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ABSTRACT

Four different kinds of hydrozoan medusae, two of scyphozoans, and four of siphonophores are recorded from three basins of southern California, largely in depths greater than 4000 feet. The records are based on photographs made with a special underwater camera which is described. These coelenterates show specific distributional patterns which appear to reflect not only limited tolerances to temperatures, but also preferences for certain foods either near the sea floor or in the sound-scattering layers.

INTRODUCTION

Many of the animals that live at great depths in the ocean are soft and gelatinous. When caught in trawl nets they break up and wash between the cords. Some of them live just above the bottom where trawling is hazardous to equipment. For these reasons the deep-water forms are but little known from specimens. During the course of a program of underwater photography off southern California by the Allan Hancock Foundation (Emery 1952) many pictures have shown bathypelagic (deep water) coelenterates of several kinds. They were made with a 70-mm camera housed in a steel sphere 39 inches in diameter with walls 1½ inches thick and having one quartz window for the camera and another for a stroboscopic light (Fig. 1). The camera shutter was synchronized with the light, which flashed at 30-second intervals. Enough film was carried in the camera to allow the making of 325 photographs during a span of 2½ hours. Ordinarily, the equipment was started at the surface and allowed to operate while being lowered, while held on or just above the bottom, and while being hoisted back to the surface. On deck, records were kept at one-minute intervals of the amount of cable overside. These records permitted the identification of the depth at which each picture was made.

Twenty-two useful lowerings of the device, called the benthograph, were made between 22 May 1950 and 10 July 1952, when it was lost at a depth of 2440 feet. About 5000 individual photographs were taken. Many of the lowerings were on the bottom or side slopes of three deep basins (Fig. 2). Color film, used in five lowerings, showed but few organisms in the water column, possibly because of low sensitivity of the film. In one color film and in all black-and-white films many objects may be seen in the pictures of the water column. Most of them are small, indistinct, and at depths shallower than 2000 feet; they are probably related to the sound-scattering layer or "false bottom" (Emery 1952). Larger and more clearly defined are the animals that were photographed at greater depth. Nearly all of the identified deep forms are coelenterates, including hydromedusans, scyphozoans, and siphonophores. Only a few fishes and one prawn were noted. Use of nets in upper and middle water levels has demonstrated the presence of many macroplanktonic (more than ½ inch across) animals. Some so taken have been ctenophores (*Pleurobrachia*, *Beroë*), tunicates (especially *Pyrosoma* and *Oikopleura*), chaetognaths or arrow-worms, larger crustaceans, and others. These have not been observed on photographs.

We wish to extend special thanks to Captain Allan Hancock for his continued interest and support.

HYDROZOAN MEDUSAE

Hydrozoan medusae in shallow water are best known for their bottom or polyp stages as feathery or branched colonial growths

[1] Contribution of Allan Hancock Foundation No. 179.

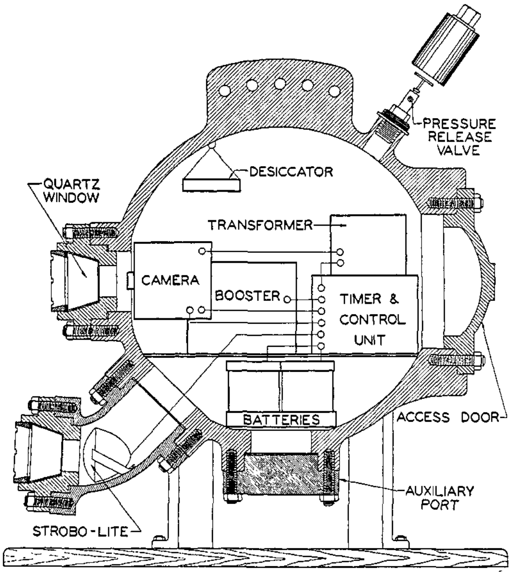

FIG. 1. Cross-section of benthograph showing construction details and equipment used for photography in the water.

called hydroids attached to rocks or other solid objects. This asexual stage, by budding, gives rise to sexual dioecious medusae which may measure only a fraction to several inches across the disk. For most kinds the medusa stage is small or unknown. For other kinds the medusa stage may be known and its hydranth stage unknown. One of the best known in California is *Polyorchis*, which attains a diameter of 2½ to 3 inches (Skogsberg 1948) and its tentacles number 40 to 150. Another much smaller medusa, *Monobrachium parasitum* Mereschkowsky, measuring ¼ to ½ inch across the disk, has been found (unpublished data) in considerable abundance in the shallower parts of Santa Monica Bay, California, adhering to its hydranth stage which is commensal with *Axionopsis* sp. (a bivalve mollusk). Others, of larger size, are trachyline medusae of various kinds; some have been recorded between the surface and 1650 feet (vertical hauls) in Monterey Bay (Bigelow and Leslie 1930). They differ from those reported below.

The deep water hydrozoan medusae appear uniformly white or somewhat translucent and without a pigment pattern. Their disks are circular and of considerable size, approximately 3½ to 8 inches in diameter. Tentacles are inserted subterminally and number from 23 to 32. According to the photographs the umbrella or bell has an entire, not scalloped, margin, and the mouth is at the end of a longer or shorter manubrium or neck. Another fundamental character, whether the gonads are on the radial canals as in the Trachymedusae, or in the floor of the gastric cavity as in the Narcomedusae, cannot be determined from examination of the photographic film alone. Specific identification must await collection of specimens, but for the present they are considered to be trachyline Trachymedusae. Four kinds have been noted.

The most abundant kind of trachyline medusa (Plate 1) is characterized by a long manubrium, the disk is an estimated 3½ to 4 inches in diameter, and the 23 to 32 tentacles are 2½ to 6 inches long, varying with size of the individual. This species has its greatest concentration in San Nicolas Basin, but was also observed in Catalina Basin. Altogether 79 individuals were counted. Its typical horizon a short distance above the bottom and its long manubrium suggest that it feeds on animals existing near, on, or in the sediments of the sea floor.

