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QUANTITATIVE SURVEY OF THE
BENTHOS OF SAN PEDRO BASIN,
SOUTHERN CALIFORNIA

PART I

PRELIMINARY RESULTS
(Charts 1-2, Plates 1-7)

BY

OLGA HARTMAN



THE UNIVERSITY OF SOUTHERN CALIFORNIA PRESS
LOS ANGELES, CALIFORNIA

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TABLE OF CONTENTS

INTRODUCTION	1
ACKNOWLEDGEMENTS	4
DESCRIPTION OF THE AREA	5
CHART OF THE AREA	6-7
CRUISES OF THE VELERO IV CONCERNED WITH QUANTITATIVE SURVEY	9
LIST OF STATIONS	11
ANALYSES OF SAMPLES BY DEPTHS	39
ANALYSES OF BIOLOGICAL MATERIALS	41
SUMMARY OF RESULTS	144
APPENDICES	
A. Improved Techniques for Ocean Bottom Sampling, by Floyd E. Durham	152
B. A List of the Mollusca identified from samples of the Benthos of San Pedro Basin, California, by Norman T. Mattox	154
C. A List of Phoxocephalid Amphipoda identified from samples of the Benthos of San Pedro Basin, California, by J. Laurens Barnard	159
D. A List of Brachiopoda identified from samples of the Benthos of San Pedro Basin, California, by Olga Hartman	164
E. A List of Enteropneusta identified from samples of the Benthos of San Pedro Basin, California, by Keith Woodwick	166
F. A List of Polychaetous Annelids identified from samples of the Benthos of San Pedro Basin, California, by Olga Hartman	168
PLATES	187

QUANTITATIVE SURVEY OF THE BENTHOS OF SAN PEDRO BASIN, SOUTHERN CALIFORNIA

Part I. Preliminary Results

INTRODUCTION

This report outlines the preliminary results of a quantitative study of the marine animal populations in a limited area of southern California. The purpose of the project has been to conduct an intensive survey of the benthic invertebrate metazoan animals of San Pedro Basin, and to attempt a reconstruction of the natural animal associations. Many of the physical features, including temperature and salinity of the Basin, are known or are being investigated by the geologists and oceanographers of southern California. In time, therefore, the biological and physical data may be correlated and many features of distribution and abundance explained.

Throughout the San Pedro Basin, measured samples have been taken at chosen intervals for more than two years (1952 to 1954), using a bottom sampling device that grabs a sizeable part of the sea bottom from any depth. The device is dropped as a plummet, presumably without obliquity; its measured descent is used to indicate depth to the bottom. The sample is hauled up and immediately deposited in a large tub that completely accommodates the contents of the grab, in as undisturbed a condition as possible. Two half-pint samples are removed and set aside for future physical studies. From the tub the material is transferred to a set of screens of selected sizes. Care is taken that the innumerable soft-bodied animals remain as intact as possible. The screens, with mesh from coarse to fine, measuring to 24 meshes to the inch, sort out the animals and other particles; they are washed with seawater and preserved with a reagent (formalized seawater) to harden protoplasmic tissue. Finally the labeled samples are taken to the laboratory, where all subsequent work is done. Tyler Standard screens, with meshes to a fine of 32 to the inch, are used for further washing of the samples. They are sorted and analyzed, then transferred to 70% alcohol.

During the first part of the operation, a series of four or five screens was used on the boat. These screens measured 18 by 24 inches and were made of stainless steel fitted with a brass mesh that varied from a coarse one of 12 meshes, through 16, 20, and 24 meshes to the inch. When much rubble was present in a sample, a coarser screen was placed over the others to expedite the sorting of the finer materials. The mud was washed through the screens with the aid of seawater hoses. The process was slow and physically tiring. As harsh sprays were found to damage soft-bodied animals, the use of nozzles on hoses was impracticable. Lighter, finger-controlled sprays were laborious but resulted in better preservation of the animals.

The methods of washing and clearing of fine debris were considerably improved when larger screens (figs. 14-16) with greater range in mesh-size were introduced. These larger screens are now mounted on a shaker device (see fig. 16 and Description of Equipment, below) which permits the flow of materials through them without damaging the specimens. The seawater comes through a system of shower-sprays, and the amount and force of the sprays can be controlled through valves. Many of the smaller animals that had become enmeshed around the wires of the screens, had formerly to be washed or picked off separately; now they are largely disentangled with the aid of an air hose that causes them to drop to the retaining sack (fig. 23). The removal of the washed and cleared animals from the screens was at first performed by raising the entire screen and washing the contents into a large pan or tub. This method has been improved so that the contents are removed without much lifting.

The *Velero IV* has provided an excellent base from which a grab, called by its manufacturer the Hayward-orange-peel bucket (known below as the orange-peel grab), of about two cubic feet capacity (see figs. 5-8 and Description of Equipment, below), can be suspended. A second larger one, the Campbell grab (figs. 17-20), named for its designer, Alex Campbell, was introduced in April, 1954, and found more effective in some kinds of bottoms. For each sample, the living metazoan animals are sorted out. Many of these have now been identified, counted, and charted. Since ultimate results can be based only on final counts of heads or some other unit parts of living specimens, all estimates should be regarded as minimal. There are, necessarily, losses of unmeasurable amounts, resulting from the various stages through which each sample must be processed.

A map of the area (Chart 1) has been marked off by intersecting lines two minutes of latitude and longitude apart, choosing all even minutes of each, or about every two miles. It is at once obvious that a small sample covering approximately two square feet of surface and with a volume of about two or three cubic feet, is very meager to represent a seabottom that measures nearly four square miles in surface area. Furthermore, it was soon found that even though a uniform sampling device was employed, few of the samples measured as much as two cubic feet, especially when taken from the shallower waters of the continental shelf, where measured samples were as small as a tenth of a cubic foot. Others, from soft oozy muds in great depths, measured well over three cubic feet. It was found also that the degree of penetration of the grab varied in different kinds of bottoms; these varied from the finest muds to compact sandy or shelly gravels to clay. In addition, the incomplete closure of the jaws of the grab may have caused the loss of contents on the way to the surface. Some of these difficulties have been met through improvements in techniques as the sampling continued.

Although the studies are not complete, it seems worthwhile to describe the methods that have been used, and to indicate preliminary results which are remarkable for their qualitative and quantitative relations.

ACKNOWLEDGEMENTS

This program has been supported by Captain Allan Hancock, Director of the Allan Hancock Foundation of the University of Southern California. Captain Hancock has taken an active interest in the project and accompanied most of the cruises. The field work was performed by participating members who were largely members of the Foundation or the University faculty, and zoology students. The technical problems of constructing and adjusting suitable equipment were solved by the Engineer, Alex Campbell, and his staff on the *Velero IV*. The ship was maneuvered in position by Fred Ziesenhenné so that chosen points were accurately found; he has also had charge of recording all terrestrial positions for the charts. During the second half of the survey, Dr. Floyd E. Durham has had charge of field operations. The photographs of the submarine scapes were made with the benthograph operated from the *Velero IV*. Dr. K. O. Emery and staff of the Geology Department of the University provided data on temperature and some physical properties of the San Pedro Basin.

Identifications of animals were made by various authorities. Dr. J. Laurens Barnard is responsible for the phoxocephalid amphipods; Keith Woodwick determined the enteropneusts and most of the polydoriid polychaetes; Dr. Norman T. Mattox was consulted for the mollusks. Other determinations, except those indicated below, were by the writer.

DESCRIPTION OF THE AREA

The area selected for a quantitative investigation is the San Pedro Basin (Chart 1), the shallowest of a series of about a dozen depressions along the coast of southern California (see Emery and Shepard, 1945, "Lithology of the sea floor off southern California." Bull. Geol. Soc. America, vol. 56, pp. 431-477, chart). It lies between the mainland of southern California and Catalina Island, and is continuous northwestward through a narrow channel with the Santa Monica Basin. It is bounded by a submarine valley, the Redondo Canyon, to the north, and by the city of South Laguna Beach to the south. Its geographic boundaries extend from $33^{\circ} 16'$ to $33^{\circ} 50'$ north latitude, and $117^{\circ} 46'$ to $118^{\circ} 36'$ west longitude. The area comprises about 520 square miles of sea bottom. Depths range from 4 to 495 fathoms, with the deepest measured depth about half way between Isthmus, Catalina Island, and Long Point, on the mainland. There are two poorly marked channels running approximately parallel to the mainland. There is a northwestern threshold or sill depth of about 489 fathoms, only slightly above the deepest part of the basin, and a southeastern one of about 400 fathoms, east of Avalon, Catalina Island. The oceanward basins, beyond San Pedro Basin, gradually attain far greater depths, to more than a thousand fathoms.

There are four submarine mounts within the Basin, one on each side of the two threshold depths, at the northwestern and southern ends. The largest one, the Lasuen Seamount (Chart 2), is the most easterly. It rises abruptly from 385 to 58 fathoms within a mile. There are steep descents along the rims of Redondo Canyon and along the leeward shores of Catalina Island. There is a broad shallow submarine shelf, about six miles wide at most, south of San Pedro Bay, that extends coastwise from Long Point to Newport Beach. This has an extremely rich and highly diversified fauna. There is a large sewer outlet (conduit for domestic pollution) off White's Point, San Pedro, emptying into the sea nearly a mile off shore. There are fluvial and terrigenous materials brought in by rivers, especially the Santa Ana River, northwest of Newport Bay, and the San Gabriel River, near Long Beach; these carry considerable loads into the sea during some months of the year. There is a long breakwater at the ocean side of Outer Harbor. There are cable crossings and possible industrial pollutions from manufacturing plants, all of which may have some effect on the productivity of benthic populations.

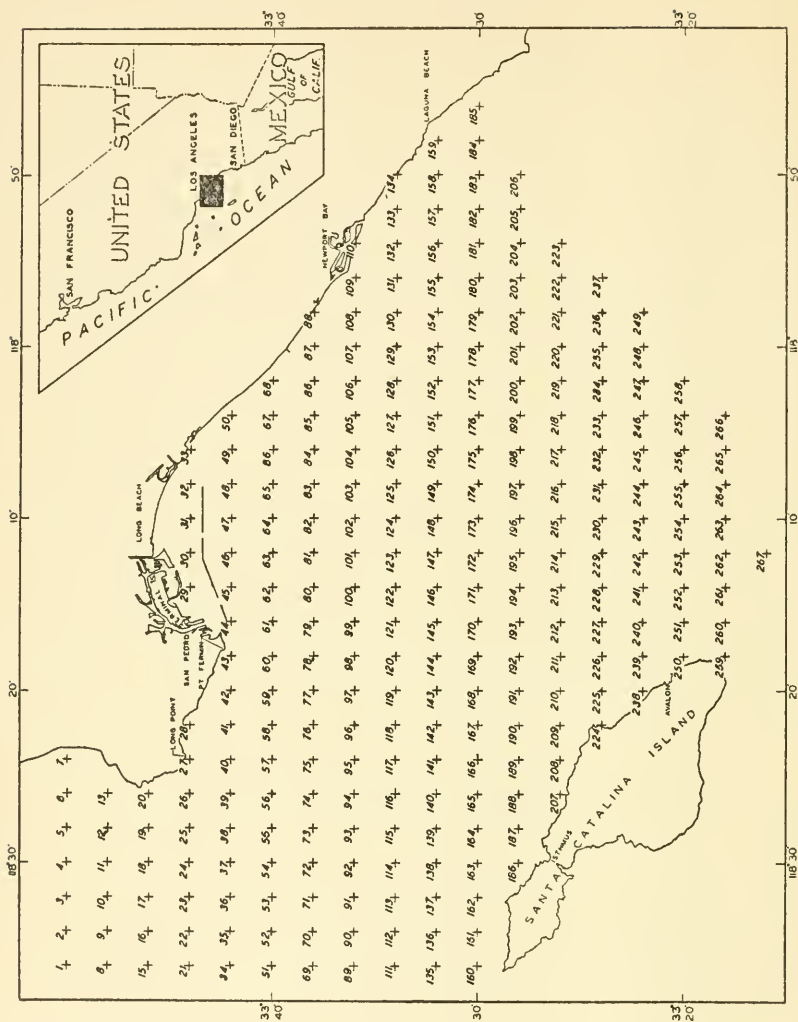


Chart 1. San Pedro Basin and adjacent areas, showing numbers of samples, 1 to 267, placed on the even numbers of minutes of latitude and longitude. The small insert map in the upper right hand corner, orients the area along the northeast Pacific.

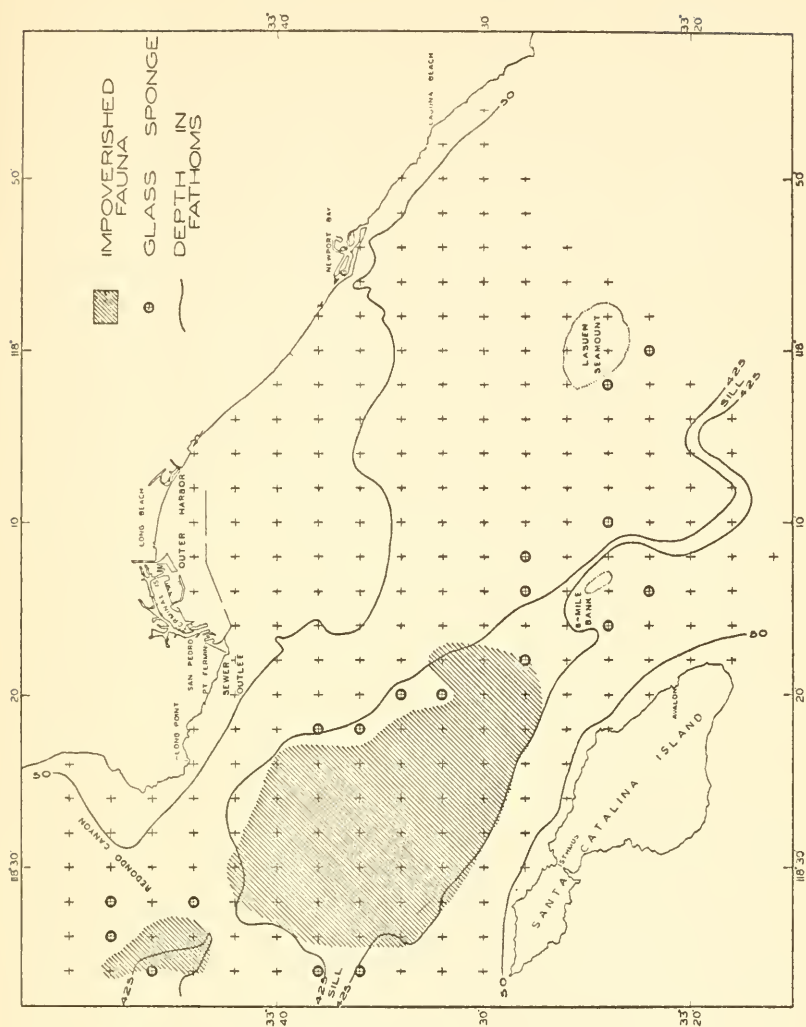


Chart 2. San Pedro Basin and adjacent areas, showing the 50 fathom and 425 fathom contour lines, the northwest and southeast sills. The areas of impoverished fauna at the western end are indicated, and the glass sponge bottoms are shown.

The latitudinal and longitudinal lines used to mark off this area result in 267 intersecting points (see Chart 1), from which the samples originate. The departures from the exact even minutes are due to operational or economic factors, beyond the control of the experiment. The precise locations are expressed in the Station List, below.

The numbers, 2107-52 to 2859-54, are a continuation of the series published earlier in the Allan Hancock Pacific Expeditions (vol. I, no. 3, 1943). Only stations in the San Pedro Basin for which quantitative grabs have been taken, are here included.

Temperatures were taken during the first year of the survey, by immersing a centigrade thermometer in the mud sample just after it had reached the deck of the ship. It was found that the readings were unreliable, since those from great depths were too high, due perhaps to the effects of warming on ascent through the upper warmer layers of water. The samples from shallow depths were frequently very small, making the process difficult. On the whole it can be stated that the temperatures of the shallower shelf vary diurnally and seasonally. The deeper parts of the basin may be nearly homothermal, depending on depth.

Based on readings taken by immersing a thermometer in the mud sample on the deck of the ship, temperatures from shallow depths were about as follows:

Station 2124-52, no. 61, June, in 29 fathoms—15.5°C.

Station 2152-52, no. 224d, Sept., in 19 fathoms—14.0°C.

Station 2176-52, no. 164a, October, in 28 fathoms—13.0°C.

Station 2217-52, no. 45b, February, in 12 fathoms—11.5°C.

Temperatures for greater depths, taken with a reversing thermometer lowered to the water mass just above the surface of the mud, have been made available by Dr. K. O. Emery, from transects taken from San Pedro shelf to Catalina Island; these are as follows:

650 feet (108 fms)—8.5°C.

1000 feet (167 fms)—8.0°C.

1200 feet (200 fms)—7.5°C.

1600 feet (267 fms)—6.5°C.

1800 feet (300 fms)—6.0°C.

2100 feet (350 fms)—5.5°C.

2700 to 2850 feet (450 to 480 fms)—5.04°C to 5.07°C.

CRUISES OF THE VELERO IV CONCERNED WITH
QUANTITATIVE SAMPLING OF THE BENTHOS
OF SAN PEDRO BASIN, CALIFORNIA

Thirty-seven cruises, from April, 1952, to June, 1954, have been made by the *Velero IV*, concerned partly or wholly with taking quantitative samples in San Pedro Basin and vicinity. These cruises, with dates and station numbers are:

- Cruise 85. iv-20-1952. Stations 2107-52 to 2110-52.
- Cruise 88. vi-18/19-1952. Stations 2113-52 to 2122-52.
- Cruise 89. vi-25/26-1952. Stations 2124-52 to 2130-52.
- Cruise 94. viii-6/7-1952. Stations 2138-52 to 2146-52.
- Cruise 97. ix-26/27-1952. Stations 2148-52 to 2153-52.
- Cruise 99. x-18-1952. Station 2166-52.
- Cruise 100. x-30/31-1952. Stations 2168-52 to 2177-52.
- Cruise 104. xii-5-1952. Stations 2189-52 to 2193-52.
- Cruise 106. i-17-1953. Station 2202-53.
- Cruise 111. ii-27/28-1953. Stations 2217-53 to 2233-53.
- Cruise 114. iv-19-1953. Station 2290-53.
- Cruise 115. iv-24/25-1953. Stations 2291-53 to 2306-53.
- Cruise 117. v-15/16-1953. Stations 2307-53 to 2314-53.
- Cruise 118. v-19-1953. Stations 2315-53 to 2317-53.
- Cruise 119. vi-24/25-1953. Stations 2321-53 to 2336-53.
- Cruise 120. vii-1/2-1953. Stations 2337-53 to 2355-53.
- Cruise 121. vii-8/9-1953. Stations 2356-53 to 2374-53.
- Cruise 125. vii-28-1953. Stations 2386-53 to 2389-53.
- Cruise 126. viii-17-1953. Station 2394-53.
- Cruise 129. ix-16/17-1953. Stations 2403-53 to 2414-53.
- Cruise 131. ix-29/30-1953. Stations 2417-53 to 2429-53.
- Cruise 132. x-10/11-1953. Station 2430-53 to 2445-53.
- Cruise 133. x-14/15-1953. Stations 2446-53 to 2454-53.
- Cruise 135. x-28-1953. Stations 2470-53 to 2476-53.
- Cruise 137. xi-27-1953. Stations 2496-53 to 2500-53.
- Cruise 138. xii-10-1953. Stations 2501-53 to 2508-53.
- Cruise 143. iii-3-1954. Stations 2606-54 to 2615-54.
- Cruise 146. iv-7-1954. Stations 2618-54 to 2620-54.
- Cruise 148. iv-20-1954. Stations 2625-54 to 2629-54.
- Cruise 149. iv-24/25-1954. Stations 2630-54 to 2646-54.

Cruise 152. v-8/9-1954. Stations 2722-54 to 2740-54.

Cruise 153. v-14/15-1954. Stations 2741-54 to 2757-54.

Cruise 156. v-22/23-1954. Stations 2788-54 to 2802-54.

Cruise 159. vi-17-1954. Stations 2835-54 to 2839-54.

Cruise 160. vi-22/23-1954. Stations 2840-54 to 2850-54.

Cruise 161. vi-25/26-1954. Stations 2851-54 to 2859-54.

The 303 stations, numbered 2107-52 to 2859-54, are described immediately below, giving the corresponding serial number (1 to 267) on the chart, date, approximate locality in San Pedro Basin, exact latitude and longitude, depth in fathoms, volume of grab and kind of gear used, and general remarks on kind of bottom. Some of the earlier stations (2107-52 to 2291-53) give temperature of the bottom.

LIST OF STATIONS MADE BY THE VELERO IV, for a Survey of the Benthos of San Pedro Basin, California, giving corresponding Serial (Sample) number, shown on Chart 1, date, approximate locality in San Pedro Basin, position, depth in fathoms, volume of sample and kind of gear used, temperature for some of the earlier stations, and general remarks.

Station	Serial No. on Chart	Date	Locality in San Pedro Basin	Position North Latitude West Longitude	Depth	Volume and Gear	Temp. of Bottom	REMARKS
Cruise 85— 2107-52	46a	Apr 20	2.2 mi ESE of Los Angeles light	33-41-36 118-12-37	13 fms	2.0 cu. ft. orange-peel grab		Sand and mud; very rich in life; jack-knife clams; diversified.
2110-52	58a	Apr 20	4.45 mi SW of Pt. Fermin light	33-39-15 118-21-29	427 fms	large sample orange-peel grab		Oozy mud; foraminiferans, <i>Phyllochaetopterus</i> and serpulid tubes.
Cruise 88— 2113-52	63a	Jun 18	2.4 mi S of Long Beach light	33-41-01 118-11-04	13 fms	0.95 cu. ft. orange-peel grab		Red sand; phoronids, echinoids, ophiuroids, burrowing anemones, sand-dwelling annelids; richly diversified.
2114-52	108	Jun 18	1.9 mi WSW of Newport Beach pier	33-35-45 117-57-57	17 fms	1.26 cu. ft. orange-peel grab		Mud and sand; diversified; polychaetes, echinoderms, mollusks, crustaceans.
2115-52	109	Jun 18	0.9 mi S of Newport Beach pier	33-35-28 117-55-41	61 fms	1.51 cu. ft. orange-peel grab	9.2° C	Mud and sand; diversified; polychaetes, echinoderms, echinoderms, mollusks.
2116-52	159a	Jun 18	0.66 mi SSE of Abalone Pt., Laguna Beach	33-32-07 117-48-15	26 fms	2.45 cu. ft. orange-peel grab	11° C	Mud; polychaetes, ophiuroids, enteropneusts, foraminiferans.
2117-52	184	Jun 18	3.15 mi SSE of Abalone Pt., Laguna Beach	33-30-20 117-47-32	54 fms	3.65 cu. ft. orange-peel grab		Mud; several hundred ophiuroids, stellate foraminiferans, 9 larger <i>Molpadia</i> , mollusks, many diversified polychaetes.
2120-52	224a	Jun 19	0.53 mi ESE of Long Pt., Catalina I.	33-24-09 118-21-21	44 fms	1.07 cu. ft. orange-peel grab		Sandy mud; <i>Lyttechinus</i> , spioniform worms, ophiuroids, mollusks.

Station	Serial No. on Chart	Date	Locality in San Pedro Basin	Position North Latitude West Longitude	Depth	Volume and Gear	Temp. of Bottom	REMARKS
2121-52	238a	Jun 19	2 mi SSE of Long Pt. light, Catalina I.	33-22-34 118-20-52	32 fms	1.26 cu. ft. orange-peel grab	ca. 14° C	Black sandy mud; dead <i>Laqueus</i> , larger seasters, solitary coral, many annelids.
2122-52	250a	Jun 19	0.47 mi ESE of Jewfish Pt., Catalina I.	33-19-04 118-17-39	48 fms	0.95 cu. ft. orange-peel grab		sandy mud; dead <i>Laqueus</i> , large maldanid and other polychaetes, ophiuroids.
Cruise 89— 2124-52	81a	Jun 25	4.35 mi SE x S from Los Angeles light	33-38-52 118-12-08	16 fms	Volume not taken orange-peel grab	14.6° C	Shell and fine rubble; many annelids.
2125-52	80a	Jun 25	5.5 mi S of Los Angeles light	33-37-03 118-14-21	29 fms	Volume not taken orange-peel grab	15.5° C	Fine mud and shaley rubble; many annelids, ophiuroids, mollusks, smaller crustaceans.
2126-52	123a	Jun 25	9.2 mi SSE of Los Angeles light	33-34-05 118-10-41	48 fms	Volume not taken orange-peel grab	14° C	Coralline clumps; diversified bottom; ophiuroids, many bivalves, many different annelids.
2127-52	149	Jun 25	11.25 mi SSE of Los Angeles light	33-32-38 118-08-39	125 fms	Volume not taken orange-peel grab	9° C	Mud and sand; a rock; many dead gastropod shells, considerable mucus, <i>Chloëta</i> and nephytids.
Cruise 94— 2138-52	34	Aug 6	9.2 mi WSW of Pt. Vicente	33-41-15 118-34-53	282 fms	very small sample orange-peel-grab		Mud and fine gravel; ophiuroids, a large spider crab, many smaller annelids.
2139-52	35	Aug 6	8.2 mi WSW of Pt. Vicente	33-41-28 118-33-38	433 fms	1.89 cu. ft. orange-peel grab		Mud; many annelids and crustaceans.
2142-52	186a	Aug 7	0.25 mi off Howlands Ldg., Catalina I.	33-27-48 118-31-02	19 fms	1.9 cu. ft. orange-peel grab		Fine sandy mud; <i>Chaetopterus</i> and <i>Spiochaetopterus</i> ; very richly diversified.

Station	Serial No. on Chart	Date	Locality in San Pedro Basin	Position North Latitude West Longitude	Depth	Volume and Gear	Temp. of Bottom	REMARKS
2143-52	186b	Aug 7	0.29 mi off Howlands Ldg., Catalina I.	33-27-50 118-30-56	25 fms	2.0 cu. ft. orange-peel grab		Mud, broken shells and rubble; <i>Chloëta</i> , malda-nids, ophiuroids.
2144-52	224b	Aug 7	0.4 mi ESE of Long Pt. light, Catalina I.	33-24-12 118-21-29	45 fms	1.6 cu. ft. orange-peel grab		Sandy mud; enteropneusts and many smaller annelids.
2145-52	224c	Aug 7	0.6 mi SE of Long Pt. light, Catalina I.	33-24-02 118-21-19	44 fms	Volume not taken orange-peel grab		Fine mud; ophiuroids and many annelids.
2146-52	142a	Aug 7	9.6 mi SSW of Pt. Fermin	33-31-45 118-21-45	490 fms	3.46 cu. ft. orange-peel grab	7° C	Oozy mud; foraminiferans, <i>Phyllochaetopterus</i> .
Cruise 97— 2148-52	6b	Sep 26	2.2 mi WSW of Redondo Beach pier	33-49-32 118-25-53	161 fms	2.8 cu. ft. orange-peel grab	11° C	Mud; 4 large unknown echiuroids with a commensal crab, many smaller annelids, about 50 <i>Chloëta</i> .
2149-52	6c	Sep 26	1.7 mi WSW of Redondo Beach pier	33-49-54 118-25-27	129 fms	2.7 cu. ft. orange-peel grab	10° C	Mud; 3 large echiuroids; more than 60 <i>Chloëta</i> , many bivalves and other mollusks, many diversified annelids.
2150-52	10a	Sep 26	7 mi WSW of Redondo Beach pier	33-47-56 118-31-16	310 fms	1.38 cu. ft. orange-peel grab	7° C	Mud; 10 urchins, a large nemertean, scaphopods, many annelids and foraminiferans.
2151-52	11a	Sep 27	6.4 mi WSW of Redondo Beach Pier	33-48-06 118-30-39	291 fms	0.5 cu. ft. orange-peel grab	9° C	Mud; many diversified annelids, ophiuroids, mollusks, 2 spider crabs.
2152-52	224d	Sep 27	0.8 mi S of Long Pt., Catalina I.	33-23-33 118-21-47	19 fms	0.85 cu. ft. orange-peel grab	14° C	Sandy mud; holothurians, many annelids including hundreds of spioniform specimens.

Station	Serial No. on Chart	Date	Locality in San Pedro Basin	Position North Latitude West Longitude	Depth	Volume and Gear	Temp. of Bottom	REMARKS
2153-52	224c	Sep 27	0.5 mi E of Long Pt., Catalina I.	33-24-28 118-21-36	45 fms	1.0 cu. ft. orange-peel grab	12° C	Broken shells and mud; very rich in annelids, amphipods, echinoderms.
Cruise 99— 2166-52	115	Oct 18	6.1 mi NE of Arrow Pt., Catalina I.	33-33-38 118-28-06	470 fms	3.15 cu. ft. orange-peel grab	7° C	Oozy mud; many foraminiferans; empty tubes of <i>Phyllochaetopterus</i> ; no living metazoans.
Cruise 100— 2168-52	45a	Oct 30	1.8 mi E x S of Los Angeles light	33-42-05 118-12-52	12 fms	2.2 cu. ft. orange-peel grab	13° C	Mud; phoronids, ophiuroids, mollusks, many annelids.
2176-52	164a	Oct 31	1.9 mi W of Salta Verde Pt., Catalina I.	33-29-07 118-27-25	28 fms	1.32 cu. ft. orange-peel grab	13° C	Nodular muddy sand; many annelids and mollusks; large <i>Chaetopterus</i> ; sigalionids.
2177-52	267b	Oct 31	5 mi E of E end light, Catalina I.	33-17-20 118-13-06	172 fms	0.63 cu. ft. orange-peel grab	9° C	Sandy mud; ophiuroids, <i>Chloecia</i> , urchins, nemertean.
Cruise 104— 2189-52	12a	Dec 5	4.5 mi WSW of end of Redondo Beach pier	33-48-33 118-28-30	228 fms	1.07 cu. ft. orange-peel grab	8° C	Fine sandy mud; <i>Chloecia</i> , pelecypods, ophiuroids, foraminiferans.
2190-52	6d	Dec 5	2.8 mi WSW of end of Redondo Beach pier	33-49-19 118-26-38	186 fms	3.02 cu. ft. orange-peel grab	8° C	Fine sandy mud; many annelids and bivalves, scaphopods.
2191-52	6a	Dec 5	1.65 mi WSW of end of Redondo Beach pier	33-49-42 118-25-18	125 fms	2.70 cu. ft. orange-peel grab	10° C	Fine sandy mud; many annelids, bivalves, scaphopods.
2192-52	7a	Dec 5	1.1 mi WSW of end of Redondo Beach pier	33-49-58 118-24-40	61 fms	1.51 cu. ft. orange-peel grab	10° C	Fine sandy mud; <i>Pratinaria</i> , many annelids, scaphopods.

Station	Serial No. on Chart	Date	Locality in San Pedro Basin	Position North Latitude West Longitude	Depth	Volume and Gear	Temp. of Bottom	REMARKS
2193-52	7b	Dec 5	0.8 mi SW of end of Redondo Beach pier	33-49-49 118-24-12	40 fms	3.0 cu. ft. orange-peel grab	11° C	Fine sandy mud; many annelids, very many slender <i>Dentalium</i> , <i>Pectinaria</i> , and capitellids.
Cruise 106— 2202-53	46b	Jan 17	2 mi E of Los Angeles light	33-42-22 118-12-43	11 fms	1.89 cu. ft. orange-peel grab	12° C	Mud; very richly diversified fauna.
Cruise 111— 2217-53	45b	Feb 27	1 mi ESE of Los Angeles light	33-42-00 118-14-02	12 fms	0.31 cu. ft. orange-peel grab	11.5° C	Miocene shale, cherty rocks, wood fragments; many animals.
2218-53	59a	Feb 27	3 mi SW of Pt. Fermin light	33-40-01 118-19-59	249 fms	2.83 cu. ft. orange-peel grab	7° C	Fine dark green mud; much life.
2219-53	59b	Feb 27	2.6 mi WSW of Pt. Fermin light	33-41-02 118-20-21	235 fms	2.96 cu. ft. orange-peel grab		Fine dark green mud; many annelids.
2220-53	41a	Feb 27	3.5 mi W of Pt. Fermin light	33-42-00 118-21-49	180 fms	3.15 cu. ft. orange-peel grab	8° C	Fine dark green mud; much life.
2221-53	42a	Feb 27	2.4 mi WSW of Pt. Fermin light	33-41-17 118-20-17	147 fms	2.2 cu. ft. orange-peel grab	9° C	Fine dark green mud; diversified animal life.
2222-53	96	Feb 27	7.45 mi SSW of Pt. Fermin light	33-35-50 118-21-48	440 fms	3.15 cu. ft. orange-peel grab	7° C.	Oozy mud; foraminiferans, mollusks, echinoderms, annelids.
2223-53	190	Feb 27	3.6 mi N of Long Pt., Catalina I.	33-28-00 118-21-53	480 fms	3.15 cu. ft. orange-peel grab	7° C	Oozy mud; foraminiferans, few other living forms.
2224-53	209a	Feb 27	1.65 mi N of Long Pt., Catalina I.	33-26-00 118-21-49	200 fms	1.76 cu. ft. orange-peel grab	7.5° C	Fine dark green mud; diversified animals.
2227-53	225a	Feb 28	1.6 mi E of Long Pt., Catalina I.	33-24-12 118-20-01	128 fms	0.81 cu. ft. orange-peel grab	9° C	Fine dark green mud; many diversified animals.
2228-53	228	Feb 28	6.75 mi E of Long Pt., Catalina I.	33-24-08 118-13-55	293 fms	0.56 cu. ft. orange-peel grab	8° C	Oozy mud; richly diversified in living animals.

Station	Serial No. on Chart	Date	Locality in San Pedro Basin	Position North Latitude West Longitude	Depth	Volume and Gear	Temp. of Bottom	REMARKS
2229-53	213	Feb 28	6.9 mi ENE of Long Pt., Catalina I.	33-26-00 118-13-57	440 fms	0.63 cu. ft. orange-peel-grab	7° C	Sandy clay, gravel, rubbly black groundy clumps to rocks; many diversified animals.
2230-53	146	Feb 28	10.1 mi ENE of Long Pt., Catalina I.	33-31-57 118-14-03	300 fms	3.27 cu. ft. orange-peel grab	6.5° C	Fine dark green mud; diversified animals.
2231-53	122	Feb 28	8.8 mi SSE of Pt. Fermin light	33-34-00 118-14-00	115 fms	1.76 cu. ft. orange-peel grab	9° C	Sandy clay; many kinds of annelids; diversified.
2232-53	100	Feb 28	6.8 mi SSE of Pt. Fermin light	33-36-04 118-14-01	33 fms	0.37 cu. ft. orange-peel grab	11° C	Fine mud and shell; very richly diversified.
2233-53	80b	Feb 28	5.4 mi SSE of Pt. Fermin light	33-38-00 118-14-01	23 fms	0.31 cu. ft. orange-peel grab	11° C	Fine mud; egg cases of <i>Loligo</i> ; many living forms.
Cruise 114— 2290-53	225b	Apr 19	2 mi ENE of Long Pt., Catalina I.	33-24-57 118-19-39	200 fms	Volume not taken orange-peel grab		Mud.
Cruise 115— 2291-53	65	Apr 24	6.4 mi ESE of Los Angeles breakwater	33-40-03 118-07-54	14 fms	0.31 cu. ft. orange-peel grab	11.8° C	Fine gray sandy mud; very rich in life.
2292-53	104	Apr 24	10.6 mi SE of Los Angeles breakwater	33-35-30 118-05-30	60 fms	0.81 cu. ft. orange-peel grab	(Discontinued)	Fine mud; many annelids and ophiuroids.
2293-53	179	Apr 24	6.9 mi SW of Newport west jetty light	33-30-00 117-57-57	252 fms	2.58 cu. ft. orange-peel grab		Oozy mud; diversified animals.
2294-53	133	Apr 24	1.45 mi SSE of Newport west jetty light	33-33-56 117-52-00	47 fms	1.76 cu. ft. orange-peel grab		Fine mud and clay; diversified animals.
2295-53	159b	Apr 24	4.3 mi SE of Newport west jetty light	33-32-38 117-48-42	26 fms	0.69 cu. ft. orange-peel grab		Dark grayish mud; enteropneusts, echinoderms, annelids.
2296-53	237	Apr 24	12.2 mi WSW of Dana Pt. light	33-24-00 117-55-54	268 fms	1.82 cu. ft. orange-peel grab		Dark grayish-green mud; ophiuroids, annelids.

Station	Serial No. on Chart	Date	Locality in San Pedro Basin	Position North Latitude West Longitude	Depth	Volume and Gear	REMARKS
2297-53	236	Apr 24	13.6 mi WSW of Dana Pt. light	33-24-00 117-57-56	181 fms	0.68 cu. ft. orange-peel grab	Larger and smaller hard rocks and mud; annelids.
2298-53	235	Apr 24	16.9 mi ENE of E. end of Catalina I. light	33-24-01 118-00-00	68 fms	0.37 cu. ft. orange-peel grab	Shelly sand and a few rocks; diversified animals.
2299-53	234	Apr 24	15.3 mi ENE of E. end of Catalina I.	33-23-58 118-02-02	360 fms	3.08 cu. ft. orange-peel grab	Dark oozy mud; glass sponge, diversified animals.
2301-53	189	Apr 25	3 mi ENE from Ship Rock, Catalina I.	33-28-24 118-25-53	335 fms	3.33 cu. ft. orange-peel grab	Oozy mud; foraminiferans, diversified animals.
2302-53	187	Apr 25	1.35 mi ENE of Ship Rock, Catalina I.	33-28-30 118-28-05	185 fms	1.57 cu. ft. orange-peel grab	Fine greenish mud; diversified animals.
2303-53	164b	Apr 25	4 mi NNE of Ship Rock, Catalina I.	33-31-07 118-27-58	470 fms	2.52 cu. ft. orange-peel grab	Fine greenish mud; foraminiferans, chaetopterid tubes.
2304-53	141	Apr 25	5.9 mi NE of Ship Rock, Catalina I.	33-31-27 118-23-54	470 fms	2.70 cu. ft. orange-peel grab	Fine greenish mud; foraminiferans, chaetopterid tubes.
2305-53	169a	Apr 25	8 mi NNE of Long Pt., Catalina I.	33-31-52 118-18-35	460 fms	2.70 cu. ft. orange-peel grab	Fine greenish mud; foraminiferans, chaetopterid tubes.
2306-53	98	Apr 25	6.2 mi S of Pt. Fermin light	33-36-07 118-18-00	215 fms	2.64 cu. ft. orange-peel grab	Clay and mud; many annelids and echinoderms; diversified.
Cruise 117— 2307-53	44b	May 15	1 mi W of Los Angeles breakwater light	33-42-32 118-16-12	7 fms	2.14 cu. ft. orange-peel grab	In Outer Harbor, rubbly clay; very richly diversified animal life.
2309-53	47	May 16	1.7 mi SE of Long Beach breakwater light	33-42-04 118-10-00	12 fms	1.32 cu. ft. orange-peel grab	Fine black mud; richly diversified.
2310-53	64	May 16	3.5 mi SSE of Long Beach breakwater light	33-40-00 118-10-00	15 fms	0.37 cu. ft. orange-peel grab	Sandy mud (grab failed to penetrate); rich in animals.
2311-53	66a	May 16	6 mi SE x E of Long Beach breakwater light	33-40-00 118-05-08	12 fms	0.5 cu. ft. (2 grabs) orange-peel grab	Hard-packed sandy mud (grab failed to penetrate).

Station	Serial No. on Chart	Date	Locality in San Pedro Basin	Position North Latitude West Longitude	Depth	Volume and Gear	REMARKS
2312-53	49	May 16	5 mi ESE of Long Beach breakwater light	33-42-06 118-05-22	7.5 fms	0.7 cu. ft. orange-peel grab	Brown sandy mud, gravel (grab failed to penetrate); very rich in animal forms.
2313-53	48	May 16	3.3 mi ESE of Long Beach breakwater light	33-41-58 118-07-36	11 fms	0.37 cu. ft. orange-peel grab	Fine mud (grab did not penetrate); many diversified animals.
2314-53	32	May 16	3 mi ENE of Long Beach breakwater light	33-43-57 118-07-41	4.5 fms	0.56 cu. ft. orange-peel grab	Mud (grab was incompletely closed on reaching surface; very small sample taken).
Cruise 118—							
2315-53	61a	May 19	2.6 mi SSW of Los Angeles breakwater light	33-40-04 118-15-02	20 fms	1.07 cu. ft. orange-peel grab	Mud; shell fragments.
2316-53	79	May 19	4.6 mi S of Los Angeles breakwater light	33-38-00 118-15-53	117 fms	2.70 cu. ft. orange-peel grab	Dark mud.
2317-53	78	May 19	4.3 mi S of Pt. Fermin light	33-38-00 118-17-57	280 fms	2.83 cu. ft. orange-peel grab	Dark mud.
Cruise 119—							
2321-53	58b	Jun 24	4.3 mi WSW of Pt. Fermin light	33-40-12 118-22-06	385 fms	2.83 cu. ft. orange-peel grab	Fine mud; many diversified animals.
2322-53	56	Jun 24	4.6 mi SSW of Pt. Vicente light	33-40-02 118-26-03	460 fms	2.77 cu. ft. orange-peel grab	Fine mud; foraminiferans, <i>Phyllochaetopterus</i> tubes.
2323-53	72	Jun 24	8 mi SW of Pt. Vicente light	33-38-00 118-30-09	480 fms	3.17 cu. ft. orange-peel grab	Fine mud; foraminiferans, <i>Phyllochaetopterus</i> tubes.
2324-53	69	Jun 24	11.6 mi SW of Pt. Vicente light	33-37-55 118-36-00	400 fms	3.08 cu. ft. orange-peel grab	Fine mud; glass sponge, richly diversified animal forms.
2325-53	90	Jun 24	9.2 mi NW of Ship Rock, Catalina I.	33-36-02 118-34-13	475 fms	2.77 cu. ft. orange-peel grab	Fine greenish mud; foraminiferans, <i>Phyllochaetopterus</i> .
2326-53	111	Jun 24	8.5 mi NW of Ship Rock, Catalina I.	33-34-06 118-36-10	385 fms	2.52 cu. ft. orange-peel grab	Fine greenish mud.
2327-53	113	Jun 24	6.6 mi NNW of Ship Rock, Catalina I.	33-34-05 118-31-53	490 fms	3.15 cu. ft. orange-peel grab	Fine greenish mud; foraminiferans, <i>Phyllochaetopterus</i> .

Station	Serial No. on Chart	Date	Locality in San Pedro Basin	Position North Latitude West Longitude	Depth	Volume and Gear	REMARKS
2328-53	162	Jun 24	3 mi NW of Ship Rock, Catalina I.	33-29-55 118-31-52	150 fms	1.26 cu. ft. orange-peel grab	Fine sandy mud; annelids, ophiuroids.
2329-53	163	Jun 24	2.2 mi N of Ship Rock, Catalina I.	33-29-56 118-29-41	260 fms	2.56 cu. ft. orange-peel grab	Fine greenish mud; diversified animals.
2330-53	165	Jun 25	3.6 mi NE of Ship Rock, Catalina I.	33-30-00 118-21-00	490 fms	3.4 cu. ft. orange-peel grab	Fine mud; foraminiferans, <i>Phyllochaetopterus</i> .
2331-53	167	Jun 25	5.7 mi N of Long Pt., Catalina I.	33-30-04 118-21-55	489 fms	2.7 cu. ft. orange-peel grab	Fine mud; foraminiferans, <i>Phyllochaetopterus</i> .
2332-53	142b	Jun 25	7.6 mi N of Long Pt., Catalina I.	33-32-00 118-22-00	490 fms	2.68 cu. ft. orange-peel grab	Fine mud; foraminiferans, <i>Phyllochaetopterus</i> .
2333-53	117	Jun 25	9.8 mi N of Long Pt., Catalina I.	33-34-03 118-24-04	487 fms	2.52 cu. ft. orange-peel grab	Fine mud; foraminiferans, <i>Phyllochaetopterus</i> .
2334-53	75	Jun 25	6.9 mi SW of Pt. Fermin light	33-37-53 118-23-58	437 fms	3.02 cu. ft. orange-peel grab	Fine mud; foraminiferans, <i>Phyllochaetopterus</i> .
2335-53	76	Jun 25	5.7 mi SW of Pt. Fermin light	33-37-52 118-22-02	420 fms	2.58 cu. ft. orange-peel grab	Fine mud; glass sponge and diversified animals.
2336-53	77	Jun 25	4.6 mi SSW of Pt. Fermin light	33-38-09 118-19-52	355 fms	2.83 cu. ft. orange-peel grab	Fine greenish mud; diversified animals.
Cruise 120— 2337-53	148	Jul 1	11.3 mi SSE of Los Angeles breakwater light	33-32-00 118-10-00	170 fms	1.51 cu. ft. orange-peel grab	Fine mud; very rich in animal forms.
2338-53	230a	Jul 1	10 mi E of Long Pt., Catalina I.	33-24-12 118-10-00	393 fms	2.58 cu. ft. orange-peel grab	Fine mud; glass sponge, diversified animals.
2339-53	245	Jul 1	11.7 mi ENE of E end, Catalina I.	33-22-08 118-05-49	394 fms	2.2 cu. ft. orange-peel grab	Fine mud; ophiuroids, annelids.
2340-53	255	Jul 1	9.4 mi ENE of E end, Catalina I.	33-20-00 118-07-58	410 fms	2.26 cu. ft. orange-peel grab	Fine mud; ophiuroids, annelids, sponge spicules.
2341-53	263	Jul 1	7.6 mi E of E end, Catalina I. light	33-18-00 118-10-00	440 fms	0.1 cu. ft. orange-peel grab	Fine sandy mud; few living forms.
2342-53	262	Jul 1	5.9 mi E of E end, Catalina I. light	33-18-05 118-11-57	230 fms	0.31 cu. ft. orange-peel grab	Fine sandy mud; sample small; annelids, heart urchin.
2343-53	253	Jul 1	6 mi ENE of E end, Catalina I. light	33-20-03 118-12-13	418 fms	1.63 cu. ft. orange-peel grab	Fine mud; foraminiferans and diversified metazoan animals.

Station	Serial No. on Chart	Date	Locality in San Pedro Basin	Position North Latitude West Longitude	Depth	Volume and Gear	REMARKS
2344-53	252	Jul 1	5.3 mi ENE of E end, Catalina I. light	33-19-54 118-14-20	210 fms	0.37 cu. ft. orange-peel grab	Sandy mud, gravelly rocks, rubble; foraminiferans, diversified animals.
2347-53	251	Jul 2	2.9 mi NE of E end, Catalina I. light	33-19-56 118-16-15	100 fms	0.25 cu. ft. orange-peel grab	Sandy mud; sample small; many ophiuroids, annelids and other animals.
2348-53	260	Jul 2	2.25 mi E of E end, Catalina I. light	33-17-45 118-16-21	75 fms	0.37 cu. ft. orange-peel grab	Sandy mud, coralline rubble, broken shells; diversified animals.
2349-53	261	Jul 2	3.9 mi E of E end, Catalina I. light	33-17-57 118-14-18	110 fms	0.1 cu. ft. orange-peel grab	Sandy mud; many ophiuroids and diversified annelids, rich in invertebrates.
2350-53	241a	Jul 2	6.75 mi ESE of Long Pt., Catalina I. light	33-21-54 118-15-26	350 fms	0.1 cu. ft. orange-peel grab	Rocks, mud, sand; ophiuroids and rock-boring annelids.
2352-53	227a	Jul 2	5 mi. E of Long Pt., Catalina I.	33-24-30 118-14-26	420 fms	2.5 cu. ft. orange-peel grab	Fine mud; glass sponge, richly diversified animals.
2353-53	193	Jul 2	6.4 mi NE of Long Pt., Catalina I.	33-27-27 118-16-04	430 fms	3.21 cu. ft. orange-peel grab	Fine mud; many foraminiferans, radiolarians, diversified animals.
2354-53	121a	Jul 2	8.3 mi S of Los Angeles break-water light	33-34-16 118-15-43	200 fms	1.95 cu. ft. orange-peel grab	Muddy clay and rocks; diversified animals.
2355-53	99a	Jul 2	6.3 mi S of Los Angeles break-water light	33-36-15 118-15-08	41 fms	0.1 cu. ft. orange-peel grab	Sandy mud; many ophiuroids and annelids (sample very small).
Cruise 121—							
2356-53	40	Jul 8	2.5 mi S of Pt. Vicente light	33-42-03 118-24-02	294 fms	2.57 cu. ft. orange-peel grab	Fine mud; many annelids.
2357-53	26	Jul 8	1.1 mi WSW of Pt. Vicente light	33-44-10 118-25-45	100 fms	1.63 cu. ft. orange-peel grab	Fine sandy mud; diversified annelids, ophiuroids.
2358-53	19	Jul 8	3.4 mi WNW of Pt. Vicente light	33-46-12 118-28-04	125 fms	2.89 cu. ft. orange-peel grab	Light clay; annelids, <i>Molpadia</i> , and ophiuroids.
2359-53	13	Jul 8	3.2 mi SW of Redondo Beach, end of pier	33-48-00 118-26-03	31 fms	0.63 cu. ft. orange-peel grab	Sandy clay; annelids, ophiuroids, diversified.

Station	Serial No. on Chart	Date	Locality in San Pedro Basin	Position North Latitude West Longitude	Depth	Volume and Gear	REMARKS
2360-53	12b	Jul 8	4.5 mi WSW of Redondo Beach, end of pier	33-47-59 118-27-58	49 fms	1.63 cu. ft. orange-peel grab	Sandy mud, rocks; clay; diversified animals.
2361-53	11b	Jul 8	6.4 mi WSW of Redondo Beach, end of pier	33-47-03 118-30-07	167 fms	1.44 cu. ft. orange-peel grab	Sandy mud; echinoids and many worm tubes.
2362-53	17	Jul 8	6.3 mi WNW of Pt. Vicente light	33-46-02 118-31-52	352 fms	2.83 cu. ft. orange-peel grab	Fine mud; foraminiferans, diversified animals.
2363-53	37	Jul 8	5.3 mi WSW of Pt. Vicente light	33-41-55 118-30-06	429 fms	2.77 cu. ft. orange-peel grab	Fine mud; foraminiferans, chaetopterid tubes.
2364-53	94	Jul 8	8.6 mi S of Pt. Vicente light	33-35-58 118-25-53	495 fms	2.5 cu. ft. orange-peel grab	Fine mud; foraminiferans, chaetopterid tubes.
2365-53	210	Jul 8	2.4 mi NE of Long Pt., Catalina I.	33-26-06 118-20-06	300 fms	1.57 cu. ft. orange-peel grab	Sandy mud; annelids, echinoderms, diversified.
2367-53	240	Jul 9	5.35 mi ESE of Long Pt., Catalina I.	33-22-02 118-16-10	230 fms	0.5 cu. ft. orange-peel grab	Sandy mud; <i>Chloria</i> , brissopsids bivalves, diversified animals.
2368-53	242	Jul 9	6.7 mi NE of E end, Catalina I. light	33-22-03 118-12-15	385 fms	2.26 cu. ft. orange-peel grab	Sandy mud, rock; foraminiferans, diversified animals
2369-53	243	Jul 9	8.5 mi ENE of E end, Catalina I. light	33-22-01 118-10-02	390 fms	3.33 cu. ft. orange-peel grab	Fine mud; ophiuroids, diversified animals.
2370-53	232	Jul 9	12.5 mi ENE of E end, Catalina I. light	33-24-14 118-06-00	366 fms	2.83 cu. ft. orange-peel grab	Fine mud; foraminiferans.
2371-53	218	Jul 9	14.8 mi NE of E end, Catalina I. light	33-26-06 118-04-00	350 fms	2.43 cu. ft. orange-peel grab	Fine sandy mud; diversified annelids and other animals.
2372-53	199	Jul 9	16 mi NE of E end, Catalina I. light	33-28-05 118-04-00	230 fms	0.81 cu. ft. orange-peel grab	Sandy mud; diversified animals.
2373-53	151	Jul 9	13.9 mi SE of Los Angeles break-water light	33-32-03 118-04-00	220 fms	2.7 cu. ft. orange-peel grab	Muddy clay; worm tubes, foraminiferans.

Station	Serial No. on Chart	Date	Basin Locality in San Pedro	Position North Latitude West Longitude	Depth	Volume and Gear	REMARKS
2374-53	103	Jul 9	3.8 mi SE of Los Angeles break-water	33-36-04 118-07-55	27 fms	0.62 cu. ft. orange-peel grab	Sandy mud; diversified animals.
Cruise 125—							
2386-53	95	Jul 28	8.3 mi WSW of Pt. Fermin	33-35-57 118-23-57	460 fms	3.3 cu. ft. orange-peel grab	Fine mud; foraminiferans, <i>Phyllochaetopterus</i> tubes.
2387-53	140	Jul 28	5.2 mi NE of Ship Rock, Catalina I. light	33-32-00 118-25-55	482 fms	2.8 cu. ft. orange peel grab	Fine mud; foraminiferans, <i>Phyllochaetopterus</i> tubes.
2388-53	138	Jul 28	4.2 mi N of Ship Rock, Catalina I. light	33-32-00 118-30-00	482 fms	3.1 cu. ft. orange-peel grab	Fine greenish mud; foraminiferans, chaetopterid tubes.
2389-53	161	Jul 28	3.2 mi NE of Ship Rock, Catalina I. light	33-29-57 118-34-04	136 fms	2.2 cu. ft. orange-peel grab	Sandy mud; very richly diversified animals.
Cruise 126—							
2394-53	101	Aug 17	7.8 mi. SE of Pt. Fermin	33-35-54 118-12-10	29 fms	0.25 cu. ft. orange-peel grab	Sandy mud, broken shells; richly diversified.
Cruise 129—							
2403-53	25	Sep 16	2.8 mi W of Pt. Vicente light	33-44-08 118-28-00	400 fms	3.15 cu. ft. orange-peel grab	Greenish mud; a large nemertean, foraminiferans, ampharetids, terebellids.
2404-53	38	Sep 16	3.75 mi SW of Pt. Vicente light	33-41-58 118-28-00	438 fms	1.07 cu. ft. orange-peel grab	Gray sandy mud; diversified animals.
2405-53	55	Sep 16	5.35 mi SSW of Pt. Vicente light	33-40-00 118-28-00	457 fms	2.26 cu. ft. orange-peel grab	Sandy mud; foraminiferans, <i>Phyllochaetopterus</i> tubes.
2406-53	73	Sep 16	7 mi SSW of Pt. Vicente light	33-38-00 118-27-58	475 fms	3.4 cu. ft. orange-peel grab	Fine greenish mud; foraminiferans, <i>Phyllochaetopterus</i> .
2407-53	93	Sep 16	9 mi SSW of Pt. Vicente light	33-35-57 118-28-02	480 fms	3.4 cu. ft. orange-peel grab	Fine greenish mud; foraminiferans; empty <i>Phyllochaetopterus</i> tubes.
2408-53	191	Sep 17	3.9 mi NNE of Long Pt., Catalina I.	33-27-57 118-20-06	480 fms	3.21 cu. ft. orange-peel grab	Sandy mud; foraminiferans, <i>Phyllochaetopterus</i> and <i>Protula</i> .

Station	Serial No. on Chart	Date	Basin Locality in San Pedro Pt., Catalina I.	Position North Latitude West Longitude	Depth	Volume and Gear	REMARKS
2409-53	168	Sep 17	5.8 mi NNE of Long Pt., Catalina I.	33-30-00 118-20-00	470 fms	3.4 cu. ft. orange-peel grab	Greenish mud; foraminiferans, <i>Phyllochaetopterus</i> and serpulid tubes.
2410-53	170	Sep 17	7.5 mi NE of Long Pt., Catalina I.	33-30-03 118-15-58	410 fms	3.2 cu. ft. orange-peel grab	Greenish mud; foraminiferans, diversified metazoan animals.
2411-53	near 171	Sep 17	8.7 mi NE of Long Pt., Catalina I.	33-29-59 118-14-57	400 fms	3.15 cu. ft. orange-peel grab	Greenish mud; glass sponge, richly diversified fauna.
2412-53	172	Sep 17	10 mi NE of Long Pt., Catalina I.	33-30-02 118-12-02	324 fms	3.2 cu. ft. orange-peel grab	Fine mud; heart urchins, diversified animals.
2413-53	173	Sep 17	11.5 mi ENE of Long Pt., Catalina I. light	33-30-00 118-10-00	205 fms	0.5 cu. ft. orange-peel grab	Muddy clay, very small sample; richly diversified, notable in undescribed species.
2414-53	174	Sep 17	12.9 mi ENE of Long Pt., Catalina I. light	33-30-00 118-08-00	177 fms	0.4 cu. ft. orange-peel grab	Coarse sand, many larger hard rocks; diversified animals.
Cruise 131—							
2417-53	42b	Sep 29	2.1 mi W of Pt. Fermin light	33-41-57 118-20-08	34 fms	2.14 cu. ft. orange-peel grab	Black mud; many annelids, pennatulids.
2418-53	41b	Sep 29	3.7 mi W of Pt. Fermin light	33-42-00 118-22-00	185 fms	2.7 cu. ft. orange-peel grab	Black mud; very richly diversified, especially annelids and echinoderms.
2419-53	39	Sep 29	2.8 mi SSW of Pt. Vicente light	33-42-00 118-26-03	437 fms	3.71 cu. ft. orange-peel grab	Fine mud; echinoids, foraminiferans, <i>Phyllochaetopterus</i> .
2420-53	54	Sep 29	6.35 mi SW of Pt. Vicente light	33-40-00 118-30-04	458 fms	3.15 cu. ft. orange-peel grab	Fine greenish mud; foraminiferans, <i>Phyllochaetopterus</i> .
2421-53	71	Sep 29	8 mi SW of Pt. Vicente light	33-38-00 118-21-58	466 fms	3.08 cu. ft. orange-peel grab	Fine greenish mud; foraminiferans, <i>Phyllochaetopterus</i> .
2422-53	139	Sep 29	4.45 mi NNE of Ship Rock, Catalina I. light	33-32-02 118-27-57	484 fms	3.15 cu. ft. orange-peel grab	Fine greenish mud; foraminiferans, <i>Phyllochaetopterus</i> .
2423-53	209b	Sep 29	1.6 mi N of Long Pt., Catalina I. light	33-25-57 118-21-54	175 fms	1.13 cu. ft. orange-peel grab	Mud and shelly sand, with an appearance of coarse pepper; ophiuroids, annelids, diversified.

Station	Serial No. on Chart	Date	Basin Locality in San Pedro	Position North Latitude West Longitude	Depth	Volume and Gear	REMARKS
2426-53	226	Sep 30	3.55 mi E of Long Pt., Catalina I. light	33-24-02 118-18-00	270 fms	1.0 cu. ft. orange-peel grab	Dark mud; diversified annelids.
2427-53	230b	Sep 30	8.35 mi E of Long Pt., Catalina I. light	33-24-00 118-10-03	290 fms	2.26 cu. ft. orange-peel grab	Fine greenish mud; glass sponge, richly diversified fauna.
2428-53	196	Sep 30	10.6 mi ENE of Long Pt., Catalina I. light	33-27-58 118-10-01	350 fms	3.41 cu. ft. orange-peel grab	Fine dark mud; many smaller annelids.
2429-53	195	Sep 30	9 mi ENE of Long Pt., Catalina I. light	33-28-00 118-12-03	380 fms	3.15 cu. ft. orange-peel grab	Fine dark mud; foraminiferans, glass sponge, diversified animals.
Cruise 132—							
2430-53	60	Oct 10	2.3 mi S of Pt. Fermin light	33-40-00 118-18-00	80 fms	1.44 cu. ft. orange-peel grab	Hard-packed mud; many annelids and ophiuroids, diversified animals.
2431-53	57	Oct 10	4.55 mi S of Pt. Vicente light	33-40-00 118-24-00	431 fms	2.52 cu. ft. orange-peel grab	Fine mud; foraminiferans, <i>Phyllochaetopterus</i> , serpulid tubes.
2432-53	53	Oct 10	7.6 mi SW of Pt. Vicente light	33-40-02 118-32-01	450 fms	3.59 cu. ft. orange-peel grab	Silty mud; foraminiferans, <i>Phyllochaetopterus</i> tubes and serpulid fragments.
2433-53	70	Oct 10	10.2 mi SW of Pt. Vicente light	33-38-00 118-34-00	460 fms	2.07 cu. ft. orange-peel grab	Fine sandy mud; foraminiferans, tube and shell fragments.
2434-53	114	Oct 10	6.35 mi N of Ship Rock, Catalina I. light	33-34-00 118-30-00	480 fms	3.15 cu. ft. orange-peel grab	Fine mud; foraminiferans, <i>Phyllochaetopterus</i> and serpulid tubes.
2435-53	188	Oct 10	2.8 mi E of Ship Rock, Catalina I. light	33-28-00 118-26-00	244 fms	1.95 cu. ft. orange-peel grab	Clayey mud and sand; scaphopod, nemertean and diversified annelids.
2436-53	250b	Oct 11	5.5 mi SE of Long Pt., Catalina I. light	33-20-00 118-18-00	44 fms	1.07 cu. ft. orange-peel grab	Oily sandy mud and clay; ophiuroids, annelids, and other animals.

Station	Serial No. on Chart	Date	Basin Locality in San Pedro	Position North Latitude West Longitude	Depth	Volume and Gear	REMARKS
2437-53	259	Oct 11	0.9 mi E of E end, Catalina I. light	33-18-00 118-18-00	48 fms	1.3 cu. ft. orange-peel grab	Fine sandy mud; diversified animals, especially annelids and ophiuroids.
2438-53	267a	Oct 11	6.2 mi ESE of E end, Catalina I. light	33-16-01 118-12-00	153 fms	1 quart orange-peel grab	Hard rocks with surface and crevice dwelling animals only.
2439-53	264	Oct 11	9.2 mi E of E end, Catalina I. light	33-18-04 118-08-03	435 fms	2.52 cu. ft. orange-peel grab	Clay and mud; foraminiferans, <i>Phyllochaetopterus</i> tubes.
2440-53	244	Oct 11	10 mi ENE of E end, Catalina I. light	33-22-02 118-07-57	415 fms	3.27 cu. ft. orange-peel grab	Clay and mud; foraminiferans, annelids, echinoderms.
2441-53	215	Oct 11	10.1 mi E of Long Pt., Catalina I. light	33-26-02 118-10-02	340 fms	2.64 cu. ft. orange-peel grab	Mud and clay; diversified animals, some glass sponge.
2442-53	147	Oct 11	10.8 mi SSE of Los Angeles break-water light	33-32-00 118-12-00	220 fms	2.52 cu. ft. orange-peel grab	Sticky mud; foraminiferans, echinoderms, annelids, nemerteans.
2443-53	123b	Oct 11	8.9 mi SSE of Los Angeles break-water light	33-34-00 118-12-02	60 fms	0.5 cu. ft. orange-peel grab	Dark mud, sand and shells, small sample; crinoids and diversified fauna.
2444-53	81b	Oct 11	5.2 mi SSE of Los Angeles break-water light	33-38-02 118-12-01	18 fms	0.31 cu. ft. orange-peel grab	Black mud and shells; very richly diversified.
2445-53	63b	Oct 11	3.5 mi SE of Los Angeles break-water light	33-40-00 118-12-00	11 fms	0.81 cu. ft. orange-peel grab	Coarse reddish-brown sand; enormous numbers of annelids, burrowing anemones and other animals.
Cruise 133—							
2446-53	62	Oct 14	2.7 mi SSE of Los Angeles break-water light	33-40-00 118-14-02	14 fms	0.15 cu. ft. orange-peel grab	Compact sandy clay, very small sample; many smaller annelids and other animals.
2447-53	150	Oct 14	13.9 mi SE of Los Angeles break-water light	33-31-58 118-05-57	208 fms	2.2 cu. ft. orange-peel grab	Compact sticky clay and mud; many annelids.

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2448-53	185	Oct 14	3.5 mi NW of Dana Pt.	33-30-00 117-46-00	30 fms	1.95 cu. ft. orange-peel grab	Compact sticky mud; extremely rich with echinoderms, annelids and other animals.
2449-53	183	Oct 14	5.8 mi SSE of E. Newport jetty light	33-30-01 117-50-00	303 fms	3.02 cu. ft. orange-peel grab	Sticky mud; foraminiferans, many annelids, echinoderms and other animals.
2451-53	208	Oct 15	2.35 mi NW of Long Pt., Catalina I. light	33-26-02 118-24-00	111 fms	1.57 cu. ft. orange-peel grab	Compact sandy clay; ophiuroids and other echinoderms, annelids, pelecypods.
2452-53	207	Oct 15	3.35 mi ESE of Ship Rock, Catalina I. light	33-25-55 118-26-04	28 fms	0.37 cu. ft. orange-peel grab	Compact sandy clay; extremely rich in numbers and kinds of invertebrate animals, also foraminiferans.
2453-53	166	Oct 15	5.7 mi NNW of Long Pt., Catalina I. light	33-30-00 118-24-02	480 fms	3.02 cu. ft. orange-peel grab	Very fine mud; foraminiferans, <i>Phyllochaetopterus</i> tubes.
2454-53	118	Oct 15	9.7 mi N of Long Pt., Catalina I. light	33-34-03 118-22-00	460 fms	2.96 cu. ft. orange-peel grab	Very fine mud; foraminiferans, <i>Phyllochaetopterus</i> tubes.
Cruise 135—							
2470-53	44a	Oct 28	1.4 mi E. of Pt. Fermin light	33-42-02 118-15-59	10 fms	1.95 cu. ft. orange-peel grab	Black sandy mud, shell fragments; foul odor; very rich in animals.
2471-53	43	Oct 28	0.45 mi SW of Pt. Fermin light	33-42-01 118-18-02	12 fms	0.69 cu. ft. orange-peel grab	Black sandy mud and shell fragments; <i>Chaetopterus</i> and other annelids, richly diversified.
2472-53	28	Oct 28	2.25 mi ESE of Pt. Vicente light	33-43-58 118-22-00	11 fms	0.63 cu. ft. orange-peel grab	Coarse black sandy mud and broken shells; many annelids and nematodes.
2473-53	27	Oct 28	0.75 mi SE of Pt. Vicente light	33-44-00 118-23-58	16 fms	0.75 cu. ft. orange-peel grab	Coarse sandy mud and shell fragments; very rich in living animals.

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2474-53	16	Oct 28	8.1 mi W of Pt. Vicente light	33-46-03 118-34-08	405 fms	3.9 cu. ft. orange-peel grab	Fine mud; foraminiferans, <i>Phyllochaetopterus</i> tubes.
2475-53	23	Oct 28	6.2 mi W of Pt. Vicente light	33-44-02 118-32-03	370 fms	3.21 cu. ft. orange-peel grab	Fine dark mud; glass sponge, richly diversified.
2476-53	24	Oct 28	4.5 mi W of Pt. Vicente light	33-44-00 118-29-59	386 fms	0.95 cu. ft. orange-peel grab	Fine black mud and sand, wood fragments; many annelids, gastro- pod, enteropneust.
Cruise 137—							
2496-53	82	Nov 27	6.2 mi SE of Los Angeles break- water light	33-38-00 118-10-00	18 fms	0.5 cu. ft. orange-peel grab	Dark sandy mud; very rich especially with onuphid and spioniform annelids; mollusks.
2497-53	102	Nov 27	7.7 mi SSE of Los Angeles break- water light	33-36-00 118-10-01	24 fms	0.16 cu. ft. orange-peel grab	Sandy mud, very small sample; many tubicolous annelids, ophiuroids.
2498-53	124	Nov 27	9.5 mi SSE of Los Angeles break- water light	33-34-01 118-09-58	50 fms	1.0 cu. ft. orange-peel grab	Sandy mud and pepper-colored sand; many ophiuroids and <i>Chloëia</i> , other annelids and ostracods.
2499-53	143	Nov 27	7.8 mi NNE of Long Pt., Catalina I. light	33-32-02 118-20-00	483 fms	3.27 cu. ft. orange-peel grab	Fine mud; foraminiferans, <i>Phyllochaetopterus</i> and serpulid tubes.
2500-53	119	Nov 27	8.55 mi SSW of Pt. Fermin light	33-34-07 118-20-02	450 fms	3.33 cu. ft. orange-peel grab	Fine greenish mud; foraminiferans, glass sponge, diversified animals.
Cruise 138—							
2501-53	83	Dec 10	7.4 mi SE of Los Angeles light	33-38-01 118-08-02	19 fms	0.1 cu. ft. orange-peel grab	Black compact oily mud; sea star, ophiuroids, annelids.
2502-53	84	Dec 10	3.8 mi ESE of Los Angeles light	33-38-00 118-06-00	18 fms	0.15 cu. ft. orange-peel grab	Black compact oily mud; small sample; some annelids and other animals.

Station	Serial No. on Chart	Date	Locality in San Pedro Basin	Position North Latitude West Longitude	Depth	Volume and Gear	REMARKS
2503-53	85	Dec 10	10.3 mi ESE of Los Angeles light	33-37-59 118-04-00	16 fms	0.13 cu. ft. orange-peel grab	Black compact oily mud; small sample; sea stars, barnacles, hydroids, annelids.
2504-53	67	Dec 10	9.6 mi ESE of Los Angeles light	33-40-00 118-04-00	9 fms	0.13 cu. ft. orange-peel grab	Black sandy mud; onuphids and shell fragments.
2505-53	33	Dec 10	3.5 mi E of Long Beach breakwater light	33-43-48 118-06-58	5 fms	0.13 cu. ft. orange-peel grab	Black sandy mud; <i>Dioptatra</i> , sabellid, other annelids, bivalves, fish.
2506-53	31	Dec 10	1.1 mi ENE of Long Beach breakwater light	33-44-00 118-09-59	9 fms	3.15 cu. ft. orange-peel grab	Black mud; many smaller annelids.
2507-53	30	Dec 10	0.8 mi NW of Long Beach breakwater light	33-43-59 118-11-52	8 fms	3.15 cu. ft. orange-peel grab	Black mud; nemertean, polyodontid, and other annelids, richly diversified.
2508-53	20	Dec 10	1.3 mi NE of Los Angeles light	33-44-00 118-14-00	6 fms	2.56 cu. ft. orange-peel grab	Black mud and clay; boring and other annelids, richly diversified.
Cruise 143—							
2606-54	66b	Mar 3	3.65 mi SSW of E Jetty light, Anaheim Bay	33-39-58 118-05-59	13 fms	0.13 cu. ft. orange-peel grab	Compact black sand; annelids, sea stars; diversified.
2607-54	68	Mar 3	1.6 mi WNW of Huntington Beach pier	33-39-59 118-01-59	5 fms	0.06 cu. ft. orange-peel grab	Compact black sand; <i>Nephtys</i> and many smaller annelids.
2608-54	87	Mar 3	1.2 mi SSE of Huntington Beach pier	33-38-01 118-00-02	7.5 fms	0.06 cu. ft. orange-peel grab	Compact black sand; sea star, many annelids, ophiuroids.
2609-54	88	Mar 3	1.9 mi SE of Huntington Beach pier	33-38-03 117-58-31	4.5 fms	0.13 cu. ft. orange-peel grab	Compact black sand; sea star, annelids, <i>Nassarius</i> .

Station	Serial No. on Chart	Date	Locality in San Pedro Basin	Position North Latitude West Longitude	Depth	Volume and Gear	REMARKS
2610-54	107	Mar 3	3.2 mi S. of Huntington Beach pier	33-36-00	18 fms	0.25 cu. ft. orange-peel grab	Compact sand; many annelids and ophiuroids.
2611-54	106	Mar 3	3.47 mi SSW of Huntington Beach pier	33-35-59	19 fms	0.06 cu. ft. orange-peel grab	Compact gray-black sand; ophiuroids, many annelids.
2612-54	128	Mar 3	5.4 mi SSW of Huntington Beach pier	33-33-59	100 fms	2.64 cu. ft. orange-peel grab	Dark green mud; large heart urchin, ophiuroids, annelids.
2613-54	127	Mar 3	6.0 mi SSW of Huntington Beach pier	33-34-00	138 fms	1.0 cu. ft. orange-peel grab	Dark green mud; <i>Chloëia</i> , heart urchin, <i>Nephtys</i> , holothurian.
2614-54	126	Mar 3	7 mi SW of Huntington Beach pier	33-34-00	155 fms	3.02 cu. ft. orange-peel grab	Dark green mud; urchin, nemertean, annelids, echiuroids.
2615-54	125	Mar 3	8.2 mi SW of Huntington Beach pier	33-34-00	50 fms	0.63 cu. ft. orange-peel grab	Early Pleistocene gravelly mud, shell and rubble; rich fauna; did not pass through screens.
Cruise 146—							
2618-54	61b	Apr 7	2.6 mi SSE of Pt. Fermin light	33-40-04	21 fms	0.44 cu. ft. orange-peel grab	Warm, black muddy sand; dead shells, ophiuroids, annelids.
2619-54	36	Apr 7	6.7 mi WSW of Pt. Vicente light	33-42-02	432 fms	3.15 cu. ft. orange-peel grab	Gray-green mud; foraminiferans; few annelids and ophiuroids.
2620-54	22	Apr 7	7.8 mi W of Pt. Vicente light	33-44-02	418 fms	2.2 cu. ft. orange-peel grab	Gray-green mud; foraminiferans, little life.
Cruise 148—							
A new grab, designated the Campbell grab, of about 6 cu. ft. capacity, was introduced, for this cruise.							
2625-54	121b	Apr 20	8.4 mi S of Pt. Fermin light	33-34-00	230 fms	5.25 cu. ft. Campbell grab	Gray-green mud; sea urchins, echiuroid, annelids, small mollusks.
2626-54	169b	Apr 20	6.5 mi NNE of Long Pt., Catalina I. light	33-30-00	460 fms	5.75 cu. ft. Campbell grab	Gray-green mud; foraminiferans and smaller annelids.
2627-54	144	Apr 20	8.3 mi NNE of Long Pt., Catalina I. light	33-31-59	455 fms	5.75 cu. ft. Campbell grab	Gray-green sandy mud; foraminiferans, chaetopterids and other annelids.

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2628-54	120	Apr 20	10.1 mi NNE of Long Pt., Catalina I. light	33-34-00 118-18-00	350 fms	6.1 cu. ft. Campbell grab	Green sandy mud; foraminiferans; annelids.
2629-54	99b	Apr 20	6.45 mi SSE of Pt. Fermin light	33-36-00 118-16-02	50 fms	0.18 cu. ft. Campbell grab	Green sandy mud; ophiuroids, annelids, mollusks.
Cruise 149—The Campbell grab was improved with the addition of 430 pound weight.							
2630-54	105	Apr 24	4.4 mi SW of end of Huntington Beach pier	33-35-58 118-03-57	45 fms	0.86 cu. ft. Campbell grab	Sandy gray-green mud; ophiuroids, annelids including <i>Travosia</i> .
2631-54	129	Apr 24	4.2 mi SW of end of Newport Beach pier	33-34-02 118-00-01	50 fms	0.71 cu. ft. Campbell grab	Sandy gray-green mud; ophiuroids, <i>Chloctia</i> and other annelids.
2632-54	155	Apr 24	4.4 mi S of end of Newport Beach pier	33-31-58 117-55-57	230 fms	5.45 cu. ft. Campbell grab	Sandy gray-green mud; echiuroids, sipunculids, urchins, annelids.
2633-54	182	Apr 24	7.1 mi SSE of end of Newport Beach pier	33-30-00 117-52-00	292 fms	6.03 cu. ft. Campbell grab	Gray-green clay; foraminiferans, brissosids, ampharetids, <i>Pectinaria</i> and many other annelids.
2634-54	223	Apr 24	9.4 mi W of Dana Pt.	33-25-59 117-53-58	320 fms	5.74 cu. ft. Campbell grab	Gray-green clay; foraminiferans, larger and smaller annelids.
2635-54	249	Apr 24	13.9 mi WSW of Dana Pt.	33-22-00 117-58-02	278 fms	2.99 cu. ft. Campbell grab	Green clay and mud; foraminiferans, echiuroids, brissosid, crab, many annelids.
2636-54	257	Apr 24	12.8 mi E of E end, Catalina I.	33-20-01 118-03-59	412 fms	6.03 cu. ft. Campbell grab	Greenish-gray clay; foraminiferans, ophiuroid, many annelids.
2637-54	238c	Apr 25	2.9 mi SSE of Long Pt., Catalina I. light	33-21-59 118-20-00	40 fms	1.14 cu. ft. Campbell grab	Gray sandy mud; holothurian, ophiuroids, annelids.
2638-54	238b	Apr 25	2.9 mi SSE of Long Pt., Catalina I. light	33-21-59 118-20-00	40 fms	0.93 cu. ft. orange-peel grab	Gray sandy mud; ophiuroids, urchins, annelids.

Station	Serial No. on Chart	Date	Locality in San Pedro Basin	Position North Latitude West Longitude	Depth	Volume and Gear	REMARKS
2639-54	239	Apr 25	4.1 mi SE of Long Pt., Catalina I.	33-21-58 118-18-01	82 fms	1.14 cu. ft. orange-peel grab	Gray-green sandy mud; ophiuroids, <i>Chloeta</i> and other annelids.
2640-54	241b	Apr 25	7.1 mi ESE of Long Pt., Catalina I.	33-22-00 118-14-00	370 fms	1 quart only orange-peel grab	Rock and muddy gravel; foraminiferans, annelids, galatheid crab.
2641-54	241c	Apr 25	7.1 mi ESE of Long Pt., Catalina I.	33-22-01 118-13-58	373 fms	3.01 cu. ft. Campbell grab	Green-brown sandy mud; brissopods, ophiuroids, <i>Chloeta</i> and other annelids.
2642-54	254	Apr 25	7.75 mi ENE of East end, Catalina I. light	33-20-00 118-10-00	422 fms	6.17 cu. ft. Campbell grab	Greenish-gray mud; foraminiferans, chaetopterid tubes, many smaller annelids.
2643-54	248	Apr 25	16.4 mi ENE of East end, Catalina I. light	33-22-00 118-00-00	382 fms	6.03 cu. ft. Campbell grab	Greenish-gray clay; a starfish, ophiuroids, annelids.
2644-54	222	Apr 25	10.4 mi S of end of Newport Beach pier	33-26-03 117-56-02	310 fms	5.74 cu. ft. Campbell grab	Greenish-gray clay; foraminiferans, annelids, gastropods.
2645-54	86	Apr 25	1.8 mi SW of end of Huntington Beach pier	33-37-58 118-01-57	12 fms	0.26 cu. ft. Campbell grab	Greenish-gray sand; many annelids.
2646-54	near 86	Apr 25	1.8 mi SW of end of Huntington Beach pier	33-37-58 118-01-57	12 fms	0.3 cu. ft. Campbell grab	Sandy mud; many annelids, amphipods, small shells.
Cruise 152—							
2722-54	20	May 8	1.9 mi NW of Pt. Vicente light	33-46-00 118-26-00	14 fms	0.25 cu. ft. orange-peel grab	Sand and shells; urchins, ophiuroids, many smaller annelids.
2723-54	18	May 8	4.8 mi WNW of Pt. Vicente light	33-46-00 118-30-00	325 fms	3.4 cu. ft. orange-peel grab	Fine mud; foraminiferans, annelids, many thick mud tubes, enteropneusts.
2724-54	11c	May 8	3.9 mi WNW of Palos Verdes Pt.	33-48-00 118-30-00	157 fms	2.52 cu. ft. orange-peel grab	Fine green mud; echiuroids, annelids, ophiuroids.

Station	Serial No. on Chart	Date	Locality in San Pedro Basin	Position North Latitude West Longitude	Depth	Volume and Gear	REMARKS
2725-54	5	May 8	4.1 mi NNW of Palos Verdes Pt.	33-50-00 118-28-00	58 fms	1.13 cu. ft. orange-peel grab	Coarse green mud; ophiuroids, sea whip, echiuroids, annelids.
2726-54	4	May 8	5.1 mi NW of Palos Verdes Pt.	33-50-00 118-30-00	70 fms	2.77 cu. ft. orange-peel grab	Green mud; ophiuroids, urchins, annelids, <i>Dentalium</i> .
2727-54	3	May 8	6.4 mi NW of Palos Verdes Pt.	33-50-00 118-32-00	66 fms	1.76 cu. ft. orange-peel grab	Green mud; ophiuroids, annelids, dead shells.
2728-54	near 15	May 8	9.6 mi W of Pt. Vicente light	33-46-00 118-36-00	454 fms	unmeasured orange-peel grab	Unscreened sample, green mud; <i>Phyllochaetopterus</i> , foraminiferans.
2729-54	15	May 8	9.5 mi W of Pt. Vicente light	33-45-59 118-35-50	445 fms	3.4 cu. ft. orange-peel grab	Green mud; foraminiferans, glass sponge, many annelids.
2730-54	51	May 8	10.45 mi WSW of Pt. Vicente light	33-40-00 118-36-00	297 fms	1.44 cu. ft. orange-peel grab	Green rocky mud; much rubble; many annelids.
2731-54	near 112	May 8	5.6 mi NNE of W end, Catalina I.	33-34-02 118-34-03	450 fms	unmeasured orange-peel grab	Unscreened, fine green mud; foraminiferans, <i>Phyllochaetopterus</i> .
2732-54	112	May 8	5.7 mi NNE of W end, Catalina I.	33-33-55 118-33-36	464 fms	3.15 cu. ft. orange-peel grab	Fine green mud; foraminiferans, <i>Phyllochaetopterus</i> tubes.
2733-54	near 187	May 9	1.3 mi ENE of Ship Rock, Catalina I.	33-27-58 118-27-57	152 fms	1.13 cu. ft. orange-peel grab	Green sandy mud; brissopsids, and other echinoid; ophiuroid; many annelids.
2734-54	near 187	May 9	1.35 mi ENE of Ship Rock, Catalina I.	33-28-03 118-27-54	154 fms	unmeasured orange-peel grab	Unscreened, fine green sandy mud; ophiuroids, holothuroid, <i>Eunice</i> and other annelids.
2735-54	137	May 9	4.8 mi SSE of W end, Catalina I.	33-32-00 118-32-04	435 fms	3.27 cu. ft. orange-peel grab	Fine green mud; foraminiferans, <i>Phyllochaetopterus</i> , few annelids.
2736-54	160	May 9	1.3 mi N of W end, Catalina I.	33-30-00 118-36-02	132 fms	1.57 cu. ft. orange-peel grab	Sandy green mud; foraminiferans, ophiuroids, annelids, sipunculids, amphipods.
2737-54	135	May 9	3.3 mi N of W end, Catalina I.	33-32-02 118-36-02	256 fms	2.77 cu. ft. orange-peel grab	Fine green mud; foraminiferans, echiuroid, nemertean, urchin, annelids.
2738-54	136	May 9	3.8 mi NE of W end, Catalina I. light	33-31-58 118-34-00	342 fms	3.15 cu. ft. orange-peel grab	Fine green mud; foraminiferans, many smaller annelids.

Station	Serial No. on Chart	Date	Locality in San Pedro Basin	Position North Latitude West Longitude	Depth	Volume and Gear	REMARKS
2739-54	92	May 9	9 mi NE of W end, Catalina I. light	33-36-00 118-30-00	478 fms	3.15 cu. ft. orange-peel grab	Fine green mud; <i>Phyllochaetopterus</i> tubes, foraminiferans, dead <i>Pecten</i> shells.
2740-54	74	May 9	6.6 mi S of Pt. Vicente light	33-37-59 118-26-03	470 fms	5.31 cu. ft. Campbell grab	Fine green mud; foraminiferans, <i>Phyllochaetopterus</i> tubes, dead <i>Pecten</i> shells.
Cruise 153—							
2741-54	50	May 14	9.3 mi E of Los Angeles break- water light	33-42-00 118-03-58	5 fms	2.15 cu. ft. Campbell grab	Shifting red sand and shell; <i>Saccocirrus</i> , juvenile annelids, <i>Grenella</i> , juvenile <i>Dendroaster</i> .
2742-54	130	May 14	3 mi SSW of end of Newport Beach pier	33-33-58 117-58-00	105 fms	5.31 cu. ft. Campbell grab	Sticky green mud; thick mud tubes of <i>Nothria</i> and <i>Maldane</i> ; many other annelids.
2743-54	131	May 14	2.35 mi S of end of Newport Beach pier	33-33-58 117-55-57	150 fms	5.59 cu. ft. Campbell grab	Sticky gray-green mud; large bris- sopods, thick mud tubes of anne- lids; similar to preceding station.
2744-54	132	May 14	2.85 mi SE of end of Newport Beach pier	33-34-00 117-53-56	155 fms	7.1 cu. ft. Campbell grab	Greenish-gray mud; brissopod, holothurian, echiuroid, nemertean, annelids.
2745-54	110	May 14	0.1 mi NNE of end of Balboa Beach pier	33-35-48 117-54-05	8 fms	0.27 cu. ft. Campbell grab	Gray sand and shell fragments; <i>Chaetopterus</i> and other annelids, mollusks.
2746-54	134	May 14	2.3 mi SE of W jetty, Newport Beach light	33-34-00 117-50-24	13 fms	0.7 cu. ft. Campbell grab	Fine gray sand; sea stars, gastropods, annelids.
2748-54	158	May 15	1.4 mi SSW of Abalone Pt.	33-31-59 117-50-00	167 fms	2.45 cu. ft. orange-peel grab	Oily, sticky, green mud; brissopod, onuphid tubes, other annelids.
2749-54	157	May 15	2.65 mi WSW of Abalone Pt.	33-32-00 117-51-58	277 fms	2.83 cu. ft. orange-peel grab	Green mud; brissopod, annelids.
2750-54	156	May 15	4.65 mi SSE of end of Newport Beach pier	33-32-00 117-53-57	238 fms	2.77 cu. ft. orange-peel grab	Green mud; brissopod, nemertean, holothurian, many annelids.

