ALLAN HANCOCK PACIFIC EXPEDITIONS

VOLUME 1 NUMBER 1

GENERAL ACCOUNT OF THE SCIENTIFIC WORK OF THE *VELERO III* IN THE EASTERN PACIFIC, 1931-41

PART I

Historical Introduction, *Velero III*, Personnel

BY

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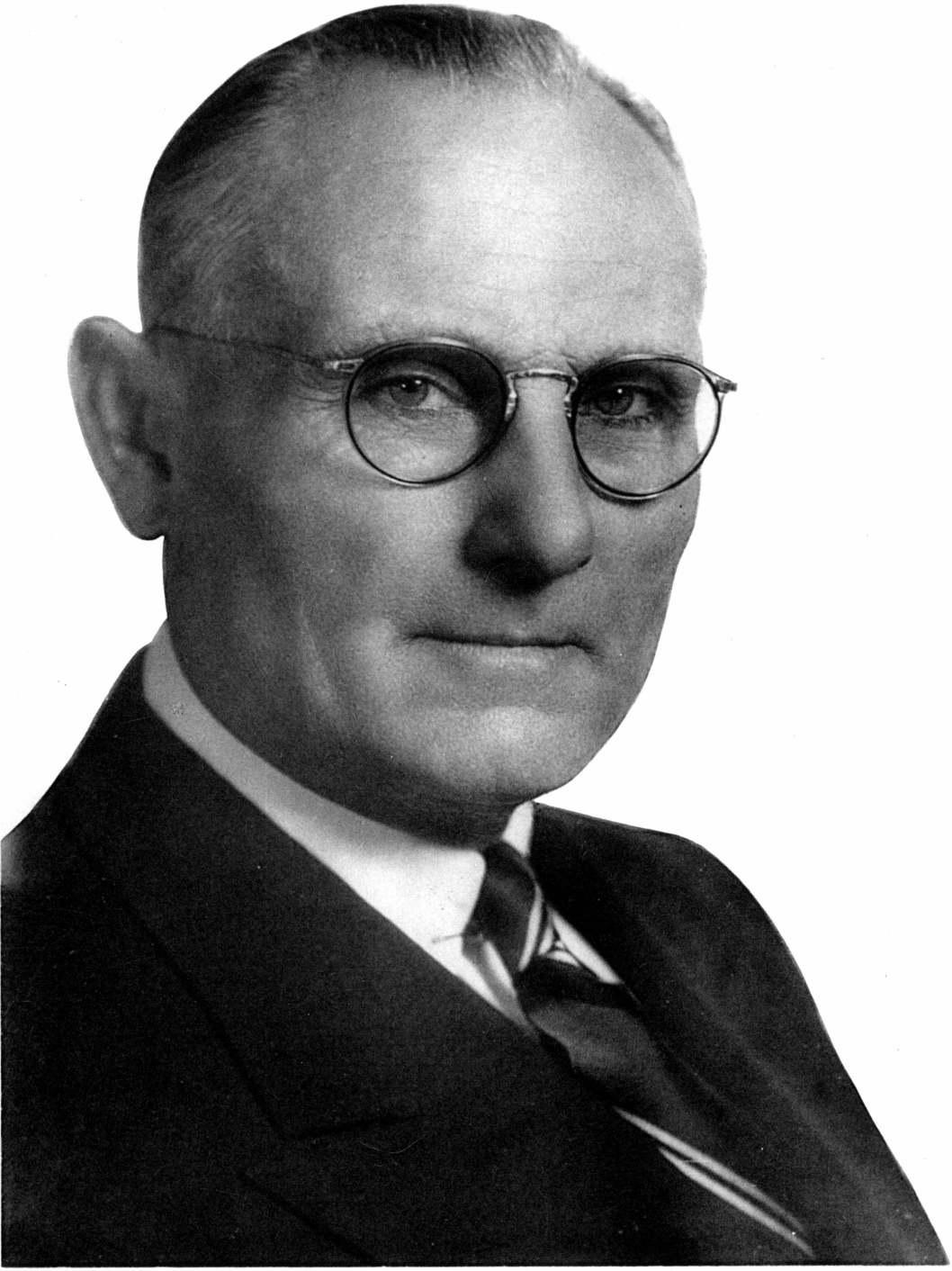
FRONTISPIECE

Dr. Allan Hancock, Chairman of the Board of Trustees and Director of the Hancock Foundation for Scientific Research of The University of Southern California. (Photograph by Lansdowne, Los Angeles.)



Dr. Allan Hancock

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CONTENTS

GENERAL ACCOUNT OF THE SCIENTIFIC WORK OF THE *VELERO III* IN THE EASTERN PACIFIC

HISTORICAL INTRODUCTION

Brief Account of Previous Expeditions

Previous to the year 1931 the possibilities afforded by the Eastern Tropical Pacific for successful marine biological investigation were little appreciated, or, if they were appreciated, opportunities to explore these possibilities were few and far between.

For centuries the waters of this region have been navigated, but for long little notice was taken of anything of biological interest concerning the organisms inhabiting this vast marine expanse, across which were carried the riches of the Orient, often much detoured en route.

The buccaneers became well acquainted with the configuration of the coast, since it was necessary to be familiar with the geographic features in order that safe anchorage might be available in which to lurk when looking for rich galleons to plunder, or to sort and divide the booty when the plundering was successfully carried out. When buccaneering passed into history, it was natural that the geographical information obtained, and to some extent disseminated, should be turned to good account as a basis for exploration of some of the commercially valuable natural resources. Even during buccaneering days some observations looking to such exploitation must have been made on such conspicuous species as the fishes, whales, turtles, and tortoises; but, when the days of piracy were over, these resources became quite important in and around the Galapagos Islands, later in the Gulf of California, and to a lesser extent along other parts of the coast.

Commonly, the ships engaged in the industrial ventures arising out of this exploitation remained at sea for a long period of time. Many, if not most, of these fishermen doubtless had little interest in anything apart from their vocation, but some of them had sufficient curiosity to observe some of the plants and animals that came within their field of vision, particularly when they were ashore. In time some of these observations were reported, biologists became interested enough to provide for the collection of the more easily obtained specimens, and, on occasion, arrangements were made for naturalists to accompany some of the expeditions. In general, the collecting was confined to the shore or to the land not far from shore; but, in time, this collecting provided much informa-

tion on such land forms as birds, reptiles, amphibians, and insects, and such shore forms as mollusks and crustacea. The plant collecting was confined, almost entirely, to the terrestrial species. When the results of this collecting were reported, a wider interest in the Eastern Tropical Pacific was aroused, and scientific expeditions were organized to carry investigation further; for by this time the sea had become definitely established as a suitable medium for biological investigation, although, as yet, ecological relationships and detailed distribution came into consideration very little. For that reason, the itinerary usually provided for but a short stay in any locality, and there was little variety added to the type of information obtained, even though the amount of information was materially increased.

With some significant exceptions then, the expeditions previous to 1931 supplied little information on organisms living farther out in the sea than the low-water mark, unless these organisms were exploited for commercial purposes. In the case of the exceptions, e.g., some of the *Albatross* expeditions, when dredging was done, it was done in deeper water, or when bottom samples were taken, they were also from the deep. The most fertile area in the ocean, lying between the low-tide mark and the 100-fathom line, was almost untouched. It was into this rich faunal and floral area that the *Velero III* entered in 1931, and it is in this area that most of the biological investigation has been continued for these ten years, with special emphasis on the Gulf of California and the Galapagos.

Since this exploration was started, some other expeditions have spent some time in the Eastern Pacific doing very serviceable work, but the region is so extensive that there is little likelihood of overlapping, or danger of overcrowding for generations to come. As yet, there has not been time to appraise in detail the results of these recent expeditions; hence they will not be further mentioned in this report. They will all report for themselves in the near future.

The observations made during many of these earlier expeditions have little bearing on the work of the Allan Hancock Pacific Expeditions, and no attempt has been made to make a complete list of them. A reference to a few of the more important, selected without prejudice, of these expeditions that have paid particular attention to the Galapagos, and/or the Gulf of California, will serve to give some idea of the nature of the explorations. The remainder of the Eastern Tropical Pacific has been almost entirely neglected by these, comparatively speaking, casual explorations.

The history of the Galapagos Islands dates back to 1535, when Fray Tomás de Berlanga, Bishop of Panama, visited the islands, but apparently they remained little known until the buccaneers made use of them during the period between 1675 and 1775. When the last of the buccaneers disappeared, their place was taken by the whalers, who continued operations here until 1858. The whalers, and probably also the buccaneers, made use of the large tortoises (galápagos) for food, thus beginning the slaughter that lasted for long, and has led to the near extermination of these animals.

In the meantime, in 1831, Ecuador secured possession of the islands and proceeded to establish a penal colony that remained in existence for some time, during which horses, donkeys, cattle, and goats were introduced, and their descendants, since gone wild, have done much to disturb the biological equilibrium of the islands. In 1832 a small settlement was established on Charles Island, on the shore at Post Office Bay, where an oil rendering plant gave an added impetus to the slaughter of galápagos, and probably accounted for the total extermination of these tortoises on Charles Island. This settlement has long since disappeared, but the office, the oil-drum lighthouse (now no longer lighted), and the "Barrel Post Office" still remain as evidences of habitation. In 1869, Manuel Cobos started a settlement on Chatham Island, which has developed into "Progreso," the only sizable settlement in the Galapagos.

In 1826 the yacht *Discoverer* set out from Valparaiso with the pioneer conchologist Hugh Cuming aboard. Included in the itinerary, according to the Report of the British Association for the Advancement of Science for 1856, were five of the Galagapos Islands, which were reached in 1827. For so early a cruise, that of the *Discoverer* is remarkable in that dredging in shallow water was accomplished. Cuming's collections of Crustacea and Mollusca were extensive and contained a high proportion of species new to science.

In 1830, Alcide d'Orbigny spent three months, February through April, between Valparaiso and Arica, stopping at Cobija en route. After extensive travel overland, he returned to the coast in July, 1833, and proceeded to Callao via Islay, remaining in the environs of Lima until September of that year. The historical account of his voyages, in three volumes, appeared between 1835 and 1844. The reports on specimens collected by him form the basis of all subsequent work in marine zoology of coastal Peru.

From the scientific angle, the year 1835 stands out by itself, for in that year the *Beagle* sailed northward along the coast of Chile and Peru

and west to the Galapagos, with Charles Darwin on board. One month, September 15 to October 15, was spent among the islands, a short time indeed; but Darwin could make more accurate observations on natural phenomena in a month than most other people could in a much longer period. Without flourish or exaggeration he gave in the *Voyages of the Beagle* a simple, unvarnished description of what he saw and heard that for clarity and exactitude remains unequaled. His observations were confined mainly to the terrestrial species, the birds taking much of his attention, but the marine iguana could not go unobserved. Marine shells from the beaches and fish from the sea comprise his contribution to marine zoology.

In 1859 the Austrian frigate *Novara,* commanded by Commodore B. von Wüllerstorf-Urbair, left Valparaiso for Europe via Cape Horn on the last leg of a three-year voyage around the world. One of the scientists, Dr. Karl Scherzer, made a leisurely journey home via the Isthmus of Panama, stopping at Coquimbo, Caldera, Cobija, Iquique, Arica, Port d'Islay, Chala, Pisco, Chinchas, Callao, Lima, Lambajeque, Payta, and Taboga Island. The narrative describing this cruise appeared in 1861.

In 1872 the *Hassler,* Louis Agassiz in charge, visited the Galapagos briefly on a cruise from Boston to San Francisco via Cape Horn. An account of the expedition appears in *Nature* (London) for 1872, and a popular article by Elizabeth Agassiz in the *Atlantic Monthly* of the same year.

It might be well to mention the voyage of the *Peterel,* Commander W. E. Cookson, in June, 1875, during which Abingdon, Charles, and Albemarle (Tagus and Iguana coves) were visited and birds, reptiles, myriapods, arachnids, insects, fishes, mollusks, crustaceans, and echinoderms were collected. Reports on the collections by various authors appeared in the *Proceedings* of the Zoological Society of London, in 1877.

In the following year, 1876, W. J. Fisher of San Francisco chartered a small vessel to make an investigation of the shores of Lower California, as well as of the islands near these shores, and the Gulf of California as far south as the Tres Marias Islands, in the interest of natural history. The mollusks were written up by Robert E. C. Stearns in *Proceedings* of the United States National Museum, Volume XVIII, 1894, but there is no information available as to what was done with the other collections.