A second kind of trachyline medusa (Plate 2, A) is characterized by a very flat umbrella, a short manubrium, about 32 tentacles, and the margin of the bell is entire. The disk, probably circular, has an estimated diameter of 5½ inches and the length of the tentacles is about 6¾ inches. Only one individual was seen. Its presence in the sound-scattering layer of Catalina Basin suggests that it may prey on the organisms associated with this layer.

A third, perhaps much smaller kind of medusa (Plate 2, B) has a flattened umbrella. It also differs from the others in that the tentacles appear to form two series, one directed stiffly out at the sides, the other at right angles to the oral side. This medusa was observed only once.

The fourth kind of medusa has a tangled mesh of long, slender, distally enlarged tentacles (Plate 2, C). It is presumed to be

PLATES 1–4

PLATE 1. Trachyline medusae—most abundant form.

A. Station 2087 at 5800 feet.
B. Station 2087 at 5760 feet.
C. Station 2087 at 5765 feet.
D. Station 2083 at 5589 feet. Part of a swarm of at least 14.

PLATE 2. Trachyline medusae—rare forms and scyphozoan medusa.

A. Station 2099 at 1225 feet. Trachyline medusa seen in the sound-scattering layer.
B. Station 2083 at 3990 feet. Another kind of trachyline medusa.
C. Station 2102 at 1045 feet. *Gonionemus*-like medusa.
D. Station 2111 at 4360 feet. Scyphozoan medusa.

PLATE 3. Siphonophores and Scyphozoan.

A. Station 2097 at 1549 feet. Part of axon of an abylid siphonophore. Note successive light and dark areas.
B. Station 2097 at 1549 feet. Abylid siphonophore with part of tail cut off (turned 90° to the right).
C. Station 2096 at 2806 feet. Abylid siphonophore (turned 90° to the right).
D. Station 2083 at 380 feet. Abylid siphonophore with zig-zag tail.
E. Station 2096 at 2916 feet. Abylid siphonophore and campanulate scyphozoan.

PLATE 4. Bathyphysid siphonophores.

A. Station 2096 at 2915 feet.
B. Station 2100 at 2060 feet (turned 90° to the right).
C. Station 2100 at 2080 feet. Part of an axon.