Station	Serial No. on Chart	Date	Locality in San Pedro Basin	Position North Latitude West Longitude	Depth	Volume and Gear	REMARKS
2751-54	184	May 15	4.9 mi WNW of Dana Pt.	33-30-00 117-47-58	200 fms	2.83 cu. ft. orange-peel grab	Greenish-gray mud; brissopods, thick mud tubes of annelids, mollusks.
2752-54	206	May 15	5.9 mi W of Dana Pt.	33-27-59 117-49-58	330 fms	3.0 cu. ft. orange-peel grab	Greenish-gray mud; sulphur odor; foraminiferans, annelids.
2753-54	205	May 15	7.6 mi W of Dana Pt.	33-27-56 117-51-57	322 fms	1.26 cu. ft. orange-peel grab	Gray sandy mud; foraminiferans, annelids, amphipods, ophiuroids, shell fragments.
2754-54	204	May 15	9.35 mi W of Dana Pt.	33-27-57 117-54-00	312 fms	2.83 cu. ft. orange-peel grab	Greenish-gray sticky mud; foraminiferans, nereid, sabellid and many smaller annelids.
2755-54	203	May 15	11.1 mi W of Dana Pt.	33-27-56 117-56-04	304 fms	3.0 cu. ft. orange-peel grab	Greenish sticky mud; foraminiferans, smaller animals.
2756-54	181	May 15	9.5 mi WNW of Dana Pt.	33-30-00 117-58-56	285 fms	2.7 cu. ft. orange-peel grab	Greenish mud and coarse shelly sand; <i>Aphrodita</i> , sabellid and other annelids, gastropods.
2757-54	180	May 15	11.2 mi WNW of Dana Pt.	33-30-00 117-55-58	258 fms	2.64 cu. ft. orange-peel grab	Greenish mud; brissopods, echiuroid, foraminiferans, annelids.
Cruise 156—							
2788-54	14	May 22	0.35 mi NW of Flat Rock Pt., S. of Redondo Beach	33-48-03 118-24-47	9.5 fms	1.32 cu. ft. orange-peel grab	Coarse gray sand and shell; did not pass through screens; many annelids, <i>Aricidea</i> , <i>Pisone</i> , sipunculid in <i>Dendrastra</i> tests.
2789-54	2	May 22	7.8 mi WNW of Palos Verdes Pt.	33-49-59 118-34-05	90 fms	1.7 cu. ft. orange-peel grab	Sandy blue-gray mud; brissopod, echiuroid, <i>Travisia</i> , <i>Chloeta</i> , and other annelids.
2790-54	1	May 22	9.3 mi WNW of Palos Verdes Pt.	33-49-58 118-36-00	180 fms	2.33 cu. ft. orange-peel grab	Blue-gray mud; brissopod, echiuroid, <i>Pectinaria</i> , <i>Nothria</i> , and other annelids.
2791-54	8	May 22	8.8 mi WNW of Palos Verdes Pt.	33-48-00 118-36-03	415 fms	3.08 cu. ft. orange-peel grab	Blue-gray mud; foraminiferans, <i>Phyllochaetopterus</i> tubes.

Station	Serial No. on Chart	Date	Locality in San Pedro Basin	Position North Latitude West Longitude	Depth	Volume and Gear	REMARKS
2792-54	9	May 22	7.2 mi WNW of Palos Verdes Pt.	33-47-59 118-33-59	300 fms	2.77 cu. ft. orange-peel grab	Blue-gray mud; foraminiferans, annelids, echiuroid, urchins, gastropod.
2793-54	10b	May 22	5.5 mi WNW of Palos Verdes Pt.	33-48-00 118-32-00	251 fms	0.95 cu. ft. orange-peel grab	Blue-gray mud; large rocks; foraminiferans, annelids.
2794-54	21	May 22	9.6 mi W of Palos Verdes Pt.	33-44-02 118-36-00	430 fms	3.4 cu. ft. orange-peel grab	Blue-gray mud; foraminiferans, glass sponge, <i>Phyllochaetopterus</i> tubes, poor in life.
2795-54	52	May 22	9.05 mi WSW of Pt. Vicente	33-40-00 118-33-58	290 fms	0.95 cu. ft. orange-peel grab	Phosphorite rocks with dark mud; nemertean, annelids.
2797-54	near 186	May 23	0.5 mi WNW of Ship Rock, Catalina I. light	33-28-00 118-30-00	63 fms	0.12 cu. ft. orange-peel grab	Coarse yellow-gray sand with shell; <i>Chloëia</i> , nemertean, ophiuroids, urchin.
2798-54	89	May 23	7.3 mi N of W end, Catalina I. light	33-36-00 118-36-03	386 fms	2.96 cu. ft. orange-peel grab	Blue-green-gray mud; glass sponge, annelids, nemerteans, ophiuroid.
2799-54	91	May 23	8.1 mi NNE of W end, Catalina I. light	33-35-37 118-32-00	484 fms	3.15 cu. ft. orange-peel grab	Blue-green-gray mud; foraminiferans, <i>Phyllochaetopterus</i> tubes, shells of <i>Pecten</i> .
2800-54	116	May 23	6.8 mi NNE of Ship Rock, Catalina I. light	33-34-00 118-26-04	478 fms	3.27 cu. ft. orange-peel grab	Blue-green-gray mud; foraminiferans, <i>Phyllochaetopterus</i> tubes, shells of <i>Pecten</i> .
2801-54	192	May 23	4.9 mi NE of Long Pt., Catalina I. light	33-27-57 118-17-58	474 fms	2.64 cu. ft. orange-peel grab	Blue-green-gray mud; foraminiferans, many long glass sponge spicules, <i>Phyllochaetopterus</i> .
2802-54	194	May 23	7.5 mi ENE of Long Pt., Catalina I. light	33-27-57 118-14-00	420 fms	2.64 cu. ft. orange-peel grab	Blue-green-gray mud; glass sponge, foraminiferans, sea star, annelids, mollusks.
Cruise 159—							
2835-54	97	Jun 17	6.6 mi from Pt. Fermin light	33-35-57 118-20-00	370 fms	3.21 cu. ft. orange-peel grab	Greenish-gray sticky mud.
2836-54	145	Jun 17	10.45 mi from Pt. Fermin light	33-32-01 118-15-58	430 fms	2.88 cu. ft. orange-peel grab	Greenish-gray sticky mud.

Station	Serial No. on Chart	Date	Locality in San Pedro Basin	Position North Latitude West Longitude	Depth	Volume and Gear	REMARKS
2837-54	211	Jun 17	3.7 mi from Long Pt. light, Catalina I.	33-26-02 118-17-58	454 fms	3.08 cu. ft. orange-peel grab	Greenish-gray sticky mud.
2838-54	214	Jun 17	8.5 mi from Long Pt. light, Catalina I.	33-26-00 118-12-02	394 fms	2.7 cu. ft. orange-peel grab	Greenish-gray sticky mud, some gravel.
2839-54	212	Jun 17	5.25 mi from Long Pt. light, Catalina I.	33-26-00 118-15-58	446 fms	3.46 cu. ft. orange-peel grab	Greenish-gray sticky mud.
Cruise 160—							
2840-54	152	Jun 22	Off Los Angeles breakwater light	33-31-59 118-02-00	205 fms	2.6 cu. ft. orange-peel grab	Sticky green mud, many animals, <i>Thalassema</i> , brissopsid, mollusks.
2841-54	178	Jun 22	Off Newport west jetty light	33-30-00 118-00-00	257 fms	2.93 cu. ft. orange-peel grab	Green mud, little debris; many smaller animals, sea-pen, brissopsid.
2842-54	202	Jun 22	Off Dana Pt.	33-27-57 117-57-56	288 fms	3.15 cu. ft. orange-peel grab	Gray-green mud; a dead conch, echinoid, many smaller animals.
2843-54	220	Jun 22	Northern end of Lasuen seamount	33-26-01 118-00-00	230 fms	1.32 cu. ft. orange-peel grab	Gray-green sandy mud, little rubble; brissopsids, a large nemertean, pelecypods, many annelids.
2844-54	233	Jun 22	Off East end, Catalina I.	33-24-03 118-04-00	362 fms	3.15 cu. ft. orange-peel grab	Sticky gray-green mud; foraminiferans, ophiuroids, many smaller annelids.
2845-54	229	Jun 22	Off Long Pt., Catalina I.	33-24-00 118-12-03	277 fms	1.25 cu. ft. orange-peel grab	Gray-green sandy mud; foraminiferans, a brissopsid, many annelids.
2846-54	out-side	Jun 23	West of Catalina I.	33-26-02 118-42-00	612 fms	5.74 cu. ft. Campbell grab	Gray-green mud; much glass sponge, foraminiferans, ophiuroids, annelids.

Station	Serial No. on Chart	Date	Locality in San Pedro Basin	Position North Latitude West Longitude	Depth	Volume and Gear	REMARKS
2847-54	out- side	Jun 23	West of Catalina I.	33-22-30 118-36-38	504 fms	2.58 cu. ft. Campbell grab	Sandy greenish-gray mud; little glass sponge, many animals, a large isopod.
2848-54	out- side	Jun 23	West of Catalina I.	33-18-00 118-42-00	715 fms	3.30 cu. ft. Campbell grab	Greenish-gray sandy mud; many smaller animals.
2849-54	out- side	Jun 23	West of Catalina I.	33-12-00 118-34-06	700 fms	5.74 cu. ft. Campbell grab	Greenish-gray mud; some glass sponge; many smaller animals.
2850-54	out- side	Jun 23	West of Catalina I.	33-14-00 118-18-04	620 fms	5.31 cu. ft. Campbell grab	Green mud; a large maldanid, a large amphipod, brachiopod, many annelids.
Cruise 161—							
2851-54	175	Jun 25	Off Long Pt., Catalina I. light	33-30-00 118-06-00	230 fms	1.51 cu. ft. orange-peel grab	Mud; many diversified smaller animals.
2852-54	198	Jun 25	Off East end, Catalina I. light	33-27-56 118-05-57	280 fms	2.52 cu. ft. orange-peel grab	Mud; numerous smaller animals.
2859-54	227b	Jun 26	Off Long Pt., Catalina I.	33-24-00 118-15-58	425 fms	2.58 cu. ft. orange-peel grab	Greenish-gray sandy mud; much glass sponge, ghost shrimps, many animals.

ANALYSES OF SAMPLES BY DEPTHS

The following list groups the numbers of samples taken from various depths, from shallow (0-25 fms) to deep (476-500 fms). The serial numbers are the same as those used in the Station List (above) and the Analyses of samples (below).

51 samples are from 0 to 25 fathoms:

14, 20, 27, 28, 29, 30, 31, 32, 33, 43, 44a, 44b, 45a, 45b, 46a, 46b, 47, 48, 49, 50, 61a, 61b, 62, 63a, 63b, 64, 65, 66a, 66b, 67, 68, 80b, 81a, 81b, 82, 83, 84, 85, 86, near 86, 87, 88, 102, 106, 107, 108, 110, 134, 186a, 186b, 224d.

31 samples are from 26 to 50 fathoms:

7b, 12b, 13, 42b, 80a, 99a, 99b, 100, 101, 103, 105, 123a, 124, 125, 129, 133, 159a, 159b, 164a,* 185, 207, 224a, 224b, 224c, 224e, 238a, 238b, 238c, 250a, 250b, 259.

11 samples are from 51 to 75 fathoms:

3, 4, 5, 7a, 104, 109, 123b, 184a, near 186, 235, 260.

6 samples are from 76 to 100 fathoms:

2, 26, 60, 128, 239, 251.

8 samples are from 101 to 125 fathoms:

6a, 19, 79, 122, 130, 149, 208, 261.

8 samples are from 126 to 150 fathoms:

6c, 42a, 127, 131, 160, 161, 162, 225a.

12 samples are from 151 to 175 fathoms:

6b, 11b, 11c, 126, 132, 148, 158, near 187 (2 lots), 209b, 267a, 267b.

11 samples are from 176 to 200 fathoms:

1, 6d, 41a, 41b, 121a, 174, 184b, 187, 209a, 225b, 236.

7 samples are from 201 to 225 fathoms:

98, 147, 150, 151, 152, 173, 252.

12 samples are from 226 to 250 fathoms:

12a, 59a, 59b, 121b, 155, 156, 175, 188, 199, 220, 240, 262.

8 samples are from 251 to 275 fathoms:

10b, 135, 163, 178, 179, 180, 226, 237.

18 samples are from 276 to 300 fathoms:

9, 11a, 34, 40, 51, 52, 78, 146, 157, 181, 182, 198, 202, 210, 228, 229, 230b, 249.

*Compare with 164b, from 470 fathoms.

9 samples are from 301 to 325 fathoms:

10a, 18, 172, 183, 203, 204, 205, 222, 223.

8 samples are from 326 to 350 fathoms:

120, 136, 189, 196, 206, 215, 218, 241a.

9 samples are from 351 to 375 fathoms:

17, 23, 77, 97, 232, 233, 234, 241b, 241c.

14 samples are from 376 to 400 fathoms:

24, 25, 58b, 69, 89, 111, near 171, 195, 214, 230a, 242, 243, 245, 248.

13 samples are from 401 to 425 fathoms:

8, 16, 22, 76, 170, 194, 227a, 227b, 244, 253, 254, 255, 257.

22 samples are from 426 to 450 fathoms:

15, near 15, 21, 35, 36, 37, 38, 39, 53, 57, 58a, 75, 96, near 112, 119, 137, 145, 193, 212, 213, 263, 264.

20 samples are from 451 to 475 fathoms:

54, 55, 56, 70, 71, 73, 74, 90, 95, 112, 115, 118, 141, 144, 164b, 168, 169a, 169b, 192, 211.

20 samples are from 476 to 500 fathoms:

72, 91, 92, 93, 94, 113, 114, 116, 117, 138, 139, 140, 142a, 142b, 143, 165, 166, 167, 190, 191.

5 samples from stations 2846-54 to 2850-54 originate from the deep basin on the windward side of Catalina Island, in depths of 504 to 715 fathoms.

ANALYSES OF SAMPLES, GIVING BIOLOGICAL COMPONENTS

The serial numbers 1 to 267, shown on Chart 1, correspond to the samples that have been taken in San Pedro Basin. The following pages give a summarized analysis of many of the animals, with numbers of individuals, for some of the samples. Specific determinations are to be regarded as provisional; they are given to provide an index and approximation of the sample. Counts of individuals are minimal, especially for tubicolous forms which have not been entirely examined. The identifications of species have been made by numerous individuals, indicated under the proper category, unless specified in one of the Appendices (see below). The analyses are intended to provide information on abundance and diversity of species, and associations within a limited area.

With the aid of the specific names and sample numbers, it is possible to plot the distribution in San Pedro Basin for any particular species, by placing it on its corresponding number on Chart 1.

1. Station 2790-54. Off Palos Verdes Point, in 180 fms, blue-gray mud. 2.33 cu. ft.

brissopsid and another urchin

echiuroid

burrowing anemone

crustaceans, including amphipods, isopod, cumaceans, ostracod
phoxocephalid amphipod, *Harpinia* sp. A.—2

polychaetes, including:

Aglaothamus sp.—2

Anaitides sp.—3

Chone sp.—1

cirratulid—1

Drilonereis sp.—1

Goniada sp.—1

Harmothoe scriptoria—1

another harmothoid—1

Laonice sp.—1

Lumbrineris cruzensis—1

another *Lumbrineris* sp.—1

Maldane sp.—many

another maldanid—1

Nothria pallida—many, in thick mud-walled tubes

Onuphis sp.—1 or more
Pectinaria californiensis—many
Prionospio pinnata—several
 another *Prionospio* sp.—2
 terebellid—1

2. Station 2789-54. Off Palos Verdes Point, in 90 fms, sandy blue-gray mud with sand, several larger stones and much shelly rubble. 1.7 cu. ft.
 echinoderms, including brissopsid and ophiuroids
 pelecypod, *Tellina* sp.—7 or more
 echiuroid—1, bright green
 polychaetes, including:
 Chloeia pinnata—several
 Travisia sp.—2 larger
 tubes of polyodontid
 many smaller annelids, not yet analyzed
3. Station 2727-54. Off Palos Verdes Point, in 66 fms, green sticky mud. 1.76 cu. ft.
 many ophiuroids and annelids, not yet analyzed.
4. Station 2726-54. Off Palos Verdes Point, in 70 fms, green sticky mud with sand. 2.77 cu. ft.
 many ophiuroids; urchin; *Dentalium rectius*; *Chloeia pinnata*—many; diversified smaller annelids
5. Station 2725-54. Off Palos Verdes Point, in 58 fms, coarse green shelly mud with rounded stones; many fine white spicules of sponge resembling rock wool, much rocky shell rubble and fine to coarse gravel. 1.13 cu. ft.
 sea whip—1; echiuroid—1, deep green; mollusks, including scaphopods, *Chaetoderma*, purple tectibranch—1; flatworm—1
 polychaetes, including:
- | | |
|---------------------------|---------------------------|
| <i>Aglaophamus</i> sp. | <i>Nephtys ferruginea</i> |
| <i>Brada</i> sp. | onuphids |
| <i>Haploscoloplos</i> sp. | <i>Pectinaria</i> sp. |
| <i>Laonice</i> sp. | polyodontid tube |
| <i>Lumbrineris</i> sp. | <i>Sternaspis</i> sp. |
| maldanids | <i>Terebellides</i> sp. |
- 6a. Station 2191-52. Off Redondo Beach pier, in 125 fms, fine sandy mud. 2.7 cu. ft.
 mollusks, including pelecypods and scaphopods; polychaetes, including *Chloeia*, spionids, maldanids, chaetopterids

6b. Station 2148-52. Off Redondo Beach pier, in 161 fms, sandy mud.
2.8 cu. ft.

nemertean—1 large

Thalassema sp.—4 large, in life deep blood red, with white proboscis; length to 140 mm, width about 20 mm, harboring a pinnotherid crab

echinoid—1

polychaetes, including:

Chloeia pinnata—about 50

Ancistrosyllis sp.—1 or more

capitellids—many

Lepidasthenia sp.—1

Lumbrineris sp.—several

Nephtys sp.—several

neriid—1

Pherusa spp.—several

Prionospio spp.—several

Travisia sp.—1

many smaller annelids not yet identified

6c. Station 2149-52. Off Redondo Beach pier, in 129 fms, sandy mud.
2.7 cu. ft.

echinoid—1 large

crustaceans, including amphipods, ostracods, copepod

phoxocephalid amphipods—*Heterophoxus* sp. A—1

Phoxocephalus sp. A.—1

Paraphoxus sp. A.—1

nemertean—1 or more

mollusks, including:

scaphopod—*Dentalium rectius*—2

pelecypod—*Yoldia scissurata*—3

echiuroid, including *Thalassema* sp.—3 large

polychaetes, including:

Anaitides sp.—1

Ancistrosyllis sp.—1

Chloeia pinnata—more than 60; to 15 mm long, bright orange red in life

cirratulid—1

Cossura n. sp.—several

Dorvillea sp.—2

Glycera sp.—2

Goniada sp.—2

Haploscoloplos elongatus—6

Lumbrineris index—6 large

another *Lumbrineris* sp.—several

maldanid—several, in thick mud-walled tube

Mesochaetopterus sp.—1, in very long, strawlike tube

Nothria sp.—2

Notomastus sp.—many

Pectinaria californiensis—several with many tubes

Pherusa spp.—several

polynoid—1

Terebellides sp.—1

other annelids

6d. Station 2190-52. Off Redondo Beach pier, in 186 fms, fine sandy mud. 3.02 cu. ft.

echinoid—1

Thalassema sp.—1

nemertean—several

holothuroid—several

Chaetoderma—several

polychaetes, including:

Aglaophamus sp.—1 or more

Anaitides sp.—1

Brada sp.—1

?*Capitella* sp.—1 or more, and
other capitellids

Chloecia pinnata—many

Glycera sp.—1 large

Goniada sp.—1

Harmothoë scriptoria—2, with
internal parasites

Lumbrineris sp.—several

Nephtys sp.—several

Nothria sp.—1

Pectinaria californiensis—12

Pherusa sp.—several

Prionospio spp.—several

sabellid—1

Scalibregma—1

other annelids not yet
sorted

7a. Station 2192-52. Off Redondo Beach pier, in 61 fms, fine mud and sand. 1.51 cu. ft.

mollusks, including:

scaphopods—*Cadulus fusiformis*—1

Dentalium rectius—142

gastropods—*Acteon punctocoelata*—1

Bittium catalinensis—1

Fusinus arnoldi—2

Turbonilla sp.—1

Volvulella tenussima—6

pelecypods—*Lucinoma annulata*—2

Parvilucina tenuisculpta—14

Solemya panamensis—1

Tellina bodegensis—1

Thyasira barbarentis—3

Yoldia scissurata—13

polychaetes, including *Pectinaria*, a large terebellid, and other annelids

7b. Station 2193-52. Off Redondo Beach pier, in 40 fms, fine sandy mud. 3.0 cu. ft.

mollusks, including:

scaphopods—*Cadulus fusiformis*—1

Dentalium rectius—8gastropods—*Acteon punctocoelata*—1*Cylichnella diegensis*—1pelecypods—*Lucinoma annulata*—1*Nucula carlottensis*—1*Pandora filosa*—2*Parvilucina tenuisculpta*—13*Pitar newcombiana*—3*Rochefortia tumida*—11*Tellina bodegensis*—1*Thyasira barborensis*—1*Yoldia scissurata*—19

a commensal crab

polychaetes, including:

Ancistrosyllis sp.—1 or more*Aricidea* sp. and perhaps*Paraonis* sp.—many

capitellids—many, with

several species

cirratulids—several

Cossura n. sp.—several*Lepidasthenia* sp.—1*Lumbrineris* spp.—many

malidanids—several

nephtyid—several

Ninoë sp.—1*Nothria* sp.—1?*Pareurythoë* sp.—1*Pectinaria californiensis*—

many

Prionospio pinnata—many*Prionospio*, another species—

several

Spiophanes sp.—several

8. Station 2791-54. Off Palos Verdes Point, in 415 fms, blue-gray mud. 3.08 cu. ft.

A large sample measuring 3.08 cu. ft. yielded less than a pint of screenings.

foraminiferans and *Phyllochaetopterus* tubes only

9. Station 2792-54. Off Palos Verdes Point, in 300 fms, blue-gray mud. 2.77 cu. ft.

foraminiferans, urchin, echiuroid, gastropod, many annelids, not yet analyzed

- 10a. Station 2150-52. Off Redondo Beach pier, in 310 fms, mud. 1.38 cu. ft.

urchins—10, pale yellow to pink in life, measuring about 40 mm across

nemertean—1, bright red ribbonlike in life

scaphopods, possibly *Cadulus*, many tubes

Chaetoderma—1 or more

- arenaceous foraminiferans, especially *Goësella flintii* (determined by Dr. O. Bandy)
- many nephtyid and spioniform annelids
- 10b. Station 2793-54. Off Palos Verdes Point, in 251 fms, blue-gray mud, much coarse to fine rubble. 0.95 cu. ft.
- glass sponge, with long spicules
- ophiuroid—1
- mollusks, including:
- Cadulus* sp.—14 or more
- Chaetoderma*—several
- bivalve—1
- gastropods—several
- crustaceans, including amphipods, isopods
- phoxocephalid amphipods:
- Harpinia* sp. B.—1
- Leptophoxus* sp. A.—2
- burrowing anemone—3
- Thalassema* sp.—2
- polyclad—1
- many annelids, including:
- Ammotrypane* sp.—1
- ampharetid—2
- Hydroïdes norvegica*—2 opercula, possibly from hull of *Velero IV*
- Lanice* sp.—1 large, in tube covered with the foraminiferan, *Goësella flintii*
- Lumbrineris cruzensis*—3
- Maldane* sp.—more than 50
- maldanid—several
- Melinna* sp.—2
- Myriochele* sp.—1
- Nothria* sp.—1
- Onuphis*, near *vexillaria*—1 or more
- Paraonis* n. sp.—1
- Pectinaria californiensis*—1
- Petaloproctus* sp.—2 or more
- Pherusa* sp.—2
- polynoids—clytra of *Lagisca* and another polynoid
- Prionospio* sp.—2
- Syllis* sp.—1

?*Thelepus* sp.—1, with tube

other annelids

11a. Station 2151-52. Redondo Canyon, in 291 fms, mud. 0.5 cu. ft.

echinoids—2

ophiuroids—many

glass sponge

gastropod, *Nitidella* sp.—about 30

boring bivalve—many in wood

crustaceans, including:

spider crab—2

shrimp—1

stalked barnacle—1

phoxocephalid amphipod—*Heterophoxus* sp. A.—1

polychaetes, including:

Acrocirrus ?*crassifilis*—about 15

Amphicteis sp.—1

Anaitides sp.—1

?*Asclerocheilus*—about 4

capitellid—2

chaetopterid—3 long tubes and

fragments of animals

Cirratulus ?*cirratus*—1

Cirratulus, another species—1 larger and 3 smaller

?*Eumida* sp.—1

Euphrosine sp.—1

Evarnella fragilis—1

Glycera tessellata—3

?*Hauchiella* sp.—1

?*Hypoeulalia bilineata*—1

Lagisca sp.—1

Laonice sp.—1

Lepidonotus sp.—2

Lumbrineris spp.—9

Nereis sp.—1

Onuphis sp.—1

Pherusa sp.—3

phyllodocid—1

Polydora spp.—about 10, representing 3 species

Protula sp.—several tubes, fully attached to hard surfaces

syllid—3

Terebellides sp.—1, pale yellow and orange in life

- 11b. Station 2361-53. Redondo Canyon, in 167 fms, gray sandy mud.
1.44 cu. ft.

not yet analyzed

- 11c. Station 2724-54. Redondo Canyon, in 157 fms, fine green sticky mud with stones (jurassic, metamorphic); much rocky rubble, gravel and shell fragments. 2.52 cu. ft.

some glass sponge

ophiuroids—few

echiuroids—3, deep green

amphipods—many

phoxocephalid—*Heterophoxus* sp. A.—7

polychaetes, including:

Anaitides sp.—several

Ceratocephala crosslandi americana—1

Drilonereis sp.—1 or more

Glycera sp.—1

Lumbrineris sp.—several

Maldane sp.—many

onuphids—several

polynoid—1 or more

polyodontid tube fragments

spionids and other annelids

- 12a. Station 2189-52. Off Redondo Beach pier, in 228 fms, fine sandy mud. 1.07 cu. ft.

Conspicuous forms include many pelecypods, red *Chloëia*, ophiuroids, urchin, red sand covered *Goësella* (foraminiferan), and scaphopods

mollusks, including:

amphineuran, Aplacophora—*Chaetoderma* sp. B.—13

Limifossor sp.—9

scaphopods—*Cadulus tolmiei*—33

Dentalium rectius—3

gastropods—*Balcis rutila*—6

Bittium attenuatum—1

pelecypods—*Axionopsis sericatus*—12

Cardiomya pectinata—1

Crenella columbiana—1

Macoma incongrua—323

Nuculana conceptionis—42

- Nuculana spargana*—8
Sphenia globula—5
Tellina carpenteri—61
Thyasira barbharensis—1

crustaceans, including:

- ostracods—more than 50, with at least 3 species
 phoxocephalid amphipod—*Heterophoxus* sp. A.—11
 cumaceans—5

nemerteans—several

unknown animal—5, reddish purple in life

polychaetes, including:

- ampharetid—2 or more, in thick mud-walled tube
 another ampharetid—several, in sand-covered tube

Anaitides sp.—4

?*Brada* sp.—5

capitellid—1

Chloeia pinnata—more than 90

other cirratulids—several

Cossura n. sp.—2

Glycera americana—1 large

another *Glycera* sp.—1

Glycinde sp.—1

Goniada sp.—1

Haploscoloplos elongatus—1

maldanids—10 or more

Marphysa sp.—1

Myriochele n. sp.—about 8

nephtyids—several, with 2 or more species

onuphid—1

Pectinaria californiensis—50 or more, including juveniles

Pherusa spp.—several

Polydora sp.—1

polynoid—several

Prionospio ?*cirrifera*—8

Prionospio pinnata—8

sabellids—2

Scalibregma sp.—1 large and 2 small

Streblosoma sp.—fragment

12b. Station 2360-53. Off Redondo Beach pier, in 49 fms, gray sand, rock and clay. 1.63 cu. ft.

not yet analyzed

13. Station 2359-53. Off Redondo Beach pier, in 31 fms, gray sandy mud and clay. 0-63 cu. ft.

not yet analyzed

14. Station 2788-54. South of Redondo Beach, in 9.5 fms, coarse gray sand and shell. 1.32 cu. ft.

Eight gallons of shell and sandy rubble that did not pass through the screens, sorted in the laboratory. There were hundreds of mud filled tests of *Dendraster*, harboring a sipunculid, each test with one or more worms. Numerous individuals of a solitary tunicate, externally covered with bits of shell and sand.

phoxocephalid amphipods—*Pontharpinia* sp. B.—32

Pontharpinia sp. M.—2

polychaetes, including:

Aricidea jeffreysi—many

Lumbrineris sp.—several, with long head

Marphysa mortenseni—1, large

Pisone, near *remota*—many

15. Station 2729-54. Off Point Vicente light, in 445 fms, fine green sticky mud. 3.4 cu. ft.

foraminiferans, some glass sponge, a large chaetoderm and numerous polychaetes, not yet analyzed.

near

15. Station 2728-54. Off Point Vicente light, in 454 fms, fine green sticky mud, brought to laboratory without screening. Volume not taken.

foraminiferans and tubes of *Phyllochaetopterus* only

16. Station 2474-53. Off Point Vicente light, in 405 fms, green-black fine mud. 3.9 cu. ft.

foraminiferans and tubes of *Phyllochaetopterus* only

17. Station 2362-53. Off Point Vicente light, in 352 fms, fine gray-green mud. 2.83 cu. ft.

not yet analyzed

18. Station 2723-54. Off Point Vicente light, in 325 fms, fine sticky green mud; most of the sample passed through the screen assembly. 3.4 cu. ft.

many foraminiferans

many thick mud tubes formed by at least two polychaetes, including

Amphicteis scaphobranchiata and *Maldane* sp.

ophiuroid—1

mollusks, including:

Chaetoderma—1 large and several small

Nitidella sp.—several

another gastropod—several

enteropneusts—33 with at least two species, perhaps juveniles

echiuroid—2

sipunculids—several

polychaetes, including (in addition to those named above):

Aricidea ?*jeffreysi*—2

capitellid—1

cirratulid—several

Euclymenini—2

?*Leocrates* sp.—1

Lumbrineris sp.—1

orbiniid, new genus and species—several

Paraonis n. sp.—3

sabellid, possibly unknown—2

sigalionid, possibly *Sthenelanelia* sp.—4

19. Station 2358-53. Off Point Vicente light, in 125 fms, gray clay.
2.89 cu. ft.

not yet analyzed

20. Station 2722-54. Off Point Vicente light, in 14 fms, greenish sand
with shell fragments; a very small sample. 0.25 cu. ft.

purple urchins—2

ophiuroids—several

foraminiferans

many smaller annelids, not yet analyzed

21. Station 2794-54. Off Palos Verdes, in 430 fms, blue-gray mud. 3.4
cu. ft.

foraminiferans, some glass sponge, chaetopterid and serpulid tubes

Phyllochaetopterus sp.

22. Station 2620-54. Off Point Vicente light, in 418 fms, gray-green
mud. 2.20 cu. ft.

foraminiferans, phyllochaetopterid tubes; little life

Phyllochaetopterus sp.

23. Station 2475-53. Off Point Vicente light, in 370 fms, fine dark mud.
3.21 cu. ft.

much glass sponge

foraminiferans—many

ophiuroids—many large and small

- mollusks, including:
- Cadulus*—5
 - Chaetoderma*—1
 - gastropod—several
 - pelecypod—3
- Stylatella* (sea whip)
- anemone—3
 - amphipod—2
 - phoxocephalid—*Harpinia* sp. B.—1
 - echiuroid—1
- polychaetes, including:
- ampharetid—many
 - Ancistrosyllis* sp.—2
 - Laonice* sp.—1
 - Maldane* sp.—2 or more
 - orbiniid—1
 - Phyllochaetopterus* sp.—several tubes
 - polynoid—1
 - Protula* sp.—1 or more
24. Station 2476-53. Off Point Vicente light, in 386 fms, fine black sandy mud, wood fragments. 0.95 cu. ft.
- sea whip
 - enteropneusts—*Schizocardium* sp.—3
 - nemertean
 - anemone—2
- mollusks, including:
- Cadulus*—many
 - Chaetoderma*—1
 - gastropods—many
- polychaetes, including:
- ampharetids—many
 - capitellid—1
 - cirratulids—several
 - ?*Laonice* sp.—1 large, with greatly prolonged branchiae
 - Lumbrineris* sp.—some
 - maldanid—several
 - onuphid—juveniles
 - paraonid—1, with very long branchiae
 - Phyllochaetopterus* sp.—1 large, in tube
 - Protula* sp.—many, some tubes attached to wood, some clumped

- ?*Spiophanes* sp.—1
other annelids
25. Station 2403-53. Off Point Vicente light, in 400 fms, green mud. 3.15 cu. ft.
many foraminiferans
nemertean—a large one
polychaetes, including:
Amphicteis scaphobranchiata—many
other ampharetids
capitellids
terebellids—many
other annelids, not yet analyzed
26. Station 2357-53. Off Point Vicente light, in 100 fms, fine gray sandy mud. 1.63 cu. ft.
not yet analyzed
27. Station 2473-53. Off Point Vicente light, in 16 fms, coarse sandy mud, shell fragments; very rich in living animals. 0.75 cu. ft.
ophiuroids—many
polychaetes, including:
Chaetopterus sp.—many
cirratulids—many, with several species
Cistenides sp.—several
dexiorbid spirorbids, attached to rocks
Spiophanes sp.—many
Sthenelanella sp.—many
Streblosoma sp.—several
and other annelids
28. Station 2472-53. Off Point Vicente light, in 11 fms, sandy black coarse mud, broken shells, considerable debris; diversified fauna. 0.63 cu. ft.
foraminiferans
Glottidia albida—several
nemerteans—several species
nematodes—very many
gastropods and bivalves, including shells of *Leda*, *Yoldia*, *Lima*.
Olivella
anemone—several
Heterocrypta sp. (crab)—several carapaces
amphipods—some
ostracods—many

polychaetes, including:

Anotomastus gordiodes—several

Aphrodita sp.—1

Aricidea spp.—several

Cistenides sp.—1

Dasybranchus sp.—1

Diopatra tridentata—tube fragments

Eumida sp.—1

Exogoninae—several

Halosydna sp.—1

Leocrates n. sp.—1

Lumbrineris spp.—several

Magelona sp.—1

Nephtys sp.—many

nereid—1

Odontosyllis sp.—1

onuphid—1

Pectinaria californiensis—several

Poecilochaetus sp.—several

polynoid—1

Prionospio, near *malmgreni*—many, the most abundant species

Prionospio pinnata—several

Rhodine sp.—tubes or also living

Scalibregma sp.—1

sigalionids—several

Sthenelanelia sp.—some

Streblosoma sp.—1

syllids—some

29. Station 2508-53. In Outer Harbor, in 6 fms, black mud. 2.56 cu. ft.

several small sea whips, some bivalves, nemerteans, anemones, a few amphipods, a small ophiuroid

polychaetes, including:

ampharetid—1

arabellid—1

capitellid—1

Chaetozone sp.—several

Cossura n. sp.—several

Diopatra sp.—1

Eteone sp.—1

Glycera sp.—1 large
Haploscoloplos sp.—1
Laonice sp.—several
Lumbrineris spp.—many
 maldanid—1
Marphysa sp.—10 or more
Nephtys sp.—some
Nereis procera—few
Pectinaria sp.—1
Podarke sp.—1
Prionospio pinnata—several
Scalibregma sp.—1
Spiophanes sp.—1
Terebellides sp.—2
Tharyx sp.—hundreds

30. Station 2507-54. In Outer Harbor, off Long Beach breakwater, in 8 fms, black mud; richly diversified fauna. 3.15 cu. ft. not yet analyzed

31. Station 2506-54. In Outer Harbor, in 9 fms, black mud; diversified fauna. 3.15 cu. ft.

various mollusks

crustaceans, including a ghost shrimp, numerous pinnotherid crabs, amphipods

ophiuroids—many

enteropneust—*Schizocardium* sp.—1

polychaetes, including: (specimens not counted)

Ancistrosyllis sp.

Arabella sp.

Amphicteis scaphobranchiata

Brada sp.

Diopatra sp.

disomid

Glycera sp.

Haploscoloplos sp.

Harmothoë sp.

Lumbrineris spp.

maldanid

Marphysa sp.

Megalomma sp.

Nereis sp.

Notomastus sp.

Owenia n. sp.

Prionospio pinnata

Scalibregma sp.

Spiophanes sp.

Terebellides sp.

terebellids

32. Station 2314-53. In Outer Harbor, in 4.5 fms, heavy gray mud. 0.56 cu. ft.
not yet analyzed
33. Station 2505-53. In Outer Harbor, in 5 fms, black sandy mud; rich bottom. 0.13 cu. ft.
not yet analyzed
34. Station 2138-52. Off Point Vicente, in 282 fms, mud and fine gravel; very small sample. Volume not taken.
brissopsid—2
ophiuroids—many
nemertean—at least 1
many annelids, not yet analyzed
35. Station 2139-52. Off Point Vicente, in 433 fms, mud. 1.89 cu. ft.
not yet analyzed
36. Station 2619-54. Off Point Vicente light, in 432 fms, gray-green mud. 3.15 cu. ft.
many foraminiferans
nemertean—1
ophiuroid—1
polychaetes, including:
 ?*Drilonereis*—1, white and very slender in life
 Lumbrineris sp.—1, dark purple in life
 tubes of *Phyllochaetopterus*, *Protula*, and onuphid
37. Station 2363-53. Off Point Vicente light, in 429 fms, fine gray-green mud. 2.77 cu. ft.
not yet analyzed
38. Station 2404-53. Off Point Vicente light, in 438 fms, gray sandy mud. 1.07 cu. ft.
debris contains many bits of wood, fragments of plant stems, foraminiferans.
Chaetoderma—1
scaphopod—1

polychaetes, including:

Amphicteis scaphobranchiata—several

Aricidea sp.—many

cirratulid—4

Lagisca sp.—1

Phyllochaetopterus n. sp.—many with tubes

Polydora sp.—1

serpulid tubes—several long, slender, slightly coiled

terebellid—1

39. Station 2419-53. Off Point Vicente light, in 437 fms, fine mud.

3.71 cu. ft.

foraminiferans

echinoids—2 large

Phyllochaetopterus tubes or specimens

serpulid tubes

a few other animals

40. Station 2356-53. Off Point Vicente light, in 294 fms, gray-green

mud. 2.57 cu. ft.

not yet analyzed

41a. Station 2220-52. Off Point Fermin light, in 180 fms, fine green

mud. 3.15 cu. ft.

ophiuroids—many

echinoids—several

mollusks, including pelecypods, gastropods, *Chaetoderma*

smaller crustaceans

many polychaetes, not yet analyzed

41b. Station 2418-53. Off Point Fermin light, in 185 fms, black mud.

2.7 cu. ft.

echinoids—3 or more

ophiuroids—some

smaller crustaceans, including amphipods, isopods, cumaceans

mollusks, including *Dentalium*, pelecypods, gastropods, and *Chaetoderma*

sipunculids

polyclad

nemertean

polychaetes, including:

thick, muddy tubes of ampharetids, onuphids, *Pista*—many

Ammotrypane sp.—1

Anaitides sp.—many

- Aricidea* sp. and perhaps *Paraonis* sp.—several
 capitellids
Chloeia sp.
 ?*Chone* sp.
 cirratulids
Dorvillea sp.—1
Eumida sp.—many
 ?*Eunice* sp.—1
Glycera sp.—1
Glycinde sp.—1
Haploscoloplos sp.—1
Harmothoë scriptoria—1
 hesionid—1
Laonice sp.—1
Lumbrineris spp.—numerous
 maldanids—several
Melinna sp.—1
Nephtys sp.—several
Nothria sp.—1
Onuphis sp.—1
 ?oweniid
Pectinaria sp.—several
Pherusa sp.—several
Polydora sp.—1
Prionospio pinnata—1
- 42a. Station 2221-53. Off Point Fermin light, in 147 fms, fine dark green mud. 2.2 cu. ft.
 mollusks
 nemerteans—several large
 sipunculid
 many thick mud-walled tubes of *Nothria pallida*, terebellid, and maldanid
 polychaetes, including:
Anaitides sp.—1 or more
Brada sp.—1
 cirratulids
Chloeia pinnata—several
Dorvillea sp.—1
 flabelligerids, 2 species—several individuals
Lumbrineris spp.—several

maldanids—several
 nephtyids—several
Nothria pallida—many
Pista sp.—some in muddy tubes
 orbiniid—1 or more
Pectinaria sp.—several
 ?*Podarke* sp.—1
 spionids
 terebellids

42b. Station 2417-53. Off Point Fermin light, in 34 fms, black mud; a rich spioniform bottom. 2.14 cu. ft.

sea whip—at least three

Chætoderma—several

polyclad—1

polychætes, including:

Aricidea sp.—1 or more

Chlæia pinnata—29 or more

Cossura n. sp.—several

?*Eumida* sp.—1

Fabricia sp.—several

hesionid—1

Lumbrineris spp.—many

Marphysa sp.—several

nereid—some

orbiniid—several

oweniid—1

Paraonis n. sp.—1 or more

Pectinaria sp.—several small or juveniles

Peisidice aspera—some

Pholoë sp.—several

Polydora spp.—1

Spiophanes sp.—1

other spionids

Tharyx, possibly *parvus*—more than 1530

other small annelids—many

43. Station 2471-53. Off Point Fermin light, in 12 fms, black sandy mud and shell fragments, very rich in animals, especially smaller ones. 0.69 cu. ft.

a large living *Cardium*

many polychætes, especially *Chætopterus* sp. and spioniform anne-

lids, not yet analyzed

- 44a. Station 2470-53. Off Point Fermin light, in 10 fms, black sandy mud, shell fragments, foul odor; very rich in large and small animals. 1.95 cu. ft.

ophiuroids—many

holothuroids—many

enteropneusts—*Schizocardium* sp.—8

polychætes, including:

Aphrodita sp.—3 or more

Lumbrineris spp.—many

Streblosoma sp.—many

other annelids

- 44b. Station 2307-53. In Outer Harbor, in 7 fms, black rubbly clay, friable. 2.14 cu. ft.

ophiuroids

amphipods and other crustaceans

anemones

nematodes

nemerteans—at least two species

sipunculid

polychætes, including:

Amœa occidentalis—1

Ampharete ?*arctica*—3

Amphicteis scaphobranchiata—26

Ancistrosyllis bassi—10

Aricidea sp.—1

Armandia sp.—1 juvenile

Boccardia ?*redeki*—1

Boccardia sp.—2

Carazzia sp.—1

Chætozone corona—10

Chone sp.—several

Cirratulus ?*cirratus*—about 10

Cirriformia ?*luxuriosa*—several

Cossura n. sp.—more than 250

Diopatra tridentata—3 with tubes

Dorvillea articulata—about 10

Eteone californica—1

?*Fabricia* sp.—1 or more

Glycera americana—2 large and 1 small

- Haploscoloplos elongatus*—6
Harmothoë scriptoria—2
Laonice sp.—1
Lumbrineris cruzensis—many
Lumbrineris ?erecta—several
Lumbrineris, other species
Magelona sp.—1 or more
Marphysa, resembling *conferta*—13
Megalomma sp.—3
Melinna sp.—3
Nephtys spp.—about 15
Nereis procera—more than 145, including some epitokes
Notomastus ?hemipodus—about 5
Paraonis n. sp.—more than 92
Pectinaria californiensis—3
Peisidice aspera—32
Pherusa sp.—about 15
Pista sp.—1
Podarke pugettensis—19
Polydora, resembling *armata*—several
Polydora citrona—9
Polydora, near *ligni*—several
Prionospio, near *malmgreni*—8
Prionospio pinnata—3
Spiochætopterus sp.—1 and tubes
Spiophanes missionensis—3
Sthenelanelle uniformis—8
Streblosoma crassibranchia—3
Tharyx parvus—hundreds, some ovigerous and with swimming setæ
Travisia sp.—2 juveniles
 other annelids, serpulid tubes

45a. Station 2168-52. Off Los Angeles light, in 12 fms, mud with many large animals. 2.2 cu. ft.

ophiuroids—several

sea whip—1 or more

mollusks, including:

amphineuran, Aplacophora—*Chaetoderma* sp. A.—1

scaphopods—*Cadulus fusiformis*—2

Dentalium neohexagonum—1

- gastropods—*Aglaja* sp.—1
 Crepidula nivea—15
 Ferreria belcherii—1
 Nassarius perpinquis—2
 Volvulella tenuissima—3
- pelecypods—*Macoma yoldiformis*—1
 Nuculana taphira—2
 Pitar newcombiana—1
 Solen rosaceus—2
 Tagelus californianus—several
 Thyasira barbarena—2
- cephalopod—*Octopus apollyon*—1
- crustaceans, including 2 small crabs, a shrimp, 2 cumaceans
- phoronids—many in slender stiff tubes externally covered with sand
Glottidia albida—1 small
- enteropneusts—*Schizocardium* sp.—3
- nemerteans—about 8
- polyclads—4 large, of which 3 come from crevices in the dead conch
 leech—1 small
- other mollusks include: many pelecypods, gastropods, some living
Crepidula on the dead conch
- polychætes, including:
- Amphicteis scaphobranchiata*—many
Ancistrosyllis rigida—8
Aphrodita parva—2
Asychis sp.—several
Brada ? pluribranchiata—7
- capitellids—many
Cossura, n. sp.—7
Diopatra tridentata—about 10 with tubes
Drilonereis sp.—many
Glycera sp.—2 juveniles
Goniada sp.—6
Halosydna latior—3, in crevices on dead conch
Harmothoë scriptoria—4
Laonice cirrata—19
Lepidasthenia virens—1
Lumbrineris spp.—many
Magelona, near *pacifica*—3
- maldanids—many

Marphysa, resembling *conferta*—18
Melinna sp.—about 5, juveniles
Nereis procera—12, bright green in life
Nothria sp.—many
Owenia sp.—2 large
Pectinaria californiensis—9
Pherusa sp.—about 20
Pholoë sp.—about 6
Phyllodoce sp.—several
Pista sp.—many
Podarke sp.—4
Pæcilochætus johnsoni—about 12
Prionospio, near *malmgreni*—8
Prionospio pinnata—about 30
Scalibregma sp.—28
Scoloplos sp.—5 juveniles
Spirochætopterus sp.—several
Spiophanes sp.—about 14
Sthenelanelia uniformis—7
Streblosoma crassibranchia—many and tubes
Terebellides sp.—2
Tharyx sp.—several
Typosyllis sp.—2, deep orange color in life
 other annelids

45b. Station 2217-53. Off Los Angeles light, in 12 fms, shale, chert rocks, wood fragments, hard packed black mud; many animals. 0.31 cu. ft.

ophiuroids and asteroids—many

holothuroid—1 large and 3 small

mollusks, including chitons, rock oysters, slipper shells, and others

sipunculids, resembling *Golfingia*—many, in tortuous burrows in shale

burrowing anemone—2

nemerteans—3

crustaceans, including a crab, many amphipods, and isopods

Glottidia albida—1

phoronid—1 or more

echiuroid, possibly *Thalassema*—1 small

polychætes, including:

ampharetids—several

- amphinomid—1 small
Anaitides sp.—1
Aphrodita sp.—6
 arabellid—several
Boccardia sp.—6
 capitellid—2
Ceratonereis sp.—3
Chætozone sp.—several
Chone sp.—several
 cirratulids—many
Cistenides sp.—about 10
 dextral spirorbids, on foliose bryozoan
Dorvillea sp.—2
Eteone sp.—1
Eumida sp.—1
Euphrosine—1 juvenile
 Exogoninae—1, on bryozoan
 flabelligerids—at least 2 species and several individuals
Glycera sp.—1 juvenile
Halosydna sp.—3
Haploscoloplos elongatus—2
Harmothoë scriptoria—several
Hesperalia sp.—1
Leocrates n. sp.—1
Lepidonotus sp.—more than 25
Lumbrineris spp.—many
Megalomma sp.—several
Myxicola sp.—1 juvenile
 onuphid—4
Owenia sp.—2
Peisidice sp.—1
Pherusa inflata—many, in U-shaped burrows in clay
Phyllochætopterus, resembling *prolifera*—about 15
Pista, resembling *cristata*—several
Pista elongata—1 or more
Podarke sp.—several
Sabellaria sp.—many
Salmacina sp.—clumps of tube masses
Scalibregma sp.—3
 spionids—numerous small

Sthenelanella sp.—several

Syllinæ—about 6

terebellids—numerous

Thalenessa sp.—several

Tharyx sp.—1

46a. Station 2107-53. Off Los Angeles light, in 13 fms, sand and mud, much life. 2.0 cu. ft.

sea anemone—1

sea whip—2

Glottidia albida—2

mollusks, including:

chætoderman—1

scaphopods—3

pelecypods—*Solen rosaceus*—6

Tagelus californianus—6, the longest 8 cm long

Trachycardium quadragenarium—1

sipunculids—8

echiuroid, *Listriolobus pelodes*—2

phoronids—more than 3

crustaceans, including caprellids, amphipods, ostracod, a juvenile brachyuran, and a cumacean

nemertean—2

enteropneusts—*Schizocardium* sp.—2

polychaetes, including:

?*Amage* sp.—6

Amphicteis sp.—2

Ancistrosyllis bassi—6

Asychis ?*lacera*—1

Boccardia sp.—2 or more

Brada sp.—1

Capitella sp.—1, male

Chaetozone sp.—18

Cossura n. sp.—20

Diopatra tridentata—more than 3, longest measures about 170 mm

Drilonereis ?*nuda*—9, longest measures about 100 mm

Exogoninae—1

Glycera ?*capitata*—1

Haploscoloplos elongatus—5

?*Isolda* sp.—11

- Laonice* sp.—1 or more
Lumbrineris index—8
Lumbrineris japonica—10
Lumbrineris minina—17
Marphysa, resembling *conferta*—5, longest measures about 80 mm
Nephtys ?*caecoides*—2
Nereis procera—31, longest measures 38 mm
Notomastus sp.—11
 opheliid, anterior fragment
Owenia sp.—2, longest measures 80 mm
 paraonids—9
Pectinaria californiensis—5, largest tube measures 61 mm long
Pherusa sp.—several
Phyllochaetopterus sp.—1 or more
 phyllodocid—1
Poecilochaetus johnsoni—5 or more
 polynoid—2
Scalibregma sp.—12
Spiophanes ?*missionensis*—12 or more
Sternaspis sp.—2
Sthenelais ?*tertiaglabra*—3
Sthenelanella uniformis—31
Streblosoma sp.—3 or more

46b. Station 2202-53. Off Los Angeles light, in 11 fms, mud, many animals. 1.89 cu. ft.

- Tagelus californianus*—7 large
 other mollusks, including scaphopods, gastropods, pelecypods
 enteropneust, *Schizocardium* sp.—3
 echinoderms, including an ophiuroid, a holothuroid
 nemerteans—many, with several species
 echiuroid—1
 sipunculid—1
 phoronid—1 or more
 smaller crustaceans, including an amphipod, 4 copepods
Glottidia albida—2 large
 polychaetes, including:
 ampharetids—many
 ?*Amphicteis scaphobranchiata*—1
Arabella sp.—2 or more

Artacaminae, new genus and species—1
Asychis lacera—1 with tube
Axiothella sp.—many
Boccardia sp.—several
Brada sp.—several
 capitellids—several
 ?*Ceratonereis* sp.—1 or more
 cirratulid—several
Cossura n. sp.—3
Diopatra tridentata—many with tubes
Drilonereis sp.—1
Glycera sp.—1
Goniada sp.—1
Haploscoloplos elongatus—2
Harmothoë scriptoria—3
 hesionid—2 or more
Laonice sp.—several
Lepidasthenia sp.—1
Lumbrineris spp.—at least 4 species and about 20 specimens
Magelona sp.—several
Marphysa sp.—1
 nephtyid—3
Nereis sp.—several
Nothria sp.—2 or more
Paraonis n. sp.—1
Pherusa ?inflata—1 or more, and other species of the genus—
 many
Phyllodoce sp.—3
Pista sp.—several
Poecilochaetus sp.—several with many tubes
Praxillella sp.—many
Prionospio sp.—several
Scalibregma sp.—about 40
 sigalionids—at least 2 species and many specimens
Spiophanes sp.—many
Sternaspis sp.—2
 other annelids

47. Station 2309-53. Off Long Beach breakwater, in 12 fms, fine black mud. 1.32 cu. ft.
 not yet analyzed

48. Station 2313-53. Off Long Beach breakwater, in 11 fms, fine gray mud. 0.37 cu. ft.
Richly diversified, abundant fauna, not yet analyzed
phoxocephalid amphipods — *Pontharpinia* sp. B.—2
Pontharpinia sp. Q.—1
49. Station 2312-53. Off Long Beach breakwater, in 7.5 fms, brown sandy mud and gravel, perhaps detritus from Santa Ana River.
Richly diversified fauna. 0.7 cu. ft.
a large ovigerous cancer crab
Lepidopa myops, a spiny sand crab—1
mollusks—various and numerous, especially gastropods, pelecypods
echinoderms—many ophiuroids, some echinoids, a sea star
Glottidia albida—1
a sea whip
nemerteans, sipunculid, nematodes—many
small crustaceans, including amphipods, isopods
phoxocephalid amphipods—20, including *Harpinia* sp. C.—2
Pontharpinia sp. B.—7
Pontharpinia sp. G.—1
Pontharpinia sp. M.—8
- polychaetes, including:
- Aricidea* sp.—1 or more
 - Chaetozone* sp.—1
 - Chone* sp.—1
 - Eteone* sp.—1
 - Euchone* sp.—1
 - Goniada* sp.—1
 - Harmothoë ?imbricata*—1
 - Lumbrineris* spp.—many
 - Magelona* sp.—several
 - maldanids—many
 - Marphysa* sp.—1
 - nephtyids—more than 1 species, many
 - Nereis ?procera*—several
 - Nothria ?elegans*—many tubes
 - Notomastus* sp.—1 or more
 - Onuphis eremita*—1
 - Ophelia* sp.—1
 - Owenia* sp.—1 large
 - Perinereis* sp.—1

Poecilochaetus sp.—1
Polycirrus sp.—1
Prionospio, near *malmgreni*—several
Prionospio pinnata—1
Rhynchospio sp.—several
Scalibregma sp.—1
Scoloplos sp.—1
Spiophanes sp.—several
 other annelids

50. Station 2741-54. Off Los Angeles light, in 5 fms, red beach sand with broken shells; most of sample failed to pass through the screens. 2.15 cu. ft.
 many juveniles of *Dendraster* and echinoid
Grenella decussata (identified by Dr. T. Soot-Ryen)—many
 many polychaetes, including:
Saccocirrus papillocercus—many
 juveniles of *Anaitides*, *Dorvillea*, *Glycera*, *Owenia*, and others
51. Station 2730-54. Off Point Vicente light, in 297 fms, green rocky mud. 1.44 cu. ft.
 not yet analyzed
52. Station 2795-54. Off Point Vicente, in 290 fms, much rock and dark mud; black phosphorite rocks coated black, also basaltic and other metamorphic rocks not penetrated by animals but some with attached tubes of annelids, especially malidanids and terebellids. 0.95 cu. ft.
 brissopsisid, nemertean, small sponge masses on rocks
 polychaetes, including:
Lanice sp.—long tube with tessellated tip, externally covered with arenaceous foraminiferan *Goëssella flintii*
 malidanids, in tubes fully attached to rocky surfaces
 spionid—few
 other annelids not yet analyzed
53. Station 2432-53. Off Point Vicente light, in 450 fms, silty mud. 3.59 cu. ft.
 foraminiferans, *Phyllochaetopterus* and *Protula* tubes. Few animals.
54. Station 2420-53. Off Point Vicente light, in 458 fms, fine greenish mud. 3.15 cu. ft.
 foraminiferans, tubes of *Phyllochaetopterus* and *Protula*, dead translucent shells of *Pecten*. Little life.

55. Station 2405-53. Off Point Vicente light, in 457 fms, sandy mud. 2.26 cu. ft.
foraminiferans, tubes of *Phyllochaetopterus* and *Protula*.
56. Station 2322-53. Off Point Vicente light, in 460 fms, fine grey-green mud. 2.77 cu. ft.
foraminiferans, small amounts of glass sponge, tubes and animals of *Phyllochaetopterus* and *Protula*, an ampharetid, a nemertean; little life.
57. Station 2431-53. Off Point Vicente light, in 431 fms, fine mud. 2.52 cu. ft.
foraminiferans, tubes of *Phyllochaetopterus* and *Protula*, little life.
- 58a. Station 2110-52. Off Point Fermin light, in 427 fms, oozy mud; little life. Volume not taken.
foraminiferans, tubes of *Phyllochaetopterus*, serpulid *Glycera ?branchiopoda*—2
ampharetid—2 juveniles.
- 58b. Station 2321-53. Off Point Fermin light, in 385 fms, fine gray-green mud. 2.83 cu. ft.
echinoderms, including 2 ophiuroids, 1 holothurian
crustaceans, including amphipods and an isopod
nemerteans, sipunculids, and echiuroids
many polychaetes, not yet analyzed
- 59a. Station 2218-53. Off Point Fermin light, in 249 fms, fine green mud. 2.83 cu. ft.
Richly diversified, including:
foraminiferans
ophiuroids, echinoids, asteroids
mollusks, including scaphopods
amphineurans, Aplacophora—*Chaetoderma* sp. A.—1
Chaetoderma sp. C.—1
Limifossor sp.—9
gastropods—*Nitidella gouldi*—10
a macruran
numerous diversified polychaetes, not yet analyzed
- 59b. Station 2219-53. Off Point Fermin light, in 235 fms, fine dark green mud. 2.96 cu. ft.
mollusks, including gastropods, scaphopods, *Chaetoderma*
echiuroid—1 large and 1 small
nemertean—1 large ribbon-like
polychaetes, including:

Asychis sp.—1, in thick mud-walled tube
capitellid—several

Chloecia pinnata—many

Maldane sp.—many

Onuphis sp.—in thick mud-walled tube
orbiniid, new genus and species—1

Pectinaria californiensis—1 or more

Pista ? cristata—1

terebellids and other annelids

60. Station 2430-53. Off Point Fermin light, in 80 fms, hard packed
mud with many animals. 1.44 cu. ft.

ophiuroids—many

crustaceans, including amphipods and ostracods

phoxocephalid amphipods—25, including:

Harpinia sp. A.—2

Heterophoxus sp. A.—2

Phoxocephalus sp. A.—6

Pontharpinia sp. E.—15

mollusks, including *Chaetoderma*, many tubes of *Dentalium*, pelecypods

polychaetes, including: (specimens not counted)

ampharetids

Chloecia sp.

goniadid

Harmothoë scriptoria

Lumbrineris sp.

maldanids

Myriochele sp.

Nephtys ferruginea

Pherusa sp.

Pholoë sp.

Prionospio, near *malmgreni*

Prionospio pinnata

Spiophanes sp.

Tuaryx sp.

61a. Station 2315-53. Off Los Angeles light, in 20 fms, mud, shell
fragments; richly diversified fauna. 1.07 cu. ft.

not yet analyzed

phoxocephalid amphipods: *Metaphoxus* sp. A.—3

Pontharpinia sp. J.—2

61b. Station 2618-54. Off Point Fermin light, in 21 fms, muddy sand, dead shells. 0.44 cu. ft.

echinoderms, including:

ophiuroids—many

asteroid—1 small

holothuroids—a large papillate and a small smooth one

mollusks, including:

Pecten shells—many

tectibranch—1, with large lateral wings

Chaetoderma—several

crustaceans, including a decapod, amphipods, and isopods

phoxocephalid amphipods: *Heterophoxus* sp. A.—1

Pontharpinia sp. E.—3

Pontharpinia sp. K.—1

nemertean

burrowing anemone

enteropneust—5

polychaetes, including:

ampharetid

Aricidea sp.

Boccardia sp.

capitellids

cirratulids, several species

Dorvillea sp.

Drilonereis sp.

Eulalia sp.

Eunice sp.

flabelligerids

Glycera sp.

Haploscoloplos sp.

Hyalinoecia sp.

Lumbrineris spp.

maldanids

Nephtys sp.

Pectinaria sp.

Pholoë n. sp.

Phyllochaetopterus ? *prolifera*

phyllodocids

Polydora sp., boring in dead gastropod shell

Scalibregma sp.

sigalionids

Spiophanes sp.

Sternaspis sp.

Sthenelanelia sp.

?*Streblosoma*

other annelids

62. Station 2446-53. Off Los Angeles breakwater light, in 14 fms, compact sandy clay. Sample very small, about 0.15 cu. ft.; not yet analyzed.

63a. Station 2113-52. Off Long Beach light, in 13 fms, red sand, failed to pass through the screens; much life. 0.95 cu. ft.

echinoderms, including 5 ophiuroids, 5 small echinoids, and a large brissopsid

crustaceans, including a large sand crab (*Lepidopa*), amphipods, cumaceans

phoxocephalid amphipod: *Pontharpinia* sp. M—8

burrowing anemone—12

phoronids—more than 15

sea whip—1

nemertean—2

polychad—3

mollusks, including 5 scaphopods and others

polychaetes, including:

ampharetid—1 in tube

Aricidea spp.—several

Boccardia sp.—1

Chone sp.—1

?*Eumida* sp.—1

Lumbrineris spp.—3

Magelona sp.—2

Nephtys caecoides—7

Nothria ?elegans—2

Onuphis eremita—4

Ophelia sp.—7

Prionospio spp.—several

Rhynchospio arenicola—55 or more

Scoloplos sp.—1

Spiophanes missionensis—8

syllid—7

Thalenessa spinosa—2 large and 1 small

63b. Station 2445-53. Off Los Angeles breakwater light, in 11 fms, coarse red sand. 0.81 cu. ft.

Failed to pass through screens; one pail of sand, or about 0.3 cu. ft. of unscreened and unfixed sand, was sorted in the laboratory and found to yield richly in polychaetes, notably *Dorvillea*, *Magelona*, *Aricidea*, *Paraonis*, and *Anaitides* species, anemones, and nematodes. The sand is rich in mollusks, including Caecidae and other gastropods, scaphopods, and pelecypods of various genera, and circular disk-like colonies of bryozoans. Other animals include:

Dendraster (sand dollar)—several living, to 23 mm across nudibranch—1

phoxocephalid amphipod: *Pontharpinia* sp. M.—1

phoronids—at least 10

anemone (*Harenactis* ?*attenuata*, according to the late Dr. W. K. Fisher)—many hundreds

sipunculids—many

polychaetes, including: (numbers of individuals not counted)

Anaitides sp.

Aricidea sp.

Axiiothella sp.

Chaetozone sp.

Chone sp.

cirratulids, deep yellow in life

Dorvillea ?*gracilis*—hundreds

Drilonereis sp.

goniadid

Harmothoë sp., very dark, deeply depressed, resembling a commensal

Leocrates sp., juvenile

Lumbrineris sp.

Magelona sp.

maldanids, the largest polychaetes in the sample

Nephtys sp.

onuphid, in fine red sand-covered tube

Paraonis sp.

Pisione, near *remota*

Rhynchospio sp.

Scalibregma sp.

Scoloplos sp.—1

Spiochaetopterus sp.

spionids

syllid, long, slender, with pink ova

Thalenessa spinosa

other annelids

64. Station 2310-53. Off Long Beach breakwater light, in 15 fms, sandy mud. 0.37 cu. ft.

several ophiuroids, a small asteroid

mollusks, including pelecypods, gastropods, scaphopods

phoxocephalid amphipods, including *Pontharpinia* sp. K.—23

Pontharpinia sp. Q.—10

Pontharpinia sp. V.—11

ostracods

Glottidia albida—1 large

nemerteans; nematodes; sipunculids; some hydroid branches

others not yet analyzed

65. Station 2291-53. Off Los Angeles breakwater, in 14 fms, fine gray sandy mud. 0.31 cu. ft.

many ophiuroids, some asteroids

several mollusks

phoxocephalid amphipods—3, including *Pontharpinia* sp. B.—1

Pontharpinia sp. K.—1

numerous other small crustaceans

Glottidia albida—2 large

nemerteans

polychaetes, including:

Amaea occidentalis—3

Amphicteis scaphobranchiata—many

capitellid—1

Chone sp.—5 or more

cirratulid spp.—many

Diopatra tridentata—several

Drilonereis sp.—2

flabelligerids—about 10

Goniada sp.—3

Haploscoloplos elongatus—1

Laonice sp.—1

Lumbrineris spp.—several

Magelona sp.—7

Maldane sp.—1

Melinna sp.—many

nephtyid—1
 nereid—3
Nothria ?*geophiliformis*—many in tubes
Nothria spp.—several
 phyllodocids, several species—many
Pista, possibly *cristata*—4
 ?*Polycirrus* sp.—1 small, ovigerous
Praxillella sp.—1
Prionospio, near *malmgreni*—several
Prionospio pinnata—1
Rhodine sp.—1 and tubes
Scalibregma sp.—1
Schistocomus sp.—4
Spiophanes sp.—many
Sternaspis sp.—2 large and 9 small
Sthenelais ?*tertiaglabra*—1
Sthenelanellella uniformis—many
 syllid—7, in tubes
Thalenessa sp.—several

66a. Station 2311-53. Off Long Beach breakwater light, in 12 fms, hard packed sandy mud, rich in living animals. The grabbing device failed to penetrate; two successive grabs yielded only 0.5 cu. ft. echinoderms, including ophiuroids, holothurians, asteroids (2 large) mollusks, including scaphopods, gastropods, pelecypods, chaetoderm (1 long)

Dentalium rectius—8

crustaceans, including a cancrivore crab, 4 commensal crabs, amphipods, ostracods, phoxocephalid amphipods, 89, including:

Pontharpinia sp. B.—1

Pontharpinia sp. G.—1

Pontharpinia sp. K.—26

Pontharpinia sp. Q.—26

Pontharpinia sp. R.—12

Pontharpinia sp. V.—21

Glottidia albida—2

nemerteans—several

nematodes—many

sipunculid—1 or more

leech—1

a few branches of hydroids

polychaetes including: (counts not made)

Amphicteis scaphobranchiata

Anotomastus gordiodes

Arabella sp.

Aricidea spp.

Brada sp.

Chaetozone corona (many)

Chone and perhaps other Fabricinae

cirratulids

Cossura sp. (many)

Diopatra tridentata (many)

Drilonereis spp.

Goniada sp.

Haploscoloplos elongatus

Harmothoë sp.

Laonice sp.

Lepidasthenia sp.

Lumbrineris cruzensis

Lumbrineris minima

Lumbrineris spp.

Magelona sp.

maldanids

Naineris n. sp.

Nephtys spp.

neroids

Nothria spp.

Paraonis sp.

Pherusa sp.

Pholoë sp.

phyllodocids

Pilargis sp.

Pista sp.

Podarke sp.

Poecilochaetus sp.

Prionospio, near *malmgreni*

Prionospio pinnata

Rhynchospio sp.

Scalibregma sp.

Schistocomus sp.

spionids

Spiophanes sp.

syllid

terebellids

Thalenessa sp.

Tharyx sp.

- 66b. Station 2606-54. Off East Jetty light, Anaheim Bay, in 13 fms, compact black sandy mud. 0.13 cu. ft.

sea stars; many annelids, not yet analyzed

phoxocephalid amphipods: *Pontharpinia* sp. B.—7

Pontharpinia sp. Q.—5

Pontharpinia sp. R.—4

Pontharpinia sp. V.—4

67. Station 2504-53. Off Los Angeles light, in 9 fms, black sandy mud. 0.13 cu. ft.

not yet analyzed

68. Station 2607-54. Off Huntington Beach pier, in 5 fms, compact black sand. 0.06 cu. ft.

phoxocephalid amphipods, 29, including: *Pontharpinia* sp. E.—1

Pontharpinia sp. K.—1

Pontharpinia sp. S.—10

Pontharpinia sp. T.—14

other animals not yet analyzed

69. Station 2324-53. Off Point Vicente light, in 400 fms, fine mud with glass sponge. 3.08 cu. ft.

foraminiferans; small calcareous sponge; 10 small anemones

an enteropneust; compound ascidians attached to needles of glass sponge

mollusks, including:

amphineurans, Aplacophora — *Chaetoderma* sp. A.—1

Chaetoderma sp. B.—2

neomeniiniid sp.—1

gastropods — *Leptogyra* sp.—6

Nitidella permodesta—25

pelecypods — *Kellia* sp.—4

crustaceans, including:

pycnogonids—11

phoxocephalid amphipods—*Heterophoxus* sp. A.—3

isopod—36

galatheid crab—1

polychaetes, including:

amphinomid—1
Aricidea sp.—3
Autolytus sp.—1 epitoke
 capitellid—2
Chone ecaudata—more than 200
 cirratulid—2 or more
Harmothoë triannulata—about 125
 hesionid—1
Lagisca sp.—many
Lumbrineris sp.—1
Myriochele sp.—1
 orbiniid, new genus and species—fragments
Paraonis sp.—1
Phyllochaetopterus sp.—2
Protula sp.—more than 200
 sabellid—1 or more
Spionid—1
Typosyllis sp.—several

70. Station 2433-53. Off Point Vicente light, in 460 fms, fine sandy mud. 2.07 cu. ft.
 foraminiferans, tubes of *Phyllochaetopterus* and *Protula*
71. Station 2421-53. Off Point Vicente light, in 466 fms, fine greenish mud. 3.08 cu. ft.
 foraminiferans, tubes of *Phyllochaetopterus* and *Protula*, dead shells of *Pecten*
72. Station 2323-53. Off Point Vicente light, in 480 fms, fine mud. 3.17 cu. ft.
 foraminiferans, tubes of *Phyllochaetopterus* and *Protula*
73. Station 2406-53. Off Point Vicente light, in 475 fms, fine greenish mud. 3.4 cu. ft.
 foraminiferans, tubes of *Phyllochaetopterus*
74. Station 2740-54. Off Point Vicente light, in 470 fms, fine green mud. 5.31 cu. ft.
 foraminiferans, tubes of *Phyllochaetopterus*, dead *Pecten* shells
75. Station 2334-53. Off Point Fermin light, in 437 fms, fine mud. 3.02 cu. ft.
 foraminiferans, tubes of *Phyllochaetopterus*
76. Station 2335-53. Off Point Fermin light, in 420 fms, fine mud, with glass sponge and diversified animals. 2.58 cu. ft.
 not yet analyzed

77. Station 2336-53. Off Point Fermin light, in 355 fms, fine greenish mud. 2.83 cu. ft.
Diversified fauna, with ophiuroids, echiuroids, foraminiferans, and polychaetes; not yet analyzed.
78. Station 2317-53. Off Point Fermin light, in 280 fms, greenish mud. 2.83 cu. ft.
not yet analyzed
79. Station 2316-53. Off Los Angeles breakwater light, in 117 fms, dark mud. 2.7 cu. ft.
not yet analyzed
- 80a. Station 2125-52. Off Los Angeles light, in 29 fms, fine mud and shaley rubble. Volume not taken.
ophiuroids
Glottidia albida
mollusks, including:
 gastropod, *Aglaja* sp.—1
 pelecypods, *Tellina* sp., and others
crustaceans, including amphipods, isopods, ostracods, cumaceans
 phoxocephalid amphipod—*Pontharpinia* sp. B.—3
phoronids
enteropneust—1
polychaetes, including:
 Ammotrypane sp.
 Aricidea sp.
 Chaetozone sp.
 Chloeia pinnata
 cirratulids
 Fabricinae
 Lumbrineris spp.
 Magelona sp.
 maldanids
 Myriochele sp.
 Nephtys sp.
 onuphid
 Paraonis sp.
 Pectinaria sp.
 Pherusa sp.
 phyllodocids
 Pista sp.
 Prionospio spp.

sabellids

Scoloplos sp.

sigalionid

Spiophanes sp.

syllid

Terebellides sp.

terebellids

Tharyx sp.

80b. Station 2233-53. Off Point Fermin light, in 23 fms, fine mud.
0.31 cu. ft.

echinoderms, including ophiuroids, holothuroids, echinoids
anemones; nemerteans

mollusks, including:

scaphopod, *Cadulus tolmiei*—1

gastropod, *Aglaja* sp.—2

chaetodermans

egg cluster of *Loligo* sp. (squid)

crustaceans, including amphipods, an isopod, a cumacean

phoxocephalid amphipods, 31, including *Metaphoxus* sp. A.—4

Pontharpinia sp. E.—11

Pontharpinia sp. J.—13

Pontharpinia sp. L.—2

polychaetes, including:

ampharetids of several genera—6 juveniles

Aricidea sp.—14

Artacaminae, new genus and species—1 large and 5 small

Capitella ovincola—hundreds, in egg cluster of *Loligo*

Chone sp.—13

cirratulid—7

Drilonereis sp.—2

Halosydna sp.—1

Haploscoloplos elongatus—12

Hyalinoecia juvenalis—1

?*Leanira* sp.—2

Lumbrineris spp.—11

Magelona sp.—2

maldanids—about 10

?*Maldanella robusta*—fragments

Nephtys sp.—6

Nereis sp.—1

Nerine foliosa n. subsp.—1
Nothria sp.—1
 ?*Notomastus* sp.—3 juveniles
Onuphis sp.—4
Owenia sp.—2
Pectinaria californiensis—1
Pherusa sp.—4
Pholoë sp.—9
 phyllodocids—2
Pista, resembling *cristata*—9
Prionospio, near *malmgreni*—45
Prionospio pinnata—2
Rhamphobrachium sp.—1
Rhynchospio arenincola—11
Sabella sp.—2
Scalibregma sp.—4 juveniles
Schistocomus sp.—1 or more
 sigalionids
Spiophanes sp.—9
Sthenelais sp.—fragment
Sthenelanella uniformis—13
 syllid—1
Terebellides sp.—1
 other annelids

81a. Station 2124-52. Off Los Angeles light, in 16 fms, shell and fine rubble. Volume not taken.

Richly diversified spioniform fauna; not yet analyzed.

81b. Station 2444-53. Off Los Angeles breakwater light, in 18 fms, black mud and shells. 0.31 cu. ft.

many ophiuroids and 2 small holothurians

Glottidia albida, burrowing anemone, bryozoan colonies (circular disk-like)

mollusks, including pelecypods, gastropods, scaphopods, a *Chaetoderma*

crustaceans, including a *Heterocryptus* sp., amphipods, and others
 phoxocephalid amphipods, 32, including *Metaphoxus* sp. A.—6

Pontharpinia sp. B.—18

Pontharpinia sp. K.—3

Pontharpinia sp. Q.—4

Pontharpinia sp. S.—1

polychaetes, including:

- Anaitides* sp.
- Ancistrosyllis bassi*
- Aricidea* sp.
- Chaetozone* sp.
- Chone* sp.
- Dexiospira* sp.
- Dorvillea* sp.
- Eulalia* sp.
- Eumida* sp.
- goniadid
- Harmothoë scriptoria*
- Laonice* sp.
- Lepidasthenia* sp.
- Lumbrineris* spp.
- Magelona* sp.
- neriid
- Nothria* sp.
- Pholoë* sp.
- Praxillella* sp.
- Prionospio*, near *malmgreni*
- Rhynchospio* sp.
- Scoloplos* sp.
- Sternaspis* sp.
- Streblosoma* sp.
- Tharyx* sp.
- and others

82. Station 2496-53. Off Los Angeles breakwater light, in 18 fms, dark sandy mud. 0.5 cu. ft.

echinoderms, including ophiuroids, 2 holothurians, an asteroid sea whip—2; anemones—about 6

bryozoan colonies

Glottidia albida—6

mollusks, including:

- amphineuran, Aplacophora — *Chaetoderma* sp. A.—1
- Chaetoderma* sp. B.—2
- scaphopods — *Cadulus fusiformis*—5
- Dentalium neohehexagonum*—1
- gastropods — *Aglaja* sp.—1
- Balcis rutila*—2

- Eulima californica*—2
Ophiodermella incisa—2
 pelecypods — *Axionopsis sericatus*—2
Lyonsia californica—1
Nuculana taphira—4
Parvilucina tenuisculpta—2
Rochefortia tumida—3
Solemya volvulus—8
Tellina buttoni—1
- crustaceans, including many amphipods, a caprellid, isopods, several cumaceans, 2 pycnogonid; phoxocephalid ampipods, 32, including
- Metaphoxus* sp. A.—12
Pontharpinia sp. B.—3
Pontharpinia sp. Q.—19
Pontharpinia sp. V.—5
- polychaetes, including:
- Ampharete* sp.—4
Asychis lacera—1
Brada sp.—2
Chone sp.—3
 cirratulids—5
Drilonereis sp.—1
 Euclymenini—3
Eumida sp.—2
 goniadid—2
Hyalinoecia sp.—3
Labidognathus sp.—2, endoparasitic in *Tharyx* sp.
Lumbrineris sp.—more than 3
Magelona sp.—5
Melinna sp.—2
Nephtys sp.—1
 nereid—1
Owenia sp.—1
 paraonid—2
Pherusa spp.—many
Pholoë sp.—15
Pista sp.—3
Praxillella sp.—several
Prionospio, near *malmgreni*—8
Prionospio pinnata—2

Scalibregma sp.—1
Sternaspis sp.—8
Sthenelanelia sp.—18
Streblosoma sp.—2
Terebellides sp.—1
Thalenessa spinosa—13
Tharyx sp.—1 or more
 other annelids

83. Station 2501-53. Off Los Angeles light, in 19 fms, black compact oily mud. 0.1 cu. ft.

phoxocephalid amphipods, 18, including *Metaphoxus* sp.A.—1
Pontharpinia sp. B.—2
Pontharpinia sp. Q.—6
Pontharpinia sp. V.—9

other animals not yet analyzed

84. Station 2502-53. Off Los Angeles light, in 18 fms, black compact oily mud. 0.15 cu. ft.

not yet analyzed

85. Station 2503-53. Off Los Angeles light, in 16 fms, black compact oily mud. 0.13 cu. ft.

not yet analyzed

86. Station 2645-54. Off Huntington Beach pier, in 12 fms, greenish-gray sand. 0.26 cu. ft.

not yet analyzed

near

86. Station 2646-54. Off Huntington Beach pier, in 12 fms, sandy mud. 0.3 cu. ft.

A measured quart, unscreened sample, analyzed in the laboratory.

some ophiuroids; many nematodes; hydroids

crustaceans, including amphipods, isopods

phoxocephalid amphipods, including *Pontharpinia* sp. K.—11
Pontharpinia sp. Q.—5
Pontharpinia sp. R.—8

polychaetes, including:

arabellid

Aricidea sp.

cirratulid

Diopatra tridentata

Goniada sp.

Lumbrineris spp.

Magelona sp.

Nephtys sp.

nereid

Nothria sp.

Prionospio spp.

sabellid

Scoloplos sp.

Sphaerodorum sp.

spionids

syllid

terebellids

other annelids

87. Station 2608-54. Off Huntington Beach pier, in 7.5 fms, compact black sand. 0.06 cu. ft.

not yet analyzed

88. Station 2609-54. Off Huntington Beach pier, in 4.5 fms, compact black sand. 0.13 cu. ft.

phoxocephalid amphipods: *Pontharpinia* sp. Q.—1

Pontharpinia sp. S.—3

other animals not yet analyzed

89. Station 2798-54. Off Catalina Island light, in 386 fms, blue-green-gray mud, glass sponge, fish scales, otoliths, foraminiferans, and radiolarians. 2.96 cu. ft.

an ophiuroid; several nemerteans; a ghost shrimp

mollusks, including 2 gastropods, a pelecypod, a scaphopod, *Chaetoderma*

enteropneust, *Stereobalanus* sp.—1

polychaetes, including:

ampharetids—many

Aricidea sp.—several

capitellid, new genus and species—3

Chloeia sp.—1 juvenile

Chone sp.—1

Glycera branchiopoda—1

?*Isolda* or related genus—1

Lumbrineris cruzensis—1

maldanid—1

orbiniid, new genus and species—2

Phyllochaetopterus sp.—tube fragments

Protula sp.—tube fragments

Spiophanes sp.—1

90. Station 2325-53. Off Ship Rock, Catalina Island, in 475 fms, fine greenish mud. 2.77 cu. ft.
foraminiferans, *Phyllochaetopterus* and *Protula* tubes
91. Station 2799-54. Off Catalina Island light, in 484 fms, blue-green-gray mud. 3.15 cu. ft.
foraminiferans, tubes of *Phyllochaetopterus* and *Protula* sp., shells of *Pecten*; also small bits of wood, fish vertebrae, and otoliths
92. Station 2739-54. Off Catalina Island light, in 478 fms, fine green mud. 3.15 cu. ft.
foraminiferans, tubes of *Phyllochaetopterus*, and dead *Pecten* shells
93. Station 2407-53. Off Point Vicente light, in 480 fms, fine greenish mud, a large black oil sludge. 3.4 cu. ft.
foraminiferans, tubes of *Phyllochaetopterus*, serpulid tubes
94. Station 2364-53. Off Point Vicente light, in 495 fms, fine mud. 2.5 cu. ft.
foraminiferans, tubes of *Phyllochaetopterus*
95. Station 2386-53. Off Point Fermin, in 460 fms, fine mud. 3.3 cu. ft.
foraminiferans, tubes of *Phyllochaetopterus* and *Protula*
96. Station 2222-53. Off Point Fermin light, in 440 fms, oozy mud. 3.15 cu. ft.
glass sponge; ophiuroids; mollusks, including gastropods, scaphopods, pelecypods; nemerteans
polychaetes, including:
ampharetid—1
cirratulid—1
Melinna sp.—1, in long, thick mud-walled tube about 14 inches long
Pista sp.—1, in thick mud-walled tube
Protula—several, in white cylindrical tubes
97. Station 2835-54. Off Point Fermin light, in 370 fms, greenish-gray sticky mud, otoliths, many foraminiferans. 3.21 cu. ft.
gastropod shell; *Chaetoderma*—1; enteropneust, possibly *Stereobalanus*—1; nemertean—2
polychaetes, including:
Amphicteis scaphobranchiata—1 large and several small
other ampharetids—several
capitellid—1
chaetopterid tubes

Glycera sp.—2
Maldane sp.—2
 other maldanids—several
 orbiniid—1
Paraonis sp.—1 or more
Prionospio sp.—1
Protula tubes

98. Station 2306-53. Off Point Fermin light, in 215 fms, clay and mud. 2.64 cu. ft.

echinoderms, including an ophiuroid, an echinoid, a holothurian
 mollusks, including many scaphopods, gastropods, pelecypods,
Chaetoderma
 crustaceans, including amphipods, isopods, and copepods
 phoxocephalid amphipods, including *Harpinia* sp. A.—6
Heterophoxus sp. A.—1

polychaetes, including:

Chloeia pinnata—about 50
Longosoma catalinensis—1 or more
 maldanids—many
 other annelids

- 99a. Station 2355-53. Off Los Angeles breakwater light, in 41 fms, sandy mud. 0.1 cu. ft.

many ophiuroids and annelids; not yet analyzed

- 99b. Station 2629-54. Off Point Fermin light, in 50 fms, green sandy mud, passed quickly through screens. 0.18 cu. ft.

crustaceans, including ostracods—hundreds; amphipods, cumaceans,
 and slender linear white isopods—many
 phoxocephalid amphipods: *Metaphoxus* sp. A.—9
Pontharpinia sp. R.—6

gastropods, pelecypods—many

polychaetes, including:

ampharetids
 Artacaminae, new genus
Chloeia sp.
 Fabricinae
Myriochele sp.
 nephtyids of several species
Pectinaria sp.
Pholoë sp.
Prionospio, near *malmgreni*

syllid

Terebellides sp.