In 1883 the Italian frigate *Vettor Pisani* spent six months, from January until June, along the west coast of South America between Valparaiso and the Gulf of Guayaquil, collecting marine invertebrates

at Coquimbo, Calderas, Mexillones, Callao, and Puná. In 1884 the months of January and February were spent in the Gulf of Panama and in March the Galapagos Islands were visited. An extensive list of the Crustacea collected appears in the *Bulletin* of the Nature Society of Naples for 1889.

In the early months of 1888—January to May—the United States Fish Commission Steamer *Albatross*, Lieutenant Z. L. Tanner commanding, with Charles H. Townsend on board, made a cruise northward from the Strait of Magellan to Panama, to the Galapagos Islands, to Acapulco, Mexico, into the Gulf of California, and along the coast of Lower California, collecting at several stations in the Galapagos, and north of Acapulco, en route. Much of the collecting was done with the beam trawl in shallow water (as little as 5½ fathoms). There was much shore and land collecting. The dredge was used for only eight hauls. An account of the cruise by Lieutenant Commander Tanner appeared in the Commissioner's *Report,* United States Fish Commission for 1887, published in 1891.

Again in 1889—February to April—the *Albatross,* Lieutenant Z. L. Tanner commanding, with C. H. Townsend and C. H. Gilbert on board, did some exploring in this general region. The route lay south from San Diego along the west coast of Lower California, out to the Revilla Gigedo Islands, back to Cape San Lucas, into the Gulf of California, and back to San Diego via the west coast of Lower California. Here again the beam trawl was in general use in water less than 100 fathoms. Very little dredging was done. Fish made up an important part of most of the catches. The *Report* of Commander Tanner appeared in the same publication in 1892.

In 1891 marine investigation on the *Albatross* was in charge of Alexander Agassiz, with C. H. Townsend assisting, and Lieutenant Z. L. Tanner in command of the ship. Operations were carried on off the west coast of Central America, the Galapagos Islands, the west coast of Mexico, and the Gulf of California. This time much more dredging was done, but nearly all in deep water; out of the 100 stations, only 8 were in less than 100 fathoms, and none was in less than 50 fathoms. Pelagic collecting occupied much time, and numerous observations were made on topography, currents, temperatures, specific gravity, and bottom configuration. Agassiz gave a general sketch of the Expedition in the *Bulletin* of the Museum of Comparative Zoology, Harvard, XXIII, 1891, and Commander Tanner's Report appeared in 1893.

In 1898, under the patronage of Timothy Hopkins, Menlo Park, California, the Schooner *Julia E. Whalen,* Captain William C. Noyes, set out on the Hopkins-Stanford Galapagos Expedition, with Edmund Heller and R. E. Snodgrass in charge of operations that lasted for ten months—October 30, 1898, to August 30, 1899. On the way, Guadalupe, Clarion, and Cocos islands were visited, and in the Galapagos, Culpepper, Wenman, Albemarle, Narborough, James, North Seymour, South Seymour, Duncan, Charles, Hood, Chatham, Barrington, Bindloe, Abingdon, and Tower islands. Except for some echinoderms, crustaceans, and mollusks collected along shore, and insects collected in the interior, all attention was applied to vertebrates. The itinerary was recorded by Edmund Heller in his paper on Reptiles (XII) of the expedition, published in the *Proceedings* of the Washington Academy of Science, V, in 1903.

In 1904 Alexander Agassiz took charge of another expedition to the Eastern Tropical and Subtropical Pacific—October, 1904, to March, 1905. All dredge and trawl hauls were made in deep water. There were only six of them at a depth of less than 1,000 fathoms—2 off Panama, 1 off Aguja Point, Peru, and 3 in the vicinity of Hood Island, Galapagos. Of these, one was at 100 fathoms, one at 300 fathoms, and one at 500 fathoms. As in the previous cruise, much pelagic collecting was done.

In 1905-1906, a party headed by Joseph R. Slevin, representing the California Academy of Sciences, made a cruise to the Galapagos Islands in the schooner *Academy,* R. H. Beck, Master and Chief of party. The cruise lasted from June 28, 1905, to November 29, 1906. Over a year was spent in the Galapagos, a greater length of time than that of any other expedition. All the larger islands and almost all of the smaller islands were visited. On the way to the Galapagos calls were made at several locations on the outer coast of Lower California, and at Socorro Island, Clipperton Island, and Cocos Island. Evidently the main object of the expedition was to study the galápagos in detail in order to determine all the specific differences existing in these tortoises from the different islands. No other expedition has made even an approach to the number of shells brought out. Apart from these, valuable and extensive collections, especially birds and reptiles, were obtained. The vertebrate marine fauna received some attention, but any that the invertebrate marine fauna or the marine flora received was merely incidental. The account of the expedition by Joseph R. Slevin was not published by the Academy until 1931. (*Occasional Papers* of the California Academy of Sciences, XVII, pp. 1-162.)

In 1906-1908 Dr. Robert E. Coker of the U.S. Fish Commission made an extensive survey of the fisheries resources of Peru at the invitation of the Peruvian government. Collecting along the coast between latitudes 3° 30′ and 17° S. was accomplished, both ashore, on sand beaches and salt marshes with the seine, and in shallow water, to a depth of several fathoms, with dredge and trawl. The collections were large, the Crustacea alone numbering 80 species. Reports on the findings of the survey, published in the *Proceedings* of the U.S. National Museum for 1909-10, not only served as a basis for the regulation of fisheries by the Peruvian government, but aided in the rehabilitation of the guano industry as well.

In 1911—February 23 to April 29—the *Albatross,* with C. H. Townsend on board, cruised along the coast of Lower California, calling at Guadalupe Island, and in the Gulf of California. There was much shore collecting but comparatively little dredging. There were four hauls in less than 400 fathoms, but only one of them in less than 250 fathoms.

In the year 1921, the California Academy of Sciences sent an expedition to the Gulf of California. The collecting was entirely terrestrial, but a good map of the Gulf of California was published, with information as to anchorages, etc. The Report was published in 1923 in the *Proceedings* of the California Academy of Sciences (4), XII, No. 6.

In 1923, William Beebe, with several associates, on the yacht *Noma,* spent 100 hours in the Galapagos. Observations were mainly on the terrestrial fauna—birds, reptiles, and insects—and on fish, although marine invertebrates were collected and reported upon. The popular account was published as *Galapagos, World's End,* in 1924. The scientific accounts appeared in *Zoologica,* V, 1924.

In 1925, William Beebe again visited the Galapagos, this time on the steam yacht *Arcturus* and with a larger scientific staff. The *Arcturus* was in the Pacific from March 28, 1925, to June 21, 1925. The route was from Panama to the Galapagos Islands, to Balboa, to Cocos Island, to Galapagos Islands, to Balboa. Much attention was given to fishes, birds, and insects, and there was extensive plankton collecting. The diving helmet was used in shallow water. Some dredging was done, but this mostly in deeper water. The popular account, including the "Log of the Arcturus," was published as *"Arcturus Adventure"* in 1926. The scientific accounts comprise volumes VII and VIII of *Zoologica,* 1926 and 1927.

In 1925, the steam yacht *St. George,* with Dr. Cyril Crossland, naturalist, aboard, visited the islands of Taboga, Gorgona, and the Galapa-

gos en route to the Marquesas. An important contribution to the geology of the region, by Chubb, appears in the *Geological Magazine* (London) for 1925, and the Crossland report, stressing the marine ecology and coral formations in the regions visited, appeared in the *Transactions* of the Royal Society of Edinburgh for 1927.

In 1929, Gifford Pinchot, in his trip to the South Seas, traveled through the Pacific area from Panama to the islands of the South Seas, with other scientists on board. In his book *To the South Seas,* he gives some general information about the species (mostly terrestrial) to be found in the Galapagos, but little new or of scientific interest concerning the marine fauna.

In 1930, the scientific portion of the Astor Expedition to the Galapagos Islands, in the *Nourmahal,* was organized by C. H. Townsend, who had for his assistants Kermit Roosevelt and Henry K. Svenson. The work done was largely confined to Indefatigable Island. Birds, reptiles, insects, and plants were collected, but there was no special marine investigation. The general Report was published in the *Bulletin* of the New York Zoological Society, in July, August, 1930.

Preparation for the Allan Hancock Pacific Expeditions

This brief account is sufficient to indicate that, from a scientific viewpoint, the shallow-water area along the coast of the mainland and of the numerous islands of the Eastern Tropical and Subtropical Pacific had received but little attention, when, in 1931, Captain Allan Hancock, in the newly commissioned *Velero III,* turned his attention to the exploration of this area.

The venture was the result of no hasty decision, for, directly or indirectly, there were years of preparation for this very expedition, but even the Captain, as on December 3 he set his course southward from Los Angeles Harbor, could scarcely have dreamed of the immensity of the project that would develop from this unpretentious embarkation. Looking back over ten years of operation, it is an easy matter to see the manner in which the whole plan has unfolded and developed. It is only after having obtained a full appreciation of the comprehensiveness of the work that has been done, and the results that have been obtained, that due credit can be given to the man who had the foresight to plan the first expedition and, as experience indicated, to continue the expansion of the project, always ready and willing to "take occasion by the hand" in making the most of his own experience and the experience of the scientists who were brought from hither and yon to assist in carrying out the exploration, year after year, to the greatest advantage.

This is not the place to refer to Captain Hancock's multifarious activities. That has been done and can be done by others who have more carefully followed these activities; but it is appropriate here to say something concerning the development of his enthusiasm and aptitude for navigation and marine investigation. To make the story complete, it is necessary to say it. (Illustrations, plates 1-3.)

The story begins back in boyhood days on the Rancho La Brea, when Allan Hancock built for himself and his brother Bertram a punt, still intact beside the old ranch house, with which to explore the tar pits. This is of importance because it is the first association of navigation and biology in Allan's experience. The La Brea pits were soon to become famous as the great depository of fossil remains, in which, of course, Allan took much interest. This interest in the La Brea fossils has developed to include animal life in general, especially as it appears in its own habitat. The other side of the association, navigation, has developed and has been nurtured until it has become one of the Captain's major activities.

PLATE 1

Fig. 1 Capt. Hancock and his younger brother exploring one of the larger pools of Rancho La Brea in his first boat, a punt built about 1890.

Fig. 2 The *Cricket*, a 54-foot boat.

PLATE 2

Fig. 3 *Velero I*, a 99-foot cruiser, after her lengthening by the insertion of a 21-foot section amidships.

Fig. 4 The *Velero II*, a 125-foot cruiser.

PLATE 3

Fig. 5 *S. S. Oaxaca*, operated by Capt. Hancock between San Pedro and Mazatlan, Mexico, and used by him on Galapagos and Alaskan cruises prior to the advent of the *Velero III*.

Fig. 6 Capt. Hancock on the bridge of the motor cruiser *Velero III*.

PLATE 4

Fig. 7 *Velero III* of Allan Hancock Pacific Expeditions, 1931-42, approximately 195-foot cruiser.