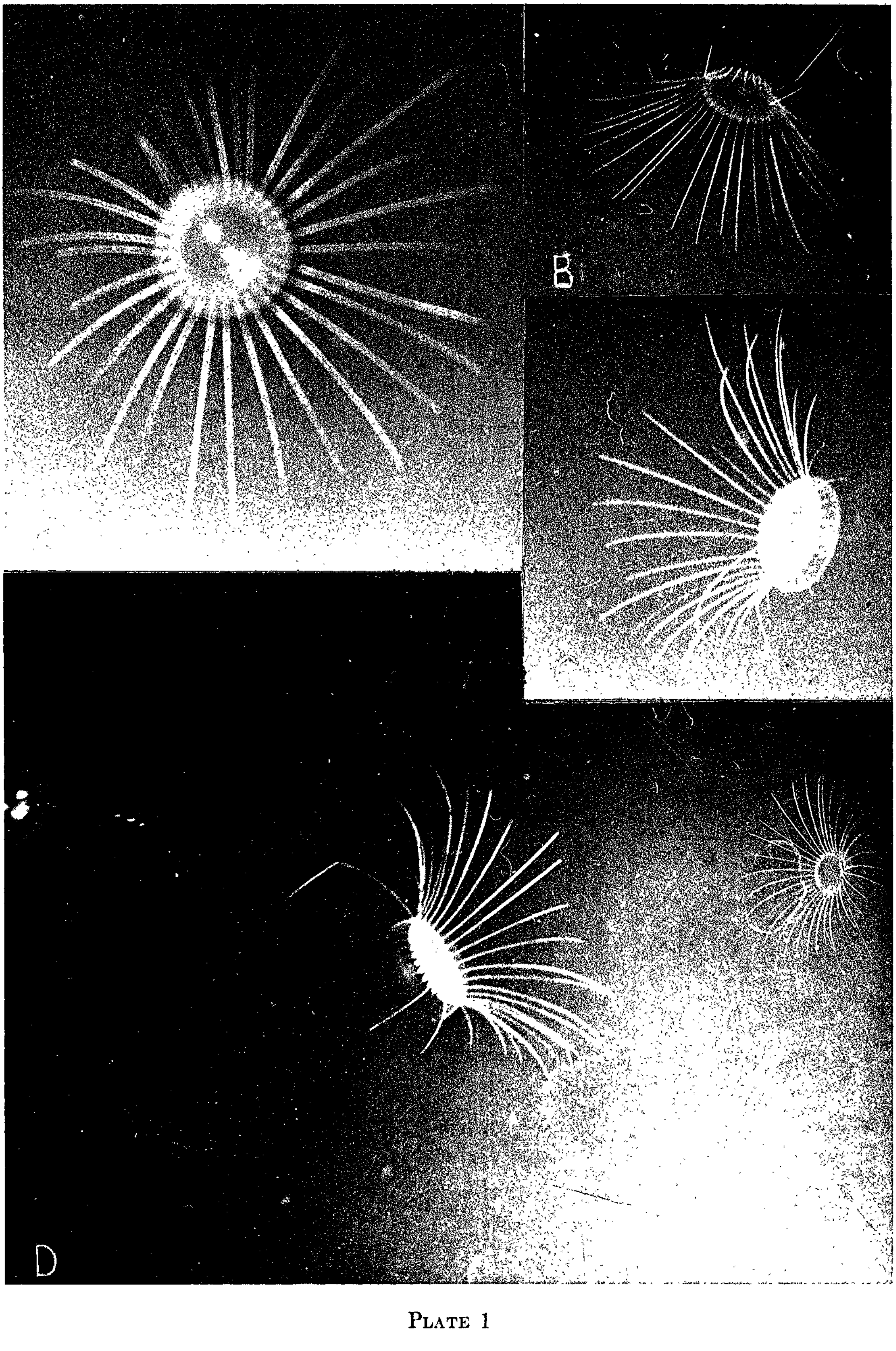

Plate 1

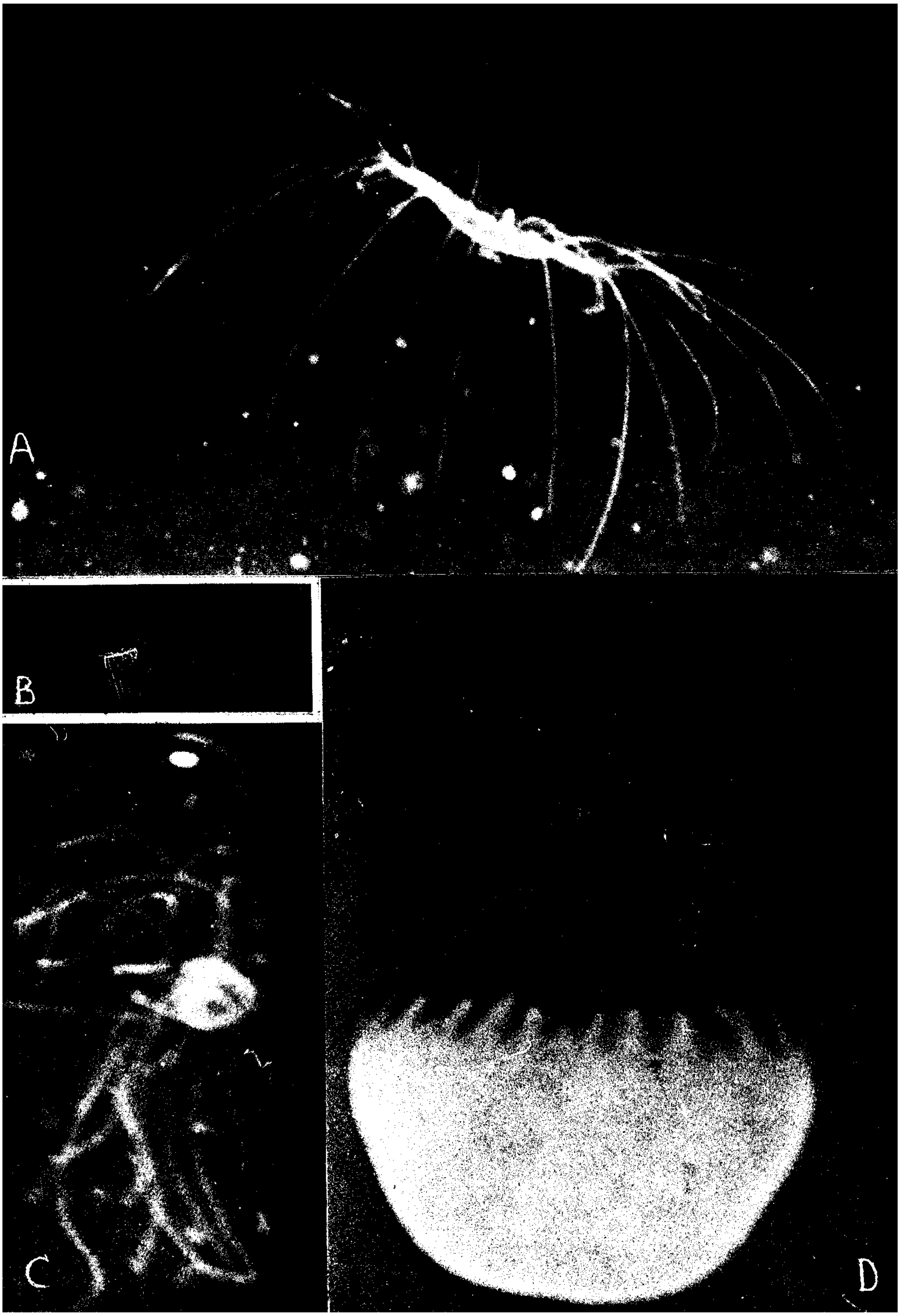

PLATE 2

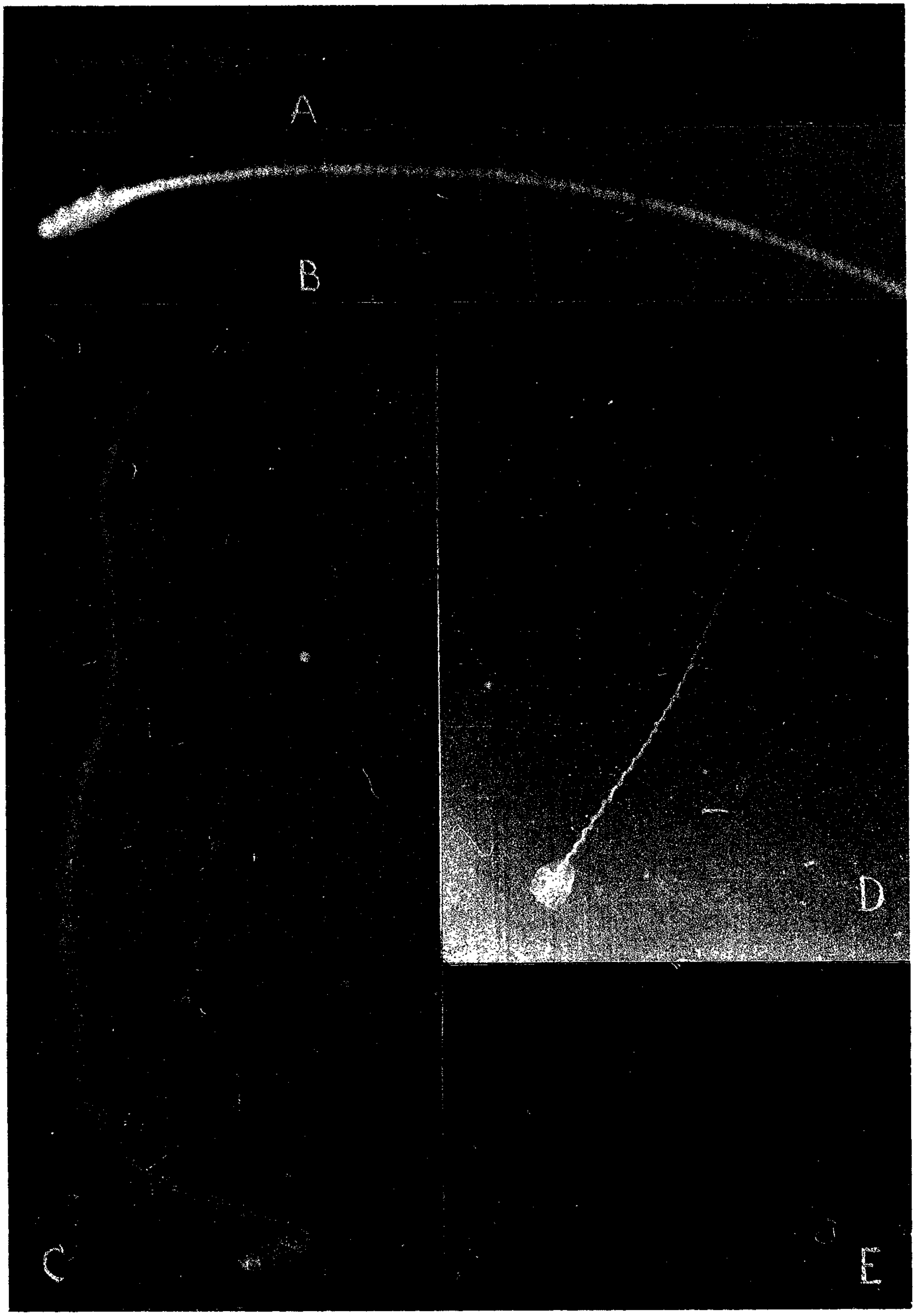

PLATE 3

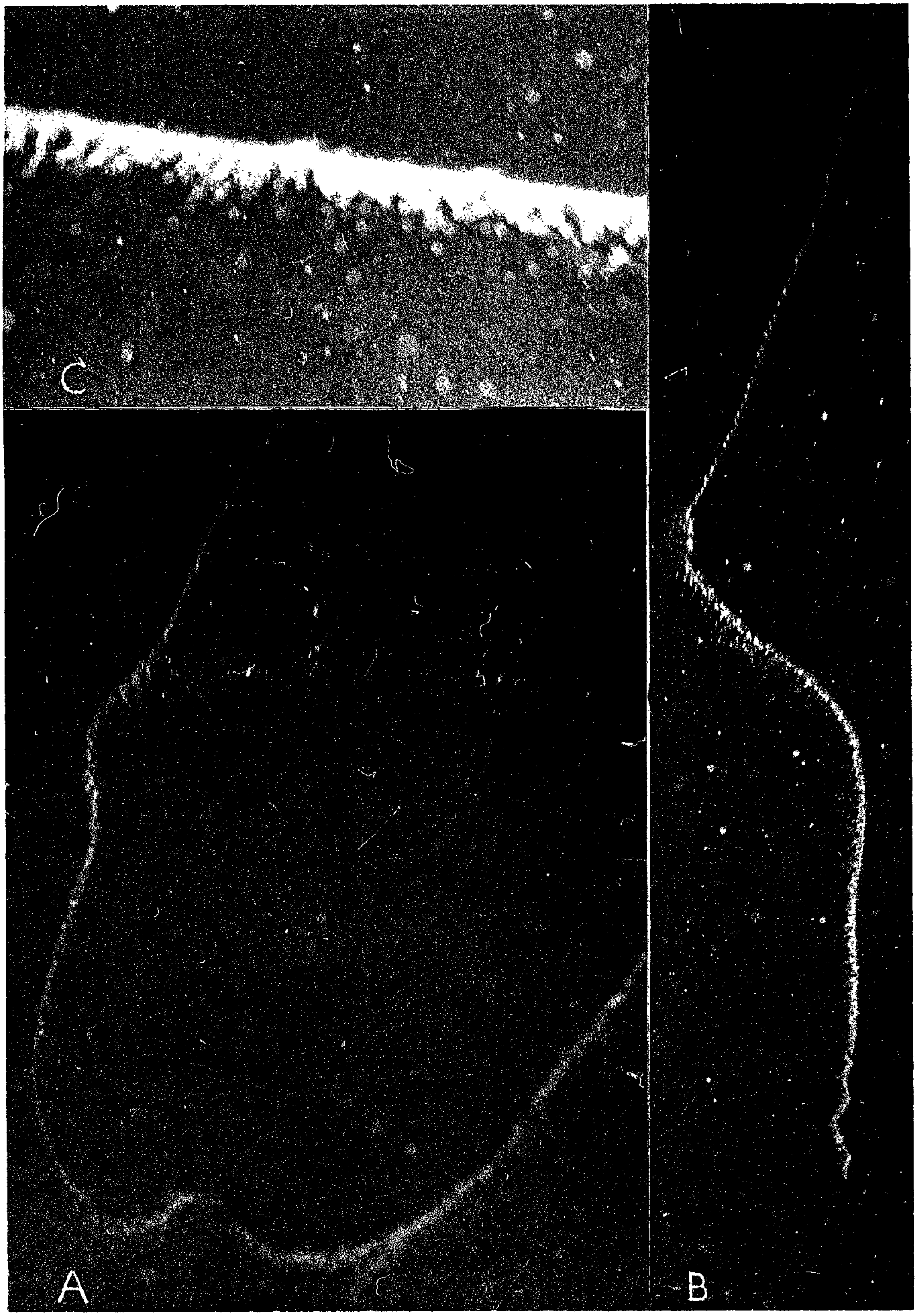

PLATE 4

a trachyline medusa having affinities with *Gonionemus*, in the family Olindiidae; these are characterized by hollow tentacles, and adhesive disks on some or all tentacles, adapted to clinging to algae. One such from California is *Vallentinia adherens* Hyman (1947), described from algal associations in shallow water. Another related species from the warmer areas of eastern United States is *Olindias phosphorica tenuis* Fewkes, for which the interesting nocturnal habits have been described by Breder (1956) who reported the medusae actively predaceous on fishes at night and resting in algal strands during the day. The medusa was observed on the film only once, near the bottom on the side slope of San Pedro Basin.

SCYPHOZOA

Scyphozoan medusae, or jelly-fishes, differ from hydrozoan medusae in several ways. Usually they are larger, some attaining gigantic proportions. The bell is more opaque and lacks a shelf or velum along its inner edge. The mouth is commonly surrounded by frilled lobes. They are frequently encountered in shallow or moderate depths. Sometimes cast ashore is the beautiful white and purple radially striped *Pelagia cyanella* Péron and Leseuer, which may be 12 inches across and has eight slender tentacles and four oral lappets. The dark brown *Chrysora gilberti* Kishinouyi may grow to be nearly as large; it has 24 tentacles, an umbrella flatter than that of *Pelagia*, and four oral tentacles that are much frilled at the margins. The white sea-jelly, *Aurelia aurita* Lamarck, is more delicate; it lacks long marginal tentacles but has a close fringe of many very short ones. The large sea-blubber, *Cyanea capillata* Eschscholtz, may measure 6½ feet across the disk and the tentacles may extend 60 feet; in life it is bright yellow or orange. The beautiful Prussian blue jelly-fish in shallow waters of California is *Stomopholus melaegris* Agassiz.