100. Station 2232-53. Off Point Fermin light, in 33 fms, fine mud and shell. 0.37 cu. ft.

many foraminiferans; 3 anemones; many ophiuroids

mollusks, including gastropods, pelecypods, scaphopods, and *Chaetoderma*

crustaceans, including amphipods, isopods, and 12 or more cumaceans

phoxocephalid amphipods, 18, including *Metaphoxus* sp. A.—2

Pontharpinia sp. B.—2

Pontharpinia sp. K.—2

Pontharpinia sp. L.—4

Pontharpinia sp. P.—4

1 *Listriolobus pelodes*, nematodes

polychaetes, including:

ampharetids—3 small

Aricidea sp.—17 or more

cirratulids—about 12

Drilonereis sp.—1

Glycera sp.—1

Haploscoloplos elongatus—12

Harmothoe sp.—2

Lumbrineris spp.—about 8

Magelona sp.—1

maldanid—1

Myriochele sp.—12 or more

Nephtys sp.—about 10, including 2 large

onuphids—8

Owenia sp.—3 tubes

Pherusa sp.—6 juveniles

Pholoë sp.—about 10

Prionospio spp.—about 20

sabellids—5

Scalibregma sp.—2

sigalionids—several

spionids—several

Spiophanes sp.—1

terebellids—several

101. Station 2394-53. Off Point Fermin, in 29 fms, sandy mud and broken shells. 0.25 cu. ft.
 echinoderms, including 2 urchins, an ophiuroid, holothurians
Glottidia albida
 phoxocephalid amphipods, 7, including *Pontharpinia* sp. B.—1
Pontharpinia sp. P.—5
 a parasitic copepod on a maldanid in sandy tube
 polychaetes, including :
- Aricidea* sp.
 - capitellid—1 large
 - Chloëia* sp.—juveniles
 - Chone* sp.
 - cirratulids
 - Harmothoë* sp.
 - Lumbrineris* sp.
 - maldanids
 - Nereis* sp.
 - Onuphis* sp.
 - Peisidice* sp.
 - Prionospio* sp.
 - Scalibregma* sp.
 - Scoloplos* sp.
 - Spiochaetopterus* sp.
 - Spiophanes* sp.
 - Sthenelanelia* sp.
 - Tharyx* sp.
 - other annelids
102. Station 2497-53. Off Los Angeles breakwater light, in 24 fms, sandy mud. 0.16 cu. ft.
 ophiuroids; broken shells; many tubicolous annelids; not yet analyzed
103. Station 2374-53. Off Los Angeles breakwater, in 27 fms, sandy mud. 0.62 cu. ft.
 diversified fauna; not yet analyzed
104. Station 2292-53. Off Los Angeles breakwater, in 60 fms, fine mud. 0.81 cu. ft.
 echinoderms, including many ophiuroids and one echinoid
 mollusks, including pelecypods, gastropods, scaphopods, aplacophoran

crustaceans, including amphipods, isopods, ostracods, cumaceans, a copepod, phoxocephalid amphipods, 114, including

Heterophoxus sp. A.—3

Heterophoxus sp. B.—2

Metaphoxus sp. A.—1

Pontharpinia sp. E.—58

Pontharpinia sp. J.—48

Pontharpinia sp. R.—1

nemertean; an anemone; nematodes, a turbellarian

numerous polychaetes, not yet analyzed

105. Station 2630-54. Off Huntington Beach pier, in 45 fms, sandy gray-green mud. 0.86 cu. ft.

many ophiuroids; a large *Travisia* and numerous smaller polychaetes; other animals; not yet analyzed

106. Station 2611-54. Off Huntington Beach pier, in 19 fms, compact gray-black sand. 0.06 cu. ft.

phoxocephalid amphipods, including:

Metaphoxus sp. A.—1

Pontharpinia sp. B.—3

Pontharpinia sp. K.—2

Pontharpinia sp. P.—5

Pontharpinia sp. R.—2

other animals not yet analyzed

107. Station 2610-54. Off Huntington Beach pier, in 18 fms, compact sand. 0.25 cu. ft.

phoxocephalid amphipods, 18, including:

Metaphoxus sp. A.—2

Pontharpinia sp. E.—9

Pontharpinia sp. K.—2

Pontharpinia sp. R.—4

108. Station 2114-52. Off Newport Beach pier, in 17 fms, mud and sand. 1.26 cu. ft.

echinoderms, including ophiuroids, holothurians, asteroids

many small anemones

Glottidia albida—1

phoronid tube

mollusks, including gastropods, pelecypods, scaphopods, 2 nudibranchs, *Chaetoderma*

crustaceans, including amphipods, isopods, and others

nemertean, sipunculid, nematodes, polyclads

polychaetes, including :

- Amaea occidentalis*—2
Ancistrosyllis sp.—3 juveniles
Aphrodita sp.—1 juvenile
Aricidea spp.—about 36
Asychis ?*lacera*—5
Autolytus sp.—1
Boccardia n. sp.—23
 capitellid—5
Chone sp.—about 7
 cirratulid—about 11
Cossura n. sp.—5
Diopatra tridentata—9
Drilonereis ?*falcata*—5
Ehlersia heterochaeta—20
Eteone sp.—1
 flabelligerid, resembling *Brada*—20 juveniles
Glycera tessellata—14
 goniadids—19
Haploscoloplos elongatus—6
Harmothoë sp.—14 juveniles
Hyalinoecia ?*juvenalis*—1
Lepidasthenia sp.—2 juveniles
Loandalia fauveli—1
Lumbrineris californiensis—2
Lumbrineris cruzensis—14
Lumbrineris spp.—3, one with very long prostomium
Magelona, near *pacifica*—10
 maldanid—1 large, with 5 or 6 posterior apodous segments
 other maldanids—about 6
Marphysa, resembling *conferta*—1
Melinna and other ampharetids—about 10 juveniles
Nephtys caecoides—7
 another *Nephtys* sp.—about 20
Nereis procera—1 adult and about 13 juveniles
Nerine foliosa n. subsp.—2
Nothria iridescens—4 large and 9 small
 paraonids—about 50
Pectinaria californiensis—5
Pherusa sp.—about 75 juveniles

- Pholoë* sp.—23
 phyllococids—about 5
Pilargis ?*maculata*—1
 ?*Pionosyllis* sp.—2
Pista ?*crinata*—4
 another *Pista* sp.—about 20
Podarke sp.—1
Poecilochaetus johnsoni—1
Praxillella affinis pacifica—5
Prionospio, near *malmgreni*—more than 60
Prionospio pinnata—31
Rhynchospio arenicola—5
Scalibregma sp.—2
 sigalionid—2
Sphaerodorum spp.—2
Spiochaetopterus sp.—2
Spiophanes missionensis—about 20
Sternaspis sp.—18
Sthenelanella uniformis—5 or more
Streblosoma sp.—1
Terebellides sp.—2
Thalenessa spinosa—4
Travisia sp.—4

109. Station 2115-52. Off Newport Beach pier, in 61 fms, mud and sand. 1.51 cu. ft.
 ophiuroids and a holothuroid
 pelecypods, gastropods, scaphopods
 phoxocephalid amphipod: *Pontharpinia* sp. E.—1
 isopod—1
 echiuroids, including *Listriolobus pelodes* and another—about 12
 a nemertean, a polyclad, nematodes
 polychaetes, including:
 - ?*Amaea* sp.—1
 - Ammotrypane* sp.—2
 - Anaitides* sp.—2
 - capitellid—fragments
 - Chloeia* sp.—2
 - cirratulid—1
 - Glycera* sp.—1
 - Glycinde* sp.—1

Haploscoloplos elongatus—2
Lumbrineris sp.—several
Magelona sp.—1
 maldanid—several
Nephtys sp.—2
Nereis sp.—1 epitoke
Pectinaria sp.—45, largely juveniles
Pherusa sp.—1
Poecilochaetus johnsoni—1
 polynoid—1
Prionospio pinnata—2
Scalibregma sp.—6
 spionids—several
 spirorbid—1
 terebellid—1
 other annelids

110. Station 2745-54. Off Balboa Beach pier, in 8 fms, gray sand and shell fragments. 0.27 cu. ft.
 mollusks and diversified annelids, including *Chaetopterus* sp.; not yet analyzed
111. Station 2326-53. Off Ship Rock, Catalina Island, in 385 fms, fine greenish mud. 2.52 cu. ft.
 not yet analyzed
112. Station 2732-54. Off west end of Catalina Island, in 464 fms, green mud. 3.15 cu. ft.
 foraminiferans, tubes of *Phyllochaetopterus*
 near
112. Station 2731-54. Off west end of Catalina Island, in 450 fms, green mud, unscreened. Volume not taken.
 foraminiferans, tubes of *Phyllochaetopterus*; no other metazoans
113. Station 2327-53. Off Ship Rock, Catalina Island, in 490 fms, fine greenish mud. 3.15 cu. ft.
 foraminiferans, tubes of *Phyllochaetopterus*
114. Station 2434-53. Off Ship Rock, Catalina Island, in 480 fms, fine mud. 3.15 cu. ft.
 foraminiferans, tubes of *Phyllochaetopterus*, and serpulid
115. Station 2166-52. Off Arrow Point, Catalina Island, in 470 fms, oozy mud. 3.15 cu. ft.
 foraminiferans, tubes of *Phyllochaetopterus*

116. Station 2800-54. Off Ship Rock, Catalina Island, in 478 fms, blue-green-gray mud. 3.27 cu. ft.
foraminiferans, tubes of *Phyllochaetopterus*, dead shells of *Pecten*
117. Station 2333-53. Off Long Point, Catalina Island, in 487 fms, fine mud. 2.52 cu. ft.
foraminiferans, tubes of *Phyllochaetopterus*
118. Station 2454-53. Off Long Point, Catalina Island light, in 460 fms, fine mud. 2.96 cu. ft.
foraminiferans, tubes of *Phyllochaetopterus*
119. Station 2500-53. Off Point Fermin light, in 450 fms, fine greenish sticky mud, much glass sponge, diversified fauna. 3.33 cu. ft.
foraminiferans
many ophiuroids, with several species
mollusks, including scaphopods, at least one living *Pecten*, another pelecypod, and 2 *Chaetoderma*
a galatheid crab, *Munidopsis depressa* Faxon—1 male (identified by Miss Janet Haig)
a large nemertean
polychaetes, including:
Lagisca sp.—10 or more
Protula sp.—100 or more
Sabellinae, one new genus and species—many
terebellids—several
120. Station 2628-54. Off Long Point, Catalina Island, in 350 fms, green sandy mud. 6.1 cu. ft.
many foraminiferans; shark's tooth; otoliths; a white holothurian
mollusks, including several scaphopods and a large *Chaetoderma*
several nemerteans
polychaetes, including:
Amphicteis ?*scaphobranchiata*—several
capitellid, new genus and species—1 large
flabelligerid—1
Maldane sp.—several
Myriochele sp.—2
orbiniid, new genus and species—1
sabellid—1
- 121a. Station 2354-53. Off Los Angeles breakwater light, in 200 fms, muddy clay and rocks. 1.95 cu. ft.
not yet analyzed

121b. Station 2625-54. Off Point Fermin light, in 230 fms, gray-green sticky mud. 5.25 cu. ft.

foraminiferans

echinoderms, including 3 echinoids, 2 ophiuroids

a sea whip; a burrowing anemone

many amphipods, including phoxocephalids: *Harpinia* sp. A.—8

Harpinia sp. B.—1

Heterophoxus sp.

B.—1

Paraphoxus sp. A.—1

Phoxocephalus sp. A.—1

mollusks, including scaphopods and pelecypods

polychaetes, including:

Ancistrosyllis ?*rigida*

Aricidea sp.—1 large

Asychis lacera—1 large, with tube

?*Brada* sp.—1

Fabricinae—several

Maldane sp.—many

another maldanid—1

Melinna sp.—1

Nephtys sp.—1

Nothria sp.—1 or more

Paraonis sp.—1

Pectinaria sp.—1

polynoid—1

Prionospio pinnata—1 or more

122. Station 2231-53. Off Point Fermin light, in 115 fms, sandy clay. 1.76 cu. ft.

foraminiferans; echinoderms, including ophiuroids, holothuroid

mollusks, including:

amphineuran, Aplacophora — *Chaetoderma* sp. A.—1

Limifossor sp.—3

gastropods — *Volvulella californica*—1

pelecypods — *Axionopsis sericatus*—3

Nucula cardara—2

crustaceans, including ostracods and phoxocephalid amphipods:

Heterophoxus sp. A.—11

Metaphoxus sp. A.—6

Pontharpinia sp. E.—10

polychaetes, including:

Amphicteis scaphobranchiata—2

Aricidea ?*pacifica*—3

cirratulids—several

Drilonereis sp. — 2

Glycera sp.—1

Harmothoë sp.—3

Lumbrineris sp.—4

maldanids—several

Melinna sp.—2 and tubes

Nephtys sp.—5

Notomastus lobatus—4

Onuphis parva—32

Pherusa sp.—2

Pholoë sp.—3

Pista ?*cristata*—1

Prionospio pinnata—3

Rhamphobrachium sp.—1

Spiochaetopterus sp.—tubes

spionids—several

Spiophanes sp.—3

Sternaspis sp.—1

Terebellides sp.—1

123a. Station 2126-52. Off Los Angeles light, in 48 fms, rubbly bottom.

Large sample, volume not taken.

coralline clumps; many ophiuroids; pelecypods, 2 chitons, gastropods

Thalassema sp.—1

a leech

polychaetes, including:

Aglaothamus sp.—1

Ammotrypane sp.—2 or more

ampharetids—several in more than one species

Chaetozone sp.—several

Chloëia sp.—many

Drilonereis sp.—several

Glycera sp.—1

goniadid—1

Lumbrineris spp.—many

Magelona sp.—1 or more

maldanid—several

Megalomma sp.—1
Myriochele sp.—several
Nephtys sp.—several
Oncoscolex sp.—1
Onuphis sp.—many
Owenia sp.—several
 paraonids—many, possibly *Aricidea* and *Paraonis* spp.
Pectinaria sp.—several
Pherusa spp.—several
Pista spp.—several
 polynoid—several
Prionospio spp.—many
 sabellid—many
Scalibregma sp.—1
Scoloplos sp.—several
 sigalionids—several
 sphaerodorida—1
Spiochaetopterus or other chaetopterid—1 or more
 spirorbids—several
Sternaspis sp.—1
Sthenelanelia sp.—several
 syllid—1
Thalenessa spinosa—2 or more
Tharyx sp.—many

123b. Station 2443-53. Off Los Angeles breakwater light, in 60 fms, dark mud, sand and shells, much coarse rubble and clumps of bryozoans. 0.5 cu. ft.

ophiuroids—many

crinoid (*Florometra*)—2, ovigerous, with bright orange eggs along pinnules

mollusks, including *Tellina* and *Chaetoderma*

crustaceans, including amphipods, isopods, ostracods, and cumaceans

polychaetes, including:

Chaetozone sp.

Chloecia pinnata

cirratulids

Glycera sp.

Harmothoe scriptoria

Laonice sp.

Lumbrineris spp.

maldanids

Megalomma sp.

Myriochele sp.

Nephtys sp.

Odontosyllis sp.

Oncoscolex sp.

Onuphis parva

Pectinaria californiensis

Pherusa capulata

Pholoë sp.

Prionospio spp.

sigalionid

sinistral spirorbids—many, on bryozoan colonies

Sternaspis sp.

Thalenessa spinosa

Travisia sp.

124. Station 2498-53. Off Los Angeles breakwater light, in 50 fms, sandy mud, considerable pepper-colored sand or fine gravel. 1.0 cu. ft.

many ophiuroids; a dark purple holothuroid

numerous pelecypods, some gastropods

ostracods—more than 100

many isopods, tanaids, and others; cumaceans

phoxocephalid amphipods, including:

Heterophoxus sp. A.—1

Pontharpinia sp. B.—2

Pontharpinia sp. J.—2

Pontharpinia sp. P.—11

polychaetes, including:

?*Amaea* sp.—1

arabellid, parasitic in body cavity of *Tharyx* fragment

Aricidea sp.—several

Chloeia sp.—more than 50

Harmothoë scriptoria—1 or more

Magelona sp.—2

Paraonis sp.—1

Thalenessa sp.—1

Tharyx sp.—1

and others

125. Station 2615-54. Off Huntington Beach pier, in 50 fms, gravelly mud, shell and rubble. 0.63 cu. ft.
 parts of a large sea star ; many ostracods, amphipods
 polychaetes numerous, including *Onuphis* sp. in long slender tubes,
 and others ; not yet analyzed
126. Station 2614-54. Off Huntington Beach pier, in 155 fms, dark green mud. 3.02 cu. ft.
 an ophiuroid ; 2 larger brissopsids ; 6 purple holothurians
 mollusks, including :
 pelecypods, especially *Acila* sp.
 a tectibranch
 scaphopods, and others
 a large nemertean ; a large deep green echiuroid and a smaller one
 sipunculids—2
 polychaetes, including :
 Aglaothamus sp.
 ampharetids
 Anaitides sp.
 Ancistrosyllis sp.
 Brada sp.
 Glycera sp.
 goniadid
 harmothoid
 Laonice sp.
 Lumbrineris spp.
 maldanids
 Melinna sp.
 ? *Mesochaetopterus* sp.
 Nephtys ferruginea
 Nothria sp.
 Prionospio pinnata
 Terebellides sp.
 and others
127. Station 2613-54. Off Huntington Beach pier, in 138 fms, dark green mud, silt. 1.0 cu. ft.
 foraminiferans ; otoliths of fishes
 a large purple urchin ; 2 purple holothurians
 mollusks, including a tectibranch, gastropods, pelecypods, *Cadulus*,
 Chaetoderma
 ostracods

polychaetes, including:

- Aglaothamus* sp.
- Chloeia* sp.—abundant
- cirratulids
- Cossura* sp.
- ?*Diopatra* sp.
- Goniada* sp.
- ?*Leocrates* sp.
- Lumbrineris* sp.
- Myriochele* sp.
- Nephtys* sp.
- Pectinaria* sp.
- Prionospio pinnata*
- and others

128. Station 2612-54. Off Huntington Beach pier, in 100 fms, dark green mud. 2.64 cu. ft.

many ophiuroids; a large purple urchin; 2 holothurians
mollusks: *Dentalium rectius* (scaphopod) and *Acila* sp. (pelecypod)

amphipods, phoxocephalid:

- Heterophoxus* sp. A.—3
- Phoxocephalus* sp. A.—1

polychaetes, including:

- ampharetids
- Aricidea* sp.
- Cossura* sp.
- Glycera* sp.
- goniadid
- Harmothoë scriptoria*
- ?*Leocrates* sp.
- Lumbrineris* sp.
- Maldane* sp., in thick mud tubes
- Melinna* sp.
- Nephtys* sp., numerous
- Pectinaria* sp.
- Pholoë* sp., several mature
- Prionospio*, near *malmgreni*
- Prionospio pinnata*
- Sternaspis* sp.
- and others

129. Station 2631-54. Off Newport Beach pier, in 50 fms, sandy gray-green mud. 0.71 cu. ft.
 numerous ophiuroids, broken shells, sand-dwelling annelids, especially *Chloeia* sp., and others; not yet analyzed
130. Station 2742-54. Off Newport Beach pier, in 105 fms, sticky green mud. 5.31 cu. ft.
 many large thick muddy tubes, especially of *Nothria pallida* and maldanids
 other animals not yet identified
131. Station 2743-54. Off Newport Beach pier, in 150 fms, sticky green mud. 5.59 cu. ft.
 large brissopsids; many tube worms. Similar to number 130.
132. Station 2744-54. Off Newport Beach pier, in 155 fms, greenish-gray mud. 7.1 cu. ft. Much did not pass through the screens; about 5 quarts of debris.
 echinoderms, including brissopsid and holothurian
 echiuroid, including 2 large *Thalassema* sp.—deep red with white proboscis
 nemerteans
 polychaetes, including:
 many onuphids in thick large muddy tubes
 Maldane sp., in similar though slenderer tubes
 nephtyids
 others not yet analyzed
133. Station 2294-53. Off Newport west jetty light, in 47 fms, fine mud and clay. 1.76 cu. ft.
 foraminiferans
 echinoderms, including many ophiuroids and 3 echinoids
 coelenterates
 mollusks, including gastropod, pelecypods, scaphopods
 crustaceans, including many amphipods, ostracods, isopods, cumaceans, a copepod; phoxocephalid amphipods, 126, including
 Heterophoxus sp. A.—30
 Metaphoxus sp. A.—5
 Paraphoxus sp. A.—1
 Phoxocephalus sp. A.—6
 Pontharpinia sp. E.—66
 Pontharpinia sp. J.—18
 nemerteans, sipunculids, a turbellarian

polychaetes, including:

ampharetid—several

Aricidea—several

Capitella sp.—1, and another capitellid

Ceratocephala crosslandi americana—1

Chloeia pinnata—1

cirratulids—many

Cossura sp.—2

Glycera sp.—about 5

Glycinde sp.—3

Harmothoë sp.—1

Lumbrineris spp.—many

Maldane sp.—1

maldanids—some

Megalomma sp.—1

Myriochele sp.—several

nephtyid—many

onuphids—about 6

Panthalis sp.—1

Paraonis sp.—many

Pectinaria californiensis—many

Pholoë sp.—several

Pista sp.—1 large in mud-walled tube

Podarke sp.—1

Praxillella sp.—many

sigalionid—several

Sphaerodorum sp.—2

Spiophanes sp.—several

other spionids, including *Laonice*, *Prionospio*, or others—many

Sternaspis sp.—3

Travisia sp.—2

134. Station 2746-54. Off Newport Beach light, in 13 fms, fine gray sand. 0.7 cu. ft.

some shelly debris; sea stars, gastropods, many annelids; not yet analyzed

135. Station 2737-54. Off west end, Catalina Island, in 256 fms, fine green mud. 2.77 cu. ft.

foraminiferans; purple urchin; nemertean; echiuroid, possibly *Thalassema*; many annelids; not yet analyzed

136. Station 2738-54. Off west end, Catalina Island, in 342 fms, fine green mud. 3.15 cu. ft.
foraminiferans; many smaller annelids; not yet analyzed
137. Station 2735-54. Off west end, Catalina Island, in 435 fms, fine green mud. 3.27 cu. ft.
foraminiferans, tubes of *Phyllochaetopterus*, a few other annelids
138. Station 2388-53. Off Ship Rock, Catalina Island, in 482 fms, fine green mud. 3.1 cu. ft.
foraminiferans, tubes of *Phyllochaetopterus*
139. Station 2422-53. Off Ship Rock, Catalina Island light, in 484 fms, fine greenish mud. 3.15 cu. ft.
foraminiferans, tubes of *Phyllochaetopterus* and *Protula*, dead shells of *Pecten*
140. Station 2387-53. Off Ship Rock, Catalina Island, in 482 fms, fine mud. 2.8 cu. ft.
foraminiferans, tubes of *Phyllochaetopterus*, serpulid, and dead *Pecten* shells
141. Station 2304-53. Off Ship Rock, Catalina Island, in 470 fms, fine greenish mud. 2.7 cu. ft.
foraminiferans; tubes of *Phyllochaetopterus* and serpulid; a pelecypod
- 142a. Station 2146-52. Off Point Fermin, in 490 fms, oozy mud. 3.46 cu. ft.
foraminiferans, tubes of *Phyllochaetopterus* and serpulid
- 142b. Station 2332-53. Off Long Point, Catalina Island, in 490 fms, fine mud. 2.68 cu. ft.
foraminiferans, tubes of *Phyllochaetopterus*
143. Station 2499-53. Off Long Point, Catalina Island, in 483 fms, fine mud. 3.27 cu. ft.
foraminiferans; glass sponge; radiolarians; shells of *Pecten*; an ostracod; and otoliths
polychaetes, including:
arabellid—1
Lumbrineris sp.—1
Phyllochaetopterus sp.—3 and many tubes
Protula sp.—1 and many tubes
144. Station 2627-54. Off Long Point, Catalina Island, in 455 fms, gray-green sandy mud. 5.75 cu. ft.
foraminiferans, tubes of phyllochaetopterids
145. Station 2836-54. Off Point Fermin light, in 430 fms, greenish-gray

- sticky mud, foraminiferans, small polychaetes. 2.88 cu. ft.
 sea star—1
 mollusks, including *Chaetoderma*—1 ; *Nitidella*—1 ; pelecypod—1 ;
Pecten shells
 crustaceans, including ghost shrimp—1 ; isopod—1
Stereobalanus sp.—1
 polychaetes, including :
 ampharetid—1
Ancistrosyllis sp.—3
Aricidea jeffreysi—3
 capitellid—4
 hesionid—2
 maldanid—1 or more
Protula sp.—tubes and 2 tentacular crowns
146. Station 2230-53. Off Long Point, Catalina Island, in 300 fms,
 fine dark green mud. 3.27 cu. ft.
 ophiuroids, echinoids; 3 nemerteans; mollusks, including pelecypods, gastropods, scaphopods, *Chaetoderma*
 crustaceans, including amphipods, with phoxocephalid amphipod
Harpinia sp. ?D.—3
 1 *Listriolobus pelodes*
 polychaetes, including :
 ampharetid—2
Ancistrosyllis sp.—2
Aricidea sp.—8
 ?*Brada* sp.—4
 capitellid—4
 cirratulid—1 or more
Cossura sp.—1
Euchone sp.—1
Glycera sp.—1
Maldane sp.—7
Melinna sp.—4
Myriochele sp.—2
Pherusa sp.—1
Podarke sp.—1
 sabellid—2 larger and 2 smaller
Scoloplos sp.—1
Spiophanes sp.—1
 other annelids

147. Station 2442-53. Off Los Angeles breakwater light, in 220 fms, sticky mud. 2.52 cu. ft.
not yet analyzed
148. Station 2337-53. Off Los Angeles breakwater light, in 170 fms, fine mud. 1.51 cu. ft.
some glass sponge; many foraminiferans, including *Goëssella flintii*;
otoliths
ophiuroids — many; echiuroids — 2 large; holothurians — 3 dark purple
mollusks, especially *Tellina*, *Cadulus*, gastropods, *Chaetoderma*
crustaceans, especially amphipods and isopods, including the phoxocephalid amphipod *Heterophoxus* sp. B—5
nemerteans—several small
polychaetes, including:
- Aricidea* sp.
Brada sp.
capitellid
Chloeia sp.
Eunice sp.—2 large, in chitinized tubes with lateral branches
Glycera sp.
goniadiid
Harmothoë scriptoria
Lanice sp.—in tube adorned with *Goëssella* (foraminiferan)
Leocrates sp.
Lumbrineris spp.
Maldane sp.
Nephtys sp.
Nothria sp.
Paraonis sp.
Pectinaria sp.
Pholoë sp.
Pilargis sp.
Prionospio pinnata
Rhodine sp.
Scoloplos sp.
? *Spiochaetopterus* sp.
? *Spiophanes* sp.
Terebellides sp.
Travisia sp.

149. Station 2127-52. Off Los Angeles light, in 125 fms, mud and sand, some rock. Volume not taken.
Considerable slime, resembling that of a large dead polyodontid; poor in living organisms but with some *Chloecia* sp. and nephtyid.
150. Station 2447-53. Off Los Angeles breakwater light, in 208 fms, compact sticky clay and mud. 2.2 cu. ft.
not yet analyzed
151. Station 2373-53. Off Los Angeles breakwater light, in 220 fms, muddy clay. 2.7 cu. ft.
not yet analyzed
152. Station 2840-54. Off Los Angeles breakwater light, in 205 fms, sticky green mud. 2.6 cu. ft.
brissopsids, holothurians; mollusks; echiuroids; many annelids, not yet analyzed
- 153 and 154 not yet sampled
155. Station 2632-54. Off end of Newport Beach pier, in 230 fms, sandy gray-green mud. 5.45 cu. ft.
2 urchins; echiuroids; sipunculids; chaetopterid tubes and many other annelids, not yet analyzed
156. Station 2750-54. Off end of Newport Beach pier, in 238 fms, greenish mud. 2.77 cu. ft.
brissopsids, holothurians; nemerteans; many annelids, not yet analyzed
157. Station 2749-54. Off Abalone Point, in 277 fms, green mud. 2.83 cu. ft.
brissopsids; many larger and smaller annelids, not yet analyzed
158. Station 2748-54. Off Abalone Point, in 167 fms, oily sticky green mud. 2.45 cu. ft.
foraminiferans, an otolith, numerous thick mud-walled tubes
ophiuroids—several
purple holothuroid—about 10
brissopsid—2
mollusks, including:
Chaetoderma—2
pelecypods—2 or more
scaphopods—few
gastropods
nemertean—2
polyclad—1
crustaceans, including amphipods, 2 cumaceans, an ostracod

polychaetes, including:

goniadiid—3

Lumbrineris sp.—1

maldanid—1

neptyiid—numerous small ones, more than one species

Nothria sp.—several, in thick mud-walled tubes lined with chitinized sheath

Pectinaria californiensis—about 10, with tubes

pilargiid fragment

Pista disjuncta—several, in very thick mud-walled tubes

Prionospio pinnata—1 or more

other spionid—several

159a. Station 2116-52. Off Abalone Point, Laguna Beach, in 26 fms, mud. 2.45 cu. ft.

ophiuroids—more than 100; holothuroids—more than 25

anemones—about 6

mollusks—many, including 3 *Chaetoderma*

crustaceans—many amphipods, and other small ones, and 6 stalked barnacles

phoxocephalid amphipods, including: *Heterophoxus* sp. A.—50

Metaphoxus sp. A.—3

Pontharpinia sp. E.—26

Pontharpinia sp. J.—13

echiuroids—8

sipunculid—more than 1

phoronids—many tubes

nemerteans—several small

Glottidia albida—12

enteropneusts, *Stereobalanus* sp.—19

polychaetes, including:

Ammotrypane sp.—2

Amphicteis sp.—1

Ancistrosyllis sp.—1

Asychis sp.—2 or more

Ceratocephala crosslandi americana—3

Chloeia pinnata—more than 50

cirratulids—many

Cossura n. sp.—many

Diopatra tridentata—1 large

Drilonereis sp.—5

- Euclymenini—many
Eunice americana—2 in tubes
Glycera sp.—15
goniadid—9
Haploscoloplos elongatus—5
Harmothoë scriptoria—6 (one has a parasitic copepod)
Hyalinoecia juvenalis—4
Lumbrineris californiensis—1
Lumbrineris spp.—many
Magelona, near *pacifica*—many
Maldane sp.—1
Myriochele sp.—1 or 2
Nephtys sp.—1 large and three small
Nereis sp.—several
Notomastus sp.—about 6
paraonids—9 or more
Pectinaria sp.—many
Pherusa sp.—1 large and 4 small
Pholoë sp.—3
Pista sp.—1 large in tube
Podarke sp.—6
Poecilochaetus sp.—5
Polydora spp.—3 or more
Polyodontes, near *panamensis*—1 large
Prionospio, near *malmgreni*—19
Prionospio pinnata—about 15
Rhodine sp.—many, with tubes
Sabellaria sp.—about 3
Scalibregma sp.—1
serpulid tubes
Spiochaetopterus sp.—1
spionid—1 or more
Spiophanes missionensis—many, with tubes
spirorbid—1
Sternaspis sp.—28
Sthenelanelia uniformis—10 or more
syllid—1
Terebellides sp.—about 18
Travisia sp.—1
other annelids

- 159b. Station 2295-53. Off Newport west jetty light, in 26 fms, dark grayish mud. 0.69 cu. ft.
 enteropneusts:
Balanoglossus sp.—1
Stereobalanus sp.—11
 other animals not yet analyzed
160. Station 2736-54. Off west end, Catalina Island, in 132 fms, sandy green mud. 1.57 cu. ft.
 not yet analyzed
161. Station 2389-53. Off Ship Rock, Catalina Island light, in 136 fms, sandy mud. 2.2 cu. ft.
 echinoderms, including many ophiuroids, a very large urchin,
 holothurians
 mollusks, including pelecypods, *Dentalium* and *Cadulus*
 burrowing anemone—1
 phoxocephalid amphipods, 6, including *Heterophoxus* sp. A.—5
Thalassema (echiuroid)—1 large
 sipunculid—1
 polyclad—1
 parasitic copepod—1
 polychaetes, including:
 ampharetids—several juvenile
Anaitides sp.—1
Aricidea sp.—several
Chone sp.—1
 cirratulids—many
Cossura sp.—2
Drilonereis sp.—1 or more
Eunice aphroditois—1 large
Glycera sp.—2
 goniadid—1
Haploscoloplos elongatus—8 juveniles
Lumbrineris sp.—several
Maldane sp.—several, in tubes
Melinna sp.—many, in tubes
Myriochele sp.—6
Nephtys spp.—few, juveniles
 nereid—1
Nothria sp.—1
Paraonis sp.—several

Pectinaria californiensis—about 6

Pholoë sp.—many

Pilargis sp.—1

polynoid—1

Prionospio, near *malmgreni*—several

Prionospio pinnata—several

Sternaspis sp.—1

Terebellides sp.—1

terebellids—several, juveniles

162. Station 2328-53. Off Ship Rock, Catalina Island, in 150 fms, fine sandy mud. 1.26 cu. ft.

not yet analyzed

163. Station 2329-53. Off Ship Rock, Catalina Island, in 260 fms, fine greenish mud. 2.56 cu. ft.

not yet analyzed

164a. Station 2176-52. Off Salta Verde Point, Catalina Island, in 28 fms, nodular muddy sand. 1.32 cu. ft.

holothurian

anemone—7

mollusks, including 2 *Crepidula*; a gastropod, *Aglaja* sp.; a *Chaetoderma*; and a nudibranch

crustaceans, including many amphipods

nemertean—few

sipunculid—1

Glottidia albida—4

branching bryozoans

simple ascidian—3 or more

polychaetes, including:

Aglaothamus dicirris—1

Amaea occidentalis—1

Ampharete arctica—1

Amphisamytha bioculata—1

Aphrodita armifera—1

Aricidea spp. — several

Artacaminae, new genus and species—2

capitellid—several

Chaetopterus sp.—tubes and fragments

cirratulids—more than 29

Diopatra tridentata—1 or more

Dorvillea sp.—2

- Drilonereis* spp.—2 or more
Euchone sp.—1 and tube
Eulalia sp.—3
Exogone sp.—1, ovigerous
Glycera sp.—1
Goniada sp.—3
Haploscoloplos elongatus—9
?Hypoeulalia bilineata—3
Lanice sp.—several
Lumbrineris spp.—many
Magelona spp.—2 large
 maldanids, several species—many
Nephtys californiensis—1 large
 another *Nephtys* sp.—3
 onuphid, in tube
Owenia sp.—about 5
Pherusa sp.—5
Poecilochaetus sp.—6
 polydorid—several, with tubes
Prionospio, near *malmgreni*—18
Prionospio pinnata—3
Pseudopotamilla sp.—1, juvenile
Rhaphobranchium sp.—1 or more
Rhodine sp.—1 or more
Sabella, resembling *crassicornis*—2
 sabellid—2, with tube
Scalibregma sp.—10
 serpulid tube fragments
 sigalionids—several
Spiochaetopterus sp.—several, with tubes
Spiophanes missionensis—many
Sternaspis sp.—about 10
Sthenelanelia uniformis—hundreds
Streblosoma, possibly *crassibranchia*—many
Terebellides sp.—1
Tharyx, possibly *parvus*—27
Travisia sp.—6

164b. Station 2303-53. Off Ship Rock, Catalina Island, in 470 fms, in fine greenish mud. 2.52 cu. ft.

- foraminiferans; tubes of *Phyllochaetopterus* and serpulid; dead
Pecten shells; a living tectibranch
phoxocephalid amphipod, *Leptophoxus* sp. A.—1
165. Station 2330-53. Off Ship Rock, Catalina Island, in 490 fms,
fine mud. 3.4 cu. ft.
foraminiferans; tubes of *Phyllochaetopterus*
166. Station 2453-53. Off Long Point, Catalina Island, in 480 fms,
very fine mud. 3.02 cu. ft.
foraminiferans; tubes of *Phyllochaetopterus*
167. Station 2331-53. Off Long Point, Catalina Island, in 489 fms, fine
mud. 2.7 cu. ft.
foraminiferans; tubes of *Phyllochaetopterus*
168. Station 2409-53. Off Long Point, Catalina Island, in 470 fms,
greenish mud. 3.4 cu. ft.
foraminiferans; tubes of *Phyllochaetopterus* and serpulid; dead
Pecten shells
- 169a. Station 2305-53. Off Long Point, Catalina Island, in 460 fms,
fine greenish mud. 2.7 cu. ft.
foraminiferans; tubes of *Phyllochaetopterus* and serpulid; dead
Pecten shells; a small ophiuroid
- 169b. Station 2626-54. Off Long Point, Catalina Island light, in 460
fms, gray-green mud. 5.75 cu. ft.
foraminiferans; tubes of *Phyllochaetopterus*
170. Station 2410-53. Off Long Point, Catalina Island, in 410 fms,
greenish mud. 3.2 cu. ft.
foraminiferans, 1 large and 6 small ophiuroids
mollusks, including 2 *Chaetoderma*, scaphopods, a gastropod
crustaceans, including an amphipod, a cumacean
phoxocephalid amphipod, *Harpinia* sp. B.—1
a nemertean
polychaetes, including:
Ancistrosyllis sp.—1
Aricidea sp.—1 or more
capitellid, new genus and species—1 or more
Chaetozone corona—fragments
other cirratulids—several
Cossura sp.—1 or more
Maldane sp.—2
orbiniid, new genus and species—2
Paraonis sp.—1 or more

near

171. Station 2411-53. Off Long Point, Catalina Island, in 400 fms, greenish mud, glass sponge. 3.15 cu. ft.
 echinoderms, including 3 brissopsid urchins and 4 ophiuroids
Chaetoderma—3 large and several small
 phoxocephalid amphipod, *Harpinia* sp. B.—1
 caprellid—1
 enteropneust, *Stereobalanus* sp.—1
 polychaetes, including:
 Amphicteis ?*scaphobranchiata*—6
 Ancistrosyllis sp.—2 or more
 Aricidea sp.—4
 capitellid, new genus and species—about 9
 cirratulid—5
 Cossura sp.—4
 flabelligerid—fragments
 Lumbrineris sp.—2
 Maldane sp.—1
 orbiniid, new genus and species—2
 Petaloproctus sp.—3 or more
 Protula sp.—several
 sabellid, with parasite—1
 Spiophanes sp.—3
 other annelids
172. Station 2412-53. Off Long Point, Catalina Island light, in 324 fms. fine mud. 3.2 cu. ft.
 4 brissopsid urchins
Chaetoderma—4
 pelecypod—2
 nemertean—1
 polychaetes, including:
 Amphicteis sp.—9
 Ancistrosyllis sp.—2
 Aricidea sp.—12
 cirratulid—2
 Euchone sp.—1, in mud tube
 maldanid—about 3
 Myriochele sp.—1
 Nephtys sp.—1
 orbiniid, new genus and species—1

Pista sp.—1

Prionospio sp.—5

serpulid on worn *Phyllochaetopterus* tube—2

173. Station 2413-53. Off Long Point, Catalina Island light, in 205 fms, muddy clay. 0.5 cu. ft.

many ophiuroids, 2 echinoids

mollusks, including *Dentalium*, pelecypods, 3 chitons, a *Chaetoderma*

crustaceans, including a ghost shrimp, amphipods, isopods, cumaceans, copepods

phoxocephalid amphipods, 14, including *Harpinia* sp. F.—1

Heterophoxus sp. A.—6

Leptophoxus sp. A.—3

Paraphoxus sp. A.—2

sipunculid—2

polyclad—1

polychaetes, including:

Ammotrypane sp.—3

ampharetid—2

Anaitides sp.—1

Aricidea sp.—1

capitellid—3 or more

cirratulids—several

flabelligerid, new genus and species—about 20

Glycera sp.—4

Lagisca sp.—fragments

Laonice sp.—fragments

Nephtys sp.—several

Pectinaria sp.—1

Pherusa capulata—1

Polydora spp.—several, from drilled holes in shale

polynoid—1

Prionospio sp.—1 or more

Sphaerodorum sp.—1

?*Sphaerosyllis* sp.—1

Streblosoma sp.—2

Terebellides sp.—1

174. Station 2414-53. Off Long Point, Catalina Island light, in 177 fms, coarse sand and rocks. 0.4 cu. ft.

several ophiuroids

mollusks, including:

chitons—7 or more, from crevices in large rocks

Tellina sp.—1

Lima sp. or related genus—2 or more

Dentalium sp.—several

Chaetoderma—1

crustaceans, including a pagurid in dead conch; ostracods; isopods
phoxocephalid amphipods—14, including:

Harpinia sp. F.—2

Heterophoxus sp. A.—2

Pontharpinia sp. F.—4

Pontharpinia sp. J.—3

Pontharpinia sp. N.—2

sipunculids—2

polychaetes, including:

Ammotrypane sp.—3

Anaitides sp.—1

Aricidea sp.—several

cirratulid—several

Glycera sp.—1

Lumbrineris sp.—3 or more

maldanid—several in tubes fully attached to under side of rocks

polynoids—several

Prionospio spp.—more than 2

sphaerodorid—2

syllid—1

terebellid—several

175. Station 2851-54. Off Long Point, Catalina Island light, in 230
fms, mud. 1.51 cu. ft.

foraminiferans; many diversified smaller animals; not yet analyzed

176 and 177 not yet sampled

178. Station 2841-54. Off Newport west jetty light, in 257 fms, green
mud. 2.93 cu. ft.

passed rapidly through screens, with little debris

a large sea pen; brissopsids; many smaller animals; not yet analyzed

179. Station 2293-53. Off Newport west jetty light, in 252 fms, oozy
mud. 2.58 cu. ft.

ophiuroids and urchins

a sea pen and an anemone

mollusks, including pelecypods, gastropods, and scaphopods

echiuroids—3

crustaceans, including ostracods, isopods, cumaceans, amphipods

phoxocephalid amphipods, including *Harpinia* sp. A.—2

Paraphoxus sp. A.—7

Phoxocephalus sp. A.—8

other animals and annelids, not yet analyzed

180. Station 2757-54. Off Dana Point, in 258 fms, greenish mud. 2.64 cu. ft.

2 large brissopsids; an echiuroid; many small animals, not yet analyzed

181. Station 2756-54. Off Dana Point, in 285 fms, greenish mud and coarse shelly sand. 2.7 cu. ft.

gastropods; polychaetes, including *Aphrodita*, sabellid, and many others, not yet analyzed

182. Station 2633-54. Off end of Newport Beach pier, in 292 fms, gray-green clay. 6.03 cu. ft.

foraminiferans; a large brissopsid; annelids, including ampharetids, *Pectinaria*, and others; many small animals, not yet analyzed

183. Station 2449-53. Off Newport jetty light, in 303 fms, sticky mud. 3.02 cu. ft.

not yet analyzed

- 184a. Station 2117-52. Off Abalone Point, Laguna Beach, in 54 fms, mud. 3.65 cu. ft.

many foraminiferans

burrowing anemones—several

echinoderms, including ophiuroids—several hundred; holothurians, including 9 *Molpadia intermedia*

mollusks, including pelecypods, gastropods, scaphopods

crustaceans, especially amphipods, isopods, cumaceans

nemerteans, sipunculids

Glottidia albida—1

polychaetes, including:

Ammotrypane sp.—1

ampharetids—5 or more

Aricidea sp.—5 or more

Asychis or *Maldane* sp.—1

Chloeia sp.—2

cirratulid—1

Glycera sp.—several

Glycinde sp.—1

other goniadid—several
Lumbrineris spp.—many
Magelona sp.—1
 maldanids—many
Megalomma sp.—2
Myriochele sp.—about 15
nephtyid—several
Panthalis pacifica—about 5, in a clump of tubes
Paraonis sp.—3
Pectinaria californiensis—15
Pholoë sp.—fragment
Polydora sp.—1
Prionospio spp.—several
Rhodine sp.—1
Spiophanes sp.—1
Sternaspis sp.—about 20
Sthenelais sp.—1
Terebellides sp.—2
 terebellids—several

184b. Station 2751-54. Off Dana Point, in 200 fms, greenish-gray mud.
 2.83 cu. ft.

many thick mud-walled tubes of *Nothria pallida* and *Maldane* sp.;
 brissopsids; smaller mollusks, not yet analyzed

185. Station 2448-53. Off Dana Point, in 30 fms, compact sticky mud.
 1.95 cu. ft.

ophiuroids—hundreds

caudate holothuroid, perhaps *Molpadia*—4

mollusks, including a *Chaetoderma* and scaphopods

crustaceans, including many amphipods, a pinnotherid and a juvenile brachyuran

phoxocephalid amphipods, 34, including *Heterophoxus* sp. A.—7

Pontharpinia sp. E.—8

Pontharpinia sp. J.—8

nemertean, sipunculid, a polyclad

Glottidia sp.—few

phoronids—in slender sand-covered tube

enteropneusts, *Stereobalanus* sp.—1

polychaetes, including: (individuals not counted)

Amaea sp.

ampharetids

Ancistrosyllis sp.
Aricidea sp.
Brada sp.
Ceratocephala crosslandi americana
Cossura sp.
Glycera sp.
 goniadid
Harmothoë sp.
Hyalinoecia sp.
Laonice sp.
Leocrates sp.
Lumbrineris spp.
Magelona sp.
Maldane sp.
 other maldanids
Myriochele sp.
 nephtyids—several species
Pectinaria sp.
Pholoë sp.
Pista sp.
Poecilochaetus sp.
Prionospio pinnata
Rhodine sp.
 sabellid
 sigalionid
Sphaerodorum sp.
Spiophanes sp.
Sternaspis sp.
Terebellides sp.
 terebellids

186a. Station 2142-52. Off Howlands Landing, Catalina Island, in 19 fms, fine sandy mud. 1.9 cu. ft.

Dominant and conspicuous were the large tubes of *Chaetopterus variopedatus*, that measured to 5 inches long; and the annulated, strawlike tubes of *Spiochaetopterus*, 10 to 12 inches long (see photograph of bottom, fig. 1)

echinoderms, including many ophiuroids and 7 holothuroids

poriferans—several

anemones—many tube dwelling

sea whips—5

mollusks, including:

- gastropods—*Conus californicus*—5
- Crepidula nivea*—3
- Kellettia kelletti*—1
- pelecypods—*Botulina denticulata*—1
- Cardium* sp.—1, juvenile
- Crenella decussata*—1
- Gastropteron* sp.—1
- Lima dehiscens*—6
- Lyonsia californica*—2
- Saxicava arctica*—1
- Semele pulchra*—1
- Sportella californica*—1
- Volsella capax*—1

crustaceans, including amphipods, isopods, several shrimps, a crab,
a pycnogonid; phoxocephalid amphipod, *Heterophoxus* sp. A.—1

nemerteans—4

sipunculids—12

many bryozoans

Glottidia albida—1

solitary ascidians—7

enteropneusts: *Saccoglossus* sp.—1; ptychoderid—2; other—5

polychaetes, including:

- Aglaophamus dicirris*—14
- Anaitides* sp.—1
- Chaetopterus variopedatus*—11 or more
- Chaetozone corona*—3
- cirratulids—about 6
- Cirriformia* sp.—several
- Eulalia* sp.—2
- Eumida* sp.—1
- Lumbrineris* sp.—2
- Owenia* sp.—about 60
- Paraonis* sp.—2
- Pherusa* sp.—2
- Phyllochaetopterus* ?*prolifera*—1
- Polycirrus* sp.—2
- polynoid—2
- Psammolyce* sp.—3
- Pseudopotamilla* sp.—1

Scalibregma sp.—5

?*Semiodera* sp.—11

Spiochaetopterus sp.—hundreds, with tubes
spionid—1

Sternaspis sp.—1

Sthenelais sp.—several

Sthenelanella uniformis—6

?*Streblosoma* sp.—fragments
terebellid—1

Trypanosyllis sp.—1

Vermiliopsis sp.—1

186b. Station 2143-52. Off Howlands Landing, Catalina Island, in 25 fms, mud, broken shells and much rubble. 2.0 cu. ft.

mollusks, including gastropods, *Conus californicus*—3; pelecypods
—*Trachycardium quadragenarium*—1

many other animals, not yet analyzed

near

186. Station 2797-54. Off Ship Rock light, Catalina Island, in 63 fms, coarse yellow-gray sand with shell and nullipore rubble. 0.12 cu. ft.

ophiuroids; a large urchin; nemerteans; many annelids, including
considerable *Chloeia* sp. and others, not yet analyzed

187. Station 2302-53. Off Ship Rock, Catalina Island, in 185 fms, fine greenish mud. 1.57 cu. ft.

echinoderms, including 4 brissopsids, numerous ophiuroids, 3 holo-
thurians

anemone—1

mollusks, including pelecypods, gastropods, scaphopods, *Chaeto-
derma*

echiuroids—2; several nemerteans

crustaceans, including amphipods and isopods; phoxocephalid am-
phipods, *Harpinia* sp. G.—2; *Heterophoxus* sp. A.—1

numerous annelids, not yet analyzed

near

187. Station 2733-54. Off Ship Rock, Catalina Island, in 152 fms, green sandy mud. 1.13 cu. ft.

a large and a small brissopsid; many ophiuroids; an echiuroid;
many annelids, not yet analyzed

near

187. Station 2734-54. Off Ship Rock, Catalina Island, in 154 fms, green sandy mud. An unscreened, unmeasured quart examined for smaller

- forms that might escape finest screens in field sorting; many smaller annelids washed out, not yet analyzed
188. Station 2435-53. Off Ship Rock, Catalina Island, in 244 fms, clayey mud and sand. 1.95 cu. ft.
not yet analyzed
189. Station 2301-53. Off Ship Rock, Catalina Island, in 335 fms, oozy mud. 3.33 cu. ft.
many foraminiferans
a large echinoid
anemone—2
mollusks, including a pelecypod, 3 scaphopods, 2 *Chaetoderma*
echiuroid—1
sipunculid—3
nemerteans—several
enteropneust—1
polychaetes, including:
 ampharetids—many
 Aricidea sp.—6
 capitellid—3
 Cossura sp.—1
 maldanids—several
 Myriochele sp.—5
 orbiniid, new genus and species—1
 Paraonis sp.—3
 Protula sp.—1 or more
 sabellid—1 or more
- i90. Station 2223-53. Off Long Point, Catalina Island, in 480 fms, oozy mud. 3.15 cu. ft.
foraminiferans; tubes of *Phyllochaetopterus* and serpulid; a small pelecypod and a *Chaetoderma*
191. Station 2408-53. Off Long Point, Catalina Island, in 480 fms, sandy mud. 3.21 cu. ft.
foraminiferans; tubes of *Phyllochaetopterus* and serpulid, with living specimens
192. Station 2801-54. Off Long Point, Catalina Island light, in 474 fms, blue-green-gray mud and some glass sponge. 2.64 cu. ft.
foraminiferans; *Phyllochaetopterus* and a few other animals, not yet analyzed
193. Station 2353-53. Off Long Point, Catalina Island, in 430 fms, fine mud, a rock, some wood fragments, many foraminiferans, minute

shells, and radiolarians. 3.21 cu. ft.

sea whip—1

pelecypods—2

polychaetes, including:

Amphicteis scaphobranchiata—several

Cossura sp.—1 or more

Glycera sp.—several juvenile

Laonice sp.—1

Maldane sp.—1

Pista sp.—1 large, in thick mud-walled tube

tubes of *Protula* sp.

Spiophanes sp.—1

terebellid fragments

194. Station 2802-54. Off Long Point, Catalina Island light, in 420 fms, blue-green-gray mud. 2.64 cu. ft.

foraminiferans; glass sponge; a large sea star; scaphopods; gastropod—*Nitidella* sp.; large mud-covered tubes of annelids; *Protula* sp.; and other animals

195. Station 2429-53. Off Long Point, Catalina Island light, in 380 fms, fine dark mud. 3.15 cu. ft.

glass sponge and foraminiferans

ophiuroids—about 10

holothuroid—1

sea pen, with broad pannicles—1

mollusks, including a small scaphopod and 2 *Chaetoderma*

nemertean—2 anterior ends

polychaetes, including:

ampharetid—1

Aphrodita sp.—1 juvenile

cirratulid—many, some ovigerous, with flesh-pink ova

Maldane sp.—several, including large specimens

Mesochaetopterus sp.—tubes

Myriochele sp.—several tubes

Scalibregma sp.—1 large

196. Station 2428-53. Off Long Point, Catalina Island light, in 350 fms, fine dark mud, with many spherical foraminiferans and a mass of felt and setae of a large aphroditid. 3.41 cu. ft.

echinoderms, including 3 brissopsids and one ophiuroid

nemertean—1 or more

polychaetes, including:

ampharetid—about 20, ovigerous

capitellid—2 or more

?*Chone* sp.—1

Maldane sp.—1

Myriochele sp.—1 or more

orbiniid, new genus and species—2

Pherusa sp.—2

Pilargis n. sp.—1

serpulid, in tube fully attached to tube of *Mesochaetopterus*

Spiophanes sp.—2

and other species

197. not yet sampled

198. Station 2852-54. Off east end, Catalina Island light, in 280 fms, mud. 2.52 cu. ft.

foraminiferans; sipunculid; numerous smaller animals, not yet analyzed

199. Station 2372-53. Off east end, Catalina Island light, in 230 fms, sandy mud. 0.81 cu. ft.

not yet analyzed

200 and 201 not yet sampled

202. Station 2842-54. Off Dana Point, in 288 fms, gray-green mud. 3.15 cu. ft.

a large dead conch; a large echiuroid; many smaller animals, not yet analyzed

203. Station 2755-54. Off Dana Point, in 304 fms, green sticky mud. 3.0 cu. ft.

foraminiferans; many smaller animals, not yet analyzed

204. Station 2754-54. Off Dana Point, in 312 fms, greenish-gray sticky mud. 2.83 cu. ft.

foraminiferans; several long tubes, possibly annelids; a large ovigerous nereid; a sabellid; and many smaller animals, not yet analyzed

205. Station 2753-54. Off Dana Point, in 322 fms, greenish-gray sandy mud. 1.26 cu. ft.

foraminiferans; shell fragments; ophiuroids; amphipods; annelids; not yet analyzed

206. Station 2752-54. Off Dana Point, in 330 fms, greenish-gray clay. 3.0 cu. ft.

foraminiferans, large and small animals, not yet analyzed

207. Station 2452-53. Off Ship Rock, Catalina Island light, in 28 fms, compact sandy clay; many disklike foraminiferans and arenaceous *Goëssella flintii*, retained in lowest screen. 0.37 cu. ft.
- ophiuroids—many
 - holothurians—several
 - burrowing anemone
 - mollusks, including gastropods, pelecypods, *Chaetoderma*
 - crustaceans, including amphipods and decapods
 - nemertean
 - phoronid
 - Glottidia albida*
 - solitary ascidian
 - enteropneust, ptychoderid—1
 - polychaetes, including: (individuals not counted)
 - Aglaophamus dicirris*
 - Amaea occidentalis*
 - ampharetids, several species
 - Aricidea* sp.
 - capitellid
 - Chaetopterus* sp.
 - cirratulids, more than one species
 - Diopatra* sp.
 - Eumida* sp.
 - Glycera* sp.
 - Lanice* sp.—in tubes covered with foraminiferan, *Goëssella flintii*
 - Lepidasthenia* sp.
 - Lumbrineris* spp.
 - maldanid
 - Megalomma* sp.
 - Panthalis* sp.
 - phyllodocid, associated with tube of *Spiochaetopterus* and ascidian
 - Pista*, resembling *cristata*
 - Pista* ?*elongata*
 - Prionospio pinnata*
 - Rhodine* sp.
 - sabellid, in coarse, sandy chitinized tube
 - Spiochaetopterus* sp.—many tubes and specimens, the dominant species
 - Spiophanes* sp.

Sternaspis sp.

?*Sthenelais* sp.

Sthenelanella sp.

Streblosoma sp.

syllid

Terebellides sp.

Thelepus sp.

208. Station 2451-53. Off Long Point, Catalina Island light, in 111 fms, compact sandy clay. 1.57 cu. ft.
not yet analyzed

- 209a. Station 2224-53. Off Long Point, Catalina Island, in 200 fms, fine dark green mud. 1.76 cu. ft.

echinoderms, including several ophiuroids and 8 echinoids

coelenterates, including one sea anemone and a dead solitary coral

mollusks, including gastropods, pelecypods, scaphopods, *Chaetoderma*

crustaceans, including 6 amphipods and an ostracod

phoxocephalid amphipods, including *Harpinia* sp. A.—2

Heterophoxus sp. B.—1

nemertean—1

nematode—1

polychaetes, including:

Anaitides sp.—1

cirratulid—1

Drilonereis sp.—fragment

Glycera sp.—1

Haploscoloplos elongatus—6

Lumbrineris cruzensis—1

Nephtys sp.—2

Nothria sp.—6

Notomastus sp.—1

Pectinaria californiensis—3

?*Pilargis* sp.—2 fragments

- 209b. Station 2423-53. Off Long Point, Catalina Island light, in 175 fms, mud and shelly sand. 1.13 cu. ft.

many ophiuroids, several urchins; numerous pelecypod shells; many smaller animals, not yet analyzed

210. Station 2365-53. Off Long Point, Catalina Island, in 300 fms, sandy mud. 1.57 cu. ft.

not yet analyzed

211. Station 2837-54. Off Long Point light, Catalina Island, in 454 fms, greenish-gray sticky mud. 3.08 cu. ft.
 glass sponge; foraminiferans; an ophiuroid; a pelecypod; a *Chaetoderma*; compound ascidian on tubes of *Protula*; a sipunculid polychaetes, including:
Aricidea sp.—3
Paraonis sp.—6
Phyllochaetopterus sp.—6 or more and tubes
 polynoid—1
Protula sp.—tubes
212. Station 2839-54. Off Long Point light, Catalina Island, in 446 fms, greenish-gray sticky mud. 3.46 cu. ft.
 foraminiferans; glass sponge; ophiuroids
 mollusks, including:
Nitidella sp.—1
 a small pelecypod
Chaetoderma—12
 enteropneust—*Stereobalanus* sp.—1
 polychaetes, including:
Aricidea jeffreysi—2
Cossura sp.—1
Hydroides sp.—1
Maldane sp.—1
Paraonis sp.—8, including some ovigerous
 sabellid—1
Scalibregma sp.—1 or more
Tharyx sp.—2 or more
213. Station 2229-53. Off Long Point, Catalina Island, in 440 fms, sandy clay, gravel, and rubbly black groundy clumps to rocks. 0.63 cu. ft.
 many foraminiferans
 echinoderms, including a large ophiuroid and several smaller ones, and echinoids
 mollusks, including pelecypods, gastropods, scaphopods, *Chaetoderma*
 branching corals and hydroid
 amphipods—phoxocephalid: *Harpinia* sp. B.—22
 a nemertean and a sipunculid
 nematodes—4 or more

polychaetes, including:

Ammotrypane sp.—1

ampharetids—2 or more

Amplicteis scaphobranchiata—1, the largest annelid in the sample

Aricidea sp.—some

chaetopterid fragments

Cossura sp.—3

Drilonereis sp.—2

Glycera branchiopoda—2

Goniada sp.—2

Harmothoë sp.—1

Myriochele sp.—6

Myxicola sp.—1

Naineris sp.—3

Spiophanes sp.—2

Terebellides sp.—1

Tharyx sp.—several

214. Station 2838-54. Off Long Point light, Catalina Island, in 394 fms, greenish-gray sticky mud and considerable gravel. 2.7 cu. ft. many foraminiferans; radiolarians; glass sponge mollusks, including *Nitidella* sp. and *Chaetoderma* phoxocephalid amphipods; several cumaceans; an isopod with very large chelae

polychaetes, including:

Aricidea sp.—several

capitellid, new genus and species

Chloeia sp.—1 large

Cossura sp.—3 or more

sabellid—1

Tharyx sp.—many, some with long setae and large ova

215. Station 2441-53. Off Long Point, Catalina Island light, in 340 fms, mud and clay. 2.64 cu. ft.

otoliths, many foraminiferans, some glass sponge

ophiuroids—few

mollusks, including a gastropod shell, 3 scaphopods, 3 *Chaetoderma*

crustaceans, including 2 amphipods and a caprellid

polychaetes, including: (single or few individuals of each)

ampharetid

Chaetozone sp.

Glycera sp.

Maldane sp. or perhaps ?*Praxillella* sp.

Myriochele sp.

orbiniid, new genus and species—2

216 and 217 not yet sampled

218. Station 2371-53. Off east end, Catalina Island light, in 350 fms, fine sandy mud. 2.43 cu. ft.

not yet analyzed

219 not yet sampled

220. Station 2843-54. Northern base of Lasuen Seamount, in 230 fms, gray-green sandy mud and trace of rubble. 1.32 cu. ft.

brissopsids—7 or more; a large nemertean; pelecypods; many annelids and other smaller animals, not yet analyzed

221 not yet sampled

222. Station 2644-54. Off Newport Beach pier, in 310 fms, greenish-gray clay. 5.74 cu. ft.

foraminiferans; gastropods; smaller animals, not yet analyzed

223. Station 2634-54. Off Dana Point, in 320 fms, gray-green clay. 5.74 cu. ft.

foraminiferans; many larger and smaller animals, not yet analyzed

224a. Station 2120-52. Off Long Point, Catalina Island, in 44 fms, sandy mud. Two very incompletely filled grabs together totalled 1.07 cu. ft. (This bottom was photographed, see fig. 2.)

echinoderms, including ophiuroids, holothurians, and echinoid

(*Lytechinus*)

burrowing anemones

mollusks, including pelecypods, gastropods, scaphopods, and *Chaetoderma*

crustaceans, including amphipods, ostracods, isopods, and cumaceans

nemerteans; sipunculid; *Glottidia*

enteropneust—1

polychaetes, including:

Ammotrypane sp.—1

Aricidea spp.—many

Chaetozone sp.—several

Chloeia sp.—about 20 juveniles

Chone sp.—1

cirratulids—many

Drilonereis sp.—2

goniadid—1

Haploscoloplos elongatus—6

Harmothoë sp.—fragments
Lumbrineris sp.—2
Magelona sp.—several
 maldanids—several
Myriochele sp.—many
Nephtys spp.—many
Nothria sp.—1
Onuphis parva—12 or more
Panthalis sp.—2 or more
Pectinaria sp.—1
Pholoë sp.—several
Prionospio, near *malmgreni*—several
Prionospio pinnata—1
Spio, n. sp.—34 or more
Spiophanes sp. and other spionids—many
Sternaspis sp.—2
Sthenelais sp.—several
Sthenelanella sp.—several
Terebellides sp.—1 or more
Thalenessa sp.—many

- 224b. Station 2144-52. Off Long Point, Catalina Island, in 45 fms, sandy mud. 1.6 cu. ft. in two grabs not yet analyzed
- 224c. Station 2145-52. Off Long Point, Catalina Island, in 44 fms, fine mud. Volume not taken. enteropneust, ptychoderid—1; other animals not yet analyzed
- 224d. Station 2152-52. Off Long Point, Catalina Island, in 19 fms, sandy mud. 0.85 cu. ft. holothurians—several mollusks, including:
- gastropods—*Agglaja* sp.—1
 - pelecypods—*Parvilucina tenuisculpta*—9
 - Solen rosaceus*—3
 - Sphenia fragilis*—1
 - Tellina buttoni*—18
 - Tellina carpenteri*—6
 - Thyasira barbataensis*—1
- crustaceans, including many amphipods, isopods, cumaceans polyclad—1

polychaetes, including:

- Amaea occidentalis*—3
- Ampharete* sp.—5
- Anaitides* sp.—4
- Aphrodita* sp.—1
- Aricidea* sp.—32 or more
- Armandia* sp.—1
- Artacaminae, new genus and species—3
- Chaetozone* sp.—12
- Cossura* sp.—6
- Diopatra* sp.—3
- Euchone* sp.—about 25
- Fabricia* sp.—several
- Glycera* sp.—1
- Goniada* sp.—1
- Harmothoë* sp.—8
- Laonice* sp.—4 or more
- Lumbrineris* spp.—43
- Megalomma* sp.—3
- Nephtys* sp.—10 or more
- Nereis procera*—1
- Ninoë* sp.—1
- Odontosyllis* sp.—31
- Paraonis* sp.—50 or more
- Pectinaria californiensis*—2
- Pholoë* sp.—1
- Poecilochaetus johnsoni*—4
- Polycirrus* sp.—1
- Prionospio*, near *malmgreni*—many
- Prionospio pinnata*—more than 42
- sabellid*—several, in tubes
- Scalibregma* sp.—5
- Scoloplos* sp.—3
- Spiochaetopterus* sp.—several
- Spiophanes missionensis*—hundreds
- Sternaspis* sp.—3 large and 10 small
- Sthenelais* spp.—several
- Sthenelanelia* sp.—2
- Tharyx parvus*—more than 16, ovigerous
and other annelids

224e. Station 2153-52. Off Long Point, Catalina Island, in 45 fms, broken shells and mud; 2 grabs, both very incomplete, were taken, to total 1 cu. ft.

holothurians—many; anemones and sea pen

mollusks, including:

gastropods—*Aglaja* sp.—1

Cavolina tricuspidata—1

eolid—1

Haminoea virescens—2

Puncturella galeata—1

pelecypods—*Nemocardium centifilosum*—4

Nuculana hamata—1

Parvilucina tenuisculpta—5

Solen rosaceus—3

Sphenia fragilis—6

Tellina buttoni—26

Tellina carpenteri—18

numerous amphipods, including *Photis californica*, *Ampelisca brevisimilis*, lysianassid, oedicerotid; also phoxocephalids, including

Harpinia sp. D.—2

Heterophoxus sp. A.—3

Metaphoxus sp. A.—4

Pontharpinia sp. M.—3

cumaceans, ostracods, and isopods of several species

Glottidia albida and phoronid

polyclad

sipunculid

8 larvae of a wrasse—*Oxyjulis californica* (identified by Miss Janet Haig)

polychaetes, including: (individuals not yet counted)

ampharetids—many

Anaitides sp.

arabellid, parasitic

?*Armandia* sp.

Chloeia sp.

Chone sp.

cirratulids, of more than one species

Drilonereis sp.

Euchone sp.

Eumida sp.
Eunice sp.
Fabricinae
Glycera sp.
goniadid
Harmothoë sp.
Lepidasthenia sp.
Longosoma catalinensis
Lumbrineris spp.
Magelona spp.
maldanids, of several species
Megalomma sp.
Myriochele sp.
Naineris sp.
nephtyid
nereid
Nothria sp.
Odontosyllis sp.
Onuphis sp.
Owenia sp.
Paraonis sp.
Pectinaria sp.
Peisidice sp.
Pherusa capulata
Pherusa sp.
phyllodocid
Pista elongata
Pista, other species
Polydora sp.
Prionospio spp.
Rhampobrachium sp.
sabellids
Scalibregma sp.
Scoloplos sp.
serpulid, with glassy tube
sigalionids
Spiochaetopterus sp.
Spiophanes sp.
spirorbids—many
Sternaspis sp.

Syllis sp.

terebellids—many

Thalenessa sp.

Thelepus sp.

trichobranchiid, new genus and species

Vermiliopsis on dead shells of *Laqueus*

225a. Station 2227-53. Off Long Point, Catalina Island, in 128 fms, fine dark green mud. 0.81 cu. ft.

ophiuroids

mollusks, including pelecypods, gastropods, scaphopods, *Chaetoderma*

amphipods, ostracods, isopods, cumaceans, one hermit crab

phoxocephalid amphipods *Heterophoxus* sp. A.—2

Pontharpinia sp. U.—14

polychaetes, including:

Ammotrypane sp.—10

ampharetids—12 juveniles

Amphicteis sp.—1

Aricidea sp.—numerous

capitellid—14

Chone sp.—3

cirratulid—8

Drilonereis sp.—3

Exogoninae—1

Glycera tessellata—4

Goniada sp.—2

Haploscoloplos elongatus—11

Laonice sp.—1

Lumbrineris cruzensis—13

Magelona sp.—8

Maldane sp.—1

maldanids—10

Melinna sp.—1 or more

neriid—1

Nothria ?stigmatis—15

Notomastus sp.—2

Onuphis sp.—5

onuphids in tubes—about 4

Paraonis sp.—several

Pectinaria californiensis—3

?Phyllodoce ferruginea—1
Pista ?cristata—7 or more
Prionospio ?cirrifera—8
Prionospio pinnata—3
Scalibregma sp.—1
Scionella sp.—1
 spiochaetopterid sp.—many tubes
Terebellides sp.—1
Thalenessa spinosa—1
Travisia sp.—1

225b. Station 2290-53. Off Long Point, Catalina Island, in 200 fms, mud. Volume not taken.

The partially analyzed organisms include an ophiuroid, an anemone, 3 scaphopods resembling *Cadulus*, a deep water gastropod, a *Tellina*

polychaetes, including:

capitellid—1
Chloeia sp.—2
Maldane sp.—1
Nephtys sp.—1
Nothria sp.—1
Pectinaria californiensis—1
 and others

226. Station 2426—53. Off Long Point, Catalina Island, in 270 fms, dark mud. 1.0 cu. ft.

not yet analyzed

227a. Station 2352-53. Off Long Point, Catalina Island, in 420 fms, fine mud. 2.5 cu. ft.

glass sponge and many foraminiferans

ophiuroids—3
Chaetoderma—1
 pelecypod—1
 scaphopod—1

sea pen—1, with digitately arranged branches, red in life

polychaetes, including:

Amphicteis scaphobranchiata—1 large
Thelepus sp.—1 large
 serpulid tube, attached to tube of *Thelepus*

227b. Station 2859-54. Off Long Point, Catalina Island, in 425 fms, greenish-gray sandy mud. 2.58 cu. ft.

foraminiferans; radiolarians; much glass sponge; shells of *Pecten* ghost shrimp, *Callianassa goniophthalma* Rathbun—1 male (?) (identified by Miss Janet Haig)

mollusks, including a pelecypod and a chiton

a nemertean; ?sipunculid

polychaetes, including tubes of *Protula*, ?*Phyllochaetopterus*, ampharetid, *Aricidea* sp., *Paraonis* sp., ?*Tharyx* sp.

228. Station 2228-53. Off Long Point, Catalina Island, in 293 fms, oozy mud. 0.56 cu. ft.

many foraminiferans, some glass sponge

ophiuroids

mollusks, including gastropods, pelecypods, scaphopods, *Chaetoderma*

phoxocephalid amphipods:

Heterophoxus sp. A.—1

Pontharpinia sp. U.—1

polychaetes, including:

Amage sp.—1

Amphicteis sp.—2

Anaitides sp.—fragment

Aricidea sp.—several

Cossura sp.—1

Goniada sp.—fragment

Haploscoloplos elongatus—2 juveniles

Laonice sp.—2 or more

Lumbrineris sp.—2

Notomastus lobatus—4 (the largest of the polychaetes)

Streblosoma sp.—1

Terebellides sp.—1

fragments and juveniles of cirratulid, onuphid, and others

229. Station 2845-54. Off Long Point, Catalina Island, in 277 fms, gray-green sandy mud. 1.25 cu. ft.

foraminiferans, a brissopsid, many annelids, not yet analyzed

230a. Station 2338-53. Off Long Point, Catalina Island, in 393 fms, fine mud. 2.58 cu. ft.

glass sponge, many foraminiferans, long slender spines of echinoids ophiuroid—1 large white

ghost shrimp, resembling *Callianassa*—1

Pecten shells, delicate in texture—several

polychaetes, including:

capitellid—1

Chloeia sp.—1 large, about 40 mm long

cirratulid—several

Glycera branchiopoda—1

Lumbrineris sp.—posterior fragment

Paraonis sp.—1

- 230b. Station 2427-53. Off Long Point, Catalina Island, in 290 fms, fine greenish mud. 2.26 cu. ft.

glass sponge, numerous animals, not yet analyzed

- 231 not yet sampled

232. Station 2370-53. Off east end, Catalina Island light, in 366 fms, fine mud. 2.83 cu. ft.

foraminiferans and other animals, not yet analyzed

233. Station 2844-54. Off east end, Catalina Island, at western end of Lasuen Seamount, in 362 fms, sticky gray-green mud. 3.15 cu. ft. foraminiferans, large ophiuroids, many small annelids, not yet analyzed

234. Station 2299-53. Off east end, Catalina Island, near Lasuen Seamount, in 360 fms, dark oozy mud. 3.08 cu. ft.

glass sponge, dead mollusk shells, foraminiferans

echinoderms, including 1 ophiuroid, 1 echinoid

Chaetoderma—1

pelecypod and gastropod shells

nemertean, 1 sipunculid, 1 echiuroid

polychaetes, including:

Ancistrosyllis ?rigida—1

Aricidea sp.—3

capitellid—3

Glycera ?branchiopoda—1

Maldane sp.—1 or more

oweniid—1

phyllodocid—1

?*Scolelepis* sp.—1

Thalenessa spinosa—1

235. Station 2298-53. Off east end, Catalina Island light, near Lasuen Seamount, in 68 fms, shelly sand and a few rocks. 0.37 cu. ft.

echinoderms, including ophiuroids and echinoids

mollusks, including pelecypods and gastropods

an anemone, nemertean, nematodes, sipunculids

- crustaceans, including amphipods, isopods, and a copepod
 numerous polychaetes, not yet analyzed
236. Station 2297-53. Off Dana Point light, in 181 fms, large and
 small hard rocks and mud; most of the sample failed to pass
 through screens. 0.68 cu. ft.
 ophiuroids—several
 echiuroids—some
 sipunculid—more than one
 polychaetes, including:
Anaitides sp.—several
Boccardia sp.—fragment
 capitellid—1
Dodecaceria sp.—1
Eunice sp.—1
Glycera sp.—1
Lepidonotus sp.—1
 maldanid—1 or more
Polycirrus sp.—1
 syllid—several
 and other annelids
237. Station 2296-53. Off Dana Point light, in 268 fms, dark grayish-
 green mud. 1.82 cu. ft.
 ophiuroids, annelids, and other animals; not yet analyzed
- 238a. Station 2121-52. Off Long Point light, Catalina Island, in 32 fms,
 black sandy mud, many dead *Laqueus* and other shells, much
 debris. 1.26 cu. ft., in two grabs.
 a large white sponge; an urchin
 numerous diversified mollusks, including *Chaetoderma*—2
Laqueus californicus—many shells
Terebratalia transversa—dead shells
 crustaceans, including several small crabs, about 8 shrimps, isopods,
 amphipods
 phoxocephalid amphipods *Heterophoxus* sp. A.—1
Metaphoxus sp. A.—3
 a small polyclad
 polychaetes, including:
Anaitides sp.—1
 cirratulids—several
 disomid—1

Glycera sp.—1

Goniada sp.—1

maldanids—numerous

Owenia sp.—2 or more

Pherusa spp.—many

polynoids—several

Prionospio spp.—numerous

Scalibregma sp.—1

Spiochaetopterus sp.—many

spionids

Sternaspis sp.—1

Vermiliopsis sp.—hundreds, attached to dead *Laqueus* shells

- 238b. Station 2638-54. Off Long Point light, Catalina Island, in 40 fms, gray sandy mud. 0.93 cu. ft. (orange-peel grab)
many ophiuroids; a large urchin; many annelids and other animals, not yet analyzed
- 238c. Station 2637-54. Off Long Point light, Catalina Island, in 40 fms, gray sandy mud. 1.14 cu. ft. (Campbell grab)
many ophiuroids; a large caudate holothurian; many annelids and other animals, not yet analyzed
239. Station 2639-54. Off Long Point light, Catalina Island, in 82 fms, gray-green sandy mud. 1.14 cu. ft.
many ophiuroids; *Chloeia* and other annelids; many other animals; not yet analyzed
240. Station 2367-53. Off Long Point, Catalina Island, in 230 fms, gray-green sandy mud. 0.5 cu. ft.
not yet analyzed
- 241a. Station 2350-53. Off Long Point, Catalina Island, in 350 fms, rocks, mud, sand. 0.1 cu. ft.
many ophiuroids, annelids, and other animals; not yet analyzed
- 241b. Station 2640-54. Off Long Point, Catalina Island, in 370 fms, rock and muddy gravel. 1 quart.
foraminiferans and much rubbly material
2 male galatheid crabs, *Munida quadrispina* Benedict (identified by Miss Janet Haig)
numerous annelids, not yet analyzed
- 241c. Station 2641-54. Off Long Point, Catalina Island, in 373 fms, green brown sandy mud. 3.01 cu. ft.
a large ophiuroid; 5 brissopsids; *Chloeia* and other annelids, not yet analyzed

242. Station 2368-53. Off east end, Catalina Island, in 385 fms, sandy mud, rock. 2.26 cu. ft.
foraminiferans and diversified animals; not yet analyzed
243. Station 2369-53. Off east end, Catalina Island, in 390 fms, fine mud. 3.33 cu. ft.
not yet analyzed
244. Station 2440-53. Off east end, Catalina Island, in 415 fms, clay and mud. 3.27 cu. ft.
not yet analyzed
245. Station 2339-53. Off east end, Catalina Island, in 394 fms, fine mud. 2.2 cu. ft.
not yet analyzed
- 246 and 247 not yet sampled
248. Station 2643-54. Off east end, Catalina Island, in 382 fms, greenish-gray rubbly clay. 6.03 cu. ft.
foraminiferans; glass sponge; a large sea star; a large ophiuroid;
Chaetoderma; an amphipod; an ostracod
polychaetes, including:
Aricidea sp.
cirratulids, including *Tharyx* sp.
Glycera branchiopoda
Maldane sp.—a large one
Myriochele sp.
tubes of *Phyllochaetopterus* sp. and *Protula* sp.
Rhodine sp.
249. Station 2635-54. Off Dana Point, in 278 fms, green clay and mud, yellow and black marbled clayey mud with small rocks, much rubble. 2.99 cu. ft.
foraminiferans; ophiuroids; a brissopsid; ?burrowing anemone
mollusks, including *Cadulus* and *Chaetoderma*
a shrimp and several amphipods
an echiuroid and a nemertean
polychaetes, including:
ampharetids
Aricidea sp.
Brada sp.
capitellid
Ceratocephala crosslandi americana
Chloeia sp.
Glycera sp.

Hydroides sp.
 maldanids
 nephtyid
 orbiniid, new genus and species
 tubes of *Poecilochaetus* sp. or *Rhodine* sp.
 polynoid
 spionid
 and others

250a. Station 2122-52. Off Jewfish Point, Catalina Island, in 48 fms, sandy mud, dead brachiopod shells. 0.95 cu. ft. in two grabs.
 many ophiuroids; crustaceans, including hundreds of ostracods, many amphipods, isopods, cumaceans; a pelecypod; tubicolous anemones

polychaetes, including:

Chaetozone sp.
Chloeia sp.
Lepidasthenia virens
Magelona sp.
 maldanid
Myriochele sp.
Nephtys sp.
Prionospio sp.
Sternaspis sp.
Sthenelanellela uniformis
Thalenessa spinosa
Tharyx sp.
Thelepus sp.
 and others

250b. Station 2436-53. Off Long Point, Catalina Island light, in 44 fms, oily sandy mud and clay. 1.07 cu. ft.
 phoxocephalid amphipods, 34, including *Harpinia* sp. D.—27;

Metaphoxus sp. A.—1

other animals not yet analyzed

251. Station 2347-53. Off east end, Catalina Island light, in 100 fms, sandy mud. 0.25 cu. ft.

many ophiuroids; a brissopsid; numerous mollusks; amphipods
 a large polyodontid tube, *Chloeia* sp., and other polychaetes, not yet analyzed

252. Station 2344-53. Off east end, Catalina Island light, in 210 fms, sandy mud, gravelly rocks, rubble. 0.37 cu. ft.

foraminiferans; a brissopsid and 2 or more ophiuroids
 mollusks, including *Tellina* sp. and others
 hermit crab in conch; many ostracods
 phoxocephalid amphipods—5, including:

Harpinia sp. G.—1

Heterophoxus sp. B.—1

burrowing anemone—3

nemertean—1 or more

polychaetes, including:

Ammotrypane sp.—2

cirratulids

Drilonereis sp.—1

Maldane sp.—several

Onuphis sp.—several

Prionospio pinnata—several

Rhodine sp.—several

and others

253. Station 2343-53. Off east end, Catalina Island light, in 418 fms, fine sandy mud. 1.63 cu. ft.
 foraminiferans; long spines of urchins; a holothuroid; ophiuroids, brissopsid; mollusks, including *Tellina* and others; several amphipods, an isopod; polychaetes, including new orbiniid and others, not yet analyzed
254. Station 2642-54. Off east end, Catalina Island light, in 422 fms, greenish-gray mud. 6.17 cu. ft.
 foraminiferans; chaetopterid tubes; many smaller animals, not yet analyzed
255. Station 2340-53. Off east end, Catalina Island, in 410 fms, fine mud. 2.26 cu. ft.
 not yet analyzed
- 256 not yet sampled
257. Station 2636-54. Off east end, Catalina Island, in 412 fms, greenish-gray clay. 6.03 cu. ft.
 richly diversified animals, not yet analyzed
- 258 not yet sampled
259. Station 2437-53. Off east end, Catalina Island light, in 48 fms, fine sandy mud. 1.3 cu. ft.
 not yet analyzed
260. Station 2348-53. Off east end, Catalina Island light, in 75 fms, sandy mud, rocks, broken shell and rubble. 0.37 cu. ft.

many ophiuroids; 2 brissopsids; a holothurian
mollusks

1 anemone

4 phoxocephalid amphipods, including *Pontharpinia* sp. B.—3

polychaetes, including:

Anaitides sp.—1

Chloeia sp.—1

Chone sp.—1

Glycera sp.—1

Lumbrineris sp.—1

Magelona sp.—2

Pholoë sp.—1

Prionospio sp.—1

and others

261. Station 2349-53. Off east end, Catalina Island light, in 110 fms, sandy mud. 0.1 cu. ft.
ophiuroids, a brissopsid; 6 phoxocephalid amphipods; many isopods, some cumaceans; pelecypod mollusks; numerous smaller polychaetes; not yet analyzed
262. Station 2342-53. Off east end, Catalina Island light, in 230 fms, fine sandy mud. 0.31 cu. ft.
not yet analyzed
263. Station 2341-53. Off east end, Catalina Island light, in 440 fms, fine sandy mud. 0.1 cu. ft.
not yet analyzed
264. Station 2439-53. Off east end, Catalina Island light, in 435 fms, clay and mud. 2.52 cu. ft.
not yet analyzed
- 265 and 266 not yet sampled
- 267a. Station 2438-53. Off east end, Catalina Island light, in 153 fms, hard rocks with surface and crevice dwelling animals. 1 quart.
encrusting bryozoans; an amphipod; polychaetes, including a sphaerodorid, some maldanids in encrusting tubes on rocks, a polynoid
- 267b. Station 2177-52. Off east end, Catalina Island light, in 172 fms, sandy mud. 0.63 cu. ft.
numerous ophiuroids, some urchins; nemerteans; polychaetes, including *Chloeia* and others, not yet analyzed

SUMMARY OF RESULTS

The unscreened samples have shown that much of the bottom of San Pedro Basin is bed rock overlain by silt, ooze, clay or fine detritus in a layer that exceeds in thickness the depth of the grabbing devices. Most of the samples have been of this kind. Some have come up with varying amounts of rock, gravel, or rubbly materials. Such are samples from the vicinities of submerged mounts, on either side of the northwestern and southeastern thresholds (see chart 2, and sample 235, above). Large rocks come from parts of Redondo Canyon (sample 12b), from a canyon southwest of Newport Bay (121a), and from steep slopes off the eastern end of Catalina Island (241, 252, and 267). Pleistocene gravel comes from a canyon wall (at 125) and blackened phosphorite rocks from sample 52.

It is noteworthy that samples taken with uniform methods, using the orange-peel grab, have been very irregular in volumetric amounts, ranging from as much as 3.71 cu. ft. in a sample (39), to as little as a quart (0.033 cu. ft.) in another (267a). These differences are explained in several ways. For 252, 262, and 263, the grab closed before the bottom had been penetrated, perhaps through an oversensitivity on the part of the trigger, or from striking a swimming object, such as a large fish. For some samples (45b, 241b, and 267a), the jaws were incompletely closed on ascent, due to the presence of rocks and debris. For others (65, 66a, and others) the hard packed bottoms of sand, clay or other materials, could not be penetrated by the device used. Furthermore, it was not possible to measure the amounts of the sample which might have filtered out on hauling up the grab, or to retrieve the solid particles, including animals, which might have escaped through apertures, such as vents for releasing water pressures. In spite of unmeasurable losses of varying amounts, the quantities and diversities of the samples are conspicuous.

Most of the bottoms of San Pedro Basin have been found to support a rich and varied fauna in shallow to great depths, except for a conspicuous impoverished area in the western end (see chart 2, and text, below). The diversity is manifested not only in single samples, where the numbers of species may run very high, but in samples from adjacent areas, indicating a patchiness of occurrence which is unpredictable, and at present unexplainable.

Thus, sample 44b yielded more than 50 species of annelids, with more than 850 individuals, in addition to many other invertebrates (see Analyses, above). A nearby sample, 45a, contained several large jack-knife clams, phoronids, ophiuroids, more than 43 species of annelids with hundreds of individuals, few of which were common to the adjacent sample, 44b. The *Chaetopterus* association, sample 43a, is quite different from that in 44a, even though both come from shallow bottoms near shore. Adjacent samples, 123a and 123b, about a minute of longitude apart, differ considerably in the species comprising their populations (see Analyses, above).

The effects of the breakwater along the outer side of the Los Angeles Harbor, are well shown by comparison of samples 44b and 44a (see Analyses, above). Sample 44a, beyond the breakwater, has many specimens of a larger terebellid, *Streblosoma* sp., enteropneusts, ophiuroids and holothurids. Sample 44b, in the Outer Harbor behind the breakwater, contains many specimens of *Nereis procera*, *Tharyx parvus*, *Cosura* sp., *Amphiteis scaphobranchiata*, and other annelids.

Similar habitats, such as sandy bottoms along shore, differ in their dominant animals, even though ecological conditions appear the same. For example, sands off Anaheim Bay (sample 50) support an archannelid, *Saccocirrus*, and a pelecypod, *Crenella*, in considerable numbers. Sands off Los Angeles breakwater (sample 63b) have large numbers of an anemone, *Harenactis*; those north of Palos Verdes Point (sample 14) support large numbers of a sipunculid in dead tests of *Dendraster*, together with annelids of the genera *Pisione* and *Aricidea*.

Masses of biological detritus, such as the thick layers of dead lamp shells, *Laqueus californicus* and *Terebratalia transversa* (from samples 186b, 238a and 224e), and the associations of glass sponge (see text, below) have been found to contain a great variety of animals.

The number of specimens in some samples runs very high, with some groups, but seldom single species, of animals dominant. In all soft bottoms (rocky bottoms have not been successfully sampled with the grabs), the marine annelids are most abundant, followed by ophiuroids, pelecypods, holothurians, gastropods, amphipods, scaphopods, burrowing anemones, echinuroids, nemerteans and other invertebrates. Thus, sample 108, off Newport Beach pier, in 17 fms, measuring 1.26 cu. ft., yielded 63 species and more than 500 individuals of annelids, in addition to many ophiuroids, holothurians, pelecypods, gastropods, amphipods, and other groups. A sample from Redondo Canyon (6b) in 161 fms, containing 2.8 cu. ft. of mud, had 6 large specimens of an undescribed species of

Thalassema (communication from the late Dr. W. K. Fisher), the largest measuring 140 mm long, and more than 50 specimens of *Chloeia pinnata*, together with many other animals.

Another sample from Redondo Canyon (72) from 40 fms, with 3 cu. ft. of mud, yielded 142 living specimens of *Dentalium rectius* (see list of mollusks by Dr. Norman T. Mattox, below), in addition to hundreds of individuals of other species. Sample 12a, from 229 fms, yielded 323 living individuals of *Macoma incongrua*, 42 of *Nuculana conceptionis*, 61 of *Tellina carpenteri* (according to Dr. Mattox), more than 90 of *Chloeia pinnata*, and many others (see Analyses, above). Sample 69 contained more than 200 individuals of a sabellid, *Chone ecaudata*, and 125 of a polynoid, *Harmothoë triannulata*.