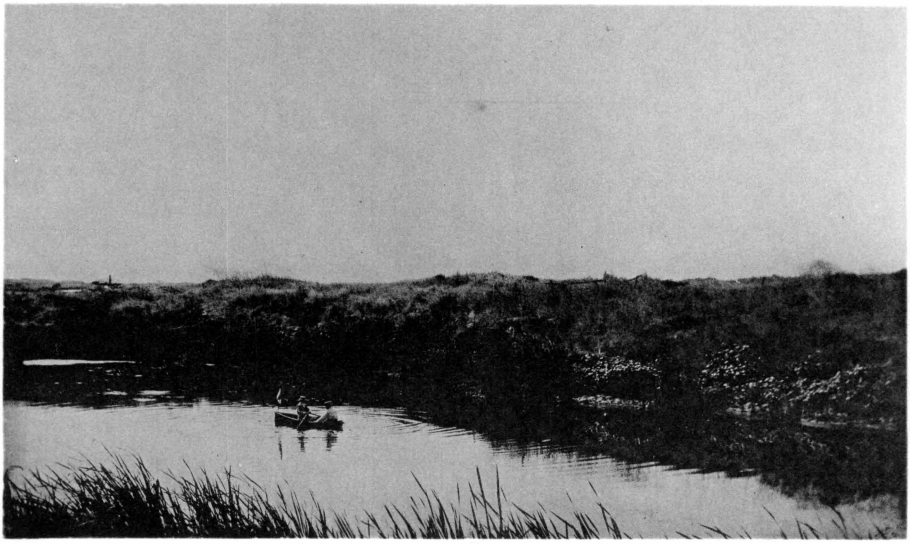


Fig. 1 Punt in La Brea Tar Pits

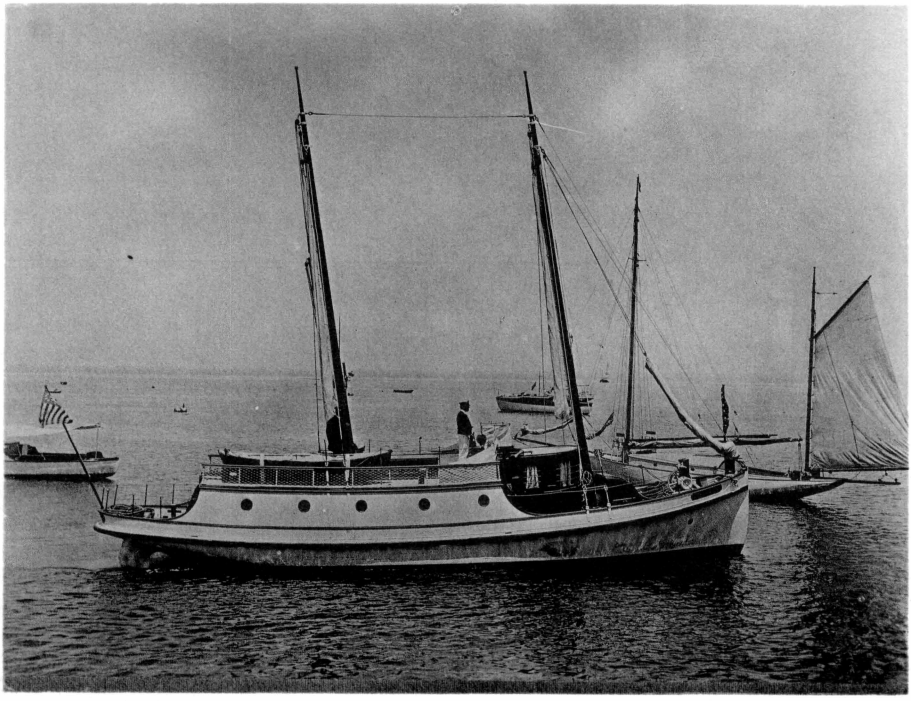


Fig. 2 *Cricket*

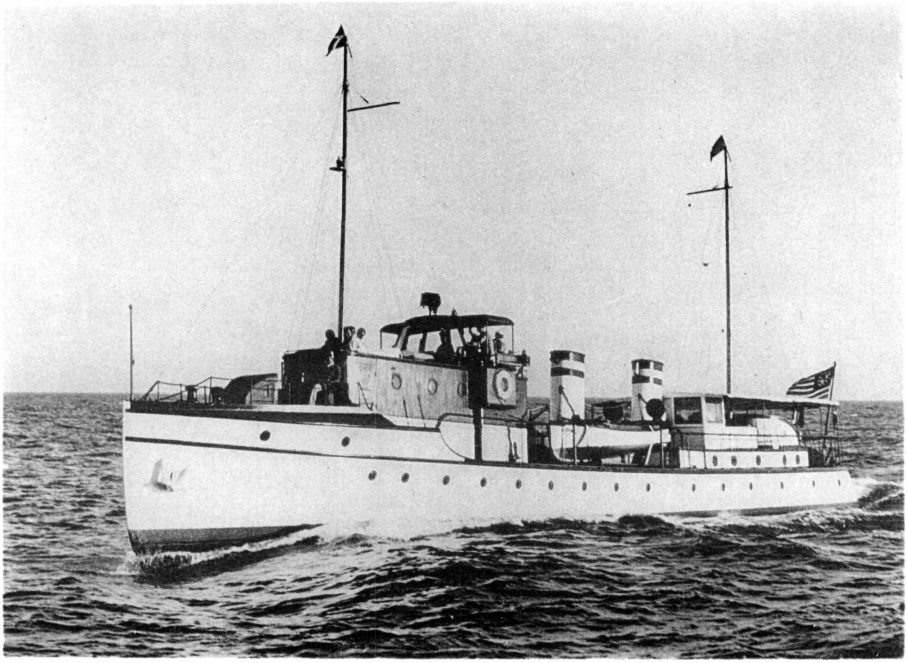


Fig. 3 *Velero I*

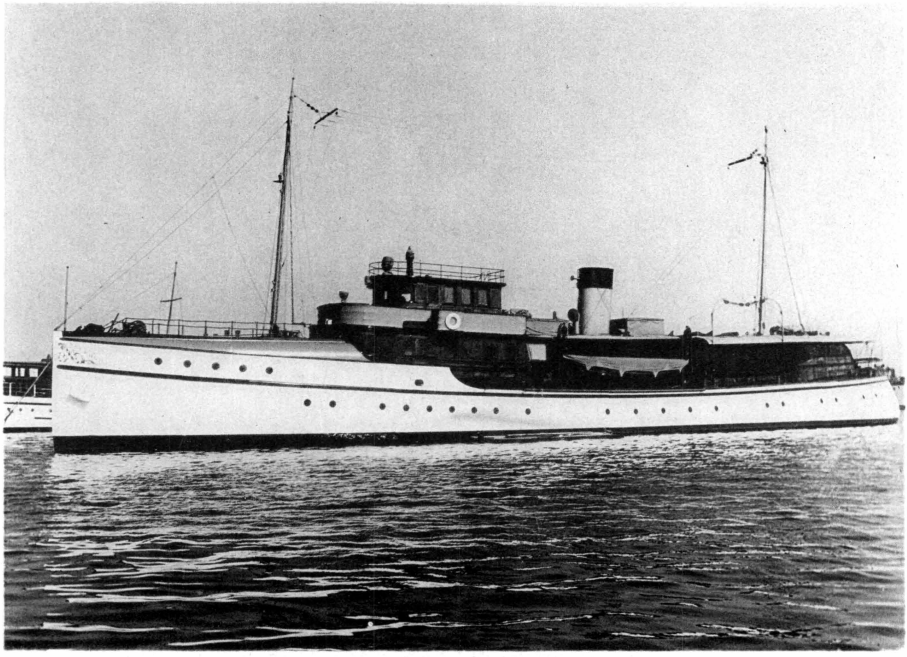
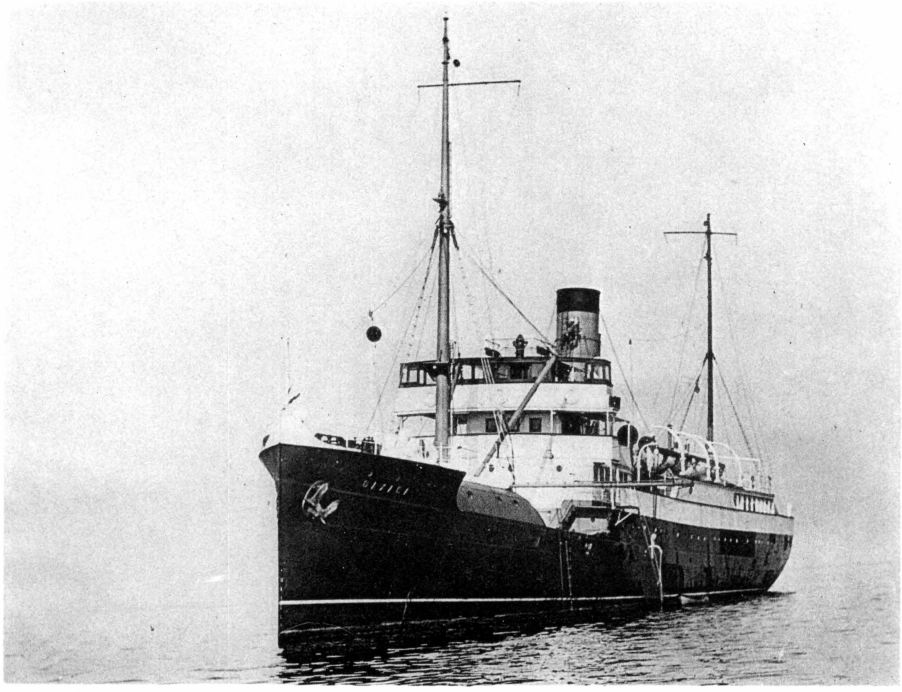
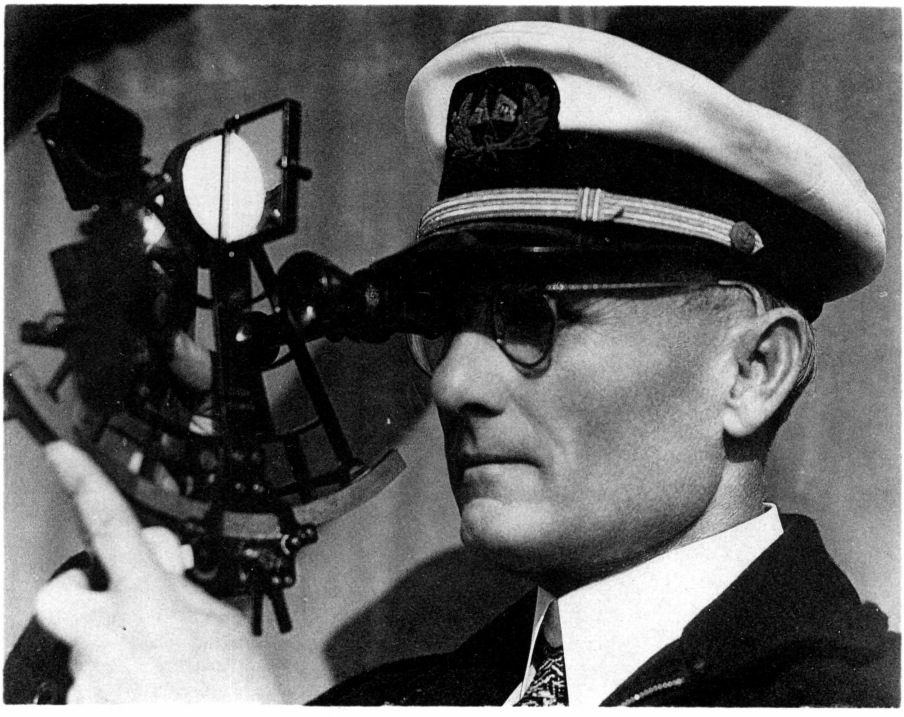


