the "Alva" World Cruise of 1931-1932 made extensive collections of exceptionally fine stone corals, discussed elsewhere. The two species herein reported were collected by the "Ara" in Hawaii and include the typical form of *Pocillopora cespitosa* Dana, which was first taken by the United States Exploring Expedition in this archipelago, and the very rare cluster coral, *Dendrophyllia manni* (Verrill), known only from Kaneohe Bay, Oahu, and represented in the Vanderbilt Marine Museum by the finest series of specimens recorded.



*Corydendrium splendidum* Boone, type, a portion of the colony showing the branching hydrocaulus, supporting hydranths in the various stages of development found, also the sporosacs; one of the rare, isolated gonophores, is shown on the lower left primary ramus.

## COELENTERATA

Order: HYDROIDA

Family: CLAVIDAE

Genus: CORYDENDRIUM Van Beneden

*Corydendrium splendidum*, new species

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### Plate 4

**TYPE:** A large colony taken in one fathom, at low tide, in Kaneohe Bay, Oahu, Hawaiian Islands, December 15, 1928.

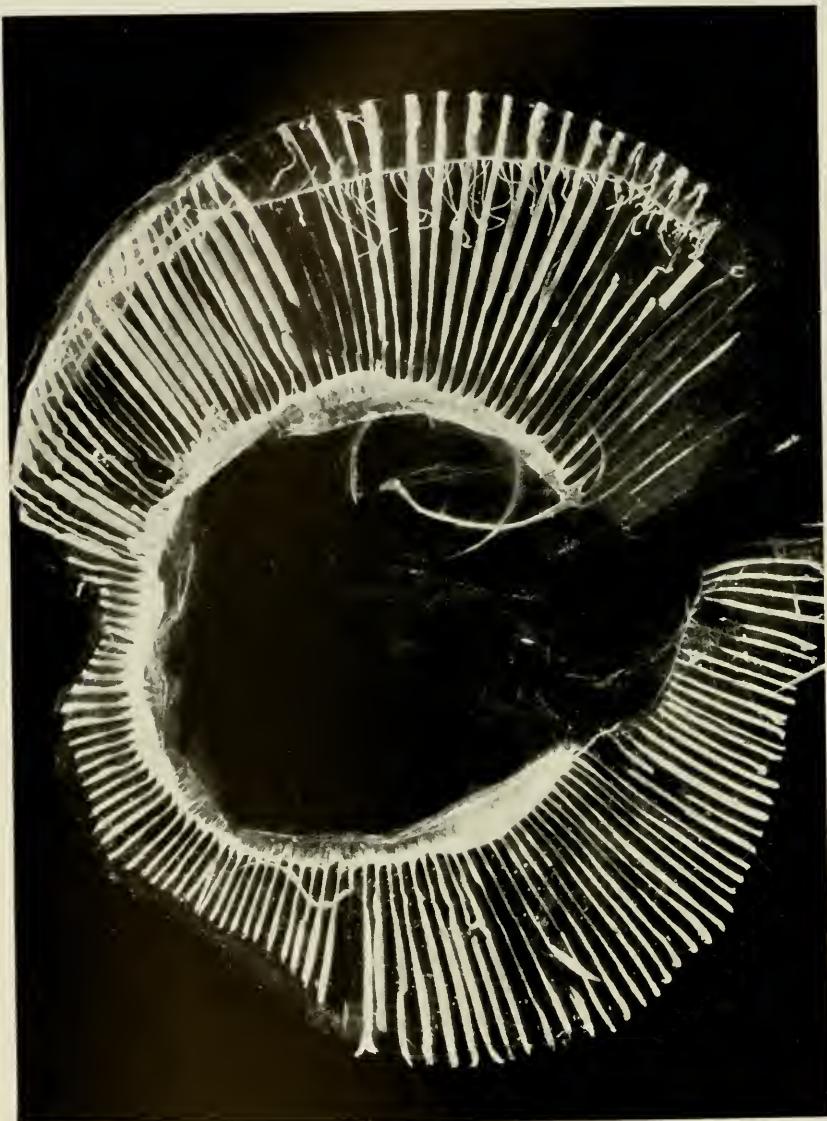
**DISTRIBUTION:** Littoral zone of Hawaii.

**TECHNICAL DESCRIPTION:** Trophosome: Colony with a strong creeping, much branched, netlike hydrorhiza which gives rise to a much branched hydrocaulus, fascicled at the base, attaining a height of five to six inches, the primary ramification irregular, but with the successive branches uniformly alternate and distichous in their division, giving rise throughout their length, on the exposed upper or distal sides, to short branches which support the hydranths on their tips. The perisarc is horn-like, firm, elastic; the primary stem annulated with two or three rings at each joint and the branches with six to eight rings at the origin of these and the yet smaller branches which are the hydrophore-like supports of the hydranths. These hydrophore-like branches may be distributed alternately to the left and right of the supporting branch, or irregularly if the latter arrangement achieves a more advantageous distribution. The hydrotheca have an elongated, narrowed, ovoidal body, with numerous short to medium length filiform tentacles irregularly distributed over the surface, these tentacles varying in the hydranths examined from four to six short, button-like protuberances encircling the distal end to sixteen to twenty tentacles of medium length irregularly distributed over the entire body; in those where the greatest tentacle development exists some of these tentacles form a simple, encircling circle around the base of the hydranth body and vary in length from one-third to one-half the length of the body; while above these, on the same body, shorter tentacles occur, in some instances nearly concealing the body, giving it a black-berry-like appear-

ance, created by the close grouping of the rounded tentacle-tips, (See pl. 4.). More frequently these small tentacles are sparsely distributed with much of the surface of the hydranth body visible. In a great many instances there arise from the identical hydrophore one, two or three globular or ovoidal shaped sporosacs; each of these is attached proximally by a thread, these threads converging and forming the attachment with the lumen of the hydrophore-like stem. None of the several hundred hydranths examined showed any indication of being capable of retraction within the hydrophore-like stem. The hypostome was found in varying degrees of extensibility and dilation; in some instances resembling a mere puckered distal end with a small aperture, in others a pair of lips surrounding a slit-like aperture, while in a few examples, completely dilated, the proboscis resembles distally a concave saucer-like form united proximally by a narrowed neck to the body, the whole having a vase-like profile.

**GONOSOME:** There are a few isolated gonophores present. Each of these is attached singly by a short peduncle to a primary lateral branch, a short distance below the distal end of a joint and adnate to the base of a smaller branch which forms the hydrophore, giving rise to a cluster of the numerous ovoidal sporosacs. These isolated gonophores are small, slender, narrowly ovoidal, proximally tapered and distally rounded, canary-yellow, with a shining surface, about 1 millimeter long with a maximum width diameter of about 0.4 millimeters.

The ovoidal sporosacs, which in the present colony are more numerous than the developed hydranths, arise in clusters of two, three, four, or much more rarely, six to eight, globular-ovoidal bodies, usually in various sizes and stages of development, each attached proximally by a filament, these threads forming a fascicle that extends within the lumen of the hydrophore. Not infrequently the degenerated tentacles of a hydranth occur at the base of such a cluster of sporosacs.



*Aequorea coerulescens* (Brandt), the smaller specimen taken in Valparaiso Harbor, Chile, about one-half of natural size, photographed from the dorsad of disk.



*Aequorea coerulescens* (Brandt), slightly more than one-half of the larger specimen, taken in Valparaiso Harbor, Chile; about one-half of natural size, photographed from the dorsad of disk.

Order: **LEPTOMEDUSAE**

Family: **AQUORIDAE**

Genus: **AEQUOREA** Périon and Lesueur

*Aequorea coerulescens* (Brandt)

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Plates 5 and 6

**TYPE:** Brandt's type was taken in the Pacific Ocean, about Lat. 35° N., Long. 144° W., by Mr. C. H. Mertens, whose exquisite colour plates of this species apparently furnish the only colour record published. The type material is deposited in the Zoological Museum at St. Petersburg (Leningrad), Russia.

**DISTRIBUTION:** This exceedingly rare medusa is known only from the type locality, a fragmentary specimen from the Maldives, insufficient for positive identification (Bigelow, 1904), and one "large" specimen, 60 millimeters in diameter, from the "Albatross" station 4652, 100 fathoms to surface, and one specimen, 12 millimeters in diameter, from station 4655, 300 fathoms to surface, off Agudas Point, Peru, and the two specimens taken by Mr. Vanderbilt at Valparaiso, Chile.

**MATERIAL EXAMINED:** Two specimens, taken at Valparaiso, Chile, February, 1935, by the "Alva."

**TECHNICAL DESCRIPTION:** The larger specimen has a total diameter of 225 millimeters, a central mouth diameter of 75 millimeters and a radius of 75 millimeters for the area between the outer margin of the mouth and the circumferal margin. The smaller specimen has a total diameter of 225 millimeters, a central mouth diameter of 60 millimeters and a radius of 55 millimeters for the bell area between the outer margin of the mouth and the circumferal margin. These specimens are extremely interesting not only because of their great size, the larger one being 3.75 times the size of the largest one hitherto recorded (Bigelow, 1909), but because they establish the first Chilean record for a medusa for which the southernmost record has heretofore been off Agudas Point, Peru, (about 82° Long. W., 5° Lat. S.), thus extending our fragmentary knowledge of the Leptoline Medusae fauna of the tropical west coast of South America. It is significant that both

recent records of this exquisite medusa are within the range of the Humboldt Current. The gelatinous disk is a thick, plano-convex, with a diameter equal to one-third of the total diameter.

**Gastro-vascular system:** The stomach is from one-third to one-half of the total diameter of the medusa, well developed in both specimens, although somewhat torn in the smaller specimen. The lower gastric wall is well developed in the larger specimen, with slight contraction, the mouth rather widely open. The lips, or oral prominences, appear to be about one-third as many as there are canals in the larger specimen. These vary in size, obviously due to the degree of contraction existent, from approximately the ratio Brandt (1838) illustrated in the type, to some slightly larger and others, smaller.

**CANALS:** The canals of the larger specimen are shown in pl. 6 and are of comparatively one size. The majority of the canals of the smaller specimen are moderately stout, approximately subequal, with others quite slender; there being no definite arrangement nor alteration of different sizes, such as is represented in Brandt's plate. In the present smaller specimen these canals show as thick or thin, in ratio to the degree of contraction existent, in part, and in part, to the position and light in which they are visible through the gelatinous substance. Critical examination of the uninjured canals show these to be approximately subequal. In the larger specimen these radial canals are all about equal and show in varying degree a puckered repetitional sinuate contour. The gonads are well developed.

**OCTOCYSTS:** These are very numerous, frequently double octocysts occur; all are closely crowded among the tentacles.

**TENTACLES:** These are almost entirely absent in the larger specimen, which is imperfect marginally, except for a space of about 12 millimeters width. About half of the circumferal margin is present in the smaller specimen where a fairly constant repetition of four to six tentacles per radial section between two canals occurs; these tentacles are of different sizes due to growth stages, the longest ones not exceeding 18 millimeters in the contracted state, the majority being 10 to 12 millimeters long; all are very slender. The tentacular bulbs are long, laterally compressed, only moderately dilated, of subovoidal form, or appearing in contour as irregularly oval, more narrowed distally than proximally. Each tentacular bulb communicates at the base on the inner side with

a conspicuous excretory papilla. The tentacular bulbs are distinctly darker, approaching a bluish black. In the larger specimen, the canals and gonads show a deep ivory yellowish tone; while in the smaller specimen these merely show as opaque creamy lines through the gelatinous bell.

**COLOUR:** The bell is opalescent, transparent gelatinous, somewhat crystalline. Canals with gonads show deep ivory yellow, otherwise they show an opaque creamy line.

**REFERENCES:** *Mesonema coerulescens*, BRANDT, J. F., Mem. Sci. Math., St. Petersbourg, 1838, p. 360, pl. 5, (colour plate by Mertens).

*Aequorea coerulescens*, BIGELOW, H. B., Mem. Mus. Comp. Zool., 1909, vol. XXXVII, pl. 4, fig. 4, and pl. 35, figs. 3-8.

**Order: CALYCOPHORAE**

**Family: SPHAERONECTIDAE**

**Subfamily: Muggiinae**

**Genus: DOROMASIA Chun**

**Doromasia picta Chun**

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**TYPE:** Dr. Chun's type series was secured in the Canary Islands; it included a good series of living specimens. The depository is not stated.

**DISTRIBUTION:** A deep-sea species found in the warm regions of the Atlantic Ocean and in the tropic Pacific, Malaysia and Indian Ocean.

**MATERIAL EXAMINED:** The "Alva" specimens are twelve in number, with five additional partially destroyed specimens; the largest one is 26 millimeters long. They were taken in 250 fathoms, off Puerto Cabras, bearing 270° true, 7 miles distant, Fuerte Ventura, Canary Islands, February 18, 1932.

**COLOUR:** Transparent milky with touches of yellow on the internal organs.

**LIFE HISTORY:** Imperfectly known.

TECHNICAL DESCRIPTION: Consult *Doromasia picta* Chun, C., Senckenb. Naturf. Gesellsch., Abh., 1892-95, p. 91, pl. 8, figs. 3-5, pl. 9, figs. 5-10, pl. 10, figs. 1-9.

The complete specimens in the "Alva" series conform in every way with Dr. Chun's excellent description and exquisite illustration of this siphonophore. Variation in the extent of dentition occurs along the lateral ridges of the prismatic nectophore, in the present series of specimens. One of the largest specimens, with the nectophore 24 millimeters long, has these ridges serrate throughout their length; another nectophore, 16 millimeters long, has some of the ridges entirely serrate, others smooth. Very small nectophores, from 10, 12 to 14 millimeters long, do not have any more serration than is shown in plate 8, figure 3, of Chun's type illustration.

REFERENCES: *Doromasia picta*, CHUN, C., Senckenb. Naturf. Gesellsch., Abh. 1892-95, p. 91, pl. 8, figs. 3-5, pl. 9, figs. 5-10, pl. 10, figs. 1-9.—BIGELOW, H. B., Mem. Mus. Comp. Zool., 1911, vol. XXXVIII, p. 346, also see p. 264, (with extensive synonymy).

Genus: **CUBOIDES** Quoy and Gaimard

**Cuboides vitreus** Quoy and Gaimard

TYPE: Quoy and Gaimard's type of the Eudoxid was secured in the Strait of Gibraltar by the "Astrolabe," in May, 1826, and is deposited in the Paris Museum.

Chun's type of the polygastric series was secured in the Canary Islands; the depository was not given.

DISTRIBUTION: This species is reliably known from the tropic Atlantic from the Canary Islands to the West Indies and also from the Indian Ocean (Huxley), the Malaysian region (Lens and Van Riemsdijk) and is abundant in the eastern tropical Pacific (Bigelow).

MATERIAL EXAMINED: One Eudoxid and one representative of the polygastric generation from off Fuerte Ventura, Puerto Cabras, Canary Islands, bearing 270° true, 7 miles distant, depth 250 fathoms, February 18, 1932.

TECHNICAL DESCRIPTION: Consult Chun (1892). The present specimens, also from the Canary Islands, are identical with those described by Dr. Chun from this locality.

REFERENCES: *Cuboides vitreus*, QUOY AND GAIMARD, Ann. Sci. Nat. Paris, t. X, 1827, p. 19, pl. 2, E, figs. 1-3.

*Eudoxid*, BIGELOW, H. B., Mem. Mus. Comp. Zool., 1911, vol. XXXVIII, No. 2, p. 190, (with extensive synonymy).

*Halopyramis adamantina*, CHUN, C., Sitz. Akad. Wiss. Berlin, Bd. XLIV, 1888, p. 1155; Abh. Senckenb. Nat. Ges. Bd. XVIII, 1892, p. 11, taf. 10, fig. 10, taf. 12.

*Cuboides adamantina*, CHUN, C., Ibid, p. 112.