All of the forms described above occur at moderate or shallow depths in waters of comparatively high temperature. They are considered cosmopolitan in distribution with temperature the limiting factor. Others in deeper colder water are shown in photographs from Catalina and San Pedro Basins. One near the bottom of Catalina Basin (Plate 2, D) may be about 12 inches across; its long slender streaming marginal tentacles are seen in swimming position, and the bell is directed downward. Another kind of scyphozoan medusa near the bottom of San Pedro Basin (Plate 3, E) has long frilled oral lappets and a campanulate bell. This is associated with organisms in the sound-scattering layer and with siphonophores.

SIPHONOPHORES

The best known representatives of siphonophores in California are those inhabiting the shallow layers of the sea. The strand of windswept beaches is sometimes strewn with countless thousands of small epiplanktonic, rafted Blue-sail, *Velella lata* Chamisso and Eysenhardt, with individuals 3 to 4 inches long. Tropical areas have the more conspicuous and formidable Portuguese-man-of-war, *Physalia pelagica* Bosc. Its enormous brilliantly colored floating pneumatophore may be 12 inches long, and from its lower surface the varied array of tentacles may extend 20 to 45 feet. Both of these are surface forms that can exist only if their floats are maintained upright above the surface of the water. Each is a colony of highly specialized individuals named for their function and attached at nodes along a stem or axis that may be several yards long. Nectophores, or modified bell-like individuals at the forward end, jet-propel the colony through the water. In the Physophorida, to which *Velella* and *Physalia* belong, the float is called a pneumatophore.

Deep water siphonophores also are colonies of hydrozoan coelenterates, characterized by consisting of different kinds of individuals: gastrozooids or siphons ingest food, gonozooids are reproductive and dioecious (sexes separate), dactylozooids or feelers are sensory detecting, and the bell or float serves to propel the colony through the water. A gastrozooid is provided with a single hollow, long, contractile