Fig. 4 *Velero II*





Figs. 5 *Oaxaca;* 6 Captain Allan Hancock

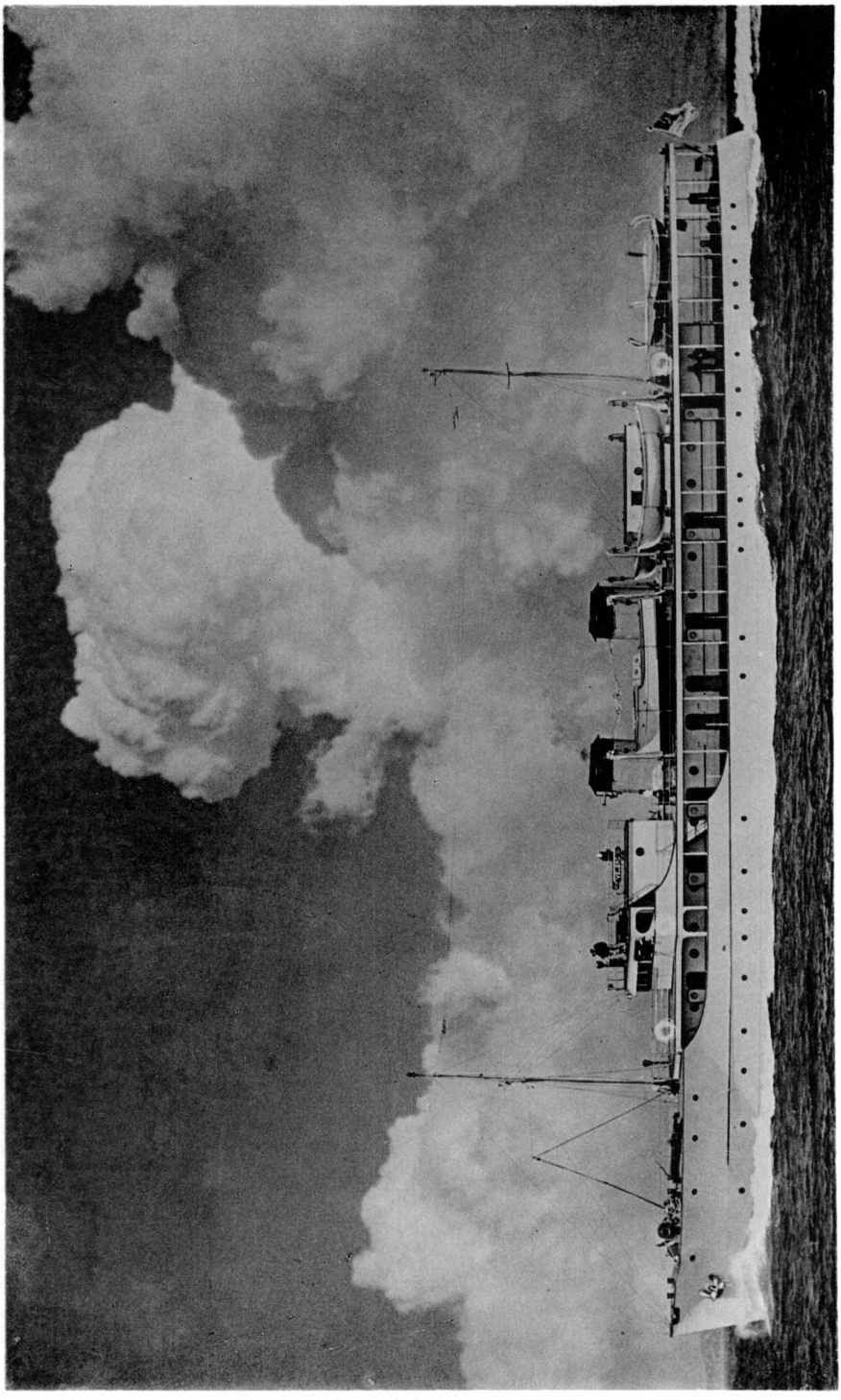


Fig. 7 *Velero III*

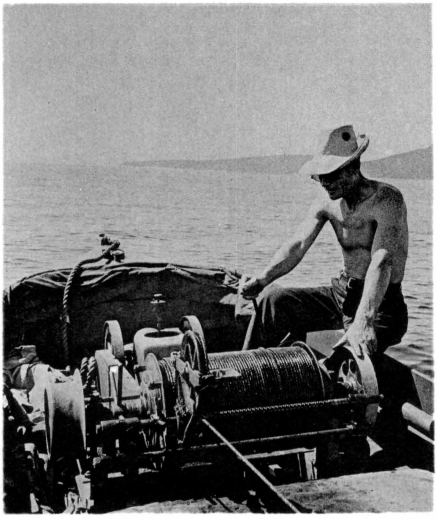


Fig. 8 Winch and cable in dredge boat

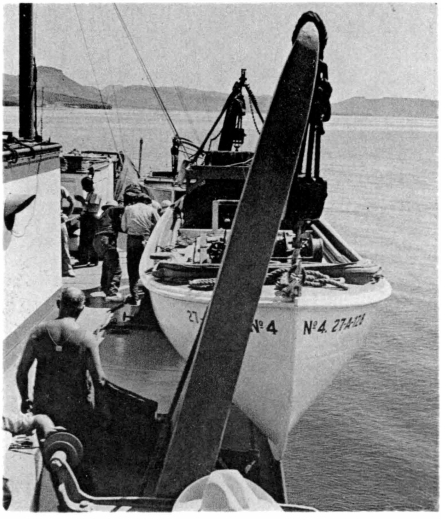


Fig. 9 Dredge boat, deck of *Velero III*

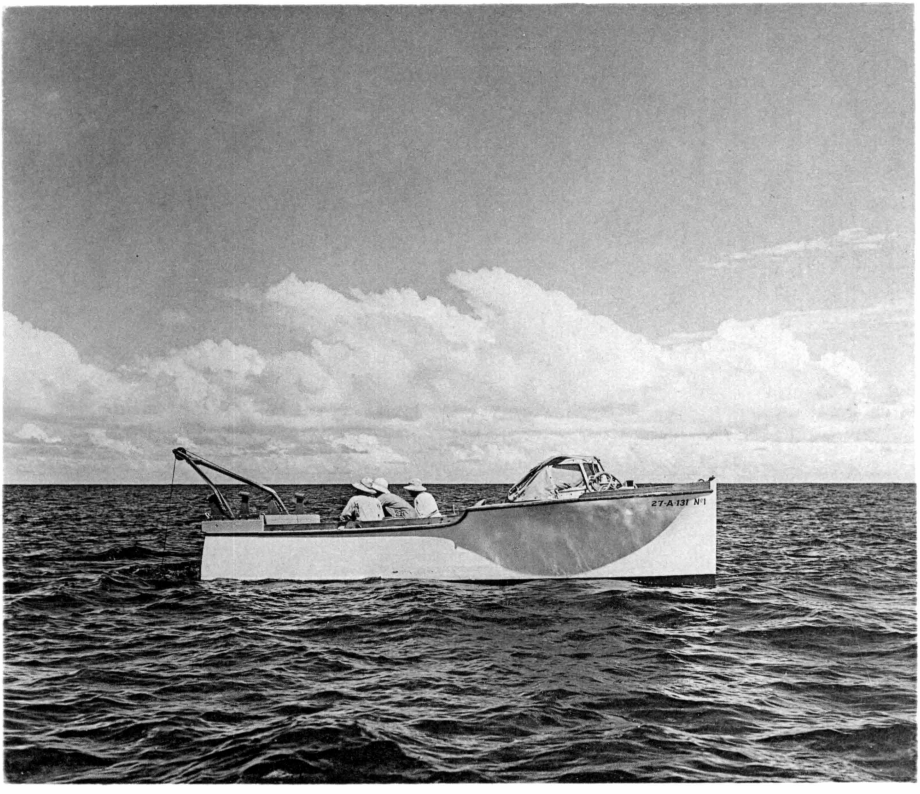


Fig. 10 Dredge boat in operation

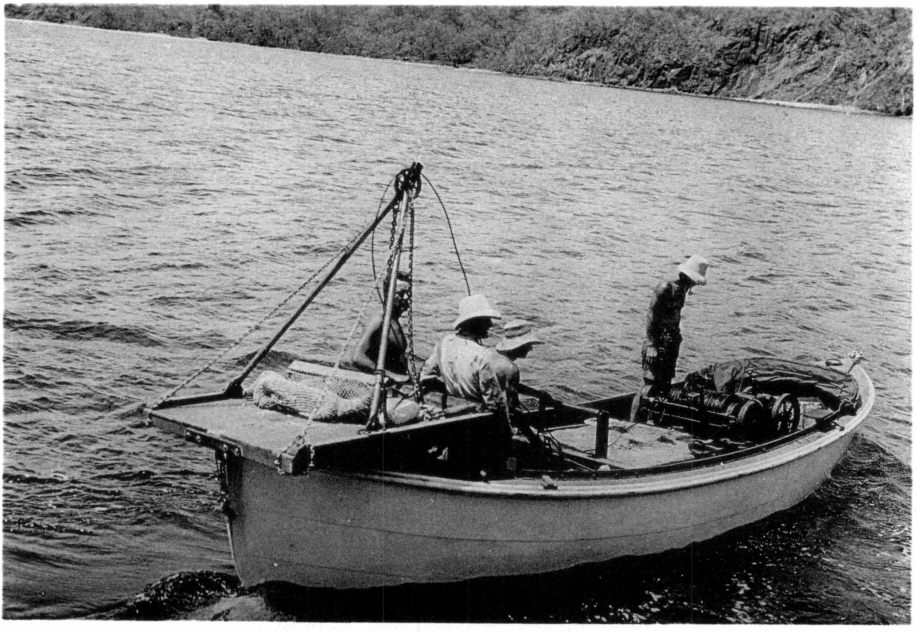


Fig. 11 Old dredge boat

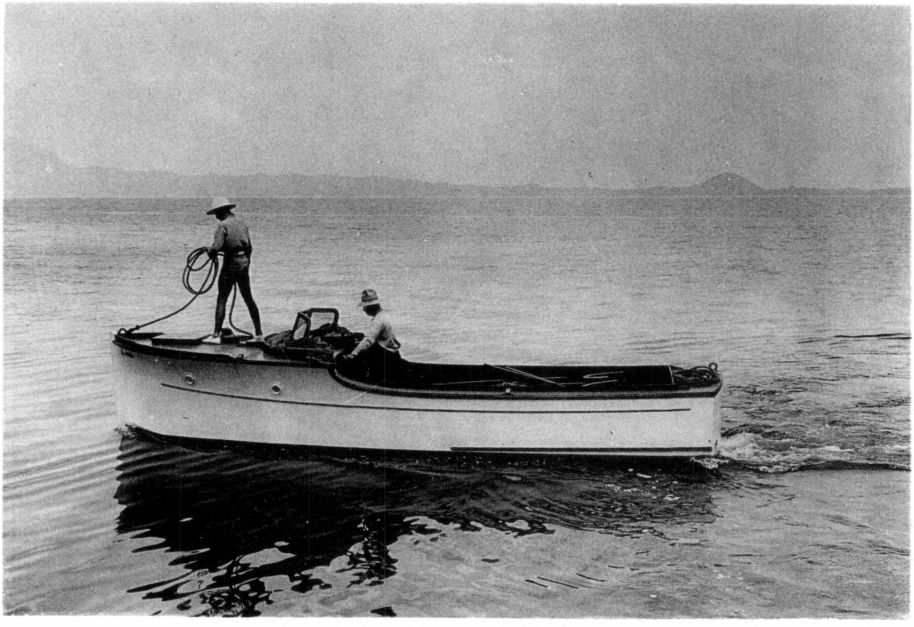


Fig. 12 Motor launch

Fig. 13 Boat deck of *Velero III*

Fig. 14 Deck load of animals

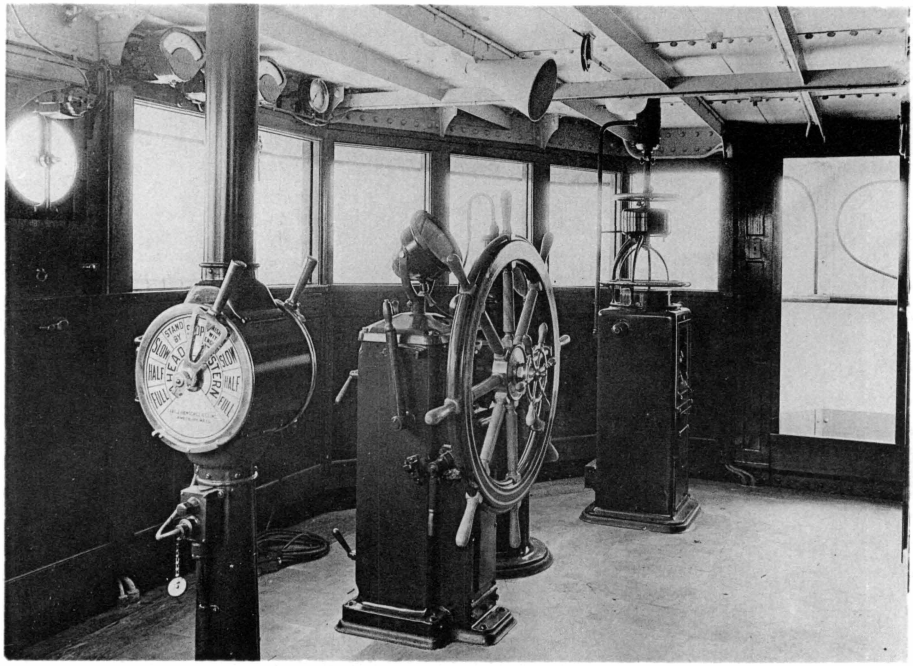


Fig. 15 Pilot house showing steering gear

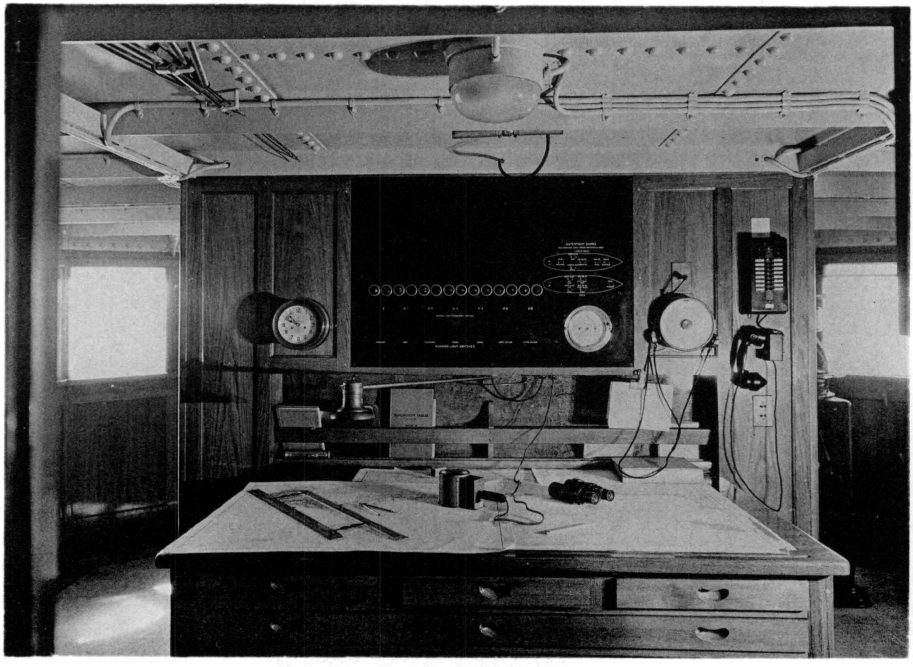


Fig. 16 Chart table and indicator board

PLATE 5

Fig. 8 Winch of the small dredge boat being operated by Alec Campbell, engineer aboard the *Velero III.*

Fig. 9 Dredge boat, deck of *Velero III.*

Fig. 10 Dredge boat converted from auxiliary launch, in operation in Gulf of California waters.