Family: PRAYIDAE

Subfamily: Amphicaryoninae

Genus: AMPHICARYON Chun

Amphicaryon acaule Chun

¶

TYPE: Dr. Chun's type material was taken in the vicinity of the Canary Islands.

DISTRIBUTION: This species has been recorded twice from the Atlantic Ocean, namely, in the vicinity of the Canary Islands and possibly also Bermuda (Chun); while Dr. Bigelow reported it from the West Indies and from the tropical eastern Pacific seven specimens were taken at seven "Albatross" stations in depths ranging from 300 fathoms to surface.

MATERIAL EXAMINED: One young colony, taken in 150 fathoms, north of Nuka Hiva, Marquesas Islands, August 11, 1931, by the "Alva."

REMARKS: This young colony, the only one taken in a large haul of plankton, is like the specimen from the tropical eastern Pacific shown in Dr. Bigelow's plate 4, figures 1 to 8. The present specimen is quite young but shows clearly the short corm with its appendages and the canal system of the two nectosarc is traceable. This colony has a long diameter of 3.5 millimeters and shows the older nectosarc but little larger than the younger.

- REFERENCES: *Amphicaryon acaule*, CHUN, C., Sitz. Akad. Wiss. Berlin, Bd. XLIV, 1888, p. 1162.—BIGELOW, H. B., Mem. Mus. Comp. Zool., 1911, vol. XXXVIII, p. 195, pl. 4, figs. 1-8.  
*Mitrophyes peltifera*, HAECKEL, E., Rept. Voy. H. M. S., "Challenger" Zool., vol. XXVIII, 1888, p. 131; Jena Zeit. f. Naturwiss., 1888, p. 34.—CHUN, C., Ergeb. der Plankton Exp., II, K.-b, 1897, 1888, p. 102.

### Family: HIPPOPODIIDAE

Genus: **HIPPOPODIUS** Quoy and Gaimard

**Hippopodius hippopus** (Forskal), s. s. Schneider

1

TYPE: Forskal's type is no longer extant.

DISTRIBUTION: This species is well known in the Atlantic from the West Indies eastward to the coast of Europe, also in the Mediterranean Sea. It is also known from one record in the Malaysian region (Lens and Van Riemsdijk) and is generally distributed in the eastern tropical Pacific (Bigelow). Bathymetric occurrence: surface to 400 fathoms.

MATERIAL EXAMINED: Ten detached nectophores, the largest one being 12 millimeters long, the smallest one about 3 millimeters long, the remainder being a series intermediate between these two. These were taken in 250 fathoms, about seven miles off Fuerte Ventura, Puerto Cabras, Canary Islands, February 18, 1932.

TECHNICAL DESCRIPTION: Numerous excellent descriptions and illustrations of this species are cited by Bigelow (1911).

REFERENCES: *Gleba hippopus*, FORSKAL, P., Icones rerum naturalium quas in itinere orientali, 1776, Hauniae, p. 14, taf. 43, fig. 1.

*Hippopodius hippopus*, SCHNEIDER, K. C., Zool. Anz., Bd. XXI, 1898, p. 82.—BIGELOW, H. B., Mem. Mus. Comp. Zool., 1911, vol. XXXVIII, p. 208 (with extensive synonymy).

Family: DIPHYIDAE

Subfamily: Abylinae

Genus: ABYLOPSIS Chun

*Abylopsis tetragona* (Otto)

¶

REMARKS: For discussion of this species refer to Volume IV, Bulletin of the Vanderbilt Marine Museum, p. 36. The present series of specimens, from near the Marquesas Islands, agree closely in all essentials with the "Ara" series, previously reported (1933), from 400 fathoms depth, off St. Raphael, France, in the Mediterranean Sea.

The seven superior nectophores of the Marquesas Islands series, range from four to six millimeters long, while the free Eudoxids are 3 to 4 millimeters wide.

All stages of this species have been well described and illustrated. The diagnostic features distinguishing *tetragona* from *eschscholtzi*, the only other species with which it is likely to be confused, have been given in the writer's earlier account.

MATERIAL EXAMINED: Seven superior nectophores and five free Eudoxids, taken in a plankton haul, from 150 fathoms to surface, north of Nuka Hiva Island, Marquesas Islands, August 11, 1931.

REFERENCES: *Pyramis tetragona*, OTTO, A. W., Nova Acta Caes.

Leop. Carol., 1823, vol. XI, p. 306, taf. 42, figs. 2a-2c, 1883.

*Abylopsis tetragona*, BIGELOW, H. B., Mem. Mus. Comp. Zool., vol. XXXVIII, 1911, p. 224, pl. 14, figs. 6, 7 and pl. 15, fig. 2.

Subfamily Diphyopsiinae

Genus: DIPHYES Cuvier

*Diphyes bojani* (Chun)

¶

TYPE: This was taken between Hawaii and the Caroline Islands. The depository is not stated.

DISTRIBUTION: This species is known from the tropical Indo-Pacific, in depths varying from the surface to 300 fathoms. In

addition to the type locality, it was secured by the "Siboga" in the Malaysian region and by the "Albatross" in the Eastern Pacific, from off Manzanilla, Mexico, southward off the coast of Central America, as far as Guatemala, abundantly in the Galapagos Archipelago, both within and without the Humboldt Current, but it is not yet recorded from the Panamic region.

MATERIAL EXAMINED: Fourteen superior nectophores and a colony with two nectophores still connected, dredged in 140 fathoms, in Flores Straits, near Larantuka Village, Flores Island, Dutch East Indies, November, 1931.

The smallest specimen is 5 millimeters long and one of the largest nectophores is 12 millimeters long. The remainder form a series intermediate in size between these two, with more than half the collection in the longer group.

The excellent description of this species by Chun (1892), augmented by Bigelow's discussion (1911), makes further analysis unnecessary.

REFERENCES: *Doromasia bojani*, CHUN, C., Abh. Senckenb. Nat. Ges. 1892, Bd. XVIII, pp. 108, 110, fig. 8.

*Diphyes bojani*, BIGELOW, H. B., Mem. Mus. Comp. Zool., 1911, vol. XXXVIII, p. 232, pl. 7, figs. 2, 3, pl. 8, fig. 6, pl. 9, figs. 1, 2, pl. 10, figs. 2, 3, pl. 11, fig. 5, pl. 12, fig. 1, (with synonymy).

## PHYSOPHORAE

Family: AGALMIDAE

Genus: AGALMA Eschscholtz

*Agalma okeni* Eschscholtz

1

TYPE: This is simply recorded as being from the South Seas.

DISTRIBUTION: This *Calycophora* is very widely distributed in the warmer regions of the Atlantic, Pacific and Indian Oceans and also in the Red Sea. It does not seem to be known from the Mediterranean to date.

**MATERIAL EXAMINED:** A portion of the siphonophore with two mature bracts attached and also the pneumatophore and a cormidium with the siphon, tentacles, several palpons, female and male gonodendra. The bracts are each about 5.5 millimeters long. The "Alva" specimens were collected in 250 fathoms, about seven miles off Fuerte Ventura, Puerto Cabras, Canary Islands, in the Atlantic Ocean, February 18, 1932.

**COLOUR:** In the living specimens the pneumatophore has pigment spots of reddish purple, the stem opaque white or yellow, the tentilla brilliant brick-red.

**REMARKS:** For full description of this species consult Dr. H. B. Bigelow (1911, p. 281), whose analyses of an extensive series of living specimens, obtained by the "Albatross" expedition to the tropical eastern Pacific as well as West Indian material from other sources have greatly augmented our knowledge of this remarkable species, first described by Eschscholtz (1825), and more fully described and illustrated by Haeckel (1869, also 1888), from collections from the North Atlantic area and from Ceylon.

*Agalma okeni* is easily distinguished from its congeners by its characteristic form and habit of floating horizontally in the water. The largest colonies recorded range from 95 to 60 millimeters and many much smaller. The stem is short, non-contractile, the bracts are stiff, closely crowded in exceedingly precise and regular arrangement, prismatic in outline and roughly triangular, thickest at the distal end.

**REFERENCES:** *Agalma okeni*, ESCHSCHOLTZ, FR., Isis von Oken, 1825, vols. 16-17, p. 733-47, t. 5.—BIGELOW, H. B., Mem. Mus. Comp. Zool., 1911, vol. XXXVIII, No. 2, The Siphonophorae, p. 277, pl. 17 (extensive synonymy and full illustrations, also analyses of large collection of living specimens).

*Crystallodes rigida*, HAECKEL, E., Utrechter Gesell, Kunst.u.Wiss., 1869, p. 49, taf. 5, p. 65-71; Jena Zeit. Naturwiss. 1888, p. 40.

## CHONDROPHORAE

Family: PORPITIDAE

Genus: PORPEMA Haeckel

*Porpema prunella* (Haeckel)

7

TYPE: Dr. Ernst Haeckel, professor of Zoology in the University of Jena, found this species in 1888, on the young stages only, taken by the "Challenger" at station 222, north of New Guinea, in the Pacific Ocean and also at station 288, in the South Pacific, in 2600 fathoms and deposited in the British Museum of Natural History.

Dr. H. B. Bigelow (1911) described the adult forms from an extensive series of specimens taken by the "Albatross" in the tropical eastern Pacific, at stations 4685 and 4686, and deposited in the United States National Museum and the Museum of Comparative Zoology.

DISTRIBUTION: This species, originally reported from the Pacific Ocean, north of New Guinea, at the surface, and more recently taken by the "Albatross," in the tropical eastern Pacific, off the west coast of Peru, about Long. 95°, Lat. 21° S., in quantity, was taken by the "Alva" north of the Marquesas Islands, in a 150 fathoms-to-surface haul. The record is of interest, being a station intermediate between the widely separated earlier records.

MATERIAL EXAMINED: A corm practically denuded of tentacles and gonozoids, this corm diameter being 2.5 millimeters preserved specimen; a second corm 2 millimeters wide; another corm with the bell broken but with several tentacles attached, also a few gonozoids, this corm about 2.5 millimeters wide; three more corms with broken bells, two separate pieces of tentacle base, also a separate contracted gonozoid, all taken in plankton, haul from 150 fathoms to surface, north of Nuka Hiva Island, Marquesas Islands, August 11, 1931.

REFERENCES: *Porpalia prunella*, HAECKEL, E., Jena Zeit. f. Naturwiss. Berlin, 1888, p. 30; Rept. Voy. H. M. S. "Challenger" Zool., 1888, vol. XXVIII, p. 58, pl. 48.

*Discalia medusina*, HAECKEL, E., loc. cit. A, p. 20; loc. cit. B, p. 46, pl. 49, figs. 1-6.

*Porpita globosa*, SCHNEIDER, K. C., Zool. Anz., Bd. XXI, 1898, p. 195, partim.

*Porpema prunella*, BIGELOW, H. B., Mem. Mus. Comp. Zool. vol. XXVIII, 1911, p. 325, pls. 25, 26, 27, pl. 28, figs. 11, 15 (excellent description, based on an extensive series of adult forms).

## SCYPHOMEDUSAE

Order: SEMAEOSTOMEAE

Family: PELAGIDAE

Genus: PELAGIA Péron and Lesueur

*Pelagia noctiluca* (Forskal)

1

**TYPE:** Forskal's type came from the Mediterranean Sea and was deposited in the Copenhagen Museum.

**DISTRIBUTION:** This very beautiful medusa is pelagic in the open seas of a very wide area of the Mediterranean and the warm regions of the Atlantic Ocean. Curiously it is sometimes locally abundant in the Mediterranean for several successive seasons and then, without apparent cause, vanishes for several seasons. It has been extensively studied at the Bay of Naples where it is especially abundant in summer but the larger specimens of it are seldom recorded there in winter.

**MATERIAL EXAMINED:** One young specimen, taken in 250 fathoms, off Fuerte Ventura, Canary Islands.

**LIFE HISTORY:** The development of this species is most unusual, being direct, without a sessile larval stage. It has been exhaustively studied by Krohn (1855), Kovalevski (1873), Hamann (1883), Goette (1893), Hyde (1894) and Mechnikov (1886).

The structure of the gonads was examined critically by the two Hertwigs (1878) and the development of the gonads by Hamann (1883). These organs first appear in the entoderm of the subumbrella as four interradial, elongate ridges. The entoderm develops

a series of follicles in which the sex cells develop and then migrate into a gelatinous lamella situated between the layers of entoderm.

The egg is violet brown according to Mechnikov. Complete and nearly equal segmentation occurs and a very large, central segmentation cavity results. Invagination at the posterior end of the body forms the gastrula; the blastopore remains open, forming the mouth of the larva. The mouth is of ectodermal origin and forms by invagination of the posterior end of the larva but this invaginated sac fills only a limited portion of the segmentation cavity. The first pair of stomach pouches are entodermal and situated diametrically opposite each other. The second pair are ectodermal and placed one each halfway between the first pair. The entodermal pair develop two lateral pouches each; and later the endodermal pair also develop two lateral pouches each; thus the larva has six ectodermal and six entodermal stomach pouches. Next the ectodermal pouches develop four new adradial pouches, giving the larva sixteen stomach pouches, ten of ectodermal and six of entodermal origin.

The external characters of the transformation of this free swimming larva have been reported by Krohn, Kovalevski and more recent writers. The larval mouth-end expands crater-like with the mouth at the summit of this central zone. The subumbrella develops from the depressed region around the cone. The lappets grow out around the margin of the gastrovascular cavity. At about this stage the larva loses the body covering of cilia and then swims by rhythmical contraction of the oral disk, the free swimming scyphostoma becoming an adult medusa without strobilization.

**TECHNICAL DESCRIPTION:** Numerous excellent descriptions of the adult medusa are available. The single specimen taken by the "Alva" off the Canary Islands is 20 millimeters diameter in the preserved state, or about one-third the size of the average adult specimens taken in the Mediterranean. The bell (preserved specimen) is subhemispherical with the apex flattish, the sides relatively straight, sloping. The exumbrella has numerous verrucae, arranged in irregular radiating series from the aboral center of the exumbrella; these verrucae become less mammiform, more oval and smaller toward the margin. Eight tubular, tapering tentacles are present, each averaging a length equal to twice the

width diameter of the bell. Eight marginal sense organs are present set in deep niches, interradial and perradial. The sense club has no ocellus, having only a terminal, crystalline, orange-colored concretion mass. There is no sensory pit in the exumbrella above the sense club. There are sixteen marginal lappets, each being subrectangular with rounded angles and shallow median notches. The four-sided throat-tube is one-half as long as the bell diameter and the four lanceolate palps, each with their multi-folded margins are about one and one-third times the bell diameter. The outer edges of the palps have verrucae similar to those of the exumbrella.

**COLOUR:** The bell of the medusa is rose tinged with light lavender, this purplish tone deepening in the gonads and tentacles. The verrucae of the exumbrella and palps are brownish-orange-red.

**REFERENCES:** *Medusa noctiluca*, FORSKAL, P., *Descript. Anim. Itin. Orient.*, 1775, p. 109.

*Pelagia noctiluca*, PÉRON, F., et Lesueur, C. A., *Ann. Mus. Hist. Nat. Paris*, 1809, t. XIV, p. 350.—KROHN, A., in Muller's *Archiv. Anat. Physiol.*, 1855, p. 491, taf. 20, (discusses development).—HAECKEL, E., *Densksch. Med.-Naturwiss. Gesell. Jena*, *Syst. der Medusen*, 1880, Bd. I, p. 505 (with extensive early synonymy).—KOVALEVSKI, A. O., *Mem. Imp. Soc. Lovers of Nat. Hist. Moscow*, 1873, t. X, pt. II, p. 7, pl. 3, (discusses development).—HAMANN, O., *Zeit. f. Wissenschaft. Zool.*, 1883, Bd. XXXVIII, p. 422, taf. 32, (development and structure of gonads).—MECHNIKOV, I. I., *Embryol. Studien Medusen*, Wien, 1886, p. 24 (egg), p. 67 (segmentation), p. 100, (larva), taf. 10, figs. 23-28.—Monaco, Prince Albert of, presented by Edwards, A. M., *Compt. Rend. Sci. Paris*, 1887, to. CIV, p. 452, (swarming habits of this medusa).—VANHOFFEN, E., *Bibliotheca Zoologica*, 1888, heft No. III, p. 8, taf. 1, figs. 5, 6, taf. 6, figs. 1-5; *Deutsch. Sudpolar Exped.* 1901-03, Bd. X, *Zool. II*, p. 38.—GOETTE, A., *Zeit. f. Wissenschaft. Zool.*, 1893, Bd. LV, fig. 11, taf. 30-31; *Sitzber. Akad. Wissenschaft. Berlin*, 1893, p. 853 (development).—SHAXEL, J., *Zool. Anz.*, 1910, Bd. XXXV, p. 407 (histology of oogenesis).—MAYER, A. G., *Medusae of World*, Carnegie Inst. Wash. Publ. 109, vol. III, 1910, p. 572, pl. 60, figs. 1-3, colour.