tentacle with lateral branches or tentilla, each of which ends in a knob or coil of stinging cells or nematocysts. The swimming bell is surmounted by a thick gelatinous bract of various shapes. When these seried groups of individuals are still attached to a colony, they are collectively called a cormidium, each differing in age so that the distalmost from the nectophore is the oldest one. When they break away from the colony they are called eudoxomes and it is as such that they are most frequently taken in nets. Since the entire colony is very fragile and gelatinous, it cannot be taken in good condition by ordinary collecting methods.

The nectophore, from which most generic and specific descriptions (Davis 1955: 209) have had to be made, is a complex gelatinous sack shaped like a prism, a helmet, or a flattened truncate or rounded bell and sometimes of minute proportions compared with the size of the colony. Its outer surface consists of a series of facets separated from one another by serrated or smooth ridges. The individual facets are named and lettered with reference to their position about the opening of the hydroecial cavity. They vary further according to the number of their sides and whether they are concave, convex, or straight; their ridges may be simple or divided, and the facets may meet one another at acute to blunt angles. Such detailed characters have provided the base for both specific and subfamilial ranks. The names Monophysid and Diphysid have been used to designate the numbers of distal nectophores, whether single or multiple, but since the bells are subject to loss or replacement, and may number more than four, the designations are inapt. Individual nectophores have been described with sizes ranging from ⅛ to ¼ inch long and ⅙ to ⅛ inch wide (Lens and Riemsdijk 1908). Fragments of these are sometimes taken in nets or trawls or cast ashore during storms. When so taken they are usually injured or disrupted. From these fragments it is difficult to reconstruct entire colonies, or to estimate the general form or size of the colony. Underwater photographs can provide more accurate records.