The largest count that has been made of a metazoan species comes from sample 42b, in 34 fms, 2.14 cu. ft. of mud, where a cirratulid annelid, *Tharyx parvus*, is represented by more than 1530 individuals. An interesting sample, 63b, from 11 fms, 0.81 cu. ft., of sandy mud, contained hundreds of an anemone, *Harenactis*, in addition to many other species of animals. Phoxocephalid amphipods have been counted, numbering to 126 individuals in six species from one sample (133); 144 individuals in six species from another (104); and 93 specimens in four species from a third (159a) (see list in Appendix, by Dr. J. Laurens Barnard).

Based on analyses of the annelids, it is noteworthy that there are few species in the benthos of San Pedro Basin which occur also in intertidal zones of southern California. There are few representatives of nereids, eunicids, serpulids, and some other large families. There are many genera and species which are new records for southern California and also the eastern Pacific (note especially genera and species in *Aricidea*, Artacaminae, capitellids, *Cossura*, flabelligerids, *Hauchiella*, *Leocrates*, *Mage-lona*, maldanids, *Myriochele*, orbiniids, *Paraonis*, *Petaloproctus*, *Pholoë*, *Phyllochaetopterus*, *Pilargis*, *Pisione*, *Saccocirrus*, and others). There are relatively few cosmopolitan species. There are many species which appear to have prolonged reproductive seasons, or to lack peaks of high productivity.

More than 400 species of metazoan invertebrate animals have been identified from the benthos of San Pedro Basin. The list will be considerably enlarged as the various groups of animals are studied. The annelids, with more than 283 species, have been examined by the writer. Twenty-eight species of phoxocephalid amphipods have been identified by Dr. J. Laurens Barnard; 80 species of mollusks have been examined by

Dr. Norman T. Mattox; four species of enteropneusts were studied by Keith Woodwick (see Appendices, below).

The technical details of the equipment are described by Dr. Floyd E. Durham (see Appendices, below).

The Impoverished Area of San Pedro Basin

An analysis of the samples shows that there is an area in San Pedro Basin that is characterized by an impoverished fauna (see chart 2); it is an approximately lozenge-shaped tract measuring about 8 by 15 miles, with a much smaller area to the north and west. Its outer margins follow rather closely the 425 fathom contour line. Depths range from about 405 to 495 fms, or the deepest part of the Basin. The area is bounded by a glass sponge association (see below), especially along the rims where the current may be most rapid. The few animals existing in the impoverished association are almost entirely a chaetopterid annelid, *Phyllochaetopterus* sp., a serpulid, protulid, and less frequently an ampharetid and a glycerid, *Glycera branchiopoda*. There are often delicate, translucent shells of a *Pecten*, few of which have been found living; but many have been seen that were unworn and not long dead.

The impoverished *Phyllochaetopterus* association in San Pedro Basin comes from maximum depths in bottoms of very fine oozy mud. The following lists the sample numbers, depth in fathoms, and volumetric measurements of the samples obtained.

Sample Number	Depth in Fathoms	Volume of Sample, in Cubic Feet
8	415	3.08
near 15	454	(volume not taken)
16	405	3.90
21	430	3.4
22	418	2.20
36	432	3.15
39	437	3.71

Sample Number	Depth in Fathoms	Volume of Sample, in Cubic Feet
53	450	3.59
54	458	3.15
55	457	2.26
56	460	2.77
57	431	2.52
70	460	2.07
71	466	3.08
58a	427	(uncertain)
72	480	3.17
73	475	3.40
75	437	3.02
90	475	2.77
93	480	3.40
94	495	2.50
95	460	3.30
113	490	3.15
114	480	3.15
115	470	3.15
117	487	2.52
118	460	2.96
137	435	3.27
138	482	3.10
139	484	3.15
140	482	2.80
141	470	2.70
142a	490	3.46
142b	490	2.68
143	483	3.27
164b	470	2.52
165	490	3.40
166	480	3.02
167	489	2.70
168	470	3.40
169a	460	2.70
190	480	3.15
191	480	3.21

The Glass Sponge Association

Another association that has been identified is characterized by the presence of glass sponge. It comes only from deep water and is distributed in its greatest diversity in the vicinities of low submarine mounts, and along the margins of the impoverished faunal area. Its geographic extent is limited by depth, since it gives rise rather rapidly to a shallow water association in other parts of the Basin. The dominant groups of animals are listed below, based on samples taken from the stations. The following gives the sample numbers, depth in fathoms and volumetric measurements of the samples obtained.

Sample Number	Depth in Fathoms	Volume of Sample, in Cubic Feet
9	300	2.77
10b	251	0.95
15	445	3.40
23	370	3.21
69	400	3.08
76	420	2.58
89	386	2.96
96	440	3.15
119	450	3.33
171	400	3.15
192	474	2.64
194	420	2.64
195	380	3.15
227a	420	2.50
230a	393	2.58
234	360	3.08
241c	373	3.01
248	382	6.03

List of Animals that occur in Glass Sponge Association

Echinoderms, including ophiuroids, brissopsid, echinoids

Mollusks, especially scaphopods, chaetodermans, gastropods of the genus

Nitidella, pelecypods, including translucent shells of a pecten

ghost shrimp, *Callianassa goniophthalma*

a broad-pannicled sea pen

amphipods and isopods

echiuroids and nemerteans

an enteropneust, *Stereobalanus* sp.

polychaetous annelids including:

Amphicteis scaphobranchiata

Ancistrosyllis rigida

Aphrodita sp.

capitellid, new gen. and sp.

Chloeia pinnata

Cossura, n. sp.

other cirratulids

Eumida sp.

Glycera branchiopoda

Hydroides sp.

Laonice sp., or ?*Spiophanes* sp.

Lumbrineris spp.

Maldane sp.

Mesochaetopterus sp.

Myriochele sp.

orbiniid, new genus and species

paraonids

Petaloproctus sp.

Phyllochaetopterus sp.

polynoid, one or more species

Protula sp.

sabellid

Scalibregma sp.

Scolelepis sp.

Spiophanes sp.

Thalenessa spinosa

Thelepus sp.

other annelids

APPENDICES A TO F

A.

IMPROVED TECHNIQUES FOR OCEAN BOTTOM SAMPLING

By FLOYD E. DURHAM

The obtaining of invertebrate specimens from the bottom of the San Pedro Channel, California, by the *Velero IV* involves two operations: (1) bringing to the surface bottom samples, and (2) separating the specimens from the substrate.

The first operation is effected by a Hayward Standard orange-peel bucket, with a rated capacity of two cubic feet. The area sampled is $2\frac{3}{5}$ square feet. The bucket is modified by a canvas hood over the open structure, to prevent the washing out of the bottom sample as the bucket is hauled up through the water. The hood has twelve four-inch by six-inch oval vents, each bearing a flap on the outside, hinged at the top to allow the escape of air and water as the bucket is lowered and to allow the escape of water as the bucket is raised. Because of the hood, the bucket will bring to the surface almost double its rated capacity of soft mud. The bucket is further modified with a lowering pendant which automatically trips the bucket when it strikes the bottom, and allows its operation on the single 7/16-inch steel cable wound on a variable-speed power winch mounted on the working deck.

At a selected spot, the open bucket is swung clear of the stern by the pneumatically operated A-frame and lowered, with the winch in high gear, at approximately forty fathoms per minute. A tachometer measures in feet the cable paid out and indicates the depth from which the sample is taken. Hauling on the cable closes the four jaws of the tripped bucket and it is brought to the surface at the same speed as it descended. It is swung onto the deck by the A-frame and the contents of the bucket are dropped into a heavy cylindrical tub with a capacity of 4.46 cubic feet. Particularly when sticky mud is being handled, it is necessary to do some cleaning of the bucket by hand. Fragments remaining in the bucket are washed out as the bucket descends for another grab.

The tub with the bottom sample is then moved by the four strong handles, and as many men, over to the screens. The surface of the sample in the tub is smoothed, if necessary, and the volume is determined by a calibrated measuring stick. Two small one-half \pm pint labelled samples are removed for special studies in sedimentation and foraminifera.

The second operation, that of separating the biological specimens from the substrate, is done in a mechanical shaker with a set of graded screens. The process of softening and removing the wastes is accelerated by a spray of salt water from a system of six sprinkler heads mounted above the screens. The top screen, in which the bottom sample is placed by hand-scoops, is of one-half inch diamond mesh, flat, galvanized steel. The second screen, of brass, is twelve mesh per inch, and the third and last screen, also of brass, is twenty-four mesh per inch. The latter determines the minimum size of specimens saved, except for those contained in the two above-mentioned unsorted samples.

When all the substrate possible has been washed over the side of the ship, the specimens, with the remaining debris, are collected in jars. The larger specimens are removed from the screens by forceps, whereas smaller ones are either gently swept to one corner of the screen with a stream of water and picked up with a spatula, or the screen is inverted over a framed, shallow, white, oilcloth tray. In the latter method, the specimens are dislodged from the screen by tapping it gently and/or applying a draft of air from the exhaust end of a vacuum cleaner head. The specimens are then easily crowded to the center of the sagging cloth and scooped up with a large spoon. Preservative, together with a label bearing the station number, is added to each jar of specimens. All apparatus is hosed clean prior to the collecting of the next bottom sample.

The screens are two feet by four feet and are framed with two inch by one inch galvanized channel iron with welded corners. Supporting the screening is one-half inch strap iron on edge every twelve inches. The sieves are inserted into the carrier from the side, and held by a self-locking hasp at each end of the carrier. Longitudinal motion within the carrier is prevented by tightening a winged set screw at the end of each screen. The carrier is well braced and is mounted on four small, steel wheels on a short track, making possible a rapid to and fro motion, power being supplied by a small electric motor directly through an adjustable eccentric (7/16 inch stroke being satisfactory for the work). The four screens and the carrier assembly are mounted on a steel stand supporting the track for the carrier, the mounting for the electric motor, a rack for specimen trays and tools, and supports for the sprinkler heads.

B.

A LIST OF THE MOLLUSCA IDENTIFIED
FROM SAMPLES OF THE BENTHOS OF
SAN PEDRO BASIN, CALIFORNIA

By NORMAN T. MATTOX

Name of Species	Number of Specimens	Sample Number	Depth in Fathoms
AMPHINEURA	1	45a	12
Aplacophora	1	59a	249
<i>Chaetoderma</i> sp. A	1	69	400
	1	82	18
	1	122	115
<i>Chaetoderma</i> sp. B	13	12a	228
	2	69	400
	2	82	18
<i>Chaetoderma</i> sp. C	1	59a	249
<i>Limifossor</i> sp.	9	12a	228
	1	59a	249
	3	122	115
Neomeniiniid sp.	1	69	400
Polyplacophora			
<i>Lepidizona catalinae</i> Willett	4	224e	45
SCAPHOPODA			
<i>Cadulus fusiformis</i> Pilsbry and Sharp	1	7a	61
	1	7b	40
	2	45a	12
	5	82	18

Name of Species	Number of Specimens	Sample Number	Depth in Fathoms
<i>Cadulus tolmiei</i> Dall	33	12a	228
	1	80b	23
<i>Dentalium neohexagonum</i> Pilsbry and Sharp	1	45a	12
	1	82	18
<i>Dentalium rectius</i> Carpenter	2	6c	129
	142	7a	61
	8	7b	40
	3	12a	228
	8	66a	12

GASTROPODA

<i>Acteon punctocoelata</i> (Carpenter)	1	7a	61
	1	7b	40
<i>Aglaja</i> sp.	1	45a	12
	1	80a	29
	2	80b	23
	1	82	18
	1	164a	470
<i>Balcis rutila</i> (Carpenter)	1	224d	19
	1	224e	45
	6	12a	228
<i>Bittium attenuatum</i> Carpenter	2	82	18
	1	12a	228
<i>Bittium catalinensis</i> Bartsch	1	7a	61
<i>Cavolina tricuspidata</i> (Rivers)	1	224e	45
<i>Conus californicus</i> Hinds	5	186a	19
	3	186b	25
<i>Crepidula nivea</i> C. B. Adams	15	45a	12
	3	186a	19
<i>Cylichnella diegensis</i> (Dall)	1	7b	40
	2	45a	12
	1	82	18
Eolid	1	224e	45
<i>Eulima californica</i> (Bartsch)	2	82	18
<i>Ferreria belcherii</i> (Hinds)	1	45a	12
<i>Fusinus arnoldi</i> (Cossmann)	2	7a	61
<i>Gastropteron</i> sp.	1	186a	19
<i>Haminoea virescens</i> (Sowerby)	2	224e	45

Name of Species	Number of Specimens	Sample Number	Depth in Fathoms
<i>Kellettia kelletti</i> Forbes	1	186a	19
<i>Leptogyra</i> sp.	6	69	400
<i>Nassarius perpinquis</i> (Hinds)	2	45a	12
<i>Nitidella gouldi</i> (Carpenter)	10	59a	249
<i>Nitidella permodesta</i> Dall	25	69	400
<i>Ophiodermella incisa</i> (Carpenter)	2	82	18
<i>Puncturella galeata</i> (Gould)	1	224e	45
<i>Turbonilla</i> sp.	1	7a	61
<i>Volvulella californica</i> Dall	1	122	115
<i>Volvulella tenuissima</i> Willett	6	7a	61
	3	45a	12

PELECYPODA

<i>Axionopsis sericatus</i> Carpenter	12	12a	228
	2	82	18
	3	122	115
<i>Botulina denticulata</i> (Dall)	1	186a	19
<i>Cardiomya pectinata</i> (Carpenter)	1	12a	228
<i>Cardium</i> sp. (juvenile)	1	186a	19
<i>Crenella columbiana</i> Dall	1	12a	228
<i>Crenella decussata</i> Montagu	1	186a	19
<i>Kellia</i> sp.	4	69	400
<i>Lima dehiscens</i> Conrad	6	186a	19
<i>Lucinoma annulata</i> (Reeve)	2	7a	61
	1	7b	40
<i>Lyonsia californica</i> Conrad	1	82	18
	2	186a	19
<i>Macoma incongrua</i> (Martens)	323	12a	228
<i>Macoma yoldiformis</i> Carpenter	1	45a	12
<i>Nemocardium centiflosum</i> (Carpenter)	4	224e	45
<i>Nucula cardara</i> (Dall)	2	122	115
<i>Nucula carlottensis</i> Dall	1	7b	40
<i>Nuculana conceptionis</i> (Dall)	42	12a	228
<i>Nuculana hamata</i> (Carpenter)	1	224e	45
<i>Nuculana spargana</i> (Dall)	8	12a	228
<i>Nuculana taphira</i> (Dall)	2	45a	12
	4	82	18

Name of Species	Number of Specimens	Sample Number	Depth in Fathoms
<i>Pandora filosa</i> Carpenter	2	7b	40
<i>Parvilucina tenuisculpta</i> (Carpenter)	14	7a	61
	13	7b	40
	2	82	18
	9	224d	19
	5	224e	45
<i>Pitar newcombiana</i> (Gabb)	3	7b	40
	1	45a	12
<i>Rochefortia tumida</i> Carpenter	11	7b	40
	3	82	18
<i>Saxicava arctica</i> (Linné)	1	186a	19
<i>Semele pulchra</i> (Sowerby)	1	186a	19
<i>Solemya panamensis</i> Dall	1	7a	61
<i>Solemya volvulus</i> Carpenter	8	82	18
<i>Solen rosaceus</i> Carpenter	2	45a	12
	6	46a	13
	3	224d	19
	3	224e	45
<i>Sphenia fragilis</i> Carpenter	1	224d	19
	6	224e	45
<i>Sphenia globula</i> Dall	5	12a	228
<i>Sportella californica</i> Dall	1	186a	19
<i>Tellina bodegensis</i> Hinds	1	7a	61
	1	7b	40
<i>Tellina buttoni</i> Dall	1	82	18
	18	224d	19
	26	224e	45
<i>Tellina carpenteri</i> Dall	61	12a	228
	6	224d	19
	18	224e	45
<i>Thyasira barbarena</i> Dall	3	7a	61
	1	7b	40
	1	12a	228
	2	45a	12
	1	224d	19
<i>Trachycardium quadragenarium</i> (Conrad)	1	46a	13
	1	186b	25

Name of Species	Number of Specimens	Sample Number	Depth in Fathoms
<i>Volsella capax</i> (Conrad)	1	186a	19
<i>Yoldia scissurata</i> Dall	3	6c	129
	13	7a	61
	19	7b	40
CEPHALOPODA			
<i>Octopus apollyon</i> Berry	1	45a	12

C.

A LIST OF PHOXOCEPHALID AMPHIPODA
IDENTIFIED FROM SAMPLES OF THE
BENTHOS OF SAN PEDRO BASIN,
CALIFORNIA

By J. LAURENS BARNARD

Name of Species	Number of Specimens	Sample Number	Depth in Fathoms
<i>Harpinia sp. A.</i>	2	1	180
	2	60	80
	6	98	215
	8	121b	230
	2	179	252
	2	209a	200
<i>Harpinia sp. B.</i>	1	10b	251
	1	23	370
	1	121b	230
	1	170	410
	1	near 171	400
	22	213	440
<i>Harpinia sp. C.</i>	2	49	7½
<i>Harpinia sp. D.</i>	(?)3	146	300
	2	224e	45
	27	250b	44
<i>Harpinia sp. F.</i>	1	173	205
	2	174	177
<i>Harpinia sp. G.</i>	2	187	185
	1	252	210

Name of Species	Number of Specimens	Sample Number	Depth in Fathoms
<i>Heterophoxus sp. A.</i>	1	6c	129
	1	11a	291
	7	11c	157
	11	12a	228
	2	60	80
	1	61b	21
	3	69	400
	3	104	60
	1	98	215
	11	122	115
	1	124	50
	3	128	100
	30	133	47
	50	159a	26
	5	161	136
	6	173	205
	2	174	177
	7	185	30
	1	186a	19
	1	187	185
3	224e	45	
2	225a	128	
1	228	293	
1	238a	32	
1	outside	58	
<i>Heterophoxus sp. B.</i>	2	104	60
	1	121b	230
	5	148	170
	1	209a	200
	1	252	210
<i>Leptophoxus sp. A.</i>	2	10b	251
	1	164b	470
	3	173	205
<i>Metaphoxus sp. A.</i>	3	61a	20
	4	80b	23
	6	81b	18
	12	82	18

Name of Species	Number of Specimens	Sample Number	Depth in Fathoms	
<i>Metaphoxus sp. A.</i> (cont.)	1	83	19	
	9	99b	50	
	2	100	33	
	1	104	60	
	1	106	19	
	2	107	18	
	6	122	115	
	5	133	47	
	3	159a	26	
	4	224e	45	
	3	238a	32	
	1	250b	44	
	<i>Paraphoxus sp. A.</i>	1	6c	129
		1	121b	230
		1	133	47
2		173	205	
7		179	252	
<i>Phoxocephalus sp. A.</i>	1	6c	129	
	6	60	80	
	1	121b	230	
	1	128	100	
	6	133	47	
	8	179	252	
<i>Pontharpinia sp. B.</i>	32	14	9½	
	2	48	11	
	7	49	7½	
	1	65	14	
	1	66a	12	
	7	66b	13	
	3	80a	29	
	18	81b	18	
	3	82	18	
	2	83	19	
	2	100	33	
	1	101	29	
	3	106	19	
	2	124	50	
	3	260	75	

Name of Species	Number of Specimens	Sample Number	Depth in Fathoms	
<i>Pontharpinia sp. E.</i>	15	60	80	
	3	61b	21	
	1	68	5	
	11	80b	23	
	58	104	60	
	9	107	18	
	1	109	61	
	10	122	115	
	66	133	47	
	26	159a	26	
	8	185	30	
	<i>Pontharpinia sp. F.</i>	4	174	177
	<i>Pontharpinia sp. G.</i>	1	49	7½
1		66a	12	
<i>Pontharpinia sp. J.</i>	2	61a	20	
	13	80b	23	
	48	104	60	
	2	124	50	
	18	133	47	
	13	159a	26	
	3	174	177	
	8	185	30	
	<i>Pontharpinia sp. K.</i>	1	61b	21
23	64	15		
1	65	14		
26	66a	12		
1	68	5		
3	81b	18		
11	near 86	12		
1	87	7½		
2	100	33		
2	106	19		
2	107	18		
<i>Pontharpinia sp. L.</i>	2	80b	23	
	4	100	33	
<i>Pontharpinia sp. M.</i>	2	14	9½	
	8	49	7½	
	8	63a	13	

Name of Species	Number of Specimens	Sample Number	Depth in Fathoms
<i>Pontharpinia</i> sp. M. (cont.)	1	63b	11
	3	224e	45
<i>Pontharpinia</i> sp. N.	2	174	177
<i>Pontharpinia</i> sp. P.	1	87	7½
	4	100	33
	5	101	29
	5	106	19
	11	124	50
<i>Pontharpinia</i> sp. Q.	1	48	11
	10	64	15
	26	66a	12
	5	66b	13
	4	81b	18
	19	82	18
	6	83	19
	5	near 86	12
	4	87	7½
	1	88	4½
<i>Pontharpinia</i> sp. R.	12	66a	12
	4	66b	13
	8	near 86	12
	6	99b	50
	1	104	60
	2	106	19
	4	107	18
<i>Pontharpinia</i> sp. S.	10	68	5
	1	81b	18
	1	87	7½
	3	88	4½
<i>Pontharpinia</i> sp. T.	14	68	5
<i>Pontharpinia</i> sp. U.	14	225a	128
	1	228	293
<i>Pontharpinia</i> sp. V.	11	64	15
	21	66a	12
	4	66b	13
	5	82	18
	9	83	19
<i>phoxocephalids</i>	6	261	110

D.

A LIST OF BRACHIOPODA IDENTIFIED
FROM SAMPLES OF THE BENTHOS OF
SAN PEDRO BASIN, CALIFORNIA

By OLGA HARTMAN

Name of Species	Sample Number	Depth in Fathoms
Class INARTICULATA		
Order ATREMATA		
<i>Glottidia albida</i> (Hinds)	28	11
	45a	12
	45b	12
	46a	13
	46b	11
	49	7.5
	64	15
	65	14
	66a	12
	80a	29
	81b	18
	82	18
	101	29
	108	17
	159a	26
	164a	28
	184a	54
	185	30
	186a	19
	207	28

Name of Species	Sample Number	Depth in Fathoms
<i>Glottidia albida</i> (cont.)	224a	44
	224e	45
Class ARTICULATA		
Order TELOTREMATA		
<i>Laqueus californicus</i> (Koch)	238a	32
(many dead shells, mostly unworn)		
<i>Terebratalia transversa</i> (Sowerby)		
(mostly dead shells, strewn in masses of <i>Laqueus californicus</i>)	238a	32

E.

A LIST OF ENTEROPNEUSTA IDENTIFIED
FROM SAMPLES OF THE BENTHOS OF
SAN PEDRO BASIN, CALIFORNIA

By KEITH WOODWICK

Name of Species	Number of Specimens	Sample Number	Depth in Fathoms
Family PTYCHODERIDAE			
<i>Balanoglossus</i> sp.	1	159b	26
ptychoderids	2	186a	19
	1	207	28
	1	224c	44
Family SPENGELLIDAE			
<i>Schizocardium</i> sp.	3	24	386
	1	31	9
	8	44a	10
	3	45a	12
	2	46a	13
	3	46b	11
Family Harrimaniidae			
<i>Saccoglossus</i> sp.	1	186a	19
	2	186b	25
<i>Stereobalanus</i> sp.	1	89	386
	1	145	430
	19	159a	26
	11	159b	26
	1	near 171	400
	1	185	30
	1	212	446

Name of Species		Sample Number	Depth in Fathoms
unidentified enteropneusts	32	18	325
	5	61b	21
	1	80a	29
	5	186a	19
	1	189	335
	1	224a	44

F.

A LIST OF POLYCHAETOUS ANNELIDS
IDENTIFIED FROM SAMPLES OF THE BENTHOS
OF SAN PEDRO BASIN, CALIFORNIA

By OLGA HARTMAN

Name of Species	Sample Number	Name of Family
<i>Acrocirrus ?crassifilis</i> Moore, 1923	11a	Cirratulidae
<i>Aglaophamus dicirris</i> Hartman, 1950	164a, 186a, 207	Nephtyidae
<i>Aglaophamus</i> spp.	1, 5, 6d, 123a, 126, 127	Nephtyidae
<i>Amaea occidentalis</i> Hartman, 1944	44b, 65, 108, 164a, 207, 224d	Terebellidae
? <i>Amaea</i> sp.	109, 124, 185	Terebellidae
<i>Amage</i> sp.	46a, 228	Ampharetidae
<i>Ammotrypane</i> sp.	10b, 41b, 80a, 109, 123a, 159a, 173, 174, 184a, 213, 224a, 225a, 252	Opheliidae
<i>Ampharete ?arctica</i> Malmgren, 1866	44b, 164a	Ampharetidae
<i>Ampharete</i> sp. ampharetids	82, 224d 10b, 12a, 23, 24, 25, 29, 41b, 45b, 46b, 56, 58a, 60, 61b, 63a, 80b, 89, 96, 97, 99b, 100, 123a, 126, 128, 133, 145, 146, 161, 173, 182, 184a, 185, 189, 195, 196, 207, 213, 215, 224e, 225a, 227b, 249	Ampharetidae

Name of Species	Sample Number	Name of Family
<i>Amphicteis</i> <i>scaphobranchiata</i> Moore, 1906	18, 25, 31, 38, 44b, 45a, 46b, 65, 66a, 97, ?120, 122, ?near 171, 193, 213, 227a	Ampharetidae
<i>Amphicteis</i> spp.	11a, 46a, 159a, 172, 225a, 228	Ampharetidae
amphinomid <i>Amphisamytha bioculata</i> (Moore) 1906	45b, 69 164a	Amphinomidae Ampharetidae
<i>Anaitides</i> spp.	1, 6c, 6d, 11a, 11c, 12a, 41b, 42a, 45b, 50, 63b, 81b, 109, 126, 161, 173, 174, 186a, 209a, 224d, 224e, 228, 236, 238a, 260	Phyllodocidae
<i>Ancistrosyllis bassi</i> Hartman, 1945	44b, 46a, 81b	Pilargiidae
<i>Ancistrosyllis rigida</i> Fauvel, 1919	45a, ?121b, ?234	Pilargiidae
<i>Ancistrosyllis</i> spp.	6b, 6c, 7b, 23, 31, 108, 126, 145, 146, 159a, 170, near 171, 172, 185	Pilargiidae
<i>Anotomastus gordiodes</i> (Moore) 1909	28, 66a	Capitellidae
<i>Aphrodita armifera</i> Moore, 1910	164a	Aphroditidae
<i>Aphrodita parva</i> Moore, 1905	45a	Aphroditidae
<i>Aphrodita</i> spp.	28, 44a, 45b, 108, 181, 195, 224d	Aphroditidae
<i>Arabella</i> sp. arabellids	31, 46b, 66a 29, 45b, near 86, 143	Arabellidae
arabellid, parasitic	124, 224e	
<i>Aricidea jeffreysi</i> (McIntosh) 1879	14, 18, 145, 212	Paraonidae
<i>Aricidea</i> ? <i>pacifica</i> Hartman, 1944	122	Paraonidae

Name of Species	Sample Number	Name of Family
<i>Aricidea</i> spp.	7b, 28, 38, 41b, 42b, 44b, 49, 61b, 63a, 63b, 66a, 69, 80a, 80b, 81b, near 86, 89, 100, 101, 108, 121b, 123a, 124, 128, 133, 146, 148, 161, 164a 170, near 171, 172, 173, 174, 184a, 185, 189, 207, 211, 213, 214, 224a, 224d, 225a, 227b, 228, 234, 248, 249	Paraonidae
<i>Armandia</i> sp.	44b, 224d, ?224e	Opheliidae
Artacaminae, new genus and species	46b, 80b, 99b, 164a, 224d	Terebellidae
<i>Asclerocheilus</i> sp.	11a	Scalibregmidae
<i>Asychis lacera</i> (Moore) 1923	?46a, 46b, 82, ?108, 121b	Maldanidae
<i>Asychis</i> sp.	45a, 59b, 159a, 184a,	Maldanidae
<i>Autolytus</i> sp.	69, 108	Syllidae
<i>Axiothella</i> spp.	46b, 63b	Maldanidae
<i>Boccardia ?redeki</i> (Horst) 1920	44b	Spionidae
<i>Boccardia</i> spp.	44b, 45b, 46a, 46b, 61b, 63a, 108, 236	Spionidae
<i>Brada ?pluribranchiata</i> (Moore) 1923	45a	Flabelligeridae
<i>Brada</i> spp.	5, 6d, 12a, 31, 42a, 46a, 46b, 66a, 82, ?121b, 126, ?146, 148, 185, 249	Flabelligeridae
<i>Capitella ovincola</i> Hartman, 1947	80b	Capitellidae
<i>Capitella</i> sp. capitellid, new genus and species	6d, 46a, 133 89, 120, 170, near 171, 214	Capitellidae Capitellidae
capitellids	6b, 6d, 7b, 11a, 12a, 18, 24, 25, 29, 41b, 45a, 45b,	

Name of Species	Sample Number	Name of Family
capitellids (cont.)	46b, 59b, 61b, 65, 69, 97, 101, 108, 109, 145, 146, 148, 164a, 173, 189, 196, 207, 225a, 225b, 230a, 234, 236, 249	
<i>Carazzia</i> sp.	44b	Spionidae
<i>Ceratocephala crosslandi</i> <i>americana</i> Hartman, 1952	11c, 133, 159a, 185 249	Nereidae
<i>Ceratonereis</i> spp.	45b, 46b,	Nereidae
chaetopterids	6a, 11a, 97, 213	Chaetopteridae
<i>Chaetopterus variopedatus</i> (Renier) 1804	186a	Chaetopteridae
<i>Chaetopterus</i> sp.	27, 43, 110, 164a, 207	Chaetopteridae
<i>Chaetozone corona</i> Berkeley and Berkeley, 1941	44b, 66a, 170, 186a	Cirratulidae
<i>Chaetozone</i> spp.	29, 45b, 46a, 49, 63b, 80a, 81b, 123a, 123b, 215, 224a, 224d, 250a	Cirratulidae
<i>Chloeia pinnata</i> Moore, 1911	2, 4, 6b, 6c, 6d, 12a, 42a, 42b, 59b, 80a, 98, 123b, 133, 159a	Amphinomidae
<i>Chloeia</i> spp.	6a, 41b, 60, 89, 99b 101, 109, 123a, 124, 127, 129, 148, 149, 184a, 186, 214, 224a, 224e, 225b, 230a, 239, 241, 249, 250a, 251, 260, 267b	Amphinomidae
<i>Chone ecaudata</i> (Moore) 1923	69	Sabellidae
<i>Chone</i> spp.	1, 41b, 44b, 45b, 49, 63a, 63b, 65, 66a, 80b, 81b, 82, 89, 101, 108, 161, ?196, 224a, 224e, 225a, 260	Sabellidae
<i>Cirratulus ?cirratus</i> (Müller) 1776	11a, 44b	Cirratulidae

Name of Species	Sample Number	Name of Family
<i>Cirratulus</i> sp.	11a	Cirratulidae
cirratulids	1, 6c, 7b, 12a, 18, 24, 27, 38, 41b, 42a, 45b, 46b, 61b, 63b, 65, 66a, 69, 80a, 80b, 82, near 86, 96, 100, 101, 108, 109, 122, 123b, 127, 133, 146, 159a, 161, 164a, 170, near 171, 172, 173, 174, 184a, 186a, 195, 207, 209a, 224a, 224e, 225a, 230a, 238a, 248, 252	Cirratulidae
<i>Cirriformia</i> ? <i>luxuriosa</i> (Moore) 1904	44b	Cirratulidae
<i>Cirriformia</i> sp.	186a	Cirratulidae
<i>Cistenides</i> sp.	27, 28, 45b	Pectinariidae
<i>Cossura</i> n. sp.	6c, 7b, 12a, 29, 42b, 44b, 45a, 46a, 46b, 66a, 108, 127, 128, 133, 146, 159a, 161, 170, near 171, 185, 189, 193, 212, 213, 214, 224d, 228	Cirratulidae
<i>Dasybranchus</i> sp.	28	Capitellidae
<i>Dexiospira</i> sp.	81b	Serpulidae
<i>Diopatra tridentata</i> Hartman, 1944	28, 44b, 45a, 46a, 46b 65, 66a, near 86, 108, 159a, 164a	Onuphidae
<i>Diopatra</i> sp. disomid	29, 31, 127, 207, 224d 31, 238a	Onuphidae Disomidae
<i>Dodecaceria</i> sp.	236	Cirratulidae
<i>Dorvillea articulata</i> (Hartman) 1938	44b	Dorvilleidae
<i>Dorvillea</i> ? <i>gracilis</i> (Hartman) 1938	63b	Dorvilleidae
<i>Dorvillea</i> sp.	6c, 41b, 42a, 45b, 50, 61b, 63b, 81b, 164a	Dorvilleidae
<i>Drilonereis falcata</i> Moore, 1911	?108	Arabellidae

Name of Species	Sample Number	Name of Family
<i>Drilonereis nuda</i> Moore, 1909	?46a	Arabellidae
<i>Drilonereis</i> spp.	1, 11c, 36, 45a, 46b, 61b, 63b, 65, 66a, 80b, 82, 100, 122, 123a, 159a, 161, 164a, 209a, 213, 224a, 224e, 225a, 252	Arabellidae
<i>Ehlersia heterochaeta</i> Moore, 1909	108	Syllidae
<i>Eteone californica</i> Hartman, 1936	44b	Phyllodocidae
<i>Eteone</i> spp.	29, 45b, 49, 108	Phyllodocidae
<i>Euchone</i> sp.	49, 146, 164a, 172, 224d, 224e	Sabellidae
Euclymenini	18, 82, 159a	Maldanidae
<i>Eulalia</i> spp.	61b, 81b, 164a, 186a,	Phyllodocidae
<i>Eumida</i> spp.	11a, 28, 41b, 42b, 45b, 63a, 81b, 82, 186a, 207, 224e	Phyllodocidae
<i>Eunice americana</i> Hartman, 1944	159a	Eunicidae
<i>Eunice aphroditois</i> (Pallas) 1788	161	Eunicidae
<i>Eunice</i> spp.	41b, 61b, 148, 224e, 236	Eunicidae
<i>Euphrosine</i> sp.	11a, 45b	Euphrosinidae
<i>Evarnella fragilis</i> (Moore) 1911	11a	Polynoidae
<i>Exogone</i> sp.	164a	Syllidae
Exogoninae	28, 45b, 46a, 225a	Syllidae
<i>Fabricia</i> sp.	42b, 44b, 224d	Sabellidae
Fabricinae	80a, 99b, 121b, 224e	Sabellidae
flabelligerid, new genus and species	173	Flabelligeridae
flabelligerids	42a, 45b, 61b, 65, 108, 120, near 171	
<i>Glycera americana</i> Leidy, 1855	12a, 44b	Glyceridae

Name of Species	Sample Number	Name of Family
<i>Glycera branchiopoda</i> Moore, 1911	?58a, 89, 213, 230a, ?234, 248	Glyceridae
<i>Glycera ?capitata</i> Oersted, 1843	46a	Glyceridae
<i>Glycera tessellata</i> Grube, 1863	11a, 108, 225a	Glyceridae
<i>Glycera</i> spp.	6c, 6d, 11c, 12a, 29, 31, 41b, 45a, 45b, 46b, 50, 61b, 97, 100, 109, 122, 123a, 123b, 126, 128, 133, 146, 148, 159a, 161, 164a, 173, 174, 184a, 185, 193, 207, 209a, 215, 224d, 224e, 236, 238a, 249, 260	Glyceridae
<i>Glycinde</i> sp.	12a, 41b, 109, 133, 184a	Goniadidae
<i>Goniada</i> spp.	1, 6c, 6d, 12a, 45a, 46b, 49, 65, 66a, near 86, 127, 164a, 213, 224d, 225a, 228, 238a	Goniadidae
goniadids	60, 63b, 81b, 82, 108, 123a, 126, 128, 148, 158, 159a, 161, 184a, 185, 224a, 224e	
<i>Halosydna latior</i> Chamberlin, 1919	45a	Polynoidae
<i>Halosydna</i> spp.	28, 45b, 80b	Polynoidae
<i>Haploscoloplos elongatus</i> (Johnson) 1901	6c, 12a, 44b, 45a, 45b, 46a, 46b, 65, 66a, 80b, 100, 108, 109, 159a, 161, 164a, 209a, 224a, 225a, 228	Orbiniidae
<i>Haploscoloplos</i> sp.	5, 29, 31, 41b, 61b	Orbiniidae
<i>Harmothoë ?imbricata</i> (Linnaeus) 1767	49	Polynoidae
<i>Harmothoë scriptoria</i> Moore, 1910	1, 6d, 41b, 44b, 45a, 45b, 46b, 60, 81b, 123b, 124, 128, 148, 159a	Polynoidae
<i>Harmothoë triannulata</i> Moore, 1910	69	Polynoidae
<i>Harmothoë</i> spp.	31, 63b, 66a, 100, 101, 108, 122, 133, 185, 213, 224a, 224d, 224e	Polynoidae

Name of Species	Sample Number	Name of Family
harmothoid	1, 126	
? <i>Hauchiella</i> sp.	11a	Terebellidae
hesionids	41b, 42b, 46b, 69, 145	
<i>Hesperalia</i> sp.	45b	Syllidae
<i>Hyalinoecia juvenalis</i> Moore, 1911	80b, ?108, 159a	Onuphidae
<i>Hyalinoecia</i> sp.	61b, 82, 185	Onuphidae
<i>Hydroides norvegica</i> Gunnerus, 1768	(usually contaminant from hull of <i>Velero</i> IV)	Serpulidae
<i>Hydroides</i> sp.	212, 249	Serpulidae
? <i>Hypoeulia bilineata</i> (Johnston) 1840	11a, 164a	Phyllodocidae
? <i>Isolda</i> sp.	46a, 89	Ampharetidae
<i>Labidognathus</i> sp.	82	Arabellidae
<i>Lagisca</i> sp.	10b, 11a, 38, 69, 119, 173	Polynoidae
<i>Lanice</i> sp.	10b, 52, 148, 164a, 207	Terebellidae
<i>Laonice cirrata</i> (Sars) 1851	45a	Spionidae
<i>Laonice</i> spp.	1, 5, 11a, 23, 24, 29, 41b, 44b, 46a, 46b, 65, 66a, 81b, 123b, 126, 133, 173, 185, 193, 224d, 225a, 228	Spionidae
? <i>Leanira</i> sp.	80b	Sigalionidae
<i>Leocrates</i> n. sp.	18, 28, 45b, 63b, ?127, ?128, 148, 185	Hesionidae
<i>Lepidasthenia virens</i> (Blanchard) 1849	45a, 250a	Polynoidae
<i>Lepidasthenia</i> spp.	6b, 7b, 46b, 66a, 81b, 108, 207, 224e	Polynoidae
<i>Lepidonotus</i> spp.	11a, 45b, 236	Polynoidae
<i>Loandalia fauveli</i> Berkeley and Berkeley, 1941	108	Pilargiidae
<i>Longosoma catalinensis</i> Hartman, 1944	98, 224e	Longosomidae
<i>Lumbrineris californiensis</i> Hartman, 1944	108, 159a	Lumbrineridae
<i>Lumbrineris cruzensis</i> Hartman, 1944	1, 10b, 44b, 66a, 89, 108, 209a, 225a	Lumbrineridae

Name of Species	Sample Number	Name of Family
<i>Lumbrineris ?erecta</i> (Moore) 1904	44b	Lumbrineridae
<i>Lumbrineris index</i> Moore, 1911	6c, 46a	Lumbrineridae
<i>Lumbrineris japonica</i> (Marenzeller) 1879	46a	Lumbrineridae
<i>Lumbrineris minima</i> Hartman, 1944	46a, 66a	Lumbrineridae
<i>Lumbrineris</i> spp.	1, 5, 6b, 6c, 6d, 7b, 11a, 11c, 14, 18, 24, 28, 29, 31, 36, 41b, 42a, 42b, 44a, 44b, 45a, 45b, 46b, 49, 60, 61b, 63a, 63b, 65, 66a, 69, 80a, 80b, 81b, 82, near 86, 100, 101, 108, 109, 122, 123a, 123b, 126, 127, 128, 133, 143, 148, 158, 159a, 161, 164a, near 171, 174, 184a, 185, 186a, 207, 224a, 224d, 224e, 228, 230a, 260	Lumbrineridae
<i>Magelona</i> , near <i>pacifica</i> Monro, 1933	45a, 108, 159a	Magelonidae
<i>Magelona</i> spp.	28, 44b, 46b, 49, 63a, 63b, 65, 66a, 80, 80a, 80b, 81b, 82, near 86, 100, 109, 123a, 124, 164a, 184a, 185, 224a, 224e, 225a, 250a, 260	Magelonidae
<i>Maldane</i> spp.	1, 10b, 11c, 18, 23, 59b, 65, 97, 120, 121b, 128, 132, 133, 146, 148, 159a, 161, 170, near 171, 184a, 184b, 185, 193, 195, 196, 212, 215, 225a, 225b, 234, 248, 252	Maldanidae
? <i>Maldanella robusta</i> Moore, 1906	80b	Maldanidae
maldanids	1, 5, 6a, 6c, 7b, 10b, 12a, 24, 29, 31, 41b, 42a, 45a, 49, 52, 60, 61b, 63b, 66a, 80a, 80b,	

Name of Species	Sample Number	Name of Family
maldanids (cont.)	89, 97, 98, 100, 101, 108, 109, 121b, 122, 123a, 123b, 126, 130, 133, 145, 158, 164a, 172, 174, 184a, 185, 189, 207, 224a, 224e, 225a, 236, 238a, 249, 250a, 267a	
<i>Marphysa mortenseni</i> Monro, 1928	14	Eunicidae
<i>Marphysa</i> , resembling <i>conferta</i> Moore, 1911	12a, 29, 31, 42b, 44b, 45a, 46a, 108	Eunicidae
<i>Marphysa</i> spp.	46b, 49	Eunicidae
<i>Megalomma</i> sp.	31, 44b, 45b, 123a, 123b, 133, 184a, 207, 224d, 224e	Sabellidae
<i>Melinna</i> spp.	10b, 41b, 44b, 45a, 65, 82, 96, 108, 121b, 122, 126, 128, 146, 161, 225a	Ampharetidae
<i>Mesochaetopterus</i> sp.	6c, ?126, 195	Chaetopteridae
<i>Myriochele</i> sp.	10b, 12a, 60, 69, 80a, 99b, 100, 120, 123a, 123b, 127, 133, 146, 159a, 161, 172, 184a, 185, 189, 195, 196, 213, 215, 224a, 224e, 248, 250a	Oweniidae
<i>Myxicola</i> sp.	45b, 213	Sabellidae
<i>Naineris</i> sp.	66a, 213, 224e	Orbiniidae
<i>Nephtys</i> ? <i>caecoides</i> Hartman, 1938	46a, 63a, 108	Nephtyidae
<i>Nephtys californiensis</i> Hartman, 1938	164a	Nephtyidae
<i>Nephtys ferruginea</i> Hartman, 1940	5, 60, 126	Nephtyidae
<i>Nephtys</i> spp.	6b, 6d, 28, 29, 41b, 42a, 44b, 61b, 63b, 66a, 80a, 80b, 82, near 86, 100, 108, 109, 121b, 122, 123a, 123b, 127, 128, 148, 159a, 161, 164a, 172, 173, 209a, 224a, 224d, 225b, 250a	Nephtyidae

Name of Species	Sample Number	Name of Family
nephtyids	7b, 12a, 46b, 49, 65, 99b, 132, 133, 149, 158, 184a, 185, 224e, 249	
<i>Nereis procera</i> Ehlers, 1868	29, 44b, 45a, 46a, 49, 108, 224d	Nereidae
<i>Nereis</i> spp.	11a, 31, 46b, 80b, 101, 109, 159a	Nereidae
nereids	6b, 28, 42b, 65, 66a, 81b, 82, near 86, 161, 181, 204, 224e, 225a	
<i>Nerine foliosa</i> (Audouin-M. Edwards) 1834, new subspecies	80b, 108	Spionidae
<i>Ninoë</i> sp.	7b, 224d	Lumbrineridae
<i>Nothria ?elegans</i> (Johnson) 1901	49, 63a	Onuphidae
<i>Nothria ?geophiliformis</i> (Moore) 1903	65	Onuphidae
<i>Nothria iridescens</i> (Johnson) 1901	108	Onuphidae
<i>Nothria pallida</i> Moore, 1911	1, 42a, 129, 130, 184b, 185a	Onuphidae
<i>Nothria ?stigmatis</i> (Treadwell) 1922	225a	Onuphidae
<i>Nothria</i> spp.	6c, 6d, 7b, 10b, 41b, 45a, 46b, 65, 66a, 80b, 81b, near 86, 121b, 126, 148, 158, 161, 209a, 224a, 224e, 225b	Onuphidae
<i>Notomastus ?hemipodus</i> Hartman, 1947	44b	Capitellidae
<i>Notomastus lobatus</i> Hartman, 1947	122, 228	Capitellidae
<i>Notomastus</i> spp.	6c, 31, 46a, 49, 80b, 159a, 209a, 225a	Capitellidae
<i>Odontosyllis</i> sp.	28, 123b, 224d, 224e	Syllidae
<i>Oncoscolex</i> sp.	123a, 123b	Scalibregmidae
<i>Onuphis eremita</i> Audouin and M. Edwards, 1834	49, 63a	Onuphidae

Name of Species	Sample Number	Name of Family
<i>Onuphis parva</i> Moore, 1911	122, 123b, 224a	Onuphidae
<i>Onuphis</i> , near <i>vexillaria</i> Moore, 1911	10b	Onuphidae
<i>Onuphis</i> spp.	1, 11a, 41b, 59b, 80b, 101, 123a, 125, 224e, 225a, 252	Onuphidae
onuphids	5, 11c, 12a, 24, 28, 36, 41b, 45b, 63b, 80a, 100, 132, 133, 164a, 225a	
<i>Ophelia</i> sp.	49, 63a	Opheliidae
opheliid	46a	
orbiniid, new genus and species	18, 59b, 69, 89, 120, 170, near 171, 172, 189, 196, 215, 249, 253	Orbiniidae
orbiniids	23, 42a, 42b, 97	
<i>Owenia</i> sp.	31, 45a, 45b, 46a, 49, 50, 80b, 82, 100, 123a, 164a, 186a, 224e, 238a	Oweniidae
oweniids	41b, 42b, 234	
<i>Panthalis pacifica</i> Treadwell, 1914	184a	Polyodontidae
<i>Panthalis</i> spp.	133, 207, 224a	Polyodontidae
<i>Paraonis</i> n. sp.	7b, 10b, 18, 42b, 44b, 46b, 63b, 66a, 69, 80a, 97, 121b, 123a, 124, 133, 148, 161, 170, 184a, 186a, 189, 211, 212, 224d, 224e, 225a, 227b, 230a	Paraonidae
paraonoids	24, 46a, 82, 108, 123a, 159a	
? <i>Pareurythoë</i> sp.	7b	Amphinomidae
<i>Pectinaria californiensis</i> Hartman, 1941	1, 6c, 6d, 7b, 10b, 12a, 28, 44b, 45a, 46a, 59b, 80b, 108, 123b, 133, 158, 161, 184a, 209a, 224d, 225a, 225b	Pectinariidae
<i>Pectinaria</i> spp.	5, 7a, 29, 41b, 42a, 42b, 61b, 80a, 99b, 109, 121b, 123a, 127, 128, 148, 159a, 173, 182, 185, 224a, 224e	Pectinariidae

Name of Species	Sample Number	Name of Family
<i>Peisidice aspera</i> Johnson, 1897	42b, 44b, 45b	Polyodontidae
<i>Peisidice</i> sp.	101, 224e	Polyodontidae
<i>Pcrinereis</i> sp.	49	Nereidae
<i>Petaloproctus</i> sp.	10b, near 171	Maldanidae
<i>Pherusa capulata</i> (Moore) 1909	123b, 173, 224e	Flabelligeridae
<i>Pherusa inflata</i> (Treadwell) 1914	45b, 46b	Flabelligeridae
<i>Pherusa</i> spp.	6b, 6c, 6d, 10b, 11a, 12a, 41b, 44b, 45a, 46a, 60, 66a, 80a, 80b, 82, 100, 108, 109, 122, 123a, 146, 159a, 164a, 186a, 196, 224e 238a	Flabelligeridae
<i>Pholoë</i> sp.	42b, 45a, 60, 61b, 66a, 80b, 81b, 82, 99b, 100, 108, 122, 123b, 128, 133, 148, 159a, 161, 184a, 185, 224a, 224d, 260	Sigalionidae
<i>Phyllochaetopterus</i> ? <i>prolifca</i> Potts, 1914	45b, 61b, 186a	Chaetopteridae
<i>Phyllochaetopterus</i> n. sp.	8, near 15, 16, 21, 22, 23, 24, 36, 38, 39, 53, 54, 55, 56, 57, 58a, 70, 71, 72, 73, 74, 75, 91, 92, 93, 94, 95, 112, near 112, 113, 114, 115, 116, 117, 118, 137, 138, 139, 140, 141, 142a, 142b, 143, 144, 164b, 165, 166, 167, 168, 169a, 169b, 190, 191, 192, 211, ?227b, 248	Chaetopteridae
<i>Phyllochaetopterus</i> sp.	46a, 69, 89, 90	Chaetopteridae
? <i>Phyllodoce ferruginea</i> Moore, 1909	225a	Phyllodocidae
<i>Phyllodoce</i> sp.	11a, 45a, 46b	Phyllodocidae
phyllodocids	46a, 61b, 65, 66a, 80a, 80b, 108, 207, 224e, 234	

Name of Species	Sample Number	Name of Family
<i>Pilargis ?maculata</i> Hartman, 1947	108	Pilargiidae
<i>Pilargis</i> spp.	66a, 148, 158, 161, 196, ?209a	Pilargiidae
? <i>Pionosyllis</i> sp.	108	Syllidae
<i>Pisione</i> , near <i>remota</i> (Southern) 1914	14, 63b	Pisionidae
<i>Pista ?cristata</i> (Müller) 1776	45b, 59b, 65, 80b, 108, 122, 207, 225a	Terebellidae
<i>Pista disjuncta</i> Moore, 1923	158	Terebellidae
<i>Pista elongata</i> Moore, 1909	45b, ?207, 224e	Terebellidae
<i>Pista</i> spp.	41b, 42a, 44b, 45a, 46b, 66a, 80a, 82, 96, 108, 123a, 133, 159a, 172, 185, 193, 224e	Terebellidae
<i>Podarke pugettensis</i> Johnson, 1901	44b	Hesionidae
<i>Podarke</i> spp.	29, 42a, 45a, 45b, 66a, 108, 133, 146, 159a	Hesionidae
<i>Poecilochaetus johnsoni</i> Hartman, 1939	45a, 46a, 108, 109, 224d	Disomidae
<i>Poecilochaetus</i> sp.	28, 46b, 49, 66a, 159a, 164a, 185, 249	Disomidae
<i>Polycirrus</i> sp.	49, ?65, 186a, 224d, 236	Terebellidae
<i>Polydora</i> , near <i>armata</i> Langerhans, 1880	44b	Spionidae
<i>Polydora citrona</i> Hartman, 1941	44b	Spionidae
<i>Polydora</i> , near <i>ligni</i> Webster, 1879	44b	Spionidae
<i>Polydora</i> spp.	11a, 12a, 38, 41b, 42b, 61b, 159a, 173, 184a, 224e	Spionidae
polydorid	164a	
polynoids	6c, 10b, 11c, 12a, 23, 28, 46a, 109, 121b, 123a, 161, 173, 174, 186a, 211, 238a,	

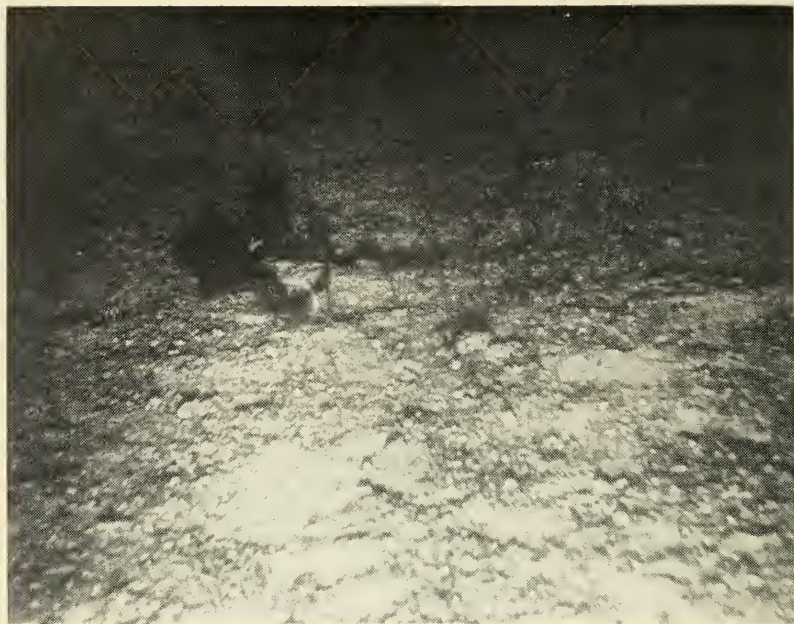
Name of Species	Sample Number	Name of Family
polynoids (cont.)	249, 267a	
<i>Polyodontes</i> , near <i>panamensis</i> (Chamberlin) 1919	159a	Polyodontidae
polyodontids	2, 5, 11c	
<i>Praxillella affinis pacifica</i> Berkeley, 1929	108	Maldanidae
<i>Praxillella</i> sp.	46b, 65, 81b, 82, 133, 215	Maldanidae
<i>Prionospio ?cirrifera</i> Wirén, 1883	12a, 225a	Spionidae
<i>Prionospio</i> , near <i>malmgreni</i> Claparède, 1870	28, 44b, 45a, 49, 60, 65, 66a, 80b, 81b, 82, 99b, 108, 128, 159a, 161, 164a, 224a, 224d	Spionidae
<i>Prionospio pinnata</i> Ehlers, 1901	1, 7b, 12a, 29, 31, 41b, 44b, 45a, 49, 60, 65, 66a, 80b, 82, 108, 109, 121b, 122, 126, 127, 128, 148, 158, 159a, 161, 164a, 185, 207, 224a, 224d, 225a, 252	Spionidae
<i>Prionospio</i> spp.	1, 6b, 6d, 7b, 10b, 46b, 63a, 80a, near 86, 97, 100, 101, 123a, 123b, 133, 172, 173, 174, 184a, 224e, 238a, 250a, 260	Spionidae
<i>Protula</i> sp.	11a, 23, 24, 36, 53, 54, 55, 56, 57, 69, 70, 71, 72, 89, 90, 91, 95, 96, 97, 119, 139, 143, 145, near 171, 189, 193, 194, 211, 227b, 248	Serpulidae
<i>Psammolyce</i> sp.	186a	Sigalionidae
<i>Pseudopotamilla</i> sp.	164a, 186a	Sabellidae
<i>Rhaphobranchium</i> sp.	80b, 122, 164a, 224e	Onuphidae
<i>Rhodine</i> sp.	28, 65, 148, 159a, 164a 184a, 185, 207, 248, 249, 252	Maldanidae
<i>Rhynchospio arenicola</i> Hartman, 1936	63a, 80b, 108	Spionidae

Name of Species	Sample Number	Name of Family
<i>Rhynchospio</i> sp.	49, 63b, 66a, 81b	Spionidae
<i>Sabella</i> , resembling <i>crassicornis</i> Sars, 1851	164a	Sabellidae
<i>Sabella</i> sp.	80b	Sabellidae
Sabellinae, new genus and species	119	Sabellidae
sabellids	6d, 12a, 18, 69, 80a, near 86, 100, 120, 123a, 146, 164a, near 171, 181, 185, 189, 204, 207, 212, 214, 224d, 224e	
<i>Sabellaria</i> sp.	45b, 159a	Sabellariidae
<i>Saccocirrus papillocercus</i> Bobretzky, 1871	50	Saccocirridae
<i>Salmacina</i> sp.	45b	Serpulidae
<i>Scalibregma</i> sp.	6d, 12a, 28, 29, 31, 45a, 45b, 46a, 46b, 49, 61b, 63b, 65, 66a, 80b, 82, 100, 101, 108, 109, 123a, 159a, 164a, 186a, 195, 212, 224d, 224e, 225a, 238a	Scalibregmidae
<i>Schistocomus</i> sp.	65, 66a, 80b	Ampharetidae
<i>Scionella</i> sp.	225a	Terebellidae
? <i>Scolecopsis</i> sp.	234	Spionidae
<i>Scoloplos</i> spp.	45a, 49, 63a, 63b, 80a, 81b, near 86, 101, 123a, 146, 148, 224d, 224e	Orbiniidae
? <i>Semiodera</i> sp. serpulids	186a 38, 39, 159a, 164a, 172, 196 224e, 227a	Flabelligeridae
sigalionids	18, 28, 46b, 61b, 80a, 80b, 100, 108, 123a, 123b, 133, 164a, 185, 224e	
<i>Sphaerodorum</i> spp. sphaerodorids	near 86, 108, 133, 173, 185 123a, 174, 267a	Sphaerodoridae
<i>Sphaerosyllis</i> sp.	?173	Syllidae
<i>Spio</i> n. sp.	224a	Spionidae
<i>Spiochaetopterus</i> sp.	44b, 45a, 63b, 101, 108,	Chaetopteridae

Name of Species	Sample Number	Name of Family
<i>Spiochaetopterus</i> sp. (cont.)	122, 123a, 148, 159a, 164a, 186a, 207, 224d, 224e, 225a, 238a	
spionids	6a, 11c, 42a, 42b, 45b, 52, 63b, 66a, 69, near 86, 100, 109, 122, 133, 158, 159a, 186a, 238a, 249	
<i>Spiophanes missionensis</i> Hartman, 1941	44b, 46a, 63a, 108, 159a, 164a, 224d	Spionidae
<i>Spiophanes</i> sp.	7b, 24, 27, 29, 31, 42b, 45a, 46b, 49, 60, 61b, 65, 66a, 80a, 80b, 89, 100, 101, 122, 133, 146, ?148, near 171, 184a, 185, 193, 196, 207, 213, 224a, 224e	Spionidae
spirorbids	27, 45b, 109, 123a, 123b, 159a, 224e	Serpulidae
<i>Sternaspis</i> sp.	5, 46a, 46b, 61b, 65, 81b, 82, 108, 122, 123a, 123b, 128, 133, 159a, 161, 164a, 184a, 185, 186a, 207, 224a, 224d, 224e, 238a, 250a	Sternaspidae
<i>Sthenelais ?tertiaglabra</i> Moore, 1910	46a, 65	Sigalionidae
<i>Sthenelais</i> spp.	80b, 184a, 186a, ?207, 224a, 224d	Sigalionidae
<i>Sthenelanella uniformis</i> Moore, 1910	44b, 45a, 46a, 65, 80b, 108, 159a, 164a, 186a, 250a	Sigalionidae
<i>Sthenelanella</i> sp.	18, 27, 28, 45b, 61b, 82, 101, 123a, 207, 224a, 224d	Sigalionidae
<i>Streblosoma crassibranchia</i> Treadwell, 1914	44b, 45a, ?164a	Terebellidae
<i>Streblosoma</i> sp.	12a, 27, 28, 44a, 46a, ?61b, 81b, 82, 108, 173, ?186a, 207, 228	Terebellidae
Syllinae	45b	Syllidae
<i>Syllis</i> sp.	10b, 224e	Syllidae

Name of Species	Sample Number	Name of Family
syllids	11a, 28, 63a, 63b, 65, 66a, 80a, 80b, near 86, 99b, 123a, 159a, 174, 207, 236	
<i>Terebellides</i> sp.	5, 6c, 11a, 29, 31, 45a, 80a, 80b, 82, 99b, 108, 122, 126, 148, 159a, 161, 164a, 173, 184a, 185, 207, 213, 224a, 225a, 228	Tricho- branchidae
terebellids	1, 25, 31, 38, 42a, 45b, 52, 59b, 66a, 80a, near 86, 100, 109, 119, 161, 174, 184a, 185, 186a, 193, 224e	
<i>Thalenessa spinosa</i> (Hartman) 1939	63a, 63b, 82, 108, 123a, 123b, 225a, 234, 250a	Sigalionidae
<i>Thalenessa</i> sp.	45b, 65, 66a, 124, 224a, 224e	Sigalionidae
<i>Tharyx parvus</i> Berkeley, 1929	42b, 44b, ?164a, 224d	Cirratulidae
<i>Tharyx</i> spp.	29, 45a, 45b, 60, 66a, 80a, 81b, 82, 101, 123a, 124, 212, 213, 214, ?227b, 248, 250a	Cirratulidae
<i>Thelepus</i> sp.	10b, 207, 224e, 227a, 250a	Terebellidae
<i>Travisia</i> sp.	2, 6b, 44b, 105, 108, 123b, 133, 148, 159a, 164a, 225a 224e	Opheliidae
trichobranchiid	224e	
<i>Trypanosyllis</i> sp.	186a	Syllidae
<i>Typosyllis</i> sp.	45a, 69	Syllidae
<i>Vermiliopsis</i> sp.	186a, 224e, 238a	Serpulidae

PLATES



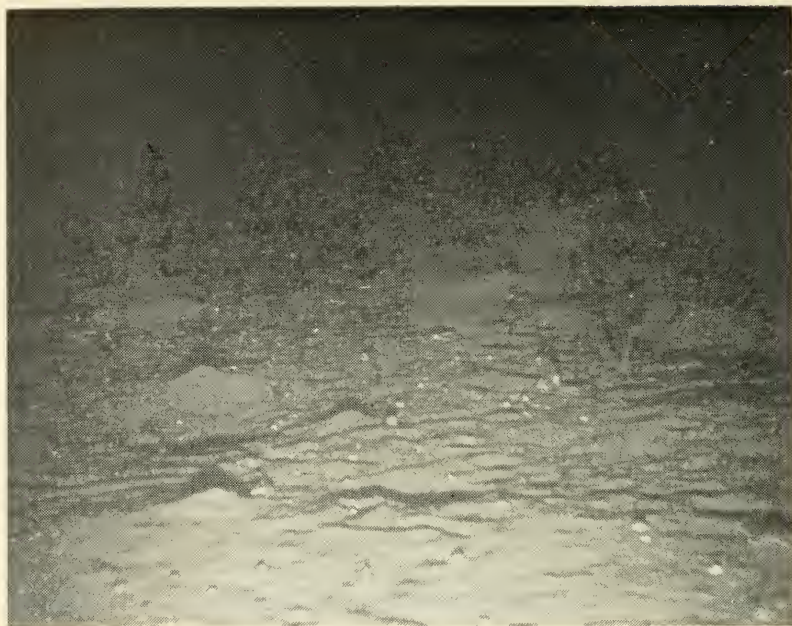
- 1.¹ Emerald Cove, Catalina Island, California. Nov. 17, 1951. In 17 fms. $33^{\circ} 28' 05''$ north latitude, $118^{\circ} 31' 17''$ west longitude. The rubby appearance is caused by masses of *Chactopterus* tubes, tubicolous anemones, and other tube-dwelling animals. A two sq. ft. sample yielded at least 60 species of metazoan invertebrates, of which 28 are annelids, 3 are enteropneusts, and the others are representatives of different phyla or classes of animals. The bottom is highly productive. The base line represents about five feet.

¹ Photographs 1 to 4 were made with the benthograph operating from the *Velero IV*, by William Fortun, staff photographer of the Allan Hancock Foundation.



2. Off Jew Fish Point, 200 yards NNE of Abalone Point and southeast of Avalon Bay, at the east end of Catalina Island, California. Sept. 22, 1951. In about 48 fms. $33^{\circ} 20' 47''$ north latitude, $118^{\circ} 18' 54''$ west longitude.

Surface features show tests of *Lytechinus*, sea whips, *Chloëia*. Hummocks are those of large maldanids, burrowing anemones, onuphids, and sigalionids. Depressions are made by ophiuroids, other annelids, etc. The bottom is richly populated. Size proportions can be estimated from the tests of *Lytechinus*, which measure 30 to 40 mm across.



3. In a deep part of San Pedro Basin, 11 miles northeast of Avalon, Catalina Island, California. Aug. 11, 1951. In 350 to 400 fms. $33^{\circ} 28' 00''$ north latitude, $118^{\circ} 11' 33''$ west longitude.

Surface features show tests of *Allocentrotus* (measuring 30 to 80 mm across), a crinoid at right center, a sea star at lower right. A two sq. ft. sample from the bottom yielded glass sponge, many foraminiferans, 20 or more species of annelids, many ophiuroids, and a high percentage of new or little known animals.



4. Off Jew Fish Point, southeast of Avalon Bay, Catalina Island, California. Sept. 22, 1951. In about 30 fms.

Surface features show many tests of *Lytechinus* (measuring 30 to 40 mm across), a sea whip, tangled tubes of *Phyllocharopterus* at lower left; the bottom is inhabited by many species of annelids, ophiuroids, and other invertebrate animals. The large hummocks are those of a large maldanid, the smaller are onuphid.

PLATE 3

- 5.² The Hayward orange-peel-grab, modified with canvas sleeve, hooked up for descent to the bottom, shown on the rear working deck of the *Veleo II*.
6. Hoisted through the A-frame with the aid of air compression, showing position of the claws at greatest extension.
7. Turned to show arrangement of canvas flaps which permit escape of air or water, but prevent escape of solid particles.
8. About to enter the water over the point selected for investigation, showing the hook-up mechanism with the end of the cable.

²The following photographs were made by Roy V. George, staff photographer of the Allan Hancock Foundation, except No. 15, which was made by Floyd E. Durham.

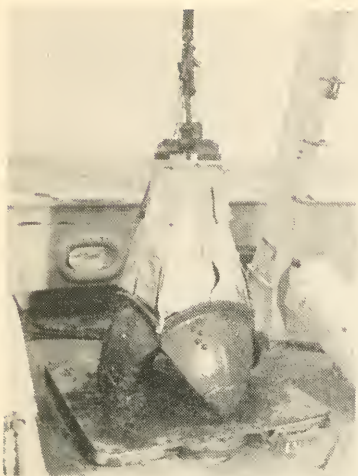


Fig. 5

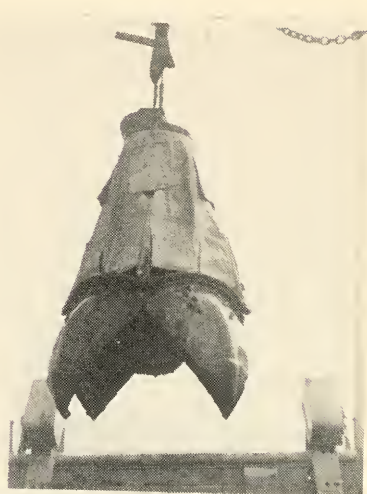


Fig. 6

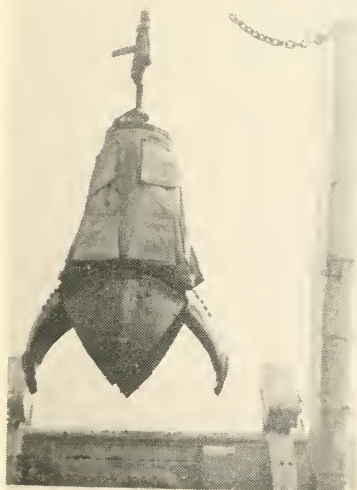


Fig. 7



Fig. 8

PLATE 4

9. The A-frame at its greatest extension, with the orange-peel-grab still descending; the cable taut, shown diagonally across the picture.
10. The grab loaded with a sample from the bottom, just after breaking the surface of the water; the jaws are well closed to prevent the loss of contents.
11. The sample is hoisted through the A-frame and about to be hooked to the chain and released from its cable, before it is brought down.
12. It is placed over its large retaining tub on the rear platform of the *Vclero II*, and opened, to empty its contents in the tub.



Fig. 9



Fig. 10

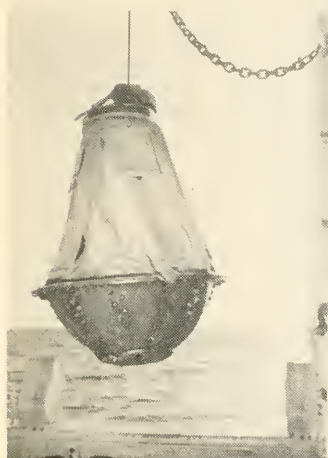


Fig. 11

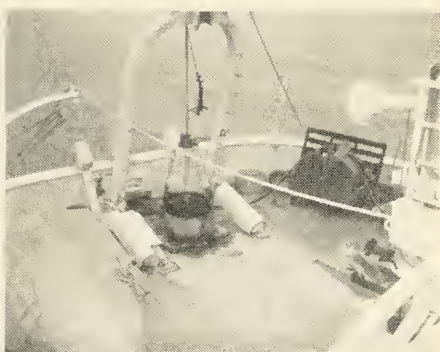


Fig. 12

PLATE 5

13. The tub with its load of mud is pulled out from under the grab and its contents are about to be measured with a graduated brass rule. Two half-pint samples are set aside for geological study.
14. The tub is moved to a screen assembly, consisting of 4 assorted screens (ranging in size from coarse to fine mesh) on a table of convenient height. The finest or lowest screen has a mesh that measures 24 meshes to the inch.
15. The screen assembly is equipped with an overhead shower spray which washes the sample; the particles are thus sorted to size; then they are transferred to jars and fixed with formalized seawater.
16. The screen assembly is provided with a shaker device, located under the bottom screen and operated with a small motor housed at its far end; the sorting trays are on a raised platform, shown to the left of the picture.

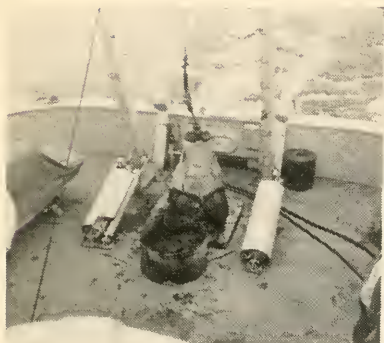


Fig. 13

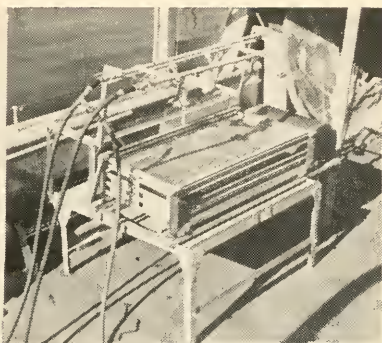


Fig. 14



Fig. 15

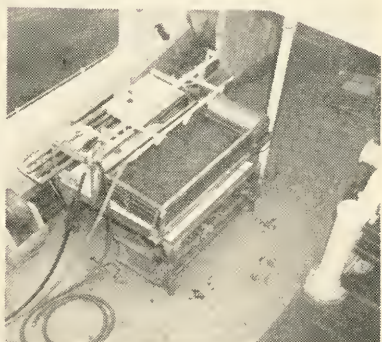


Fig. 16

PLATE 6

17. The Campbell grab, named for its designer, Alex Campbell, has a capacity of about 4.46 cu. ft., and weighs about 900 pounds; it was devised to take samples from hard-packed bottoms; it is shown open, suspended in the A-frame on the working deck of the *Victro II*. Area covered, 6 sq. ft.
18. It is attached to the cable and hoisted overboard, with its trigger mechanism set to shut on striking bottom; the vents to permit escape of air or water pressure, are visible at the upper end of the shell; they are covered by flaps to prevent escape of mud.
19. The grab returns from the bottom with a load of mud; its jaws close tightly so that even water is retained.
20. It is hoisted over its large retaining tub and hooked to its chains, which are mechanically pulled to open the grab.

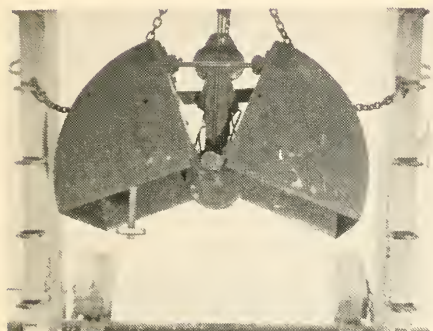


Fig. 17

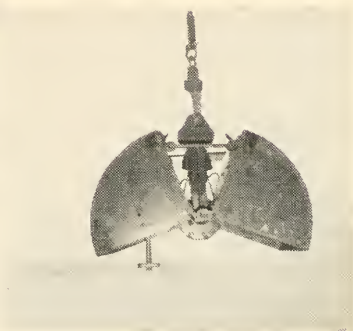


Fig. 18

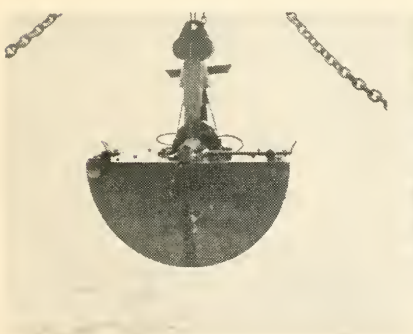


Fig. 19

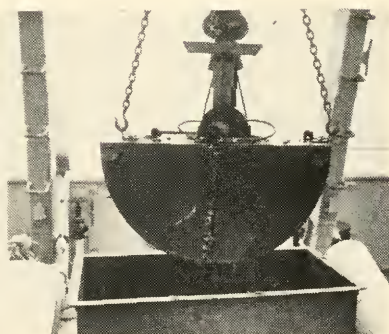


Fig. 20

PLATE 7

21. The Campbell grab has emptied its contents into a rectangular tub which easily accommodates its load; the tub is mounted on a castored base to permit moving across the deck of the *Vclero II*.
22. The mud in the tub is measured and two half-pint samples are removed for future geological study; the grab is cleaned and readied for another sample.
23. The screen assembly seen from the top, showing the six shower-heads and the sorting trays; a canvas bag is in place over the screen base, to catch smaller bits that are then washed into jars for preservation.
24. The large Dragger winch on the working deck of the *Vclero II*, showing the drum within its housing and the extending cable seen across the lower left of the picture.

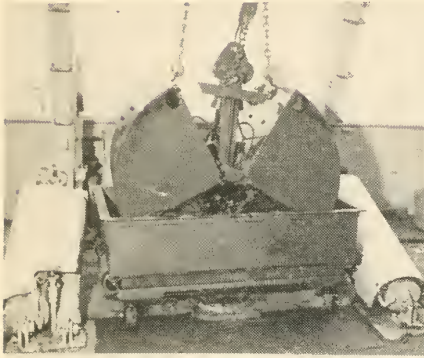


Fig. 21

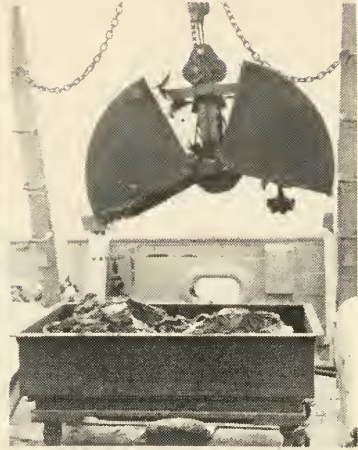


Fig. 22



Fig. 23

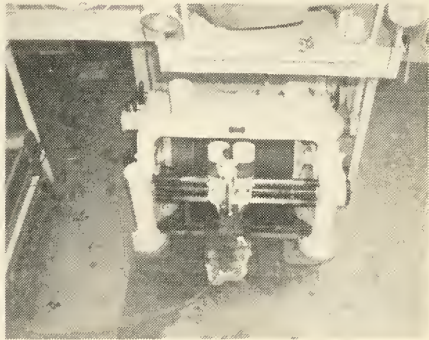


Fig. 24

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PART II

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(Maps 1-2, Plates 1-13)

BY

OLGA HARTMAN



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TABLE OF CONTENTS

	Pages
INTRODUCTION	187
METHODS	189
SUMMARY OF RESULTS	190
ACKNOWLEDGEMENTS	191
DESCRIPTIONS OF NEW AND LITTLE KNOWN POLYCHAETOUS ANNELIDS	192
ANALYSES, BY AREAS	205
MAP OF THE SAN PEDRO REGION	207
MAP OF THE SANTA CATALINA ISLAND AREA	208
LOS ANGELES-LONG BEACH OUTER HARBOR, with chart	209
PALOS VERDES SHELF AND SLOPE, with chart	219
SAN PEDRO SHELF, with chart	251
SAN PEDRO SLOPE, with chart	289
NEWPORT SHELF, with chart	316
SUBMERGED SEA MOUNTS, with chart	326
SANTA CATALINA ISLAND, LEEWARD SIDE, with chart	333
SANTA CATALINA ISLAND, WINDWARD SIDE, with chart	371
PHOTOGRAPHIC RECORDS, with chart	389

TABLE OF CONTENTS

	Pages
ALPHABETICAL LISTS OF SPECIES NAMED FROM THESE AREAS	397
POLYCHAETES	397
ECHINODERMS	409
MOLLUSKS	411
BRYOZOANS FROM FARNSWORTH BANK, by William Banta	419
SERIAL NUMBERS 11 to 267, WITH STATION NUMBERS	422
LITERATURE CITED	426
PLATES	429
INDEX	456

QUANTITATIVE SURVEY OF THE BENTHOS OF SAN PEDRO BASIN, SOUTHERN CALIFORNIA

PART II

FINAL RESULTS AND CONCLUSIONS

INTRODUCTION

This is a continuation and conclusion of the study of the San Pedro area for which preliminary results have been published (Hartman, 1955). This area (Map 1) lies between the mainland of southern California and Santa Catalina Island (Map 2), in 33° and 34° north Latitude, and 117° to 119° west Longitude. The submarine lands comprise more than 1060 square miles, of which the shelflands make up about a fourth, the slopes and canyons together about half, and the San Pedro Basin nearly a fourth. The terrain is rugged, consisting of shelf, slope, canyon, basin and sea mount features; depths range from a few to 495 fathoms. This large, partly enclosed, oceanic area receives not only the discharge of the Los Angeles, San Gabriel and Santa Ana Rivers which drain the slopes of the lofty San Gabriel and San Bernardino Mountains, but also the liquid effluent wastes of populous Los Angeles County. As a result, much terrigenous material is carried downstream to the sea, where long-shore currents, chiefly with a southeasterly drift, pick up the loads, to deposit the coarser gravels along the beaches and shallow shelf; the sands, silts and muds are carried successively farther out, or may be deposited in the canyons and San Pedro Basin. All but the finest particles may have been filtered out before the nutrient-rich waters reach the outer shelf and slope. As a result, the long-shore shelves and slopes are heavily populated with a richly diversified benthic fauna, which attains its maximum development along the Palos Verdes and the San Pedro shelves. These benthic populations chiefly represent a few groups, includ-

ing infaunal polychaetes, nemerteans, enteropneusts, and some others. They maintain a dynamic stability, showing no seasonal differences, and have continued to flourish through several years.

This broadly oval submarine area was marked off as a grid, at about two-mile intervals, resulting in 267 intersecting points (Hartman, 1955, pp. 6, 7). Grab samples were taken from these pre-selected sites, and analyzed for their specific components. The samples varied greatly in volumetric sizes, ranging from 0.06 to nearly 3 cubic feet. The surface areas covered by the sampler probably varied far less, because the initial bite-size was more nearly equal for all samples. The sampler was effective in taking surface scratchings, where the largest numbers of animals are known to occur. In assessing unit quantitative values, therefore, not only differences in grab sizes, but kinds of substrata are to be considered. It is further noteworthy that all final values must be considered minimal, for only those organisms which finally reached the microscope and the specialist could be fully named and recorded. In this study, therefore, it would be meaningless to re-assess these areal quantities to units of a square meter, for it has been observed repeatedly that the aggregates of animals in the San Pedro area occur in small patches, with surface units perhaps much less than a square meter. Even more importantly, it has been shown that the faunal units are patchy, differing greatly from one sample to the next.

Except for differences in contour, the physical features are fairly uniform. Salinity is nearly constant throughout the year, ranging from 33.5% near the surface (physical data are from Emery, 1960, p. 108) to 34.29% in 100 fms. There is some indication that lowered salinities occur in scattered spots, possibly near aquifers, as indicated by the presence of peak numbers of the polychaete *Capitella capitata* subspp. Such spots have been found in the San Pedro shelf as well as in other offshore places (Hartman, 1961a). Temperatures in the sediments vary little, from 12.5°C near the surface, to 8.5°C in 100 fms, and 5.06°C in 495 fms, in the San Pedro basin. Dissolved oxygen varies from 5.5 ml/l at 50 fms, 1.5 ml/l at 100 fms, to only 0.2 ml/l in the San Pedro basin, where there is almost no life. Sediments are chiefly sands, with coarser fractions near beaches and increasingly finer sands at greater distances from shore; sands change to silty sands, sandy silts and then to clays and oozes along deep slopes, in canyon and basin depths, and axes of canyons, and their lower ends may have coarse gravels (Emery and Hülsemann, 1963, p. 62). Some rocky outcrops, such as the sea mounts, are conspicuous in a few places. Red sands, near Alamitos Bay, in 3 to 7.5 fms, and near the center of San Pedro shelf, are sparse.

METHODS

This planned procedure was more or less consistently followed: (1) The samples were collected, usually with the orange-peel grab, less often with the larger Campbell grab, and processed aboard ship, using a screen with finest mesh slightly less than a millimeter. (2) The washed samples were fixed in formalin-seawater, and then transferred to the laboratory, where more complete sorting and washing were done. Larger macroscopic animals were removed, some of the larger ones weighed, and assessments made of the largest individuals in the sample, the most conspicuous species, and the general characteristics of the faunal population. (3) As many as possible of the invertebrate animals were identified to the specific level, and counts made of individual species. Smaller animals, including nematodes, small crustaceans (amphipods, isopods, cumaceans, tanaids, ostracods, and others) as well as juvenile stages of other animals, were probably taken only very incompletely because of the coarse techniques employed. It is therefore all the more noteworthy that large numbers of these and other animals were retained in the individual samples.

(4) Many species from southern California were newly described, based on specimens found in the materials. Separate reports have been issued for some major groups. Amphipods have been studied by Dr. J. Laurens Barnard (1957-1963) and Barnard and Given (1960), cumaceans by Mr. Robert Given (1961, 1964) and Barnard and Given (1961) and some isopods by Dr. Robert Menzies (1959). Echinoderms were identified by Mr. Fred Ziesenhenné (1951) and Barnard and Ziesenhenné (1961) and polychaetes by Hartman (1955-1963). Mollusks were studied by Mr. Gilbert F. Jones (1963, 1965), the late Dr. Norman Mattox (1955, 1958) and Dr. Mathilde Schwabl (1961, 1963). There still remain many groups of animals requiring study, the most important of which are nemerteans, sipunculids, enteropneusts, ostracods, tanaids, ceriantharian and other coelenterates, and nematodes.

(5) The distributions of individual species, with their relative abundance, were named for each of the selected areas, and plotted by increasing depth (see charts following the analyses for each area). These show not only the recurrence of each species in single areas but throughout the region, and associated ecological groupings, in a frame of reference.

SUMMARY OF RESULTS

A sampler lowered almost anywhere off the coast of southern California recovers an amazing array of kinds of animals. These kinds and numbers vary from one sample to the next and attain large numbers in shallow bottoms. This diversity extends not only to most samples and in all kinds of sediments, but throughout the year, with little indication of season. It is difficult to relocate the exact spot from which a sample was taken, except in shallowest bottoms or in few places where one or few species are known to occur in massed numbers. Such are some known *Dendraster* and *Capitella* bottoms, where exceptional aggregates occur. Usually the numbers of species in a sample from shallow bottoms range to a hundred or more, with individuals numbering to near five thousand. These species occur as aggregates, where the presence of one generally indicates that of other kinds; they seem to maintain their restricted locations over periods of years, as proven by subsequent probes in successive seasons and years.

The kinds of species and their respective numbers, the stages of development, and the state of maturity, as well as the associations with other groups in the sample, are repetitive characteristics and should therefore be predictable.

Samples with large numbers of specimens are generally characterized by having one or a few species with exceptionally high numbers of individuals; these specific units may change from one sample to the next, and their occurrences are not as predictable as are the aggregated species with which they occur. Their kinds and distributions are indicated by an asterisk in the charts, below. Exception must be made for the *Amphiodia urtica-Pectinaria californiensis* association, in which individual numbers continue high along most of the edge of the San Pedro shelf and in other areas remote from shore, especially where sediments are somewhat impoverished. Isolated peak numbers are indicated for many of the more than 600 species named below. Peak numbers may be partly explained by the successful establishment of spatfalls of larvae, but they do not explain the continuance of the colony through successive generations.

Specific diversity in southern California is so characteristic that large-scale communities of organisms cannot be identified. Exception may be made for a *Listriolobus pelodes* colony on the Santa Barbara shelf (Barnard and Hartman, 1959) where a continuous shelf depth is occupied by an identifiable community of organisms.

Numbers of species and specimens are highest in shelf depths, and lowest in outer slopes and the oxygen-impoverished, long-shore basin

(Hartman and Barnard, 1958, p. 29). Numbers of species and specimens have ranged to 88 species and about 4500 specimens per sample.

Biomasses are highest in long-shore areas, especially the Palos Verdes and San Pedro shelves, where the sediments are enriched by the runoff of the mainland. Single samples have yielded a gross moist weight of 768 grams per sample, and similar high biomasses have been found on the San Pedro shelf and other places along the shelflands of southern California (see California, 1965a, 1965b, pp. 104-319).

Most of the species named below may be expected to produce individuals with a short life span, not exceeding a year. cursory examinations have shown that ova are usually numerous in mature individuals, insuring the wide dispersal of larval stages, well beyond the limits in which the species normally settles and matures. Nearly all can be expected to occur in competition with others, where space, food, protection from predators are factors determining survival and further reproduction. The fact remains that most of the benthic stages of these species continue to exist only in selected places. It must be assumed that these areas are previously biologically conditioned by the predecessors of the same species.