## Order: RHIZOSTOMAE Cuvier

**Rhizostomata dichotoma** Vanhoffen, emended, Mayer

Genus: CEPHEA Péron and Lesueur

*Cephea cephea* (Forskal)

7

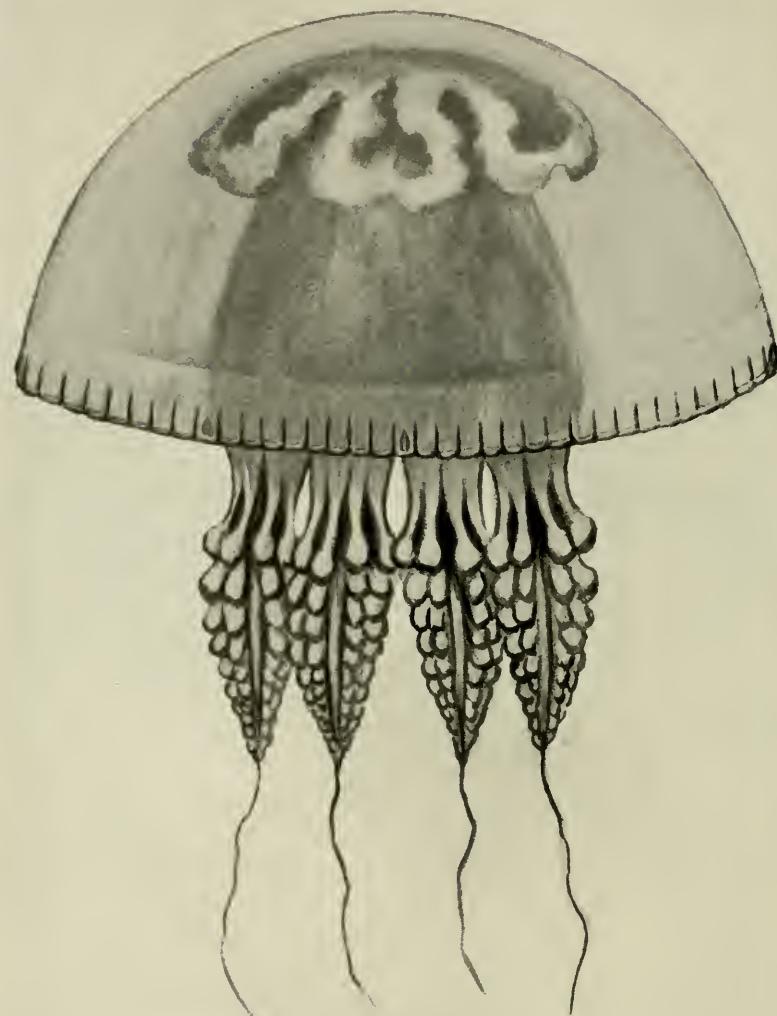
**TYPE:** Forskal's type was secured in "Djiddae" and deposited in the Royal Zoological Museum, Copenhagen.

**DISTRIBUTION:** According to the various specialists working with this group, this species and its several subspecies are widely distributed in the Indo-Pacific, it having been recorded from the Red Sea (Forskal), eastward to Malabar (Péron and Lesueur), northward as far as Misaki, Japan, in winter, east to northwestern Australia (Péron and Lesueur), Samoa (Haeckel), near the Marquesas Archipelago (Boone) and the Hawaiian Archipelago (Agassiz; Mayer).

**MATERIAL EXAMINED:** Eight young specimens, taken in 150 fathoms, north of Nuka Hiva Island, Marquesas Islands, August 11, 1931, by the "Alva."

**TECHNICAL DESCRIPTION:** There are several excellent descriptions of this species and varieties based on large adult, living specimens. The "Alva" catch are all young, the smallest jelly-fish measuring 10 millimeters diameter, the largest one 22 millimeters diameter, the other six varying from 15 to 21 millimeters diameter. These are particularly interesting in showing a serial variation in the wart-like ornamentation of the bell dome, but possessing a constant identity with the other specific characters. In the specimen 10 millimeters diameter, the dome is flattish and its entire dorsal surface is regularly dotted with small, granular dots, a few of which, about thirteen, incompletely ring the area which becomes the typical dome. The ring furrow is incipient. There are sixteen divisions of the marginal zone, thickened, opaque, and sixteen long filaments. The subumbrella is developed, gelatinous, and the characteristic long, tubular filaments are present.

In the specimen 15 millimeters diameter, the dome is present, well developed, with the near marginal warts reduced, the central dome more definitely defined and the warts here longer, larger, mammiform and more numerous and closely crowded. In the speci-



*Mastigias papua* (Lesson),  $\times 1.2$ .

men 22 millimeters diameter, the warts of the central dome are crowded, elongated, mammiform, much as those shown in Kishinouye's figures of "*Perirhiza nematophora*" (Journ. Coll. Sci. Tokio, 1902, vol. XVII, pl. 2). This, the largest of the "Alva" specimens, has the marginal lappets and is quite typically developed.

REFERENCES: *Medusa cephea*, FORSKAL, P., Descript. Anim. Itin. Orient., 1775, p. 108, No. 22; Icon., tab. 30.

*Medusa octostyla*, LINNÉ, C. (Gmelin, J. F.), Syst. Nat., 1788, ed. XIII, par. 6, p. 3157.

*Cephea rhizistomoidea*, PÉRON, F., et Lesueur, C. A., Ann. Mus. Hist. Nat. Paris, 1809, t. XIV, p. 361, No. 100.

*Polyrhiza cephea*, AGASSIZ, L., Contrib. Nat. Hist. U. S. Smithsonian, 1862, vol. IV, p. 156.

*Diplophilus couthouyi*, AGASSIZ, L., op. cit. p. 158.

*Cephea forskalea*, HAECKEL, E., Syst. der Medusen, Dansk. Med.-Natur. Gesellsch. Jena, 1879-1880, p. 574.

*Cephea conifera*, HAECKEL, E., op. cit. p. 576, taf. 36, figs. 3-8.

(?) *Cephea fusca*, PÉRON, F., et Lesueur, C. A., op. cit. 1809, p. 361, No. 99.

(?) *Cassiopea fusca*, DUSIMUER, M., 1835, Musée du Jardin des Plantes, No. 111.

*Perirhiza nematophora*, KISHINOUYE, K., Journ. Coll. Sci. Tokio, 1902, vol. XVII, art. 7, p. 14, pl. 2, figs. 11-13.

*Cephea cephea*, MAYER, A. G., Carnegie Inst. Washington, Publ. 109, 1910, Medusae of the World, vol. III, Scyphomedusae, p. 654.

### Rhizostomata triptera Vanhoffen

Genus: **MASTIGIAS** L. Agassiz

Mastigias papua (Lesson)

### Plate 7

TYPE: M. Lesson first described and exquisitely illustrated this species from material secured by the "Coquille" in Offack Bay, Waigiou and Dorey Harbor, New Guinea, and deposited in the Paris Museum collections.

DISTRIBUTION: This pelagic species is widely distributed in the Indo-Pacific, having been reported from the east coast of Africa, the Indian Ocean, the Malay Archipelago, the China Sea northward to Japan and outward through Malaysia in the Pacific Ocean as far as the Fiji Archipelago. The species possesses much variation which has resulted in the recognition of three or more varieties, namely, Vanhoffen's *M. sibogae* from the Malay Archipelago; Schultze's *M. siderea* of the east African coast, and Kishinouye's *M. physophora* found off the coasts of Shima and Sagami, Japan, during summer. It was first taken on the coasts of New Guinea (Lesson) while the most recent record, from Banka Straits, by the "Alva" refers to the typical *papua* and not the variety *sibogae*.

MATERIAL EXAMINED: Twenty-six jellies, from Muntok, Banka Island, Banka Straits, Dutch East Indies, October, 1931; labeled taken with large sea-jelly, *Versura palmata* Haeckel.

COLOUR: This jelly-fish is variable in colour, the bell and mouth organs normally being greenish-blue or olive-green to olive-brown, the exumbrella having, especially near the margin, numerous oval markings of white, yellow, brown, blue or green. The frills of the mouths vary from olive, greenish-blue, yellowish-green to brown, usually in tones harmonious with the remainder of the organism.

TECHNICAL DESCRIPTION: The bell is from 25 to 60 millimeters diameter in the present series consisting of twenty-six specimens. Specimens measuring 80 millimeters diameter have been recorded by Mayer.

The bell is hemispherical, in preserved specimens varying from slightly less or slightly greater fullness than a hemisphere, of firm, gelatinous substance, the exumbrella showing fine granulations. There are eight rhopalia, each possessing a pigmented mass of concretions and a shallow, exumbrella, sensory pit devoid of furrows. There are eighty marginal lappets. Each octant has two small, pointed ocular lappets and eight larger, distally rounded velar lappets, with deep grooves between them extending up the sides of the umbrella for a distance about equal to two and a half or three times the width of a velar lappet. The arm disk is a little more than half the width of the bell. The four subgenital

ostia are each about twice as wide as the columns between and are constricted medially. The subgenital porticus is unitary.

There are eight mouth-arms, each of which is about as long in the dead specimen as the bell radius. The simple upper part is about 0.4 as long as the frilled distal portion which is three-winged. The frilled mouths are numerous along the margins of the three wings and also for considerable distance inward along the sides of each wing. Numerous small, club-shaped vesicles arise between the mouths on the outer sides of the mouth arms; a few long filaments similarly arise on the ventral or inner sides of the mouth-arms. The distal end of each mouth-arm terminates in a clavate tentacle or filament, which varies in length from zero to approximately equal to the bell diameter. This club is subtriangular in cross-section and contains an axial canal. Each mouth-arm contains a main canal that arises from the stomach and within the arm divides into three branches which extend to the three series of frilled mouths of the winged lower part of the arm with ramifications and distally these three unite in confluence with the axial canal of the distal club.

The central stomach is cruciform and gives rise to the eight radial canals which extend to the rhopalia. These radial canals are communicant by means of the wide ring canal which is situated well inward from the margin. Each octant of the stomach between the rhopalar canals gives rise to six to nine anastomosing radial canals that fuse with the ring canal. The ring canal gives rise on the outer side to a fine mesh network of anastomosing vessels that extend into the marginal lappets and unite with the ends of the rhopalar canals. The circular muscle area of the marginal zone of the exumbrella is very much interrupted in the eight rhopalar radii. The gonads consist of four folded walls forming cruciform sides of the subgenital aperture.

This species is a rapid swimmer, moving by an incessant rhythmic pulsation of the bell rim which alternately contracts and expands.

The young stage of this species was described by Agassiz and Mayer (1899).

REFERENCES: *Cephea papua*, LESSON, R. P., in DuPerry, L. I., Voy. Autour du Monde, La Coquille, 1822-25, Zool., t. II, pt. II, 1829, p. 122, pl. 11, figs. 2, 3.

*Cephea papuensis*, GRIFFITH, E., in Cuvier's Regne Anim. 1832, pl. 3, fig. 3.

*Pseudorhiza thocambau*, AGASSIZ, A., and MAYER, A. G., Bull. Mus. Comp. Zool., 1899, vol. XXXII, p. 173, pl. 13, figs. 40-44 (young stages).

*Mastigias papua*, VANHOFFEN, E., Wiss. Ergeb. deutsch. Tiefsee Exped. Valdivia, 1902, Bd. 3, lief. 1, p. 47, tab. 1, figs. 17-19.

*Mastigias physophora*, KISHINOUYE, K., Zoolog. Mag. Tokio, 1895, vol. VII, No. 78, 3 pp., pl. 13, figs. 1-13.—SCHULTZE, L. S., Denkschr. Med. Nat. Gessell. Jena, 1898, Bd. VIII, p. 443.—VANHOFFEN, E., *op. cit.*, "Valdivia" p. 49.

*Mastigias papau* variety *physophora*, MAAS, O., Abh. Akad. Wiss. Munchen Suppl. N. Bd. I, Abh. 8, p. 46.

*Mastigias papua*, AGASSIZ, L., and MAYER, A. G., Contrib. Nat. Hist. U. S. (Smiths. Publ.), 1862, vol. IV, p. 152.—HAECKEL, E., 1880, Syst. der Medusen, 1879, Bd. I, Densch. Med.-Naturwiss Gessellsch. zu Jena, p. 623.—MAAS, O., 1903, Scyphomedusen der Siboga Exped. Monogr. Number XI, p. 66, 69, taf. 12, fig. 111, MAYER, A. G., Medusae of the World, Carnegie Inst. Wash. Publ. 109, 1910, pt. III, p. 678, fig. 415.—LIGHT, S. F., 1914, Philippine Journ. Sci. Sect. D., Biol., vol. IX, p. 209.—MAYER, A. G., Bull. 100, U. S. Nat. Mus., vol I, 1917, p. 220.

Genus: VERSURA Haeckel  
Versura palmata Haeckel

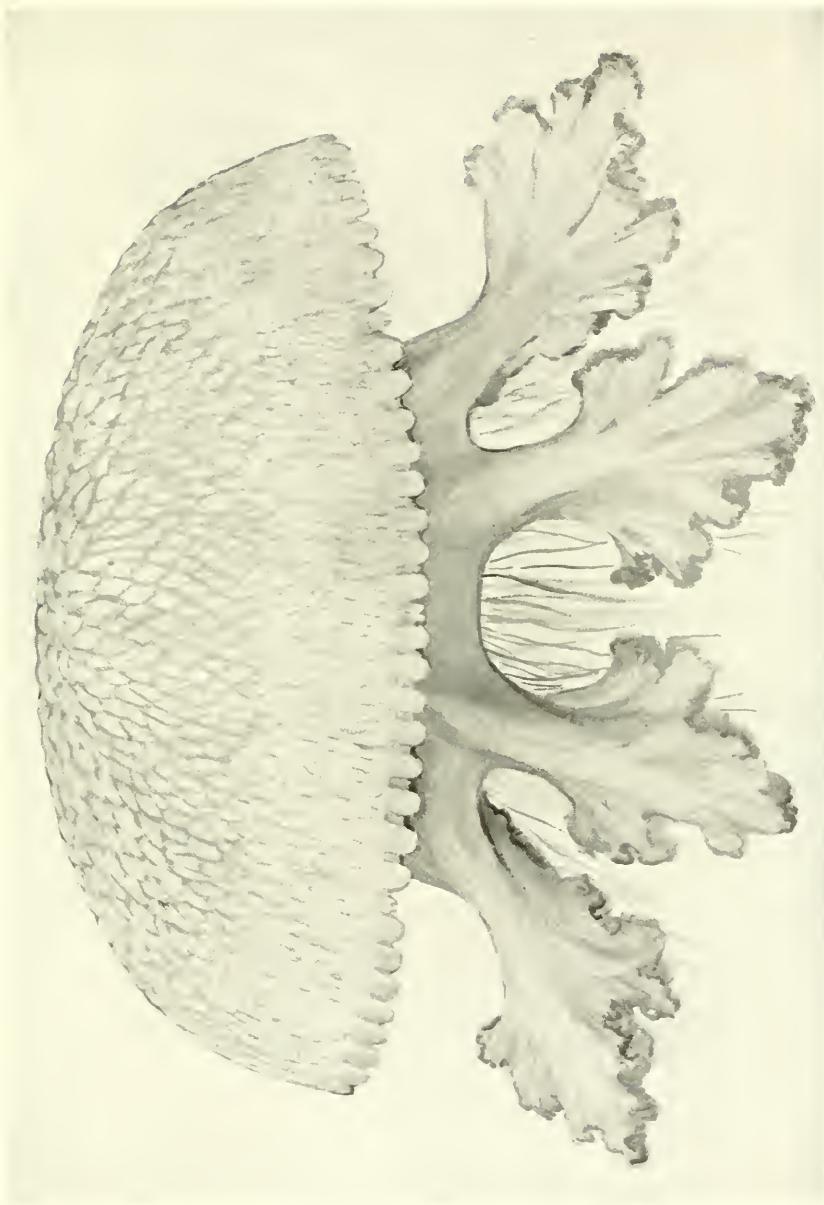
Plates 8 and 9

TYPE: Haeckel's description is based on specimens from the Malay Archipelago, Sunda Sea, Java, Cherebon, Andrea. The depository is not directly stated, but much of Haeckel's collection was deposited in the Jena University Museum.