PLATE 6

Fig. 11 Whale boat converted into an efficient dredger for use at moderate depths. Dr. Schmitt and Dr. Fraser occupy positions adjacent to the dredging table.

Fig. 12 Ship's launch used for deep-sea fishing and in transporting scientists from the *Velero III* to shore.

PLATE 7

Fig. 13 View of the boat deck of *Velero III* from the wharf at San Diego showing animal cages, scientists' working space, and auxiliary craft under cover.

Fig. 14 The exploration cruiser *Velero III* at dockside with a deckload of live animals for the San Diego Zoological Society.

PLATE 8

Fig. 15 The bridge of *Velero III* showing from left to right automatic windshield wiper, ship's telegraph, and gyroscopic steering device, and radio beacon detector.

Fig. 16 The chart room of *Velero III* showing panel indicator board, telephone, electric ship's log, and other navigational aids on the commodious chart table.

As the plan for marine exploration has developed step by step, and as practically all of the Captain's other activities have developed, navigation plans and facilities developed step by step. Each successive vessel, owned or built, must show an increase in magnitude or in efficiency or in both, as experience in navigation goes on "from strength to strength." To test his mettle in sailing on the open ocean, Allan Hancock, in partnership with his friend, Hancock Banning, purchased the *Cricket,* a 54-foot boat, large enough to travel extensively in the waters between Los Angeles and Santa Catalina Island. Later Allan became sole possessor. The range of operation was somewhat limited, and inevitably the *Cricket* soon had to give place to a larger, speedier rival.

The Captain had a new vessel built to his own design, the *Velero I,* a 78-foot cruiser, with 300 horsepower to take it along at a speed of 11 knots. In 1915 the *Velero I* was put into commission, the fastest and trimmest cruiser on the coast. Although it sailed with a crew of two, the Captain and an engine-room assistant, it was eminently suitable for exploring any or all of the Channel Islands, or all of the waters between Point Conception and San Diego.

The satisfaction in sailing this craft was not complete for long. The engine room and galley were cramped for space, and in other respects there was much lack of room; hence, after two years of service, in 1917 the *Velero I* was put on the ways and cut in two, so that a 21-foot section could be introduced between the two parts. Now the vessel, with a length of 99 feet, had more generous engine-room and galley space, and a fair-sized recreation hall. The additional equipment included a complete wireless apparatus. While World War I was raging, the field of operation was not extended; but, after the war was over, the Channel area was no longer sufficient. Mexico called, and the Captain answered.

Although Lower California and the Gulf of California lie so near southern California, there was a woeful lack of information about any portion of this area, unless, possibly, the ports of occasional call. To acquire such information and to learn something of the conditions for navigation, Captain Hancock planned an expedition to that part of Mexico in which the shore line and suitable locations for anchorage could be investigated.

On January 30, 1921, the *Velero I* left the home port on a 3,000-mile cruise, southward along the west coast of Lower California and into the Gulf of California, as far as Tiburon Island. This cruise was important for its immediate intrinsic value, but even more so because the informa-

tion obtained had so much to do with the success of the later expeditions into the same region for more definitely scientific exploration.

Satisfactory as this cruise was, it was only enough to whet the appetite for more. To satisfy this appetite even temporarily, a larger vessel was required, and so the *Velero II* was designed and constructed in 1922. This 125-foot, 195-ton cruiser, equipped with twin Winton-Diesel, six-cylinder engines, developed a speed of ten knots, with a cruising radius of 5,000 miles.

With the *Velero II* in commission, a much more extensive expedition was soon initiated, and this one had a somewhat stronger biological tinge than the previous expedition. Calls were made at Guadalupe Island, Cerros Island, Magdalena Bay, Cape San Lucas, Clarion Island, Socorro Island, Clipperton Island, several points in the Gulf of California, Mazatlan and other points on the mainland coast of Mexico, La Union, El Salvador, and Panama, and, on the return, Cape San Lucas and Mazatlan.

As a follow-up of this cruise, Captain Hancock purchased the Hacienda Barron, a short distance inland from Mazatlan, with the idea of introducing more modern methods of agriculture into this region. This is mentioned because it had much to do with the next distinct development in navigation.

There was little to be gained by an increase in agricultural production in western Mexico unless some means were provided to carry the produce, still in good condition, to northern markets. To overcome this difficulty the steamer *Oaxaca* was purchased from the British Admiralty. The *Oaxaca* was much larger and more powerful than *Velero II*. It was 255 feet in length, with a beam of 35 feet, and a normal draft of 18 feet 6 inches, gross tonnage 1,683, normal horsepower 1,800, extreme speed 16 knots, normal cruising speed 12.5 knots, cruising radius 4,500 miles. There were large cargo space and passenger accommodation. Air-cooled facilities for the preservation of fruit and vegetables were installed, and, for easier navigation, a gyro compass, and a "Metal Mike."

The ship was put into service as a produce transport, operating under the West Coast Transportation Company. As to its vocation nothing more need be said, as it was its avocation that is of scientific interest. Produce transport is a seasonal occupation. In off seasons, the *Oaxaca* could be, and actually was, used for extended expeditions.

For some time, Captain Hancock had been nurturing the desire to sponsor a scientific expedition to the Galapagos Islands. Now, with the

Oaxaca, he was well equipped to do so. At this time the California Academy of Sciences was particularly eager to obtain specimens of some of the characteristic species of animals of the Galapagos. The synchronism was perfect. On November 27, 1927, the *Oaxaca*, with a crew of 35 men and a passenger list of 12, left San Pedro, Galapagos bound, on a seven weeks' cruise. Joseph Slevin, who was with the *Academy* party in 1905, and Frank Tose represented the California Academy of Sciences. The route followed the mainland coast to Panama, and then, by way of Cocos Island, to the Galapagos. The principal faunal attraction consisted of birds and reptiles, but observations were made more or less incidentally on many of the other groups. For this first visit to the Galapagos, the islands put on a special display of fireworks. From the channel between Albemarle and Narborough the ship's company had a grandstand view of the violent volcanic eruption on Narborough Island.

In the following summer, after carrying a load of freight to New Westminster, B.C., the *Oaxaca* was outfitted for a cruise in Alaskan waters, and a pilot familiar with local waters was engaged. Northward, the trip ended at Skagway. On the return, owing to faulty beacon marking, the *Oaxaca* piled up on Burnt Island Reef in Wrangel Narrows. Later she was released and with some temporary repairs was taken south to Vancouver for a thorough examination. The damage was extensive and rather than contract for repairs that would not give assurance that the ship could be made seaworthy, she was sold without further ado.

The *Velero II* was still available for cruising, and she continued in use for that purpose, but she was scarcely large enough or well enough equipped for the longer scientific expeditions that the Captain now had in mind. An association with the late Dr. Harry Wegeforth, who was doing so much to increase interest in the Zoological Gardens in Balboa Park, San Diego, could not fail to arouse enthusiasm in the expansion of this institution. Hence there was another incentive to visit the southern seas and southern lands, to bring back animals alive for the San Diego Zoo.

No mention has been made of the extra time that Captain Hancock had put in with the Merchant Marine, to gain experience and to obtain the necessary papers to permit him to take command, as Master, of ships of any size on any ocean.

With his familiarity with navigation in the Eastern Pacific and with his experience in sponsoring expeditions, it is not surprising that he had some very definite ideas as to the essentials necessary to provide a ship

that, with safety and convenience, would meet any emergency likely to arise in carrying out the expanding program of marine exploration that he had in mind.

Now was the time to put these ideas to the test in building a new cruiser, which became *Velero III,* with Naval Architect, G. Bruce Newby, commissioned to carry out the plans. In June, 1930, the keel was laid in the Craig Shipbuilding Yards at Long Beach. The work was carried out expeditiously, so that everything was ready for launching on April 2, 1931, and it was not long until the *Velero III* was ready for her trial trip to San Francisco, on which she embarked July 11, 1931. Her performance was well up to expectations, but before starting on her first long cruise in the interest of science shorter cruises were made to the Channel Islands, San Francisco, San Diego, Guadalupe Island, and Cerros Island. Every test was met so successfully that there was no necessity of any further delay in starting out on the First Allan Hancock Pacific Expedition. How well the *Velero III* behaved on these expeditions is told elsewhere in this volume.

THE VELERO III

Plates 4-16

The *Velero III* is a steel, Diesel-propelled cruiser, 195′ 1¼″ in over-all length, with 30′ beam and 11′ 9″ draft. Her dead weight is 1,300 tons and she has a net cargo capacity of 293 tons. She is driven by twin, air-injection, full Diesel, six-cylinder, four-cycle Winton engines; each, developing 850 horsepower at 250 R.P.M., is directly connected to a propeller shaft. There are fuel oil capacity of 54,000 gallons and water capacity of 18,000 gallons, which gives a cruising radius of 9,500 miles at 14 knots. The trimness of her lines can be better appreciated from a photograph than from any description that might be given.

Within the compass of the hull, the ship may be said to consist of a flying bridge, an upper deck divided into fo'c's'le deck forward and boat deck aft, a main deck, a lower or A deck, and a hold or B deck. To give some idea of the structure and equipment of the ship, these deck levels will be described in turn.

Flying bridge. The bridge is provided with steering pedestal and steering wheel of the electric contact type, magnetic binnacle, gyro repeater, two telegraphs, rudder indicator, speaking tubes, public address system to after deck, searchlight mountable on either port or starboard base, and the customary running lights.

Fo'c's'le deck. The forward extension of the boat deck, at a little lower level, is the fo'c's'le deck, with fore mast reaching 39 feet above deck. This mast has an 18-foot yard arm and a cargo boom. The deck is provided with anchors (four of them, 1,764, 1,596, 1,428, and 448 pounds), anchor windlass with 20-horsepower motor, winch, and cable drum, with the necessary equipment for their operation, and on the starboard side, a set of three screens for sorting the dredge material.

Boat deck. Well forward on the boat deck is the pilothouse, with its eleven windows forming an arc to give wide range of vision. In one window is set a clear vision screen. The forward portion of the pilothouse is provided with Sperry gyro metal mike, electric and hand steering gear, gyroscopic and magnetic compasses, radio direction finder, rudder indicator, telegraph, signal bell, buzzer, speaking tube to the engine room, and field glasses. The after part is supplied with chart table, chart lockers, indicator board, with running light switches, water-tight door indicators, and electric ship's log, flag locker, fathometer, automatic course recorder, gyrocompass alarm, chronometer, desks, and cupboards. To the left of the chart table is located the compass of the "Southern Cross," the plane used

by the late Sir Charles Kingsford-Smith in making the pioneer flight across the Pacific, sponsored by Captain Hancock. In the floor of the pilothouse is located a trapdoor, through which entrance may be gained from the galley below in the event heavy seas prevent use of the outside passages. Immediately aft of the pilot room are the Captain's quarters.

Aft the Captain's quarters, the fidley is above the engine room, and is largely taken up with the skylights, the two stacks, and four cowl ventilators. Aft the fidley is the electric hoist for lifting the motor boats. Farther aft is the radio house, provided with three complete transmitting units, long, intermediate, and short-wave, a standard receiving set, a loud speaker, table, drawers, instrument table, two bunks, cabinet, and wash basin. Immediately aft the radio house is a recess that has been used as a laboratory and at other times for stores.