This horizontal distributional pattern is closely linked to that of vertical zonation, for it can be seen (see charts) that replacement of closely related species, by depth, is a constant factor of these benthic animals. The result is a stepping-stone effect, where greater depths result in a dropping out of many species, and additions of others. This effect is illustrated not only for the polychaetes, but for echinoderms and mollusks, and may extend to other well represented groups. It has also been demonstrated for the faunas in the submarine canyons of southern California (Hartman, 1963a).

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were identified by Mr. Fred Ziesenhene; the mollusks were studied by Mr. Gilbert F. Jones and the late Dr. Norman Mattox. Crustaceans were identified or described by various specialists; Dr. J. Laurens Barnard studied the amphipods, Mr. Robert Given the cumaceans, Dr. Robert Menzies some of the isopods, and Mr. William Banta the bryozoans from the Farnsworth Bank. Professor K. O. Emery provided copies of photographs from submarine areas off Santa Catalina Island. The National Science Foundation, through grant no. B5-1780, supported Mrs. Hannelore Paxton, who assisted in the organization and preparation of the manuscript, and Mr. Carl Petterson, illustrator, who prepared the illustrations for plates 1 to 6, and arranged the photographs for plates 8 to 14. Mr. Anker Peterson prepared the figures on plate 7. Mrs. Dorothy Halmos, Editor of the Hancock Publications, gave invaluable aid in the final preparation of the manuscript. To all of these people and institutions, I am most deeply indebted.

DESCRIPTIONS OF NEW AND LITTLE KNOWN
POLYCHAETOUS ANNELIDS FROM THE
SAN PEDRO REGION

The benthic samples taken from the San Pedro region were unusually productive of polychaetous annelids, and resulted in the recovery of species heretofore unknown. Some are here described.

Family POLYNOIDAE

Genus *Gattyana* McIntosh, 1900

Gattyana brunnea, new species

(Plate 1, Figs. 1-3)

Collection: Sta. 2154 (TYPE).

A small, linear, depressed species, it measures 15 mm long by 2 mm wide with parapodia, and has 30 segments. Elytra number 15 pairs and completely cover the dorsum. The prostomium has two pairs of eyes; the anterior ones are in front of midlength and at sides, and the posterior pair nearer together, and at the posterior margin of the prostomium. Elytra are subcircular (Fig. 1) in anteriormost segments, where they are large, dusky brown and have a chalky white spot over the elytral scar; their lateral margins are smooth in the first pairs, then have a sparse marginal fringe at outer lateral edges, with the fringe in a single row; they are never fimbriated as in other species of the genus. The upper surface of elytra appears smooth but is sparsely covered with low, inconspicuous surface nodules.

Notosetae occur in small, close fascicles and do not extend to the distal ends of neuropodial lobes. Notosetae are hairlike; under high magnification they show deep lateral serrations (Fig. 2). Neurosetae (Fig. 3) are much coarser; each is distally entire, the tip long, smooth, slightly falcate, and with four to seven rows of serrations subproximally.

Gattyana brunnea approaches *G. ciliata* Moore (1902, p. 263) from which it differs in lacking heavy elytral fringe, and in the details of parapodial setae.

Gattyana brunnea was taken only at Sixmile bank, in 300 fms, in rocky bottom.

Genus *Halosydna* Kinberg, 1855

Halosydna latior Chamberlin, 1919

Halosydna latior Chamberlin, 1919:1-2; Rioja, 1941:680.

Collections: Many specimens come from shallow depths off southern California, usually in a large gastropod shell occupied by a pagurid crab, especially in shells of *Polinices* and *Strombus* occupied by *Holopagurus pilosus* Holmes. The commensal polynoid is usually paired, with the individuals near the anterior end of the crab. The body is greatly depressed, unusually broad for a *Halosydna*; its length is 40 to 50 mm, its width 14 to 20 mm, and segments number 37. The 18 pairs of elytra are broadly imbricated and completely cover the body. The prostomium has two pairs of moderately large eyes, the anterior pair just in front of mid-length, the posterior pair nearer together and near the posterior margin. Parapodia are distinctly biramous with smaller notopodia and larger neuropodia. Neurosetae are thick, distally falcate, the tip entire. Elytra are characteristic; they have broad, smooth surfaces and enlarged, very flat, pale pustules in an area behind the elytral scar.

Halosydna latior is recorded from southern California and western Mexico, in shelf depths; its association with pagurid crabs is not previously mentioned.

Genus *Harmothoe* Kinberg, 1855

Harmothoe priops Hartman, 1961

(Plate 1, Figs. 4-6)

Harmothoe priops Hartman, 1961b:50-51; Hartman, 1963b:3.

Collections: Sta. 2314; Sta. 4886.

The body is about 7 mm long, 0.7 mm wide, and segments number 39. The dorsum is crossed by broad, reddish brown pigment bars which

are most intense between dorsal parapodial bases. The prostomium (Fig. 4) has distinct peaks and a deep median groove at the insertion of the median antenna. The anterior prostomial eyes are under the frontal peaks, and the posterior ones on the posterior third of the lobe; in addition, 10 to 20 irregularly dispersed small black spots are on the posterior third of the lobe. Notosetae (Fig. 5) are of one kind; each is long, slender, distally whiplike, and serrated along the cutting edge. Neurosetae are of two kinds; supra-acicular ones are similar to the notosetae; subacicular setae are thicker and distally bifid (Fig. 6).

Harmothoe priops is known from southern California, in shelf, slope and canyon depths, in silty mud bottoms.

Family HESIONIDAE

Genus *Hesionura* Hartmann-Schroeder, 1958

Hesionura coineau *difficilis* (Banse, 1963)

Eteonides coineau *difficilis* Banse, 1963:197-200, fig. 1; Hartmann-Schroeder, 1963:223-225, figs. 33-35.

Collection: Sta. 3595 (15+).

The body is small, slender, measures 3.5 to 5.6 mm long; its color is translucent yellow, with a dark brown pharyngeal region. The everted proboscis is dark brown, completely covered with coarse papillae in dispersed arrangement. The long trapezoidal prostomium has two pairs of long, cirriform antennae inserted at the frontal margin, and two or three small black eyespots near its posterior end. The first segment is a simple ring with a pair of long, tentacular cirri; the second segment has a pair of similar long, dorsal cirri and a pair of normal ventral cirri; the third segment is the first setigerous and has embedded acicula. The formula

$$1 \quad 0$$

may be expressed thus: $1 + \frac{1}{N} + Sa - \frac{0}{N}$. Parapodia are uniramous,

with smaller dorsal and larger ventral cirri. Setae are in small, fan-shaped fascicles, number about five or six in a bundle; all are composite, the appendage bladeliike and ridged along its length.

Previously known only from San Juan Archipelago, Washington, in 20 and 100 m, from coarse, clean sand with broken shells, it is here reported from Farnsworth Bank, outer side of Santa Catalina Island, in 16 fms.

Family SYLLIDAE

Genus *Eusyllis* Malmgren, 1867*Eusyllis transecta*, new species

(Plate 2)

Collection: Sta. 2006 (12, TYPE).

The body is short, thick and fragile; it measures 6.1 mm long by 0.8 mm wide between segments 10-20, or at its widest part; it has 46 segments. The dorsum (preserved) is crossed by black bars, at segmental grooves. The prostomium (Fig. 1) is subquadrate, wider than long, has four small eyes in trapezoidal arrangement, behind the insertion of the paired antennae; the anterior, slightly larger pair are wider apart than the posterior pair. The median antenna is much the longest, inserted behind the paired antennae; its length is about 2.5 times that of the paired ones, which are about as long as the second dorsal cirri. Antennae, dorsal and tentacular cirri appear smooth, but show weak annulations under magnification.

Palpi are short, broad; the two are fused at the base; each is directed forward for a length equal to that of the prostomium. The retracted proboscis and proventriculus extend through segments 1 to 5 and 6 to 11 respectively. The dissected pharynx is cylindrical; it terminates anteriorly in a serrated margin (Fig. 2); its dorsal arc is slightly crenulated and the ventral arc has 18 pointed teeth which increase in length midventrally. A large, middorsal tooth (Fig. 3) is embedded in the pharyngeal tissue some distance beyond the anterior edge (Fig. 3, seen in lateral view).

The first segment, or peristomium, slightly overlaps the prostomium medially; its tentacular cirri are long, with the dorsal pair the longest, exceeded only in length by the median prostomial antenna. The second segment is the first parapodial one; its ventral cirri are cirriform, and farther back they are short, triangular. All parapodia (Fig. 4) are lateral, have long, pseudoarticulate dorsal cirri which diminish in length posteriorly, or alternate long and short in anterior segments. Ventral cirri, from the second, are short, triangular, exceeded in length by the acicular lobes. Anterior and median parapodia have setae of two kinds; the superior-most, supra-acicular one is long, slender, distally pointed and laterally slightly dentate (Fig. 5). Subacicular setae number 9 to 12 in a fascicle; each is composite, distally falcate; anterior ones (Fig. 6) have a slightly longer appendage than posterior ones, and are dentate along the cutting edge; posterior setae have a shaft distally dentate and the appendage is smooth (Fig. 7). Acicula occur singly in a ramus; each is straight and

distally slightly club-shaped (Fig. 8). Posterior segments have simple, slender, superiormost setae, occurring singly in a fascicle; each has widely spaced denticles along the cutting edge. The body tapers posteriorly and terminates in a pair of long, cirriform, pygidial appendages.

Eusyllis transecta differs from other species of the genus in its pharyngeal formula; it has falcigerous setae which are distally entire. It has been recovered only from the San Pedro shelf, in 14 fms, where the trawl took algae, sand, rock and ascidians.

Genus **Sphaerosyllis** Claparède, 1863

Sphaerosyllis californiensis, new species

(Plate 3)

Collections: Sta. 5028 (66, TYPE); Sta. 4806 (57); Sta. 5102 (100+).

The body is small, depressed, linear and trim in appearance. Length is about 3.0 mm, width 0.5 mm, and segments number 32 to 34. The dorsal surface is papillated and convex; the ventral surface is nearly smooth and flat. The quadrate prostomium (Fig. 1) is wider than long, has a pair of broad palpi completely fused, and a slight, midfrontal emargination. The two pairs of eyes are in quadrate arrangement, with the two on a side nearly touching; the anterior pair are slightly the larger. Prostomial antennae resemble one another; all are short, clavate, their length less than that of the prostomium; the median one is inserted behind the middle of the lobe, and the paired ones are in front, within the anterior eyes.

The proventriculus, seen through the body wall (Fig. 1), is short, extends through setigerous segments 3 to 5, and is crossed by about 13 or 14 muscular bands. The anterior end of the pharynx terminates in 10 soft, widely spaced, small papillae; a conspicuous, blunt yellow, middorsal tooth is embedded in the pharyngeal wall.

The first segment is reduced to a lower lip or peristomium and a pair of bases for the tentacular cirri, best seen in ventral view; they project laterally, and in dorsal view are seen in line with the prostomial eyes. These cirri, and all other dorsal cirri are clavate, with a thick, bulbous base and a terminal digitate lobe exceeding in length that of the base. The second parapodia lack dorsal cirri, but all others have well developed ones.

Parapodia (Fig. 3) are similar throughout, but diminish in size posteriorly. Dorsal and ventral cirri are clavate, and taper distally. A superior-most, nearly straight acicular spinelike seta is present from the first, and

continues in posterior segments. This is followed inferiorly by three or four composite falcigers in which the appendage is longest (Fig. 4) in anteriormost segments, and diminishes in proportionate length farther back (Fig. 5); the distal end is falcate; the cutting edge has a few long, slender teeth in a single row. Each of the last few segments has, in addition, an inferiormost simple, slightly curved, spinelike seta (Fig. 6) directed ventrolaterally. Acicula occur singly in a ramus; each is a slender rod, distally club-shaped (Fig. 7).

The posterior end of the body terminates in a pair of short, laterally directed, clavate processes (Fig. 2) resembling the dorsal cirri.

Sphaerosyllis californiensis is characterized as follows: the epithelium is papillated; the first segment is reduced to a lower lip and a pair of tentacular bases, lying in line with the prostomial eyes; parapodia have simple setae in superiormost and inferiormost positions, and composite falcigers; acicula occur singly. It is unique for having the paired prostomial antennae inserted far forward, and the median one near the posterior end of the lobe. Composite falcigers have a few long teeth limited to the basal half of the appendage.

Sphaerosyllis californiensis occurs in San Pedro shelf, in silt and mixed sediments.

Family QUESTIDAE, new family

Genus *Questa*, new genus

Genotype: *Questa caudicirra*, new species

The body is long, linear and consists of many segments. The prostomium is a simple, triangular lobe without appendages. The first segment or peristomium is a smooth ring which is somewhat biannulated; all other segments have lateral, biramous parapodia in which notopodia and neuropodia are ventrolateral in median and posterior segments. Setae are simple, of two kinds, including slender, distally tapering ones and shorter, thicker, distally bifid hooks without a hood. The pygidium terminates in an anal pore bounded by paired cirri. The alimentary tract is simple, linear, with a pharyngeal region in the first four or five segments without jaws or other hard parts. A single species is known.

Questa caudicirra, new species

(Plate 4)

Collections: Sta. 3595 (20⁺, TYPE); Sta. 2298 (1).

The body is long, linear, measures 9 to 10 mm long by 0.275 mm wide and consists of 50 to 58 segments. All segments are smooth, plain,

with inconspicuous biramous parapodia (Fig. 1) from which the setae project in sparse fascicles; the last 9 to 15 segments have long, dorsally inserted branchiae. The posterior anal pore is surrounded by a pair of dorsolaterally and similar, slightly longer ventrolaterally inserted cirri-form processes (Fig. 2). The prostomium (Fig. 3) is a simple, depressed, bluntly triangular lobe without eyes. The first ring is smooth, or somewhat biannulate; all other segments are simple, uniannulate, with biramous parapodia. The first three segments have only slender, distally pointed setae in notopodia and neuropodia. The fourth segment has similar setae accompanied by thicker, distally falcate hooks with bifid tip; these hooks usually number one in a fascicle (Fig. 4), but an occasional one has two or three hooks, all of one kind. Numbers of setae and hooks in fascicles remain about the same except in posteriormost, branchial segments where setae are less conspicuous.

Each long seta (Fig. 5) is serrated along the cutting edge and its tip is pointed. The hook consists of a straight, embedded shaft, a slightly curved free region, and a broader, laterally directed fang, nearly at right angles to the shaft (Fig. 6); the accessory tooth is small and distal. The alimentary tract of some specimens contains white calcareous ooze, such as the sediments in the sample from which they were removed.

These small, linear worms may be allied to the PARAONIDAE, with which they agree in their small size, the presence of two kinds of setae, and the presence of a well developed, simple prostomium. They were at first thought to have affinities with oligochaetes, but this appears unlikely in view of the characteristics named.

Questa caudicirra was taken only on Farnsworth bank, Santa Catalina Island in 16 fms, and on Lasuen sea mount, in 68 fms.

Family CIRRATULIDAE

Genus *Cirratulus* Lamarck, 1801

Cirratulus, unknown species

Collection: Sta. 2737 (2).

These individuals differ from known species of the genus, and may represent an undescribed species. Length of the body is more than 30 mm, width 3 to 4.5 mm, and segments number more than 67 (the tail is lacking). The body is inflated through setigers 10 to 25, then depressed cylindrical. Segments are uniannulate, wider than long, smooth, their width up to 25 times that of their length in front, but only 1.5 times as wide as long in middle and posterior segments. Setae are long, silky,

laterally directed, their extended length 3.5 to 5 times as long as the body is wide. The prostomium is broad, thick, nearly semicircular; eyes have not been identified. The buccal region is triannulate, with each ring smooth, and longer than the prostomium or any body segment.

The first pair of branchiae are on the posterior margin of the third buccal segment. Branchiae are inserted immediately above the notopodial ridge, in median and posterior segments. Most branchiae have been lost from the specimen, so that it looks rather like a spindle-shaped oligochaete. All setae in anteriormost segments are slender and capillary. Thick, short, acicular spines are first present in neuropodia 32, or behind the anterior, inflated region; they number only one or two in a fascicle, and are located at the lower end of the fascicle; they are accompanied by slenderer, longer capillary setae. Similar but slenderer acicular spines also occur with long, slender, capillary setae. These spines are translucent yellow, nearly straight, taper to blunt points, and never number more than two or three in a fascicle, where they are accompanied by capillary setae.

This *Cirratulus* sp. has been taken only from West End, Santa Catalina Island, in 256 fms.

Family SCALIBREGMIDAE

Genus *Sclerocheilus* Grube, 1863

Sclerocheilus acirratulus, new species

(Plate 5, Figs. 1-5)

Collections: Sta. 1370 (4, TYPE); Sta. 1378 (2), White Cove, in *Eisenia* holdfasts (2).

Small individuals, yellow-orange in life, fading to colorless in alcohol, measure about 8.6 mm long by 1.4 mm wide near the middle of the body; they consist of 31 to 50 segments. The surface epithelium is rugose, with transverse annulations, or papillate, coarsest on the dorsum and less so ventrally. Median and posterior segments are quadri-annulated, with the rings equally long and most distinct in middle segments. Branchiae are absent. The prostomium is broadly T-shaped, with the lateral extensions continuous with the prostomium (Fig. 1). Two pairs of transverse reddish eye patches are conspicuous on its posterior half, with the two patches on a side near together, and the anterior ones the larger. The first segment is a short, smooth ring. The second, or first setigerous, segment is about twice as long as the first one; it has biramous parapodia with notopodia dorsolateral, and neuropodia lateral.

Notosetae of the first setiger are of two kinds; an anterior transverse row of five or six, coarse, spinelike setae (Fig. 2) is located in front of a posterior row of eight or nine slenderer, capillary ones (Fig. 3). The corresponding neurosetae are slender, capillary only, as in all successive parapodia. Median and posterior parapodia have, in addition, shorter, furcate setae in which the tines are spreading (Fig. 4) and the inner margins are serrated (Fig. 5).

Parapodia are short and truncate throughout; the setae emerge in front of short, postsetal lobes. Cirri are altogether absent, hence the specific name. The pygidium is a smooth ring without cirri.

Sclerocheilus acirratus differs from other species of the genus in lacking cirri. It may approach *S. minutus* Grube, from the Mediterranean Sea (Fauvel, 1927, p. 125), in having a single anterior segment with acicular setae. It differs from *S. minutus* in that these acicular spines are distally prolonged to slender tips, and the prostomium has four, instead of two eyes. The frontal extensions of the prostomium are continuous with the lobe, not set off by constrictions.

S. acirratus has been taken only in White Cove, Santa Catalina Island, in shallow depths, from holdfasts of *Eisenia arborca* (kelp). The species was first identified from samples taken by the VELERO 111 (See Fraser, 1943, for Station data), in holdfasts of this kelp. The same locality was investigated by Mr. Robert Given, where the same species was again located. It has been found nowhere else.

Genus *Asclerocheilus* Ashworth, 1901

Asclerocheilus californicus Hartman, 1963

(Plate 5, Figs. 6-9)

Asclerocheilus californicus Hartman, 1963b:56-57.

The body is long, arenicoliform, measures 43 mm long by 6 mm wide, and consists of more than 70 segments. The prostomium is triangular, broadest behind, and has a pair of thick, short, frontal processes resembling a pair of short antennae (Fig. 6); eyes are absent. The posterior end terminates in a pygidium surrounded by five short, tapering cirri; one is midventral and the others are lateral; the anal aperture is centered. Dorsal and ventral cirri are absent. Posterior parapodia are characterized by the great prolongation of superior and inferior lobes (Fig. 7) resembling dorsal and ventral cirri; they are first present from neuropodium six and notopodium seven, and continue long farther back. The first two setigerous segments have thick, acicular curved spines (Fig. 8)

in an anterior series, accompanied by longer, slenderer ones in a posterior row. Farther back, notopodia have only slender setae, and from about segment 20 they are accompanied by fewer, shorter furcate spines (Fig. 9). Neurosetae are similar to notosetae but shorter.

Asclerocheilus californicus is characterized by its greatly prolonged parapodial lobes in posterior parapodia. It is known from slope and canyon depths of southern California, in mud.

Asclerocheilus, unknown sp.

Collection: Sta. 3616 (2).

The larger specimen, in two pieces, measures 14 mm long by 1.6 mm wide in the thoracic or widest region. Segments number at least 62. The body is broadest and conspicuously rugose in the anterior third, and it tapers posteriorly, where the epithelium is less roughened. The prostomium is T-shaped, widest in front and laterally prolonged as a pair of horns which are continuous with the prostomium; a pair of conspicuous ocular patches occupies much of its first half, nearly meeting medially. The prostomium is posteriorly slightly overhung by the first short segment, a plain, incomplete ring surrounding the lobe only middorsally and laterally; the second segment is the first complete ring and its ventral part forms the lower lip.

The first two setigerous segments have thick, curved acicular spines, in an anterior series, accompanied by a posterior series of capillary setae, present in both notopodia and neuropodia. From the third segment the setae are smooth, long, capillary, and accompanied by conspicuous series of furcate setae, in both notopodia and neuropodia. Each furca has unequally long tines, with long, slender spinelike teeth along the inner cutting edges. Dorsal and ventral cirri, as well as branchiae, are totally lacking. Parapodia are clearly biramous, with notopodia and neuropodia represented by low, broad lobes, from which the setae project; the superior bases of setal fascicles are bounded by pale, glandular ridges. The pygidium terminates in 2 longer and 2 shorter, cirriform processes, directed laterally.

These specimens differ from known species of the genus in having ocular areas on the prostomium (see Uschakov, 1965:292).

The species has been taken only off East End, Santa Catalina Island, in 88 fms, in glauconitic sand.

Family SABELLIDAE

Genus *Euchone* Malmgren, 1866*Euchone arenae*, new species

(Plate 6, Figs. 1-6)

Collections: Sta. 2788 (23, TYPE) ; Sta. 2417 (2).

The body is short, thick, tumid and tapers posteriorly. It measures 3.8 mm long without, and 6.2 mm long with, the tentacular crown; width is 0.7 mm. Segments include 8 thoracic and 13 to 15 abdominal setigers; each is biannulate. A narrow, glistening white band, behind the second setigerous fascicle, surrounds the body. The tentacular crown is well developed; it consists of five to seven pairs of radioles, and two pairs of long slender filaments at the ventral ends of the radiolar base (of which only one is shown in Fig. 1). Peristomial eyes are not visible, but may be faded. A palmate membrane comprises less than a fourth of the radiolar length; it is inconspicuous. A pair of reddish eyes is visible in the pygidium, in some individuals.

The thoracic collar is continuous all around and of uniform length; it is deeply cleft middorsally, where it joins the thoracic segment; a slight midventral cleft is distinguishable.

The collar segment resembles those farther back but lacks neurosetae. Its notosetae are slender, limbate and number four or five in a fascicle. More posterior thoracic notopodia have setae of two kinds; three or four in superior position are long, limbate (Fig. 2), and four to six are short, subspatulate (Fig. 3). The corresponding neuropodia have long-handled uncini, in which the distal end is a large fang (Fig. 4) surmounted by three smaller teeth in a row.

Abdominal parapodia have thick, short uncini in notopodia; they number six to eight in a row; each has a thick, broad base, a large curved fang surmounted by three or four rows of small denticles, in transverse rows (Fig. 5). The corresponding neuropodia have capillary setae, numbering three to five in a fascicle.

The posterior end terminates in an anal groove (Fig. 6) in which the last six setigerous segments are involved; this may be broadly open, as shown in the figure, or somewhat curled inward. The groove is followed by a small triangular pygidium with dorsal anal pore.

Euchone arenae differs from known species of the genus in having six setigerous segments in the anal groove. Thoracic notosetae are essentially of one kind, with the superior longer and less curved but otherwise similar to the inferior shorter ones.

Euchone arenae has been taken near Redondo Beach, in 9.5 fms, off Point Fermin, in 34 fms, and off Point Loma light, in 23 fms, in sediments of reddish brown sand.

***Euchone incolor* Hartman, 1965**

Euchone incolor Hartman, 1965:231-232, pl. 51.

Collections: Sta. 2298 (15) ; Sta. 3585 (3).

Total length, excluding the tentacular crown, is 2.1 to 2.2 mm; width is 0.3 mm; segments include 8 thoracic and 8 abdominal setigers. The body is slender and linear. The flaring tentacular crown consists of four pairs of radioles, each with paired rows of pinnules; they extend distally for a length nearly one-fourth that of the body. A pair of slender cirriform radioles is present at the ventralmost end of the crown. The thoracic collar is large, voluminous and covers most of the peristomium; it has a straight, continuous margin, and is incised middorsally. Eyes have not been distinguished. The anal groove extends through the last three segments. Collar setae are slender, limbate and number about five in a fascicle. Other thoracic notosetae are slender and limbate; neurosetae are long-handled uncini with a large fang, surmounted by three smaller teeth.

Previously known from the western Atlantic Ocean, in shelf to abyssal depths (Hartman, 1965, p. 232), this is here recorded from the Lasuen sea mount, in 68 fms, and off Farnsworth bank, in 23 fms.

***Euchone limicola* Reish, 1959, redescribed**

(Plate 6, Figs. 7-10)

Euchone limicola Reish, 1959:717-719, figs. 1-5.

Collection: Type collection from Alamitos Bay marina, and Long Beach outer harbor.

Length of the body is 8 mm of which the crown measures 2 mm; segments include 8 thoracic and 18 abdominal, of which the last 10 setigers are involved in the anal groove (Fig. 10). The tentacular crown consists of seven pairs of radioles, each with many filaments in pairs; the palmate membrane is very low and nearly lacking. Ventral scutes or glandular areas continue through seven thoracic setigers; the last one is least developed, and all are transversely divided, in line with the biannulation of the thoracic segments. Thoracic notosetae are of two kinds; the superior ones are longest and slenderly limbate; the inferior ones are abruptly shorter, and broadly limbate (Fig. 7). Abdominal uncini are avicular, with short, thick base, large, curved fang surmounted by many teeth in four to six transverse rows (Figs. 8, 9), each row with four to seven teeth.

Euchone limicola is an estuarine form, limited to harbor areas, in sandy mud.

Family SERPULIDAE

Genus *Spirobranchus* Blainville, 1818

Spirobranchus spinosus Moore, 1923

(Plate 7)

Spirobranchus spinosus Moore, 1923 :248-250, pl. 18, fig. 47.

Collections: Isthmus Cove, Santa Catalina Island.

This brilliantly multi-colored serpulid is one of the conspicuous encrusting forms along the leeward side of Santa Catalina Island, and along outer, rocky insular coves off southern California. Its hard, stony, white tubes encrust rocky walls at and below intertidal levels. When the animals are extended, they present a variety of red and white banded, or black, blue and brown banded crowns. A slight disturbance at the surface will cause the entire colony to withdraw, revealing the purple-white tubes; these are longitudinally ridged and often diffused with red and blue pigments along the ridges.

The only known account of this species was made from a single imperfect specimen, 23 mm long, taken off Santa Barbara Island, in 29 fms, in fine yellow sand and coralline rock (possibly only from the coralline rock). Because of its abundance at Santa Catalina Island, the species is here more fully described. The body of adult specimens measures 20 to 25 mm long, the radioles being 6.2 mm long. Width in the thorax is 2.5 mm and in the collar region 4 to 5 mm. The tentacular crown has paired, inrolled halves; each consists of 45 to 50 radioles, coiled in about three spirals, and the lateral pinnae are paired with the longest outermost and the shortest innermost and most distal. The radioles are basally united by a palmate membrane for about two-fifths of the total length. The opercular stalk is unpaired (Fig. 1), formed of the dorsalmost left radiole; it terminates in a broad, circular, calcareous disk which extends distally to near the ends of the radioles; the disk has a pair of smaller inner branched spines (Fig. 2), and a pair of larger outer branched spines. The pedicle is cylindrical for half its basal length, then has a pair of broadly expanded lateral wings which extend distally to near the base of the distal disk. The operculum is sometimes partly overgrown with other organisms, especially bryozoans, spirorbids, sponge masses, etc.

The collar membrane is large, consists of a pair of long, broad, dorsolateral lobes, a pair of much smaller lateral lobes, and a pair of large

ventral lobes resembling the dorsal lobes. In damaged, or regenerated specimens these lobes may be otherwise. The thoracic membrane is reduced. The first, or collar, fascicle emerges from the dorsalmost part of the collar membrane; its setae are in thick, projecting tufts; each seta is simple and bayonet-shaped. Segments two to five have smaller notoseta fascicles and neurosetae in transverse, linear ridges; the uncini form a single row of many flat platelets; each uncinus (Fig. 3) consists of a thin rectangular base with a series of twelve teeth along the cutting edge.

The thorax is separated from the abdomen by a long, smooth, apodous region. Abdominal segments are very short, appear crowded, have short uncinial ridges and inconspicuous setal tufts. Abdominal uncini are smaller than thoracic uncini, and each has about seven marginal teeth. Tubes are fully attached to the substratum; they measure about 7 mm across, with the lumen only about 2.5 mm across. Mature females are bright orange red, males pale; the opercular stalk is deep maroon to brown, splashed with white.

Distribution: Long-shore islands of southern California, on rocky surfaces in low intertidal or littoral zones.

ANALYSES, BY AREAS

The San Pedro region is divided into areas which are believed to have unique biological characteristics. Nearly a third of the region is taken over by the San Pedro Basin (Hartman and Barnard, 1958, 1960). Submarine canyons include the San Pedro sea valley, the Newport canyon (Hartman, 1963), and the San Gabriel sea valley (see Map 1). The following areas are here further identified:

LH refers to the Los Angeles-Long Beach outer harbor, a shallow enclosure bounded on the east by the mainland, and on the west by an artificial breakwater.

PV refers to the Palos Verdes shelf and slope, bordered on the east by the Redondo canyon, on the west by the sill of the San Pedro Basin, and on the south by the San Pedro sea valley. It is the site of an important outfall line for Los Angeles County.

SP refers to the San Pedro shelf and slope; it is bordered on the east by the Los Angeles-Long Beach breakwaters, on the south by the Newport canyon, on the north by the Palos Verdes shelf and slope; on the west it surrounds the Lasuen sea mount and Sixmile bank, then continues seaward to the Catalina rise.

NE refers to the Newport shelf, bounded on the east by Newport Bay, on the north by Newport canyon, and on the west by the San Pedro slope; it extends oceanward as part of the San Pedro slope.

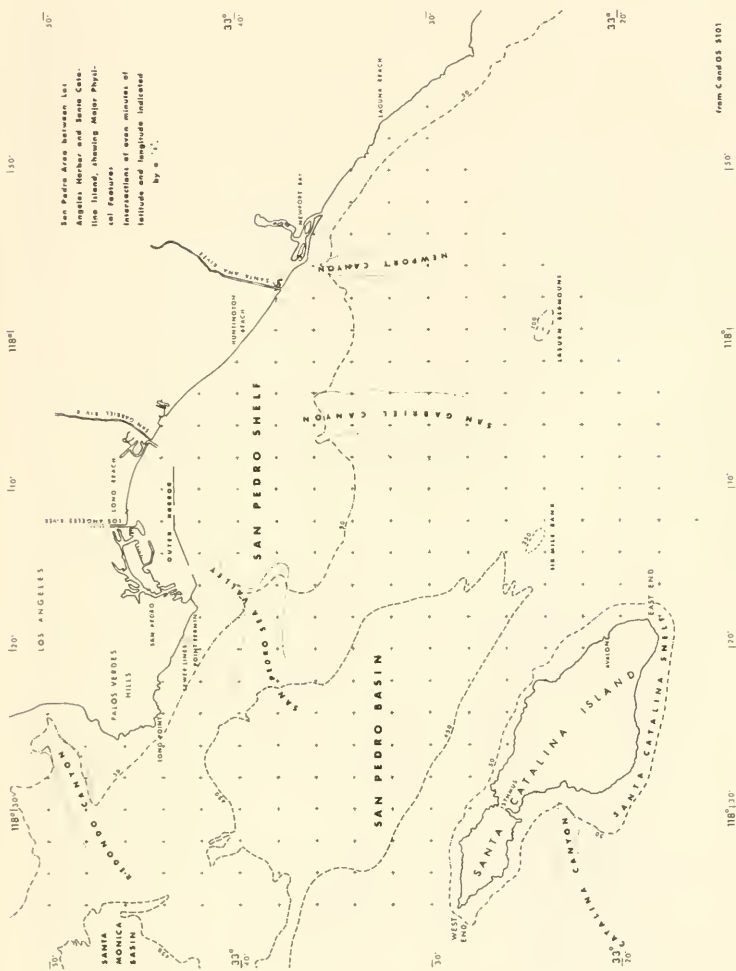
LS refers to the Lasuen seamount, located beyond the outer end of Newport canyon, in depths of 58 to 385 fms, and to Sixmile bank, approximately six miles northeast of Avalon, Santa Catalina Island.

CL refers to the leeward side of Santa Catalina Island. A narrow, long shore shelf borders the island, from East End at the southeast, to West End at the northwest; oceanward the shelf gives rise to the slope which merges with the San Pedro basin (Hartman and Barnard, 1958, 1960).

CW refers to the windward side of Santa Catalina Island. The narrow, long shore shelf extends westward as a slope, offshore rocks and banks; it is dissected by the Catalina canyon, and in greater depths it merges with the Catalina basin.

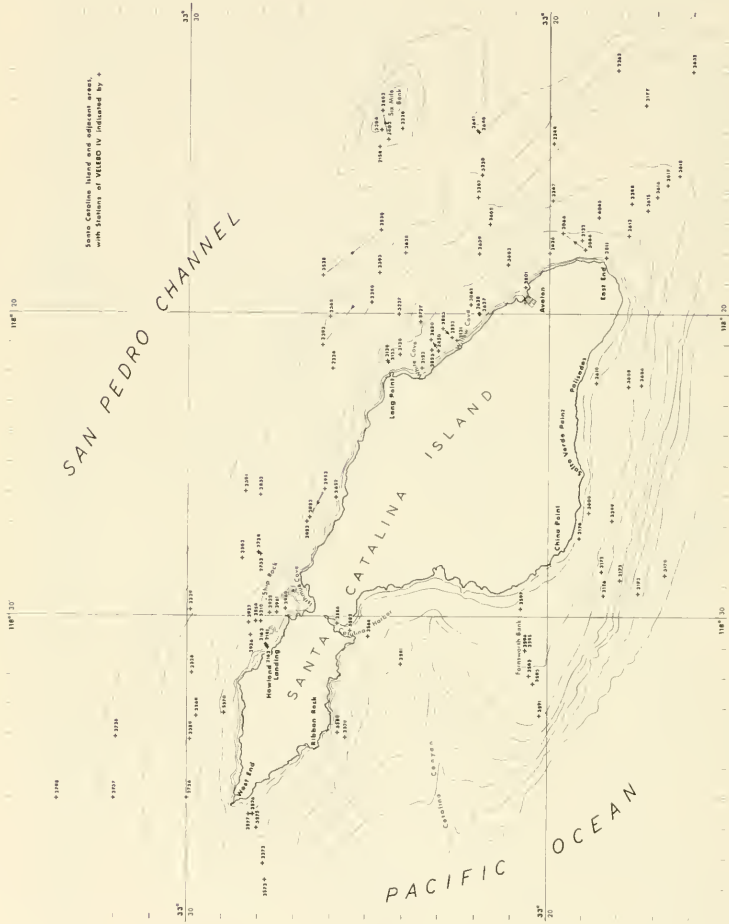
Each of these areas has characteristic associations of organisms, for which the details are explained below.

An inshore area, in 2-5 fm depths, can be recognized as having some species characteristic to it. Analyses for this area have been previously published (California, 1965b, pp. 302-318).



MAP 1. Map of the San Pedro region, showing distribution of areas named in the text. Contour intervals are indicated in fathoms (from Coast and Geodetic Survey map no. 5101).

from Coast and GS 5101



MAP 2. Map of the Santa Catalina Island area, with contour intervals indicated at 50-fathom intervals. Locations of station numbers of Veleiro IV are indicated on leeward and windward sides of the island (from Coast and Geodetic Survey map no. 5101).

LOS ANGELES-LONG BEACH OUTER HARBOR

The Los Angeles-Long Beach outer harbor (LH) is a shallow, four to nine fathom deep, artificially constructed basin, located between Terminal Island and the San Pedro shelf. It is separated from the open sea by a breakwater with openings which allow ships and seawater to move freely in and out of the basin. Sediments in the bottom are mainly silty to sticky muds and rubbly shales, except along the shipping lanes, where hard sandy bottoms prevail. Benthic animal populations, taken with the grab, are predominantly annelids of many kinds and in moderate to high numbers; they are accompanied by much smaller numbers of mollusks, crustaceans, and sparse numbers of echinoderms. They are the same kinds as those occurring more abundantly on the San Pedro shelf where the quality of the sediments and proximity to food supplies are similar.

The outer harbor receives much organic and waste materials from the drainage of the Los Angeles and San Gabriel rivers. The effects of pollution on bottom faunas in Alamitos Bay, an arm of the San Gabriel River, have been studied by Reish (1955); the kinds and numbers of animals are much like those in the outer harbor or the shallow, sandy shelf (California, 1959). The fauna is fairly uniform throughout, depending on whether sediments are chiefly mud, clay or sand.

Seven samples were analyzed:

1.¹ Sta. 6107 (near no. 29), in 4 fms. OPG took 2.96 cuft of smooth, black silty mud. Wet weights measured 28 grams, of which polychaetes were 14.7, mollusks 5.4, enteropneusts 4.2 and pinnotherid crabs 3.7 grams. In addition to those listed on the chart, a cumacean (1), a pinnotherid crab (17), and an enteropneust (6) were present. Largest species were *Glycera americana*, an enteropneust, and *Marphysa disjuncta*. Most abundant were *Ancistrosyllis tentaculata* (169), *Haploscoloplos elongatus* (50), and *Cossura candida* (35).

2. Sta. 2314 (no. 32), in 4.5 fms. OPG took 0.56 cuft of mud, silt and many animals. A sea whip (1), ?*Harenactis* (24), two kinds of nemerteans (10), amphipods (1), isopod (1), cumaceans (5), ostracods (9), and a pinnixid (7), accompanied the species named on the chart. Largest individuals were *Asychis* sp. and *Praxillella affinis pacifica*; most abundant were *Haploscoloplos elongatus* (82), *Lumbrineris* spp. (61), *Tharyx tessellata* (52), and *Nereis proccra* (41).

¹In all charts, below, the first numbers (i.e. 1-7) refer to those used in the chart-headings. Station numbers (1370 to 7726) are given in the LIST OF STATIONS. The serial numbers, 11 to 267, refer to locations on the grid, vol. 19, pt. 1, p. 6).

Numbers of species and specimens totalled :

polychaetes	46 species,	512 specimens
echinoderms	3	35
mollusks	9	24
crustaceans	6 ⁺	32
others	5	44
<hr/>		
Total:	69 ⁺ species,	647 specimens

3. Sta. 5808 (near no. 30), in 5.8 fms. OPG took 2.52 cuft of dark olive-green silt with many animals. Wet weights totalled 87.6 grams, of which polychaetes comprised 64.1, mollusks 17.5, nemerteans 4.5, and anemones 1.5 grams. A ceriantharian with dark purple stalk and red crown (1), a small anemone (3), *Cerebratulus rubra* (1), a small nemertean (3), a phoronid (2), and an ostracod (3) accompanied the species named on the chart. Largest individuals were *Solen sicarius* and *Cerebratulus rubra*. Most conspicuous were *Diopatra tridentata* and *Compsomyax subdiaphana*, and most abundant were *Marphysa disjuncta* (57), *Tharyx tessellata* (55), *Pectinaria californiensis* (34), and *Chaetozone corona* (32).

Numbers of species and specimens totalled :

polychaetes	33 species,	328 specimens
echinoderms	1	3
mollusks	25	82
crustaceans	1	2
others	5	10
<hr/>		
Total:	65 species,	425 specimens

4. Sta. 2508 (no. 29), in 6 fms. OPG took 2.56 cuft of black mud and clay with many animals. A sea-whip (2), ?*Harenactis* (1), a nemertean (3), an amphipod (5), a pinnotherid (1), were present in addition to those listed on the chart. Largest individuals were *Marphysa disjuncta* and *Glycera americana*. Most abundant species were *Tharyx tessellata* (301), *Cossura candida* (24) and *Lumbrineris ?zonata* (20).

Numbers of species and specimens totalled:

polychaetes	28 species,	465 specimens
echinoderms	1	1
mollusks	1	2
crustaceans	2	6
others	3	6
Total:	<hr/> 35 species, 480 specimens	

5. Sta. 4718 (near no. 33), in 6 fms. OPG took 0.5 cuft of coarse greenish gray sand with much flocculent debris, white branching bryozoans and many animals. In addition to species named in the chart, there were a ceriantharian (1), ?*Harenactis* (2), a sea-whip (1), a nemertean (4), a sipunculid (2), *Glottidia albida* (1), 4 kinds of amphipods (8), 2 isopods (4), 4 cumaceans (5), an ostracod (1), a cancroid crab (1), a pycnogonid (5), and an enteropneust (1). Largest species were *Pista disjuncta* and a sea-whip; most abundant were *Tharyx tessellata* (104) and *Mediomastus californiensis* (16).

Numbers of species and specimens totalled:

polychaetes	57 species,	354 specimens
echinoderms	3	5
mollusks	17	46
crustaceans	11	15
others	8	12
Total:	<hr/> 96 species, 432 specimens	

6. Sta. 2307 (no. 29), in 7 fms. OPG took 2.14 cuft of shale, black, friable, rubbly clay and many animals. In addition to species named in the chart, there were ?*Harenactis* (2), 2 nemerteans (6), a sipunculid (1), an amphipod (5), a pinnixid crab (1). There were no large individuals. Most abundant were *Cossura candida* (250+), *Nereis procera* (145), *Tharyx tessellata* (more than 100), and *Paraonis gracilis* (92).

Numbers of species and specimens totalled:

polychaetes	49 species,	846 specimens
echinoderms	1	2 ⁺
mollusks	9	41
crustaceans	2	6
others	5	10
Total:	<hr/> 66 species, 905 ⁺ specimens	

7. Sta. 2507 (no. 30), in 8 fms. OPG was filled with black mud, shelly debris and many animals. A large ceriantharian, a nemertean (2), an amphipod (5), a cumacean (2), an ostracod (28), a commensal crab (5), *Callianassa* (1), a pycnogonid (1) and an enteropneust (1) were present, in addition to those listed on the chart. Largest individuals were *Cerebratulus rubra* and *Glycera americana*. Most numerous species were *Marphysa disjuncta*, *Pectinaria californiensis* and *Cossura candida*, each with 10 individuals.

Numbers of species and specimens totalled:

polychaetes	25 species,	95 specimens
echinoderms	1	6
mollusks	11	27
crustaceans	5	41
others	5	5
Total:	<hr/> 47 species, 174 specimens	

Polychaeta in the Los Angeles-Long Beach Outer Harbor,
showing order of occurrence in 4 to 8 fms.

+ indicates presence, - absence.

Species represented by more than 10 specimens are indicated by *.

	1	2	3	4	5	6	7
<u>Ancistrosyllis tentaculata</u>	*	-	+	+	+	-	+
<u>Chaetozone corona</u>	*	*	+	+	+	*	-
<u>Chone mollis</u>	+	+	-	-	+	-	-
<u>Cossura candida</u>	*	+	+	+	+	*	*
<u>Dorvillea articulata</u>	+	-	-	-	-	-	-
<u>Dilonereis</u> sp.	+	+	-	-	-	-	-
<u>Eteone ?alba</u>	+	-	-	+	-	-	-
<u>Glycera americana</u>	+	-	+	+	+	+	+
<u>Gyptis a. glabra</u>	+	-	-	+	-	-	+
<u>Haploscoloplos elongatus</u>	*	*	+	+	+	+	+
<u>Harmothoe lunulata</u>	+	+	-	-	+	+	-
<u>Loandalia fauveli</u>	+	-	-	-	-	-	-
<u>Lumbrineris cruzensis</u>	+	-	-	+	+	*	-
<u>Lumbrineris pallida</u>	+	-	-	+	+	-	-
<u>Magelona sacculata</u>	+	-	-	-	-	+	-
<u>Marphysa disjuncta</u>	+	-	-	-	-	-	+
<u>Mediomastus californiensis</u>	+	-	-	+	*	-	-
<u>Notomastus tenuis</u>	+	+	+	+	+	+	-
<u>Paraonis gracilis</u>	+	-	-	-	-	-	-
<u>Pectinaria californiensis</u>	+	-	*	+	+	+	*
<u>Pherusa neopapillata</u>	+	*	+	-	+	*	+
<u>Pilargis hamatus</u>	+	-	-	-	-	-	-
<u>Polydora</u> sp.	+	-	-	-	+	-	-
<u>Prionospio cirrifera</u>	+	+	+	-	-	-	-
<u>Telepsavus costarum</u>	+	-	+	-	+	+	-
<u>Tharyx tesselata</u>	*	*	+	+	*	*	*
<u>Amphicteis scaphobranchiata</u>	+	+	-	+	*	+
<u>Anaitides</u> sp., checkered	+	-	-	-	-	-
<u>Anotomastus gordiodes</u>	+	-	-	+	-	-

Polychaeta in Los Angeles-Long Beach Outer Harbor (continued)

	1	2	3	4	5	6	7
<u>Aricidea lopezi</u>		+	-	-	+	+	-
<u>Aricidea</u> , other sp.		+	-	-	-	-	-
<u>Asychis</u> sp.		+	-	-	+	-	-
<u>Brada pilosa</u>		*	-	-	-	-	-
<u>Cirrophorus furcatus</u>		+	-	-	+	-	-
<u>Glycera ?capitata</u>		+	-	-	-	-	-
<u>Goniada brunnea</u>		+	-	-	+	-	-
<u>Goniada littorea</u>		+	-	-	-	-	-
<u>Laonice cirrata</u>		*	+	+	+	+	+
<u>Lumbrineris californiensis</u>		+	-	-	+	+	-
<u>Lumbrineris limicola</u>		*	*	-	-	+	+
<u>Lumbrineris minima</u>		*	-	-	-	-	+
<u>Nephtys cornuta</u>		*	-	-	-	-	-
<u>Nereis procera</u>		*	+	+	+	*	+
<u>Nothria iridescens</u>		+	-	-	+	-	-
<u>Pholoe glabra</u>		+	-	+	-	-	+
<u>Pista</u> cf. <u>cristata</u>		+	-	-	-	+	-
<u>Polydora ?limicola</u>		+	-	-	-	-	-
<u>Praxillella a. pacifica</u>		+	-	+	-	-	-
<u>Prionospio malmgreni</u>		+	-	-	+	+	-
<u>Prionospio pinnata</u>		*	+	+	+	+	-
<u>Scalibregma inflatum</u>		+	-	+	+	-	-
<u>Sphaerosyllis</u> sp.		+	-	-	-	-	-
<u>Spiophanes fimbriata</u>		+	-	+	-	-	+
<u>Spiophanes missionensis</u>		+	+	-	+	+	-
<u>Sternaspis fossor</u>		+	-	-	+	-	-
<u>Sthenelanelia uniformis</u>		+	+	-	+	+	-
<u>Streblosoma</u> sp.		+	-	-	-	-	+
<u>Terebellides stroemii</u>		+	-	+	-	-	+
<u>Ampharete</u> sp.			+	-	-	-	-
<u>Boccardia basilaria</u>			+	-	-	-	-

Polychaeta in Los Angeles-Long Beach Outer Harbor (continued)

	1	2	3	4	5	6	7
<u>Diopatra tridentata</u>			+	-	-	-	-
<u>Harmothoe priops</u>			+	-	-	-	+
<u>Marphysa disjuncta</u>			*	*	-	*	-
<u>Ninoe gemmea</u>			+	-	-	-	-
onuphid			+	-	-	-	-
<u>Paraonis gracilis</u>			+	-	-	-	-
phyllodocid			+	-	-	-	-
<u>Pista disjuncta</u>			+	-	*	-	-
<u>Poecilochaetus johnsoni</u>			+	-	-	-	-
<u>Streblosoma crassibranchia</u>			+	-	-	+	-
<u>Tharyx monilaris</u>			+	-	+	+	-
<u>Ampharete labrops</u>				+	-	+	-
<u>Diopatra ornata</u>				+	+	-	-
<u>Drilonereis ?longa</u>				+	-	-	-
<u>Lumbrineris ?zonata</u>				*	-	-	-
<u>Nephtys ferruginea</u>				+	-	-	-
<u>Polycirrus</u> sp.				+	+	-	-
<u>Amaeana occidentalis</u>					+	+	-
<u>Anaitides</u> , sp. B [trilineate]					+	-	-
<u>Arabella semimaculata</u>					+	-	-
<u>Aricidea neosuecica</u>					+	-	+
<u>Boccardia</u> sp.					+	+	+
<u>Chone gracilis</u>					+	-	-
<u>Cirriformia spirabranchia</u>					+	-	-
<u>Eteone californica</u>					+	+	-
<u>Eteone ?dilatae</u>					+	-	-
<u>Eumida bifoliata</u>					+	-	-
<u>Maldane sarsi</u>					+	-	-
<u>Melinna denticulata</u>					+	-	-
<u>Nephtys caecoides</u>					+	-	-
<u>Owenia f. collaris</u>					+	-	-

Polychaeta in Los Angeles-Long Beach Outer Harbor (continued)

	1	2	3	4	5	6	7
<u>Pherusa capulata</u>	+	-	-
<u>Pilargis maculata</u>	+	-	-
<u>Prionospio pygmaeus</u>	*	-	-
<u>Schistocomus hiltoni</u>	+	-	-
<u>Ancistrosyllis</u> sp.	*	-
<u>Armandia bioculata</u>	+	-
<u>Boccardia</u> nr. <u>redeki</u>	+	-
<u>Carazzia</u> sp.	+	-
<u>Cirratulus cirratus</u>	*	-
<u>Cirriformia luxuriosa</u>	+	-
<u>Diopatra tridentata</u>	+	+
<u>Dorvillea articulata</u>	*	-
? <u>Fabricia</u> sp.	+	-
<u>Megalomma</u> sp.	+	-
<u>Melinna</u> sp.	+	-
<u>Nephtys</u> sp.	*	-
<u>Ophiodromus pugettensis</u>	*	-
<u>Paraonis gracilis</u>	*	-
<u>Peisidice aspera</u>	*	-
<u>Polydora</u> nr. <u>armata</u>	+	-
<u>Polydora citrona</u>	+	-
<u>Polydora ligni</u>	+	-
<u>Travisia</u> sp.	+	-
<u>Drilonereis</u> cf. <u>nuda</u>	+
<u>Magelona</u> sp.	+
<u>Pilargis berkeleyi</u>	+

Echinodermata in the Los Angeles-Long Beach Outer Harbor,
showing order of occurrence in 4 to 8 fms.

<u>Dendraster excentricus</u> . . . . .	.	+	-	-	-	-	-
<u>Amphiodia urtica</u> . . . . .	.	.	*	+	-	+	-
<u>Pentamera pseudopopulifera</u> . . . . .	.	.	.	.	+	-	-

Echinodermata in Los Angeles-Long Beach Outer Harbor (continued)

	1	2	3	4	5	6	7
ophiuroid				+	-	+	-
<u>Amphiodia occidentalis</u>					+	-	-
<u>Pachythyone rubra</u>					+	-	-
<u>Amphiodia digitata</u>							+

Mollusca in the Los Angeles-Long Beach Outer Harbor,
showing order of occurrence in 4 to 8 fms.

<u>Asthenothaerus villosior</u>	+	-	-	-	-	-	-
<u>Chione undatella</u>	+	-	-	-	-	-	-
<u>Compsomyx subdiaphana</u>	+	+	+	-	-	*	+
<u>Cylichna attonsa</u>	+	-	-	-	-	-	-
<u>Lucinisca nuttalli</u>	+	-	+	-	+	-	-
<u>Macoma yoldiformis</u>	+	+	+	-	+	-	-
<u>Nassarius cooperi</u>	+	-	+	-	-	-	-
<u>Nassarius perpinguis</u>	+	-	-	-	+	-	+
<u>Nuculana taphria</u>	+	-	-	-	-	+	-
<u>Olivella baetica</u>	+	-	+	-	-	-	+
<u>Rochefortia</u> sp.	+	-	+	-	-	-	-
<u>Thyasira</u> sp.	+	-	+	-	-	-	-
<u>Turbonilla</u> sp.	+	+	+	-	+	-	-
<u>Aglaja</u> sp.		+	-	-	-	-	-
<u>Balcis rutila</u>		+	-	-	-	-	-
<u>Cadulus fusiformis</u>		+	-	-	-	-	-
<u>Cylichna diegensis</u>		+	-	-	-	-	-
<u>Lyonsia californica</u>		+	-	-	+	-	-
<u>Tellina idae</u>		+	-	-	-	-	-
<u>Aceton punctocoelata</u>			+	-	*	-	+
<u>Adontorhina cyclia</u>				+	-	-	+
<u>Cadulus</u> sp.				+	-	+	-
<u>Chione undatella</u>					*	-	-
<u>Crepidula</u> sp.				+	-	-	-
<u>Dentalium</u> sp.				+	-	-	-

Mollusca in Los Angeles-Long Beach Outer Harbor (continued)

	1	2	3	4	5	6	7
<u>Macoma</u> sp.			+	-	-	-	-
<u>Mangelia</u> sp.			+	-	-	-	-
<u>Odostomia</u> sp.			+	-	+	-	-
<u>Periploma discus</u>			+	-	-	-	+
pholad			+	-	-	-	-
? <u>Poromya</u> sp.			+	-	-	-	-
<u>Solamen columbianum</u>			+	-	+	-	-
<u>Solen sicarius</u>			+	-	-	-	-
<u>Tellina carpenteri</u>			+	-	-	-	-
<u>Vitrinella</u> sp.			+	-	-	-	-
clam			+	-	-	-	-
<u>Macoma indentata</u>				+	-	+	-
<u>Chlamys</u> sp.					+	-	-
? <u>Kellia</u> sp.					+	-	-
<u>Macoma nasuta</u>					+	-	-
<u>Mactra ?californica</u>					+	-	-
<u>Mangelia barbarensis</u>					+	-	-
<u>Modiolus</u> sp.					+	-	-
<u>Ophiidermella incisa</u>					+	-	-
<u>Crepidula aculeata</u>						+	-
<u>Lucinoma annulata</u>						+	-
<u>Protothaca tenerrima</u>						*	-
<u>Solen rosaceus</u>						+	-
<u>Tagelus californicus</u>						+	-
<u>Cadulus fusiformis</u>							+
<u>Modiolus neglectus</u>							+
<u>Parvilucina tenuisculpta</u>							+
<u>Tellina buttoni</u>							+
<u>Thyasira barbarensis</u>							+
<u>Volvulella tenuissima</u>							+

PALOS VERDES SHELF AND SLOPE

The Palos Verdes shelf (PV), in depths of 7 to 10 fms, supports conspicuous *Chaetopterus* associations consisting chiefly of this genus with other kinds of polychaetes. In its shallowest part, where sediments are somewhat sandy, the parchment-worm is associated with enteropneusts harboring pinnotherid crabs, the large swarming nereid, *Neanthes brandti*, juvenile sand-dollars *Dendraster excentricus*, a tubicolous annelid *Eupolymnia crescentis* with a commensal polynoid *Halosydna brevisetosa*, the proboscis worms, *Glycera americana* and *G. robusta*, and small spioniform worms, especially species of *Polydora* and *Prionospio*. At about 10 fms, the parchment-worm is associated with the case-building clam *Lima dehiscens*, and the worms *Myxicola infundibulum* and *Golfingia hespera*; in bottoms where rocks and gravel occur, it is present with gorgonian coelenterates, *Telepsavus costarum* and *Phyllochaetopterus prolifica*.

In depths of 11 to 20 fms, *Chaetopterus* is associated with decreasing numbers of *Lima dehiscens* and, where gravel or rocks occur, with the spiny ophiuroid, *Ophiothrix spiculata*, the elbow crab, *Heterocrypta occidentalis*, the cone-snail, *Conus californicus*, other mollusks, including *Nassarius*, *Megasurcula*, *Polinices*, together with large nemerteans, *Cerebratulus rubra*, the large cageworm, *Pherusa capulata*, as well as many other kinds of polychaetes, anemones of several kinds, and sipunculids. Red-brown sands support *Sipunculus nudus*, *Lytechinus anamesus*, other ophiuroids, and many kinds of shelf-polychaetes. In depths of 14 to 20 fms, a sea-star, *Astropecten californicus*, ophiuroids, such as *Amphioplus hexacanthus*, *Amphipholis squamata* and *Amphiodia urtica*, are prominent, together with increasing numbers of small crustaceans and polychaetes.

In 21 to 30 fms, the sediments of the Palos Verdes shelf are black muds with odor of hydrogen sulfide, flocculent black debris and decaying vegetation. Animals are chiefly polychaetes, *Dorvillea articulata*, *Ampharete arctica*, *Lumbrineris pallida*, other *Lumbrineris* species, *Ophiodoromus pugettensis*, *Boccardia basilaria*, *Tharyx* species, *Diopatra ornata*, and other smaller polychaetes, associated with a clam, *Solemya* sp., sipunculids, and *Amphiodia urtica*. At this depth *Chaetopterus* and crustaceans are nearly absent.

In 31 to 40 fms the animals in the sediments are mainly polychaetes, especially cirratulids, spionids, some *Pectinaria californiensis*, and nemerteans, such as the large *Cerebratulus*; surface forms include *Chloecia pinnata*, *Ophiothrix spiculata*, and the large sea-whip, *Stylatula*. Crusta-

cea are absent except for the barnacle, *Scalpellum*, attached to stiff tubes of polychaetes.

In deeper bottoms, sediments are silt and mud; polychaetes continue the most prominent, and occur with ophiuroids, echiuroids, sipunculids, small solenogasters and coelenterates. The most conspicuous polychaetes are *Chloeia pinnata*, *Lumbrineris pallida*, *Spiophanes* and *Tharyx* species, together with onuphids and maldanids. Brissopsids are frequent, as well as large echiuroids, *Arynchite*, and nemerteans, *Cerebratulus*. Characteristic animals in 195 fms are the large mud-tube polychaetes, *Pista disjuncta* and *Maldane sarsi*, and a tubicolous ceriantharian.

Specific diversity ranges from 25 to 129 in a sample, and numerical count from 100 to 2448. Biomasses are moderately high, ranging to 840.0 grams for a sample measuring 0.16 cuft.

The following stations, by depth, were useful in indicating the diversity and kinds of species in the Palos Verdes area; they are numbered 1 to 27 (see charts), with station (4801-57 to 4832-57) and serial number (11 to 60) (see Map, vol. 19, p. 6).

1. Sta. 4801 (no. 28). 0.3 mi offshore from Portuguese Point, in 7 fms. OPG took 1.0 cuft of organic debris, shelly silty mud and red algae. In addition to species shown on the chart, the sample contained a small anemone (1), nemerteans (10), four kinds of amphipods (20 specimens), a *Caprella* (11), a tanaid (1), and a cumacean (2).

Numbers of species and specimens were estimated at:

polychaetes	34 ⁺ species,	381 specimens
echinoderm	1	84
mollusks	6	11
crustaceans	7	34
others	2	11
Total:	<hr/> 50 ⁺ species, 521 specimens	

The most conspicuous was *Chaetopterus*, followed by *Diopatra* and juveniles of *Dendroaster*. The most abundant were *Tharyx marioni* (91), *Dendroaster* sp. (84), *Ophiodromus pugettensis* (56), with 20 or more of each of the following: *Chaetopterus variopedatus*, *Eupolymnia crescentis* and *Halosydna brevisetosa*.

2. Sta. 4830 (no. 28). 2.5 mi from Pt. Vicente light, in 7 fms. OPG took 0.95 cuft of fine olive-gray sand. The screenings contained large numbers of *Dendroaster* sp. and other animals. In addition to those shown

on the chart, crustaceans were represented by many amphipods and caprellids, and a crab, *Heterocrypta occidentalis*. Largest species were *Polinices* and *Neanthes brandti*; most abundant were *Polydora ?caulleryi* (312+) and *Diopatra ornata* (37).

3. Sta. 4806 (no. 28). 1.25 mi from Pt. Vicente light, in 7.5 fms. OPG took 1.8 cuft of debris with many algae, large tubes of *Chaetopterus variopedatus* and *Lima dehiscens* in cases. In addition to those listed on the chart, coelenterates were represented by a small anemone (2) and a ceriantharian (1); polyclads by two species, nemerteans by three species, oligochaetes by one, and *Glottidia albida* (1); bryozoans were also present. Amphipods were estimated at 11 species and 128 specimens, and decapods at two small individuals; one enteropneust was present. The largest species was *Chaetopterus variopedatus* and the most abundant *Dorvillea articulata* (754 individuals), followed by *Chaetopterus* with about 100, *Lima dehiscens* with 90, *Diopatra ornata* and *Ophiodromus pugettensis* with 5+ each, *Flabelligera commensalis* with 46, and *Lumbrineris cruzensis* with 53.

Numbers of species and specimens totalled:

polychaetes	51 species,	1509 specimens
echinoderms	3	7
mollusks	22	277
crustaceans	14	130
others	12	94

Total: 102 species, 2017 specimens

Sub. 3. Sta. 4833 (no. 27). 0.6 mi from Pt. Vicente light, in 8.5 fms. OPG took 0.95 cuft of coarse gray sand, which contained chiefly *Dendraster excentricus* and *Chaetopterus variopedatus*, also a few small pelecypods.

4. Sta. 4807 (no. 28). Off Pt. Vicente light, in 9 fms. OPG took 2.4 cuft of massed *Chaetopterus* tubes with gravelly sand. The sample contained nemerteans of 3 kinds and many specimens, a sipunculid, crustaceans with 1 amphipod, 10 caprellids, and a large brown enteropneust (2), in addition to the animals listed on the chart. The largest and most conspicuous individuals were *Chaetopterus variopedatus* (ca. 100) and *Lima dehiscens* (about 40). Other numerous species were *Dorvillea articulata*, *Lumbrineris pallida*, *Ophiodromus pugettensis*, *Telepsavus costarum*, *Tharyx multifilis*, and nemerteans of at least 3 kinds.

Numbers of species and specimens totalled:

polychaetes	22 species,	240 ⁺ specimens
echinoderms	2	4
mollusks	6	61
others	3	13 ⁺

Total: 33 species, 318⁺ specimens

5. Sta. 2788 (no. 14). South of Redondo Beach, in 9.5 fms. OPG took 1.32 cuft of coarse gray sand and shell, with dead shells of *Olivella*, *Pecten*, *Cadulus*, *Nassarius*, *Dendraster* occupied by sipunculids, and solitary tunicates. The sample contained many worm-like animals, with the most numerous being *Golfingia* (sipunculid), *Pisione remota* (50), cirratulids and hesionids. Crustaceans included several kinds of amphipods with 34 specimens and a caprellid, and an anemone (1). Largest individual was *Marphysa mortenseni*.

Sub 5. Sta. 2470 (no. 44). 1.4 mi E of Pt. Fermin light, in 10 fms. OPG took 1.95 cuft of black sandy mud with foul odor. Most abundant were many kinds of polychaetes, like those in adjacent stations, with unusual abundance of *Lumbrineris* spp., *Streblosoma crassibranchia*, and an enteropneust, possibly *Spengelina* sp.

6. Sta. 4805 (no. 28). 1.8 mi from Pt. Vicente light, in 10 fms. OPG took 1.8 cuft of *Chaetopterus-Diopatra ornata* association in sand with red algae. A few small ?*Harenactis* (anemone), a large speckled gray nemertean, several smaller ones, and two kinds of sipunculids, accompanied by large numbers of polychaetes and *Lima dehiscens*, comprised most of the sample. Crustaceans were present with a few amphipods, a *Caprella*, and *Heterocrypta occidentalis* (3). The largest and most conspicuous animals were *Chaetopterus variopedatus*, *Lima dehiscens*, *Chone* sp., *Flabelligera commensalis*, *Spiophanes missionensis* and *Tharyx multifilis*. Echinoderms were absent.

7. Sta. 4856 (near no. 28). 2.9 mi from Pt. Vicente light, in 10 fms. OPG took 0.81 cuft of fine olive-green sand and rocks with small white attached sponges. In addition to those on the chart, the lot contained a small white anemone (2), a large *Cerebratulus rubra* and a small nemertean (10), *Glottidia albida* (1), *Terebratalia* sp. (5), ten kinds of amphipods (77), two cumaceans, an isopod (15), an ostracod, an elbow crab (2) and a spider crab, a pycnogonid (6), and a large dark brown enteropneust (1). The largest species were *Burchia redondoensis* and *Pista disjuncta*, the most abundant *Paraonis gracilis* (50⁺), *Prionospio malmgreni* (45), and *Ophiothrix spiculata* (29).

Numbers of species and specimens totalled:

polychaetes	54 species,	350 specimens
echinoderms	4	47
mollusks	17	34
crustaceans	20	99
others	10	40
Total:	<hr/> 105 species, 570 specimens	

8. Sta. 3050 (near no. 28). 2.1 mi west of Pt. Fermin light, in 10-11 fms, dredged, in rocky and mixed bottom. Gorgonian corals (*Leptogorgia hebes*) were most conspicuous; other species are listed on the chart.

9. Sta. 2472 (no. 28). 2.25 mi E of Pt. Vicente light, in 11 fms. OPG took 0.63 cuft of coarse black sandy mud with broken shells and many animals. In addition to those shown on the chart, the sample contained a few small anemones, several kinds of nemerteans, *Glottidia albida* (1), and few crustaceans (amphipods, caprellids, ostracods, and *Heterocrypta occidentalis*). Echinoderms were absent.

10. Sta. 5102 (near no. 28). 3.35 mi from Pt. Vicente light, in 11 fms. OPG took 0.25 cuft of coarse black sand, with tubes of *Chaetopterus*. A ceriantharian (2), a polyclad (6), at least two kinds of nemerteans (21), a sipunculid (4), an oligochaete (30+), caprellids (100+), an amphipod (1), and *Heterocrypta occidentalis* (2), were present in addition to those listed in the chart. The largest species was *Polinices*; the most conspicuous *Chaetopterus variopedatus* (65); the most abundant *Dorvillea articulata* (550+), *Sphaerosyllis californiensis* (100+), *Paraonis gracilis* (85+), and *Lima dehiscens* (41). Echinoderms were nearly absent.

Numbers of species and specimens totalled:

polychaetes	60+ species,	4200+ specimens
echinoderms	1	2
mollusks	15	79
crustaceans	3+	103+
others	8	64+
Total:	<hr/> 87+ species, 4448+ specimens	

Sub 10. Sta. 5101 (near no. 28). 1.85 mi from Abalone Cove, in 11 fms. OPG took 0.88 cuft of coarse gray-black sand with many animals. Screenings consisted of large clumps of *Chaetopterus variopedatus* with *Lima dehiscens*, a tubicolous ceriantharian, nemerteans of several kinds,

sipunculids, many kinds of polychaetes, resembling those in adjacent samples, *Heterocrypta occidentalis*, and many other smaller kinds.

11. Sta. 4802 (near no. 27). Near Marineland, in 12 fms. OPG took 2.2 cuft of mixed gravel and sand, tubicolous polychaetes and massed cases of *Lima*. In addition to those listed on the chart, there were two small anemones, a polyclad (3), two kinds of nemerteans, a sipunculid, three kinds of amphipods (7), two caprellids (8), a tanaid (1), *Heterocrypta* sp. (3). Most conspicuous species were *Chaetopterus vario-pedatus* and tubes of *Polyodontes*; most abundant were *Ampharete* (100+), and *Flabelligera commensalis*, *Lumbrineris pallida*, *Ophiodoromus pugettensis* and *Lima dehiscens*, each with more than 10.

Numbers of species and specimens totalled:

polychaetes	31 ⁺ species,	300 ⁺ specimens
echinoderms	1	1
mollusks	14	103
crustaceans	7	19
others	4	10
Total:	<hr/> 57 ⁺ species, 433 ⁺ specimens	

12. Sta. 5030 (near no. 43). 2.7 mi from Pt. Fermin, in 12 fms. OPG took 1.13 cuft of gray and black sand with tubes of *Chaetopterus*. The sample contained a ceriantharian, small nemerteans (5), a sipunculid (5), an oligochaete (10⁺), five kinds of amphipods (20), a caprellid (3), two kinds of isopods (8), *Heterocrypta* (1), a shrimp (4), a pycnogonid (1), an enteropneust (1). Largest and most conspicuous species was *Chaetopterus*; most abundant were *Exogone uniformis* (78), *Dorvillea articulata* (70), *Melinna denticulata* (35), and *Conus californicus* (33).

Numbers of species and specimens were estimated at:

polychaetes	47 ⁺ species,	468 ⁺ specimens
echinoderms	3	20
mollusks	24	128
crustaceans	10	33
others	7	24
Total:	<hr/> 91 ⁺ species, 673 ⁺ specimens	

13. Sta. 5541 (no. 28). 8.8 mi from Pt. Fermin light, in 12 fms. OPG took 1.63 cuft of coarse black sand with odor of hydrogen sulfide.

The wet weights of larger animals were:

ceriantharian (1)	7.0 grams
<i>Cerebratulus</i> (2)	5.7
? <i>Golfingia hespera</i> (245)	106.0
polychaetes, without tubes	617.6
echinoderms	0.5
decapods	32.0
Total:	<hr/> 768.8 grams

In addition to those listed in the charts, the sample contained: a large ceriantharian, a small white anemone, *Cerebratulus* (2), small nemerteans (10⁺), two kinds of sipunculids (256), five kinds of amphipods (42), an isopod (1), a tanaid (1), *Cancer* sp. (3), *Heterocrypta occidentalis* (14), *Scalpellum* (1), a shrimp (3). Largest species were *Pherusa capulata*, *Myxicola infundibulum*, *Cerebratulus*, ceriantharian and *Heterocrypta*; most abundant were *Chaetopterus* (200), *Phyllochaetopterus prolifica* (100⁺) and *Tclepsavus costarum* (100⁺).

Numbers of species and specimens totalled:

polychaetes	28 species, ca.	686 specimens
echinoderms	2	3
mollusks	12 ⁺	156
crustaceans	ca. 12	65
others	6	270
Total:	ca. 60 species,	ca. 1180 specimens

14. Sta. 5028 (near no. 43). 0.9 mi from Pt. Fermin light, in 12 fms. OPG took 0.1 cuft of coarse, gray-black sand, with many tubes of *Chaetopterus*. Coelenterates were represented by a small *Harenactis* and another anemone (3); two kinds of polyclads (3), a nemertean (5), two kinds of sipunculids (83), an oligochaete (10), an amphipod (10), a caprellid (6), and *Glottidia albida* (3). The largest species was *Chaetopterus*, the most abundant *Pherusa neopapillata* (197), *Dorvillea articulata* (130), *Golfingia* (79), *Ampharctes labrops* (50), and *Sphaerosyllis californiensis* (66). Echinoderms, mollusks and crustaceans were nearly absent.

Numbers of species and specimens totalled:

polychaetes	54 species,	797 specimens
echinoderms	1	1
mollusks	7	8
crustaceans	2	16
others	10	114

Total: 74 species, 936 specimens

15. Sta. 3051 (no. 42). 2.4 mi off Pt. Fermin light, in 11-12.5 fms. Biol. dredge with tangles, took large quantities of *Chaetopterus* with associated animals. In addition to those on the chart, crustaceans were represented by a few *Heterocrypta*, amphipods, isopods. The most conspicuous animals were *Chaetopterus*, *Diopatra ornata* and *Ophiothrix spiculata*.

Sub 15. Sta. 2473 (no. 27). 0.75 mi SE of Pt. Vicente light, in 16 fms. OPG took 0.75 cuft of coarse sandy mud, shell fragments, and *Chaetopterus* with *Ophiothrix* (see Hartman, 1955: 53).

Sub 15. Sta. 2962-54 (near no. 42). 1.5 mi W of Pt. Fermin light, in 20 fms. Biological dredge took black mud with *Chaetopterus*, large *Stylatula*, *Listriolobus pelodes*, sipunculids, *Modiolus* and a few other pelecypods, also many polychaetes. Echinoderms and crustaceans were nearly absent.

16. Sta. 3049 (no. 42). 2.1 mi from Pt. Fermin light, in 23 fms. OPG took a small volume of black mud with dead shells of *Lima*, *Modiolus*, *Solen*, *Polinices*, *Olivella*, *Pecten*, scaphopod and caecid shells. The sample contained *Stylatula* (4, very long), a ceriantharian (2), polyclads (10), few amphipods and cumaceans, and others listed on the chart. The largest individuals were *Stylatula* and ceriantharian. Most abundant were *Capitella capitata* subsp. (985), *Dorvillea articulata* (700+), and *Ampharete arctica* (200+).

17. Sta. 4803 (no. 27). 1.6 mi from Pt. Vicente light, in 24 fms. OPG took 2.2 cuft of black detrital flocculent debris with foul odor. The sample contained large *Stylatula* (6), measuring to 50 cm long, a large *Cerebratulus rubra*, and smaller nemerteans, a caprellid (3), and other species shown on the chart. Most abundant species were *Dorvillea articulata* (100+), *Lumbrineris pallida* (20+), *Phyllochaetopterus limicolus*, and *Tharyx* spp. (70+).

18. Sta. 5096 (near no. 28). 2.5 mi from Pt. Fermin light, in 25 fms. OPG took 1.57 cuft black silt with many small animals. A sea

whip (1), a polyclad (3), two kinds of nemerteans (15), a sipunculid (1), were present in addition to those listed on the chart. The largest individual was the sea whip, the most abundant species *Dorvillea articulata* (437), *Capitella capitata* subsp. (190+), and *Telepsarus costarum* (64). The rare cirratulid, *Raricirrus maculata*, was well represented (51).

19. Sta. 2417 (no. 42). Off Pt. Fermin light, in 34 fms. OPG took 2.14 cuft of black mud. A slender sea whip (3), a polyclad (1), and nemerteans (2+), accompanied the species listed on the chart. The largest animal was *Molpadia intermedia*, the most abundant species *Tharyx* spp. (1620+) and *Spiophanes* (100+). Crustaceans and echinoderms were nearly absent.

20. Sta. 5027 (near no. 42). 1.9 mi from Pt. Fermin light, in 38 fms. OPG took 1.82 cuft of green-black silty sand. A large *Stylatula* (1), *?Harenactis* (1), *Cerebratulus rubra* (1), and two other smaller nemerteans (30), a phoronid (4), a hirudinean (1), an amphipod (2), a caprellid (1), *Scalpellum* (12), were taken in addition to those listed on the chart. Largest individuals were *Cerebratulus rubra* and *Stylatula* spp. Most abundant species were *Tharyx multifilis* (2634) and *Spiophanes* spp. (214).

Numbers of species and specimens totalled:

polychaetes	63 species,	3357 specimens
mollusks	12	30
crustaceans	5	34
others	8	43

Total: 88 species, 3464 specimens

21. Sta. 4855 (no. 12). 3.8 mi from Pt. Vicente light, in 39 fms. OPG took 1.26 cuft of fine gray sand with detritus. Coelenterates were represented by *Monobrachium parasitum* (many, on a bivalve), *?Harenactis* (1); a polyclad (2), two kinds of nemerteans (13), a sipunculid (4), nine kinds of amphipods (52), three kinds of cumaceans (13), three kinds of isopods (45), tanaids (7), two kinds of ostracods (12), a shrimp (1), were also present. The largest animals were *Aphrodita refulgida* and *Amphiura arcystata*. Most conspicuous and abundant species were *Chloëia pinnata* (126) and *Spiophanes missionensis* (56).

Numbers of species and specimens totalled:

polychaetes	76 species,	675 specimens
echinoderms	7	24
mollusks	21	55
crustaceans	20	131
others	5	20
Total:	129 species, 905 specimens	

22. Sta. 5502 (no. 42). 2 mi from Pt. Fermin light, in 49 fms. OPG took 2.39 cuft of green silty sand. Nemerteans included a large *Cerebratulus* (1), a small, red-banded (4), and a longitudinally striped one. A sipunculid (1), and *Branchiostoma* (1) were also present, in addition to those listed on the chart. Largest animal was *Pherusa capulata*, and most conspicuous was *Chlocia pinnata* (320); *Tharyx tessellata* was the most abundant (1700⁺). Echinoderms and crustaceans were sparse or absent.

23. Sta. 5029 (no. 41). 2.95 mi from Pt. Fermin light, in 50 fms. OPG took 1.76 cuft of fine greenish black silty sand with flocculent debris. In addition to those listed on the chart, the sample contained *Cerebratulus* (2 large, weighing 11 grams), and another small kind (many), also two kinds of sipunculids (2). The largest individual was *Cerebratulus*, the most abundant species *Capitella capitata* subsp. (300), *Dorvillea articulata* (110), and *Spiophanes missionensis* (75⁺). Echinoderms were absent, and crustaceans were represented only by large *Scalpellum* (5). Mollusks were few and small. Total numbers were estimated at 38 species and 803 specimens.

24. Sta. 2430 (no. 60). 2.3 mi off Pt. Fermin, in 80 fms. OPG took 1.44 cuft of hard-packed mud with many animals. In addition to those listed on the chart, there was a nemertean (2 small), four kinds of amphipods (25), an anthurid isopod (1), a tanaid (1), and an ocracod (1). There was no conspicuously large individual, and none were outstandingly abundant. Total numbers were estimated at 41⁺ species, and 185⁺ specimens.

25. Sta. 4854 (near no. 11). 5.25 mi from Pt. Vicente, in 98 fms. OPG took 1.57 cuft of dark gray silty sand, gravel and rocks. The grab was lowered twice. Nine colonies of *Monobrachium* were recovered on *Pseudopythina* sp.; others present were a nemertean (2), an echuiroid, *Aryncbite* (2, measuring 62 mm long), three kinds of amphipods (4), an isopod (1), a cumacean (5), and ostracods (4). The largest indi-

viduals were brissopsids, *Arynchite* and *Travisia pupa*. The most conspicuous species was *Amphiodia digitata* and the most abundant were *Tharyx tessellata* (100+), and onuphids (65+). Total numbers were estimated at 76 species and more than 600 specimens.

26. Sta. 4831 (near no. 41). 3.6 mi from Pt. Vicente light, in 195 fms. OPG took 2.83 cuft of olive-green silt. A ceriantharian (1), *Cerebratulus* sp. (4), and a small nemertean (2+) were taken, in addition to the species listed below. Largest individual was *Eunice americana*, and most abundant species was *Pectinaria californiensis* (25).

Numbers of species and specimens totalled:

polychaetes	19 species,	85 specimens
echinoderms	2	3
mollusks	1	4
others	3	8

Total: 25 species, 100 specimens

27. Sta. 4832 (near no. 19). 2.2 mi from Pt. Vicente light, in 195 fms. OPG took 1.32 cuft olive-green sandy and sticky silt. No large animal was present. In addition to those listed below, there were a ceriantharian (1), a white polyclad (1), and an echiuroid (1). Most abundant were *Chloëia pinnata* (96), and *Pista disjuncta* (54).

Numbers of species and specimens totalled:

polychaetes	15 species,	254 specimens
echinoderms	6	48
mollusks	10	67
others	3	3

Total: 34 species, 372 specimens

Polychaeta in Palos Verdes shelf and slope (continued)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
<u>Lumbrineris limicola</u>	+	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Lumbrineris pallida</u>	+	-	+	-	-	-	-	-	-	-	*	+	-	*	-	*	+	-	+	-	+	*	-	-	-	-	-
<u>Lumbrineris</u> , other spp.	+	*	-	-	+	+	-	+	*	-	-	-	-	-	+	-	-	+	-	-	-	-	*	+	+	*	
<u>Nephtys</u> spp.	+	-	+	-	+	-	+	-	+	-	+	-	-	-	-	-	-	-	-	*	-	-	-	+	+	+	+
<u>Notomastus magnus</u>	+	-	+	-	-	-	-	-	-	-	+	-	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-
<u>Ophiodromus pugettensis</u>	*	+	*	+	-	+	*	+	-	*	*	-	-	*	+	*	-	*	-	*	-	*	+	-	-	-	-
<u>Pherusa neopapillata</u>	+	+	-	-	-	+	*	-	-	+	+	+	*	-	*	-	-	+	-	+	-	+	-	-	-	-	-
<u>Platynereis bicanaliculata</u>	+	-	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
<u>Polydora</u> spp.	+	-	-	+	-	-	-	+	-	*	+	+	+	+	+	-	+	-	+	*	+	*	-	-	+	-	-
<u>Prionospio malmgreni</u>	+	-	*	+	-	-	*	-	+	*	*	+	-	+	-	-	-	-	-	*	-	*	-	+	*	-	-
<u>Sphaerosyllis</u> sp.	+	-	-	-	-	-	+	-	-	-	-	-	+	-	*	-	-	-	-	-	-	-	-	-	-	+	-
<u>Spiophanes bombyx</u>	+	-	-	-	+	-	-	-	*	-	-	-	+	-	+	-	-	*	-	+	-	-	-	-	-	-	-
<u>Spiophanes missionensis</u>	+	-	-	-	-	-	+	-	+	+	+	+	-	-	-	-	-	-	*	*	*	*	*	*	*	*	*
<u>Syllids</u> , various	*	-	*	-	+	-	+	-	+	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Thalenessa spinosa</u>	+	*	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
<u>Tharyx marioni</u>	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Eumida</u> spp.	.	*	-	+	*	-	-	-	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<u>Neanthes brandti</u>	.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Nereis procera</u>	.	+	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	+	-	+	-	+	+	+	+	+	-

Polychaeta in Palos Verdes shelf and slope (continued)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
<u>Paraonis gracilis</u>	#	-	-	#	-	-	-	+	-	-	+	+	#	#	-	-	+	+	+	+	-
<u>Peisidice aspera</u>	+	+	-	#	-	#	+	+	+	+	+	-	+	+	-	-	+	-	-	-	-
<u>Pherusa inflata</u>	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
<u>Pista disjuncta</u>	#	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	*
<u>Pseudopotamilla ocellata</u>	+	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
<u>Rhodine bitorquata</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
<u>Sabellaria cementarium</u>	+	-	-	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
<u>Scalibregma inflatum</u>	#	-	+	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-
<u>Syllis ?gracilis</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Thormora ?johnstoni</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Trypanosyllis gemmipara</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Dodecaceria</u> sp.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Myxicola infundibulum</u>	#	-	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-
<u>Odontosyllis</u> sp.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Pherusa</u> spp.	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
<u>spirorbids</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>terebellids</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Aphrodita</u> sp.	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
<u>Cirriformia spirabrancha</u>	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-

Polychaeta in Palos Verdes shelf and slope (continued)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
<u>Lumbrineris latreilli</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Magelona pacifica</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Panthalis pacifica</u>	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
<u>Brada pluribranchiata</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Capitita ambiseta</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Eumida bioculata</u>	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
<u>Pista alata</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Melinna</u> sp.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Naineris uncinata</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Pherusa inflata</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Pista</u> spp.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Potamilla</u> sp.	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-
<u>Ampharete labrops</u>	#	-	-	-	-	-	-	#	-	-	-	-	-	-
<u>Anaitides medipapillata</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Caulerielia bioculata</u>	+	-	-	-	-	-	+	-	-	+	-	-	-
<u>Distylidia rugosa</u>	+	-	-	-	-	-	-	-	-	-	-	-	-
<u>Eulalia</u> , cross-barrred or <u>E.</u> sp.	+	-	-	-	-	-	+	-	-	-	-	-	-
<u>Pista elongata</u>	+	-	-	-	-	-	-	-	-	-	-	-	-
<u>Spiophanes fimbriata</u>	+	-	-	-	-	.	-	-	-	-	-	-

Mollusca in the Palos Verdes shelf and slope, showing order of occurrence in 7 to 195 fms.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
<u>Acteon punctocoelata</u>	+	-	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	+	-	+	-	+	-	-	-	-
<u>Lima dehisceus</u>	+	-	*	*	-	*	+	-	+	*	*	*	*	-	+	-	*	-	+	+	-	+	-	-	-	-	-
<u>Macoma yoldiformis</u>	+	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>?Plagioctenium circularis</u>	+	-	-	-	-	+	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
<u>solenogasters</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	+
<u>Trachycardium quadragenarium</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Calliostoma sp.</u>	.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Conus californicus</u>	.	+	+	-	-	-	+	-	*	-	*	*	*	+	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Massarius sp.</u>	.	+	-	-	-	-	-	-	*	-	*	-	*	+	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>?Pecten sp.</u>	.	+	-	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Polinices sp.</u>	.	+	-	+	-	+	-	-	+	-	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Tellina sp.</u>	.	+	-	*	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
<u>Asthenothaerus villosior</u>	.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Chlamys sp.</u>	.	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
<u>Glans carpenteri</u>	.	+	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>?Kellia sp.</u>	.	+	+	-	-	-	-	-	-	-	+	-	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-
<u>Luciniscia nuttalli</u>	.	+	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
<u>Macoma sp.</u>	.	+	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Mangelia sp.</u>	.	+	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-

Mollusca in Palos Verdes shelf and slope (continued)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
<u>Cadulus</u> sp.	+	-	-	-	-	-	-
<u>Cylichna</u> ? <u>attonsa</u>	+	-	-	-	-	-	-
? <u>Nitidella</u> sp.	+	-	-	-	-	-	-
? <u>Saxicavella</u> <u>pacifica</u>	+	-	-	-	-	-	-
? <u>Vitrinella</u> sp.	+	-	-	-	-	-	-
<u>Amygdalum</u> <u>pallidulum</u>	+	-	-	-	-	-	-
<u>Axinopsida</u> <u>serricata</u>	+	-	-	-	+	-	-
<u>Lucinoma</u> <u>annulata</u>	+	-	-	-	-	-	-
<u>Lyonsia</u> <u>californica</u>	+	-	-	-	-	-	-
<u>Solamen</u> <u>columbianum</u>	+	-	-	-	-	-	-
<u>Tyasira</u> <u>trisinuata</u>	+	-	-	-	-	-	-
<u>Cancellaria</u> sp.	+	-	-	-	-	-	-
<u>Admete</u> sp.	+	-	-	-	-	-	-
<u>Adontorhina</u> <u>cyclia</u>	+	-	-	-	-	-	-
<u>Amphissa</u> <u>undata</u>	+	-	-	-	-	-	-
<u>Balcis</u> sp.	+	-	-	-	-	-	-
<u>Cylichna</u> <u>diegensis</u>	+	-	-	-	-	+	-
<u>Lima</u> <u>subauriculata</u>	+	-	-	-	-	-	-
<u>Nuculana</u> <u>hamata</u>	+	-	-	-	-	-	-

SAN PEDRO SHELF

The San Pedro (SP) shelf, in depths to 50 fms, supports a diversified and complex fauna, changing from one location to the next, according to kinds of sediments, location, and other physical factors. Some shallowest depths, off Seal Beach, characterized as reddish brown beach-sand, have a unique association of animals; similar deeper sands, in 17 fms, have different kinds and numbers of animals. Vertical zonation is similarly demonstrable in gray to black silts, in hard-packed sands, and in rocky or mixed sediments—all of which are represented in the San Pedro area. Changes of specific units with depths, kinds of sediments and other factors, are indicated on the charts of species; they show not only ecological groups of species, but vertical zonation, and relative abundance of the more numerous kinds. Proportionately few species occur in all depths, from shallowest to greatest; most are limited to one or few stations; some other species show replication by association with other biological units.