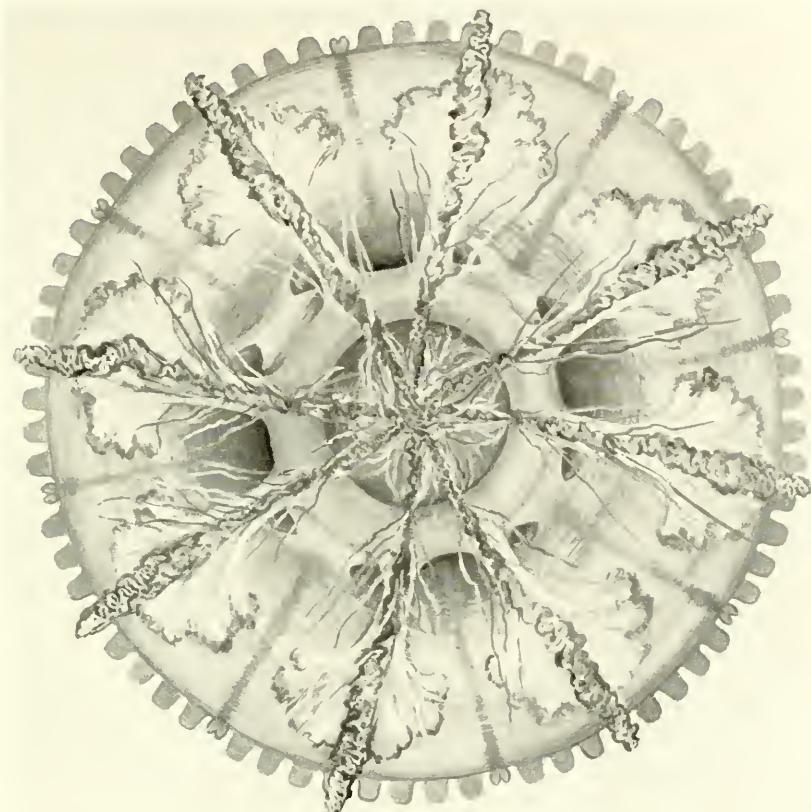
DISTRIBUTION: In addition to the localities cited above Goette recorded specimens from Zanzibar, Singapore and northward at

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Plate 8.



*Verstuva palmata* Haeckel, profile of largest specimen taken in Banka Straits,  
Dutch East Indies, by the "Alva,"  $\times 0.12$ .



*Versura palmata* Haeckel: ventral view of largest specimen taken by the  
"Alva," in Banka Straits, .1 of natural size.

Nagasaki, Japan. Vanhoffen reported it from the Sulu Seas and Java.

MATERIAL EXAMINED: One specimen from Banka Straits, diameter about 8 inches. Two specimens from Muntok, Banka Island, the complete one having a diameter of 18 inches, while the much larger, imperfect specimen indicates a diameter of about 22.5 inches.

TECHNICAL DESCRIPTION: The "Alva" specimens are much the largest recorded to date of this magnificent species of the *Rhizostomata triptera*, which are distinguished from the six other groups of *Rhizostomae* by having each mouth-arm three-winged, possessing a ventral and two dorsal branches which meet at the lower or free end of the arm.

Haekel's type measured 60 millimeters width diameter and 20 millimeters thick. Goette's specimens varied from 5 to 65 millimeters wide.

The entire Muntok specimen has the bell wide, circular, less elevated than a hemisphere, 200 millimeters diameter, about 50 millimeters thick near the center, about 30 millimeters thick midway the radius and about 5 millimeters thick near the circumference.

The bell is about 200 millimeters wide diameter, less elevated than a hemisphere and but little convex. The exumbrella is covered with a network of anastomosing reticulations defining irregular polygonal elevations. This network is coarser at the center and finer meshed toward the circumference. It is probable that in the present specimens these are accentuated by death. The gelatinous substance of the bell is semi-opaque, about 40 to 50 millimeters thick near the center, about 30 millimeters midway and about 5 millimeters thick near the margin. It has a brownish-yellowish tinge which may be due to the presence of algae. There are eight rhopalia set within very shallow niches in the bell margin. The velar lappets said to vary from four-double to twelve per octant are eight in the present specimen, each being shaped as shown in plate and separated by short, narrow clefts. The arm-disk is nearly two-thirds as wide as the bell radius. The four subgenital ostia are about twice as wide as the perradial columns between them. The subgenital cavity is narrow, cruciform, unitary. The eight mouth-arms are each about equal in

length to the radius of the disk and extend almost to the circumferal margin when laid out flat. The upper simple axial shaft of the proximal part of each arm is about two-fifths of the total length, while the three-winged distal part is three-fifths of this length, Y-shaped in cross-section and almost as wide as long. The free margins of this Y are multiple-branched and folded and bear the frilled mouths. Each lamella of the mouth-arm has seven or eight deep clefts. There are many small club-shaped vesicles scattered among the frilled mouths and several larger terminal clubs along the lower or outer end of each arm. Numerous strong, tapering filaments occur between the mouths along the side of the arm. The rows of frilled mouths along the axial side of the arms extend to the center and here form a rosette-like arrangement. There are present a great many long, tapering, thread-like filaments that arise independently and hang down. The central stomach is cruciform, the arms being perradial. Four perradial canals extend direct from the four angles of the central stomach to the four perradial sense-organs respectively. From each of the four interradial sides of the stomach there arises a network area of anastomosing capillary-like vessels, from each area of which arises an interradial canal that extends to the four perradial sense organs. Some few branches from the anastomosing interradial area extend out and unite with the perradial canals. All eight radial canals are intercommunicant through another zone of anastomosing vessels near the margin, some of which vessels extend into the lappets, this marginal network fulfilling the function usually performed by a *true ring canal*, which is absent in members of this genus. There is also a main canal arising from each of the four perradial corners of the central stomach which goes down into the arms, where it branches complexly, these branches going into the mouth-arms.

The umbrella is strengthened by a wide area of concentric ring muscles, the outer portion of which extends close to the marginal lappets; the ring is divided into eight sectors by as many radial-canals. On either side of each radial-canal and parallel thereto are narrow areas of fine radial muscles, supporting the umbrella and in a measure protecting the canals.

REFERENCES: *Versura palmata*, HAECKEL, E., Syst. der Medusen, 1879, Bd. I, Densch. Med.-Naturwiss-Gessellsch. zu Jena,

1879, Bd. I, p. 606, taf. 40, figs. 9-12.—GOETTE, A., Sitzungb. K. Preuss. Akad. Wiss. Berlin-Jahrg., 1886, halband II, (Berlin Mus.).—HAMANN, O., Jena, Zeitsch. Naturwiss. Med.-Naturwiss. Gesell. Jena, 1882, Bd. XV, n. f. 8, p. 253.—VANHOFFEN, E., in Leuckart, C. G. u. Chun, C., Biblioth. Zool. Abh. gesamtgebiete der Zool., 1889, Aft. III, Unt. semao-stome u rhizostome Medusen, p. 42.—MAYER, A. G., Medusae of World, Publ. Carnegie Inst. Wash., 1910, vol. III, p. 685.

Genus: STOMOLOPHUS L. Agassiz

*Stomolophus meleagris* L. Agassiz

¶

See Plate 10, Volume IV

MATERIAL EXAMINED: One large specimen, taken in Conway Bay, Galapagos Archipelago, July 28, 1931, by the "Alva."

REMARKS: This specimen, an unusually fine one, the bell (preserved specimen) having a maximum horizontal diameter of 280 millimeters and a vertical diameter of 120 millimeters, the length of the manubrium being 140 millimeters, is of exceptional interest since it is the first record of the adult species from the Galapagos Archipelago, from which locality Haeckel described the younger stage of the species as *Brachiolophus collaris* Haeckel (1880), the few other West Coast of America records being restricted to the mainland, ranging from San Diego, California, (Bigelow, 1914), where Dr. Henry B. Bigelow recorded the Prussian blue colour variety of *Stomolophus meleagris* as abundant during August and September, 1913, and the Pacific Coast of Costa Rica from which Haeckel (1880) described it as *S. agaricus* and the Bay of Panama specimens described as *S. chuni* Vanhoffen (1910).

This species is much better known from the many records on the East Coast of the United States, from inside the Chesapeake Bay, off Tangier Island and southward to the Capes (Boone) and more especially from the Atlantic Coast off the Virginia Capes, on the coast of North Carolina, down to South Carolina (type locality), also at Charleston (Mayer), the beach of Warsaw Island,

below Savannah, Georgia (L. Agassiz, type series), Miami Beach, Florida, (Boone, 1923, also 1933), Tortugas, Florida and Cuba (Mayer), at Surinam, described as *S. fritillaria* (Haeckel, 1880), also the northern shores of South America and in the Gulf of Paria, between Trinidad and Venezuela (Trinci, 1906, described as *S. chuni*).

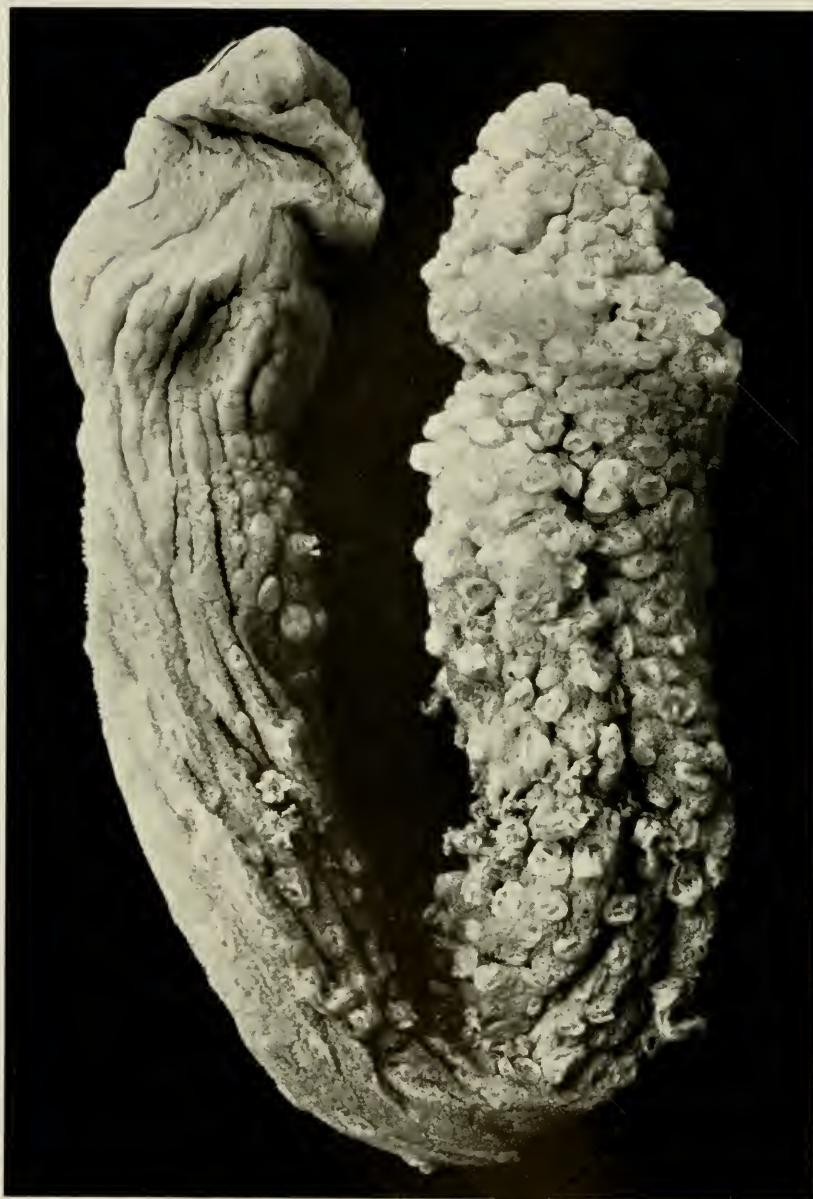
Full description and discussion of the Miami Beach, Florida, specimens, collected by Mr. Vanderbilt, in his yacht "Ara," is presented in Volume IV, Bulletin of the Vanderbilt Marine Museum, p. 48, plate 10.

The present Galapagan specimen conforms in all anatomic details with the Atlantic specimens, except that it exceeds these in the number of marginal lappets, which average twenty to twenty-two per octant in this unusually large example of the species. However, as Dr. Bigelow has illustrated with Atlantic and California Pacific specimens, there is no correlation between the number of lappets and geographic occurrence. The number of lappets in the present Galapagan adult specimen is no greater than are already known from specimens from both coasts.

REFERENCES: *Stomolophus meleagris*, HAECKEL, E., System der Medusen. Zweite Hafte des System der Medusen. Jena Denkschr. I, 1880, p. 599; *S. fritillaria*, HAECKEL, op. cit., p. 598; *S. agaricus*, HAECKEL, E., op. cit., p. 598; as *Brachiolophus collaris*, HAECKEL, E., p. 597.

*Stomolophus chuni*, VANHOFFEN, E., Ueber semaeostome und rhizostome Medusen. Bibl. Zool. I, 1888, I, heft. 3, p. 43.—TRINCI, G., Ann. Museo R. Univ. Napoli, 1906, ser. 2, t. IX, p. 1-4.