A short distance aft again are another outdoor laboratory or sorting table, over which may be stretched a canvas for protection from the tropical sun, an electric drying cupboard, an 1,800-gallon gasoline tank for fueling the launches, and the mainmast, the same height as the foremast, the two of them serving as supports for wireless antennae. After these there is considerable deck area, a portion of which is taken up by the life raft (8′ 0″ by 4′ 6″). All of the available space here is commonly taken up on the return voyage by live animal cages.

To port is the electrically operated sounding cable of 280 fathoms, used for water and mud samples. Much of the deck space, both port and starboard, is taken up with the chocks and davits for the auxiliary craft, and with the boats themselves, when they are in place. There are two twin-screw, 26-foot motor boats, two single-screw, 20-foot metal life boats, and three 14-foot skiffs, each of which can be used with one of the four outboard motors, one of which is electric, operating from storage batteries. The four larger boats are raised or lowered by mechanical davits, run by a 15-horsepower motor, and the three smaller by ordinary hand davits.

Main deck. Forward on the main deck, i.e., below the fo'c's'le deck, from the peak aft are tanks of oil for calming rough seas, emergency anchor cable, Bo's'n's locker, and carpenter shop, after which there is a hatch to the stores below. From the carpenter shop a passage extends aft to the cross passage forward of the dining saloon. On the port side of this passage are paint locker, two staterooms, a shower and toilet, and a small deck locker; on the starboard are laundry, equipped with electric washing machine, two staterooms, and a lamp locker. The cross passage opens to the outside deck passages.

PLATE 9

Fig. 17 Pilot house of *Velero III* showing the ship's telegraph, gyroscopic and magnetic compasses, steering wheel, and radio beacon detector.

Fig. 18 Radio equipment of the *Velero III* consisting of long, short, and intermediate wave transmitters and receiving sets.

PLATE 10

Fig. 19 Dining room of *Velero III* showing ship model complete in every detail and capable of propulsion by means of storage batteries.

Fig. 20 General view of recreation hall of the *Velero III* showing the open type of construction exposing steel girders and conduits. The companionway to the right leads to the staterooms.

PLATE 11

Fig. 21 Engine room of *Velero III* showing twin Winton-Diesel engines and their controls.

Fig. 22 Engine room of *Velero III* showing two of the auxiliary generators and other mechanical installations.

PLATE 12

Fig. 23 Members of the crew of *Velero III* at the controls of the dredging winch located on the bow of the vessel. The guide wheel registers the number of fathoms of cable out.

Fig. 24 Dr. Hubert Lyman Clark of Harvard University sorting a collection of echinoderms obtained at a shore collecting station in the open-air laboratory located on the after deck of *Velero III*.

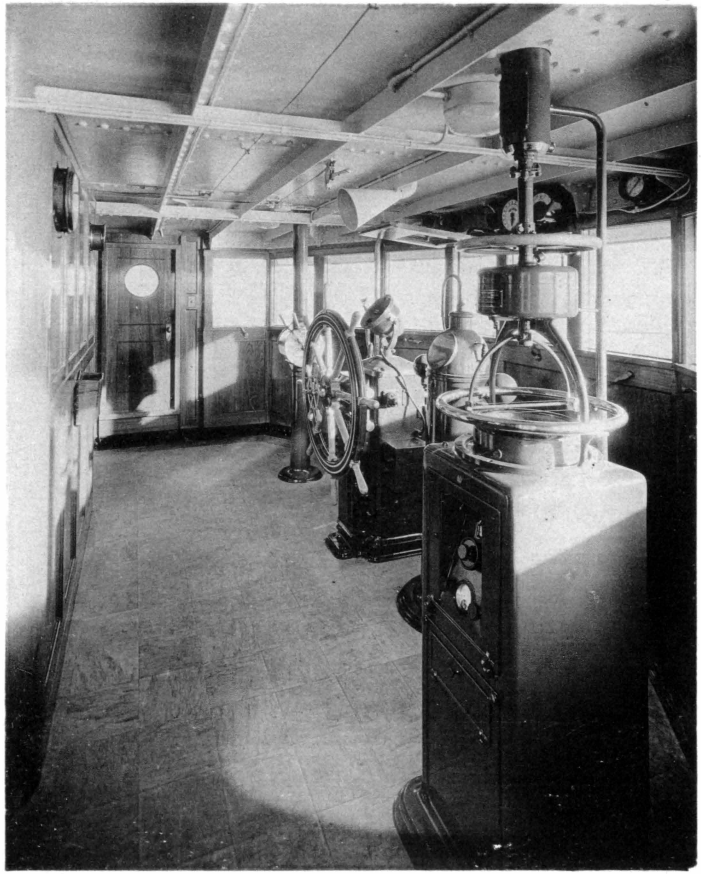


Fig. 17 Pilot house showing steering gear

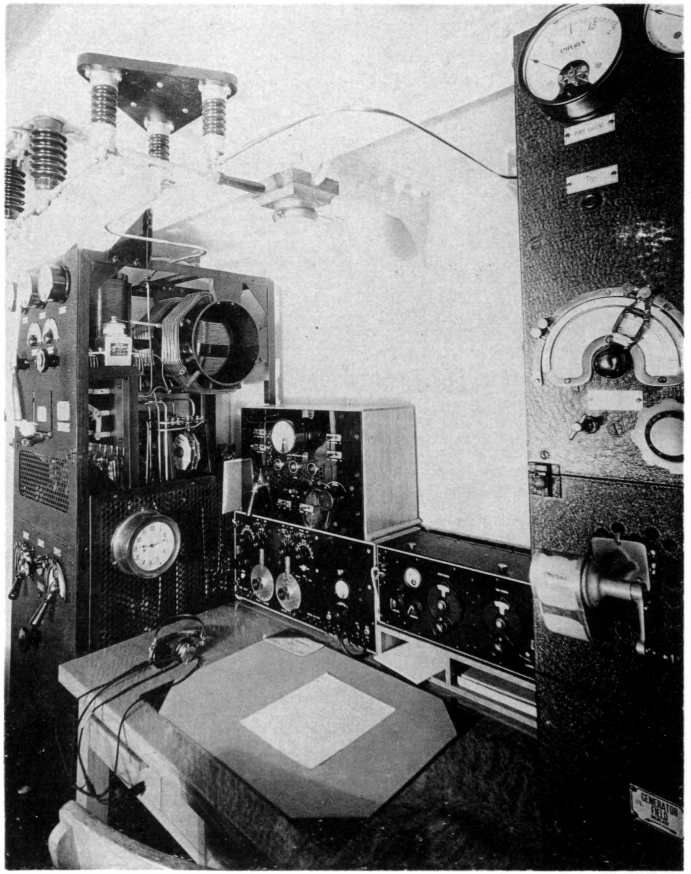


Fig. 18 Radio equipment

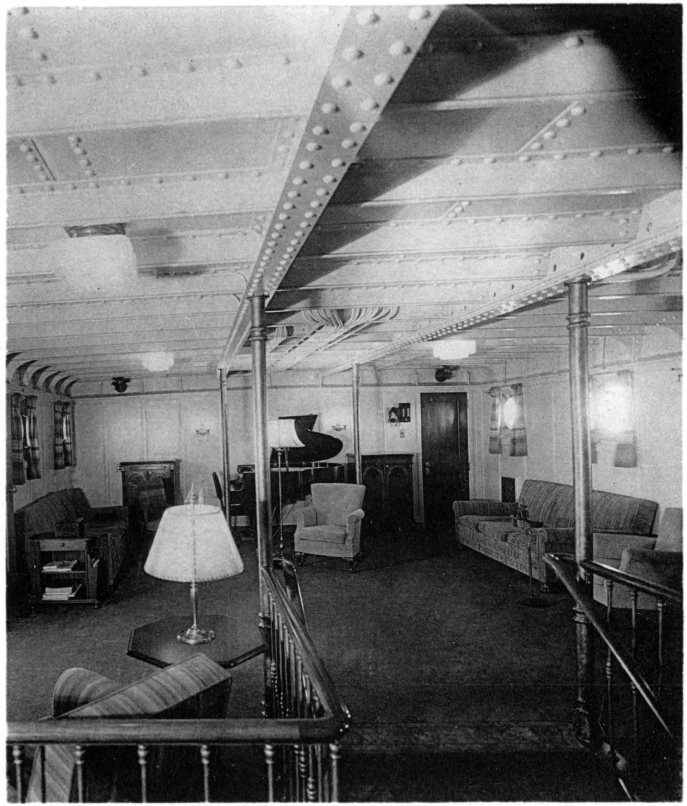
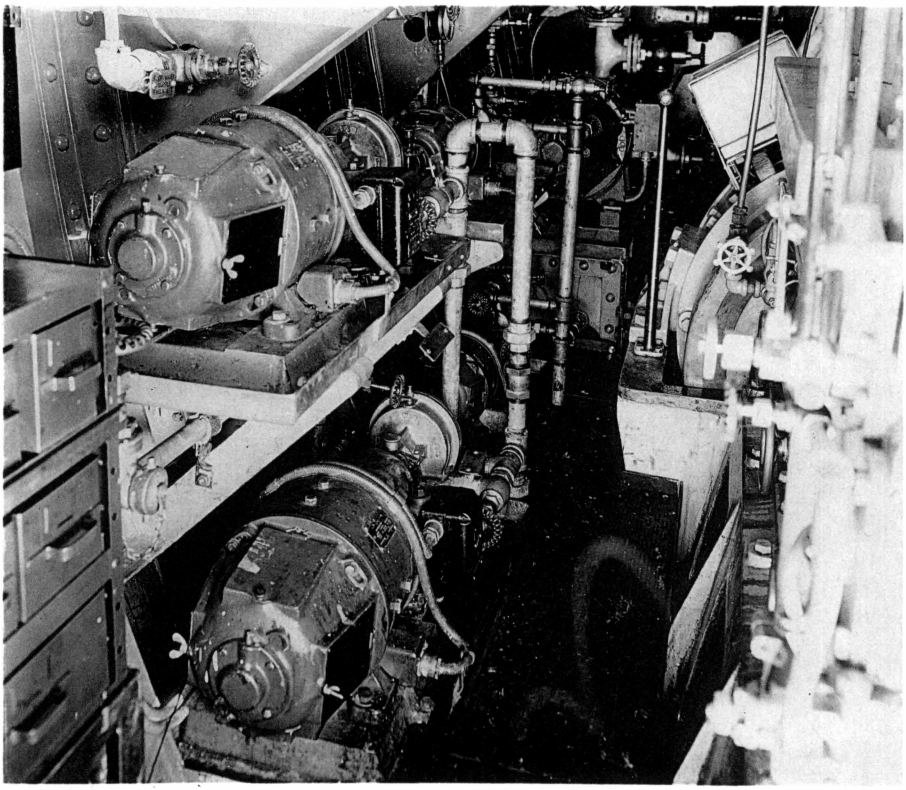
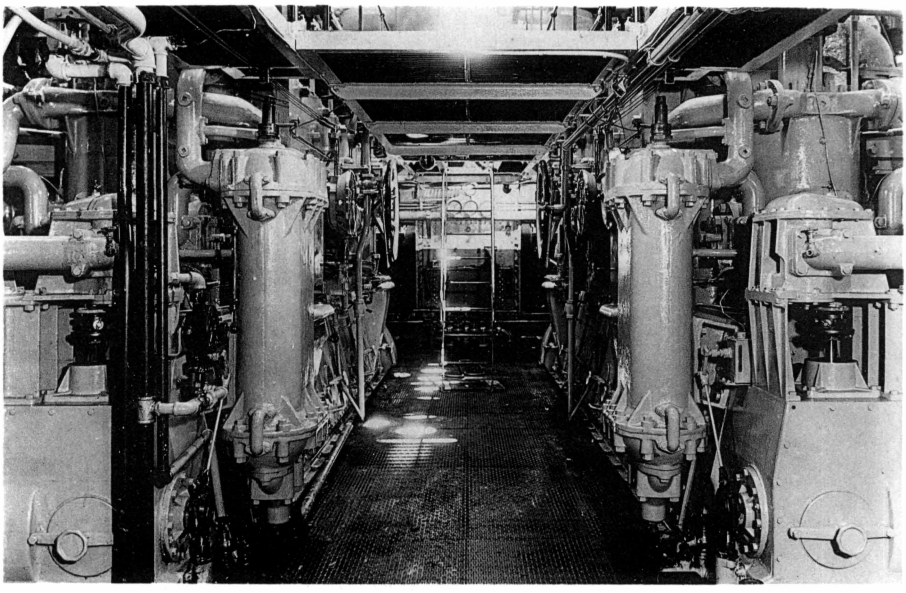