The charts demonstrate further the repeated occurrence of species within genera; in polychaete genera it is shown for species of *Lumbrineris*, *Pherusa*, *Prionospio*, *Glycera*, *Spiophanes*, and others. These occurrences may be more than incidental, for it can be assumed that the "rain of larvae" is present over all; their settlement and growth may be restricted by factors concerned with peculiarities of larval or planktonic adaptability.

Another process of some interest is the frequent recurrence of non-reproductive individuals, especially in outer, slope areas; here shelf-species are present but do not attain maturity; they show the same patterns of distribution and growth as do those below sill depths of offshore basins.

The changes of species with depth, kinds of sediments, faunal composition, and ecological associations are shown for the polychaetes, echinoderms and mollusks, in the charts below. The amphipods, which were equally numerous in some samples, and other crustaceans are omitted from the tabulations because they have been incompletely named, although more than 200 species have been named or identified in reports by Dr. J. L. Barnard (1959-1963) and many identified collections are consultable in the collection of the Allan Hancock Foundation.

A comparison of numbers of species and specimens, in depths of 6.5 to 48 fms, shows no decline or rise with depth of bottom, except in rocky areas, where numbers appear lower; this is due, in part, to the ineffective sampling methods, for when samples are hand-picked, as by diving, the numbers rise remarkably. The values of specific diversity, on the San Pedro shelf, by increasing depth, are illustrated:

Sta. no.	Depth in fms.	Size of sample in cuft	No. of species	No. of specimens
4885	6.5	1.89	85	800
5740	8	0.06	66	529
2504	9	0.13	41	115
3047	10	—	63	170
5753	10	0.13	64	320
4886	10.5	1.44	94	1097
6102	12.5	0.63	92	574
2107	13	2.0	68	316
4719	13	0.44	76	266
6100	13.5	0.78	80	433
5752	14.5	0.06	75 ⁺	494
6104	14.5	0.37	115	945
5741	15	0.31	101	899
5844	15	0.06	48	239
5754	16	0.88	72	716
5751	16.5	0.31	65	666
5742	17	0.44	63	358
5743	19	0.44	127	1412
5820	24.5	0.18	102	734
5750	25.5	0.13	67	376
5087	27	0.56	98	522
5003	30	0.18	78	527
5086	38	0.37	79	1402
5748	38	0.25	108	1347
2355	41	0.10	32 ⁺	240
5749	42	0.13	87	924
2630	45	0.86	42	689
5745	46	0.44	82 ⁺	1401
2126	48	—	64 ⁺	239 ⁺

The following samples (1 to 35) from the San Pedro shelf, come from depths of 5 to 48 fms. Polychaetes, echinoderms and mollusks are listed on the chart (immediately following); others are summarized in the

Analyses. Some of the crustaceans are more completely named in the State report (California, 1965, App. pp. 104-301).

1. Sta. 2741 (no. 50). Off Seal Beach, in 5 fms. Campbell grab took 2.15 cuft of red-brown beach sand with broken shells. The fauna was a limited one, comprising chiefly three species of polychaetes (see chart), two echinoderms, and two mollusks, each in considerable numbers.

2. Sta. 4885 (no. 49). 2 mi from east end of Long Beach breakwater, in 6.5 fms. OPG took 1.89 cuft of red sand over grayish black silt. In addition to the species listed on the chart, there were a small anemone, a polyclad (3), nemerteans (21), a phoronid (1), *Glottidia albida* (1), 11 kinds of amphipods (26), two cumaceans (5), three ostracods (6), a pinnixid crab (3), a shrimp (1), a pycnogonid (7), *Branchiostoma* sp. (22), and an enteropneust (3). Largest species was *Solen sicarius*, and most conspicuous *Branchiostoma*. Most numerous species were *Mediomastus californiensis* (125), *Tharyx tessellata* (113), *Prionospio pinnata* (61), and *Amphipholis squamata* (52).

Numbers of species and specimens totalled:

polychaetes	45 species,	619 specimens
echinoderms	4	64
mollusks	7	9
crustaceans	20	44
others	9	64
Total:	<hr/> 85 species, 800 specimens	

3. Sta. 5740 (no. 68). 9.75 mi from Los Angeles harbor light, in 8 fms. OPG took 0.06 cuft of fine gray sand. In addition to those named in the chart, the sparse sample yielded a small coelenterate, two nemerteans (9), bryozoans, eight amphipods (33), two cumaceans (9), a *Callinassa* sp. (4), and a crab (2). Largest species were *Terebra pedroana* and *Ophiidermella incisa*; most abundant were *Chaetozone corona* (65), *Tharyx tessellata* (51), *Prionospio malmgreni* (46) and *P. pinnata* (42), and *Olivella baetica* (31).

Numbers of species and specimens totalled:

polychaetes	37 species,	382 specimens
echinoderms	2	8
mollusks	13	67
crustaceans	13	50
others	3	22+
Total:	<hr/> 68 species, 529+ specimens	

4. Sta. 2504 (no. 67). Off Los Angeles light, in 9 fms. OPG took 0.13 cuft of black sandy mud and gray sand and broken shells. In addition to those named on the chart, there were nemerteans (2), amphipods (15), a tanaid (1), cumaceans (3) and ostracods (6). All were small, none was abundant, with *Tellina buttoni* (17) the best represented.

Numbers of species and specimens totalled:

polychaetes	28 species,	61 specimens
echinoderms	1	2
mollusks	5	21
crustaceans	4 ⁺	25
others	3	6
Total:	<hr/> 41 ⁺ species, 115 specimens	

5. Sta. 3047 (near no. 45). 1.1 mi east of Los Angeles light, in 10 fms. OPG took a small mud sample with many animals. Small anemones and a large enteropneust accompanied the specimens listed on the chart. None was abundant.

Numbers of species and specimens totalled:

polychaetes	ca. 50 species,	100 ⁺ specimens
echinoderms	2	5
mollusks	3	5
Total:	<hr/> ca. 55 species, 110 ⁺ specimens	

6. Sta. 5753 (near no. 45). 2.45 mi from Los Angeles harbor light, in 10 fms. OPG took 0.13 cuft of fine gray sand. In addition to those listed on the chart, there were two nemerteans (14), five amphipods (23), five cumaceans (14), an isopod (1) and a tanaid (3). The largest species was *Terebra pedroana*, the most abundant *Prionospio malmgreni* (36), *Mediomastus californiensis* (35) and *Tellina carpenteri* (18). Echinoderms were absent.

Numbers of species and specimens totalled:

polychaetes	34 species,	217 specimens
mollusks	12	44
crustaceans	14	41
others	4	18
Total:	<hr/> 64 species, 320 specimens	

7. Sta. 3048 (near no. 45). 1.25 mi east of Los Angeles light, in 10.5 fms. OPG took a small mud sample with animals. Coelenterates, with a ceriantharian, a broad-panniced sea-pen and branching hydroids, several nemerteans, a phoronid, a *Glottidia albida*, and a few amphipods,

caprellids, an ostracod, a spider crab and an enteropneust, ?*Schizocardium* (2) were present, in addition to those listed on the chart. The largest individuals were the sea-pen and the enteropneust. Most abundant species were *Nothria iridescens* and *Phyllochaetopterus prolifica*. Numbers of species is estimated at 58+, and specimens at more than 200.

8. Sta. 4886 (near no. 48). 0.85 mi east of Long Beach, near breakwater, in 10.5 fms. OPG took 1.44 cuft of gray to black, medium to coarse sand. Coelenterates were represented by ?*Harenactis* (23) and a sea-whip; one nemertean (32), 11 amphipods (35), two isopods (2), three cumaceans (26), three ostracods (+), *Callianassa* sp. (1), two pinnotherid crabs (19), two pycnogonids (8), and an enteropneust (7). The largest animal was *Amphiodia occidentalis*, and the most conspicuous were *Tharyx tessellata* (300+), *Scalibregma inflatum* (61), *Mediomastus californiensis* (45), *Amphipholis squamata* (41), and *Brada pilosa* (34).

Numbers of species and specimens totalled :

polychaetes	49 species,	836 specimens
echinoderms	3	69
mollusks	9	16
crustaceans	23	92
others	11	84+
Totals:	95 species,	1097+ specimens

9. Sta. 3053 (near no. 47). 3.5 mi off Los Angeles light, in 11-12 fms. Biological dredge, in rocky and rubbly bottom, took a diversified fauna, with a large pagurid, echinoderms, fishes, and many other animals. Coelenterates were present with gorgonian corals, *Euplexaura marki*, coarse brown *Eunicea*, *Ptilosarcus quadrangularis* (broad-panniced sea-pen) and *Corynactis californica*. Bryozoans were encrusted on rocks, and crustaceans included many amphipods, caprellids, and barnacle clumps. The largest individuals were *Holopagurus pilosus*, and *Astropecten* sp. Number of species was estimated at more than 57.

10. Sta. 2311 (no. 66). Off Long Beach breakwater light, in 12 fms. OPG took 0.5 cuft, in 2 drops. In addition to the species named (Hartman, 1955, p. 76) additional species are indicated in the chart. Total number of species is well over 100.

11. Sta. 6102 (near no. 47). Off Long Beach breakwater, in 12.5 fms. OPG took 0.63 cuft of dark gray fine sand. A polyclad (1), a small nemertean (28), six amphipods (18), four cumaceans (8), two ostracods (10), a mysid (1), and a pinnixid (1), accompanied the spe-

cies named on the chart. All species were moderately small; most abundant were *Prionospio pinnata* (47), *Chaetozone corona* (33), *Tellina carpenteri* (32).

Numbers of species and specimens totalled:

polychaetes	50 species,	373 specimens
echinoderms	3	15
mollusks	17	41
others	5	41
Total:	<hr/> 75 species, 470 specimens	

12. Sta. 2107 (no. 46). 2.2 mi off Los Angeles light, in 13 fms. OPG took 2.0 cuft of sand and mud with many animals. Present were a sea-whip (2), a small anemone, a sipunculid (8), an echiuroid, *Listriolobus pelodes* (2), a phoronid (3), *Glottidia albida* (2), an amphipod (1), a caprellid (3), a cumacean (1), an ostracod (1), a brachyuran crab (1), and an enteropneust (1). Largest animal was *Tagelus californicus* (6) measuring to 80 mm long, and most abundant species were *Nereis proccra* and *Sthenelanelia uniformis*, each with 31, and *Cossura candida* with 20.

Numbers of species and specimens totalled:

polychaetes	38 species,	256 ⁺ specimens
echinoderms	2	15
mollusks	5	17
crustaceans	5	7
others	8	21
Total:	<hr/> 58 species, 316 ⁺ specimens	

13. Sta. 4719 (near no. 48). East end of Long Beach breakwater, in 13 fms. OPG took 0.44 cuft of gray and green sand, with many animals. *Harenactis* sp. (4) and a nemertean (3), *Glottidia albida* (2), seven amphipods (19), two isopods (2), a tanaid, two ostracods (8), and a cumacean (1) accompanied the species named on the chart. Largest species were *Nephtys caecoides* and *Nothria elegans*, and most abundant was *Scalibregma inflatum* (26).

Numbers of species and specimens totalled:

polychaetes	37 species,	175 specimens
echinoderms	5	9
mollusks	14	38
others	3	9
Total:	<hr/> 59 species, 231 specimens	

14. Sta. 6100 (near no. 46). 5.65 mi from Pt. Fermin light, in 13.5 fms. OPG took 0.78 cuft of dark gray medium to fine sand. Small nemerteans (14), 11 amphipods (85), a caprellid (1), four isopods (6), a tanaid (2), three cumaceans (26), five ostracods (56), *Heterocrypta occidentalis* (2), a pinnixid (1), and an enteropneust (1), accompanied those named on the chart. The largest individual was *Lovenia cordiformis*. No species was outstandingly abundant.

Numbers of species and specimens totalled:

polychaetes	37 species,	180 specimens
echinoderms	4	23
mollusks	7	35
crustaceans	29	180
others	3	15
Total:	<hr/> 80 species, 433 specimens	

15. Sta. 2006 (near no. 47). 2.5 mi south of Long Beach, in 14 fms. The trawl took ascidian clumps, chiefly *Styela* and *Amaroecium* colonies. A polyclad and a pycnogonid accompanied the polychaetes named on the chart.

16. Sta. 5752 (near no. 64). 5 mi from Los Angeles light, in 14.5 fms. OPG took 0.06 cuft of fine gray sand with many small animals, chiefly polychaetes, together with a ceriantharian, a small nemertean (7), *Glottidia albida* (5), eight amphipods (21), two isopods (5), tanaids (5), three cumaceans (5), two crabs (3). Largest species were *Glottidia albida*, a ceriantharian and *Amphipholis squamata*; most numerous were *Prionospio pinnata* (64), *Mediomastus californiensis* (56), *Prionospio malmgreni* (39), and *Tellina buttoni* (31).

Numbers of species and specimens totalled:

polychaetes	37 species,	322 specimens
echinoderms	3	8
mollusks	16	100
crustaceans	16	50
others	4	14
Total:	<hr/> 76 species, 494 specimens	

17. Sta. 6104 (near no. 65). Nearly 10 mi from Pt. Fermin light, in 14.5 fms. OPG took 0.37 cuft of dark gray silty fine sand. A sea-whip,

a polyclad (1), a nemertean (+), a sipunculid (2), 11 amphipods (35), a caprellid (1), an isopod (9), five cumaceans (6), an epinebalian (3), and a kelp crab (2), accompanied the species named on the chart. Largest species were *Astropecten californicus* and *Glycera robusta*; most abundant were *Amphiodia urtica* (56), *Aricidea lopezi* (56), and *Chone* sp. (48).

Numbers of species and specimens totalled:

polychaetes	59 species,	567 specimens
echinoderms	6	121
mollusks	24	135
crustaceans	20	56
others	6+	66
Total:	115+ species, 945 specimens	

18. Sta. 5741 (no. 67). 9.25 mi from Los Angeles light, in 15 fms. OPG took 0.31 cuft of fine gray sand with many small animals. Weight of animals was estimated at 19.2 grams, of which polychaetes comprised 9.3, ophiuroids 7.1, and mollusks 2.5 grams. In addition to those listed on the chart, there were present a small nemertean (9), a phoronid (1), *Glottidia albida* (131 juveniles), nine amphipods (43), a tanaid (7), two ostracods (29), three cumaceans (5), *Callianassa* sp. (1), and a pin-nixid (5). The largest individual was *Astropecten californicus*, the most conspicuous species *Amphioplus hexacanthus* (88), and the most abundant *Glottidia albida* (131) and *Chaetozone corona* (88+).

Numbers of species and specimens totalled:

polychaetes	49 species,	464 specimens
echinoderms	4	99
mollusks	24	102
crustaceans	21	93
others	3	141
Total:	101 species, 899 specimens	

19. Sta. 5844 (no. 64). 2.6 mi from Los Angeles harbor light, in 15 fms. OPG took 0.06 cuft of coarse red sand and a few rocks. In addition to those shown on the chart, this very small sample took two anemones (+), a nemertean (+), a sipunculid (2), an oligochaete (12), five amphipods (29), an isopod (3), and a cumacean (1).

Numbers of species and specimens totalled:

polychaetes	28 species,	159 specimens
echinoderms	2	11
mollusks	4	7
crustaceans	8	36
others	5	22
Total:	<hr/> 47 species, 235 specimens	

20. Sta. 5754 (near no. 62). 1.65 mi from Los Angeles light, in 16 fms. OPG took 0.88 cuft of coarse dark gray to black sand, with woody debris and many animals. Wet weights totalled 43.4 grams, of which polychaetes were 13, echinoids 10.4, mollusks 9.2, holothuroids 4.6, anemones 3.0, nemerteans 2.9 grams, and others less than 1.0 gram. In addition to those listed on the chart, the lot contained a ceriantharian (1), a sand-covered anemone (12), ?*Harenactis* (1), three nemerteans (35), *Glottidia albida* (+), seven amphipods (12), two isopods (+), two ostracods (8), three cumaceans (23), *Callianassa* (1) and *Heterocrypta* (1). Largest individuals were *Lytechinus anamesus* (12), and *Pentamera pseudopopulifera* (2); most conspicuous or numerous species were *Pherusa capulata* (10), *Tharyx tessellata* (275), *Lysippe annectens* (15) and *Prionospio pinnata* (20).

Numbers of species and specimens totalled:

polychaetes	42 species,	585 specimens
echinoderms	2	14
mollusks	5	14
crustaceans	16	49
others	7	54
Total:	<hr/> 72 species, 716 specimens	

21. Sta. 5751 (near no. 63). 4.8 mi from Los Angeles light, in 16.5 fms. OPG took 0.31 cuft of gray sand with animals. In addition to those listed on the chart, there were a ceriantharian (1), a polyclad (1), two nemerteans (+), *Glottidia albida* (12), four amphipods (26), a tanaid (+), cumaceans (4), ostracods (21), and *Heterocrypta occidentalis* (1). Largest individual was *Astropecten californicus* (2), and most conspicuous *Ophiothrix spiculata* (144); high counts occurred also in *Aricidea lopezi* (96), *Prionospio malmgreni* (62), *Onuphis nebulosa* (52) and *Melinna denticulata* (45).

Numbers of species and specimens totalled:

polychaetes	42 species,	416 specimens
echinoderms	5	166
mollusks	4	9
crustaceans	8	56
others	6	19
Total:	<hr/> 65 species, 666 specimens	

22. Sta. 3052 (near no. 63). 4.4 mi off Los Angeles light, in 16.5 to 17 fms. The biological dredge took rocks overgrown with organisms, especially sponges, *Corynactis* (in crevices on rocks), branching hydroids, encrusting and branching bryozoans, and tubicolous amphipods. Echinoderms and mollusks were most conspicuous; smaller animals had perhaps been lost in recovery of the sample.

23. Sta. 5742 (near no. 86). 11.7 mi from Los Angeles light, in 17 fms. OPG took 0.44 cuft of reddish brown sand with many animals. In addition to those listed on the chart, the sample contained a rhabdocoele (2), a sipunculid (1), *Glottidia albida* (5), a phoronid (6), seven amphipods (46), an isopod (5), an ostracod (5), and two cumaceans (5). Largest individuals were *Lovenia cordiformis*, *Nephtys californiensis* and *Onuphis eremita*. Most abundant were *Lumbrineris cruzensis* (33), *Spiophanes bombyx* (27), and *Dendraster excentricus* and *Lumbrineris* cf. *acuta*, each with 19 individuals.

Numbers of species and specimens totalled:

polychaetes	32 species,	216 specimens
echinoderms	7	28
mollusks	8	32
crustaceans	12	68
others	4	14
Total:	<hr/> 63 species, 358 specimens	

24. Sta. 5743 (near no. 83). 7.2 mi from Los Angeles light, in 19 fms. OPG took 0.44 cuft of fine green sand with many small animals. Gross weight was only 17.4 grams, of which polychaetes were 10.1 and ophiuroids 5.5 grams. A polyclad (1), a nemertean (25), *Glottidia albida* (151), 13 kinds of amphipods (172), three isopods (12), two tanaids (21), five ostracods (151), five cumaceans (23), *Heterocrypta* (1), another crab (1), and *Scalpellum* (6) accompanied the species named on the chart. Largest animals were *Polinices lewisii*, *Lumbrineris californiensis* and *Nephtys californiensis*. Most abundant or conspicuous were *Amphipplus hexacanthus* (39), *Onuphis nebulosa* (15), *Prionospio*

pinnata (168), and *Glottidia albida* (151). Others attaining peak numbers were *Axiothella rubrocincta* (32), *Aricidea lopezi* (52), *Mediomastus californiensis* (47), and *Sthenelanelle uniformis* (38).

Numbers of species and specimens totalled:

polychaetes	60 species,	658 specimens
echinoderms	7	72
mollusks	25	110
crustaceans	32	395
others	3	177

Total:

127 species, 1412 specimens

25. Sta. 5820 (near no. 101). 7.2 mi from Los Angeles light, in 24.5 fms. OPG took 0.18 cuft of fine olive-green sand with many animals. A ceriantharian (29), ?*Harcnactis* (2), a nemertean (+), *Glottidia albida* (42), a phoronid (6), 13 amphipods (86), a caprellid (1), two isopods (2), tanaids (22), cumaceans (54) and *Ictero crypta* (1) accompanied the species named on the chart. Largest animal was *Ophiura lutkeni*; most abundant species were *Spiophanes missionensis* (47), *Aricidea lopezi* (42), and *Prionospio pinnata* (28).

Numbers of species and specimens totalled:

polychaetes	44 species,	360 specimens
echinoderms	5	35
mollusks	21	56
crustaceans	26	194
others	6	89

Total:

102 species, 734 specimens

26. Sta. 5750 (near no. 100). 5.5 mi from Los Angeles light, in 25.5 fms. OPG took 0.13 cuft of fine green sand, with many animals. A ceriantharian (3), *Glottidia albida* (12), six amphipods (42), caprellid (1), two isopods (4), two tanaids (39), and four cumaceans (11) accompanied the species named in the chart. Largest individual was *Nephtys caccoides*; most conspicuous were *Amphiodia urtica* (17), *Amphioplus hexacanthus* (14), and *Chloecia pinnata* (3).

Numbers of species and specimens totalled:

polychaetes	30 species,	192 specimens
echinoderms	4	33
mollusks	15	40
crustaceans	15	95
others	3	16

Total:

67 species, 376 specimens

27. Sta. 5087 (near no. 108). 3.6 mi from Newport pier, in 27 fms. OPG took 0.56 cuft of dark green sandy silt with many animals. Wet weight totalled 65.3 grams, with ophiuroids 40, polychaetes 10, crustaceans 7, gorgonian 4.6, and others less than 1.0 gram. A gorgonian, a ceriantharian, a nemertean (5), a sipunculid, small *Listriolobus pelodes* (3), a papillated leech (1), *Glottidia albida* (1), 16 amphipods (69), a caprellid (4), a tanaid (2), a cumacean (2), an ostracod (2), an epinebalian (4), *Scalpellum* (14), *Heterocrypta occidentalis* (1), a shrimp (2), a pycnogonid (1), an enteropneust (1) and *Pyrosoma* (1) were present, in addition to those listed on the chart. Largest species was *Ophiura lutkeni* (37), and most abundant *Amphiodia urtica* (119).

Numbers of species and specimens totalled:

polychaetes	35 species,	162 specimens
echinoderms	7	194
mollusks	21	53
crustaceans	25	97
others	10	16
Total:	<hr/> 98 species, 522 specimens	

28. Sta. 5003 (near no. 108). Off Newport Bay, in 30 fms. OPG took 0.18 cuft of fine grayish green sand with many animals. Present were a loose-panniced sea-whip (3), ?*Harenactis* (1), a nemertean (8), 12 amphipods (42), a caprellid (2), an isopod (5), a tanaid (8), three cumaceans (5), two ostracods (176). Largest individuals were a sea-whip and *Nephtys californiensis*. Most numerous animals were ostracods (176) and *Prionospio malmgreni* (36).

Numbers of species and specimens totalled:

polychaetes	33 species,	206 specimens
echinoderms	3	35
mollusks	18	35
crustaceans	21	239
others	3	12
Total:	<hr/> 78 species, 527 specimens	

29. Sta. 5086 (no. 129). 4.7 mi from Newport pier, in 38 fms. OPG took 0.37 cuft of dark green silt and sand, with many animals. Wet weight was 12.8 grams, of which polychaetes were 5, sea-whips 4, ophiuroids 2.8, and others less than 1 gram. A sea-whip (5), a small anemone, a nemertean (2), 16 amphipods (64), an isopod (6), two tanaids (16), five cumaceans (23), five ostracods (880), and an epinebalian (2) were present, in addition to those named on the chart. The largest individuals were a sea-whip and *Nephtys caecoides*; most con-

spicuous species were *Amphiodia urtica* (56), *Chloecia pinnata* (103), followed by *Pectinaria californiensis* (19) and *Prionospio malmgreni* (43).

Numbers of species and specimens totalled:

polychaetes	26 species,	283 specimens
echinoderms	2	60
mollusks	17	57
crustaceans	30	993
others	4	9
Total:	<hr/> 79 species, 1402 specimens	

30. Sta. 5748 (near no. 101). 8.2 mi from Los Angeles light, in 38 fms. OPG took 0.25 cuft green sand and shell, with many animals. They included a sea-whip (2), a polyclad (2), *Glottidia albida* (2), 22 amphipods (123), three isopods (18), tanaids (48), four cumaceans (37), four ostracods (425), *Scalpellum* (2), a shrimp, a pycnogonid and a colonial ascidian. Largest species were *Polinices lewisii* and *Scalpellum*, and most abundant were *Prionospio malmgreni* (106), *Amygdalum pallidulum* (90), *Chloecia pinnata* (47), *Axinopsida serricata* (40), *Chaetozone setosa* (35), *Aricidea lopezi* (32), *Lumbrineris cruzensis* (31), and *Spiophanes missionensis* (30).

Numbers of species and specimens totalled:

polychaetes	44 species,	486 specimens
echinoderms	4	41
mollusks	17	157
crustaceans	38	655
others	5	8 ⁺
Total:	<hr/> 108 species, 1347 ⁺ specimens	

31. Sta. 2355 (no. 99). 6.3 mi off Los Angeles light, in 41 fms. OPG took 0.10 cuft of green sand with many animals. In addition to those listed on the chart, *Monobrachium* (a colony), amphipods (19), caprellids (24), an isopod (1), a tanaid (6), and two ostracods (55) were present. Largest individual was a maldanid, and most abundant was *Amphiodia urtica* (52).

Numbers of species and specimens totalled:

polychaetes	23 species,	64 specimens
echinoderms	2	60
mollusks	5	8
crustaceans	6 ⁺	107
other	1	1
Total:	<hr/> 37 ⁺ species, 240 specimens	

32. Sta. 5749 (near no. 99). 6.4 mi from Los Angeles light, in 42 fms. OPG took 0.13 cuft of fine green sand with many animals. Wet weight of animals was estimated at 9.5 grams, with ophiuroids 5.3, polychaetes 3.4 grams, and all others 0.8 grams. In addition to those listed on the chart, 13 amphipods (47), two isopods (6), tanaids (16), two ostracods (23), a mysid (1) and *Monobrachium* colonies (61) on *Axinopsida* and *Erycina*, were present. The largest species were *Nephtys californiensis* and *Pentamera pseudopopulifera*; most abundant were *Prionospio malmgreni* (120), *Axinopsida serricata* (66), *Chloecia pinata* (60), *Amphiodia urtica* (57), *Aricidea lopezi* (51) and *Chaetozone setosa* (42).

Numbers of species and specimens totalled:

polychaetes	40 species,	536 specimens
echinoderms	4	67
mollusks	19	117
crustaceans	23	136
others	1	68
Total:	<hr/> 87 species, 924 specimens	

33. Sta. 2630 (no. 105). 4.4 mi SW of Huntington Beach pier, in 45 fms. Campbell grab took 0.86 cuft of sandy grayish green mud with many small animals. The following were present in addition to those named on the chart: *Monobrachium parasitum* (1), a polyclad (2), a nemertean (2), amphipods of several kinds (36), two cumaceans (3), three ostracods (9), a pinnotherid crab and a sand crab. Largest individual was *Travisia ?pupa* and most abundant *Amphiodia urtica* (390).

Numbers of species and specimens totalled:

polychaetes	26 species,	140 specimens
echinoderms	4	458
mollusks	9	27
crustaceans	9+	50
others	3	14
Total:	<hr/> 51+ species, 689 specimens	

34. Sta. 5745 (near no. 103). 9.5 mi from Los Angeles light, in 46 fms. OPG took 0.44 cuft of fine green sand. Wet weights were estimated at 15.3 grams, of which ophiuroids comprised 12.3 and polychaetes 2.2 grams, with all others 0.8 grams. The following species were present: *?Harenactis* (1), a polyclad (1), a nemertean (12), 11 amphipods (72), three isopods (11), several tanaids (46), three cumaceans (48), and five ostracods (571), in addition to those named in the chart. Largest indi-

viduals were *Panthalis pacifica* and *Megalomma splendida*. Most conspicuous and abundant species was *Amphiodia urtica* (98), followed by *Lumbrineris cruzensis* (98), *Prionospio malmgreni* (70), *Chaetozone setosa* (65), *Aricidea lopezi* (37), and *Scoloplos armiger* (34).

Numbers of species and specimens totalled:

polychaetes	36 species,	446 specimens
echinoderms	6	127
mollusks	14	60
crustaceans	23 ⁺	754
others	3	14
Total:	<hr/> 82 ⁺ species, 1401 specimens	

35. Sta. 2126 (no. 123). 9.2 mi from Los Angeles light, in 48 fms. OPG took a moderately large sample of coralline clumps, and many kinds of animals. In addition to those named in the chart, there were present a stalked hydroid, a nemertean, ?*Arynychite* sp. (1), a leech, branching bryozoans, amphipods (12), two isopods (2), tanaids (9), a cumacean, three ostracods (57) and *Scalpellum* (2⁺). The largest species was ?*Arynychite* sp., the most abundant *Ghlocia pinnata* (33). Total numbers were estimated at more than 64 species and 239 specimens.

SAN PEDRO SLOPE

The San Pedro (SP) slope, in depths below 60 fms, is an oceanward down-sloping extension of the San Pedro shelf. It is dissected by the San Gabriel sea valley; near its outer limits it surrounds the Lasuen sea mount and Sixmile bank. One of its greatest depths, 440 fms, is attained north of Sixmile bank (no. 213 on Map, Pt. 1). Its terrain is overall irregular, compared with that of adjacent areas. Surface sediments are mainly silt, mud and clay, with rocky rubble and gravel in the vicinities of the sea mounts.

The fauna in the soft bottoms is diversified and patchy. Biomass values at depths of 90 to 100 fms approach 100 grams to a sample; these values diminish to a fraction of a gram at greatest depth, showing a more or less steady decline with depth. Rocky outcrops occur in 170 and 180 fms near no. 174 (see Map, Pt. 1), and in 240 fms at no. 197; these are also the sites of siliceous sponge and conspicuous representatives of echinoderms (Sta. 2987, 2416). The values of specific diversity, by increasing depth, are illustrated:

Sta. no.	Depth in fms.	Size of sample in cuft	No. of species	No. of specimens
2292	60	0.81	87 ⁺	576 ⁺
5746	68	1.13	92	822
5747	90	0.88	98	1546
4778	100	2.96	40	227
2423	175	1.13	42 ⁺	107 ⁺
2884	190	1.93	23	123
2306	215	2.64	29 ⁺	158 ⁺
2342	230	0.31	29	146
2372	230	0.81	36 ⁺	203
2898	240	1.13	26	73
2894	253	0.81	17	37
2893	265	2.58	23 ⁺	51
2886	270	2.60	29 ⁺	49
2635	278	2.99	40 ⁺	75
2644	310	5.74	21	37
2901	312	3.02	27	40
2900	345	3.08	25	62
2844	362	3.15	17	67
2370	366	2.83	17	47
2368	385	2.26	17	37
2369	390	3.33	22	52
2440	415	3.27	19	72
2802	420	2.64	26	48
2836	430	2.88	15	31
2229	440	0.63	20	48

The following samples, numbered 1 to 31 on the charts, come from the San Pedro slope, in depths of 60 to 446 fms. Polychaeta, echinoderms and mollusks are listed on the charts by increasing depths; others are summarized in the following analyses.

1. Sta. 2292 (no. 104). Upper end of San Gabriel sea valley, in 60 fms. OPG took 0.81 cuft of fine grayish green sand, with many animals. In addition to those named on the chart, the following were present: *Harenactis* (1), *Monobrachium* (2 colonies), a nemertean (2), a turbellarian (1), four amphipods (113), an isopod (2⁺), ostracods (many) and a mysid (1). The largest species was *Lumbrineris bicirrata*; the most abundant were *Amphiodia urtica* (177), *Adontorhina cyclia* (78), *Aligena* sp. (74), *Amphipholis squamata* (53), and *Chloecia pinnata* (47).

Numbers of species and specimens totalled :

polychaetes	53 species,	350 specimens
echinoderms	11	310
mollusks	15	191
crustaceans	6 ⁺	122 ⁺
others	2	3
Total:	<hr/> 87 ⁺ species, 976 ⁺ specimens	

2. Sta. 5746 (near no. 129). SW of Newport, in 68 fms. OPG took 1.13 cuft of light green, foraminiferan sand with many animals. In addition to those named on the chart, the sample contained a nemertean (3), a sipunculid (1), 16 amphipods (86), three isopods (7), two or more tanaisids (20) six ostracods (236) and a juvenile crab (1). The largest individual was *Antiplanes ?perversa*, and the most abundant species were *Onuphis nebulosa* (135), *Tharyx tessellata* (36), and *Magelona pacifica* (20).

Numbers of species and specimens totalled :

polychaetes	48 species,	429 specimens
echinoderms	2	3
mollusks	6	13
crustaceans	33	369
others	3	8
Total:	<hr/> 92 species, 822 specimens	

3. Sta. 5747 (near no. 123). 9.2 mi south of Los Angeles light, in 90 fms. OPG took 0.88 cuft of very fine green sand. Wet weight of the larger animals was 96.7 grams, of which echinoids were 62.7, ophiuroids 17.0, polychaetes 16.6, and all others less than 0.5 grams. In addition to

those named on the chart, the sample contained *Monobrachium parasitum* (11 colonies on *Pseudopythina chacci*), a nemertean (2), a polyclad (1), a sipunculid (4), ten amphipods (137), three isopods (11), tanaids (8), three ostracods (about 400), and four cumaceans (32). Largest species were *Nephtys glabra* and brissopsid urchins; most abundant were *Chloecia pinnata* (102) and *Amphiodia urtica* (100). Peak numbers were attained also by *Tharyx monilaris* (70), *Paraonis gracilis* (58), *Pista moorei* (36), and *Adontorhina cyclia* (35).

Numbers of species and specimens totalled:

polychaetes	46 species,	667 specimens
echinoderms	7	138
mollusks	18	130
crustaceans	23	593
others	4	18
Total:	98 species,	1546 specimens

4. Sta. 4778 (no. 184). S of Laguna Beach, in 100 fms. OPG took 2.96 cuft of green mud. Animals included 8 amphipods (20), an isopod (3), a cumacean (3) and an ostracod (1), in addition to those named on the chart. Largest individuals were *Molpadia intermedia*, *Pista disjuncta* and *Travisia pupa*. Most abundant or conspicuous were *Chloecia pinnata* (56), *Amphiodia urtica* (44), and *Pectinaria californiensis* (37).

Numbers of species and specimens totalled:

polychaetes	21 species,	137 specimens
echinoderms	6	55
mollusks	2	8
crustaceans	11	27
Total:	40 species,	227 specimens

Sub. 4. Sta. 2177 and 2438 (no. 267). Outermost end of the San Pedro area, in 172 and 153 fms. OPG took sandy mud (2177) and rock (2438) with attached tubes of unnamed polychaetes, representatives of a polynoid, a sphaerodorid and a maldanid. The sample from sandy mud contained many polychaetes with *Chloecia pinnata* the most conspicuous; three kinds of echinoderms, *Amphiodia urtica* (18), *Amphiura arcystata* (1), and *Brissopsis pacifica* (5), and five mollusks: *Cadulus tolmiei* (8), *Cardita ventricosa* (7), *Cyrella minuta* (41), *Solamen columbianum* (2) and *Tellina carpenteri* (16).

Sub. 4. Sta. 2987 (no. 174). 13.7 mi SE of Los Angeles light, in 177-189 fms. The biological dredge took rocks and echinoderms with siliceous sponge and a lamprey eel.

5. Sta. 2416 (no. 174). 13.5 mi SE of Los Angeles light, in 180 fms. The biological dredge took large boulders and many echinoderms (see chart). Most abundant were *Ophiopholis bakeri* (42) and *Ophiacantha diplasia* (22).

6. Sta. 2884 (no. 154). 5.6 mi SW of Newport pier, in 190 fms. OPG took 1.93 cuft of gray-green mud. Present were a ceriantharian (1), an anemone with warty epithelium (2), ?*Arynchite* (1), small crustaceans (not examined), and those named on the chart. Largest species was *Pista disjuncta*, and most abundant *Chloecia pinnata* (70).

Numbers of species and specimens totalled:

polychaetes	12 species,	103 specimens
echinoderms	4	11
mollusks	4	5
others	3	4
Total:	<hr/> 23 species, 123 specimens	

7. Sta. 2306 (no. 98). 6.2 mi from Pt. Fermin light, in 215 fms. OPG took 2.64 cuft of mud and gray clay with large animals. In addition to those named on the chart, there were a few small crustaceans. Largest species was *Asychis disparidentata*, and most abundant *Chloecia pinnata* (51). Total numbers were estimated at more than 38 species, and 175 specimens.

8. Sta. 2342 (no. 262). 5.9 mi E of East End, SCI, in 230 fms. OPG took 0.31 cuft of sandy mud with sticky oil globules. The sample contained siliceous sponge, a nemertean (1), a tongue of a large echiuroid (1), amphipods (4), an anthurid isopod (1), ostracods (32), in addition to those named on the chart. Largest species was *Nephtys assignis*, and most abundant *Chloecia pinnata* (46).

Numbers of species and specimens totalled:

polychaetes	16 species,	73 specimens
echinoderms	2	9
mollusks	5	24
crustaceans	3+	37
others	3	3
Total:	<hr/> 29+ species, 146 specimens	

9. Sta. 2372 (no. 199). 16 mi NE of East End, in 230 fms. OPG took 0.81 cuft of gray sandy mud, with many foraminiferans, small teselated sponge balls, a nemertean (3), a polyclad (1), amphipods (14), an anthurid isopod (6), two ostracods (27), a small crab (1), in addition to those named on the chart. Largest species was *Nephtys punctata*.

and most abundant were *Praxillella affinis pacifica* (26), and *Tellina carpenteri* (24).

Numbers of species and specimens totalled:

polychaetes	23 species,	102 specimens
echinoderms	1	4
mollusks	5	42
crustaceans	5*	48
others	3	7
Total:	<hr/> 37* species, 203 specimens	

10. Sta. 2898 (no. 197). 12.7 mi SW of East End, in 240 fms. OPG took 1.13 cuft of blue-green mud with rocky rubble and shale. In addition to those named on the chart the sample contained a smooth anemone (1), and a sand-covered one (1), a nemertean (1), an amphipod (2), a caprellid (7), a gnathid isopod (1). Largest individual was *Thelepus setosus*; none was outstandingly abundant.

Numbers of species and specimens totalled:

polychaetes	14 species,	35 specimens
echinoderms	1	8
mollusks	5	17
crustaceans	3	10
others	3	3
Total:	<hr/> 26 species, 73 specimens	

11. Sta. 2894 (no. 219). 11.5 mi SW of Newport pier, in 253 fms. OPG took 0.81 cuft of gray-green, sandy mud with few animals. In addition to those named on the chart, there were a nemertean (3), an amphipod (3) and a cumacean (1). Largest animal was a nemertean, and most conspicuous *Onuphis nebulosa* (6).

Numbers of species and specimens totalled:

polychaetes	11 species,	19 specimens
mollusks	3	11
crustaceans	2	4
other	1	3
Total:	<hr/> 17 species, 37 specimens	

12. Sta. 2895 (no. 200). 9.9 SW of Newport pier, in 265 fms. OPG took 2.58 cuft of grayish green mud with arenaceous foraminiferans, small tessellated sponge balls, a large nemertean (2), an echiuroid (1), amphipods (5), two isopods (2), in addition to those named on the chart. Largest individuals were an echiuroid and a nemertean; none was outstandingly abundant.

Numbers of species and specimens totalled :

polychaetes	13 species,	31 specimens
echinoderms	2	2
mollusks	5	12
crustaceans	3 ⁺	7
Total:	<hr/> 23 ⁺ species, 52 specimens	

13. Sta. 2886 (no. 201). 9.2 mi SW of Newport pier, in 270 fms. OPG took 2.6 cuft of grayish green mud. A large nemertean (2), an echiuroid (1), amphipods (12), a cumacean (1), an ostracod (1), and a small enteropneust, were present in addition to those named on the chart. Largest animals were *Brissopsis pacifica* and a nemertean. None was abundant.

Numbers of species and specimens totalled :

polychaetes	13 species,	18 specimens
echinoderm	1	1
mollusks	7	12
crustaceans	5 ⁺	14
others	3	4
Total:	<hr/> 29 ⁺ species, 49 specimens	

14. Sta. 2635 (no. 249). S of Lasuen sea mount, in 278 fms. OPG took 2.99 cuft of greenish yellow and black, marbled clay, with small rocks and considerable rubble. Screenings contained small tessellated sponge balls, two anemones (5), a nemertean (2), an echiuroid (2), amphipods (6), a shrimp (1), in addition to those named on the chart. Largest species was *Notomastus magnus*; none was notably abundant.

Numbers of species and specimens totalled :

polychaetes	26 species,	38 specimens
echinoderms	6	13
mollusks	2	8
crustaceans	2 ⁺	7
others	4	9
Total:	<hr/> 40 ⁺ species, 75 specimens	

15. Sta. 2644 (no. 222). NE of Lasuen sea mount, in 310 fms. Campbell grab took 5.74 cuft of greenish gray clay with foraminiferans. In addition to those named on the chart, there were a large nemertean (1), ?*Arynychite* (1), and an amphipod (6). Largest individuals were a nemertean and an echiuroid; none was abundant.

Numbers of species and specimens totalled:

polychaetes	12 species,	19 specimens
echinoderms	2	3
mollusks	4	6
crustaceans	1	6
others	2	3
Total:	<hr/> 21 species, 37 specimens	

16. Sta. 2901 (no. 217). Lower end of San Gabriel sea valley, in 312 fms. OPG took 3.02 cuft of grayish green mud with many arenaceous and calcareous foraminiferans. The sample contained a large ceriantharian, *Cerebratulus* (1), two amphipods (3), a caprellid (1), a cumacean (1), and an enteropneust (2). Largest animals were *Brissopsis pacifica*, a ceriantharian, and a nemertean; none was abundant.

Numbers of species and specimens totalled:

polychaetes	14 species,	22 specimens
echinoderms	3	7
mollusks	6	8 ⁺
crustaceans	4	5
others	3	5
Total:	<hr/> 30 species, 47 ⁺ specimens	

17. Sta. 2900 (no. 231). E of Sixmile bank, in 345 fms. Grab took 3.08 cuft of mud. The sample contained those listed in the chart, together with an anemone with wrinkled epithelium (3), a large red ceriantharian (1), a red nemertean (1), a sipunculid (3), two amphipods (3), a caprellid (1) and a cumacean (1). Largest animal was a ceriantharian, and none was abundant.

Numbers of species and specimens totalled:

polychaetes	11 species,	33 specimens
echinoderms	5	9
mollusks	2	7
crustaceans	3	5
others	4	8
Total:	<hr/> 25 species, 62 specimens	

18. Sta. 2350 (no. 241). 6.75 mi SE of Long Pt., SCI, in 350 fms. OPG took 0.1 cuft of rocks, mud, sand, rubble and siliceous sponge. All animals were small, with the largest *Chaetozona* and *Lepidonotus*. The most abundant was *Ophiacantha* sp. (10). Numbers of species and specimens included polychaetes with 9 species and 11 specimens, and echinoderms with 3 species and 18 specimens.

19. Sta. 2844 (no. 233). SW of Lasuen sea mount, in 362 fms. OPG took 3.15 cuft of sticky grayish green mud with many calcareous foraminiferans, long sponge spicules and ophiuroid fragments. In addition to the species named in the chart, there were an anemone (1), a nemertean (4), and an amphipod (1). Largest species was *Amphiura arcystata*, and most abundant *Aricidea uschakowi* (16) and *Tharyx* spp. (23).

Numbers of species and specimens totalled :

polychaetes	11 species, 55 specimens
echinoderms	2 3
mollusk	1 3
crustacean	1 1
others	2 2
Total:	<hr/> 17 species, 64 specimens

20. Sta. 2370 (no. 232). Lower end of San Gabriel sea valley, in 366 fms. OPG took 2.83 cuft of grayish green mud with foraminiferans, small amount of siliceous sponge, and many small animals. In addition to those named on the chart, an amphipod (3) and a cumacean (1) were present; there was no large individual; most abundant was *Tharyx* sp.

Numbers of species and specimens totalled :

polychaetes	11 species, 26 specimens
echinoderm	1 3
mollusks	3 14
crustaceans	2 4
Total:	<hr/> 17 species, 47 specimens

21. Sta. 2640 (no. 241). S of Sixmile bank, in 370 fms. OPG took about a liter of brown-black, friable rock, clayey gravel, animals and siliceous sponge spicules. In addition to the species named on the chart, there were present an isopod (3), *Munida quadrispina* (galatheid crab) (1), and a colonial tunicate. Largest animal was the crab, and none was abundant. Total number of species 15, and specimens 27.

22. Sta. 2368 (no. 242). S of Sixmile bank, in 385 fms. OPG took 2.26 cuft of sandy mud, rocks, siliceous sponge and foraminiferans. A dark, warty anemone was present, an amphipod (3), and a tanaid (2), in addition to those named on the chart. Largest individual was *Chloeia pinnata*, and most abundant were *Lumbriclymene lineus* (9) and *Tharyx* sp. (9).

Numbers of species and specimens totalled:

polychaetes	11 species,	28 specimens
mollusks	2	2
crustaceans	2	5
others	2	2
Total:	<hr/> 17 species, 37 specimens	

23. Sta. 2369 (no. 243). 3 mi SE of Sixmile bank, in 390 fms. OPG took grayish green mud with siliceous sponge, calcareous foraminiferans, and many small animals. In addition to those named on the chart there were two amphipods (8), and a pycnogonid (1). None was large and none abundant.

Numbers of species and specimens totalled:

polychaetes	11 species,	26 specimens
echinoderms	4	11
mollusks	4	6
crustaceans	2	8
other	1	1
Total:	<hr/> 22 species, 52 specimens	

24. Sta. 2440 (no. 244). Lowest end of San Gabriel sea valley, in 415 fms. Grab took 3.27 cuft of greenish gray clay and mud, with many foraminiferans, minute mud balls, tube fragments of *Phyllochaetopterus limicolus* and a few animals. An anemone measuring 10 by 28 mm, a nemertean (1), four amphipods (5), an isopod (1), were present in addition to those named in the chart. The largest individual was an anemone.

Numbers of species and specimens totalled:

polychaetes	7 species,	34 specimens
echinoderm	1	12
mollusks	4	18
crustaceans	5	6
others	2	2
Total:	<hr/> 19 species, 72 specimens	

25. Sta. 2352 (no. 227). W of Sixmile bank, in 420 fms. OPG took 2.5 cuft of grayish green mud with considerable siliceous sponge and orbicular foraminiferans. In addition to those named on the chart, the lot included a small sea pen. The largest individual was *Thelepus setosus*, in a tube 170 mm long by 12 mm across; it was externally adorned with attached foraminiferans and tubes of *Protis*.

Numbers of species and specimens totalled :

polychaetes	3 species,	17 specimens
echinoderms	3	4
mollusks	3	3
other	1	1

Total:	<hr/> 10 species, 25 specimens	
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26. Sta. 2802 (no. 194). N of Sixmile bank, in 420 fms. Grab took 2.65 cuft of bluish greenish gray mud with siliceous sponge and foraminiferans. In addition to those named on the chart, there was a large and a small anemone, a nemertean (1), and a cumacean (1). Largest species were *Melinnexis pacifica* and *Myxoderma platyacantha*.

Numbers of species and specimens totalled :

polychaetes	13 species,	38 specimens
echinoderms	2	3
mollusks	2	3
crustacean	1	1
others	2	3

Total:	<hr/> 20 species, 48 specimens	
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27. Sta. 2859 (no. 227). W of Sixmile bank, in 425 fms. OPG took 2.58 cuft of greenish gray sand and mud with many foraminiferans and much siliceous sponge. The lot contained a sea pen (2), a nemertean (1), a sipunculid (1), an ostracod (1) and *Callianassa goniophthalma* (1). The large individual was the ghost shrimp.

Numbers of species and specimens totalled :

polychaetes	10 species,	12 specimens
mollusks	3	6
crustaceans	2	2
others	3	3

Total:	<hr/> 18 species, 23 specimens	
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28. Sta. 2836 (no. 145). Eastern sill of San Pedro basin, in 430 fms. OPG took 2.88 cuft of greenish gray sticky mud, with many foraminiferans, tubes of *Phyllochaetopterus* and diversified animals. In addition to those named in the chart, a ghost shrimp (1), an isopod (1), and a small enteropneust (1) were present.

Numbers of species and specimens totalled :

polychaetes	8 species,	24 specimens
echinoderm	1	1
mollusks	3	3
crustaceans	2	2
other	1	1

Total:	<hr/> 15 species, 31 specimens	
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29. Sta. 2229 (no. 213). N of Sixmile bank, in 440 fms. OPG took 0.63 cuft of sandy clay, gravel, rubbly rocks, with siliceous sponge, foraminiferans, and diversified animals. A gorgonian and sea pen were present, in addition to those named in the chart.

Numbers of species and specimens totalled:

polychaetes	17 species,	44 specimens
echinoderm	1	2
others	2	2
Total:	<hr/> 20 species, 48 specimens	

Sub 29. Sta. 2341 (no. 263). 7.6 mi E of East End, SCI, in 440 fms. OPG took 0.1 cuft of fine sandy mud with almost no life; only a small ophiuroid and fragments of a maldanid and *Tharyx* were present.

30. Sta. 2839 (no. 212). NW of Sixmile bank, in 446 fms. Campbell grab took 3.4 cuft of greenish gray sticky mud with foraminiferans, and siliceous sponge. In addition to those named on the chart, a nemertean (1) and an enteropneust (1) were present. Solenogasters, with 3 species and 12 specimens, were unusual.

Numbers of species and specimens totalled:

polychaetes	7 species,	17 specimens
echinoderms	2	2
mollusks	5	14
others	2	2
Total:	<hr/> 16 species, 35 specimens	

31. Sta. 2837 (no. 211). NW of Sixmile bank, in 454 fms. Campbell grab took 3.08 cuft of greenish gray sticky mud with foraminiferans, tubes of *Phyllochaetopterus limicolus*, *Protis pacifica* and siliceous sponge. In addition to those named on the chart, a sipunculid (1) and a compound ascidian (2) were present.

Numbers of species and specimens totalled:

polychaetes	5 species,	18 specimens
echinoderm	1	1
mollusks	3	4
others	2	3
Total:	<hr/> 11 species, 26 specimens	

NEWPORT SHELF

The narrow Newport Shelf (NE) has its shoreward end between Newport Bay and Laguna Beach; it is bounded on the west by Newport canyon (Hartman, 1963, 27) and merges oceanward and in greater depth with the San Pedro slope (see Map 1). Sediments of the bottom are sand and silt mixed with varying amounts of shelly and other biological debris. Faunal diversity changes with location, depth and size of sample, as shown by the following analysis:

Sta. no.	Depth in fms.	Size of sample in cuft	No. of species	No. of specimens
2745	8	0.27	47	190
5877	9	0.69	59	306
4777	10	0.88	70	437
4871	27	1.32	101	701
5354	31	1.51	82	1250
5092	50	1.51	78	1134
4872	52	3.30	61	540

Most of the benthic animals of this shelf are infaunal and thus not visible in surface views except as pores, small mounds or extended parts of animals. Eight samples are analyzed, with three of the major groups of species named on the following chart. Greater depths than 52 fms are referred to the San Pedro slope area.

1. Sta. 2745 (no. 110). 0.1 mi from end of Balboa pier, in 8 fms. OPG took 0.27 cuft of gray sand and shelly fragments and numerous branches of *Cellaria* (bryozoans). In addition to those named on the chart, *Harenactis* sp. (28), a nemertean (3), amphipods (45), a caprellid (1), cumaceans (14), ostracods (5) and a small crab (6), were present. The largest species were *Diopatra ornata* and *Chaetopterus variope-datus*. None was outstandingly abundant.

Numbers of species and specimens totalled:

polychaetes	34 species,	77 specimens
echinoderms	3	3
mollusks	3	7
crustaceans	5+	71
others	4	32+

Total: 49+ species, 190+ specimens

2. Sta. 4877 (no. 134). About half way between Newport Bay and Laguna Beach, in 9 fms. OPG took 0.69 cuft of medium dark gray sand. Wet weight of macroscopic animals was 19.9 grams, of which polychaetes comprised 10.7, ophiuroids 4, *Astropecten* (2) 1.7, nemerteans 1.4, and anemones 1.3 grams. In addition to the species named on the chart, a white anemone with flat base (8), small anemone (8), *Cerebratulus* sp. (2), a polyclad (2), a sipunculid (15), about ten species of amphipods (107), an isopod (1), cumaceans with six species (18), ostracods with four (18), a shrimp (1), and *Branchiostoma* sp. (3), comprised the lot. The largest individual was *Nothria iridescens*, the most conspicuous *Owenia f. collaris* and *Onuphis eremita*, and the most abundant *Lumbrineris cruzensis* (25) and *Glycera oxycephala* (21).

Numbers of species and specimens totalled:

polychaetes	25 species,	101 specimens
echinoderms	4	33
mollusk	1	1
crustaceans	23	133
others	6	38
Total:	<hr/> 59 species, 306 specimens	

3. Sta. 4777 (near no. 185). S of Laguna Beach, in 10 fms. OPG took 0.88 cuft of fine gray to black sand, flocculent debris having an odor of hydrogen sulfide, and many animals. Total wet weight of animals was 21.2 grams, of which polychaetes comprised 12.4, mollusks 4.6, an *Astropecten* 2.0, and crustaceans 1.0 grams. In addition to those listed on the chart, the sample had two kinds of nemerteans (18), *Glottidia albida* (2), 18 species of amphipods (284), a tanaid (23), two kinds of cumaceans (6), an epinebalian (1), an ostracod (2), *Callianassa* (3), a pagurid (1) and a crab (4). Largest individuals were *Astropecten* and *Lytechinus*; and most conspicuous was *Diopatra ornata*.

Numbers of species and specimens totalled:

polychaetes	26 species,	75 specimens
echinoderms	3	7
mollusks	8	11
crustaceans	30	324
others	3	20
Total:	<hr/> 70 species, 437 specimens	

4. Sta. 4871 (near no. 185). 2.7 mi from Dana Pt., in 27 fms. OPG took 1.32 cuft of green silt. Wet weights of animals totalled 54.5 grams, of which polychaetes comprised 22.2, ophiuroids 19.6, tunicates

5.7, mollusks 2.8, and decapods 1.8 grams. In addition to the species named on the chart, the lot comprised a small sea-whip, a hydroid stalk, several small nemerteans, many slender tubes of phoronids, 16 kinds of amphipods (115), an isopod, a tanaid, two kinds of cumaceans (3), three kinds of ostracods (40), *Callianassa* sp. (4), *Pinnixa* sp. (4), *Randallia* sp. (1), *Scalpellum* (1), a pycnogonid (1), an enteropneust (5) and a tunicate (2). There was no conspicuously large specimen; most abundant were *Amphiodia urtica* (240) and *Pectinaria californiensis* (40).

Numbers of species and specimens totalled:

polychaetes	35 species,	175 specimens
echinoderms	8	267
mollusks	21	56
crustaceans	32	173
others	5	30 ⁺
Total:	<hr/> 101 species, 701 ⁺ specimens	

5. Sta. 2747 (near no. 134). Between Newport Bay and Laguna Beach, in 30 fms. Biological dredge took a small sample in kelp and sandy bottom. The most conspicuous species were *Pectinaria californiensis* and *Platynereis bicanaliculata*.

6. Sta. 5354 (near no. 185). 7.5 mi from Newport jetty light, in 31 fms. OPG took 1.51 cuft of green sandy silt with many animals. Wet weights totalled 88.9 grams, of which ophiuroids comprised 57.5, polychaetes 17.5, holothurians 10.8, nemerteans 1.2, and others less than a gram. In addition to the species named on the chart, there were present a ceriantharian (3), a broad white polyclad (1) and another with encircling black eyes (1), nemerteans (12), a phoronid (10), 11 kinds of amphipods (106), two cumaceans (2), four ostracods (99), two pinnixid crabs (5), and an enteropneust (5). Largest individuals were *Molpadia intermedia* and *Travisia pupa*. Most abundant were *Amphiodia urtica* (595), *Pholoe glabra* (112), *Lumbrineris cruzensis* (38) and *Pectinaria californiensis* (30).

Numbers of species and specimens totalled:

polychaetes	41 species,	358 specimens
echinoderms	5	618
mollusks	10	29
crustaceans	19	213
others	7	32
Total:	<hr/> 82 species, 1250 specimens	

7. Sta. 5092 (near no. 185). 1.4 mi from Newport jetty light, in 52 fms. OPG took 3.3 cuft of sand and shell fragments. Wet weight was 131.4 grams, of which ophiuroids comprised 69.2, *Molpadia* 32.5, polychaetes 25.2, echiuroids 2.6, mollusks 1, and others less than 1 gram. In addition to the species listed on the chart, the lot contained a small white anemone (1), ?*Harenactis* sp. (1), *Monobrachium parasitum* colonies (6), a polyclad (1), nemerteans (5), sipunculid (1), *Arynchite* (1), 11 kinds of amphipods (151), two kinds of isopods (3), ostracods (4), two cumaceans (4), and small colonies of *Pyrosoma* (5). Largest individuals were *Molpadia intermedia* and *Travisia pupa*, and most abundant was *Amphiodia urtica* (648), followed by *Amphipholis squamata* (72) and *Pectinaria californiensis* (36).

Numbers of species and specimens totalled :

polychaetes	34 species,	161 specimens
echinoderms	7	747
mollusks	12	42
crustaceans	17	162
others	8	20
Total:	<hr/> 78 species, 1132 specimens	

8. Sta. 4878 (near no. 185). 1.4 mi from Newport jetty light, in 52 fms. OPG took 3.3 cuft of sand and shell fragments. Wet weights totalled 58.4 grams, of which polychaetes were 36.5, ophiuroids 15.6, mollusks 2.8, nemerteans 1.1, and others each less than 1 gram. In addition to the species named on the chart, the sample contained a small sea-whip, ?*Harenactis* (3), *Listriolobus pelodes* (9), eight kinds of amphipods (50), an isopod (2), an ostracod (2), a pinnotherid crab (2), a small crab (1), and an enteropneust (3). Largest individual was *Pista disjuncta*, and most abundant species were *Amphiodia urtica* (252), *Pectinaria californiensis* (43), and *Pista disjuncta* (20).

Numbers of species and specimens totalled :

polychaetes	31 species,	168 specimens
echinoderms	4	277
mollusks	9	17
crustaceans	12	57
others	5	21
Total:	<hr/> 61 species, 540 specimens	

Polychaeta in the Newport shelf,
showing order of occurrence in 8 to 52 fms.

+ indicates presence, - absence.

Species represented by more than 10 specimens are indicated by *.

	1	2	3	4	5	6	7	8
<u>Amaeana occidentalis</u>	+	-	-	+	-	-	-	+
<u>Anaitides</u> sp.	+	-	+	-	-	-	-	-
<u>Aricidea lopezi</u>	+	-	-	-	-	+	-	-
<u>Aricidea neosuecica</u>	+	+	-	-	-	-	-	+
<u>Chaetopterus variopedatus</u>	+	-	-	-	-	-	-	-
<u>Chaetozone corona</u>	+	-	+	-	-	-	-	-
<u>Diopatra ornata</u>	+	-	*	-	-	-	-	-
<u>Glycera convoluta</u>	+	+	+	-	-	-	-	-
<u>Goniada littorea</u>	+	-	+	-	-	-	-	-
<u>Gyptis a. glabra</u>	+	-	+	-	-	+	-	+
<u>Haploscoloplos elongatus</u>	+	+	-	-	-	+	-	-
<u>Harmothoe lunulata</u>	+	+	-	-	-	-	-	-
<u>Harmothoe priops</u>	+	-	-	-	-	-	-	-
<u>Heterospio catalinensis</u>	+	-	-	-	-	-	-	-
<u>Laonice cirrata</u>	+	-	-	+	-	-	+	+
<u>Lumbrineris</u> spp.	+	-	-	+	-	-	-	-
<u>Magelona sacculata</u>	+	+	+	-	-	-	-	-
<u>Mediomastus californiensis</u>	+	-	-	-	-	+	-	-
<u>Nephtys</u> spp.	+	-	-	-	+	-	-	-
<u>Nereis procera</u>	+	-	-	-	-	-	-	-
<u>Nothria iridescens</u>	+	*	+	-	-	-	-	-
<u>Odontosyllis phosphorea</u>	+	-	-	-	-	-	-	-
<u>Owenia f. collaris</u>	+	+	-	-	-	-	-	-
<u>Pareulepis fimbriata</u>	+	-	-	-	-	-	-	-
<u>Phyllochaetopterus limicolus</u>	+	-	-	-	-	-	-	-
<u>Prionospio malmgreni</u>	+	-	+	-	-	*	+	+
<u>Sthenelais tertiaglabra</u>	+	-	-	-	-	-	-	-
syllid	+	-	-	-	-	-	-	-
<u>Telepsavus costarum</u>	+	-	-	+	-	+	+	-

Polychaeta in Newport shelf (continued)

	1	2	3	4	5	6	7	8
<u>Thalenessa spinosa</u>	+	+	+	-	-	-	-	-
<u>Tharyx</u> spp.	*	+	-	+	-	-	+	+
<u>Exogone uniformis</u>	+	+	-	-	-	-	-	-
<u>Glycera oxycephala</u>	*	-	-	-	-	-	-	-
<u>Glycinde armigera</u>	+	*	-	-	-	-	-	-
<u>Goniada brunnea</u>	+	-	-	-	+	+	+	+
<u>Loimia medusa</u>	+	-	-	-	-	-	-	-
<u>Lumbrineris</u> nr. <u>acuta</u>	+	-	-	-	-	-	-	-
<u>Lumbrineris californiensis</u>	+	-	+	-	+	-	-	-
<u>Lumbrineris cruzensis</u>	*	-	-	-	*	*	+	+
<u>Nephtys caecoides</u>	+	+	-	-	-	-	-	-
<u>Onuphis eremita</u>	*	-	-	-	-	-	-	-
<u>Pholoe glabra</u>	+	-	+	-	*	*	*	*
<u>Pista disjuncta</u>	+	-	+	-	-	+	*	*
<u>Prionospio pinnata</u>	+	+	+	-	+	+	+	+
<u>Prionospio</u> , another sp.	+	-	-	-	-	-	-	-
<u>Rhynchospio</u> sp.	+	-	-	-	-	-	-	-
<u>Spiophanes missionensis</u>	+	-	-	-	+	+	-	-
<u>Amphicteis scaphobranchiata</u>	+	-	-	+	+	-	-	-
<u>Axiiothella rubrocincta</u>	+	-	-	+	+	-	-	-
<u>Brada pilosa</u>	+	-	-	-	-	-	-	-
<u>Glycera americana</u>	+	+	+	-	-	+	-	-
<u>Harmothoe</u> sp.	+	-	-	-	-	-	-	-
<u>Pherusa neopapillata</u>	+	+	-	-	-	-	-	-
<u>Pista</u> cf. <u>crustata</u>	+	-	-	-	-	-	-	-
<u>Platynereis bicanaliculata</u>	+	-	+	-	-	-	-	-
<u>Poecilochaetus johnsoni</u>	+	+	-	+	-	-	-	-
<u>Pseudopotamilla ocellata</u>	+	-	-	-	-	-	-	-
<u>Schistocomus hiltoni</u>	+	-	-	-	-	-	-	-
<u>Tharyx multifilis</u>	+	-	-	-	-	-	-	-
<u>Ancistrosyllis tentaculata</u>	+	-	-	+	+	-	+	+

Polychaeta in Newport shelf (continued)

	1	2	3	4	5	6	7	8
<u>Anotomastus gordiodes</u>	+	-	-	-	-
<u>Aricidea</u> sp.	+	-	-	-	-
<u>Artacamella hancocki</u>	+	-	-	-	-
<u>Brada glabra</u>	+	-	-	-	-
<u>Ceratocephala c. americana</u>	+	-	+	+	+
<u>Cossura candida</u>	*	-	*	+	-
<u>Glycera capitata</u>	+	-	-	+	+
<u>Loandalia fauveli</u>	+	-	+	-	-
<u>Magelona pacifica</u>	*	-	-	+	-
<u>Myriowenia californiensis</u>	+	-	-	-	-
<u>Naineris uncinata</u>	+	-	-	-	-
<u>Paraonis gracilis</u>	+	-	+	+	+
<u>Pectinaria californiensis</u>	*	+	*	*	*
<u>Pilargis berkeleyi</u>	+	-	+	-	-
<u>Polydora</u> sp.	+	-	-	-	-
<u>Praxillella a. pacifica</u>	+	-	-	-	-
<u>Rhodine bitorquata</u>	+	-	+	-	-
<u>Sternaspis fossor</u>	*	+	+	+	+
<u>Sthenelanelia uniformis</u>	+	-	-	-	-
<u>Terebellides stroemii</u>	+	+	*	-	+
ampharetid	+	-	-	+
<u>Asabellides ?lineata</u> or <u>A. sp.</u>	+	+	-	-
<u>Hyalinoecia juvenalis</u>	+	-	-	-
<u>Isocirrus longiceps</u>	+	-	-	-
<u>Notomastus magnus</u>	+	-	-	-
<u>Pherusa capulata</u>	+	-	-	-
<u>Travisia</u> sp.	+	+	-	-
<u>Anaitides</u> , checkered	+	-	-
<u>Ancistrosyllis</u> cf. <u>rigida</u>	*	-	-
<u>Aricidea uschakowi</u>	+	+	-
<u>Chloeia pinnata</u>	+	+	*

Polychaeta in Newport shelf (continued)

	1	2	3	4	5	6	7	8
<u>Drilonereis</u> sp.	+	-	-
<u>Eunice americana</u>	+	-	-
<u>Hesperonoe</u> sp.	+	+	-
<u>Nephtys ferruginea</u>	+	+	+
<u>Notomastus tenuis</u>	+	-	-
<u>Praxillella gracilis</u>	+	+	+
<u>Spio punctata</u>	+	-	-
<u>Travisia pupa</u>	+	+	-
<u>Brada pluribranchiata</u>	+	+
<u>Chone gracilis</u>	+	-
<u>Leanira</u> sp.	+	-
<u>Lumbrineris bifilaris</u>	+	-
<u>Megalomma</u> sp.	+	-
<u>Myriochele gracilis</u>	+	-
<u>Onuphis parva</u>	+	-
<u>Lepidasthenia</u> sp.	+
<u>Lumbrineris bicirrata</u>	+
<u>Ninoe gemma</u>	+
<u>Panthalis pacifica</u>	+
<u>Travisia brevis</u>	+

Echinodermata in the Newport shelf,
showing order of occurrence in 8 to 52 fms.

<u>Amphiodia psara</u>	+	-	-	-	-	-	-	-
<u>Amphiodia urtica</u>	+	*	-	*	-	*	*	*
<u>Astropecten californicus</u>	+	+	-	+	-	-	-	-
<u>Amphipholis squamata</u> . . . . .	.	*	-	*	-	+	*	*
<u>Dendraster excentricus</u> . . . . .	.	+	-	-	-	-	-	-
<u>Amphiodia digitata</u> . . . . .	.	.	.	+	-	-	-	-
<u>Astropecten</u> sp. . . . .	.	.	.	+	-	-	-	-
<u>Lytechinus anamesus</u> . . . . .	.	.	.	+	+	-	-	-
<u>Amphiura arcystata</u> . . . . .	.	.	.	.	+	-	-	+

Echinodermata in Newport shelf (continued)

	1	2	3	4	5	6	7	8
<u>Ophiothrix spiculata</u>				+	-	-	-	-
<u>Ophiura lutkeni</u>				+	-	-	-	-
<u>Pentamera pseudopopulifera</u>				+	-	-	-	-
<u>Amphioplus strongyloplax</u>						*	*	+
<u>Leptosynapta albicans</u>						+	-	-
<u>Molpadia intermedia</u>						+	+	-
<u>Amphiacantha amphacantha</u>							+	-
holothurian							+	-

Mollusca in the Newport shelf,
showing order of occurrence in 8 to 52 fms.

<u>Epitonium tinctum</u>	+	-	-	-	-	-	-	-
<u>Rochefortia tumida</u>	+	-	-	-	-	-	-	-
<u>Turbonilla</u> sp.	+	-	-	-	-	-	-	-
<u>Olivella baetica</u>		+	-	-	-	-	-	-
<u>Crepidula excavata</u>			+	-	-	-	-	-
? <u>Lacuna</u> sp.			+	-	-	-	-	-
<u>Nassarius perpinguis</u>				+	+	-	+	-
<u>Nitidella carinata</u>				+	+	-	-	-
<u>Olivella</u> ? <u>pedroana</u>				+	-	-	-	-
<u>Polinices lewisii</u>				+	-	-	-	-
<u>Solen</u> ? <u>sicarius</u>				+	-	-	-	-
<u>Tellina modesta</u>				+	-	-	-	-
<u>Acteocina intermedia</u>					+	-	-	-
<u>Axinopsida serricata</u>					+	-	+	+
<u>Bittium</u> sp.					+	-	-	-
<u>Cadulus</u> sp.					+	-	-	+
<u>Compsomyax subdiaphana</u>					+	-	+	+
<u>Crenella columbiana</u>					+	-	-	-
<u>Cylichna diegensis</u>					+	-	-	+
<u>Lyonsia californica</u>					+	-	-	-
<u>Macoma yoldiformis</u>					+	-	-	-

SUBMERGED SEA MOUNTS IN THE SAN PEDRO CHANNEL

Two sea mounts (LS) in the San Pedro Channel have been biologically explored. The larger Lasuen sea mount is on the eastern and the smaller Sixmile bank on the western side of the channel (see Map 1).

The Lasuen sea mount is located 13 nautical miles west of Newport and beyond the outer end of Newport Canyon; its base is in depths of about 250 fms and it rises to 40 to 68 fms at its top. It measures about 3.25 by 5.33 miles and covers more than 16 square miles. Six samples were recovered and analyzed. The sediments at the top are rocky, calcareous, with much debris; downward the sediments contain much shelly debris, mucoid stringy masses, flocculent debris; this gives way farther down to gravelly debris and then sandy green mud. Siliceous sponge occurs at its deepest perimeter. The faunal components are richly diversified; the most abundant and largest are echinoderms, coelenterates, mollusks, polychaetes and crustaceans.

1. Sta. 2298 (no. 235). SW end of sea mount, in 68 fms. OPG took 0.37 cuft of shelly sand and a few rocks. In addition to the species listed on the chart, there were single individuals of anemone, nemertean, sipunculid (2), oligochaete (1), and crustaceans (amphipods and isopods) in sparse numbers. Largest individual was *Lanice conchilega*, and most abundant species were *Spio punctata* (148), and *Chloecia pinnata* (16).

Numbers of species and specimens totalled:

polychaetes	33 species, 254 specimens
echinoderms	4 12
mollusks	3 3
crustaceans	2+ 2+
others	4 14
Total:	46+ species, 285+ specimens

2. Sta. 2297 (no. 236). Southeast end of Lasuen sea mount, in 181 fms. OPG took 0.68 cuft of large and small rocks, mud, gravelly debris, with many small animals and a large brown, coarse sponge measuring 3 by 5 cm. In addition to those named on the chart, there were also a sipunculid (2), an amphipod (2), a caprellid (1), and a tanaid (3). None was abundant, and most were under-developed. Total number of species was estimated at less than 30, and specimens numbered about 50.

3. Sta. 2843 (no. 220). Northern end of Lasuen sea mount, in 230 fms. OPG took 1.32 cuft of grayish green sandy mud with little rubble and numerous animals. The lot included a small sea-whip, a nemertean (2 large), amphipods (few), an isopod (1), a cumacean (1), ostracods (3). Largest individual was *Brissopsis pacifica* and most abundant were *Nuculana conceptionis* (16), and *Lysippe annectens* (15).

Numbers of species and specimens totalled:

polychaetes	20 species,	46 specimens
echinoderm	1	5
mollusks	8 ⁺	41
crustaceans	5 ⁺	7 ⁺
others	2	3

Total:

 36⁺ species, 102⁺ specimens

4. Sta. 2887 (no. 221). Northeast end of Lasuen sea mount, in 284 fms. OPG took 2.89 cuft of gray-green mud with many foraminiferans and small animals of few kinds. In addition to those listed on the chart, an amphipod (3) and a cumacean (2) were present. Largest was a brissopsid, and most abundant *Nitidella permodesta* (13). Most of the species are those characteristic of slope depths.

5. Sta. 2299 (no. 234). Southwest end of Lasuen sea mount, in 360 fms. OPG took a full sample of dark gray oozy mud with siliceous sponge and many kinds of animals. In addition to those listed, there were present a nemertean (1), and a sipunculid (1). Largest individuals were *Thalanesa spinosa* and *Maldane sarsi*. None was conspicuously abundant. Number of species totalled about 16, and specimens less than 20.

6. Sta. 2154-52 (near 228). Lasuen sea mount, in 300 fms. Biological dredge, with tangles, pulling upslope on a rocky incline, recovered coarse brown sponge, an alcyonarian, bryozoans encrusting rocks, a galatheid crab, and those species listed on the chart. Most, if not all, are unique to this area, and may have their affinities with animals off the deeper areas of Santa Catalina Island.

Sixmile bank is a broadly elongate seamount, 6.5 nautical miles north-east of Avalon, Santa Catalina Island; it rises from a depth of 350 fms to a flat top in 228 fms. It measures about 3.25 by 4.5 mi and covers an area of about 15 square miles. It is located in the serial numbers 213, 214 and 228, 229. Three samples were useful to indicate the kind of fauna.

Sta. 2204 (near no. 228), in 230 fms, was a dredged one and took rocks with attached ophiuroid, *Ophiacantha phragma*, asteroids, and

Psolus, also egg-capsules of a hag-fish, a chiton, a munnid crab, horny brown sponges and associated bryozoans and polychaetes. The polychaetes appear to be largely unknown species in the genera *Euchone*, *Euphrosine*, *Exogone*, *Glycera*, *Lagisca*, *Lumbrineris*, *Odontosyllis* and *Thelepus*.

Sta. 2845 (no. 229), in 227 fms. OPG took 1.25 cuft of grayish green sandy mud with small mud-balls, dark gravel, and wormlike animals. Largest individuals were a nemertean, *Cerabratulus*, a capitellid, and a brissopsid, *Brissopsis pacifica*. Polychaetes included species in *Ammotrypane*, ampharetids, capitellid, cirratulid, *Cirrophorus furcatus*, *Haploscoloplos elongatus*, *Laonice* sp., *Onuphis* sp., *Streblosoma* sp. and *Terebellides stroemii*. Mollusks were represented by *Cadulus tolmiei* and solenogasters, and crustaceans by amphipods and an apseudid isopod.

Sta. 2228 (no. 228) in 293 fms. OPG took oozy mud with siliceous sponge, orbicular foraminiferans, and metazoan animals including ophiuroids, gastropods, pelecypods, scaphopods, solenogasters, together with more numerous small polychaetes and crustaceans (see Hartman, 1955: 136).

Polychaeta from Lasuen sea mount (1-5) and Sixmile bank (6)
showing order of occurrence in 68 to 360 fms.

+ indicates presence, - absence.

Species represented by more than 10 specimens are indicated by *.

	1	2	3	4	5	6
<u>Anaitides ?madeirensis</u>	+	+	-	-	-	-
<u>Anobothrus gracilis</u>	+	-	-	-	-	-
<u>Capitella capitata</u> subsp.	+	-	-	-	-	-
<u>Chaetozone armata</u>	+	-	-	-	-	-
<u>Chloeia pinnata</u>	+	-	+	-	-	-
<u>Euchone incolor</u>	*	-	-	-	-	-
<u>Exogone uniformis</u>	+	-	-	-	-	-
<u>Glycera americana</u>	+	-	-	-	-	-
<u>Glycera cf. capitata</u>	+	-	-	-	-	-
hesionid, unknown	+	-	-	-	-	-
<u>Laonice conchilega</u>	+	-	-	-	-	-
<u>Laonice cirrata</u>	+	-	-	-	-	-
<u>Lumbrineris latreilli</u>	+	-	-	-	-	-
<u>Lumbrineris</u> spp.	+	+	-	-	-	-
<u>Lysippe annectens</u>	+	-	*	-	-	-
<u>Magelona ?californica</u>	+	-	-	-	-	-
<u>Magelona pacifica</u>	*	-	-	-	-	-
<u>Nephtys</u> , unknown sp.	+	-	-	-	-	-
<u>Notomastus lineatus</u>	+	-	-	-	-	-
<u>Notomastus magnus</u>	+	-	-	-	-	-
<u>Onuphis</u> sp.	+	-	-	-	-	-
<u>Peisidice aspera</u>	+	-	-	-	-	-
phyllodocid	+	-	-	-	-	-
<u>Polycirrus</u> sp.	+	+	-	-	-	-
<u>Polydora cf. websteri</u>	*	-	-	-	-	-
<u>Prionospio pinnata</u>	+	-	-	-	-	-
<u>Protodorvillea gracilis</u>	+	-	-	-	-	-
<u>Questa caudicirra</u> n. gen., n. sp.	+	-	-	-	-	-
<u>Sphaerosyllis</u> sp.	+	-	-	-	-	-

Polychaeta from Lasuen sea mount and Sixmile bank (continued)

	1	2	3	4	5	6
<u>Spio punctata</u>	*	-	-	-	+	-
<u>Thalenessa spinosa</u>	+	-	-	-	-	+
<u>Tharyx tessellata</u>	+	-	-	-	-	-
? <u>Typosyllis</u> sp.	+	-	-	-	-	-
<u>Aricidea</u> spp.		+	-	-	-	-
<u>Boccardia</u> sp.		+	-	-	-	-
<u>Brada glabra</u>		+	+	-	-	-
capitellid		+	-	-	-	-
<u>Cossura candida</u>		+	-	-	-	-
<u>Dodecaceria concharum</u>		+	-	-	-	-
<u>Eunice</u> sp.		+	-	-	-	-
<u>Glycera</u> sp.		+	-	-	-	-
<u>Haploscoloplos elongatus</u>		+	+	-	-	-
<u>Lepidonotus caelorus</u>		+	-	-	-	-
maldanid		+	-	-	-	-
<u>Phyllochaetopterus limicolus</u>		+	+	-	-	-
syllid		+	-	-	-	-
<u>Terebellides stroemii</u>		+	-	-	-	-
unknown annelid		+	-	-	-	-
<u>Ammotrypane aulogaster</u>			+	-	-	-
<u>Anaitides</u> sp.			+	-	-	-
<u>Cirrophorus aciculatus</u>			+	-	-	-
<u>Cirrophorus furcatus</u>			+	-	-	-
<u>Drilonereis ?longa</u>			+	-	-	-
<u>Goniada brunnea</u>			+	-	-	-
<u>Gyptis a. glabra</u>			+	-	-	-
<u>Myriochele</u> sp.			+	-	+	-
<u>Nephtys ?ferruginea</u>			+	-	-	-
<u>Paraonis gracilis</u>			+	-	+	-
<u>Potamethus</u> sp.			+	-	-	-
<u>Praxillella a. pacifica</u>			+	-	-	-

Polychaeta from Lasuen sea mount and Sixmile bank (continued)

	1	2	3	4	5	6
<u>Prionospio</u> sp.
<u>Tharyx</u> sp.
<u>Aglaophamus</u> sp.
<u>Ammotrypane</u> sp.
<u>Aricidea lopezi</u>
<u>Caulleriella</u> sp.
goniadid
<u>Ancistrosyllis</u> sp.
<u>Eumida</u> sp.
<u>Glycera branchiopoda</u>
<u>Maldane sarsi</u>
<u>Notomastus</u> sp.
<u>Gattyana brunnea</u> n. sp.
<u>Glycera tessellata</u>
<u>Lagisca</u> nr. <u>multisetosa</u>
<u>Lepidonotus caelorus</u>
<u>Macellicephala remigata</u>
? <u>Nicomache</u> , unknown
serpulid fragment
terebellid, unknown

Echinodermata from Lasuen sea mount (1-5) and Sixmile bank (6)
showing order of occurrence in 68 to 360 fms.

<u>Amphiacantha amphacantha</u> . . . . .	.	.	.	.	.	.
<u>Amphiodia urtica</u> . . . . .	.	.	.	.	.	.
<u>Amphipholis squamata</u> . . . . .	.	.	.	.	.	.
<u>Leptosynapta albicans</u> . . . . .	.	.	.	.	.	.
<u>Spatangus californicus</u> . . . . .	.	.	.	.	.	.
<u>Amphioplus strongyloplax</u> . . . . .	.	.	.	.	.	.
<u>Amphipholis pugetana</u> . . . . .	.	.	.	.	.	.
<u>Ophiothrix spiculata</u> . . . . .	.	.	.	.	.	.

Echinodermata from Lasuen sea mount and Sixmile bank (continued)

	1	2	3	4	5	6
<u>Brissopsis pacifica</u>
brissopsids
ophiuroid
echinoid
<u>Allocentrotus fragilis</u>
<u>Amphiura seminuda</u>
<u>Astrophiura marionae</u>
<u>Luidiaster californicus</u>
<u>Ophiacantha bairdi</u>
<u>Ophiacantha diplasia</u>
<u>Ophiocynodus corynetes</u>
<u>Ophiopholis bakeri</u>

Mollusca from Lasuen sea mount (1-5) and Sixmile bank (6)
showing order of occurrence in 68 to 360 fms.

<u>Glycimeris suboboleta</u> . . . . .	.	.	.	.	.	.
<u>Parvilucina tenuisculpta</u> . . . . .	.	.	.	.	.	.
<u>Tellina carpenteri</u> . . . . .	.	.	.	.	.	.
<u>Cadulus tolmiei</u> . . . . .	.	.	.	.	.	.
<u>Lepidopleurus nexus</u> . . . . .	.	.	.	.	.	.
<u>Limifossor</u> sp. . . . .	.	.	.	.	.	.
<u>Saxicava arctica</u> . . . . .	.	.	.	.	.	.
<u>Cardita</u> sp. . . . .	.	.	.	.	.	.
<u>Nuculana conceptionis</u> . . . . .	.	.	.	.	.	.
<u>Nuculana hamata</u> . . . . .	.	.	.	.	.	.
<u>Solamen columbianum</u> . . . . .	.	.	.	.	.	.
solenogasters . . . . .	.	.	.	.	.	.
<u>Dacrydium</u> sp. . . . .	.	.	.	.	.	.
<u>Nitidella permodesta</u> . . . . .	.	.	.	.	.	.
<u>Saxicavella pacifica</u> . . . . .	.	.	.	.	.	.

SANTA CATALINA ISLAND, LEEWARD SIDE

The leeward side of Santa Catalina Island (CL) has been sampled on many occasions. Quantitative grab samples noted below were taken along transects extending from East End, Avalon, Willow Cove, White Cove-Long Point, Isthmus Cove, Howlands Landing, and West End, leeward side. The details of kinds and abundance of animals are indicated on the separate charts (below).

East End

1. Sta. 3611 (no. 259), in 30 fms. OPG took 0.56 cuft of green mud, sand, strands of algae (*Egregia*) measuring to 11 feet long, and many animals, especially amphipods, red-striped spirontocarid shrimps, polychaetes, echinoderms and coelenterates. Polyclads, nemerteans and sipunculids were occasional. Encrusting bryozoans on kelps were varied. The most conspicuous animals were *Ophiothrix spiculata*, *Chaetopterus variopedatus* and *Platynecis bicanaliculata*; most abundant were amphipods and *Capitella capitata* subsp. Total number of species was more than 50.

2. Sta. 5095 (near no. 259), in 40 fms. OPG took 0.81 cuft of fine greenish brown sand. Largest individual was a red nemertean, *Lepidasthenia ?virens*, and most conspicuous was *Sternaspis fossor*. *Amphiodia urtica* was most abundant, with 186 specimens. Other animals than those shown on the chart included an anemone, three each of ceriantharians and enteropneusts, and numerous small *Pyrosoma*.

The number of species and specimens totalled:

polychaetes	17+ species,	116+ specimens
echinoderms	6	226
mollusks	6	13
crustaceans	17	45
others	5	9+
Total:	<hr/> 51+ species, 409+ specimens	

3. Sta. 2122 (no. 259), in 48 fms. OPG took 0.95 cuft of sandy mud with dead *Laqucus* and other brachiopod shells, and living animals. The largest were a ceriantharian anemone, and a nemertean. Crustaceans were numerous, with ostracods, amphipods, cumaceans, isopods.