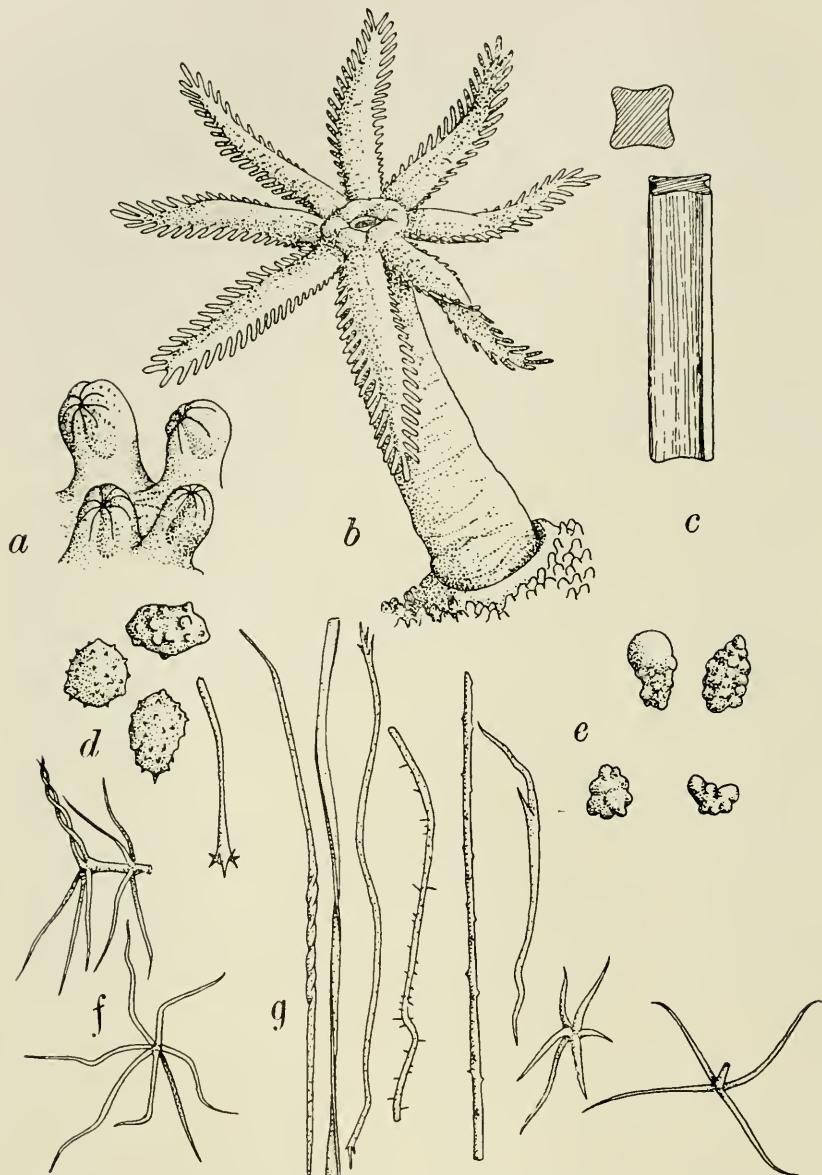
*Stomolophus meleagris*, BIGELOW, H. B., Univ. of Calif., Publ. Zool., 1914, vol. XIII, No. 10, p. 239.—BOONE, L., Bull. Vanderbilt Mar. Mus. 1933, vol. IV, p. 48, pl. 10 (with early synonymy).



*Veretillum vanderbilti* Boone, type colony, about natural size.



*Veretillum vanderbilti* Boone, type, photograph of a one-inch transverse section, selected about midway the length of trunk, showing the relative occurrence of autozooids and siphonozooids, greatly enlarged.



*Veretillum vanderbilti* Boone, type: a, group of siphonozooids,  $\times 20$ ; b, an expanded autozooid,  $\times 20$ ; c, transverse and longitudinal sections of axis,  $\times 4$ ; d, spicules, sphaeroidal and ovoidal bodies from cortex of anthocodia,  $\times 50$ ; e, spicules from cortex of rachis, irregular, rosette disks with nodular excrescences; f, single and double stellate spicules from cortex of anthocodia,  $\times 50$ ; g, needle-like spicules from the cortex of anthocodia and cortex of rachis also stellate spicules from rachis, all  $\times 50$ .

Order: PENNATULACEA  
Family: VERETILLIDAE  
Genus: VERETILLUM Cuvier  
*Veretillum vanderbilti*, new species

†

Plates 10, 11 and 12

TYPE: One colony, in excellent state of preservation, taken in 25 fathoms, seven miles northeast of Corregidor Island, Manila Bay, Luzon, Philippine Islands, January 25, 1929, by the "Ara."

The present species, seventh member of the genus *Veretillum* Cuvier, as given by Hickson (1916),<sup>1</sup> and augmented by a sixth species from the Gulf of California (Deichmann, 1936),<sup>2</sup> is the second member of the genus possessing spicules in the anthocodia, the other one being the genotype, *V. cynomorium* (Pallas)<sup>3</sup> which is known from the Red Sea, Mediterranean Sea and North Atlantic to the Bay of Biscay and on the west African coast to South Africa. *Veretillum vanderbilti* differs from *V. manillense* Kolliker<sup>4</sup>, the only other species described from the Philippines, in the presence of abundant and distinctive spicules in the cortex of the rachis of *V. vanderbilti*.

The present writer keenly appreciates the fact, pointed out by Mr. Hickson, that there is really little difference of importance existent between the Indo-Pacific species, *Veretillum manillense*, Kolliker, *V. tenue* Marshall and Fowler and *V. malayense* Hickson and the present species and that it is probable that all these Indo-Pacific species of the genus will be united, but since this cannot be sensibly done without study of a comprehensive series of specimens, it provisionally seems necessary to keep the "Ara" specimen separate as a new species, particularly since it is the only Indo-Pacific series possessing distinctive spicules in the anthocodia and also has numerous spicules intermeshed or interwoven in the mesoglea of the rachis.

<sup>1</sup>*Veretillum*, HICKSON, S. J., Siboga-Expedition, Pennatulacea, Monogr. XIV, 1916, pp. 46-50.

<sup>2</sup>*Veretillum binghami*, DEICHMANN, E., Bull. Bingham Oceanogr. Found., Yale Univ., 1936, vol. V, p. 4, text fig. 1.

<sup>3</sup>*Pennatulum cynomorium*, PALLAS, P. S., Misc. Zool., 1766, p. 176, pl. 13, figs. 1-4; with earlier records in Rondelet, 1554, etc.

<sup>4</sup>*Veretillum manillense*, KOLLIKER, A., Senckenb. Naturf. Gesellsch., abh., 1872, Bd. VIII, p. 142, fig. 189.

The species is placed provisionally in the genus *Veretillum*, Cuvier (1798), although the writer is quite aware that the present species, *V. vanderbilti*, possesses in addition to the "thin plate spicules" accepted as typical of the genus *Veretillum*, the smooth needle-shaped spicules, sometimes branching at the extremities, considered distinctive of the genus *Cavernularia* Valenciennes, Milne Edwards et Haime (1857), and likewise possesses "rod-shaped" or "flattened needle-shaped ridged spicules" diagnostic of *Actinoptilum* Kukenthal (1910), while the denticulate spheroidal or ovoidal spicules of the cutis of the rachis of *V. vanderbilti* are but a slightly more primitive form of the "double club" or dumb-bell" shaped thorny spicules typical of the genus *Lituria* Valenciennes (1850).

The alternative of designating a new genus within the group seems most undesirable, in view of the existent variability of characters accepted for those genera comprising the *Veretillidae*.

COLOUR: Mr. Vanderbilt's colour notes state: "Colour of naked part orange-yellow, body pink-salmon, tubes of polyp transparent, tentacles yellow."

TECHNICAL DESCRIPTION: The single well preserved colony gives the following measurements, all expressed in millimeters: Total length 300, length of stalk 50, maximum diameter of bulb 35, length of trunk 250, average diameter of trunk 30.

The colony is cylindrical, the proximal sixth forming a spongy stalk, distinctly bulbous, the trunk being rather evenly dilated, moderately tapered on the distad fifth, the apex rounded and crowned with numerous large autozooids; the coenenchyma is firm, compact. The autozooids are large, distributed over practically the entire surface of the trunk, with the numerous siphonozooids crowded in the interstices. The autozooids occur in practically all stages of expansion and retraction, being capable of complete retraction within the cuplike base; a typical average large autozooid expanded is shown in plate 12, figure b.

The expanded portion of an autozooid has an average anthocodia length (in millimeters) of 14, disk diameter of 5, tentacle length 5 (measured additional to the length of the anthocodia), basal pinna 0.8 and distal pinna 1 to 1.2 long. There are eight large, pinnate tentacles each side of a central tentacle, the cavity of the tentacle extending within the pinnae, which normally increases

in length gradually through the series from proximal to distal, the most proximal pinnae being from 0.5 to 0.6 the length of the most distal pinnae. The stomodaeum extends nearly the entire length of the anthocodia.

The siphonozooids show an eight-rayed aperture, but no trace of tentacles. The siphonozooids are numerous, closely set and apparently irregularly arranged over the entire surface of the trunk between the autozooids. The average vertical diameter of a siphonozooid is 3 millimeters.

There are two kinds of spicules that occur abundantly in the cortex of the anthocodia, namely, sphaeroidal to ovoidal small bodies with the external surfaces covered with fine sharp asperities and somewhat larger ovoidal bodies in which the asperities are replaced by larger, convex nodes. There are also five types of long, narrow spicules that occur in the polyp in moderate quantities: (a) needle-like spicules, three to four times as long as a sphaeroid, slightly bowed, with one end rounded, the opposite end slightly dilated and furnished with numerous outjutting spines; (b) very long spicules, 2.8 to 3 times the length of the preceding needle-spicules, with the median third twisted and contour somewhat irregularly flexed; (c) similar long needles, but with only three or four twists widely spaced in the entire spicule; (d) similar long slender needles of sinuate contour with both ends terminating in a cluster of four to six outjutting spines; (e) needle spines of sinuate contour with both lateral margins beset with numerous thorn-like barbules. A third type of spicule found in the anthocodia is the star-shaped type, shown in figure f, a six-rayed star with unequal rays variously bent or curved, with a supporting rod or shaft, a seventh ray, extending at right angles from the center of the star; there are also double stars, as shown in figure f, arising from the same supporting rod.

The spicules of the cortex of the stalk are scarce, of three types: (a) subspherical to irregularly nodular small bodies externally covered with convex nodes; (b) long, nearly straight needle-like spicules with numerous barbules on the lateral surface, also there are sinuate needle-like spines (figure g); there are also four to six-rayed star-shaped spicules present.

The spicules of the cortex of the rachis are abundant, in the form of irregular shaped disks or scales, somewhat rosette-shaped,

ornamented with numerous convex nodes and less frequently with perforations of small, irregularly oval or elongate design in the surface interstices, among the convex nodes. A thin, transparent variety of this scale is shown in figure e. These latter scales are less abundant, but are larger than the above described rosettes. The sphaeroidal bodies are moderately abundant, less frequently ovoidal, in each instance with the external surface continuously beset with asperities.

Two types of long needle-like spicules are moderately abundant in the cortex of the rachis: three varieties of long, bowed needles, one smooth, distally tapered, in both directions; a second variety bowed and distally terminating at each end in a cluster of eight to ten bristly spines; a third kind, bowed, shorter than the preceding variety, wider in ratio to length, with the two flat lateral surfaces distinctly transversely striate, like a file. There are also needle spicules with one end distinctly flexed into a wide curve, the more elongate of such spicules being tapered at both ends; the shorter forms being thicker with the distal ends dilate and spinose. A rather rare type of spicule is the spiral, variously of a one and a half to two or more whorls, with both distal ends terminating in a cluster of long divergent spines. Single and double star-shaped spicules are also present in varying growth stages.

The axis is a deep ivory color, four-sided in transverse section, nearly square, with the angles blunt and the sides moderately concave. (Plate 12, figure c.) It tapers proximally, beginning near the base of the bulbous stalk and continues in the rachis where it is thick for the proximal half, 2.5 millimeters wide, more slender distad, the tip of the axis extending quite to the apex of the trunk.

It is a pleasure to dedicate this species to the collector and Commandant of the "Ara" World Cruise, Mr. William K. Vanderbilt.



*Lobularia ceylonicum* (Pratt), colony from Raiatea Island, Society Islands,  
about natural size.

Order: ALCYONACEA

Family: ALCYONIIDAE

Genus: LOBULARIA Savigny

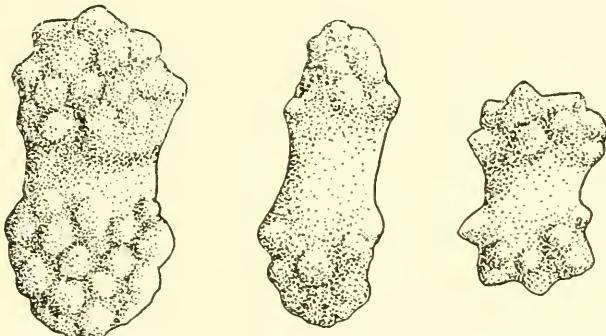
*Lobularia ceylonicum* (Pratt)

Plate 13

TYPE: Miss Pratt's type was taken at Galle, Ceylon. The type depository is not stated, but is probably the government museum at Colombo, Ceylon, and the Liverpool University museum.

DISTRIBUTION: Ceylon (Pratt); "Siboga" station 273, Jedan Island, Dutch East Indies; Society Islands (Boone). Littoral zone.

MATERIAL EXAMINED: Three separate colonies, Teviatoa Reef, Raiatea Island, Society Islands, August 21, 1931.



Text figure 2.—*Lobularia ceylonicum* (Pratt), spicules: left, example from stalk, median and right two types predominant in the lobes, all greatly enlarged.

TECHNICAL DESCRIPTION: The colony (dead and shrunken) is low-growing with a length of 12 centimeters, a width of 6 centimeters and a total height of 6 to 8 centimeters. The capitulum is low and bears numerous irregularly shaped lobes, some of which are subcylindrical, distally convex and others are irregularly shaped low, convex lobes, rather closely crowded together. The average size lobe has an apical short diameter of 3 millimeters, long diameter of 5 millimeters. The smaller subcircular lobes are 2 to 3 millimeters diameter and 5 to 9 millimeters high. The

polyps are numerous, five or six in a line of five millimeters. The polyps are large, well defined, nearly circular, with the summit divided by eight convergent segments, the center somewhat drawn and concave.

The sterile stalk is 3 to 4 millimeters high, tough, coriaceous and has a pronounced calcareous texture before branching. It divides into five or six branches which are short, closely appressed, which in series each divide to serve as bases of about three lobes, less frequently into four to six lobes. The external surface of the sterile stalk bears a conspicuous layer composed of coarse dumb-bell shape spicules (as in fig. 2). These spicules, while similar to those of the lobes in contour, are shorter in ratio to width, sometimes appearing as in fig. 2, or even shorter. The sub-spherical distal ends of the dumb-bells are roughened all over with coarse, irregular asperities. These spicules are closely packed together so that they form a sieve-like wall which has the depth of the length of a spicule, and consists of a pair of dumb-bells crossing another at right angles in serial repetition. An average spicule measures in millimeters: 0.5 long, 0.25 diameter of club end, 0.15 diameter of median bar.

The spicules of the lobes are of two sizes: (a) dumb-bell shapes having a length of 0.6 millimeters, width of enlarged end 0.25 millimeters and of the center bar 0.15 millimeters; (b) dumb-bell shapes in which the bell is less dilated and waist less constricted, having a length of 0.5 millimeters, width of enlarged end 0.5 millimeters and waist 1.7 millimeters wide.

REFERENCES: *Alcyonium ceylonicum*, PRATT, E. M., *Marine Biol. Ceylon, Roy. Soc., London, Pt. II, 1904* (issued 1905), separate XIX, p. 257, 3 figs.

*Lobularia ceylonicum*, THOMSON, J. A., and DEAN, L. M. I., *Siboga-Expeditie, Alcyonacea, Monogr. XIII-d, 1931*, p. 39, pl. 23, fig. 2.

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PLATE 14.



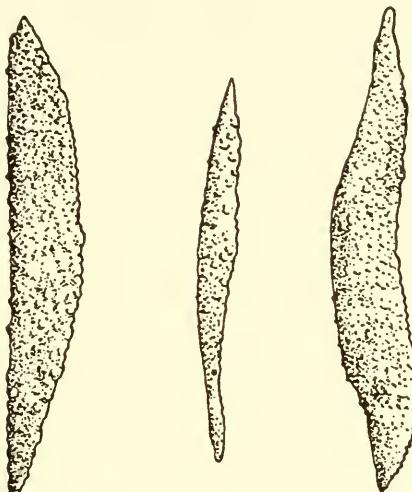
*Alcyonium confertum* (Dana), colony from the Fiji Islands, the type locality, nearly natural size.

Genus: **ALCYONIUM** Linné, emended

*Alcyonium confertum* (Dana)

Plate 14

TYPE: Dana's type came from the Fiji Islands, where it was collected by the United States Exploring Expedition. It is deposited in the Philadelphia Academy of Natural Sciences.