At least four different kinds of siphonophores have appeared on photographs made in San Pedro Basin, and with less frequency in Catalina Basin, in depths ranging from 170 to 3475 feet below the surface. They are presumed to be calycophorids (see Hyman 1940 for systematic discussion) and may belong to genera in the subfamily ABYLINAE Lens and Riemsdijk, genera *Abyla*, *Diphyes*, and *Muggiaea*, or related kinds. The subfamily is characterized for having one or more nectophores in superimposed series when more than single. The most abundant kind (Plate 3, B, C) may be an abylid siphonophore. It is represented by 35 individuals in 26 pictures from five stations, all in San Pedro Basin except one in Catalina Basin, and mainly in deep water near the bottom. This kind appeared singly in 19 photographs, twice in 5 photographs, and three times in 2 photographs. The greatest numbers were in San Pedro Basin at depths of 1568 to 2915 feet, a short distance above the sea floor. Some of the films show individuals with as many as four nectophores in superimposed series (Plate 3, B), together estimated at 2 inches long; they are followed by a long more slender tail or axon estimated at more than 3 feet long. The axon carries the polymorphic individuals in straight linear series, resembling a string of beads, in which a dark one is interspersed at nearly regular intervals (Plate 3, A). These dark spots may represent the siphons or another kind of member of the colony.

Another kind of siphonophore has a single prismatic nectophore and a long slender zig-zag tail or axon (Plate 3, D). It was photographed only once, from San Nicolas Basin.

A third kind of siphonophore was observed three times but never in sharp focus. It has a single sharply conical or pyramidal nectophore, resembling that of species of *Diphyes* or *Galeolaria*. It occurs at intermediate depths in San Nicolas and Catalina Basins.

An altogether different kind of siphonophore, with long pendanted individuals shown on some photographs, is presumed to be a bathyphysid siphonophore. Members of this group are characterized by a bell that is small for the size of the colony.

The axon is long and provided with irregularly prolonged individuals suspended at various intervals (Lens and Riemsdijk 1908). One of the largest is *Pterophysa grandis* Fewkes, which reaches a known length of 11½ feet and is recorded from depths as great as 4608 feet. Photographs made in deep water show large ropey strands, perhaps representing members of this group (Plate 4). They are recorded singly in ten photographs at four different stations in San Pedro and Catalina Basins and at depths of 1375 to 2915 feet.

DISTRIBUTION AND SIGNIFICANCE

The distribution of bathypelagic coelenterates in the basins, as judged from the photographs, shows a segregation or preference for different basins by the various forms. All except two of 82 individual trachyline medusae occur below the sills of two basins—San Nicolas and Catalina (Figs. 2 and 3). These waters are the coldest of those studied by the camera, 3.7° and 4.0°C (Emery 1954). In contrast, nearly all of the siphonophores are from the bottom of the warmer (5.1°C) San Pedro Basin or from the even warmer side slopes of San Pedro and Catalina Basins. Thus, apparently the trachyline medusae and the siphonophores have different temperature preferences. Another control, considered by us to be less effective than temperature, is that of oxygen content of bottom waters. This averages 0.60, 0.45, and 0.25 ml/L for the San Nicolas, Catalina, and San Pedro Basins, respectively (Rittenberg *et al.* 1955).

The characteristic common to the trachyline medusae, scyphozoans, and siphonophores is the preference for waters just above the bottom. Of 138 individuals in the photographs, 112 occurred within 300 feet of the bottom. This suggests that they feed on animals on or in the bottom sediments. The bottoms of both Catalina and San Nicolas Basins have been found (unpublished data) to support a diversified population of metazoan invertebrate animals, but in contrast the floor of San Pedro Basin is nearly barren (Hartman 1955a). This difference is probably the result of a lack of dissolved oxygen in the interstitial

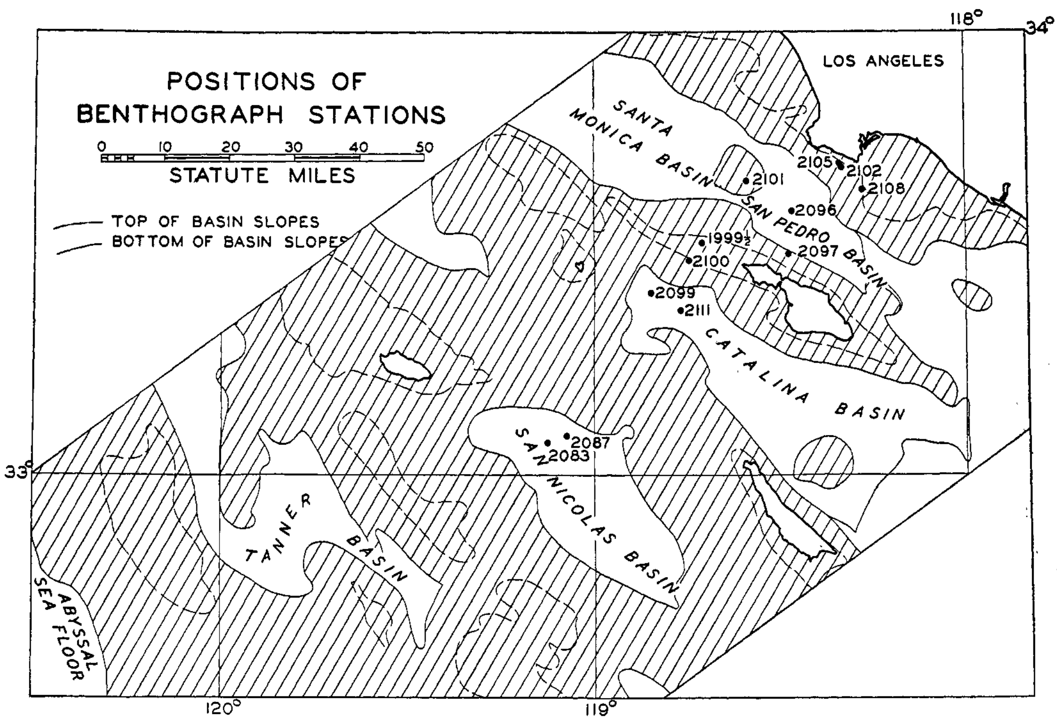

FIG. 2. Geographical distribution of benthograph stations in basins of southern California.