4. Sta. 3613 (near no. 259), in 50 fms. OPG took 0.31 cuft of glauconitic sand and white shelly debris, with many animals. Kelps were absent and there was no large or conspicuous animal. Most abundant was *Nothria elegans*, with 145+ specimens, followed by *Chaetozone setosa* with 68, and *Amphiodia urtica* with 50. The polychaetes were followed

in diversity and abundance by small crustaceans, especially amphipods, ostracods and cumaceans.

5. Sta. 4045 (near no. 259), in 57 fms. OPG took about 2 liters of sandy debris with stony hydrocoral skeletons, broken shells, a large brissopsid and many animals. The largest individual was *Spatangus californicus*, which measured 46 mm in diameter. Most conspicuous were *Amphiodia digitata*, with 43 individuals, and a large *Thelepus setosus*. Shells of *Bittium* (snail) had hydranth colonies. Crustaceans were small, included a pagurid, cumaceans, amphipods, isopods and ostracods.

6. Sta. 3615 (near no. 259), in 60 fms. OPG took 0.63 cuft of green shelly sand, with rock, white coralline rubble, and much diversified life. In addition to those animals listed in the chart, the sample contained a small amount of sponge, a solitary coral, sand covered anemones, a smooth brown-spotted anemone, a nemertean, and a sipunculid. Crustaceans included many amphipods, at least four kinds of isopods, 50 or more ostracods, crabs with eight pagurids, ten dromiids, a spider, and another crab. The most conspicuous animals were echinoderms: *Brissopsis pacifica* (4), *Lovenia californicus* (2), and *Amphipholis squamata* (21). The most abundant and diversified were polychaetes.

7. Sta. 2348 (near no. 260), in 75 fms. OPG took gray-green sand, rock, coralline and shelly rubble, with few living animals. The most abundant animal was *Nothria stigmatis*, with more than 100 specimens. Most conspicuous were two brissopsids, small ophiuroids, and a holothurian.

8. Sta. 3616 (near no. 260), in 88 fms. OPG took 0.18 cuft of glauconitic white shelly sand and rubble with trace of siliceous sponge. The screenings retained no large animal but numerous small ones, with polychaetes the most abundant and diversified. The most conspicuous was *Chloecia pinnata* (25). Amphipods were numerous and diversified, followed by ostracods, isopods, small crabs, and a pagurid, with six individuals, in dead shells of *Nassarius*.

9. Sta. 3617 (near no. 260), in 93 fms. OPG took white coralline sand and silt, the sand compacted but friable. The largest animals were single individuals of *Brissopsis pacifica* and *Brisaster townsendi*; most abundant were species of *Tharyx*, *Nothria elegans*, and amphipods.

Avalon Harbor

1. Sta. 3601 (near no. 239), in 18 fms. OPG took 0.69 cuft of gray shelly sand with flocculent debris, many animals, with large tubes of *Chaetopterus*, *Telepsavus* and *Phyllochaetopterus*. Coelenterates included

ten sea pens, more than a hundred sand covered anemones and about as many smooth anemones. Among the polychaetes the best represented were *Owenia*, *Lumbrineris*, spionids and *Telepsavus*. The most conspicuous animals were *Ophiothrix spiculata* and *Chaetopterus variopedatus*. Total numbers of species exceeded 79. Crustaceans were represented by many amphipods and tanaids; also some isopods, ostracods, cumaceans, a few small shrimps and crabs, and a pinnotherid crab. Included also were a pycnogonid (4) and an enteropneust (3). This fauna is similar to, but more diversified than, that of the mainland shelf, in comparable depths. A photograph (Plate 8) of the bottom in Emerald Bay in 17 fms (near no. 207) dominated by *Chaetopterus*, depicts a similar area.

2. Sta. 3045 (no. 250), in 42-43 fms. Biological dredge took mud, echinoids, ophiuroids, a holothuroid, a small squid, numerous polychaetes, and many kinds of small crustaceans, especially amphipods and isopods. The dredge was best suited to recover echinoderms, and least effective for infaunal animals.

3. Sta. 2436 (no. 250), in 44 fms. OPG took 1.07 cuft of oily sandy mud and clay. The largest animal was a large red-ribbon nemertean; other animals included a small ceriantharian, amphipods, and many polychaetes. The species are those characteristic of the shelf fauna.

4. Sta. 3603 (near no. 238), in 47 fms. OPG took 0.37 cuft of green shelly sand. Conspicuous were brissopsids, ophiuroids and many other animals. Animals other than those shown on the chart include coelenterates with a small sea pen, smooth and sand-covered burrowing anemones; a small *Glottidia albida*, two small sipunculids; crustaceans with 84 amphipods, 36 cumaceans, 5 anthurid isopods, 2 gnathid isopods, about 90 ostracods, 10 tanaids, and 6 pagurids in small gastropod shells. The largest specimen was *Brissopsis pacifica*, and the most abundant *Nothria stigmatis* with 215 specimens, followed by *Amphiodia urtica* with 126. Total number of species is more than 80, and specimens more than 850.

5. Sta. 2639 (no. 239), in 82 fms. OPG took 1.14 cuft of gray-green sandy mud, with white shelly sand and fine gravel. Most conspicuous were *Ophiothrix spiculata*, with about 25, and *Chloëia pinnata* with 13 specimens. Brown ostracods were numerous, and amphipods less abundant. The fauna is limited in kinds of animals and characteristic of that at the outer edge of the shelf.

6. Sta. 2347 (no. 251), in 100 fms. OPG took 0.25 cuft of gray-green sandy mud with broken shells, echinoid spines and many animals. The largest was *Brisaster townsendi*, the most conspicuous *Chloëia pinnata*, with 40 specimens, and crustaceans were represented by many amphipods and ostracods.

7. Sta. 3605 (near no. 238). OPG took 0.25 cuft of green mud and sand, in 100 fms. All animals were small and inconspicuous. The most abundant were brown ostracods, with more than 100, and *Amphipholis squamata*, with 15 specimens.

8. Sta. 2367 (no. 240), in 230 fms. OPG took 0.5 cuft of gray-green sandy mud and gravel, with dead *Cadulus* shells. The largest species was *Travisia pupa*, the most abundant and conspicuous *Chloecia pinnata*, with 51 specimens. Crustaceans were represented by amphipods (7), tanaids (2), and many ostracods.

Sta. 2344 (no. 252), in 210 fms. OPG took 0.37 cuft sandy mud, gravel, rocks, with animals. The sediments contained many *Rhabdamina* and disklike foraminiferans. The most conspicuous individual was a brisopsid. Other animals are those characteristic of the slope.

Willow Cove

1. Sta. 2121 (no. 238), in 32 fms. OPG dropped twice, recovered 1.26 cuft of sand, mud, dead *Laqueus* shells, a large white sponge, large asteroid, solitary corals, a surface echinoid, mollusks (not identified), numerous crustaceans (not identified), with small shrimps, crabs, many amphipods and some isopods. The polychaetes were represented by more than 39 species and many specimens. The species are those characteristic of the shelf fauna.

2. Sta. 2853 (no. 238), in 35-38 fms. Sigsbee trawl, in rocky bottom, took rocks, sand, silt, siliceous sponge, dead brachiopod (*Laqueus* and *Terebratalia*) shells. Coelenterates included two or more sea pens, two small colonies of hydrocorals, a few solitary corals, several nemerteans, a sipunculid, several polyclads, small crustaceans, especially tanaids (38), amphipods (7), a few isopods, stalked barnacle, *Scalpellum* attached to tubes of *Phyllochaetopterus*, and many different kinds of polychaetes. The most abundant, *Anaitides madeirensis*, had 30 specimens.

3. Sta. 2637 (no. 238), in 40 fms. Campbell grab took 1.14 cuft of gray sandy mud with white shelly debris. The largest species was *Molpadia intermedia*, and the most abundant *Amphiodia digitata* (93). Also present were a ceriantharian (1), *Glottidia albida* (1), crustaceans represented by many amphipods and an epinebalian (2).

4. Sta. 2638 (no. 238), in 40 fms. OPG took 0.93 cuft of gray sand and mud. The largest species were *Lytechinus anamesus* (urchin) and a red nemertean. Most abundant were *Amphiodia urtica* (109) and cirratulid polychaetes.

5. Sta. 2426 (no. 226), in 270 fms. OPG took 1.0 cuft of dark green mud, with siliceous sponge, tessellated small sponge, foraminiferans, and many animals. Largest species was *Thelepus setosus* with commensal, *Lepidasthenia virens*; none was outstandingly abundant. The sample contained also a small, smooth anemone, crustaceans with eight amphipods, a caprellid, five isopods, a tanaid, three cumaceans, an ostracod, and a galatheid crab. Total number of species exceeded 45, and specimens more than 100. Species are those usually found on slopes, characterized by siliceous sponge, the ophiuroid, *Sclerasterias heteropaes*, the galatheid crab, and polychaetes, *Thelepus setosus*, *Onuphis vexillaria*, *Potamethus mucronatus*, and others.

White Cove-Long Point

Two samples from White Cove, taken from shore and by shallow diving, numbered 1370 and 1378 in the Velero series (Fraser, 1943, pp. 358, 359) were useful in disclosing the presence of an unknown scalibregmid, found only in the holdfasts of *Eisenia arborea*; the occurrence of this species was verified by recent samples from the same locality, taken by Mr. Robert Given. The species is described as *Sclerocheilus acirratus* (see above).

1. Sta. 2152 (no. 224). 0.8 mi S of Long Pt., in 19' fms. OPG took 0.85 cuft of sandy mud with many small animals. Only the polychaetes have been analyzed (see chart); these number more than 37 species and 362+ specimens. The most abundant were *Paraonis gracilis* with 50, *Prionospio malmgreni* with 42, *Lumbrineris* spp. with 43, *Aricidea* spp. with 32, and *Odontosyllis phosphorea* with 31 specimens.

2. Sta. 2450 (near no. 224). Near White Cove, in 30-35 fms. Sigsbee trawl took a large sample from a rocky bottom with sand. Largest individual was a sponge, *Geodia mesotriaena* Lendenfeld, measuring 90 mm across; also present were coelenterates, *Corynactis*, *Stylatula* and solitary corals; bryozoans of several kinds; a polyclad, and dead *Laqueus* shells. Crustaceans included amphipods, isopods, ostracods, a few epinebalians, *Scalpellum*, *Eupagurus* in dead *Bursa* shells, and two large spider crabs; also an ascidian with tough tunic. The fauna is that characteristic of a rocky, shelly bottom. *Dendropoma lituella* (vermetid) was represented by numerous colonies, and *Saxicava arctica* burrowed in sponge and rocks. *Octopus apollyon* was represented by a large male and female; *Bursa californica*, dead shell, contained a large hermit crab with commensal polynoid, *Halosydna latior*. The fauna is large, diversified, associated with a rocky, shelly bottom.

3. Sta. 2128 (no. 224). 0.3 mi off Long Pt., in 42-67 fms. Biological dredge took sand, dead *Laqueus* with *Vermiliopsis*, alcyonarian and solitary corals; echinoderms of diversified kinds, including asteroids, ophiuroids, echinoids, holothurians, a crinoid. Mollusks included an octopus, key hole limpets, and various pelecypods and gastropods. Bryozoans were encrusting and stalked. Crustaceans were diversified, with amphipods, isopods, tanaids, cumaceans, ostracods, stalked barnacle, commensal crabs, spider crabs, and cancroids. Polychaetes were diversified, with at least 80 species. No one species was conspicuously abundant.

4. Sta. 2855 (no. 238). Off White Cove, in 36 fms. OPG took an unmeasured amount of black sandy mud with reddish brown waxy lumps. No species was outstandingly large; most abundant was *Chloea pinnata* with 70 specimens; *Glottidia albida* was present with 14 small individuals. Coelenterates were represented by ceriantharians (4 small), and a small anemone. Several small nemerteans and nematodes; crustaceans with amphipods (12), isopods (2), and ostracods were also present.

5. Sta. 2144 (no. 224). Off Long Pt., in 45 fms. OPG took 1.6 cuft of fine black sand in two grabs. Coelenterates were represented by small specimens of ceriantharian (6), anemones (2), nemerteans (2), and a long, slender sipunculid (1); crustaceans by amphipods (25), brown ostracods (31), cumaceans (3), isopods (3), a tanaid (1), and a small crab (2). The most abundant species were *Aricidea* spp. (112), *Spio punctata* (33), *Chaetozone setosa* (27). The fauna is that characteristic of the outer shelf.

6. Sta. 5727 (no. 225). S of Long Pt., in 57 fms. OPG took 0.37 cuft of glauconitic white shelly sand, with broken *Laqueus* shells, and diversified small animals. Crustaceans included a brown ostracod (more than a hundred), numerous ostracods and amphipods, and sparse numbers of cumaceans and isopods. The most conspicuous animals were *Ophiothrix spiculata* (more than 10) and *Nothria iridescens* (25); the most numerous were *Aricidea* spp. (more than 84).

7. Sta. 2365 (no. 210). Off Long Pt., in 300 fms. OPG took 1.57 cuft of gray-green sand and mud, with dead shells of *Limopsis*, *Cadulus*, small moon snail, turret top shells. Largest specimen was *Brisaster townsendi*, and most conspicuous *Chloea pinnata* (6). The sample contained an echiuroid fragment, two amphipods, and a polyclad. Characteristic species of this depth are *Maldane sarsi*, *Limifossor diegensis*, and *Brisaster townsendi*.

8. Sta. 2393 (near no. 211), in 250-270 fms. Trawl took kelp holdfasts, rubbly sand and rocky debris. The animals taken are those characteristic of a rocky bottom. Echinoderms (not identified) included echinoids and ophiuroids. Crustaceans were represented by a few amphipods, an isopod and a crab.

Isthmus Cove

1. Isthmus Cove, in diving depths along the rocky north wall, was sampled Nov.-Dec. 1965 (coll. Mr. Robert Given); part of an encrusting colony of the serpulid, *Spirobranchus spinosus*, yielded an association of animals (see chart); the long-spined echinoid, *Centrostephanus coronatus*, occurs in rocky pockets along the wall.

2. Intertidal holdfasts of kelps, *Eiscenia arborea*, and larger kelps (coll. Mr. Robert Given) yielded characteristic animals (see chart) with grapsid and pagurid crabs.

3. Sta. 2452 (no. 207) near Isthmus, in 28 fms. OPG took 0.37 cuft of compact sandy clay with many animals and much calcareous debris. In addition to the species named in the chart, a burrowing anemone (2), two nemerteans (2), *Phoronopsis californica*, red in life (1), *Glottidia albida* (1), many amphipods and other small crustaceans, several ascidians and an enteropneust (1) were present. The largest species was *Lanice conchilega*; none was conspicuously abundant. Total number of species was estimated at more than 60, with polychaetes about 30, echinoderms at least 2, mollusks 15, crustaceans many, and others, 8 or more.

A concentration of *Laqueus californicus* is believed to exist along the rocky exposures between Empire Landing and Ship Rock, in 30 to 70 fms, indicated by concentrations of dead shells in these areas. Several probes (+a-f) were attempted to procure living lamp-shells; the following stations indicated their presence, with associated organisms:

3. Sta. 2955 (near no. 186). SW of Ship Rock, in 34 fms. The dredge took sand, rock, shells of *Laqueus*, *Terebratalia*, *Lytechinus* and other echinoderms, together with *Conus californicus*; the echinoderms included:

<i>Amphiodia urtica</i>	<i>Ophiopsila californica</i>
<i>Amphipholis pugetana</i>	<i>Ophiopteris papillosa</i>
<i>Luidia asthenosoma</i>	<i>Ophiothrix spiculata</i>
<i>Luidia foliolata</i>	<i>Sclerasterias heteropaes</i>
<i>Ophiopholis bakeri</i>	

4a. Sta. 2960 (near no. 186). SW of Ship Rock, in 34-36 fms. Dredge took shelly sand with *Laqueus*, *Terebratalia* and other animals, with the following echinoderms:

<i>Amphipholis pugetana</i>	<i>Ophiopteris papillosa</i>
<i>Astropecten californicus</i>	<i>Ophiothrix spiculata</i>
<i>Henricia</i> sp.	<i>Ophiura lutkeni</i>
<i>Mediaster aequalis</i>	<i>Sclerasterias heteropaes</i>
<i>Ophiopholis bakeri</i>	

4b. Sta. 2959 (near no. 186). NW off Ship Rock, in 42 fms. Dredge took sand with *Lytechinus*, small pelecypods and other echinoderms, including:

<i>Amphiodia digitata</i>	<i>Luidia ludwigi</i>
<i>Amphioplus hexacanthus</i>	<i>Lytechinus anamesus</i>
<i>Amphiura arcystata</i>	<i>Ophiopholis bakeri</i>
<i>Florometra perplexa</i>	<i>Ophiura lutkeni</i>

4c. Sta. 3310 (near no. 186). NW off Ship Rock, in 47-52 fms. Dredge took sand with a sea pen, few brachiopods and mollusks, several crabs, and the following echinoderms:

<i>Allocentrotus fragilis</i>	<i>Ophiura lutkeni</i>
<i>Astropecten californicus</i>	

4d. Sta. 2952 (near no. 208). SE off Ship Rock, in 63 fms. OPG took sand with some living *Laqueus*, *Florometra perplexa* and gastropods.

4e. Sta. 2957 (near no. 186). NW off Ship Rock, in 64 fms. OPG took *Laqueus* with *Allocentrotus fragilis*, *Spatangus californicus* and *Florometra perplexa*.

4f. Sta. 2953 (near no. 208). SE off Ship Rock, in 52-65 fms. Dredge took shelly sand, *Laqueus*, heart-urchins, gastropods, with other animals.

5. Sta. 2451 (no. 208). Between Isthmus and Long Pt., in 111 fms. OPG took 1.57 cuft of compact sandy clay with many animals. In addition to those named in the chart, the sample contained amphipods (20), ostracods (8), an anthurid isopod (3), a tanaid (1), a pagurid in *Amphissa* shell (1). The largest was *Molpadia*, and the most abundant were *Maldane sarsi* (20), and *Tellina carpenteri* (16).

Numbers of species and specimens totalled :

polychaetes	21 species,	60 specimens
echinoderms	4	20
mollusks	8	39
crustaceans	5 ⁺	33
Total:	<hr/> 38 ⁺ species, 152 specimens	

6. Sta. 2733 (near no. 187). NE of Ship Rock, in 152 fms. OPG took 1.13 cuft of sandy mud with many animals. In addition to those named in the chart, the sample included a ceriantharian (2), an echiuroid (1), a nemertean (1), amphipods (several), and a gnathid isopod (1). The largest animal was the echiuroid, the most abundant *Amphiodia digitata* (48) and solenogasters (23).

Numbers of species and specimens estimated :

polychaetes	22 species,	40 ⁺ specimens
echinoderms	7	77
mollusks	6 ⁺	25 ⁺
crustaceans	2 ⁺	2 ⁺
Total:	<hr/> 37 ⁺ species, 144 ⁺ specimens	

7. Sta. 2302 (no. 187). Between Isthmus and Ship Rock, in 185 fms. OPG took 1.57 cuft of fine greenish mud with many animals. In addition to those named in the chart, the sample contained a ceriantharian (2), nemerteans (2⁺), an echiuroid (2), numerous amphipods and a few isopods. The largest individual was a brissopsid echinoid, and the most abundant were ophiuroids. Total numbers were estimated at more than 29 species and 69 specimens.

8. Sta. 2301 (no. 189), in 335 fms. Campbell grab took 3.33 cuft of fine grayish green mud with foraminiferans. In addition to those named in the chart, there were an anemone (2), an echiuroid (1), a sipunculid (3), nemerteans (2⁺) and an enteropneust (1). The largest animal was an echinoid, and none was outstandingly abundant. Numbers were estimated at 21 species and about 60 specimens.

Howlands Landing

1. Sta. 2142 (no. 186), in 19 fms. OPG took 1.9 cuft of sand and mud with many animals. In addition to those named in the chart, there were several kinds of sponges, some large and spherical, a ceriantharian (1), small sea whips (3), a burrowing anemone covered with coarse sand (4), four kinds of nemerteans (7), sipunculids of more than one

kind (12), a reddish purple echiuroid (1), *Glottidia albida* (1), *Phoronopsis californica* (7), bryozoans of several kinds, an amphipod (1), isopods (2⁺), two shrimps (5), a crab (1), two enteropneusts (6) and an ascidian (7). The largest animal was a spherical sponge, the most conspicuous *Chaopterus variopedatus*, and the most abundant *Owenia f. collaris* (60). Total numbers were estimated at more than 60 species, and more than 200 specimens.

2. Sta. 2961 (near no. 186). SW of Ship Rock, in 36 fms. OPG took shelly sand and many animals. In addition to those named in the chart, the sample contained two sponges (2), four coelenterates (20), a nemertean (4), two sipunculids (7), a leech (1), a bryozoan colony (1), a phoronid (6), *Laqueus californicus* (3), *Terebratalia occidentalis* (2), several kinds of amphipods (18), ostracods (31), isopods (5), a cumacean (1), *Mitella polymerus* (22), a decapod (2), and an enteropneust (2).

Numbers of species and specimens totalled:

polychaetes	56 species,	102 specimens
echinoderms	7	69
mollusks	23	105
crustaceans	8 ⁺	81
others	17	52
Total:	<hr/> 111 ⁺ species, about 409 specimens	

3. Sta. 3569 (near no. 162). N of Howlands Landing, in 100 fms. OPG took 0.69 cuft of green, sandy mud with many animals. The lot contained a large sea-whip, *Cerebratulus rubra*, many polychaetes characteristic of muds in slope depths, small crustaceans, and the following echinoderms:

<i>Amphiacantha amphacantha</i>	22
<i>Amphiodia digitata</i>	27
<i>Amphioplus strongyloplax</i>	12
<i>Amphipholis squamata</i>	3
<i>Amphiura arcystata</i>	1
<i>Brissopsis pacifica</i>	2
<i>Molpadia</i> sp.	1, measuring 75 mm long

4. Sta. 2738 (no. 136). Off Howlands Landing, in 342 fms. Campbell grab took 3.15 cuft of green sticky mud with oily odor and waxy nodules. In addition to those named on the chart, there was a trace of siliceous sponge, a sipunculid (2), a nemertean (3), and an enteropneust (2). Echinoderms were represented by a small ophiuroid.

Numbers of species and specimens totalled :

polychaetes	10 species,	31 specimens
ophiuroid	1	1
mollusks	2	6
others	3	6
Total:	<hr/> 16 species, 44 specimens	

West End

1. Sta. 3570 (no. 162), in 48 fms. OPG took 0.56 cuft of sandy mud with shelly debris and considerable life; dead remains included those of *Laqueus*, *Terebratalia*, solitary corals, *Protula* tubes and coralline algae. The most conspicuous living animals are listed in the chart.

2. Sta. 5148 (near no. 162), in 98 fms. OPG took 0.31 cuft of glauconitic sand with foraminiferans and large oil globules. Ophiuroids were most conspicuous. In addition to the species named in the chart, there were six amphipods (19), two cumaceans (3) and three ostracods (37). The largest animals were ophiuroids, and the most abundant *Prionospio malmgreni* (35), *Amphiodia digitata* (29), *Nothria stigmatis* (30), and *Amphiacantha amphacantha* (24). Total numbers were estimated at 45 species and 241 specimens.

3. Sta. 2736 (no. 160), in 132 fms. OPG took 1.57 cuft of sandy green mud with reddish brown waxy lumps and many dead shells of *Cardita*, *Cuspidaria*, *Cadulus*, *Nassarius* and *Thyasira*. In addition to the species named in the chart, there were a few amphipods and isopods. The largest animal was *Brissopsis pacifica*, and the most abundant were *Amphiodia digitata* (64) and *Amphioplus strongyloplax* (22). Total numbers were estimated at 32 species and 140 specimens.

4. Sta. 2389 (no. 161), in 136 fms. OPG took 2.2 cuft of gray sand and mud with many animals. In addition to those listed in the chart, there were a burrowing anemone (1), a polyclad (1), a sipunculid (1), a large echiuroid (1), and a few small crustaceans. Largest species were *Brissopsis pacifica* and the echiuroid, and the most abundant were the ophiuroids. Total numbers were estimated at more than 45 species and 175 specimens.

Sub 4. Sta. 5146 (near no. 160), in 140 fms. Grab took a large basaltic rock, 14" by 7.5", with attached large sponge (*Heathia*), solitary coral, alcyonarians (2), tunicates, and bored by pholad mollusks; ophiuroids occupied the crevices, and serpulid polychaetes were attached

on the surfaces. The ophiuroids and mollusks are named in the chart. Most abundant species was *Ophipholis bakeri* (30).

5. Sta. 2737 (no. 135), in 256 fms. OPG took 2.77 cuft of sticky green mud with odor of oil, foraminiferans, and numerous animals. Glassy sponge spicules characterized the mud. In addition to the species named in the chart, the sample contained a large nemertean (2), an echiuroid (2), and an amphipod (1). Largest individuals were the echiuroid and nemertean. Total numbers were estimated at 29 species and 72 specimens.

6. Sta. 2798 (no. 89), in 386 fms. OPG took 2.96 cuft of bluish green-gray mud, with siliceous sponge spicules, radiolarian shells, foraminiferans, otoliths, and deep-water animals. In addition to those named in the chart, there were a nemertean (2), a ghost shrimp (1), and an enteropneust (1). Total numbers were estimated at 20 species and about 35 specimens.

Polychaeta from Santa Catalina Island, showing distributions by profiles, from East End, Avalon, Willow Cove, and White Cove.

+ indicates presence, - absence. Species represented by more than 10 specimens are indicated by #.

	East End									Avalon							Willow Cove					White Cove									
	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	1	2	3	4	5	1	2	3	4	5	6	7	8	
<u>Amaeana occidentalis</u>	+	-	-	-	-	-	-	-	-	#	-	-	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-		
<u>Ammotrypane auloraster</u>	+	-	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	-	-	-	+	-	+	+	-	-	-	-		
<u>Ampharete arctica</u>	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-		
<u>Anaitides</u> sp., checkered	+	-	-	-	-	-	-	-	-	+	-	+	-	-	-	-	-	+	+	-	-	+	-	+	-	-	-	-	-		
<u>Aricidea lopezi</u>	+	+	+	-	+	+	#	-	-	-	-	+	+	-	+	+	-	-	+	+	-	+	-	+	-	-	-	-	-		
<u>Aricidea</u> spp.	+	-	+	#	+	-	-	+	+	#	+	#	-	+	+	+	+	-	-	-	-	+	-	+	-	-	-	-	-		
<u>Armandia bioculata</u>	#	-	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
arabellid	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
<u>Capitella capitata</u> subspp.	#	-	#	-	#	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
<u>Chaetozone</u> spp.	#	-	+	-	-	-	-	-	-	-	+	#	+	-	-	-	-	-	-	-	-	-	+	-	+	-	-	-	-	-	
<u>Chone</u> spp.	+	-	+	#	+	+	-	+	+	-	-	+	-	-	-	-	-	+	#	-	+	-	+	+	-	-	-	-	-	-	
<u>Dexiospira</u> sp.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<u>Dorvillea articulata</u>	+	-	+	-	-	-	-	+	+	+	-	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-	
<u>Drilonereis</u> sp.	+	+	-	-	-	-	-	-	-	-	+	+	-	+	-	-	-	+	+	-	-	-	-	+	-	-	-	-	-	-	-
<u>Exogone uniformis</u>	+	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	-	+	+	-	-	-	-	+	-	-	-	-	-	-	-
<u>Glycera</u> spp.	+	-	-	-	+	+	-	+	+	+	-	-	-	-	-	-	-	+	#	-	-	-	+	+	-	-	-	-	-	-	-
<u>Goniada brunnea</u>	+	-	+	-	-	+	+	-	-	+	+	+	-	-	-	-	-	+	+	-	-	-	+	-	+	-	-	-	-	-	-

Polychaeta from Santa Catalina Island (continued)

	East End			Avalon			Willow Cove			White Cove							
	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8
<u>Gyptis a. glabra</u>	*	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Halosydna</u> sp.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Harmothoe hirsuta</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Lepidasthenia longicirrata</u> .	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Lepidonotus caelorus</u>	+	-	-	-	+	+	-	-	-	-	+	-	-	+	-	-	-
<u>Lumbrineris</u> spp.	+	-	+	+	-	-	-	+	-	-	+	+	+	+	-	-	-
<u>Nephtys</u> spp.	+	-	+	+	-	-	-	+	-	-	+	-	-	+	-	-	-
<u>Owenia f. collaris</u>	*	-	+	-	-	-	-	*	-	-	+	-	-	+	-	-	-
<u>Pareurythoe californica</u> . . .	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Peisidice aspera</u>	+	-	-	+	+	-	-	-	-	-	+	-	-	+	-	-	-
<u>Pherusa capulata</u>	+	-	-	-	-	-	-	+	-	-	*	-	-	+	-	-	-
<u>Pherusa commensalis</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Pholoe glabra</u>	+	+	+	+	+	+	-	+	+	-	+	+	-	+	-	-	-
<u>Phyllodoce</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-
<u>pilargid</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Platynereis bicanaliculata</u> .	*	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-
<u>polynoids</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Prionospio malmgreni</u>	+	-	+	+	-	-	-	*	-	-	+	+	-	+	-	-	*
<u>Prionospio pygmaeus</u>	+	-	-	-	-	+	-	-	*	-	-	-	-	-	-	-	-

	East End									Avalon								Willow Cove					White Cove							
	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	1	2	3	4	5	1	2	3	4	5	6	7	8
<u>Scalibregma inflatum</u>	+	-	-	-	-	-	-	-	-	+	+	-	-	+	-	-	-	+	-	+	-	-	+	-	-	-	-	-	-	-
<u>Scoloplos</u> sp.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Sthenelais</u> spp.	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-
<u>Streblosoma</u> sp.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
<u>Syllis</u> sp.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
syllids, other	+	-	-	-	-	-	-	-	-	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-
spirorbids	+	-	-	-	-	-	-	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Telepsavus costarum</u>	+	-	-	-	-	-	-	-	-	*	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
<u>Tharyx monilaris</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Tharyx tessellata</u>	+	+	+	+	+	+	+	+	-	-	-	*	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-
<u>Artacamella hancocki</u>	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-
<u>Chaetopterus varlopedatus</u>	+	-	-	-	-	-	-	-	-	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Glycera americana</u>	+	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-
<u>Lepidasthenia ?virens</u>	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Lumbrineris californiensis</u>	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Mapelona pacifica</u>	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	+	-
<u>Melinna denticulata</u>	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Nephtys ferruginea</u>	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Poecilochaetus johnsoni</u>	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-

Mollusca from Santa Catalina Island (continued)

	East End			Avalon			Willow Cove			White Cove		
	1	2	3	1	2	3	1	2	3	1	2	3
nudibranchs
<u>Saxicava arctica</u>
<u>Cadulus fusiformis</u>
<u>Nemocardium centrifilosum</u>
<u>Solamen columbianum</u>
<u>Bursa californica</u>
<u>Chlamys hercicus</u>
<u>Octopus apollyon</u>
<u>Philine</u> sp.
<u>Pleurobranchaea</u>
<u>Pterynotus</u> sp.
keyhole limpet
<u>Eulima californica</u>
<u>Nucula carlottensis</u>
<u>Solariaella peramabilis</u>
? <u>Lithophaga</u> sp.

Polychaeta from Santa Catalina Island,
showing distributions by profiles,
from Isthmus Cove, Howlands Landing, and West End.
+ indicates presence, - absence.

Species represented by more than 10 specimens are indicated by *.

	Isthmus Cove								Howl. Land.				West End					
	1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	5	6
<u>Dodecaceria concharum</u> . . .	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Pherusa inflata</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Polycirrus californicus</u> . .	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Polydora</u> sp.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Spirobranchus spinosus</u> . .	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Typosyllis</u> sp.	+	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-
<u>Vermiliopsis infundibulum</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Eunice</u> spp.	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
<u>Exogone uniformis</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Fabricia pacifica</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Harmothoe hirsuta</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Lepidonotus caelorus</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Lumbrineris latreilli</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Nereis mediator</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Phragmatopoma californica</u>	.	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
phyllodocid, unknown	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Polycirrus</u> sp.	+	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-
<u>Polydora ligni</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Polyopthalmus pictus</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Salmacina dysteri</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Scelerocheilus acirrata</u> . .	.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Sphaerosyllis</u> sp.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
spionids	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
spirorbids	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
<u>Typosyllis aciculata</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Aglaophamus dicirris</u>	+	-	-	-	-	-	*	-	-	-	-	-	-	-	-	-
<u>Amaeana occidentalis</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ampharetids	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*

Polychaeta from Santa Catalina Island (continued)

	Isthmus Cove								Howl. Land.				West End					
	1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	5	6
<u>Aricidea</u> spp.	+	-	-	+	-	+	-	+	-	+	-	-	+	+	-	-
capitellid	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
<u>Chaetopterus variopedatus</u>	.	.	+	-	-	-	-	-	*	+	-	-	-	-	-	-	-	-
cirratulid	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Diopatra ornata</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Eumida</u> , trilineate	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Glycera</u> spp.	+	-	-	-	-	-	-	+	-	-	-	-	+	+	-	-
<u>Lanice conchilega</u>	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
<u>Lepidasthenia</u> spp.	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
<u>Lumbrineris</u> spp.	+	-	-	-	-	-	+	-	-	-	-	-	+	+	-	-
maldanids	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
<u>Megalomma</u> sp.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Panthalis pacifica</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Pista</u> cf. <u>cristata</u>	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-
<u>Pista elongata</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Prionospio pinnata</u>	+	+	-	-	+	-	-	+	-	-	-	-	+	+	-	-
<u>Rhodine bitorquata</u>	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
<u>Spiophanes</u> sp.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
<u>Sternaspis fossor</u>	+	+	-	-	-	-	+	+	-	-	-	-	+	+	-	-
<u>Sthenelabella uniformis</u>	+	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-
<u>Streblosoma crassibranchia</u>	.	.	+	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-
syllids	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
<u>Telepsavus costarum</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Terebellides stroemii</u>	+	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-
<u>Thalenessa spinosa</u>	+	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-
<u>Thelepus setosus</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Aedicira ramosa</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Amphicteis scaphobranchiata</u>	+	-	-	-	-	+	-	-	-	-	-	-	-	-
<u>Anaitides medipapillata</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brada pilosa</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Chloeia pinnata</u>	+	+	-	-	-	+	-	-	-	-	-	-	-	+

Polychaeta from Santa Catalina Island (continued)

	Isthmus Cove								Howl. Land.				West End					
	1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	5	6
<u>Cossura candida</u>					+	+	+		-	-	-	-	-	-	-	+	-	-
<u>Drilonereis nuda</u>					+	-	-		-	-	-	-	-	+	+	-	-	-
<u>Glycera capitata</u>					+	+	-		-	-	-	-	-	+	-	-	-	-
<u>Goniada brunnea</u>					+	-	-		-	+	-	-	-	-	-	+	-	-
<u>Haploscoloplos panamensis</u>					+	-	-		-	-	-	-	-	+	-	-	-	-
<u>Harmothoe</u> spp.					+	+	-		+	+	-	-	-	-	-	+	-	-
<u>Laonice cirrata</u>					+	-	-		-	+	-	-	-	-	+	-	-	-
<u>Lumbrineris cruzensis</u>					+	-	+		-	+	-	-	-	-	-	-	-	+
<u>Maldane sarsi</u>					*	+	*		-	+	-	+	-	-	+	+	+	-
<u>Nereis</u> sp.					+	-	-		-	-	-	-	-	-	-	+	-	-
<u>Notomastus</u> sp.					+	-	+		-	-	-	-	-	-	-	-	-	-
<u>Pholoe glabra</u>					+	-	-		+	-	-	-	-	+	+	*	-	-
<u>Praxillella a. pacifica</u>					+	-	+		-	-	-	-	-	-	-	-	-	-
<u>Sphaerodoridium minutum</u>					+	-	-		-	-	-	-	-	-	-	-	-	-
<u>Tharyx monilaris</u>					*	-	+		-	-	-	-	-	-	-	-	-	-
<u>Anaitides</u> spp.					+	-	-		+	+	-	-	-	+	-	+	-	-
<u>Brada glabra</u>					+	-	-		-	-	-	-	-	-	+	-	+	-
<u>Haploscoloplos elongatus</u>					*	*	-		-	+	-	-	-	-	+	+	-	-
<u>Nothria</u> sp.					+	-	-		-	+	-	-	-	-	-	+	-	-
<u>Nephtys cornuta</u>					+	+	-		-	+	-	-	-	-	+	+	+	-
<u>Nephtys</u> spp.					+	+	-		-	-	-	-	-	-	-	-	-	-
<u>Onuphis parva</u>					+	-	-		-	-	-	-	-	-	+	-	+	-
<u>Pectinaria californiensis</u>					+	+	-		-	+	-	-	-	+	+	+	-	-
<u>Phyllochaetopterus</u> sp.					+	-	-		-	-	-	-	-	-	-	-	-	-
pilargid					+	-	-		-	-	-	-	-	-	-	+	-	-
polynoid					+	-	-		-	-	-	-	-	-	-	-	-	-
<u>Tharyx tessellata</u>					+	-	-		-	+	-	-	-	+	-	-	+	-
<u>Travisia</u> sp.					+	-	-		-	-	-	-	-	-	+	-	-	-
<u>Aglaophamus</u> sp.					+	-	-		-	-	-	-	-	-	-	-	-	-
<u>Ammotrypane aulogaster</u>					+	-	-		-	-	-	-	-	-	-	-	-	-
<u>Ancistrosyllis breviceps</u>					+	-	-		-	-	-	-	-	-	-	-	-	-

Polychaeta from Santa Catalina Island (continued)

	Isthmus Cove								Howl. Land.				West End						
	1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	5	6	
<u>Aricidea lopezi</u>								+	-										
<u>Amphicteis</u> sp.								+	-										
<u>Brada pluribranchiata</u>								+	-										
<u>Chone</u> sp.								+	-		+				+		+		+
<u>Harmothoe scriptoria</u>								+	-										
<u>Laonice foliata</u>								+	-										
<u>Melinna denticulata</u>								+	-							+	+	*	
<u>Nothria iridescens</u>								+	-										
<u>Paraonis g. oculata</u>								+	+										
<u>Phyllochaetopterus limicolus</u>								+	-		+		+						+
<u>Prionospio cirrifera</u>								+	+										
<u>Spiophanes fimbriata</u>								+	-		+								
<u>Travisia pupa</u>								+	-										
<u>Anobothrus gracilis</u>								+											+
<u>Califia calida</u>								+											+
? <u>Leiochrides</u> sp.								+					+			+			
<u>Lysippe annectens</u>								+					+						
<u>Myriochele gracilis</u>								+			+		+		+	+	+	+	
<u>Potamethus mucronatus</u>								+					+						
<u>Protula superba</u>								+			+		+						+
<u>Chaetozone setosa</u>											+	+							
<u>Cirriformia</u> sp.											+								
<u>Eulalia myriacyclum</u>											+								
<u>Eumida</u> sp.											+								
<u>Notomastus latericeus</u>											+								
<u>Owenia f. collaris</u>											*	+							
<u>Paraonis gracilis</u>											+								+
<u>Pherusa capulata</u>											+								
<u>Pherusa neopapillata</u>											+	+			+			+	
<u>Phyllochaetopterus prolifica</u>											+								
<u>Prionospio malmgreni</u>											+	+			+	+	+		

Polychaeta from Santa Catalina Island (continued)

	Isthmus Cove								Howl. Land.				West End					
	1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	5	6
<u>Psammolyce</u> sp.	+	-	-	-	-	-	-	-	-	-
<u>Pseudopotamilla</u> sp.	+	-	-	-	-	-	-	-	-	-
<u>Scalibregma inflatum</u>	+	+	-	-	-	-	-	-	-	-
<u>Sthenelais tertiaglabra</u>	+	-	-	-	-	+	-	-	-	-
terebellids	+	-	-	-	-	-	-	+	-	-
<u>Tharyx</u> spp.	+	-	-	-	-	-	-	+	-	-
<u>Trypanosyllis</u> sp.	+	-	-	-	-	-	-	-	-	-
<u>Vermiliopsis</u> sp.	+	-	-	-	-	-	-	-	-	-
<u>Dorvillea articulata</u>	+	-	-	-	-	-	-	-	-
<u>Eulalia</u> spp.	+	-	-	-	-	-	-	-	-
<u>Gyptis a. glabra</u>	+	-	-	-	-	-	-	-	-
<u>Nereis ?procera</u>	+	-	-	-	-	-	-	-	-
<u>Peisidice aspera</u>	+	-	-	-	-	-	-	-	-
<u>Pista disjuncta</u>	+	-	-	-	-	+	-	+	-
<u>Placostegus</u> sp.	+	-	-	-	-	-	-	-	-
<u>Rhamphobrachium longisetosum</u>	+	-	-	-	-	-	-	-	-
sabellid	+	-	-	-	-	-	-	-	-
sigalionids	+	-	-	-	-	-	-	-	-
<u>Thelepus</u> sp.	+	-	-	-	-	-	-	-	-
<u>Timarete</u> sp.	+	-	-	-	-	-	-	-	-
<u>Vermiliopsis biformis</u>	+	-	-	-	-	-	-	-	-
<u>Amage ?anops</u>	*	-	-	-	-
<u>Aricidea neosuecica</u>	+	-	-	-	-
<u>Chaetozone corona</u>	+	-	-	-	-
<u>Naineris uncinata</u>	+	-	-	-	-
<u>Nothria stigmatis</u>	*	-	-	-	-
? <u>Mesochaetopterus</u> sp.	+	+	-	-	-
<u>Drilonereis</u> sp.	+	+	-	-
<u>Eunice aphroditois</u>	+	-	-	-
<u>Ancistrosyllis tentaculata</u>	+	-	-
<u>Cirratulis</u> , unknown sp.	+	-	-

Echinodermata from Santa Catalina Island (continued)

	Isthmus Cove								Howl. Land.				West End					
	1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	5	6
<u>Sclerasterias heteropaes</u>	.	.	.	+	-	-	-	-	-	+	+	-	-	-	-	-	-	-
<u>Spatangus californicus</u>	.	.	.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Amphipholis squamata</u>	+	+	-	-	-	-	+	-	-	-	+	-	-	-
<u>Molpadia intermedia</u>	+	-	-	-	-	-	+	-	-	-	-	-	-	-
<u>Amphioplus strongyloplax</u>	*	-	-	-	-	*	-	+	-	*	-	-	-
<u>Brisaster townsendi</u>	+	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brissopsis pacifica</u>	+	+	-	-	-	+	-	-	-	+	+	-	-
ophiuroids	+	-	-	*	-	-	+	-	-	+	*	+	+
<u>Amphiacantha amphacantha</u>	*	*	-	*	+	+	-	-	-
<u>Leptosynapta albicans</u>	+	-	-	-	+	-	-	-	-
<u>Parastichopus californicus</u>	+	-	-	-	-	-	-	-	-
<u>Pentamera pseudopopulifera</u>	+	-	-	-	-	-	-	-	-
<u>Molpadia sp.</u>	+	-	-	-	-	-	-	-
<u>Ophionereis eurybrachioplax</u>	+	-	-	-	-	-	-	-
<u>Ophiacantha diplasia</u>	+	-	-

Mollusca from Santa Catalina Island,
 showing distributions by profiles,
 from Isthmus Cove, Howlands Landing, and West End.

<u>Acteon punctocoelata</u>	.	.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Amygdalum pallidulum</u>	.	.	+	-	+	-	-	-	-	+	-	-	-	+	-	-	-	-
<u>Axinopsida serricata</u>	.	.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	*	-
<u>Cylichna diegensis</u>	.	.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Elaeocyma halocydne</u>	.	.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Eulima californica</u>	.	.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Lvonsia californica</u>	.	.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Nemocardium centrofilosum</u>	.	.	+	-	-	-	-	-	-	*	-	-	-	-	-	-	-	-
<u>Nucula linki</u>	.	.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Nuculana taphria</u>	.	.	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
<u>Parvilucina tenuisculpta</u>	.	.	+	-	-	-	-	-	-	*	-	-	-	-	-	-	-	+
<u>Saxicava arctica</u>	.	.	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
<u>Sinum scopulosum</u>	.	.	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-

Mollusca from Santa Catalina Island (continued)

	Isthmus Cove								Howl. Land.				West End					
	1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	5	6
<u>Solamen columbianum</u>	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-
<u>Tellina carpenteri</u>	+	-	*	+	-	-	-	+	-	-	-	-	-	-	-	-
<u>Cardiomya pectinata</u>	+	-	-	-	-	+	-	-	-	-	-	-	-	-
<u>Cardita ventricosa</u>	*	+	-	-	-	-	-	-	-	-	-	+	-
<u>Cuspidaria apodema</u>	+	-	-	-	-	-	-	-	-	-	-	-	-
solenogasters	+	*	+	-	-	-	+	-	-	-	-	+	-
<u>Thyasira barbarentis</u>	+	-	-	-	-	-	-	-	-	-	-	-	-
<u>Cadulus tolmiei</u>	+	-	-	-	-	-	-	+	-	-	+	+
<u>Cuspidaria</u> sp.	+	-	-	-	-	-	-	-	-	-	-	-
<u>Lima dehiscens</u>	+	-	-	-	-	-	-	-	-	-	-	-
gastropods	*	-	*	-	-	-	+	-	-	-	-
pelecypods	*	-	*	-	+	-	-	-	-	-	-
<u>Acteocina intermedia</u>	+	-	-	-	-	-	-	-	-
<u>Aglaja</u> sp.	+	-	-	-	-	-	-	-	-
<u>Balcis catalinensis</u>	+	-	-	-	-	-	-	-	-
<u>Clinocardium nuttalli</u>	+	-	-	-	-	-	-	-	-
<u>Conus californicus</u>	+	-	-	-	-	-	-	-	-
<u>Cyrella munita</u>	+	-	-	-	-	-	-	-	-
<u>Kellia suborbicularis</u>	+	-	-	-	-	-	-	-	-
<u>Lima subauriculata</u>	+	-	-	-	-	-	-	-	-
<u>Micranellum crebricinctum</u> or <u>M. sp.</u>	*	-	-	-	+	-	-	-	-
<u>Nuculana hamata</u>	+	-	-	-	-	-	-	-	-
<u>Pandora bilirata</u>	+	-	-	-	-	-	-	-	-
<u>Pseudochama exogyra</u>	+	-	-	-	-	-	-	-	-
<u>Sphenia fragilis</u>	+	-	-	-	-	-	-	-	-
<u>Turbonilla</u> sp.	+	-	-	-	-	-	-	-	-
<u>Verticordia ornata</u>	+	-	-	-	-	-	-	-	-
<u>Volvulella tenuissima</u>	+	-	-	-	-	-	-	-	-
<u>Dentalium</u> sp.	+	-	+	-	-
<u>Epitonium tinctum</u> or <u>E. sp.</u>	+	-	-	-	-
<u>Tellina modesta</u>	+	-	-	-	-

Mollusca from Santa Catalina Island (continued)

	Isthmus Cove								Howl. Land.				West End					
	1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	5	6
<u>Saxicava</u> cf. <u>rugosa</u>	+	-	-
<u>Amphissa</u> <u>bicolor</u>	+	-
<u>Dacrydium</u> <u>pacificum</u>	*	-
<u>Protochaetoderma</u> <u>californica</u>	+	-
<u>Nitidella</u> <u>permodesta</u>	+

SANTA CATALINA ISLAND, WINDWARD SIDE

The grab was lowered along transect lines extending oceanward, from the outer side of West End, Ribbon Rock (see Map 2), Catalina harbor, Farnsworth bank, China Point to Salta Verde point, and Palisades. Analyses disclosed changes in faunal composition by place and depth. Many species were found which are unknown on the leeward side of the island. The finding of a conspicuous bryozoan fauna on Farnsworth bank, and a large population of the lingulate brachiopod at Palisades were noteworthy.

West End

1. Sta. 3577, in 15 fms. A snapper sampler took black debris with large tubes of *Chaetopterus variopedatus* and many associated animals, resembling those at White Cove, SCI, in comparable depths.

2. Sta. 3576, in 36 fms. OPG took 0.37 cuft of shelly sand with broken shells, chiefly *Mytilus* and other shelf-mollusks, also bryozoan clusters, fragmented tubes of *Telepsavus costarum* and *Phyllochaetopterus prolifica*. In addition to the species named in the chart, there were a small ceriantharian (5), an anemone covered with coarse, black sand (12), a long ribbonlike polyclad (1), a nemertean (3), a slender sipunculid (12), a phoronid in coarse, sand-covered tube (12), amphipods of several kinds (many), an anthurid isopod (several), a tanaid (7), an ostracod (7), a cumacean (2), a dromiid crab (2), and *Glottidia albida* (5). The largest species was *Glycera americana*; none was conspicuously abundant. Total numbers were estimated at more than 80 species and 575 specimens.

3. Sta. 3575, in 44 fms. OPG took 0.25 cuft of green shelly sand with rock chips. The sample contained many small to very small animals, like those on the leeward side of the island. Rocks had attached *Vermilopsis* and tubes of *Pista*. Polychaetes, echinoderms, mollusks and small crustaceans were diversified and represented by immature individuals.

4. Sta. 3573, in 88 fms. OPG took 0.31 cuft of glauconitic white sand, with echinoid (?*Lytechinus*) spines, foraminiferans and many small animals, like those of the leeward side of the island. None was large; most abundant species were *Nothria stigmatis* (140), *Ghloeia pin-nata* (52) and *Amphiodia digitata* (45).

Numbers of species and specimens were estimated at :

polychaetes	35 species,	302 specimens
echinoderms	4	51
mollusks	2 ⁺	few
crustaceans	5	24
others	1	1
Total:	<hr/> 47 ⁺ species, 378 ⁺ specimens	

5. Sta. 3572, in 103 fms. OPG took 0.25 cuft of glauconitic white sand with shelly rubble, siliceous sponge spicules and many small animals; none was conspicuous or large. Most numerous and abundant were polychaetes, chiefly onuphids, cirratulids and spionids. Most abundant were *Nothria stigmatis* (56), *Amphiodia urtica* (43), *Chloecia pinnata* (23) and *Haploscoloplos elongatus* (10). Polychaetes numbered 26 species; none was unique to the area. Echinoderms were represented by two ophiuroids (49), and mollusks by four or more species, each with few specimens. Small crustaceans were represented by amphipods, isopods, tanaids and cumaceans.

Ribbon Rock

1. Sta. 3580, in 40 fms. OPG took 1.26 cuft of grayish green, sandy mud. Most conspicuous were a large *Luidia foliolata*, purple holothurians, *Ophiothrix spiculata* and other ophiuroids. The sample contained also a small sea pen, an anemone, polychaetes with about 35 species, mollusks with *Cadulus* (28); and small pelecypods and gastropods; small crustaceans were represented by many amphipods, cumaceans (26), an isopod (1), a small cancrivore crab (2), and a pinnotherid crab (2).

2. Sta. 3579, in 48 fms. OPG took 1.76 cuft of grayish green, sandy mud with shelly rubble and many animals. Largest was *Cerebratulus rubra*, and most conspicuous were *Amphipholis squamata* (82), *Amphipholis stronglyloplax* (7), *Amphiacantha amphacantha* (4), *Leptosynapta albicans* (16) and *Pentamera pseudopopulifera* (3). In addition to the species named in the chart, crustaceans were present as amphipods, isopods, cumaceans and tanaids, each with few individuals; other animals were small anemones (2), and a large *Cerebratulus rubra*.

Numbers of species and specimens totalled :

polychaetes	42 species,	ca. 400 specimens
echinoderms	5	112
mollusks	8	18
crustaceans	5 ⁺	10 ⁺
others	4	21
Total:	<hr/> 64 ⁺ species, 561 ⁺ specimens	

Catalina harbor

Catalina harbor was sampled in 4 to 100 fms. Shallower depths, in 0.5 to 10 fms, had been previously reported (Reish, 1964) when 43 species of polychaetes were named, identical with those of the mainland shelf, in comparable depths.

1. Sta. 3586, in 4 fms. A snapper took about a liter of gray mud with many small animals and a large nemertean, *Cerbratulus lineolatus*. Most abundant were *Lumbrineris limicola* and *L. minima* (together 260), *Prionospio malmgreni* (177), *Paraonis gracilis* (40), *Haploscoloplos elongatus* (35), and *Tharyx monilaris* (23+). Small crustaceans were present as amphipods, tanaids and cumaceans. Echinoderms were absent.

Numbers of species and specimens totalled:

polychaetes	29 species,	600+ specimens
mollusks	5+	10+
crustaceans	5+	50+
others	4	17
Total:	<hr/> 43+ species, 677+ specimens	

2. Sta. 3585, in 23 fms. OPG took 1.89 cuft of gray mud with much shelly and mucoid debris and many small animals. In addition to those named in the chart, there were a sand-covered and a smooth anemone (2), a nemertean in mucoid tube (4), *Golfingia* sp. (7), an echiuroid (1), *Dendrostoma* sp. (2), a phoronid (1) and *Glottidia albida* (14). The most conspicuous were ophiuroids. Most numerous were *Tharyx multifilis* (56), *Amphiodia urtica* (38), *Nephtys ferruginca* (24), *Ophiopholis longispina* (21) and *Amphipholis pugetana* (20). Crustaceans were present as amphipods (many) isopods, cumaceans, tanaids.

Numbers of species and specimens totalled:

polychaetes	52 species,	289 specimens
echinoderms	11	106
mollusks	7	10
crustaceans	10+	many
others	7	39
Total:	<hr/> 87+ species, 444+ specimens	

3. Sta. 3584, in 48 fms. OPG took 2.0 cuft of gray mud with shell fragments, mucoid debris, and many animals. In addition to those listed in the chart, there was a loose-panniced sea pen (1), a nemertean (2), amphipods (7), anthurid and gnathid isopods (2), a cumacean (1) and an enteropneust (2). Largest species were the sea pen and *Pista disjuncta*, and most conspicuous was *Amphiura arcystata*. Most abundant were *Amphiodia urtica* (97) and *Amphiura arcystata* (14).

Numbers of species and specimens totalled:

polychaetes	34 species,	77 specimens
echinoderms	7	110
mollusks	5	5
crustaceans	4 ⁺	11
others	3	11
Total:	<hr/> 53 ⁺ species, 214 specimens	

4. Sta. 3581, in 100 fms. OPG took 1.76 cuft of grayish green, sandy mud with shell fragments, mucoid debris, and many animals. In addition to those named in the chart, there was a nemertean (1), a sipunculid (1), amphipods (12), an anthurid isopod (1), and an ostracod (1). The largest species was *Nephtys glabra* (weight 53 grams), and the most numerous was *Amphioplus strongyloplax* (25).

Numbers of species and specimens totalled:

polychaetes	38 species,	104 specimens
mollusks	6	6
echinoderms	6	33
crustaceans	3 ⁺	14
others	2	2
Total:	<hr/> 55 ⁺ species, 159 specimens	

Farnsworth Bank

1. Sta. 3594, in 16 fms. OPG took a fraction of a rocky shoal, with hydrocorals, bryozoans, red algae and many associated animals. Noteworthy were ophiuroids, snapping shrimps, many amphipods associated with algae, many branches of salmon-pink, fenestrated bryozoans, *Phidolophora pacifica*, purple hydrocoral, *Allopora californica* with commensal gastropod, *Pedicularia californica*, and many other animals. In addition to those named in the chart, there were present also a nemertean (1), a sipunculid (1), a polyclad (1), a caprellid (1), isopods (10⁺), tanaids (2), an epinebalian (3), small crabs (2⁺), and a pycnogonid (3). Some of the bryozoans are named elsewhere (see list of bryozoans, identified by Mr. William Banta). The total numbers of species and specimens are not estimated, but are expected to be much higher than that in adjacent soft-bottoms, because of the larger numbers of epifaunal animals.

2. Sta. 3595, in 16 fms. OPG took 0.47 cuft of coralline nodules, with green *Ulva*, many bryozoan clusters, broken shells of large *Hinnites*, *Astarte*, *Astrea*, slipper limpets, many large fragments of dead hydrocorals, and dead shells penetrated by boring sponge. Animals were

very numerous and diversified. In addition to those listed in the chart, there were a ceriantharian (1), a polyclad (3), small nemerteans (2), sipunculids penetrating coral stems (6⁺), an oligochaete (6), many kinds of bryozoans, differing from those in the preceding sample, amphipods (many), isopods, especially anthurids (many), tanaids, pagurid crabs, shrimps, a pycnogonid (3), and a small enteropneust (1). The most conspicuous species were *Ophiothrix spiculata* (30), *Amphipholis squamata* (38), and a large *Asterina miniata*.

Numbers of species and specimens, excluding bryozoans (see list of species elsewhere), totalled:

polychaetes	62 species,	459 specimens
echinoderms	8	105
mollusks	7 ⁺	20 ⁺
crustaceans	5 ⁺	50 ⁺
others (excl. bryozoans)	7	17
Total:	89 ⁺ species, 651 ⁺ specimens	
	(excluding bryozoans)	

Sta. 3597, in 35 fms. OPG took 1.44 cuft of fine gray sandy mud with many small animals. The most conspicuous and abundant species was *Amphiodia urtica* (177), and other species were like those of the mainland shelf in comparable depths and sediments.

Sta. 3593, in 52 fms. OPG took 0.5 cuft of glauconitic sand and much biological rubble. Animals were like those of the shelf, but in sparser numbers. Characteristic echinoderms were *Amphiodia occidentalis* and *Amphipholis squamata*, and polychaetes were *Pherusa capulata* and *Chloëia pinnata*, with many other smaller kinds.

Sta. 3592, in 57 fms. OPG took 0.44 cuft of shelly, glauconitic sand, calcareous algae and gravelly rubble. There were no large, conspicuous animals; all were small, diversified, best represented by polychaetes and crustaceans, like those of the mainland shelf in comparable depths.

Sta. 3591, in 88 fms. OPG took 0.14 cuft of glauconitic sand with many kinds of small animals, most in sparse numbers, and *Rhabdamina* foraminiferans. Characteristic polychaetes were *Nothria stigmatis*, *Pista* cf. *cristata*, small maldanids, cirratulids, and other diversified kinds. Echinoderms were represented by *Amphipholis squamata*, *Amphiodia urtica* and *Astropecten californica*, and mollusks by *Amygdalum pallidulum*, *Cadulus*, *Tellina*, and others. Crustaceans were present as many amphipods, a few isopods, tanaids, many ostracods, some cumaceans and a small shrimp.

Between China Point and Salta Verde Point

1. Sta. 3600, in 25 fms. OPG took 0.25 cuft of sandy mud with many animals. In addition to those named in the chart, there was a ceriantharian (1), small anemones (2), a hydroid branch (2), a nemertean (2), a branching bryozoan, *Glottidia albida* (13), amphipods (20), a gnathid isopod (1), a cumacean (3), a small crab (1), a pinnotherid crab (1), a pycnogonid (2), and a sand-covered ascidian (2). Most conspicuous and abundant species were *Glottidia albida* (13), tubes of *Streblosoma crassibranchia* (many) and *Sthenelanellela uniformis* (10⁺).

Numbers of species and specimens totalled:

polychaetes	41 species,	146 specimens
echinoderms	6	19
mollusks	10	32
crustaceans	5 ⁺	26
others	7	24
Total:	<hr/> 69 ⁺ species, 247 specimens	

2. Sta. 2176, in 28 fms. OPG took 1.32 cuft of nodular muddy sand and mud. Branching bryozoans and simple ascidians resembling small cindery balls, characterized the screenings. In addition to the species named in the chart, there were an anemone (7), a nemertean (2⁺), a sipunculid (1), *Glottidia albida* (4), an ascidian (3), and small crustaceans, especially amphipods.

Numbers of species and specimens totalled:

polychaetes	54 species,	300 ⁺ specimens
echinoderms	1	2 ⁺
mollusks	4 ⁺	8 ⁺
crustaceans	10 ⁺	many
others	6	12 ⁺
Total:	<hr/> 75 ⁺ species, 322 ⁺ specimens	

Sta. 2175, in 58 fms. OPG took a small sample of mud and shell fragments, with many diversified animals. The polychaetes which were best represented included some not recovered in other samples, such as *Aphrodita refulgida*, *Magelona* with serrated prostomial margin, unidentified cirratulids, maldanid with parasitic copepod, ampharetids of several kinds, *Megalomma* sp., and spirorbids. The fauna may have affinities with that of the outer shelf.

Sta. 2174, in 161 fms. OPG took 0.95 cuft of mud with shell fragments. The largest animal was a large seastar, *Hippasteria* sp., accom-

panied by sea urchins (5), many small mollusks, numerous small crustaceans, and many diversified polychaetes, some not recovered elsewhere.

Sta. 2173, in 252 fms. OPG took 1.57 cuft of mud, with a nemertean, brissopsid urchins (2), a few ophiuroids, a small crustacean, and polychaetes including some not found elsewhere; they include *Anaitides* sp.; *Glycinde polygnatha*; *Lepidasthenia virens*; *Lumbrineris index*; *Oncoscolex pacificus*; *Prionospio* sp.; *Scalibregma inflatum*; *Thelepus* sp.

Sta. 2172, in 517 fms. OPG took 2.52 cuft of fine green mud with glass sponge, disklike foraminiferans, and animals differing from those in shallower depths. The largest individuals were a philinid mollusk (1), and a tube of *Maldane*, with lateral branches, measuring 30 mm long by 5 mm wide. Other animals were a pelecypod (3), an amphipod (1), an ovigerous isopod (1), and polychaetes: *Aricidea* sp., *Chaetozone* sp., *Drilonereis* sp., *Laonice* sp., *Lumbrineris index* (1), *Maldane* sp. with branched tube (4), *Ninoc* sp. and *Tharyx ?multifilis* (3).

Sta. 2170, in 587 fms. OPG took 2.9 cuft of fine mud with glass sponge spicules, many foraminiferans, and few animals. They were polychaetes with *Aricidea uschakowi* (several), *Onuphis* sp. (1), *Lumbrineris ?index* (1), a harmothoid (1), a terebellid (1); a small pelecypod and amphipods (few).

Palisades

1. Sta. 3610, in 20.5 fms. OPG took 0.5 cuft of gray muddy sand with black algal detritus, little sand and gravel, and many animals. Most abundant and conspicuous was *Glottidia albida* (50 large, measuring to 27 mm long, and 4 small, only 9 mm long). In addition to the species named in the chart, there were a small ceriantharian (3), a large *Cerebratulus rubra* (1), ectoproct bryozoans, crustaceans with an amphipod (2), a cumacean (1), a spider crab (1 jv), a box crab (1 jv), and a pinnotherid crab (1).

Numbers of species and specimens totalled:

polychaetes	28 species,	102 specimens
echinoderms	4	18
mollusks	5 ⁺	12 ⁺
crustaceans	5	6
others	4	59
Total:	<hr/> 46 ⁺ species, 197 ⁺ specimens	

2. Sta. 3609, in 34.5 fms. OPG took 1.07 cuft of gray mud and fine sand with shell bits and conspicuous ophiuroids. The largest animal was

Cerebratulus rubra, and the most abundant *Amphiodia urtica* (144). In addition to those named in the chart, there were nemerteans (2), *Glottidia albida* (3), amphipods (many), an anthurid isopod (1).

Numbers of species and specimens totalled:

polychaetes	35 species,	158 specimens
echinoderms	4	171
mollusks	2	2 ⁺
crustaceans	+	+
others	2	5
Total:	<hr/> 43 ⁺ species, 336 ⁺ specimens	

Polychaeta from Santa Catalina Island windward side (continued)

	West E.					R.R.		Cat. H.				F.B.		C+S		Pal.		
	1	2	3	4	5	1	2	1	2	3	4	1	2	1	2	1	2	
<u>Loandalia fauveli</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Loimia montagui</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Lumbrineris</u> spp.	*	-	+	+	+	*	-	+	+	*	-	+	*	+	*	*	*
<u>Lysippe annectens</u>	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
<u>Magelona ?pacific</u> a	+	-	-	+	+	+	-	-	-	+	-	-	-	+	-	-	-
<u>Melinna denticulata</u>	+	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	+
<u>Myriochele gracilis</u>	+	-	+	-	-	+	-	+	+	+	-	+	-	-	-	-	+
<u>Nephtys</u> spp.	+	-	-	-	+	-	-	+	-	-	-	+	-	+	+	+	-
<u>Nereis procera</u>	+	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	+
<u>Nerinides</u> sp.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Nothria iridescens</u>	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
<u>Notomastus latericeus</u>	+	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-
<u>Owenia f. collaris</u>	+	-	-	-	-	-	-	-	-	-	+	*	+	+	-	-	-
<u>Paraonis gracilis</u>	*	-	-	-	+	+	*	*	-	+	-	+	-	+	-	-	-
<u>Peisidice aspera</u>	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
<u>Pholoe glabra</u>	+	-	+	-	-	+	-	+	+	+	-	+	-	+	-	+	+
<u>Phyllochaetopterus limicolus</u>	.	+	-	-	-	+	*	-	-	-	-	-	-	-	+	-	-	-
<u>Pista</u> spp.	+	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-
<u>Praxillella a. pacifica</u>	+	-	-	-	-	*	*	+	-	+	-	-	-	+	-	-	+
<u>Prionospio malmgreni</u>	+	-	+	-	+	*	*	*	-	+	-	+	-	-	*	+	-
<u>Prionospio pinnata</u>	+	-	-	-	-	+	+	+	+	+	-	-	-	+	+	+	+
<u>Prionospio pygmaeus</u>	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Protodorvillea gracilis</u>	+	-	-	-	-	-	-	-	-	-	-	*	-	-	-	-	-
<u>Scalibregma inflatum</u>	+	-	-	+	+	-	-	+	-	+	-	-	-	+	*	-	-
<u>Scoloplos</u> sp.	+	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-
<u>Spio punctata</u>	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+
<u>Sphaerodorum</u> sp.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Sphaerosyllis</u> sp.	+	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-
<u>Sthenelanelia uniformis</u>	+	-	+	-	-	+	+	*	-	-	-	-	-	*	*	-	+
<u>Streblosoma crassi-</u> <u>branchia</u>	.	+	-	-	-	-	-	-	+	-	-	-	-	-	*	*	+	-
<u>syllids</u>	+	-	-	-	-	-	-	-	-	-	+	+	-	+	-	-	-

Polychaeta from Santa Catalina Island windward side (continued)

	West E.					R.R.		Cat. H.				F.B.		C+S		Pal.	
	1	2	3	4	5	1	2	1	2	3	4	1	2	1	2	1	2
<u>Telepsavus costarum</u>	+	-	+	-	-	*	-	+	+	+	-	+	-	-	-	+
<u>Terebellides stroemii</u>	+	-	-	+	-	-	-	+	-	+	-	-	+	+	-	+
<u>Tharyx monilaris</u>	+	-	-	-	-	-	*	+	-	+	-	+	-	-	-	+
<u>Tharyx tessellata</u>	*	-	+	+	-	+	-	-	+	+	-	-	+	-	-	+
<u>Vermiliopsis</u> sp.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Aglaophamus</u> sp.	+	+	-	+	-	-	-	-	-	-	-	-	-	-	+
<u>Ammotrypane aulogaster</u>	+	+	+	-	-	-	+	-	-	-	-	-	-	-	-
capitellids	+	-	-	-	+	-	-	-	+	-	-	-	+	-	-
cirratulids	+	-	-	+	-	-	-	-	-	-	-	-	*	-	-
<u>Haploscoloplos elongatus</u>	+	+	*	-	-	+	*	+	-	-	+	+	+	+	+
<u>Harmothoe</u> spp.	+	-	-	+	+	-	-	-	+	-	-	+	-	-	-
<u>Nereis</u> spp.	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-
onuphid	+	-	-	-	-	-	-	-	-	-	-	-	+	-	+
phyllodocid	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-
sabellid	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
terebellids	+	-	-	-	-	+	-	+	-	-	+	-	-	-	-
<u>Amage anops</u>	+	-	-	+	-	-	+	-	-	-	+	-	-	*
<u>Amphicteis scapho-</u> <u>branchiata</u>	.	.	.	+	-	-	-	-	-	-	+	-	-	-	-	-	-
<u>Maldane sarsi</u>	+	-	+	+	-	+	-	+	-	-	-	-	-	+
maldanids	+	-	+	+	-	-	-	-	-	-	+	+	-	-
<u>Nerinides maculata</u>	+	+	-	-	-	*	-	-	-	-	+	-	-	+
<u>Nothria conchylega</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Nothria stigmatis</u>	*	*	-	-	-	-	-	-	+	-	-	-	-
<u>Onuphis parva</u>	+	*	-	-	-	+	+	+	-	-	+	-	-	-
<u>Onuphis ?vexillaria</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Pectinaria californiensis</u>	+	-	+	+	-	*	+	+	-	-	+	-	-	+
<u>Pherusa neopapillata</u>	+	-	-	-	-	-	-	-	-	-	-	-	-	+
<u>Pista</u> cf. <u>crustata</u>	*	+	-	*	-	-	+	-	-	+	-	-	-
<u>Thalenessa spinosa</u>	+	+	+	-	-	-	-	+	-	-	-	-	-	-
<u>Travisia</u> spp.	+	-	+	+	-	+	-	+	-	-	-	+	-	+
<u>Amatea occidentalis</u>	+	-	-	-	+	-	-	-	-	+	+	-	+

Polychaeta from Santa Catalina Island windward side (continued)

	West E.					R.R.		Cat. H.				F.B.		C+S		Pal.	
	1	2	3	4	5	1	2	1	2	3	4	1	2	1	2	1	2
? <u>Euclymene</u> sp.					+	-	-	-	-	-	-	-	-	-	-	-	-
nephtyid					+	-	-	-	-	-	-	-	-	-	-	-	-
<u>Travisia</u> ? <u>gigas</u>					+	-	-	-	-	-	-	-	-	-	-	-	+
<u>Ancistrosyllis</u> spp.						+	-	-	-	-	-	-	-	-	-	-	-
<u>Arctonoe</u> sp.						+	-	-	-	-	-	-	-	-	-	-	-
<u>Diopatra</u> ? <u>splendidissima</u>						+	-	-	-	-	-	-	-	-	-	-	-
<u>Pherusa</u> <u>capulata</u>						+	-	-	+	-	-	+	-	+	-	+	-
<u>Poecilochaetus</u> <u>johnsoni</u>						+	-	-	*	+	-	-	-	+	+	-	-
<u>Rhodine</u> <u>bitorquata</u>						+	+	-	-	+	-	-	-	-	+	-	+
<u>Spiophanes</u> spp.						+	+	-	-	-	-	-	-	*	*	+	+
<u>Sternaspis</u> <u>fossor</u>						+	+	-	+	-	+	-	-	+	*	+	*
<u>Brada</u> <u>pluribranchiata</u>							+	-	-	+	+	-	-	-	-	-	-
<u>Prionospio</u> <u>cirrifera</u>							+	-	-	+	+	-	+	-	-	-	-
<u>Sthenelais</u> <u>tertiaglabra</u>							+	-	-	+	-	-	-	+	-	-	-
<u>Anaitides</u> sp.								+	-	-	-	+	-	-	-	-	-
<u>Apistobranchus</u> <u>ornatus</u>									+	-	-	-	-	-	-	-	-
<u>Armandia</u> <u>bioculata</u>									+	-	-	-	-	-	-	-	-
<u>Dorvillea</u> <u>articulata</u>									+	+	-	-	-	-	-	-	-
<u>Lumbrineris</u> <u>limicola</u>									*	-	-	-	-	-	-	-	-
<u>Lumbrineris</u> <u>minima</u>									*	-	-	-	-	-	-	-	-
<u>Mediomastus</u> <u>californiensis</u>									+	+	-	-	-	-	-	-	-
<u>Aglaophamus</u> <u>dicirris</u>										+	-	-	-	-	+	+	+
<u>Aricidea</u> <u>uschakowi</u>										+	-	-	+	-	-	-	-
<u>Capitella</u> <u>capitata</u> subsp.										+	-	-	+	-	-	-	-
<u>Caulleriella</u> sp.										+	-	-	-	-	-	-	-
<u>Euchone</u> <u>incolor</u>										+	-	-	-	-	-	-	-
<u>Eumida</u> , <u>bilineate</u>										+	+	-	-	-	-	-	-
hesionid										+	+	-	-	-	-	-	-
<u>Hesperonoe</u> sp.										+	+	-	-	-	-	-	-
<u>Langerhansia</u> <u>heterochaeta</u>										+	-	-	-	-	-	-	-
<u>Lumbrineris</u> <u>pallida</u>										*	-	-	-	-	-	-	-

Polychaeta from Santa Catalina Island windward side (continued)

	West E.					R.R.		Cat. H.				F.B.		C+S		Pal.	
	1	2	3	4	5	1	2	1	2	3	4	1	2	1	2	1	2
<u>Eurythoe complanata</u>												+		-	-	-	-
<u>Exogone</u> sp.												+		+		-	-
<u>Genetyllis</u> sp.												+		-	-	-	-
<u>Harmothoe hirsuta</u>												*		-	-	-	-
<u>Hesione</u> sp.												+		-	-	-	-
<u>Hesionura c. difficilis</u>												*		-	-	-	-
<u>Lepidonotus</u> sp.												+		-	-	-	-
<u>Lumbrineris acuta</u>												+		-	-	-	-
<u>Lumbrineris japonica</u>												+		-	-	-	-
<u>Lumbrineris latreilli</u>												+		-	-	-	-
<u>Lysidice ninetta</u>												+		-	-	-	-
<u>Magelona</u> sp.												+		+	-	-	-
maldanid, collared												+		-	-	-	-
<u>Nereis ?neonigripes</u>												+		-	-	-	-
<u>Nerine</u> sp.												*		-	-	-	-
<u>Ophiodromus pugettensis</u>												+		-	-	-	-
<u>Orseis</u> sp.												*		-	-	-	-
<u>Pareurythoe californica</u>												+		-	-	-	-
<u>Pherusa papillata</u>												+		-	-	-	-
<u>Pisione remota</u>												*		-	-	-	-
<u>Prionospio</u> sp.												*		+	-	-	+
<u>Psammolyce spinosa</u>												+		-	-	-	-
<u>Questa caudicirra</u>												*		-	-	-	-
<u>Salmacina dysteri</u>												+		-	-	-	-
<u>Scoloplos acmeceps</u>												+		-	-	-	-
serpulids												+		-	-	-	-
<u>Spiophanes bombyx</u>												+		-	-	-	-
spirorbids												+		-	-	-	-
<u>Vermiliopsis biformis</u>												+		-	-	-	-
<u>Asychis lacera</u>														+	-	-	-
<u>Cirriformia spirabrancha</u>														+	-	-	-

Polychaeta from Santa Catalina Island windward side (continued)

	West E.					R.R.		Cat. H.				F.B.		C+S		Pal.	
	1	2	3	4	5	1	2	1	2	3	4	1	2	1	2	1	2
<u>Goniada</u> sp.														+	-	-	-
<u>Sthenelais verruculosa</u>														+	-	-	-
<u>Ampharete arctica</u>	+	-	-
<u>Amphisamytha bioculata</u>	+	-	-
<u>Aphrodita armifera</u>	+	-	-
<u>Diopatra tridentata</u>	+	-	-
<u>Dorvillea articulata</u>	+	-	-
<u>Eulalia bilineata</u>	+	-	-
<u>Eulalia</u> spp.	+	-	-
<u>Lanice</u> sp.	+	-	-
<u>Megalomma</u> sp.	+	-	-
<u>Nephtys californiensis</u>	+	-	-
<u>Pherusa</u> sp.	+	-	-
<u>Pseudopotamilla</u> sp.	+	-	-
<u>Rhamphobrachium longi-</u> <u>setosum</u>	+	-	-
<u>Sabella ?crassicornis</u>	+	-	-
<u>Sabella</u> , another sp.	+	-	-
sigalionid	+	-	-
<u>Chaetozone</u> sp.	+	-
<u>Notomastus ?magnus</u>	+	-
<u>Potamilla</u> , oculate	+	-
<u>Myriowenia californiensis</u>	+

Echinodermata from Santa Catalina Island windward side,
 showing distributions by profiles,
 from West End, Ribbon Rock, Catalina Harbor, Farnsworth Bank,
 China Point-Salta Verde, and Palisades.

	West E.				R.R.		Cat. H.				F.B.		C+S		Pal.		
	1	2	3	4	5	1	2	1	2	3	4	1	2	1	2	1	2
<u>Amphiacantha amphacantha</u>	.	+	-	+	-	-	+	-	-	+	+	-	-	+	-	-	-
<u>Amphipholis squamata</u> . .	.	+	-	-	+	-	*	-	+	+	-	*	*	+	-	-	+
<u>Leptosynapta albicans</u> .	.	+	-	-	-	-	*	-	+	-	+	-	-	-	-	-	+
<u>Lytechinus anamesus</u> . .	.	+	-	-	-	+	-	-	-	-	-	-	+	-	-	-	-
ophiuroids	*	-	-	-	-	-	-	-	-	-	-
<u>Amphiodia digitata</u>	*	-	-	-	-	-	-	-	-	-	-	-	-
<u>Amphioplus hexacanthus</u>	+	-	-	-	-	-	-	-	-	-	-	-	-
<u>Brissopsis pacifica</u>	+	-	-	-	+	-	-	-	-	-	-	-	-
<u>Amphiodia urtica</u>	*	-	-	*	*	+	-	*	+	-	+	*
asteroids	+	-	-	-	-	-	-	-	-	-	-
holothuroids	+	-	-	-	-	-	-	-	-	-	-
<u>Luidia foliolata</u>	+	-	-	-	-	-	-	-	-	-	-
<u>Ophiothrix spiculata</u>	+	-	-	+	-	*	*	-	-	-	-
<u>Amphioplus strongyloplax</u>	-	+	-	-	*	-	-	-	-	-	-
<u>Pentamera pseudo-</u> <u>populifera</u>	-	+	-	+	-	-	-	-	-	-	+
<u>Amphipholis pugetana</u>	*	-	+	*	-	-	-	-
<u>Amphiura arcystata</u>	+	*	-	-	-	-	-	*
<u>Astropecten californicus</u>	+	-	-	-	-	+	-	+
<u>Lovenia cordiformis</u>	+	-	-	-	-	-	-	-
<u>Ophiacantha diplasia</u>	+	-	-	-	-	-	-	-
<u>Ophiocynodus corynetes</u>	+	-	-	-	-	-	-	-
<u>Ophiopholis longispina</u>	*	-	-	-	-	-	-	-
<u>Leptosynapta</u> sp.	+	-	-	-	-	-	-
<u>Molpadia intermedia</u>	+	-	-	-	-	-
<u>Ophiomusium jolliensis</u>	+	-	-	-	-	-
<u>Henricia</u> sp.	+	-	-	-	-
<u>Ophiopteris papillosa</u>	*	+	-	-	-
<u>Asterina miniata</u>	+	-	-	-
<u>Ophiopsila californica</u>	+	-	-

PHOTOGRAPHIC RECORDS ALONG THE LEEWARD SIDE OF SANTA CATALINA ISLAND

The sea bottoms on the leeward side of Santa Catalina Island were sampled with a Campbell grab equipped with camera. I am indebted to Professor K. O. Emery, Woods Hole Oceanographic Institution, for the copies of the photographs. The methods for taking the samples were like those described in the canyon report (Hartman, 1963, p. 102). The Campbell grab, with coverage of about a fourth of a square meter, was equipped with camera and lights, and lowered so that the size of the photograph and the surface taken by the grab were about equal. There was reasonable agreement with what the pictures revealed, and the numbers and kinds of larger surface organisms taken in the grab.

The locations of photographs and their analyses are listed in the chart and summaries, below.

1. Sta. 7707 (N of no. 250), off Abalone Pt., in 22.5 fms. The photograph (Pl. 8, top) shows numerous slender, projecting tubes of *Telepsavus costarum*, and larger, recumbent tubes of *Chaetopterus variopedatus* (the largest tubes measured 225 by 18 mm); three echinoids and two cone-snails are seen on the surface. The largest animals in the sample are shown (Pl. 8, bottom). Analyses revealed the presence of 21 species and 155 specimens; in addition to those listed in the chart (see below), there were bryozoan clusters, an amphipod (1), a commensal crab (1) and an ascidian. Largest were *Chaetopterus* and *Lytechinus*.

2. Sta. 7719 (N of no. 250). Shelf off Abalone Pt., in 23.5 fms. The photograph (Pl. 9, top) shows a silty surface interrupted by two tubes of *Chaetopterus variopedatus*, distal ends of slenderer tubes of *Telepsavus costarum*, and *Lytechinus anamesus*. Other animals in the sample resemble those from Sta. 7707. The photographs appear different because the surface is more completely silt-covered in the second than in the first.

3. Sta. 7720 (N of no. 253). Shelf off Abalone Pt., in 23.5 fms. The photograph (Pl. 9, bottom) shows a bottom similar to that in the preceding one, except for the presence of a seastar, *Mediaster aequalis*. *Chaetopterus* and *Telepsavus* were the most prominent organisms.

4. Sta. 7723 (near no. 250). Shelf off Jewfish Pt., in 39.5 fms. The photograph (Pl. 10, top) shows a level silty bottom, with rocks projecting at lower left, overgrown by solitary corals, and a smaller clump of the same in the upper left-hand corner; an ophiuroid arm is seen in upper right, and the surface shows pittings of smaller organisms embedded in

the sediments. The grab failed to penetrate the bottom, perhaps because the jaws struck hard rock before they closed.

5. Sta. 7725 (near no. 250). Shelf off Jewfish Pt., in 40.5 fms. The photograph (Pl. 10, bottom) shows a silty surface with a few long, ophiuroid arms, many small pits, mounds and low ridges. The sample contained an echinoid and numerous polychaete tubes, together with a ceriantharian (8), a sipunculid burrowing in the foraminiferan, *Rhabdamina* (2), a chaetognath (15), amphipods (65), a gnathid isopod (1), an anthurid isopod (1), tanaids (12), cumaceans (22), ostracods (41), a shrimp (3), a pycnogonid (2), in addition to those named in the chart. The most abundant species were *Aricidea neosuecica* (42) and *Aricidea lopezi* (25).

6. Sta. 7726 (near no. 251). Shelf off Jewfish Pt., in 40 fms. The photograph (Pl. 11, top) shows silty sediments overlain by dead shells of *Laqueus californicus*. Analyses of the sample revealed the presence of more than 100 species and 300 specimens. In addition to those named in the chart, the sample contained a ceriantharian (3), a solitary coral (2), a hydroid stalk (1), a nemertean (1), a polyclad (1), a sipunculid (1), a phoronid (1), encrusting bryozoans, amphipods of numerous kinds (60*), a caprellid (1), isopods (5), tanaids (14), cumaceans (3), three kinds of ostracods (13), a shrimp (5), an oxyrhynch crab (3), *Scalpellum* (1) attached to *Phyllochaetopterus* tube. The largest animals were *Euclymene* sp. (Pl. 11, bottom) and dead shells of *Laqueus*. The most abundant species was *Peisidice aspera* (17).

7. Sta. 7712 (near no. 260). Slope SE end of Santa Catalina Island, in 133 fms. The photograph (Pl. 12, top) shows a coarse black sandy bottom, its surface marked with a broad, shallow, depressed trail in the lower half, a patch of ophiuroid arms in center right, and the surface pitted with pores, mounds and other irregularities. The largest animals were *Brissopsis pacifica*, (Pl. 12, bottom), *Eunice americana*, *Nothria iridescens*, *Maldane sarsi* and tubes of *Phyllochaetopterus limicolus*. In addition to those named in the chart, there were a ceriantharian (1), a nemertean (1), a sipunculid (2), amphipods of several kinds (12), an anthurid isopod (1), a tanaid (3), a cumacean (1), and three kinds of ostracods (43). None was conspicuously abundant.

8. Sta. 7727 (near no. 251). Shelf off Jewfish Pt., in 44 fms. The grab failed to take a sample. The photograph (Pl. 13, top) reveals a silty sand surface riddled by pores and depressions, suggesting the presence of many animals.

9. Sta. 7713 (near no. 267). Basin slope, SE of Santa Catalina Island, in 286 fms. The sediments were black sand and gravel with silt. The photograph (Pl. 13, bottom) showed no large surface animals, but many small to large pores, mounds, trails and white shelly fragments. The analyses disclosed the presence of 32 species and 139 specimens. In addition to those named in the chart, there were glassy sponge spicules, a sea-whip with bulbous base (1), a nemertean (1), an echiuroid with anterior end lightly papillated (1), amphipods (3), a caprellid (1), a cumacean (1), and an ostracod (1). Capsules of unknown origin, measuring 4 by 1.2 mm, surrounded by a chitinized layer, were filled with uniformly minute, spherical granules. The most abundant species were *Paraonis gracilis oculata* (62), and *Crystallophrisson* sp. (15), and the largest individuals were *Scalibregma inflatum* and an echiuroid.

Polychaeta on photographic records
from the leeward side of Santa Catalina Island,
showing order of occurrence in 22.5 to 268 fms.

+ indicates presence, - absence.

Species represented by more than 10 specimens are indicated by *.