Text figure 3.—*Alcyonium confertum* (Dana), typical spicules from cortex, greatly enlarged.

DISTRIBUTION: Fiji Archipelago (Dana; Boone).

MATERIAL EXAMINED: Three large colonies, taken by the "Alva" at Vitu Levu, Suva, Fiji Islands, September 9, 1931.

COLOUR: The colony is a dull purplish brown and the partially expanded polyps are brown.

TECHNICAL DESCRIPTION: The colony, dead and shrunken, is comparatively low-growing, with a height of 12 centimeters, length of 12 centimeters and average width of 6 centimeters. It is rather rigid, coriaceous, stipitate, the pedicel being stout and supporting numerous short, cylindrical branches, which on the average vary from 4 to 9 millimeters diameter and 8 to 22 millimeters high, being distally tapered to a blunt rounded apex. The

method of arrangement and branching is shown in pl. 14. The polyps are numerous, small, paniculate, about 1 millimeter apart, each composed of a brief pedicel, supporting 8 stout, fingerlike tentacles which are distally tapered, blunt, this distal end showing under high magnification a surface bearing numerous small asperities.

The spicules in an average small branch of the colony appear to be laid in a pattern of obliquely placed spicules with the ends fitting in the spaces between the tapered tips of the series of spicules adjacent at either end. The spicules are large, spindle shape with a slightly curved or bowed aspect and are covered with numerous coarse, conical asperities. Four variants of this spindle are to be found in quantity; (a) a straight large spindle with tapered ends, measuring 2 millimeters long and 0.5 millimeters median width; (b) a spindle similar to the above in size, but more tapered at the apices and medially constricted to narrowed neck, only 0.3 millimeters diameter, while the distal portions are 0.5 millimeters wide in a spicule 2 millimeters long; (c) a more slender spindle about 1.8 millimeters long and 0.35 millimeters wide; (d) a smaller stout spindle shape about 1.5 millimeters long and 0.4 millimeters diameter.

REFERENCES *Alcyonium confertum*, DANA, J. D., in Wilkes, Charles, U. S. Explor. Exped., vol. VII, p. 621, atlas, VII, pl. 57, fig. 7-a-b.

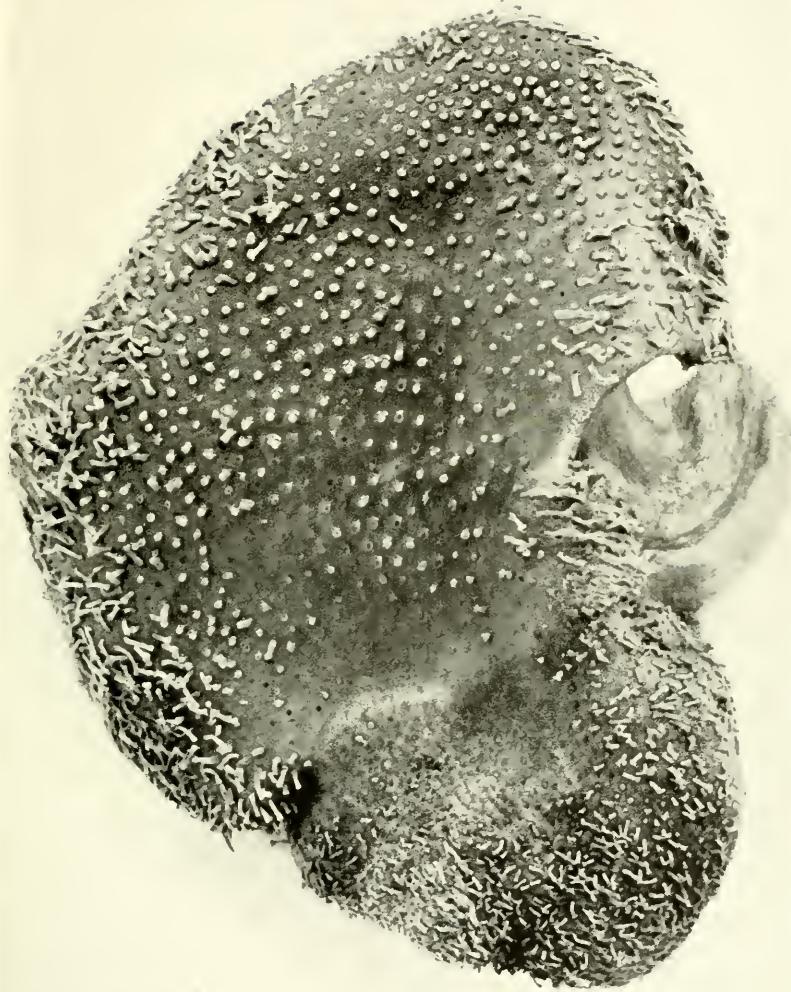
Genus: **SARCOPHYTUM** Lesson, emended  
**Sarcophytum reticulatum**, new species

#### Plates 15, 16 and 17

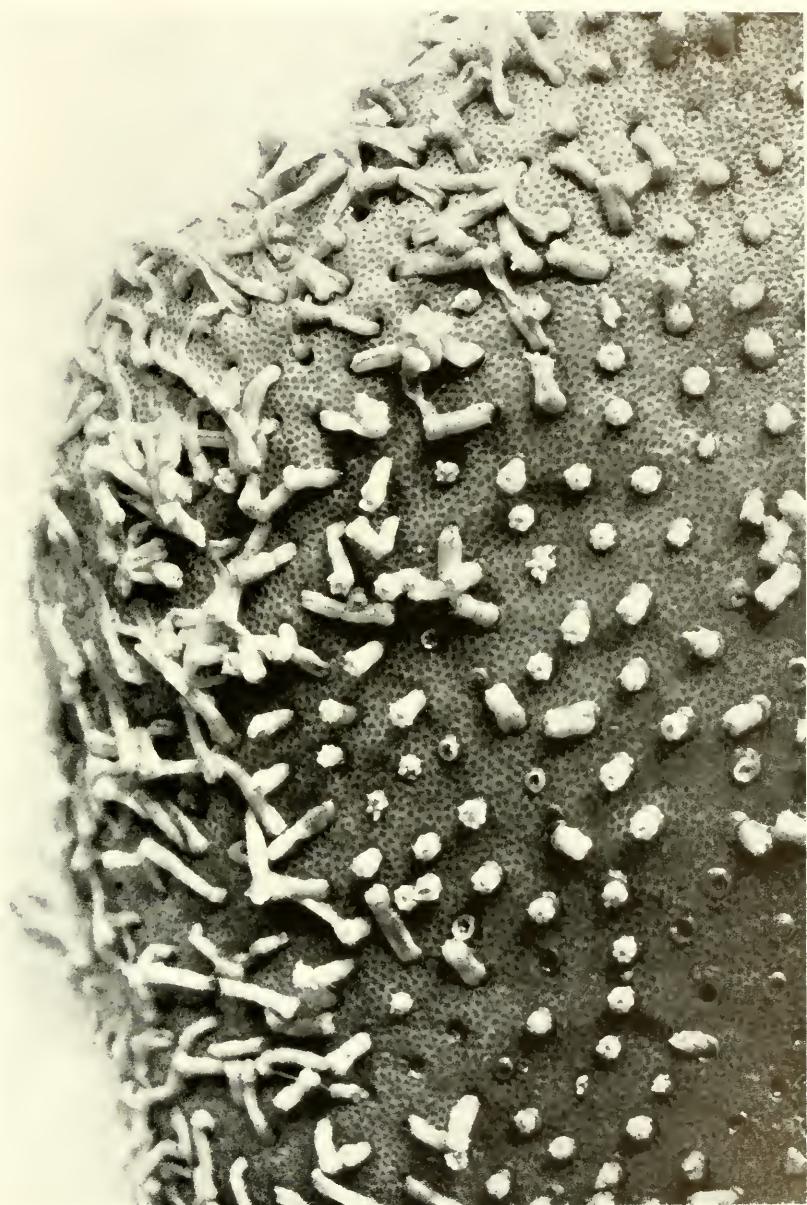
TYPE: The holotype was dredged in Pulo Condore, Anambas Islands, South China Sea, by the "Ara," February 4, 1929, and is deposited in the Vanderbilt Marine Museum.

DISTRIBUTION: Anambas Islands, South China Sea, littoral.

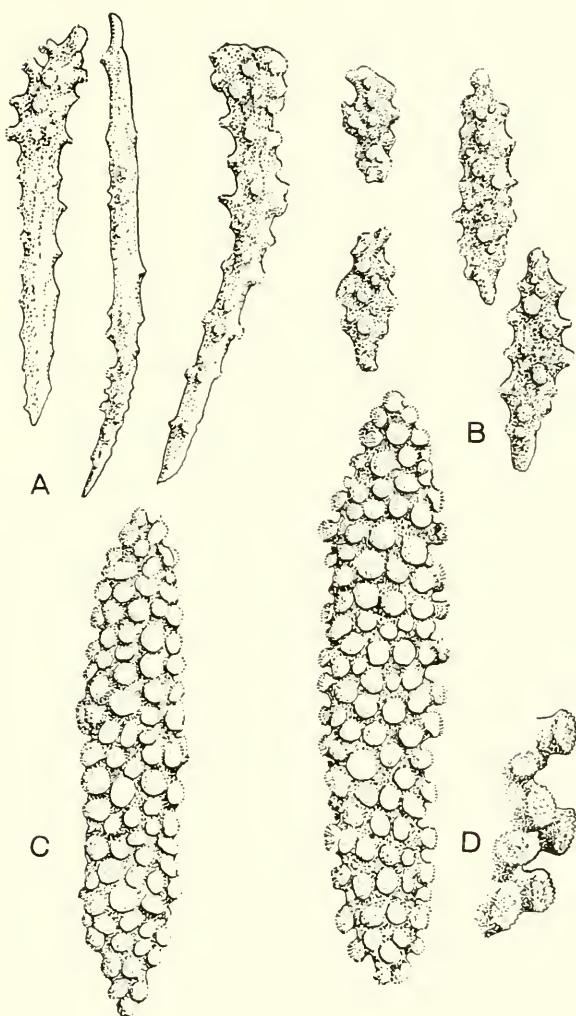
TECHNICAL DESCRIPTION: The colony, which in the preserved specimen is a drab light yellowish brown, the dorsum of the capitulum reticulated with white spicules forming a hexagonal, honey-



*Sarcophytum reticulatum* Boone, type, dorsal view of capitulum, about natural size.



*Sarcophytum reticulatum* Boone, type, a small portion of dorsad of capitulum along margin, greatly enlarged, showing siphonozooids, autozooids, and reticulate pattern formed by spiculation.



*Sarcophytum reticulatum* Boone, type: A, spicules from the internal layer of capitulum; B, spicules from the external layer of capitulum; C, spicules from the stalk; D, detail of nodules of stalk spicules, showing granulate apices; all greatly enlarged.

comb-like pattern and with lighter creamy yellowish anthocodia; the stalk, longitudinally marked with interrupted white lines of spicules, has a large, subovate, reniform capitulum, of distinctive form, resembling in contour the Madreporariaian coral, *Fungia fragilis* Alcock. This capitulum is supported on a substantial stalk which unfortunately is torn off about three centimeters below the capitulum. The portion of stalk remaining is irregularly ovate in transverse section, very firm, coriaceous, composed of great masses of coarse spicules, which occur in nearly every position within the semigelatinous tissue, but frequently are vertical or obliquely nearly vertical, arranged in close proximity, the gelatinous tissue between the spicules seldom attains more than half of the shorter diameter of a spicule, frequently is of much less width. The circular canals perforate the stalk longitudinally numerously and are of a diameter of one millimeter and occur one to one and a half millimeters apart. The external coenenchyma of the stalk is leathery with large white spicules showing through it as interrupted lines or flecks. Both the leathery external and semigelatinous internal tissues contain in addition to the spicules great quantities of minute calcareous granules of indeterminate shape.

The capitulum is soft, very flexible, with the upper surface concave in the center, the marginal border deflected and with two or three brief incisions resulting in three or four unequal, shallow lobes. The entire dorsal surface is reticulate with a very distinctive network, composed of a pavement of white spicules forming a honey-comb pattern of hexagonal units, some of which are regular, others distorted, while a few are irregular polygons. These spicule-lines border the margin of each autozooid, also the siphonozooids are located each within a unit of the reticulated pattern. The siphonozooids are small, slightly oval, with a small central aperture, from which there are eight lines indicating eight rays, divergent toward the margin.

The spicules which form the external layer of the reticulate pattern of the capitulum are shown in plate 17, fig. b. These spicules are very white, of the shapes shown, bars with very nodular surfaces, the spicules being arranged variously transversely on the surface and obliquely vertical, forming a frost-like fretwork and on the interior intermeshing with spicules of a deeper layer of the deposit, which are of the shapes shown in pl. 17, fig. c, the

predominant kind being long clubs, about 2.5 times as long as those of the external layer and distally tapered in one direction, needle-like, with the entire surface bearing numerous coarse nodules. The spicules of the external layer are shorter bars, with the surface almost entirely covered with coarse nodules.

The autozooids, which are completely retractile, within an oval aperture of a long diameter of about one millimeter, have the length, when expanded, of 11 millimeters; the polyps, when folded, forming a subspherical bud; when dilated, forming a vase-like flower, with a length of 2.6 millimeters, the tentacles being 1.5 millimeters long, digitate, with about 18 digits per tentacle, each digit a short, broad, blunt process, the cavity within it confluent with that of the central portion of the tentacle. The anthocodial armature has the formation alternate spicules. These small spicules are linear bars of smooth or finely granulose surface, not verrucose and with aborted apices.

The spicules of the stalk are shown in plate 17, fig. c. These are predominantly of the larger size, there being less than two percentum of the smaller kind. All consist of an elongate central rod, from 0.8 to 1.2 millimeters long, and 0.25 millimeters median transverse width, with the entire surface regularly covered with coarse excrescences, somewhat tree-like, consisting of a short, thick trunk supporting distally a crown, somewhat convex, of irregular marginal contour, nodular and granulose. These excrescences are placed in close formation, the usual distance separating them being usually from one-third to not quite one-half the diameter of a nodule.

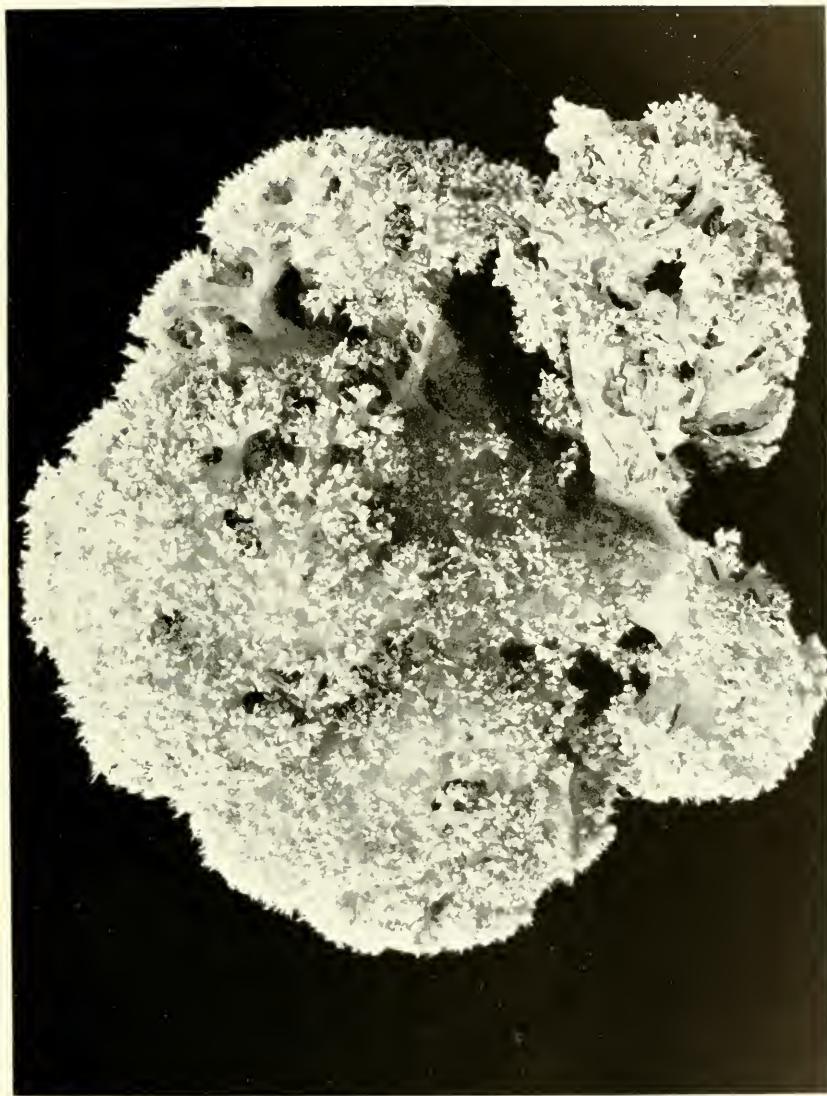
This species is distinguished from all other members of the genus by its very distinctive spiculation.