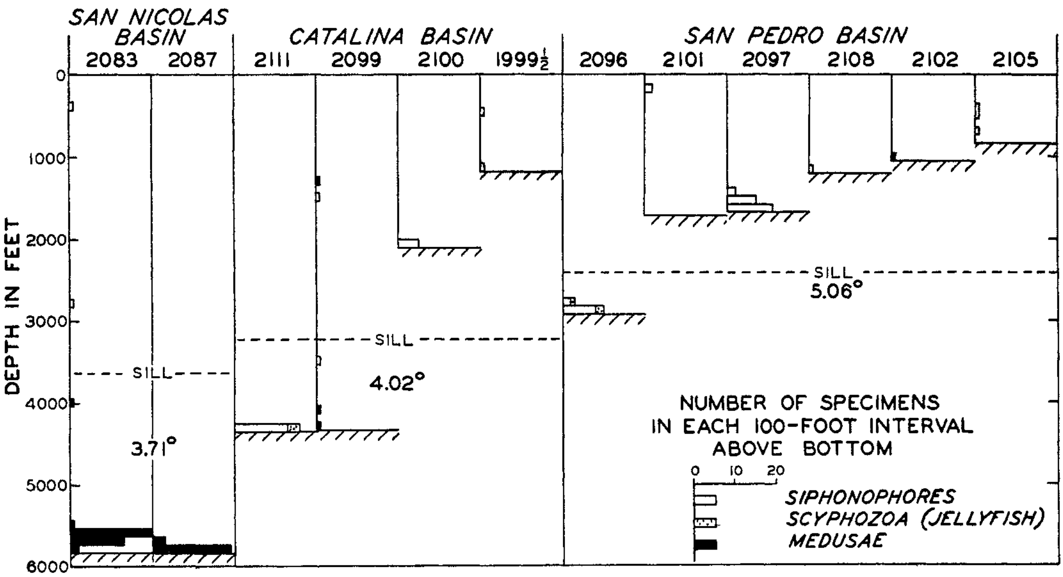

FIG. 3. Depths at each benthograph station at which bathypelagic coelenterates were photographed. Bars show numbers of individuals at 100-foot depth intervals above the bottom.

waters of the sediment in San Pedro Basin, which makes the sediment uninhabitable for many small burrowing animals such as worms but provides no barrier to larger animals living above the bottom and making temporary incursions into it. The total content of organic matter in the top few inches of bottom sediments is high, averaging about 10.3, 9.1, and 7.6 per cent for San Nicolas, Catalina, and San Pedro Basins, respectively (Emery and Rittenberg 1952). Thus, food is far more concentrated at the bottom than at any depth in the water column.

The fact that the siphonophores and scyphozoans are most abundant just above the floor of San Pedro Basin, which is nearly barren of benthonic animals, indicates that they are feeding on bathypelagic animals not visible in the photographs. The tentacles of coelenterates are provided with stinging organs to paralyze prey, and a short closed gut (the coel-enteron) is adapted to rapidly digest concentrated foods. It can be assumed, therefore, that bathypelagic medusae resemble other coelenterates in their food requirements. Whether the latter consist of deep water fishes or some other animals has not been established. However, the sediments have revealed the presence of small deep-water scallop mollusks, one of which is *Cyclopecten*, of which the delicate valves occur in conspicuous numbers; this harbors a commensal serpulid annelid, *Protis* (Hartman 1955b: 52). Both of these animals are believed to be bathypelagic and filter-feeding, and may in turn be fed upon by coelenterates. The food of the medusae in the lowest parts of San Nicolas and Catalina Basins might consist of some of the animals known to exist in or on the sediments.

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APPENDIX

STATION LIST

The following station list of the underwater photographs gives the geographical location and other descriptive data, together with the kinds of animals that have been recognized. Depths are presented in chronological order.

STATION 1999½ Nov. 5, 1950. Lat. 33° 31.4′; Long. 118° 42.5′.

Bottom is green mud at 1171 feet and its temperature 7.2° C.

Ridge northwest of Santa Catalina Island.

470 feet—1 trachyline medusa
? feet—swarm of squids
1160 feet—bathyphysid siphonophore

STATION 2083 Nov. 18, 1951. Lat. 33° 04.5′; Long. 119° 07.1′.

Bottom is green mud at 5840 feet and its temperature 3.7° C.

San Nicolas Basin.

5500 feet—1 trachyline medusa
5610 feet—1 trachyline medusa
5614 feet—1 trachyline medusa
5640 feet—4 trachyline medusae
5670 feet—6 trachyline medusae
5700 feet—2 trachyline medusae
5823 feet—1 trachyline medusa
5749 feet—1 trachyline medusa
5710 feet—1 trachyline medusa
5671 feet—1 trachyline medusa
5623 feet—2 trachyline medusae
5589 feet—14 trachyline medusae (Plate 1, D)
3990 feet—1 trachyline medusa (Plate 2, B)
2751 feet—1 abylid siphonophore
380 feet—1 siphonophore with zig-zag tail (Plate 3, D)

STATION 2087 Nov. 19, 1951. Lat. 33° 05.5′; Long. 119° 04.2′.

Bottom is green mud at 5839 feet and its temperature 3.7° C.

San Nicolas Basin.