	1	2	3	4	5	6	7	8	9
<u>Aglaophamus dicirris</u>	+	-	-	-	-	-	-	-	-
<u>Anaitides</u> , checkered	+	-	-	-	-	-	-	-	-
<u>Aphrodita</u> sp.	+	-	-	-	-	-	-	-	-
<u>Chaetopterus variopedatus</u>	*	+	+	-	-	-	-	-	-
<u>Langerhansia heterochaeta</u>	+	-	-	-	-	-	-	-	-
<u>Lepidasthenia</u> sp.	+	-	-	-	-	-	-	-	-
<u>Owenia f. collaris</u>	+	+	+	-	-	-	-	-	-
<u>Telepsavus costarum</u>	*	-	-	-	+	+	-	+	-
terebellid	+	-	-	-	-	+	-	-	-
<u>Amphicteis scaphobranchiata</u>					+	-	-	-	-
<u>Aricidea lopezi</u>					*	+	*	*	+
<u>Aricidea neosuecica</u>					*	+	*	-	-
<u>Aricidea uschakowi</u>					*	-	*	+	+
<u>Chaetozone setosa</u>					+	+	-	-	-
<u>Chone</u> sp.					+	+	+	-	-
<u>Eteone ?californiensis</u>					+	-	-	-	-
goniadid					+	+	-	-	-
<u>Harmothoe lunulata</u>					+	+	-	-	-
<u>Lumbrineris bicirrata</u>					+	-	+	-	-
<u>Myriowenia californiensis</u>					+	-	-	-	-
<u>Nephtys cornuta</u>					*	-	-	-	-
<u>Nephtys ferruginea</u>					+	-	+	-	-
<u>Nerinides pigmentata</u>					+	+	+	-	-
<u>Nothria iridescens</u>					+	-	-	+	-
<u>Onuphis parva</u>					+	-	-	+	-
<u>Paraonis gracilis</u>					+	+	+	+	-
<u>Pectinaria californiensis</u>					+	-	+	+	-
<u>Pherusa neopapillata</u>					+	-	-	-	-
<u>Pholoe glabra</u>					+	+	+	+	-

Polychaeta on photographic records (continued)

	1	2	3	4	5	6	7	8	9
<u>Polydora</u> sp.	+	+	-	-	-
<u>Rhodine bitorquata</u>	+	-	-	-	-
<u>Spio punctata</u>	+	-	+	-	-
<u>Sthenelais tertiaglabra</u>	+	-	-	-	-
<u>Sthenelanellella uniformis</u>	+	+	+	-	-
<u>Terebellides stroemii</u>	+	+	-	-	-
<u>Thalenessa spinosa</u>	+	-	+	-	-
<u>Tharyx monilaris</u>	+	+	-	+	+
<u>Aglaophamus</u> sp.	+	-	+	-
<u>Amaeana occidentalis</u>	+	+	-	-
<u>Ammotrypane</u> sp.	+	-	-	-
<u>Anaitides</u> sp.	+	-	-	-
<u>Autolytus</u> sp.	+	-	-	-
<u>Euclymene</u> sp.	+	-	-	-
<u>Eulalia myriacyclum</u>	+	-	-	-
<u>Euprosine</u> sp.	+	-	-	-
<u>Exogone uniformis</u>	+	+	+	-
<u>Flabelligera infundibularis</u>	+	-	-	-
<u>Glycera americana</u>	+	-	-	-
<u>Glycera</u> cf. <u>capitata</u>	*	-	-	-
<u>Lanice</u> sp.	+	-	-	-
<u>Laonice foliata</u>	+	-	+	-
<u>Lepidonotus caelorus</u>	+	-	-	-
<u>Lumbrineris cruzensis</u>	+	+	+	-
<u>Lumbrineris</u> , other sp.	*	-	-	-
<u>Magelona pacifica</u>	+	-	+	-
<u>Mediomastus californiensis</u>	+	-	-	-
<u>Notoproctus</u> cf. <u>pacificus</u>	+	-	-	-
<u>Odontosyllis phosphorea</u>	+	-	-	-
<u>Ophiodromus pugettensis</u>	+	-	-	-
<u>Peisidice aspera</u>	*	-	-	-

ALPHABETICAL LISTS OF SPECIES NAMED FROM
THESE AREAS

POLYCHAETES

- Aedicira ramosa* (Annenkova) ; SP, CL
Aglaophamus dicirris Hartman ; CL, CW
Aglaophamus erectans Hartman ; SP
Aglaophamus spp. ; SP, LS, CL
Amacana occidentalis (Hartman) ; PV, SP, NE, CL, CW
Amage anops (Johnson) ; PV, SP, CL, CW
Ammotrypane aulogaster Rathke ; SP, LS, CL, CW
Ammotrypane sp. ; SP, LS, CL
Ampharete arctica Malmgren ; PV, SP, CL, CW
Ampharete labrops Hartman ; PV
Ampharete spp. ; PV, SP, CL
Amphicteis mucronata Moore ; SP, CL
Amphicteis scaphobranchiata Moore ; PV, SP, NE, LH, CL, CW
Amphicteis spp. ; SP, CL
Amphiduros pacificus Hartman ; PV
Amphisamytha bioculata (Moore) ; CL, CW
Anaitides madeirensis (Langerhans) ; PV, SP, LS, CL, CW
Anaitides medipapillata (Moore) ; PV, SP, CL
Anaitides, checkered ; SP, NE, LH, CL
Anaitides spp. ; PV, SP, NE, LS, CL, CW
Ancistrotyllis cf. *bassi* Hartman ; SP
Ancistrotyllis breviceps Hartman ; CL
Ancistrotyllis cf. *rigida* Fauvel ; SP, NE
Ancistrotyllis tentaculata Treadwell ; LH, PV, SP, NE, CL, CW
Ancistrotyllis spp. ; LH, SP, LS
Anobothrus gracilis (Malmgren) ; SP, LS, CL, CW
Anotomastus gordiodes (Moore) ; LH, PV, SP, NE
Antinoella sp. ; PV, SP
Aphrodita armifera Moore ; SP, CW
Aphrodita parva Moore ; CL
Aphrodita refulgida Moore ; PV
Aphrodita spp. ; PV, SP, CL

- Apistobranchus ornatus* Hartman ; SP, CW
Apomatus geniculata (Moore and Bush) ; CL
Arabella semimaculata (Moore) ; SP
Arabella sp. ; SP, CW
Arctonoe sp. ; CL, CW
Aricidea lopezi Berkeley and Berkeley ; LH, PV, SP, NE, LS, CL, CW
Aricidea neosuecica Hartman ; PV, SP, NE, CL, CW
Aricidea uschakowi Zachs ; PV, SP, NE, CL, CW
Aricidea spp. ; LH, PV, SP, LS, CL, CW
Armandia bioculata Hartman ; LH, PV, SP, CL, CW
Artacamella hancocki Hartman ; PV, SP, NE, CL, CW
Asabellides lineata (Berkeley and Berkeley) ; NE
Asabellides sp. ; PV, NE
Asclerocheilus californicus Hartman ; SP
Asclerocheilus sp. ; CL
Asychis disparidentata (Moore) ; PV, SP
Asychis lacera (Moore) ; SP, CW
Asychis spp. ; LH, PV, SP
Autolytus sp. ; PV, SP, CW
Axiothella rubrocincta (Johnson) ; PV, SP, NE
Axiothella spp. ; SP, NE, CL
Boccardia basilaria Hartman ; PV
Boccardia nr. *redeki* (Horst) ; LH
Boccardia uncata Berkeley ; PV
Boccardia spp. ; PV, SP, LS
Brada glabra Hartman ; SP, NE, LS, CL
Brada pilosa Moore ; LH, PV, SP, NE, CL
Brada pluribranchiata (Moore) ; PV, SP, NE, CL, CW
Brada sp. ; SP
Califa calida Hartman ; SP, CL
Capitata ambiseta Hartman ; PV
Capitella capitata (Fabricius), subspp. ; PV, SP, LS, CL, CW
Capitellides sp. ; PV
Capitomastus sp. ; PV, SP
Carazzia sp. ; LH
Caulericiella alata (Southern) ; PV, CW

- Caulleriella bioculata* (Keferstein) ; PV, SP
Caulleriella spp. ; LS, CL, CW
Ceratocephala e. americana Hartman ; PV, NE, SP, CW
Ceratocephala l. pacifica Hartman ; SP
Ceratonereis sp. ; SP
Chaetopterus variopedatus (Renier) ; PV, SP, NE, CL, CW
Chaetozone armata Hartman ; LS, CL, CW
Chaetozone corona Berkeley and Berkeley ; LH, PV, SP, NE, CL
Chaetozone gracilis (Moore) ; PV, SP
Chaetozone hamata (Hartman) ; SP
Chaetozone multioculata Hartman ; CL
Chaetozone setosa Malmgren ; PV, SP, CL
Chaetozone, oculate ; PV
Chaetozone spp. ; SP, CL, CW
Chloea pinnata Moore ; PV, SP, NE, LS, CL, CW
Chone ecaudata (Moore) ; LH, PV
Chone gracilis Moore ; PV, SP, NE, CW
Chone minuta Hartman ; SP
Chone mollis (Bush) ; PV, SP
Chone spp. ; PV, SP, NE, CL, CW
Chrysopetalum occidentale Johnson ; PV
Cirratulus cirratus (Müller) ; LH, PV, SP
Cirratulus sp. ; CL
Cirriformia luxuriosa (Moore) ; LH, SP
Cirriformia spirabranca (Moore) ; PV, SP, CW
Cirriformia sp. ; CL
Cirrophorus aciculatus Hartman ; PV, SP, LS, CL
Cirrophorus furcatus Hartman ; LH, PV, SP, LS, CL, CW
Cistenides brevicoma (Johnson) ; PV, SP
Cossura candida Hartman ; LH, PV, SP, NE, LS, CL, CW
Dasybranchus glabrus Moore ; PV
Dasybranchus sp. ; PV
Dexiospira sp. ; CL
Diopatra ornata Moore ; PV, SP, NE, CL
Diopatra ?splendidissima Kinberg ; CW
Diopatra tridentata Hartman ; LH, PV, SP, CL, CW

- Diopatira* sp. ; CL
Distylidia rugosa (Moore) ; PV
Dodecaceria concharum Oersted ; LS, CL
Dodecaceria spp. ; PV, CL, CW
Dorvillea articulata (Hartman) ; LH, PV, SP, CL, CW
Dorvillea moniloceras (Moore) ; CW
Drilonereis longa Webster ; PV, SP, LS
Drilonereis nuda Moore ; LH, PV, SP
Drilonereis spp. ; LH, PV, SP, NE, CL, CW
Eteone ?*alba* Webster ; LH
Eteone californica Hartman ; PV, SP
Eteone dilatata Hartman ; SP
Eteone spp. ; CL, CW
Euchone incolor Hartman ; CW
Euchone spp. ; PV, SP, LS, CL, CW
Euclymene reticulata Moore ; PV, SP
Euclymene sp. ; PV, SP, CL, CW
 euclymenid ; SP
Eulalia myriacyclum Schmarda ; PV, SP, CL
Eulalia quadrioculata Moore ; PV, SP
Eulalia, cross-barred ; PV
Eulalia spp. ; SP, CL
Eumida sanguinea (Oersted) ; PV, SP
Eumida tubiformis Moore ; CL
Eumida, bioculate ; PV, SP
Eumida, trilineate ; PV, SP, CL
Eumida spp. ; PV, SP, LS, CL
Eunice americana Hartman ; PV, SP, NE, CL
Eunice antennata (Savigny), PV
Eunice aphroditois (Pallas) ; CL
Eunice sp. ; LS, CL
 ?*Eunoe* sp. ; CL
Euphrosine sp. ; SP, CL
Eupolymnia crescentis Chamberlin ; PV
Eupolymnia heterobranchia (Johnson) ; CL
Eupolymnia spp. ; SP, CL

- Eusyllis transecta* n. sp.; SP
Euzonus (Thoracophelia) sp.; PV
Exogone uniformis Hartman; PV, SP, NE, LS, CL
Exogone spp.; PV, CL
Exogonella brunnea Hartman; PV, CL
EXOAGONINAE; PV, SP
Fabricia pacifica Berkeley and Berkeley; CL
Fabricia spp.; LH, PV, SP, CL
Flabelligera commensalis Moore; PV, SP, CL
Flabelligera infundibularis Johnson; CL
Gattyana brunnea n. sp.; LS
Genetyllis castanea (Marenzeller); SP
Glycera americana Leidy; LH, PV, SP, NE, LS, CL
Glycera branchiopoda Moore; SP, LS, CL
Glycera ?capitata Oersted; LH, PV, SP, NE, LS, CL
Glycera convoluta Keferstein; NE
Glycera oxycephala Ehlers; SP, NE
Glycera robusta Ehlers; SP
Glycera tenuis Hartman; SP
Glycera tessellata Grube; LS, CL
Glycera spp.; PV, SP, LS, CL
Glycinde armigera Moore; SP, NE
Glycinde wireni Arwidsson; SP
Goniada brunnea Treadwell; LH, PV, SP, NE, LS, CL
Goniada littorea Hartman; LH, PV, SP, NE
Goniada sp.; SP
Gyptis arenicola glabra (Hartman); LH, PV, SP, NE, LS, CL
Gyptis brunnea (Hartman); PV
Gyptis sp.; SP
Halosydna brevisetosa Kinberg; PV, SP
Halosydna latior Chamberlin; SP, CL
Halosydna spp.; PV, CL
Haploscoloplos elongatus (Johnson); LH, PV, SP, NE, LS, CL
Haploscoloplos panamensis Monro; CL
Haplosyllis sp.; PV
Harmothoe ?fragilis Moore; CL

- Harmothoe hirsuta* Johnson; CL
Harmothoe cf. *imbricata* (Linnaeus); SP
Harmothoe lunulata (delle Chiaje); LH, PV, SP, NE, CL
Harmothoe priops Hartman; SP, NE
Harmothoe scriptoria Moore; PV, SP, CL
Harmothoe spp.; PV, SP, NE, CL
 harmothoid; SP
Hesperonoe laevis Hartman; PV, SP
Hesperonoe sp.; SP, NE
Heteromastus filiformis (Claparede); PV
Heteropale bellis (Johnson); SP
Heterospio catalinensis (Hartman); PV, SP, NE, CL
Hyalinoecia juvenalis Moore; NE
 ?*Ilyphagus* sp.; SP
Isocirrus longiceps (Moore); SP, NE
Isocirrus sp.; CL
 ?*Isolda* sp.; SP, CL
Lagisca nr. *multisetosa* Moore; LS
Lagisca sp.; SP
Langerhansia heterochaeta (Moore); PV, SP, CL
Lanice conchilega (Pallas); PV, SP, LS, CL
Lanice sp.; CL
Laonice cirrata (Sars); LH, PV, SP, NE, LS, CL
Laonice foliata (Moore); CL
Laonice sp.; SP
Leaena caeca Hartman; SP
Leanira sp.; NE
Leiochrides hemipodus Hartman; CL
Leiochrides sp.; CL
Lepidasthenia interrupta (Marenzeller); SP
Lepidasthenia longicirrata Berkeley; CL
Lepidasthenia virens (Blanchard); PV, SP, CL
Lepidasthenia spp.; PV, NE, CL
Lepidonotus caelorus Moore; PV, SP, LS, CL
Loandalia fauveli Berkeley and Berkeley; LH, PV, SP, NE
Loimia medusa (Savigny); PV, NE

- Lumbriclymene lineus* Hartman ; SP
Lumbriclymene sp. ; SP
Lumbrineris nr. *acuta* Verrill ; PV, SP, NE, CL
Lumbrineris cf. *bassi* Hartman ; PV
Lumbrineris bicirrata Treadwell ; PV, SP, NE, CL
Lumbrineris biflaris (Ehlers) ; NE
Lumbrineris californiensis Hartman ; LH, PV, SP, NE, CL
Lumbrineris cruzensis Hartman ; LH, PV, SP, NE, CL
Lumbrineris nr. *impatiens* (Claparède) ; CL
Lumbrineris index Moore ; SP
Lumbrineris inflata Moore ; PV
Lumbrineris japonica (Marenzeller) ; SP
Lumbrineris latreilli Audouin and Edwards ; PV, SP, LS, CL
Lumbrineris limicola Hartman ; LH, PV, SP
Lumbrineris pallida Hartman ; LH, PV, SP
Lumbrineris nr. *sarsi* (Kinberg) ; SP
Lumbrineris ?*tetraura* (Schmarda) ; PV, SP
Lumbrineris spp. ; PV, SP, NE, LS, CL
Lysippe annectens Moore ; PV, SP, LS, CL
Macellicephala remigata (Moore) ; LS
Magelona ?*californica* Hartman ; LS
Magelona pacifica Monro ; PV, SP, NE, LS, CL
Magelona pitelkai Hartman ; SP
Magelona sacculata Hartman ; LH, SP, NE
Magelona spp. ; LH, PV, SP, CL
Maldane sarsi Malmgren ; PV, SP, LS, CL
Maldane sp. ; SP
Maldanella robusta Moore ; SP
Marphysa disjuncta Hartman ; LH, PV, SP
Marphysa mortenseni Monro ; PV
Marphysa sanguinea (Montagu) ; CL
Mediomastus californiensis Hartman ; LH, PV, SP, NE, CL
Megalomma splendida (Moore) ; PV, SP, CL
Megalomma, bioculate ; SP
Megalomma spp. ; LH, PV, NE, CL
Melinna denticulata Moore ; PV, SP, CL

- Melinna* spp. ; LH, PV, SP
Melinnexis moorei Hartman ; SP
? *Mesochaetopterus* sp. ; CL
Myriochele gracilis Hartman ; PV, SP, NE, LS, CL, CW
myriocheliid ; SP
Myriowenia californiensis Hartman ; PV, SP, NE, CL, CW
Myxicola infundibulum (Renier) ; PV, SP
Naineris nr. *quadricuspida* (Fabricius) ; SP
Naineris uncinata Hartman ; PV, SP, NE, CL
Neanthes brandti (Malmgren) ; PV
Nephtys assignis Hartman ; SP
Nephtys caecoides Hartman ; SP, NE
Nephtys californiensis Hartman ; SP, CW
Nephtys cornuta Berkeley and Berkeley ; LH, SP, CL, CW
Nephtys ferruginea Hartman ; PV, SP, NE, LS, CL, CW
Nephtys glabra Hartman ; SP, CW
Nephtys punctata Hartman ; SP
Nephtys spp. ; LH, PV, SP, NE, LS, CL, CW
Nereiphylla sp. ; SP
Nereis latescens Chamberlin ; SP
Nereis mediator Chamberlin ; CL
Nereis pelagica neonigripes Hartman ; PV, CW
Nereis procera Ehlers ; LH, PV, SP, NE, CL, CW
Nereis zonata Malmgren ; SP
Nereis spp. ; PV, CL, CW
Nerine sp. ; CW
nerinid ; PV
Nerinides ?acuta (Treadwell) ; CL
Nerinides maculata Hartman ; SP, CL, CW
Nerinides pigmentata (Reish) ; SP, CL, CW
Nerinides sp. ; CW
Nicomache sp. ; SP, LS, CL
Ninoe gemmea Moore ; PV, NE, SP
Ninoe sp. ; CL
Nothria conchylega (Sars) ; CL, CW
Nothria elegans (Johnson) ; PV, SP, CL

- Nothria geophiliformis* (Moore) ; SP
Nothria hiatidentata Moore ; CL
Nothria iridescens (Johnson) ; LH, PV, SP, NE, CL, CW
Nothria pallida Moore ; PV, SP
Nothria stigmatis (Treadwell) ; SP, CL, CW
Nothria spp. ; PV, SP, CL
Notocirrus sp. ; PV
Notomastus latericcus Sars ; CL, CW
Notomastus lineatus Claparède ; PV, SP, LS, CL
Notomastus magnus Hartman ; PV, SP, NE, LS, CL, CW
Notomastus tenuis Moore ; LH, PV, SP, CW
Notomastus spp. ; PV, SP, LS, CL
Notoproctus pacificus (Moore) ; CL
Odontosyllis phosphorca Moore ; PV, NE, CL, CW
Odontosyllis sp. ; PV, SP, CL
Oncoscolex pacificus (Moore) ; SP, CL
Onuphis eremita Audouin and Edwards ; SP, NE
Onuphis nebulosa Moore ; SP, CL
Onuphis parva Moore ; PV, SP, NE, CL, CW
Onuphis vexillaria Moore ; CL, CW
Ophelia limacina (Rathke) ; SP
Orscis sp. ; CW
Owenia fusiformis collaris Hartman ; PV, SP, NE, CL, CW
Panthalis pacifica Treadwell ; PV, SP, NE, CL
Panthalis sp. ; SP
Paradexiospira vitrea (Fabricius) ; SP
Paranitis polynoides (Moore) ; SP
Paraonis gracilis (Tauber) ; LH, PV, SP, NE, LS, CL, CW
Paraonis gracilis oculata Hartman ; SP, CL
Paraonis sp. ; abranchiata ; CL
Pareulepis fimbriata (Treadwell) ; NE
Pareurythoe californica (Johnson) ; PV, SP, CL, CW
Pectinaria californiensis Hartman ; LH, PV, SP, NE, CL, CW
Peisidice aspera Johnson ; LH, PV, SP, LS, CL, CW
Pherusa capulata (Moore) ; PV, SP, NE, CL, CW
Pherusa inflata (Treadwell) ; PV, SP, CL

- Pherusa neopapillata* Hartman ; LH, PV, SP, NE, CL, CW
Pherusa papillata (Johnson) ; CL, CW
Pherusa spp. ; PV, SP, CL, CW
Pholoe glabra Hartman ; LH, PV, SP, NE, CL, CW
Phragmatopoma californica (Fewkes) ; CL
Phyllochaetopterus limicolus Hartman ; PV, SP, NE, LS, CL, CW
Phyllochaetopterus prolifica Potts ; PV, SP, CL
Phyllochaetopterus sp. ; CL
Phyllodoce ferruginca Moore ; SP
Phyllodoce cf. *papillosa* Uschakov and Wu ; SP
Phyllodoce sp. ; SP
Phylo felix Kinberg ; CL
Pilargis berkeleyi Monro ; LH, PV, SP, NE
Pilargis hamatus Hartman ; LH, PV, SP
Pilargis maculata Hartman ; SP
Pisione remota (Southern) ; PV, CW
Pista alata Moore ; PV
Pista cf. *cristata* (Müller) ; LH, PV, SP, NE, CL, CW
Pista disjuncta Moore ; PV, SP, NE, CW
Pista elongata Moore ; PV, CL
Pista moorei Berkeley and Berkeley ; SP
Pista spp. ; LH, PV, SP, NE, CL, CW
 ?*Placostegus* sp. ; CL
Platynereis bicanaliculata (Baird) ; PV, SP, NE, CL, CW
Poecilochaetus johnsoni Hartman ; PV, SP, NE, CL, CW
Polycirrus californicus Moore ; CL
Polycirrus spp. ; PV, SP, LS, CL, CW
Polydora nr. *armata* Langerhans ; LH, CL
Polydora nr. *caulleryi* Mesnil ; SP
Polydora citrona Hartman ; LH
Polydora ligni Webster ; LH, CL
Polydora limicola Annenkova ; LH, PV
Polydora socialis (Schmarda) ; PV
Polydora ?*spongicola* Berkeley and Berkeley ; SP
Polydora cf. *websteri* Hartman ; LS
Polydora spp. ; LH, PV, SP, NE, CL, CW

- Polyopthalmus pictus* (Dujardin) ; CL
Potamethus mucronatus (Moore) ; SP, CL
Potamethus sp. ; LS
Potamilla sp. ; PV, CW
Praxillella affinis pacifica Berkeley ; LH, PV, SP, NE, LS, CL, CW
Praxillella gracilis (Sars) ; PV, SP, NE, CW
Praxillella, collared ; CW
Praxillella spp. ; SP, CL
Praxillura maculata Moore ; CL
Prionospio cirrifera Wirén ; LH, PV, SP, CL, CW
Prionospio malmgreni Claparède ; PV, SP, NE, CL, CW
Prionospio pinnata Ehlers ; PV, SP, NE, LS, CL, CW
Prionospio pygmaeus Hartman ; SP, CL
Prionospio spp. ; PV, SP, NE, LS, CL
Protis pacifica Moore ; SP, CL
Protodorvillea gracilis (Hartman) ; PV, SP, LS, CL, CW
Protula superba Moore ; CL
Psammolyce spinosa Hartman ; CW
Psammolyce sp. ; CL
Pseudopotamilla ocellata Moore ; PV, NE, CL
Pseudopotamilla, oculate ; PV
Pseudopotamilla spp. ; PV, SP, CL, CW
Questa caudicirra n. gen., n. sp. ; LS, CW
Raricirrus maculata Hartman ; PV
Rhaphobranchium longisetosum Berkeley and Berkeley ; SP, CL, CW
Rhodine bitorquata Moore ; SP, NE, CL, CW
Rhynchospio spp. ; NE, CL, CW
Sabella crassicornis Sars ; SP, CW
Sabella sp. ; PV, SP, CW
Sabellaria cementarium Moore ; PV, SP, CL
Saccocirrus papillocercus Bobretzky ; SP
Salmacina dysteri Huxley ; CL, CW
Scalibregma inflatum Rathke ; PV, SP, CL, CW
Schistocomus hiltoni Chamberlin ; PV, SP, NE
Sclerocheilus acirrata n. sp. ; CL
Scoloplos acmeceps Chamberlin ; SP, CW

- Scoloplos armiger* (Müller) ; SP, CL
Scoloplos (Leodamas) sp. ; CL
Scoloplos sp. ; SP, CL, CW
Sphaerodoridium ?biserialis (Berkeley and Berkeley) ; SP
Sphaerodoridium minutum (Webster and Benedict) ; PV, SP, CL
Sphaerodoridium sp. ; SP
Sphaerodorum papillifer Moore ; SP, CL
Sphaerodorum sp. ; PV, SP, CW
Sphaerosyllis californiensis n. sp. ; PV
Sphaerosyllis sp. ; PV, SP, LS, CL, CW
Spio punctata Hartman ; PV, SP, NE, LS, CL, CW
Spiophanes anoculata Hartman ; SP
Spiophanes bombyx (Claparède) ; PV, SP, CW
Spiophanes fimbriata Moore ; PV, SP, CL, CW
Spiophanes missionensis Hartman ; PV, SP, NE, CL
Spiophanes spp. ; PV, SP, CL, CW
Spirobranchus spinosus Moore ; CL
 spirorbids ; PV, CL, CW
Sternaspis fossor Stimpson ; PV, SP, NE, CL, CW
Sthenelais fusca Johnson ; CL
Sthenelais tertiolabra Moore ; PV, SP, NE, CL, CW
Sthenelais verruculosa Johnson ; CL, CW
Sthenelais sp. ; SP, CL
Sthenelanella uniformis Moore ; PV, SP, NE, CL, CW
Streblosoma crassibranchia Treadwell ; PV, SP, CL, CW
Streblosoma sp. ; SP, CL
Syllis gracilis Grube ; PV
Syllis sp. ; SP, CL
Telepsavus costarum Claparède ; LH, PV, SP, NE, CL, CW
Terebellides stroemii Sars ; PV, SP, NE, LS, CL, CW
Thalenessa spinosa (Hartman) ; PV, SP, NE, LS, CL, CW
Tharyx marioni (Saint-Joseph) ; PV, CW
Tharyx monilaris Hartman ; PV, SP, CL
Tharyx multifilis Moore ; PV, SP, NE, CW
Tharyx tessellata Hartman ; LH, PV, SP, LS, CL, CW
Tharyx spp. ; PV, SP, NE, LS, CL, CW

Thelepus setosus (Quatrefages) ; SP, CL

Thelepus sp. ; CL

Thormora johnstoni (Kinberg) ; PV

Timarete sp. ; CL

Travisia brevis Moore ; SP, NE

Travisia gigas Hartman ; PV, SP, CW

Travisia pupa Moore ; PV, SP, NE, CL

Travisia spp. ; LH, CL, CW

Trypanosyllis gemmipara Johnson ; PV

Trypanosyllis sp. ; CL

Typosyllis aciculata Treadwell ; CL

Typosyllis spp. ; PV, SP, LS, CL

Vermiliopsis biformis Hartman ; SP, CL, CW

Vermiliopsis cornuta Rioja ; CL

Vermiliopsis infundibulum Philippi ; CL

Vermiliopsis sp. ; SP, CL, CW

ECHINODERMS

(E=echinoid, O=ophiuroid, H=holothuroid, A=asteroid, C=crinoid)

E *Allocentrotus fragilis* (Jackson) ; SP, LS, CL

O *Amphiacantha amphiacantha* (McClendon) ; PV, SP, NE, LS, CL, CW

O *Amphiodia (Amphispina) digitata* Nielsen ; LH, PV, SP, NE, CL, CW

O *Amphiodia (Amphispina) urtica* (Lyman) ; PV, SP, NE, LS, CL, CW

O *Amphiodia occidentalis* Lyman ; LH, SP, CL

O *Amphiodia psara* H. L. Clark ; SP, NE

O *Amphiodia*, rugose ; SP

O *Amphioplus hexacanthus* H. L. Clark ; SP, CL, CW

O *Amphioplus strongyloplax* (H. L. Clark) ; PV, SP, NE, LS, CL, CW

O *Amphipholis pugetana* (Lyman) ; PV, SP, LS, CL, CW

O *Amphipholis squamata* (delle Chiaje) ; PV, SP, NE, LS, CL, CW

O *Amphiura arcystata* H. L. Clark ; PV, SP, NE, CL, CW

O *Amphiura seminuda* Lütken and Mortensen ; SP, LS

A *Asterina miniata* (Brandt) ; PV, CW

- A *Astropecten californicus* Fisher ; PV, SP, NE, CL, CW
 A *Astropecten* sp. ; NE, CL
 O *Astrophiura marionae* Ziesenhenné ; LS
 E *Benthopecten acanthonotus* Fisher ; SP
 E *Brisaster townsendi* (A. Agassiz) ; PV, SP, CL
 E *Brissopsis pacifica* (A. Agassiz) ; PV, SP, LS, CL, CW
 H ?*Caudina* sp. ; CL
 E *Centrostephanus coronatus* (Verrill) ; CL
 A *Cryptopeltaster lepidonotus* Fisher ; SP
 H *Cucumaria* sp. ; SP, CL
 E *Dendraster excentricus* (Eschscholtz) ; LH, PV, SP, NE
 E *Dendraster laevis* H. L. Clark ; SP
 E *Dendraster* sp. ; SP
 C *Florometra perplexa* (H. L. Clark) ; SP, CL
 E *Gonimaretia laevis* H. L. Clark ; SP
 A *Gorgonocephalus caryi* (Lyman) ; SP
 A *Henricia* sp. ; SP, CL, CW
 H *Leptosynapta albicans* (Selenka) ; PV, SP, NE, LS, CL, CW
 H *Leptosynapta* sp. ; SP, CW
 A *Leptychaster* (*Parastropecten*) *pacificus* Fisher ; SP
 E *Lovenia cordiformis* A. Agassiz ; SP, CL, CW
 A *Luidia asthenosoma* Fisher ; CL
 A *Luidia foliolata* Grube ; SP, CL, CW
 A *Luidia ludwigi* Fisher ; PV, CL
 A *Luidiaster californicus* Ziesenhenné ; SP, LS
 E *Lytechinus anamesus* H. L. Clark ; PV, SP, NE, CL, CW
 A *Mediaster aequalis* (Stimpson) ; CL
 H *Molpadia intermedia* (Ludwig) ; PV, SP, NE, CL, CW
 H *Molpadia* sp. ; CL
 A *Myxoderma platyacantha* H. L. Clark ; SP
 A *Odontaster crassus* Fisher ; SP
 O ?*Ophiacantha bairdi* Lyman ; LS
 O *Ophiacantha diplasia* H. L. Clark ; SP, LS, CL, CW
 O *Ophiacantha paucispina* Lütken and Mortensen ; SP
 O *Ophiacantha phragma* Ziesenhenné ; SP
 O *Ophiacantha rhachophora* H. L. Clark ; SP

- O *Ophiacantha* sp. ; SP
 O *Ophiocynodus corynetes* H. L. Clark ; SP, LS, CL, CW
 O *Ophioderma* sp. ; SP
 O *Ophiomusium jolliensis* McClendon ; SP, CW
 O *Ophionereis eurybrachyplax* H. L. Clark ; CL
 O *Ophiopholis bakeri* McClendon ; SP, LS, CL
 O *Ophiopholis longispina* H. L. Clark ; CW
 O *Ophiopsila californica* A. H. Clark ; CL, CW
 O *Ophiopteris papillosa* (Lyman) ; CL, CW
 O *Ophiothrix spiculata* Le Conte ; PV, SP, NE, LS, CL, CW
 O *Ophiura kofoidi* McClendon ; SP
 O *Ophiura leptoctenia* H. L. Clark ; SP, CL
 O *Ophiura lutkeni* (Lyman) ; PV, SP, NE, CL, CW
 O *Ophiuroconis bispinosa* Ziesenhenné ; PV, SP
 H *Pachythyone rubra* (H. L. Clark) ; LH, SP, CL
 H *Parastichopus californicus* (Stimpson) ; CL
 H *Pentamera pseudopopulifera* Deichmann ; LH, PV, SP, NE,
 CL, CW
 A *Pisaster capitatus* (Stimpson) ; PV
 H *Psolus* sp. ; SP
 A *Rathbunaster californicus* Fisher ; SP
 A *Sclerasterias heteropaes* Fisher ; PV, SP, CL
 E *Spatangus californicus* H. L. Clark ; LS, CL
 H *Stichopus* sp. ; CL
 E *Strongylocentrotus franciscanus* (A. Agassiz) ; SP
 E *Strongylocentrotus purpuratus* (Stimpson) ; PV, SP
 E *Strongylocentrotus* sp. ; SP
 A *Stylasterias forreri* (de Loriol) ; SP

MOLLUSKS

(P=pelecypod, G=gastropod, S=scaphopod, SO=solenogaster, A=amphineuran, C=cephalopod, V=vermetid. Including those named in the brachiopod association from Mattox, 1955:8.)

- P *Acila castrensis* (Hinds) ; SP, CL, CW
 G *Acteocina culcitella* (Gould) ; SP
 G *Acteocina culcitella intermedia* Willett ; SP, NE, CL
 G *Acteon punctocoelata* (Carpenter) ; LH, PV, SP, CL

- G *Admete californica* Dall ; SP
 G *Admete* sp. ; SP
 P *Adontorhina cyclia* Berry ; LH, PV, SP, NE, CL
 P *Aequipecten circularis aequiculcatus* (Carpenter) ; SP
 G *Aglaja purpurea* Bergh ; PV
 G *Aglaja* sp. ; LH, PV, SP, CL, CW
 P *Aligena* sp. ; SP, CL
 G *Amphissa bicolor* Dall ; SP, CL
 G *Amphissa* cf. *reticulata* Dall ; PV
 G *Amphissa undata* Carpenter ; PV, SP
 G *Amphissa* sp. ; PV
 P *Amygdalum pallidulum* (Dall) ; PV, SP, CL, CW
 G *Anisodoris nobilis* (MacFarland) ; CL
 G *Antiplanes ?perversa* (Gabb) ; SP, CL
 G *Antiplanes* sp. ; CW
 G *Armina californica* (Bergh) ; CL
 P *Asthenothaerus villosior* Carpenter ; LH, PV
 P *Axinopsida serricata* (Carpenter) ; PV, SP, NE, CL
 G *Balcis catalinensis* (Bartsch) ; CL
 G *Balcis ?compacta* (Carpenter) ; SP
 G *Balcis rutila* (Carpenter) ; LH, SP, CL
 G *Balcis* sp. ; PV, SP, NE
 G *Bittium catalinensis* Bartsch ; SP, CL
 G *Bittium ?larum* Bartsch ; SP
 G *Bittium subplanatum* Bartsch ; SP
 G *Boreotrophon triangulatus* (Carpenter) ; CL
 G *Borsonella dalli* Arnold ; SP
 P *Botulina denticulata* (Dall) ; CL
 P *Burchia redondoensis* (Burch) ; PV
 G *Bursa californica* (Hinds) ; SP, CL
 S *Cadulus fusiformis* Pilsbry and Sharp ; LH, CL
 S *Cadulus tolmiei* Dall ; SP, LS, CL
 S *Cadulus* spp. ; LH, PV, SP, NE, CL, CW
 G *Calliostoma tricolor* Gabb ; PV, CL
 G *Calliostoma* sp. ; PV, CW
 G *Cancellaria cooperi* (Gabb) ; CL

- G *Cancellaria crawfordiana* Dall ; CL
 G *Cancellaria* sp. ; PV
 G *Capulus californicus* Dall ; SP
 P *Cardiomya pectinata* (Carpenter) ; SP, CL
 P *Cardiomya* sp. ; PV
 G *Carolina tridentata* Forskal ; CL
 P *Cardita ventricosa* Gould ; PV, SP, NE, CL, CW
 P *Cardita* spp. ; SP, LS, CL
 P *Chione undatella* Sowerby ; LH
 P ?*Chione* sp. ; PV
 P *Chlamys hastatus* Sowerby ; CL
 P *Chlamys hericius* (Gould) ; CL
 P *Chlamys latiauratus* Conrad ; SP
 P *Chlamys* sp. ; LH, PV, SP, CL
 P *Clinocardium nuttalli* (Conrad) ; CL
 P *Compsomyx subdiaphana* (Carpenter) ; LH, PV, SP, NE,
 CL, CW
 G *Conus californicus* Hinds ; PV, SP, CL, CW
 P *Crenella columbiana* Dall ; NE
 P *Crenella decussata* Montagu ; SP, CL
 P *Crenella divaricata* d'Orbigny ; SP
 P *Crenella* sp. ; SP
 G *Crepidula aculeata* (Gmelin) ; LH
 G *Crepidula excavata* Broderip ; NE
 G *Crepidula nivea* Adams ; PV, CL
 G *Crepidula norissiarum* Williamson ; SP
 G *Crepidula onyx* Sowerby ; PV
 G *Crepidula* spp. ; LH, PV, SP, CW
 G *Crepidatella lingulata* (Gould) ; PV
 SO *Crystallophrisson hancocki* Schwabl ; SP
 SO *Crystallophrisson hartmani* Schwabl ; SP
 SO *Crystallophrisson marinellii* Schwabl ; SP
 SO *Crystallophrisson rectum* Schwabl ; SP
 SO *Crystallophrisson* spp. ; PV, SP
 P *Cuspidaria apodema* Dall ; SP, CL
 P *Cuspidaria* sp. ; NE, CL, CW

- P *Cyathodonta pedroana* Dall ; PV
 P *Cyclopecten vancouverensis* (Whiteaves) ; PV, CL
 G *Cylichnella attonsa* (Carpenter) ; LH, PV, SP, NE
 G *Cylichnella diegensis* (Dall) ; LH, PV, SP, NE, CL
 P *Cyrilla minuta* Dall ; SP, CL
 P *Dacrydium pacificum* Dall ; SP, CL
 P *Dacrydium* sp. ; LS
 V *Dendropoma lituella* (Mörch) ; CL
 S *Dentalium neohexagonum* Pilsbury and Sharp ; SP
 S *Dentalium rectius* Carpenter ; PV, SP, CL
 S *Dentalium* sp. ; LH, CL
 P *Dermatomya tenuiconcha* (Dall) ; CL
 G *Diadora aspera* Eschscholtz ; PV
 P *Donax gouldi* Dall ; SP
 G *Elaeocyma empyrosia* (Dall) ; SP, CL
 G *Elaeocyma halocydne* (Dall) ; CL
 P *Ensis myrae* Berry ; SP
 G *Epitonium bellastriatum* Carpenter ; SP
 G *Epitonium tinctum* (Carpenter) ; NE, CL
 G *Epitonium* spp. ; PV, SP, NE, CL, CW
 P *Erycina chacei* Dall ; SP
 G *Eulima californica* Bartsch ; SP, CL
 G *Eulima rutila* (Carpenter) ; SP
 G *Eulima* sp. ; CL
 G ?*Fusinus* sp. ; PV
 P *Gari edentula* (Gabb) ; SP
 G *Gastropteron* sp. ; CL
 G *Glans carpenteri* (Lamy) ; PV
 P *Glycimeris subobsoleta* Carpenter ; LS, CL
 G *Haminoea virescens* (Sowerby) ; CL
 G *Hemitoma bella* (Gabb) ; CL
 P *Hinnites* sp. ; CW
 G *Hyalima* sp. ; CW
 G *Kellettia kelletii* Forbes ; CL
 P *Kellia laperousii* Deshayes ; PV
 P *Kellia suborbicularis* (Montagu) ; CL

- P *Kellia* sp. ; LH, PV, SP, CW
G ?*Lacuna* sp. ; NE
P *Leda* sp. ; PV
A *Lepidopleurus nexus* Carpenter ; LS
A *Lepidozona catalinae* Willett ; CL
P *Lima dehiscens* Conrad ; PV, SP, CL, CW
P *Lima subauriculata* Montagu ; PV, CL, CW
SO *Limifossor fratula* Health ; SP
SO *Limifossor* sp. ; LS
P *Limopsis diegensis* Dall ; CL
P *Linga lichthofeni* (Gabb) ; SP
P *Linga* sp. ; SP
P *Lithophaga plumula kelseyi* Hertlein and Strong ; PV
P *Lithophaga* sp. ; CL
P *Lucinisca nuttalli* (Conrad) ; LH, PV, SP
P *Lucinoma annulata* Reeve ; LH, PV, SP, CW
P *Lyonsia californica* Conrad ; LH, PV, NE, CL
P *Lyonsia* sp. ; SP
P *Macoma indentata* Carpenter ; LH
P *Macoma nasuta* Conrad ; LH, SP
P *Macoma yoldiformis* Carpenter ; LH, PV, SP, NE
P *Macoma* sp. ; LH, PV, SP, NE
P *Mactra ?californica* Conrad ; LH
G *Mangelia arteaga* Dall and Bartsch ; SP
G *Mangelia barbarena* Oldroyd ; LH, SP
G *Mangelia* spp. ; LH, PV, SP, NE
G ?*Margarites* sp. ; SP
G *Megasurcula carpenteriana* (Gabb) ; NE, CL
G *Melanella* sp. ; CL
G *Micranellum crebricinctum* (Carpenter) ; CL
G *Micranellum* sp. ; SP
G *Mitrella* sp. ; SP
P *Modiolus capax* (Conrad) ; CL
P *Modiolus modiolus* Linnaeus ; PV, SP
P *Modiolus neglectus* Soot-Ryen ; LH, SP
P *Modiolus sacculifer* (Berry) ; PV, CL

- P *Mytilus* sp.; PV
 G *Nassarius cooperi* (Forbes); LH
 G *Nassarius insculptus* (Carpenter); CL
 G *Nassarius mendicus* (Gould); PV
 G *Nassarius perpinguis* (Hinds); LH, PV, SP, NE
 G *Nassarius* sp.; PV, CL, CW
 G ?*Natica clausa* Broderip and Sowerby; SP
 P *Nemocardium centrifilosum* (Carpenter); SP, CL
 P *Nemocardium* sp.; CL, CW
 G *Neosimnia acicularis* (Lamarck); PV
 G *Neosimnia loebbeckeana* (Weinkauff); CL
 G *Neosimnia* sp.; CL
 G *Nitidella carinata* (Hinds); PV, NE
 G *Nitidella ?gouldi* Carpenter; SP
 G *Nitidella permodesta* (Dall); SP, LS, CL
 G *Nitidella ?tuberosa* (Carpenter); PV
 G ?*Nitidella* sp.; PV
 P *Nucula carlottensis* Dall; PV, SP, CL
 P *Nucula linki* Dall; CL
 P *Nucula tenuis* Montagu; SP, NE
 P *Nucula* sp.; SP, CL
 P *Nuculana conceptionis* (Dall); SP, LS
 P *Nuculana hamata* (Carpenter); PV, SP, LS, CL
 P *Nuculana minuta* (Fabricius); SP
 P *Nuculana taphria* (Dall); LH, SP, NE, CL, CW
 C *Octopus apollyon* Berry; CL
 G *Odostomia herilda* Dall and Bartsch; SP
 G *Odostomia* sp.; LH, PV, SP
 G *Olivella bactica* Carpenter; LH, PV, SP, NE
 G *Olivella ?pedroana* (Conrad); NE
 G *Ophiodermella incisa* Carpenter; LH, PV, SP
 P *Pandora bilirata* Conrad; PV, SP, NE, CL
 P *Pandora* sp.; NE
 P *Parvilucina tenuisculpta* (Carpenter); LH, PV, SP, LS, CL
 P *Pecten (Pecten) diegensis* Dall; CL
 P *Pecten* spp.; PV, SP, CW

- G *Pedicularia californica* Newcomb; CW
P *Periploma discus* Stearns; LH, SP
P *Periploma planiuscula* Sowerby; PV, SP
P *Periploma* sp.; SP
G *Philine* sp.; CL
P ?*Plagioctenium circularis* (Sowerby); PV, SP
G *Pleurobranchaea* sp.; CL
P *Pododesmus macroschismus* Deshayes; PV
G *Polinices* cf. *draconis* Dall; PV
G *Polinices lewisii* Gould; SP, NE
G *Polinices* sp.; PV, SP
P *Poromya* sp.; LH, SP
SO *Prochaetoderma californica* Schwabl; SP, CL
P *Protothaca staminea* (Conrad); PV
P *Protothaca tenerrima* Carpenter; LH
P *Psephidia lordi* Baird; SP
P *Psephidia* sp.; SP
P *Pseudamusium ?incongruus* (Dall); SP
P *Pseudochama exogyra* (Conrad); CL
P *Pseudopythina chacei* (Dall); SP, NE
P *Pseudopythina* sp.; PV
G *Pterynotus carpenteri* Dall; CL
G *Pterynotus petri* (Dall); CL
G *Pterynotus* sp.; CL
G *Puncturella cucullata* (Gould); CL
G *Puncturella galeata* (Gould); CL
G *Pusula californica* (Gray); CL
G *Retusa harpa* Dall; SP
P *Rocheffortia aleutica* Dall; PV, SP, NE
P *Rocheffortia* cf. *golischi* Dall; SP
P *Rocheffortia tumida* Carpenter; NE
P *Rocheffortia* spp.; LH, PV, SP, NE
P *Saxicava arctica* (Linnaeus); PV, SP, LS, CL, CW
P *Saxicava* cf. *rugosa* (Linnaeus); CL
P *Saxicavella pacifica* Dall; PV, SP, NE, LS
P *Semele pulchra* (Sowerby); CL

- P *Siliqua lucida* Conrad ; SP, CW
G *Sinum debile* Gould ; PV
G *Sinum scopulosum* Conrad ; PV, CL
P *Solamen columbianum* (Dall) ; LH, PV, SP, LS, CL
G *Solariella peramabilis* Carpenter ; CL
G *Solariella* sp. ; SP
P *Solemya panamensis* Dall ; SP
P *Solemya* sp. ; PV
P *Solen rosaceus* Carpenter ; LH, SP, CL
P *Solen sicarius* Gould ; LH, SP, NE
P *Solen* spp. ; PV, SP, CW
P *Sphenia fragilis* Carpenter ; CL
P ?*Sphenia* sp. ; PV
P *Spisula planulata* Conrad ; SP
P *Spisula* sp. ; SP
P *Sportella californica* Dall ; CL
G *Strombiformis californicus* Bartsch ; SP
G *Sulcuretusa taphria* (Dall) ; SP
P *Tagelus californicus* Conrad ; LH, SP
P ?*Tapes* sp. ; PV
P *Tellina buttoni* Dall ; LH, SP, CL
P *Tellina carpenteri* Dall ; LH, PV, SP, LS, CL, CW
P *Tellina idae* Dall ; LH, SP, CW
P *Tellina modesta* Carpenter ; PV, NE, CL
P *Tellina* spp. ; PV, SP, CL
P *Thracia curta* Conrad ; PV
P *Thracia trapezoides* Conrad ; SP
P *Thracia* sp. ; PV
P *Thyasira barbarentis* Dall ; LH, CL
P *Thyasira ?gouldii* (Philippi) ; SP
P *Thyasira trisinuata* Orbigny ; SP, PV, CL
P *Thyasira* spp. ; LH, PV, SP, NE, CL, CW
P *Trachycardium quadragenarium* (Conrad) ; PV, SP, CL
G *Triophora* sp. ; CL
G *Tritoniopsis aurantia* Mattox ; CL
G *Turbonilla antimunda* Dall and Bartsch ; SP

- G *Turbonilla* cf. *attrita* Dall and Bartsch; SP
 G *Turbonilla sautarosana* Dall and Bartsch; SP
 G *Turbonilla* spp.; LH, PV, SP, NE, CL
 G *Turritella cooperi* Carpenter; CL
 V vermetid; PV, SP, CW
 P *Verticordia ornata* (d'Orbigny); CL
 G *Vitrinella* sp.; LH, PV
 G *Volvulella cylindrica* (Carpenter); SP
 G *Volvulella tenuissima* Willett; LH, PV, SP, NE, CL
 G *Volvulella* sp.; PV, SP
 G *Zonaria* sp.; PV

SYSTEMATIC LIST OF BRYOZOA IDENTIFIED FROM
 FARNSWORTH BANK, SANTA CATALINA ISLAND,
 IN SAMPLES OF VELERO IV, STATIONS
 NUMBERED 3594, 3595 AND 10334

by William Banta

The following bryozoan species have been identified in three samples taken by the VELERO IV, from Farnsworth Bank, near Santa Catalina Island. Specific accounts of all species may be consulted in the monograph by Osburn (1950-1953, Hancock Pac. Exped., vol. 14). The relative abundance of species is indicated by symbols, as follows: P = present; U = uncommon; O = occasional; C = common, and A = abundant; — = not recovered.

Name of Species	Station Numbers of Velero IV		
	3594	3595	10334
Family HINKSINIDAE			
<i>Antopora tincta</i> (Hastings 1930)	—	P	C
<i>Hinksina velata</i> (Hinks 1881)	P	—	P
<i>Cauloramphus spiniferum</i> (Johnston 1832)	O	—	P
<i>Cauloramphus brunnea</i> (Canu and Bassler 1930)	—	—	C
Family ALDERINIDAE			
<i>Alderina smitti</i> Osburn 1950	—	—	P
<i>Mollia patellaria</i> (Moll 1803)	—	—	C
<i>Callopora circumclathrata</i> (Hinks 1881)	P	P	—
<i>Callopora corniculifera</i> (Hinks 1884)	—	—	P
<i>Callopora ?inconspicua</i> (O'donoghue 1923)	—	—	P
<i>Copidozoum tenuirostre</i> (Hinks 1880)	P	—	U

Name of Species	Station Numbers of Velero IV		
	3594	3595	10334
Family CHAPERIELLIDAE (= CHAPPERIIDAE)			
<i>Chaperiella</i> (= <i>Chapperia</i>) <i>californica</i> (Osburn 1950)	—	P	C
<i>Chaperiella</i> (= <i>Chapperia</i>) <i>patula</i> (Hinks 1881)	—	—	P
Family MICROPORIDAE			
<i>Micropora coriacea</i> (Esper 1791)	P	C	C
Family CELLARIIDAE			
<i>Cellaria mandibulata</i> Hinks 1882	P	—	C
? <i>Cellaria diffusa</i> ? Robertson 1905	—	—	P
Family SCRUPOCELLARIIDAE			
<i>Amastigia rudis</i> (Busk 1852)	—	—	P
<i>Caberia boryi</i> (Audouin 1826)	P	—	—
<i>Scrupocellaria varians</i> (Hinks 1882)	P	—	—
Family BICELLARIELLIDAE			
<i>Dendrobeatia longispinosa</i> (Robertson 1905)	—	—	P
Family CRIBRILINIDAE			
<i>Reginella mucronata</i> (Canu and Bassler 1923)	—	C	—
<i>Lyrula hippocrepis</i> (Hinks 1882)	P	P	—
<i>Colletosia radiata</i> (Moll 1803)	P	P	P
<i>Colletosia</i> sp.	—	P	—
<i>Figularia hilli</i> Osburn 1950	—	P	—
Division ASCOPHORA			
Family HIPPOTHOIDAE			
<i>Hippothoa distans</i> (MacGillivray 1896)	—	P	—
<i>Celleporella</i> (= <i>Hippothoa</i>) <i>hyalina</i> (Linnaeus 1758)	P	P	—
<i>Trypostega claviculata</i> (Hinks 1884)	—	P	O
Family SCHIZOPORELLIDAE			
? <i>Schizoporella linearis</i> var. <i>inarmata</i> Hinks 1884	—	—	O
<i>Emballotheca obscura</i> Osburn 1952	—	—	P
<i>Schizomavella auriculata</i> (Hassall 1842)	P	—	—
<i>Hippodiplosia insculpta</i> (Hinks 1882)	P	—	—
Family HIPPOPORINIDAE			
<i>Hippoporina porcellina</i> (Busk 1860)	P	P	C
<i>Hippoporella</i> nr. <i>gorgonensis</i> Hastings 1930	—	—	P

Name of Species	Station Numbers of Velero IV		
	3594	3595	10334
<i>Stephanosula vitrea</i> Osburn 1952	—	—	P
<i>Hippomonavella longirostrata</i> (Hinks 1883)	—	—	P
hippoporinid, unidentified	—	—	P
Family MICROPORELLIDAE			
<i>Microporella ciliata</i> (Pallas 1776)	—	P	—
<i>Microporella vibraculifera</i> (Hinks 1884)	—	P	P
<i>Microporella cribosea</i> Osburn 1952	P	—	—
<i>Microporella californica</i> (Busk 1856)	P	—	—
<i>Fenestrulina malusi</i> (Audouin 1826)	P	P	O
Family SMITTINIDAE			
<i>Porcella porifera</i> (Hinks 1884)	O	C	C
<i>Porcella patens</i> Osburn 1952	—	—	P
<i>Rhamphostomella curuirostrata</i> (O'donoghue 1923)	—	—	O
<i>Smittina landsborovi</i> (Johnston 1847)	—	P	—
<i>Parasmittina trispinosa</i> (Johnston 1838)	—	—	U
<i>Escharella</i> (= <i>Mucronella</i>) <i>major</i> (Hinks 1884)	P	P	C
Family RETEPORIDAE			
<i>Phidolopora labiata</i> Gabb and Horn 1862 [= <i>P. pacifica</i> (Robertson 1908)]	A	—	—
<i>Rhynchozoon rostratum</i> (Busk 1856) [incl. <i>R. tumulosum</i>]	P	P	P
<i>Rhynchozoon grandicella</i> Canu and Bassler 1923	—	—	P
Family CREPIDACANTHIDAE			
<i>Crepidacantha poissoni</i> (Audouin 1826)	—	—	P
Family PHYLACTELLIDAE			
<i>Lagenopora socialis</i> (Hinks 1877)	P	—	—
<i>Lagenopora spinulosa</i> (Hinks 1883)	P	—	O
<i>Lagenopora punctulata</i> (Gabb and Horn 1862)	—	—	P
Family CELLEPORARIIDAE (= CELLEPORIDAE)			
<i>Celleporaria</i> (= <i>Holoporella</i>) <i>brunnca</i> (Hinks 1884)	P	—	C
<i>Celleporina</i> (= <i>Costazia</i>) <i>robertsonae</i> (Canu & Bassler 1923)	C	P	O
<i>Celleporina</i> (= <i>Costazia</i>) <i>procumbens</i> (Osburn 1952)	—	—	P

Name of Species	Station Numbers of Velero IV		
	3594	3595	10334
Family ONCOUSOECIIDAE			
<i>Proboscina ?sigmata</i> Osburn 1953	—	—	P
<i>Proboscina</i> , two other species	—	—	P
Family DIASTOPORIDAE			
<i>Diaperoccia californica</i> (d' Orbigny 1852)	C	—	—
Family TUBULIPORIDAE			
<i>Tubulipora tuba</i> (Gabb and Horn 1862)	P	P	U
<i>Tubulipora pacifica</i> Robertson 1910	P	—	—
<i>Platonea ?expansa</i> Osburn 1953	—	—	P
Family CRISIIDAE			
<i>Crisidia corunata</i> (Linnaeus 1758)	—	—	O
<i>Crisia occidentalis</i> Trask 1857	—	—	P
Family PENETRANTIIDAE			
? <i>Penetrantia concharum</i> Silen 1946	—	P	P

Serial numbers 11 to 267 with Velero Station numbers from each station for which analyses are given

(See also vol. 19(1) :6 and 12-38, for map and additional data).

Serial number	area code	Velero Station no.
11	PV	4854
12	PV	4855
14	PV	2788
19	PV	4832
27	PV	2473; 4802; 4803; 4833
28	PV	2472; 3050; 4801; 4805; 4806; 4807; 4830; 4856; 5096; 5101; 5102; 5541
29	LH	2307; 2508; 6107
30	LH	2507; 5808
32	LH	2314
33	LH	4718
41	PV	4831; 5029
42	PV	2417; 2962; 3049; 3051; 5027; 5502
43	PV	5028; 5030

Serial number	area code	Velero Station no.
44	PV	2470
45	SP	3047; 3048; 5753
46	SP	2107; 6100
47	SP	2006; 3053; 6102
48	SP	4719; 4886
49	SP	4885
50	SP	2741
60	PV	2430
62	SP	5754
63	SP	3052; 5751
64	SP	5752; 5844
65	SP	6104
66	SP	2311
67	SP	2504; 5741
68	SP	5740
83	SP	5743
86	SP	5742
89	CL	2798
98	SP	2306
99	SP	2355; 5749
100	SP	5750
101	SP	5748; 5820
103	SP	5745
104	SP	2292
105	SP	2630
108	SP	5003; 5087
110	NE	2745
123	SP	2126; 5747
129	SP	5086; 5746
134	NE	2747; 4877
135	CL	2737
136	CL	2738
145	SP	2836
154	SP	2884
160	CL	2736; 5146
161	CL	2389
162	CL	3569; 3570; 5148
174	SP	2416; 2987
184	SP	4778
185	NE	4777; 4871; 4878; 5092; 5354

Serial number	area code	Velero Station no.
186	CL	2142 ; 2955 ; 2957 ; 2959 ; 2960 ; 2961 ; 3310
187	CL	2302 ; 2733
189	CL	2301
194	SP	2802
197	SP	2898
199	SP	2372
200	SP	2895
201	SP	2886
207	CL	2452
208	CL	2451 ; 2952 ; 2953
210	CL	2365
211	SP	2393 ; 2837
213	SP	2229
217	SP	2901
219	SP	2894
220	LS	2843
221	LS	2887
222	SP	2644
224	CL	1370 ; 1371 ; 2128 ; 2144 ; 2152 ; 2450
225	CL	5727
226	CL	2426
227	SP	2352 ; 2859
228	6M	2154 ; 2204 ; 2228
229	6M	2845
231	SP	2900
232	SP	2370
233	SP	2844
234	LS	2299
235	LS	2298
236	LS	2297
238	CL	2121 ; 2637 ; 2638 ; 2853 ; 2855 ; 3603 ; 3605
239	CL	2639 ; 3601
240	CL	2367
241	SP	2350 ; 2640
242	SP	2368
243	SP	2369
244	SP	2440
249	SP	2635

Serial number	area code	Velero Station no.
250	CL	2436 ; 3045 ; 7707 ; 7719 ; 7723 ; 7725
251	CL	2347 ; 7709 ; 7726
252	CL	2344
253	CL	7720
259	CL	2122 ; 3611 ; 3613 ; 3615 ; 4045 ; 5095
260	CL	2348 ; 3616 ; 3617 ; 7712
262	SP	2342
263	SP	2341
267	SP	2177 ; 2438 ; 7713

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PLATES

PLATE 1

Gattyana brunnea, new species (Sta. 2154).

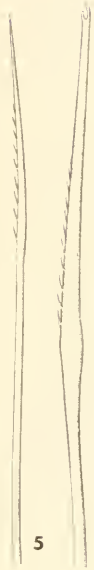
1. Elytrum from seventh segment, in dorsal view, x 30.
2. Distal end of a notoseta from eleventh parapodium, in lateral view, x 310.
3. Distal end of a neuroseta from eleventh parapodium, in lateral view, x 310.

Harmothoe priops Hartman (Sta. 5402).

4. Prostomium and first few segments, in dorsal view, x 94.
5. Distal end of notoseta from a median parapodium, x 140.
6. Distal end of neuroseta from a median parapodium, x 140.

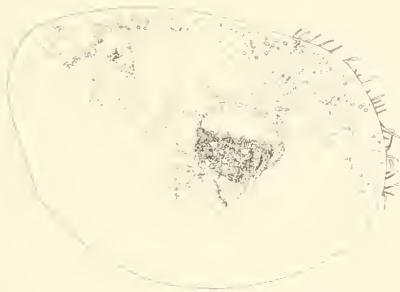


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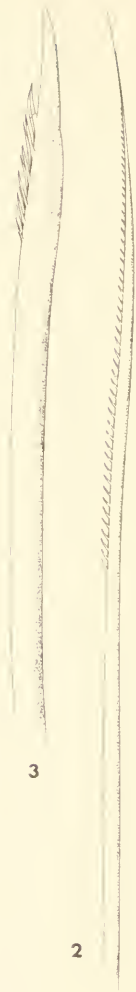


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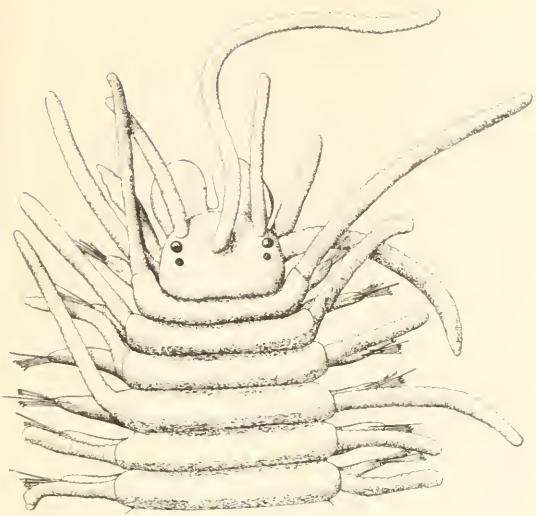
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PLATE 2

Eusyllis transecta, new species (Sta. 2006)

1. Anterior end in dorsal view, x 92.
2. Pharyngeal tooth, in lateral view, x 245.
3. Distal end of pharynx, x 490.
4. A median parapodium in anterior view, x 145.
5. Superiormost seta from an anterior parapodium, x 1042.
6. Short falcigerous seta, from anterior segment, in lateral view, x 1042.
7. Short falcigerous seta, from posterior segment, in lateral view, x 1042.
8. Aciculum with bulbous tip, x 1042.



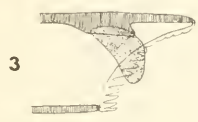
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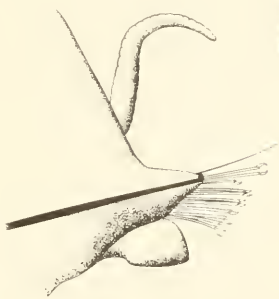
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PLATE 3

Sphaerosyllis californiensis, new species (Sta. 5028)

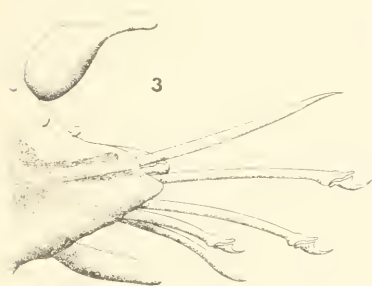
1. Anterior end, in dorsal view, x 125.
2. Posterior end, in dorsal view, x 125.
3. A median parapodium, in anterior view, x 270.
4. Falcigerous seta with dentate cutting edge, x 1450.
5. Falcigerous seta with smooth cutting edge, x 1450.
6. Distal end of an inferior simple seta, x 1450.
7. Distal end of an aciculum, x 1450.



1



2



3



6

5

4

7

PLATE 4

Questa caudicirra, new genus and species (Sta. 3595)

1. Entire body, in dorsal view, x 16.
2. Posterior end in three-fourths dorsal view, x 30.
3. Anterior end, through five setigerous segments, in dorsal view, x 32.
4. A median parapodium, in posterior view, x 120.
5. Seta from a median parapodium, x 310.
6. Bidentate hook from a median parapodium, x 310.

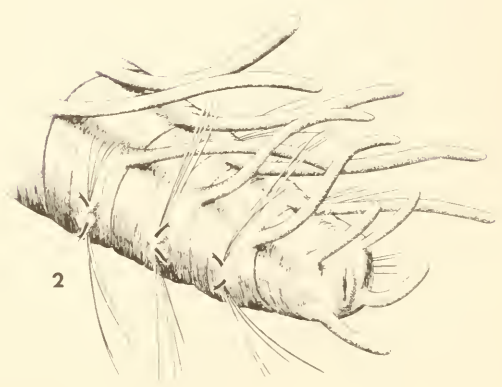
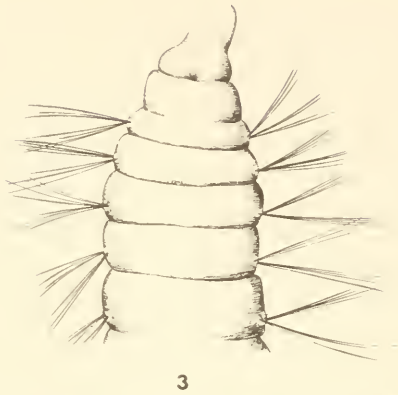
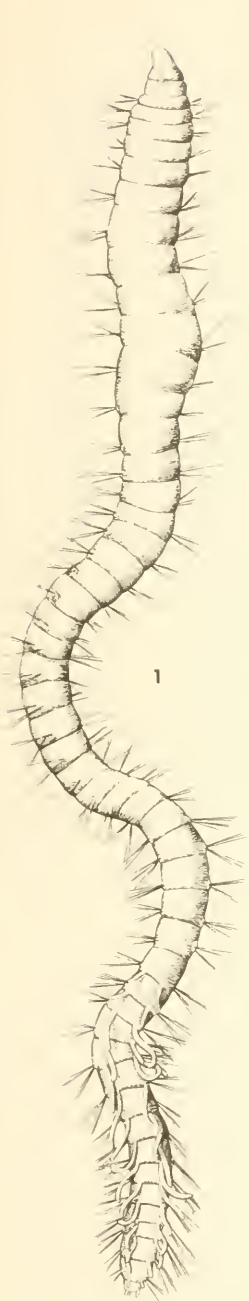


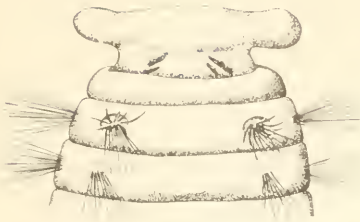
PLATE 5

Sclerocheilus acirratus, new species (Sta. 1370)

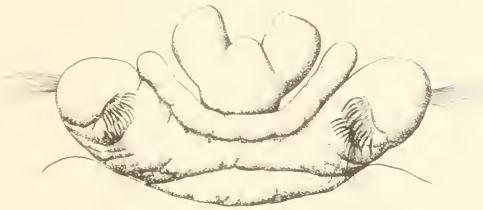
1. Anterior end, in dorsal view, x 74.
2. Acicular hook from first parapodium, x 490.
3. Slender seta from first parapodium, x 490.
4. Furcate seta from a median parapodium, x 490.
5. Tip of furcate seta, showing teeth along tines, x 980.

Sclerocheilus californicus Hartman (Sta. 3037)

6. Prostomium and first few segments, in dorsal view, x 29.
7. A posterior parapodium, showing prolonged lobes, x 29.
8. Acicular hook from first segment, in lateral view, x 260.
9. Tip of furcate seta, showing teeth along tines, x 980.



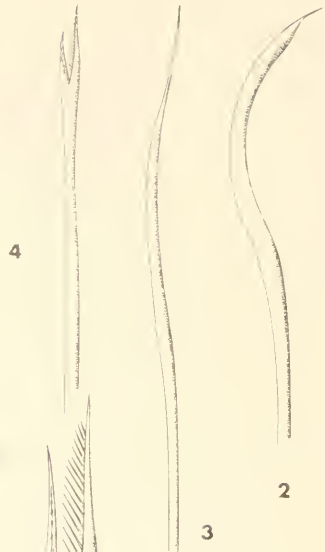
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PLATE 6

Euchone arenae, new species (Sta. 2788)

1. Ventral end of radiolar base, showing one of two simple radi-
oles, x 48.
2. Thoracic superior seta, in lateral view, x 588.
3. Thoracic inferior seta, in lateral view, x 588.
4. Thoracic uncinus, in lateral view, x 588.
5. Abdominal uncinus, in lateral view, x 1440.
6. Posterior anal groove, in ventral view, x 40.

Euchone limicola Reish (Alamitos Bay)

7. Thoracic seta, in lateral view, x 336.
8. Abdominal uncinus, in frontal view, x 336.
9. Abdominal uncinus, in three-fourths view, x 780.
10. Posterior anal groove, in ventral view, x 46.

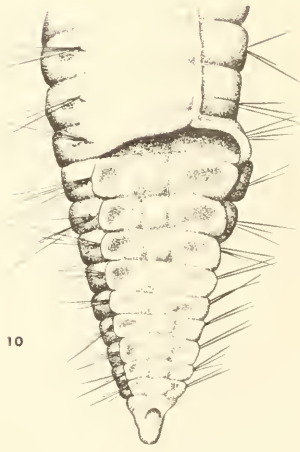
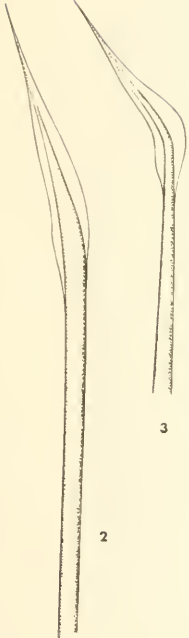


PLATE 7

Spirobranchus spinosus Moore (Isthmus Cove)

1. Entire animal, in left lateral view, x 6.3.
2. Operculum, in dorsal view, x 12.6.
3. Thoracic uncinus, in lateral view, x 875.

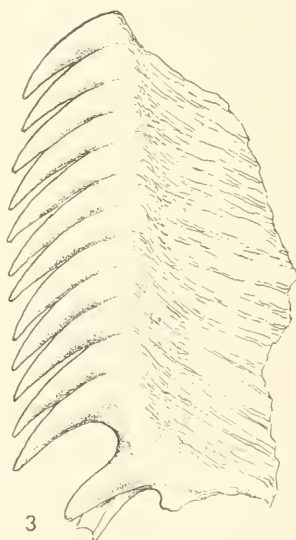
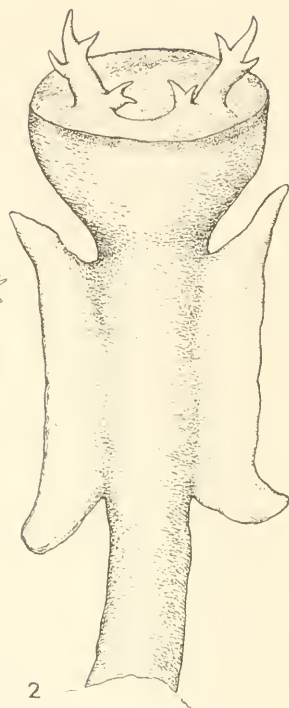
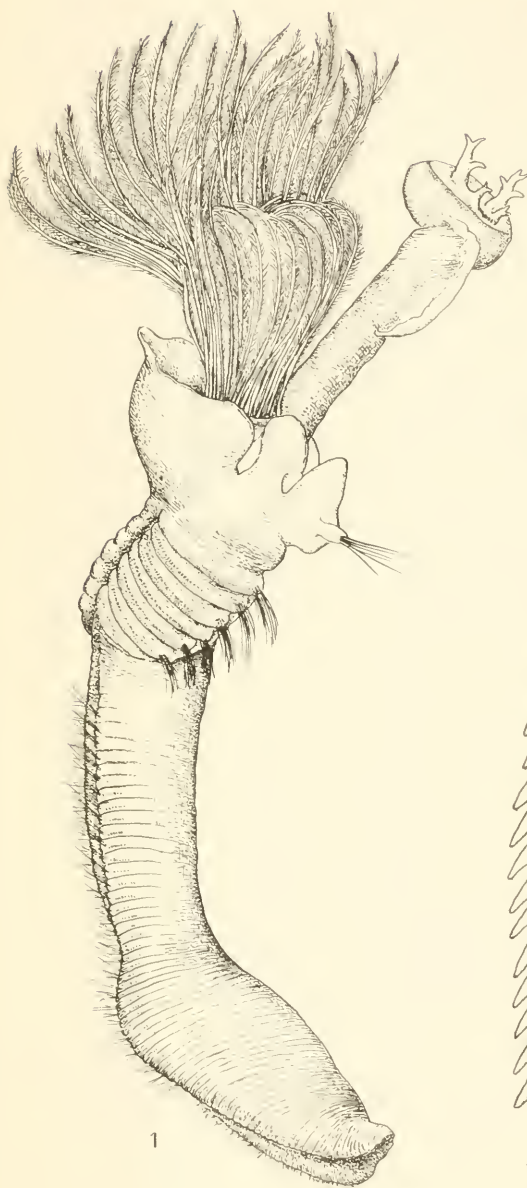


PLATE 8

- Top. Seabottom at Sta. 7707, off Abalone Point, in 22.5 fms, showing projecting tubes of chaetopterids in a silty sediment.
- Bottom. Largest individuals from the same sample, showing, from left to right, two tubes of *Chaetopterus variopedatus*, one of *Telapsanus costarum*, three *Lytechinus anamesus*, and two *Conus californicus* (the scale at bottom, refers to these specimens).

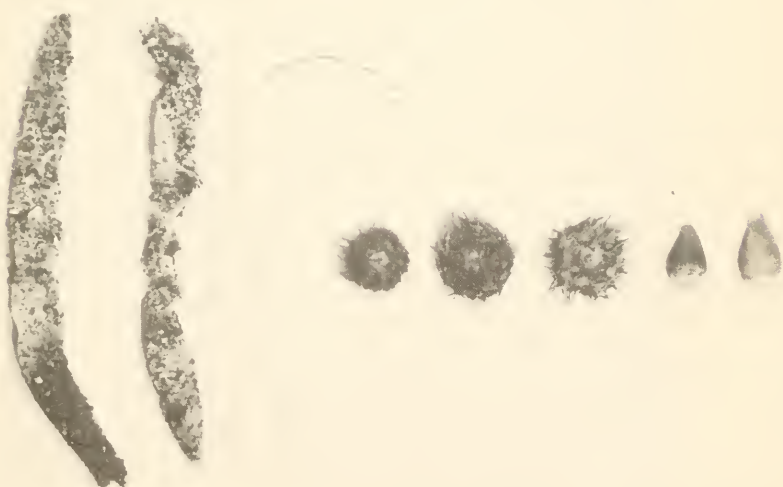
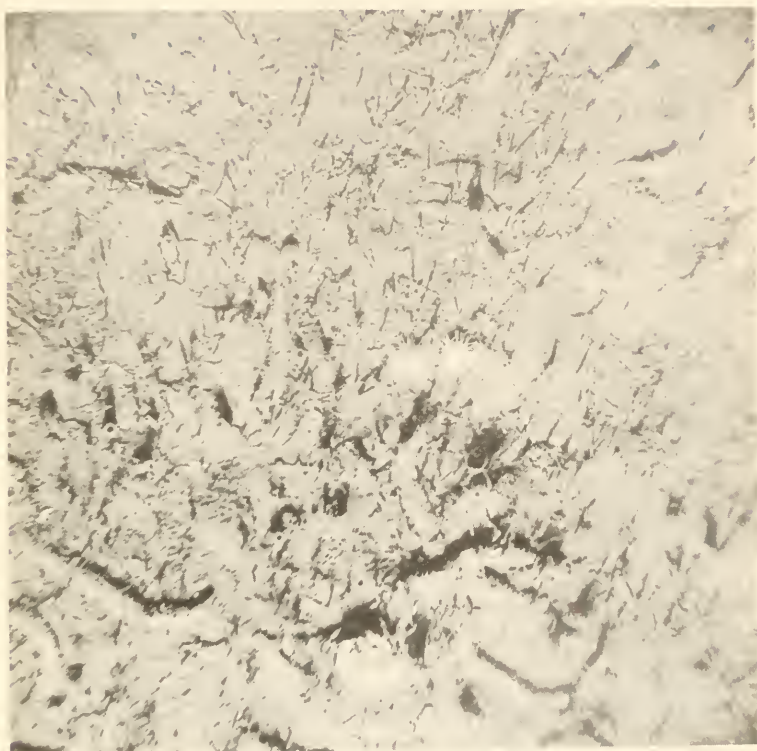


PLATE 9

- Top. Seabottom at Sta. 7719, shelf off Abalone Point, in 23.5 fms, showing a silty surface with projecting tubes of *Chaetopterus variopedatus*, slenderer *Telepsarus costarum*, and *Lytechinus anamesus*.
- Bottom. Seabottom at Sta. 7720, shelf off Abalone Point, in 23.5 fms, showing a silty bottom, similar to that at Sta. 7719, but with a seastar, *Mediaster aequalis*.



PLATE 10

- Top. Seabottom at Sta. 7723, shelf off Jewfish Point, in 39.5 fms, showing a level silty bottom, with projecting rocks at lower left, solitary corals at upper left, and a dead shell fragment near center. The sampler failed to take a sample.
- Bottom. Seabottom at Sta. 7725, shelf off Jewfish Point, in 40.5 fms, showing a silty surface with many small pits, mounds and projecting ophiuroid arms.

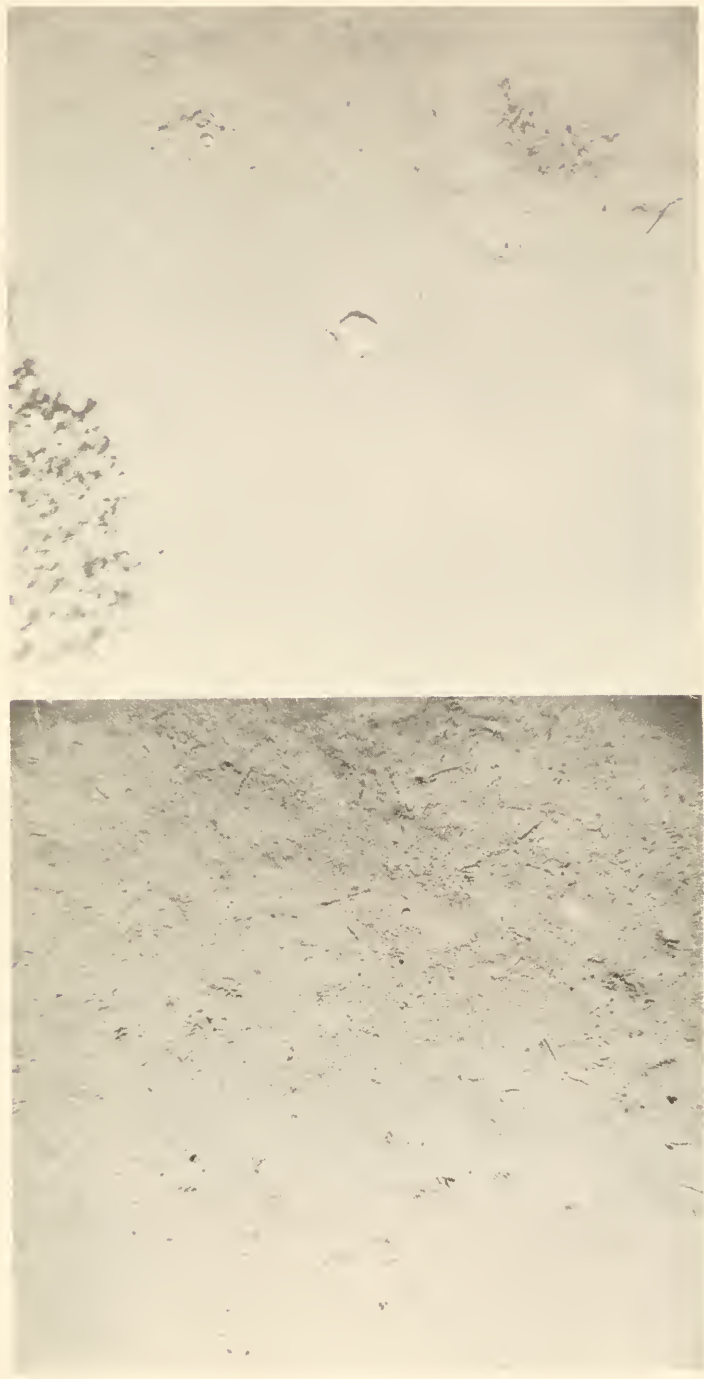
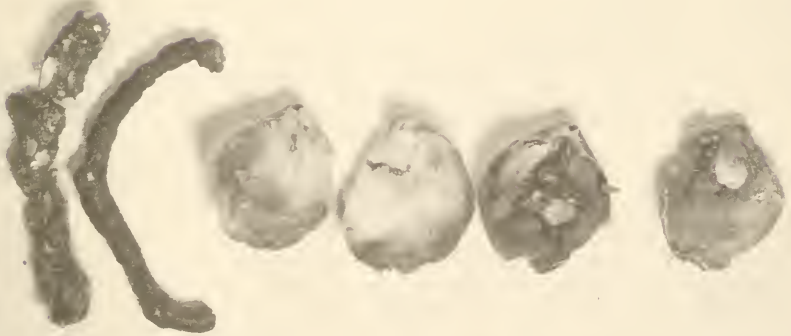


PLATE 11

- Top. Seabottom at Sta. 7726, shelf off Jewfish Point, in 40 fms, showing a silty surface overlain with dead shells of the brachiopod, *Laqueus californicus*.
- Bottom. Largest specimens from Sta. 7726, showing anterior end of *Euclymene* sp. with tube, and four dead valves of *Laqueus californicus*. The scale at bottom refers to these individuals.



7726

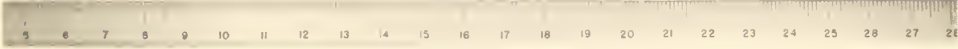


PLATE 12

- Top. Seabottom at Sta. 7712, basin slope southeast end of Santa Catalina Island, in 133 fms, coarse black sandy sediments, showing patch of ophiuroid arms at far right, and crescentic depressions formed by brissopsid urchins; the large trail across lower left has not been identified.
- Bottom. The larger organisms from Sta. 7712, including *Brissopsis pacifica*, and tubes of polychaetes; the scale at bottom refers to these organisms.

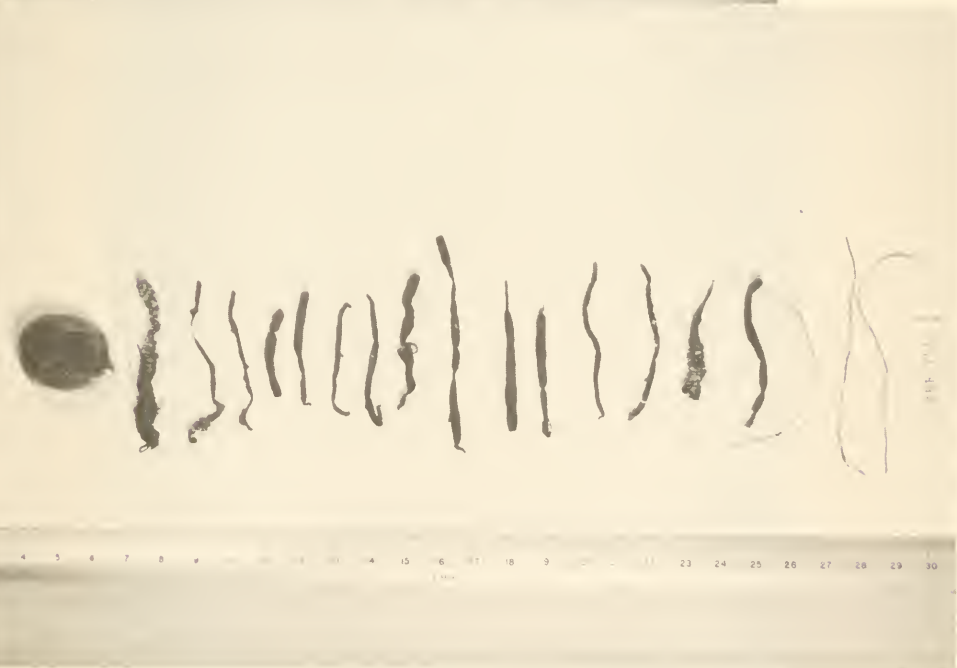


PLATE 13

- Top. Sta. 7727, seabottom on the shelf off Jewfish Point, in 44 fms, at which no sample was taken. The photograph shows the surface riddled by pores and depressions, indicating the presence of many animals in the sediments.
- Bottom. Sta. 7713, seabottom on basin slope, southeast of Santa Catalina Island, in 286 fms. Surface sediments are black sand and gravel with silt, and show pores, mounds and shallow trails with white shelly fragments.



INDEX OF SCIENTIFIC NAMES IN
SYSTEMATICS SECTION

(Numbers in **bold face** refer to illustrations)

- acirratus, *Sclerocheilus*, 199, **439**
arenae, *Euchone*, 202, **441**
Asclerocheilus, 200
 californicus, 200, **439**
 sp., 201
brunnea, *Gattyana*, 192, **431**
californicus, *Asclerocheilus*, 200, **439**
californiensis, *Sphaerosyllis*, 196, **435**
caudicirra, *Questa*, 197, **437**
ciliata, *Gattyana*, 193
Cirratulidae, 198
Cirratulus, 198
 sp., 198
coineai difficilis, *Eteonides*, 194
 Hesionura, 194
difficilis, *Eteonides coineai*, 194
 Hesionura coineai, 194
Eteonides coineai difficilis, 194
Euchone, 202
 arenae, 202, **441**
 incolor, 203
 limicola, 203, **441**
Eusyllis, 195
 transecta, 195, **433**
Gattyana, 192
 brunnea, 192, **431**
 ciliata, 193
Halosydna, 193
 latior, 193
Harmothoe, 193
 priops, 193, **431**
 Hesionidae, 194
Hesionura, 194
 coineai difficilis, 194
incolor, *Euchone*, 203
latior, *Halosydna*, 193
limicola, *Euchone*, 203, **441**
minutus, *Sclerocheilus*, 200
Paraonidae, 198
Polynoidae, 192
priops, *Harmothoe*, 193, **431**
Questa, 197
 caudicirra, 197, **437**
Questidae, 197
Sabellidae, 202
Scalibregmidae, 199
Sclerocheilus, 199
 acirratus, 199, **439**
 minutus, 200
Serpulidae, 204
Sphaerosyllis, 196
 californiensis, 196, **435**
spinosus, *Spirabranchnus*, 204
 Spirobranchus, 204, **443**
Spirabranchnus spinosus, 204
Spirobranchus, 204
 spinosus, 204, **443**
Syllidae, 195
transecta, *Eusyllis*, 195, **433**

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