Genus: **DENDRONEPHTHYA** Kukenthal  
*Dendronephthya rosamondae*, new species

✓

#### Plates 18, 19 and 20

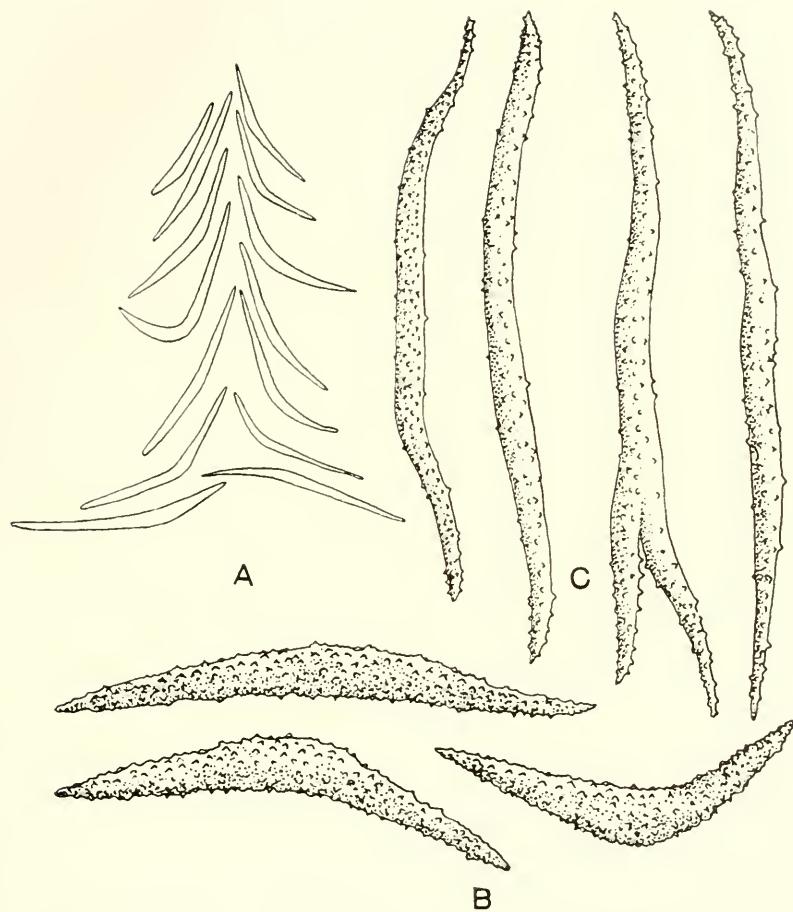
TYPE: One magnificent colony, taken at Anambas Islands, Lat. 30° N., Long. 106° E., 8 miles west of Terampa Cove, Siantan Island, South China Sea, in 33 fathoms, February 6, 1929, by the "Ara." Dedicated to Mrs. W. K. Vanderbilt.



*Dendronephthya rostrinodae* Boone, type, profile of colony, about 0.75 of natural size.



*Dendronephthya rosamondae* Boone, type, a distal branch of the colony, showing the characteristic corymb groups of polyps; the protruberant distal spicules, also the larger spicules of cortex may be seen, enlarged approximately twelve times.



*Dendronephthya rosamondae* Boone, type, A, typical anthocodial armature of spicules; B, typical spicules forming the anthocoidal armature  $\times 240$ ; C, typical kinds of spindle spicules found in the upper cortex,  $\times 20$ .

DISTRIBUTION: The holotype is the only record existing for this species.

COLOUR: The living colony is described in Mr. Vanderbilt's field notes as having "the stem whitish tan, the upper portions bright orange with white polyps." The abundance of pearly white encrusting spicules gives the distal portions of the colony a frosted appearance.

TECHNICAL DESCRIPTION: This colony, which reminds one of an intricate East Indian ivory carving of a miniature banyan forest, is 13 centimeters long horizontal diameter and 12 centimeters the greatest vertical diameter; umbellate, with the lower sub-branches somewhat foliaceous, with the central stem giving rise to four or five primary branches, which repeatedly subdivide, supporting the numerous characteristically corymbic groups of polyps which are usually in clusters of six to twelve. The polyp stalks are moderately long, 1.2 to 1.5 millimeters long; the supporting bundle of spicules consists of two, somewhat alternating, placed obliquely transverse. The anthocodial armature of spicules is quite regular, in four slightly alternating pairs, with two alternating obliquely transverse spicules below the chevron series. In the present species, the arrangement more nearly approaches the "Grade IV" arrangement of Thomson, Sir J. A., and Dean, Miss L. M. I., Siboga-Expeditie Alcyonacea, than any of the other groups. There are no pseudo-crown spicules present in *D. rosamondae*.

The spicules of the upper cortex are large, 4 to 7 millimeters long, elongated needle-like spindles, arranged in the oblique transverse pattern shown in plate 20. The surface of these spicules is covered with numerous, medium size, coarse, low, verrucose asperities (fig. c, pl. 20). These spicules of the upper cortex appear glassy with embedded colour streaks of pure orange and sometimes of reddish orange.

## ACTINARIA

### Family: CERIANTHIDAE

Genus: PEPONACTIS van Beneden

*Peponactis aequatorialis* (van Beneden)

✓

### Plate 21

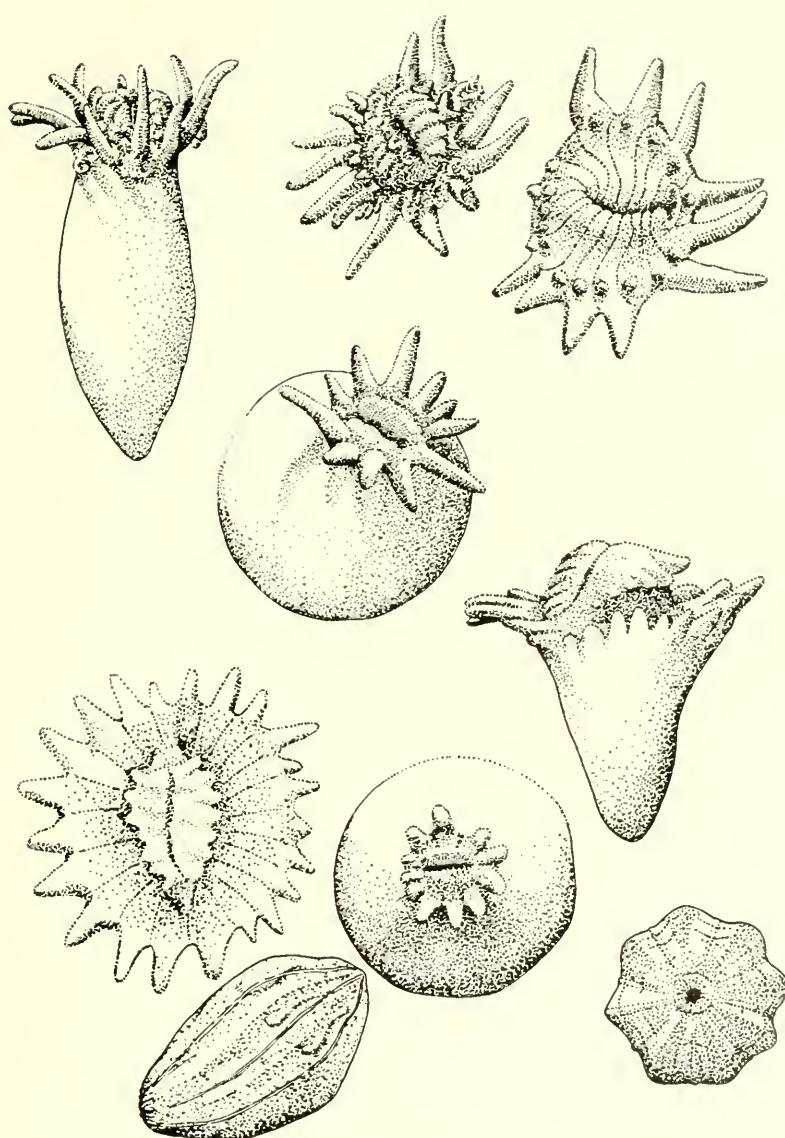
**TYPE:** The type of *Peponactis aequatorialis* van Beneden was taken by "der Plankton-Expedition der Humboldt-Stiftung" at Lat. N. 0.1°, Long. W. 15.1°, and is deposited in the Leipzig Zoological Museum.

**DISTRIBUTION:** Apparently widely distributed in the equatorial Pacific, in depths ranging from the surface down to 400 meters.

**MATERIAL EXAMINED:** Fifty specimens, in various degrees of development, taken a dredge haul from the surface to 140 fathoms depth, north of Nuka Hiva Island, Marquesas Islands, Pacific Ocean, August 11, 1931, by the "Alva."

**DISCUSSION:** A remarkably interesting series of larval *Cerianthidae*, typical forms of which are shown in plate 21, were taken by the "Alva" in a deep-sea haul north of Nuka Hiva Island. These apparently belong to *Peponactis aequatorialis* van Beneden (1898) of the typical form described by him, and also are present in considerable series possessing intermediate stages between this species and apparently younger stages of it.

The subspherical specimens have a diameter varying from 2.8 millimeters with the polar areas flattened, to 3.5 millimeters in the larger of those without tentacles; the subspherical specimens with the first, rudimentary marginal tentacles present also are of an average diameter of 3.5 to 4 millimeters, with variously ten to twelve marginal tentacles, digitiform, some short and stubby, others five to six times as long as wide. The *P. aequatorialis* typical forms vary from 4 to 6 millimeters diameter and show the tentacles in varying degrees of development, five examples of which are illustrated. The body form of these also varies from subcylindrical to obconic, but specimens of the two extremes, when dissected, fail to show any important histologic differences. The specimens are



*Peponactis aequatorialis* van Beneden,  $\times 10$ .

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PLATE 22.



*Gemmaria marquesana* Boone, type colony, from Anaho Bay, Nuka Hiva Island,  
Marquesas Islands, nearly natural size.

without exception a colorless pearly translucent cream, with the mesenteries very distinctly delineated. The obconic forms have a long diameter of 7 to 8 millimeters, exclusive of tentacles.

REFERENCES: *Peponactis aequatorialis* VAN BENEDEN, E., Ergeb. der Plankton-Expedition der Humboldt-Stiftung, Die Anthozoen, 1897, vol. II, K.e., p. 109, pl. 9, figs. 9-16, text fig. 17.

### Zoanthactinaria

#### Zoantheae

Family: ZOANTHIDAE Dana

Subfamily: Brachycneminae Haddon and Shackleton

Genus: GEMMARIA Duchassaing and Michelotti

Gemmaria marquesana, new species

#### Plate 22

TYPE: Five large colonies, taken in Anaho Bay, Nuka Hiva Island, Marquesas Islands, August 10, 1931. Deposited in the Vanderbilt Marine Museum.

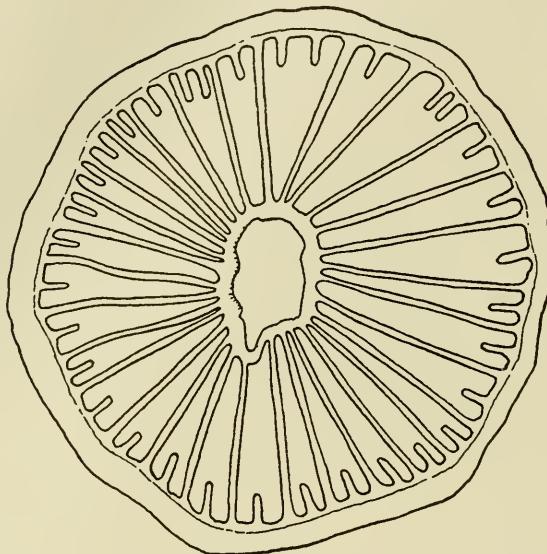
DISTRIBUTION: These rather large colonies are permanently attached to large clumps of volcanic rock, collected, apparently by breaking, in the littoral zone of Anaho Bay.

MATERIAL EXAMINED: Type series, consisting of approximately two thousand polyps.

COLOUR: Unrecorded.

TECHNICAL DESCRIPTION: The polyps are numerous, independent, attached at the base separately, closely crowded, but with a thin, basal, encrusting membrane, or with the circumferal margins of the adjacent polyps united. The polyps vary from small young ones bud-like between the side adjacent bases of large older ones, arising from the membrane encrusting coenenchyme. The dead and somewhat shrunken specimens have an average size mature polyps measuring from 18 to 25 millimeters high and from 7 to 9 millimeters disk diameter. These polyps are of cylindrical form with the external surface of the sidewalls and base

thickly encrusted by small pebbles, shells, sand and similar detritus. The disk is also sand-encrusted, but in less degree. The disk is mammiform in the dead shrunken polyp, with a diameter equal to approximately one-third of the height of the polyp, and having



Text figure 4.—*Gemmaria marquesana* Boone, type, cross-section of a single polyp, greatly enlarged.

a decidedly "ribbed" appearance, having about thirty elevated radii alternating with as many radial grooves. The radii are encrusted and have a rough surface. The tentacles are in two series, about sixty-four in number, thirty-two per series. Each tentacle is wide, shortish, blunt tapered, conical, about one-third as long as the disk diameter in the dead specimen. The actinostome is slit-shaped, the actinopharynx brief, tubular, the enterostome leading into the coelenteron, which contains about sixty mesenteries of two kinds, i. e., thirty primary mesenteries alternating with thirty secondary mesenteries, which are smaller, being scarcely half so wide as the adjacent primary mesenteries. Each primary mesentery bears along the inner free edge the corkscrew-like filaments, extending about half the length of the stomach cavity below the enterostome.

**BODY-WALL:** The ectoderm is so thoroughly penetrated by the encrustations of sand, shell, etc., that it is difficult to determine the character of the ectodermal cells. The mesoglea adheres in coarse strands and forms a distinctive layer beneath the cuticle. The lacunae are large, irregularly oval to subcircular, their interstitial border being mesogleal threads. The body-wall appears to be pierced by longitudinal canals, from base to disk, some of which anastomose by finer canals. The endoderm lining the column forms a regular layer of large cells. The muscle tissue is well developed. The sphincter is single, well developed, mesogleal.

**DISK AND TENTACLES:** The ectodermal layer is well developed, but it and the mesoglea are much penetrated by the partially embedded encrustations. No zoanthellae are present but cell enclosures, similar to those described and figured by McMurrich<sup>5</sup>, also Haddon and Shackleton<sup>6</sup>, appear to be present in this new species.