Fig. 19 (*left*) Dining room with model of *Velero III*
Fig. 20 (*above*) Recreation room





Figs. 21, 22 Engine room

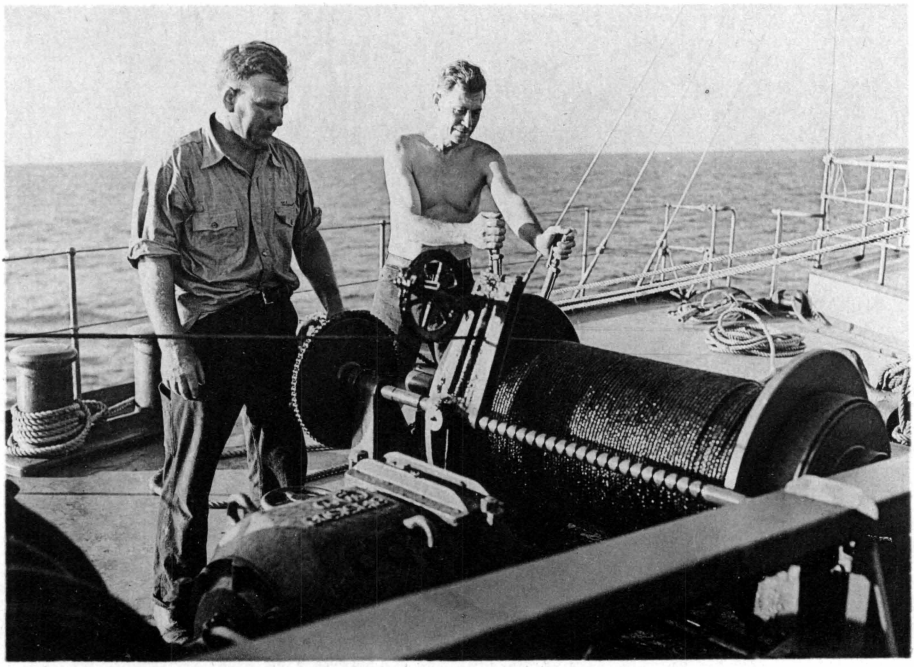


Fig. 23 Winch with cable, deck of *Velero III*

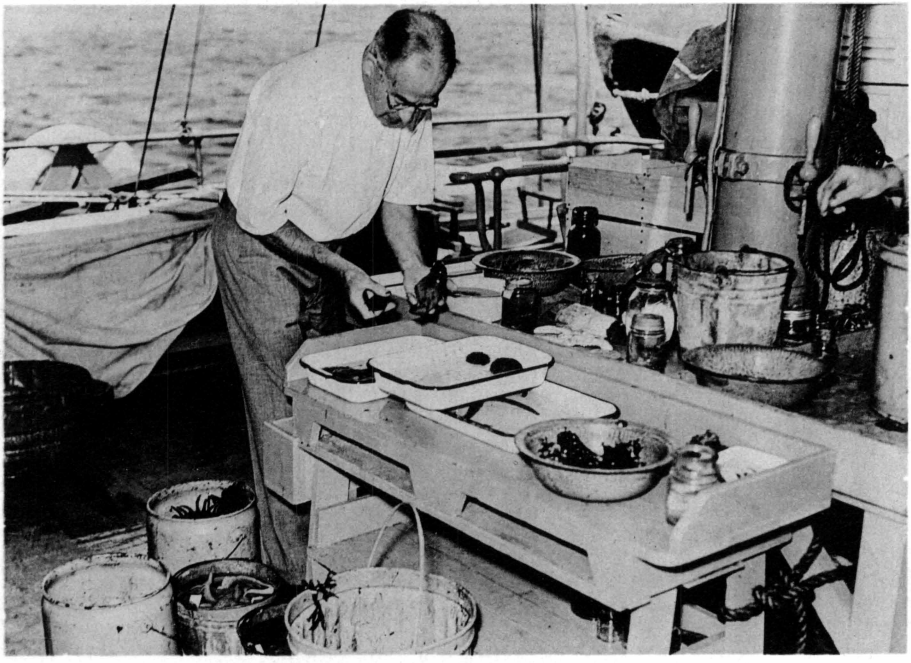
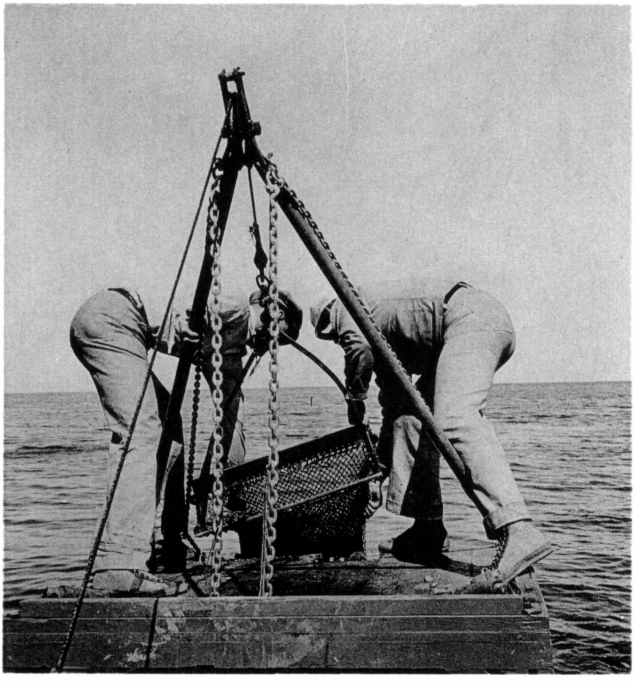


Fig. 24 Dr. Hubert Lyman Clark in deck laboratory



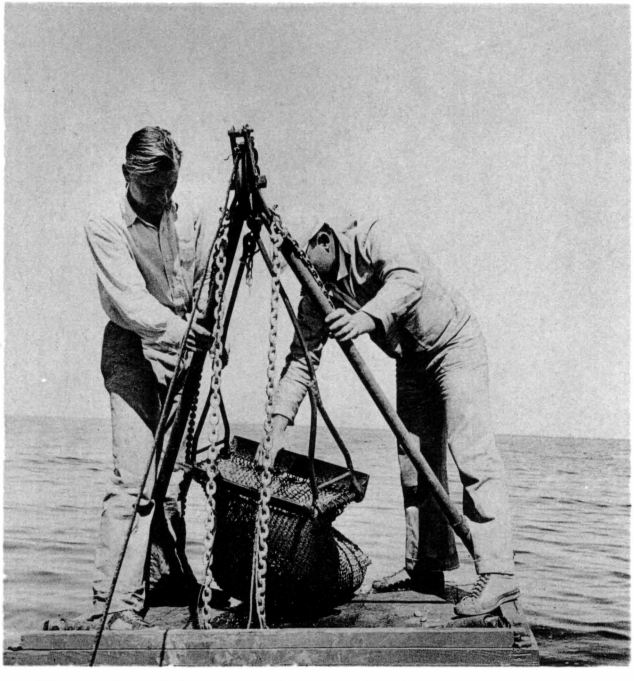


Fig. 25 A and B Dredge in operation in Gulf of California

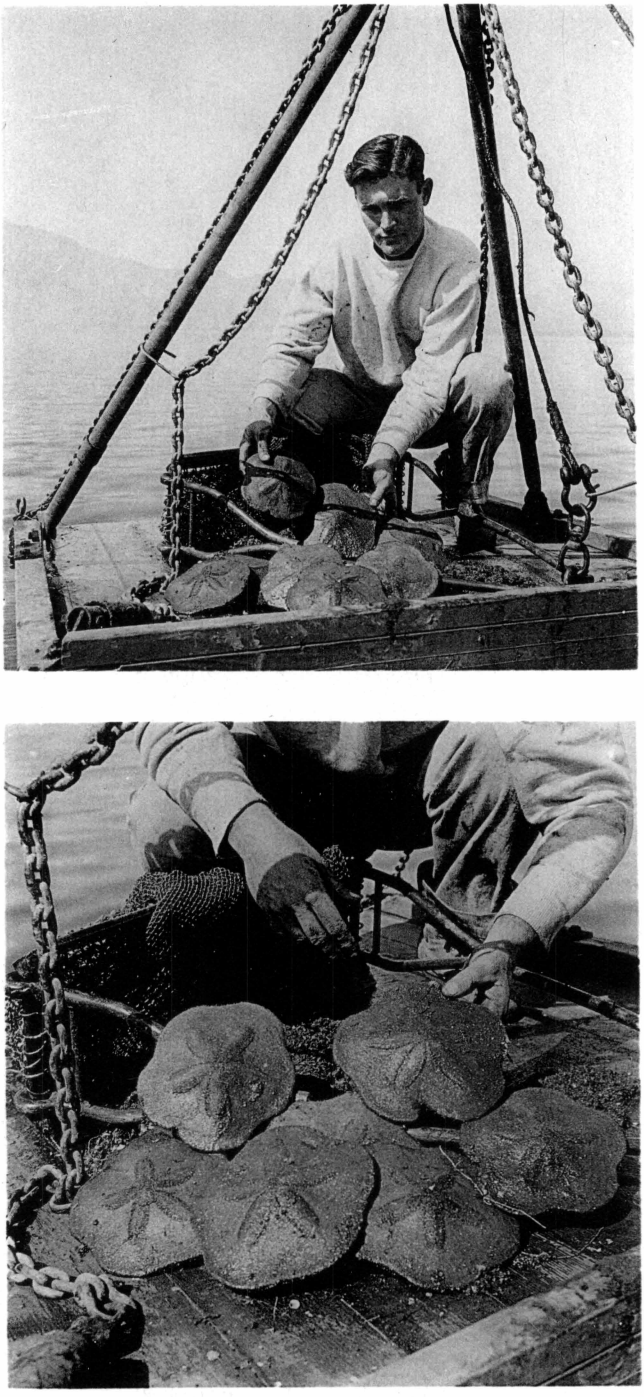


Fig. 26 A and B Dredge in operation in Gulf of California

Fig. 27 Capt. Hancock, Dr. Schmitt examine tangles

Fig. 28 Recording oceanographic data, Humboldt Current

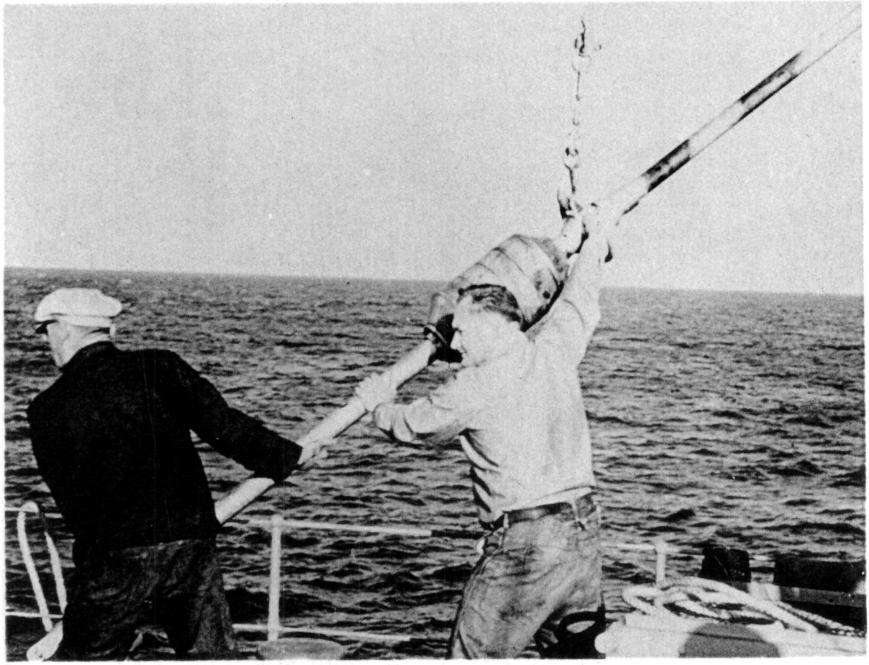


Fig. 29 Core apparatus going into operation

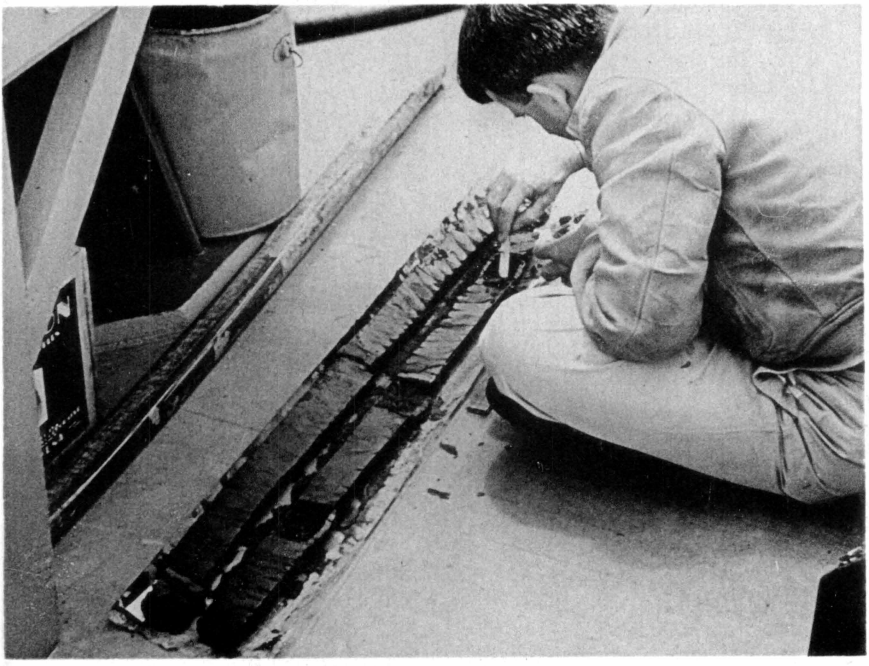


Fig. 30 Core being studied on deck of *Velero III*

PLATES 13, 14

Figs. 25, 26 A series of pictures showing the successive steps in landing a dredge haul on the platform of the small dredge boat. The specimens are giant sand dollars from the Gulf of California.