5640 feet—1 trachyline medusa
5690 feet—2 trachyline medusae
5755 feet—1 trachyline medusa
5758 feet—1 trachyline medusa
5761 feet—2 trachyline medusae
5763 feet—2 trachyline medusae
5770 feet—1 trachyline medusa
5773 feet—3 trachyline medusae
5780 feet—1 trachyline medusa
5785 feet—1 trachyline medusa
5792 feet—2 trachyline medusae
5812 feet—1 trachyline medusa
5816 feet—1 trachyline medusa
5780 feet—1 trachyline medusa
5765 feet—1 trachyline medusa (Plate 1, C)
5760 feet—1 trachyline medusa (Plate 1, B)
5810 feet—1 trachyline medusa
5830 feet—1 trachyline medusa
5820 feet—1 trachyline medusa
5780 feet—1 trachyline medusa
5800 feet—1 trachyline medusa (Plate 1, A)
5805 feet—1 trachyline medusa
5800 feet—1 trachyline medusa
5830 feet—1 trachyline medusa
5820 feet—1 trachyline medusa
5820 feet—1 trachyline medusa
5790 feet—1 trachyline medusa
5820 feet—1 trachyline medusa
5830 feet—1 trachyline medusa
5830 feet—1 trachyline medusa
5830 feet—1 trachyline medusa
5810 feet—1 trachyline medusa

STATION 2096 March 29, 1952. Lat. 33° 35.4′; Long. 118° 28.1′.

Bottom is green mud at 2921 feet and its temperature 5.1° C.

San Pedro Basin.

2916 feet—3 abylid siphonophores (Plate 3, C) and 2 campanulate scyphozoans
2915 feet—1 bathyphysid siphonophore (Plate 4, A)
2910 feet—1 abylid siphonophore
2890 feet—1 bathyphysid siphonophore
2910 feet—2 abylid siphonophores
2814 feet—1 abylid siphonophore
2806 feet—1 campanulate scyphozoan and 1 abylid siphonophore (Plate 3, E) and 1 bathyphysid siphonophore
2878 feet—1 abylid siphonophore
2735 feet—1 abylid siphonophore
1125 feet—1 slender object with bulb at either end (not identified)

STATION 2097 March 29, 1952. Lat. 33° 29.6′; Lat. 118° 29.0′.

Bottom is green mud at 1663 feet and its temperature 6.4° C.

Slope of San Pedro Basin.

1510 feet—2 abylid siphonophores
1528 feet—1 abylid siphonophore
1549 feet—2 abylid and 1 bathyphysid siphonophores (Plate 3, A, B)

1568 feet—3 abylid siphonophores
1585 feet—1 abylid siphonophore
1616 feet—1 abylid and 1 bathyphysid siphonophore
1631 feet—1 abylid siphonophore
1648 feet—2 abylid and 1 bathyphysid siphonophores
1647 feet—1 abylid siphonophore
1660 feet—1 abylid siphonophore
1465 feet—1 bathyphysid siphonophore
1375 feet—1 abylid and 1 bathyphysid siphonophore

STATION 2099 March 30, 1952. Lat. 33° 24.0′; Long. 118° 50.9′.

Bottom is green mud at 4330 feet and its temperature 4.0°C.

Catalina Basin.

4115 feet—1 trachyline medusa
3475 feet—1 abylid siphonophore
1445 feet—1 abylid siphonophore
1225 feet—1 trachyline medusa in sound-scattering layer (Plate 2, A)

STATION 2100 March 30, 1952. Lat. 33° 29.2′; Long. 118° 45.5′.

Bottom is green mud sloping between 2065 and 2099 feet and its temperature is 5.5° C.

Slope of Catalina Basin.

2080 feet—1 bathyphysid siphonophore (Plate 4, C)
2060 feet—1 bathyphysid siphonophore (Plate 4, B)
2040 feet—1 abylid siphonophore
2054 feet—1 abylid siphonophore
2080 feet—1 abylid siphonophore

STATION 2101 March 30, 1952. Lat. 33° 39.9′; Long. 118° 35.5′.

Bottom is green mud at 1714 feet and its temperature 6.1° C.

San Pedro Basin near sill from Santa Monica Basin.

1706 feet—a prawn
170 feet—2 abylid siphonophores

STATION 2102 March 30, 1952. Lat. 33° 41.2′; Long. 118° 20.2′.

Bottom is green mud sloping between 957 feet to more than 1045 feet and its temperature is about 8.0° C.

Slope of San Pedro Basin.

1045 feet—1 *Gonionemus*-like medusa (Plate 2, C)

STATION 2105 April 9, 1952. Lat. 33° 41.3′; Long. 118° 20.2′.

Bottom is green mud at 840 feet and its temperature is about 8.5° C.

Top of slope of San Pedro Basin.

660 feet—1 abylid siphonophore and a dumbbell-shaped unidentified object (out of focus)
510 feet—1 abylid siphonophore
400 feet—1 abylid siphonophore

STATION 2108 April 20, 1952. Lat. 33° 38.4′; Long. 118° 16.7′.

Bottom is green mud sloping between 870 and 1410 feet and its temperature is about 8.0° C.

San Pedro Sea Valley in slope of San Pedro Basin.

1200 feet—1 abylid siphonophore near bottom
1381 feet—a spindle-shaped object, not identified

STATION 2111 April 29, 1952. Lat. 33° 22.4′; Long. 118° 47.2′.

Bottom is green mud at 4373 feet and its temperature 4.0° C.

Catalina Basin.

1225 feet—1 trachyline medusa
4313 feet—1 trachyline medusa
4314 feet—2 trachyline medusae
4315 feet—2 trachyline medusae
4315 feet—2 trachyline medusae
4316 feet—1 trachyline medusa
4316 feet—1 trachyline medusa
4370 feet—7 trachyline medusae
4370 feet—1 scyphozoan medusa
4360 feet—1 scyphozoan medusa (Plate 2, D)
4360 feet—1 scyphozoan medusa