**AESOPHAGUS:** The groove is well marked, truncated.

**MESENTERIES:** These are typical Brachycneminae, arranged as shown in text figure 4. The mesoglea is very well developed in both series, the muscular layer also being well developed and the mesogleal plaitings well defined. Each mesentery has a conspicuous vertical canal running through it from the base of the polyp to the disk. In the aesophagal region this canal apparently does not divide, but does become of wider diameter. The endoderm is similar to that of the body-wall. The ectoderm seems to form a regular layer. The mesenterial filaments are large, their mesogleal thin and endoderm similar to that of the mesenteries.

**GONADS:** Numerous mature ova are present in one of the specimens cut.

**REMARKS:** The present species is necessarily established, since it differs anatomically from the earlier described Australian species of *Gemmaria*, namely, *Gemmaria macmurrichi* Haddon and Shackleton<sup>6</sup> and *G. mutuki* Haddon and Shackleton,<sup>6</sup> both of which are from Torres Straits; *G. arenacea* Wilsmore<sup>7</sup> from Masthead Island, Queensland, and from *G. Willeyi* Whitelegge,<sup>8</sup> described from Funafuti, Ellice Islands.

<sup>5</sup>*Gemmaria rusei* McMurrich, J. P., Proc. Acad. Nat. Sci. Phila., 1889, p. 124, pl. 7, fig. 7-9.

<sup>6</sup>*Gemmaria macmurrichi* Haddon, A. C., and Shackleton, A. M., Trans. Roy. Dublin Soc., 1891, ser. 2, vol. IV, p. 688, pl. 61, fig. 1, pl. 63, fig. 7; Ibid, *G. Mutuki*, p. 689, pl. 61, fig. 10.

<sup>7</sup>*Gemmaria arenacea* Wilsmore, L. G., Journ. Linn. Soc. Zool., 1909, vol. XXI, p. 323, pls. 43, 45, figs. 16-20.

<sup>8</sup>*Gemmaria willeyi* Whitelegge, T., Mem. Austral. Mus. Sydney, 1896-1900, vol. III, pt. 7, 1899, p. 387, pl. 24, figs. 1 and 4.

Genus: **PALYTHOA** Lamouroux  
**Palythoa tuberculosa** (Esper)

7

Plates 23 and 24

**TYPE:** Peter Pallas was apparently the first to record this species, under the name of *Alcyonium papillosum* from the Red Sea, but his brief description being so imperfect has caused writers to use the name *A. tuberculatum* given in Esper's more critical description of this primitive coral, which he had from Tranquebar, Coromandel coast, India, and which was deposited in the Nuremberg collections.

**DISTRIBUTION:** This species is widely distributed in the littoral zone of the Indo-Pacific.

**MATERIAL EXAMINED:** Two colonies, collected in shallow water, Teviatoa Reef, Raiatea Island, Society Islands, August 21, 1931, by the "Alva." One colony, about 2.5 centimeters high, oval, 10.5 centimeters long and 9.5 centimeters wide taken in one fathom, low tide, Kaneohe Bay, Oahu, Hawaiian Islands, December 15, 1928, by the "Ara."

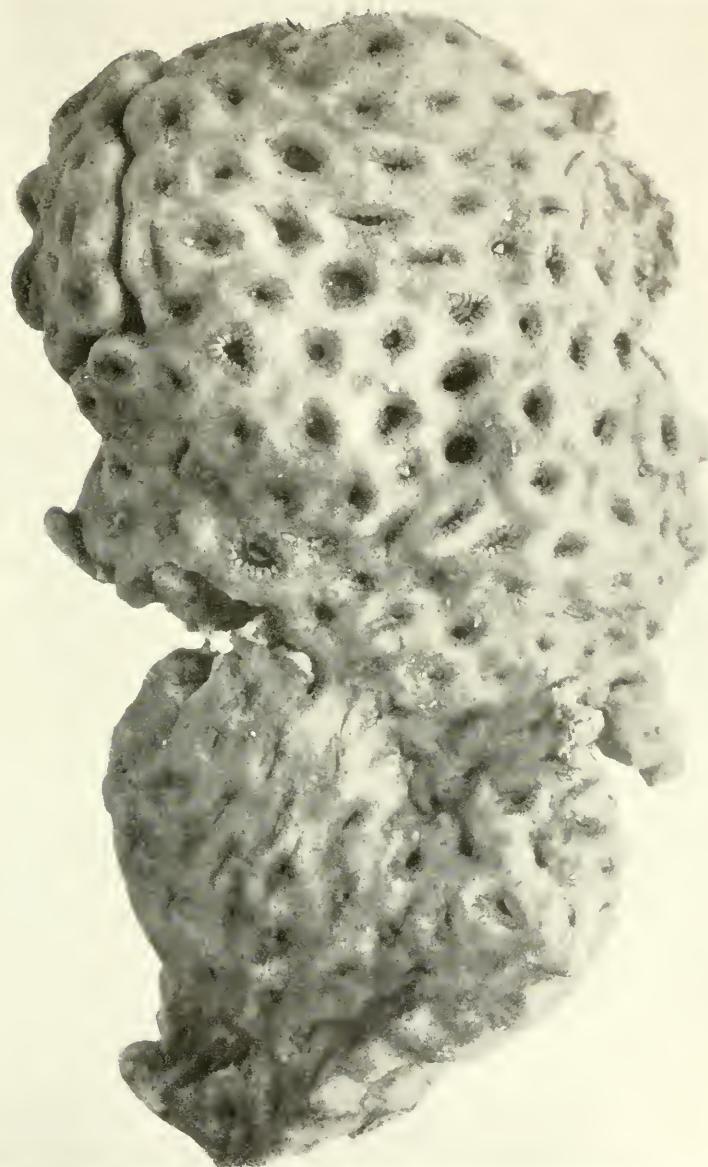
**COLOUR:** Dana records the polyps as varying from brownish yellow to bright greenish yellow.

**TECHNICAL DESCRIPTION:** The larger colony has a length of 125 millimeters, a width varying from 30 to 45 and in places 55 millimeters, and a height of 11 to 15 millimeters.

The polyps are united to their surface forming an explanate, coriaceous mass, low and of irregular contour, usually adapting itself to the stones, volcanic debris or other matter to which the young colony becomes attached, this mass having certain seam-like lines where the creeping zooids have met but not entirely fused. The polyps, when contracted, have a disk diameter of 5 to 10 millimeters, the disk being marked with crenations to the circumferal margin. The tentacles range from 16 to 20 in small polyps where they are arranged in single series, and in large polyps there are as many as forty tentacles, arranged in two series, the inner series appearing the larger, at least in dead specimens. The tentacles are large, obtuse, clavate. There are 32 internal lamellae. The texture of the mass of the colony is reinforced by



*Palythoa tuberculosa* (Esper), colony from Kaneohe Bay, Hawaii,  
nearly natural size.



*Palythoa tuberculosa* (Esper), colony from Raiatea Island,  
Society Islands, nearly natural size.

grains of coral sand agglutinated by the slimy secretions of the polyp; as the animal grows these grains become embedded and form a calcareous body-wall from extraneous origin, reinforcing the organism.

The tentacles are externally devoid of papillae and are each a hollow tube with a minute apical aperture. Internally they communicate with the visceral cavity by a duct beneath the radial lines of the disk. The mouth is a single aperture in the center of the disk, without appendages, and opens into the stomach, which occupies the upper fourth of the interior and is connected with the visceral cavity by a series of fleshy laminae.

The visceral cavity which is cylindrical, extends to the base of the polyp-mass. This stomach has a muscular arrangement enabling it to close at the bottom. The spermatic cords border the lamellae and extend from below the stomach nearly to the bottom of the cavity, each cord being very convoluted and possessing vibratile cilia. Besides the spermatic cords there is attached to the margin of each primary lamella, just below the stomach, a pair of flat, branchia-like organs; these are transparent and under high magnification are shown to possess vibratile cilia.

REFERENCES: *Alcyonium papillosum*, PALLAS, P. S., Elenchus Zoophytorum Hay. Apud. Petrum van Cleef, 1766, p. 350.

*Alcyonium tuberculatum*, ESPER, E. J. C., Die Pflanzenthiere in Abbildungen nach der Natur, etc., Nurnberg, 1791, Alcyon. II Thl. Forts., p. 68, taf. 23, figs. 1-2 .

*Palythoa flavoviridis*, EHRENBURG, C. G., Corallenthiere des Rothen Meeres, p. 47, 1834, Kgl. Akad. Wissensch, Berlin, 1834, p. 47; DANA, J. D., U. S. Explor. Exped. Zoophytes, vol. VII, 1846, p. 426.

*Palythoa argus*, EHRENBURG, C. G., loc. cit., p. 48.—DANA, J. D., loc. cit., p. 427.—MILNE EDWARDS, H., et HAIME, J., Recherches et classif. des Polypiers recents et fossiles, Paris, 1848-49, Coral. t. I, p. 305.—KLUNZINGER, C. B., Korallthiere des Rothen Meeres, Th. I, Alcy. u. Malacod. 1877, (Berlin), p. 66, taf. 4, fig. 7.

**MADREPORARIA****Family: EUPSAMMIDAE**Genus: **DENDROPHYLLIA** de Blainville*Dendrophyllia manni* (Verrill)

## Plate 25

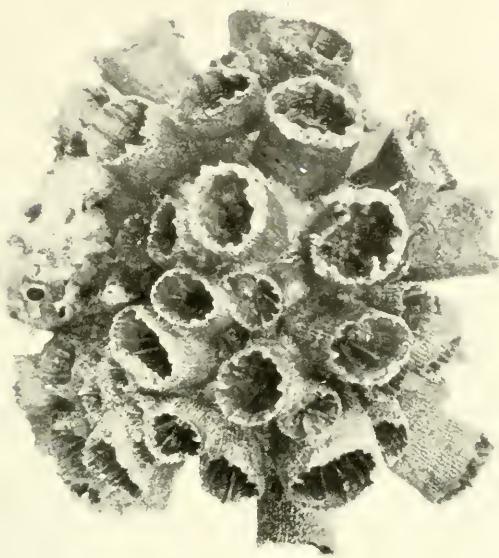
**TYPE:** Dr. Verrill's type was collected in the Sandwich Islands by Horace Mann and first described in the Proceedings of the Essex Institute (Massachusetts), in 1866, in his third "Synopsis of the Corals of the North Pacific Exploring Expedition," the majority of which are deposited in the United States National Museum. The first illustration of the type was given by Dr. T. W. Vaughan, in 1907.

**DISTRIBUTION:** This very beautiful small coral is exceedingly rare in collections, being recorded only from the two type clusters, collected at low-water mark in the Sandwich Islands and two specimens from Kaneohe, Oahu, Hawaii, collected by Dr. W. T. Brigham, deposited in the U. S. National Museum. It is restricted to the littoral zone of Kaneohe Bay, Hawaiian Islands, tide line to one fathom depth. It was not collected by the United States Bureau of Fisheries steamer "Albatross" survey of Hawaiian waters.

**MATERIAL EXAMINED:** Six clusters, taken in one fathom, at low tide, Kaneohe Bay, Oahu, Hawaiian Islands, December 15, 1928, by the "Ara."

**TECHNICAL DESCRIPTION:** This corallium encrusts rocks, forming clusters, which in the present series tend to sphaeroidal or ovoidal clusters, ranging from one to two inches high and from two to three inches across.

The corallites have the exterior closely and finely costate and covered with fine, close, granulations. Some corallites are united laterally quite to the top, others are separated distally from one to three or six millimeters; the average corallite rises six to twelve millimeters above the coenenchyma; the smaller, younger ones being somewhat more numerous than the semi-isolate large corallites in some clusters, while in other clusters the large corallites predominate, these usually being separate laterally for the distal three-



*Dendrophyllia manni* (Verrill), from Kaneohe Bay,  
Oahu, Hawaii, nearly natural size.

fourths of their length, although a few, where crowded in the clusters, are laterally united for seven-eighths of their length. The septa are in four cycles, the fourth cycle being merely slightly raised costae, very thin, uneven, and imperfectly developed. The primaries are distinctly thicker than the other series, proximally joined with the columella, widest and thickest toward the base, quite narrowed distally, the inner margin slightly concave, the distal margin not projecting beyond the wall in small corallites, but frequently in the larger corallites protruding as a small, triangular process, in which instances the marginal wall is a series of repeated concavities between these triangular elevations. The secondaries are similar to the primaries and also joined to the columella, but never extend beyond the marginal wall and are narrower and thinner than the primaries. The tertiaries are not united with the columella, frequently do not extend to the distal margin and are very thin. The columella is spongy, well developed, nearly half as broad as the cell. The cell is not quite circular, slightly oval, with the long diameter 1 to 1.5 millimeters greater than the short diameter, as 11 millimeters by 10 millimeters, or 8 millimeters by 7 millimeters in the smaller ones; the depth 5 to 7.5 millimeters.

The six clusters taken by the "Ara" have the following measurements, expressed in millimeters: Vertical diameter: 54, 55, 50, 45, 50, 50; horizontal long diameter: 72, 70, 60, 70, 60, 71; horizontal short diameter: 55, 60, 55, 55, 70 and 45.

In "The Natural History of Many Curious and Uncommon Zoophytes collected from various parts of the Globe," by the late John Ellis, Esq., F.R.S., systematically arranged and described by the late Daniel Solander, M.D., F.R.S., London, 1786, there is an illustration, Plate 32, figure 1, without legend, which apparently is "No. 7, *Madrepora tibicina* Ellis and Solander." Dr. Solander's description states (*loc. cit.*, p. 154) :

"*Madrepora fafciculata*, *ramis cylindraceis*; *ramulis fubclavatis*, *ftellis obconicis profundis*, *lamellis nonnullis latioribus*. *Centra fubfimplicia*. *Lamellae quaternae vel fexternae reliquis multo latiores*." No locality cited.

When Ellis and Solander's engraved illustration, plate 32, fig. 1, is placed beside Vaughan's photographic plate of Verrill's type of *Dendrophyllia manni*, the only differences apparent are of size of colony, more numerous cells and the fact that, due to drawing,

the septa in the Ellis and Solander plate appear stronger than do those in the Vaughan photograph. The Ellis and Solander plate 32, fig. 1, apparently *Madrepora tibicina* of their text, is quite possibly identical with Verrill's more recently described species, in which event the earlier name must take precedence.

REFERENCES: *Caenopsammia manni*, VERRILL, A. E., Proc. Essex Inst. (Mass.), 1866, vol. V, pt. 3, p. 30.

*Dendrophyllia manni*, VAUGHAN, T. W., Bull. LIX. U. S. Nat. Mus., 1907, p. 156, pl. 46, figs. 6, 6a (one of Verrill's types); figs. 7, 7a (Vaughan's Kaneohe Bay specimen).

Family: POCILLOPORIDAE

Genus: POCILLOPORA Lamarck

*Pocillopora cespitosa* Dana

7

TYPE: This species was discovered by the United States Exploring Expedition in the Sandwich Islands, and described and figured by Prof. J. D. Dana, whose type is deposited in the United States National Museum.

DISTRIBUTION: Hawaiian Islands, littoral zone: Kaunakakai and Pukoo, Molokai Island, reef at Honolulu, reef at Kahana and Waikiki, Oahu (Dana; Vaughan); Laysan Island (Studer).

MATERIAL EXAMINED: A small specimen, about five inches high, was collected at Honolulu, Oahu, Hawaiian Islands, December 14, 1928, by the "Ara."

REMARKS: The present material agrees in all essentials with the original description and illustrations given by Dana. Three new varieties of Dana's species were established by Dr. T. W. Vaughan (1907), all being based on Hawaiian material.

REFERENCES: *Pocillopora cespitosa*, DANA, J. D., in Wilkes, C., U. S. Explor. Exped., 1846, Zoophytes, vol. VII, p. 525, Atlas VII, pl. 49, figs. 5-5a.—VAUGHAN, T. W., Bull. LIX, U. S. Nat. Mus., p. 86, pl. 10, figs. 1-1a, 2-2a, pl. 11, figs. 1, 2. (With synonymy.)