PLATE 15

Fig. 27 Capt. Hancock and Dr. Schmitt examining deep-sea tangle.

Fig. 28 Dr. Fraser recording and Dr. Schmitt supervising water sampling operations in the Humboldt Current on the Expedition of 1934.

PLATE 16

Fig. 29 Coring device being hoisted by the boom preparatory to removing the core.

Fig. 30 Dr. Thomas R. Clements examining a 6-foot core obtained from a depth of several hundred fathoms by means of the coring device previously shown.

Aft the cross passage mentioned above, but not communicating with it, is the well-lighted dining saloon, occupying the full width of the ship with the exception of the outside passages. The dining table accommodates 16 people. On the forward wall is a scale model of the *Velero III*. On the starboard side leading aft is an inside passageway to the recreation hall. On the port side aft of the dining saloon are the galley and pantry, both well equipped and convenient in every respect. Cooking may be done on either of two ranges, one electric, the other oil-burning. Refrigerators large enough to hold supplies for the day are located in both galley and pantry.

The engine room, amidships, extends from the hold or B deck through the lower or A deck and the main deck to the fidley on the boat deck. On the main deck level forward are the steering gear shaft, oil filter, gravity fuel oil tank, and ventilators. On the port side are the galley, range fuel tank, ship's blueprints, emergency electric panel board, storage space for three outboard motors, gasoline auxiliary generator, and two DC-AC motor converters for radio sending equipment. On the starboard are the ventilating fans, a door to the dining saloon passage, large CO_2 fire extinguisher with 60 feet of hose, and numerous DC-AC converters for radios and motion picture machines. Aft are the manual controls for the watertight bulkhead doors on the B deck level, roll indicator, and another fire extinguisher. Directly over the main engines are "I" beams with traveling chain hoists for emergency repairs. Opening off the port outside passage, aft of the doors to the galley and pantry, are a deck toilet and a small deck locker.

The recreation hall, or music room, is located aft of the engine room well. Like the dining saloon, it occupies the full width of the ship with the exception of the outside passages. It is provided with grand piano, radio, and sound motion picture projection equipment, two couches, easy chairs, music and instrument cabinets, an exhibit case containing specimens and photograph albums representative of expedition work, and a serviceable library. A large globe, the gift of the people of Santa Maria to Captain Hancock, enables expedition members to follow the course of the *Velero III* without recourse to the pilothouse. From the recreation hall a grand stairway leads to the owner's rooms and guest rooms on the lower deck.

Abaft the music room, running athwart the ship, is the well-equipped fish and tackle room. The starboard portion is used extensively for sorting and preserving specimens, particularly in bad weather, since it is the only place protected in all weather in which such work can be done. The fish

room is provided with a sink, running sea and fresh water, a gravity flow alcohol tank, four lockers for glassware, and a work table running the full width of the room providing space for five workers. Beneath the table are eight tiers of drawers, four in a tier, and on the after wall are eight cabinets. The drawers are stocked with fishing tackle and ammunition, the cabinets with rods, reels, and firearms. Overhead storage space provides for the long-handled dipnets and harpoons used from the ship's side or from the launches.

Finally, aft of the fish and tackle room, there is the windbreak, a recess, open astern but otherwise walled in, that was formerly used as sleeping accommodation. As the need for laboratory space increased, the four bunks were removed, and in their place were built tables for three additional workers. The locker accommodation overhead is used extensively for collecting equipment.

In the open deck space astern are the capstan, run by a 5-horsepower motor, the escape hatch, and the lazarette hatch.

Forward on the starboard side is the pump locker with heating controls and filters and five 60-gallon sea-water tanks for living marine specimens. Amidships is a gangway, not used very extensively, since in ordinary operations the men board the small boats over the ship's side. A rope ladder is available for use at any point. There are 32-foot booms for both port and starboard sides, for use when the ship is at anchor and several of the boats are in the water. The port boom is stored on the fidley when not in use.

Lower or A deck. Below the main deck level the ship is divided by four watertight bulkheads into five watertight compartments, any three of which will keep the ship afloat. In the peak of the lower or A deck there are a water-trim tank, the chain locker, and officers' and crew's lavatories and showers, immediately after which is a hatch at the forward end of the passage that goes aft to the engine room gallery. On the port side there are four staterooms (crew's quarters), officers' messroom and library, linen lockers, storeroom for machine parts, room for the master gyro compass, and battery room with Exide ironclad batteries of 900 ampere-hour capacity; on the starboard, four staterooms (crew's quarters), crew's messroom, crew's pantry, well-equipped photographic darkroom, refrigerator room, and milling machine. The staterooms are certified for either two or three seamen.

The engine room, amidships, is large, 46 feet in length, with a six-foot balcony on the lower or A deck surrounding the main engines. On the

hold or B deck level the central portion is occupied by the two main engines, and forward are the two 75-kilowatt generators, each driven by a 125-horsepower Diesel engine. On the forward bulkhead is the 11′ x 7′ master switchboard. In addition there are two 20-kilowatt generators driven from the main shafts. On the B deck portside there are in succession fuel oil valve manifold, fuel oil transfer pump, lubricating oil pump, fuel oil pump, 250-gallon oil filter in two separate units, two large fresh-water pressure tanks and filters, bilge manifold, bilge pump, auxiliary air compressor, septic tank, and, on the bulkhead, the compressed air bottles. On the B deck starboard side there are in succession fuel oil manifold, fuel oil transfer pump, bilge manifold, sea-water sanitary pressure tank, two fuel oil pumps, volt booster set, two sea-water pumps, fuel oil centrifuge, lubricating oil filters, emergency sea-water pump, fire pump, auxiliary air compressor, air bottles, spare water cooler, spare oil pump, and a refrigeration unit for the cold stores forward.

On the lower or A deck portside from the battery room aft are day fuel oil tank, 1,000-gallon lubricating oil storage tank, electrician's workshop, lubricating oil heater and centrifuge, machine shop equipped with a turning lathe, two drill presses, emery wheels, and a complete set of machine tools, as well as welding equipment. On the starboard side from the milling machine room aft are day fuel oil tank, 1,000-gallon lubricating oil storage tank, spare cylinder head, spare valves and seats, five tanks for various oils, a 125-KW AC-DC converter for the use of shoreside utility power on the *Velero III,* an automatic air compressor, an electric fresh-water still, a toilet, and a large spare-parts storeroom.

Aft of the engine room on the lower A deck level are the owner's two rooms, each with twin beds, with lavatories, dressing tables, and closets forward and closets aft. The grand stairway, descending from the main deck, reaches a landing midway, from which a stairway passes on either side to each stateroom of the owner, while the main stairway continues aft to a passage, on either side of which are located three guest staterooms for scientists, two double and one single. The four double staterooms are provided, like the owner's rooms, with twin beds, chest of drawers, clothes closet, lavatory with toilet and shower, and are equipped with forced-draft ventilation. The two single staterooms are provided with bunks, one of which may be used as an operating table. A sterilizer for surgical instruments and a complete stock of medical, dental, and surgical supplies are kept in lockers in this room, which is occupied by the ship's surgeon on long cruises. Aft the single staterooms there are a laundry room on the

port side and a laboratory room on the starboard side which is used for the chemical analysis of sea water. Above the extreme after end of the central passage is an emergency escape hatch. Finally, there is the lazarette for the quadrant and other steering equipment to be used in case of a failure of the shafts between the pilothouse and the engine room.

The hold or B deck. From the peak of the ship aft on the hold or B deck level are located the forward trim tank, the refrigerators, with two cold boxes on the port side and three on the starboard, and the dry stores. Between the dry stores and the engine room are located the deep oil tanks, port and starboard. Each is divided into three compartments to prevent slopping with the roll and pitch of the ship. With one or two exceptions, there are no shell tanks. Aft the watertight bulkhead is the main deck of the engine room, previously described in connection with lower deck A. Aft the engine room are the shaft alleys, each allowing inspection of any part of the shaft, and between them are two double-bottom fresh-water tanks of 4,000-gallon capacity each. A passageway connects the shaft alleys aft the water tanks. It is followed by a watertight bulkhead, another fresh-water tank, and the after trim tank. Outside the shafts are four fuel oil wing tanks, two on either side. Below the cold stores is a fresh-water tank, below dry stores two double-bottom oil tanks. Under the engine room deck are an oil cooler and six double-bottom oil tanks, and below these are the bilges. While the ship is running, fuel oil is often pumped from tank to tank to keep her on an even keel.

General. All decks are of steel plate. On the flying bridge, the boat deck, and all boat deckhouse coverings, over the steel there is a joiner deck of Douglas fir, separated by a space through which there is air circulation, and over this, a canvas covering. In the boat deckhouses, the canvas is replaced by battleship linoleum. On the exposed portions of the upper deck, and in the principal compartments of the upper and lower decks, mastic replaces the joiner deck, and battleship linoleum is used for covering. On the fo'c's'le deck and the various workrooms, paint is used in place of linoleum. The galley, pantry, and toilet and washrooms are tiled. The staterooms are insulated at shipside with two inches of cork.

The bilge, ballast, and fire systems are handled separately. There are two fresh-water systems, one for drinking and cooking, and one for lavatory, shower, and laundry purposes. The capacity of each system is 9,000 gallons. Fresh water is circulated by automatic pumps and pressure tank. The water is heated electrically (all heat is electrically produced), and for this heating the ship is divided into three zones, each with a separate

heater. The salt-water sanitary system and salt water for showers are also circulated by automatic pump and pressure tank. In case of a breakdown of the engine pumps, an auxiliary system with a 250-gallon centrifugal pump may be placed in use. Purifiers are used for fuel oil and for lubricating oil.

The ship is artificially ventilated. Separate systems are used for all the staterooms and other watertight compartments to avoid the necessity of puncturing the watertight bulkheads. Fresh air is supplied to each stateroom. The galley and the pantry have the air exhausted rapidly enough to have a complete change every three minutes. All toilets have the air exhausted.

There are four watertight bulkheads between all compartments below the boat deck. Watertight bulkhead doors are manually operated, with indicator in the pilothouse showing whether they are open or closed. All outside doors are watertight; all openings through the lower deck are closed by watertight hatches. All air and light openings, with the exception of the skylights and those in the pilothouse front are heavy, bronze-framed portlights with extra thick glass.

There is a telephone system with telephones in the Captain's room, the dining saloon, the recreation room, the pantry, one stateroom in the fo'c's'le head, the owner's room, the engine room, and the Chief Engineer's room. All wiring is in conduits or flexible U.S. Navy marine cable. There is a general alarm system, having fire stations, controlled from the bridge. A navy standard blinker light is installed on top of the foremast, with key box arranged for portable operation from the bridge.

The auxiliary 7½-kilowatt, gasoline-driven generator on the engine room main deck level is a special safety fixture, as it can be put into use to supply light or radio power even if the engine room is flooded.

Extra equipment for scientific work. Besides such regular equipment as nets, seines, townets, dipnets, diving helmet, harpoons, and fishing tackle, there are available two sizes of dredge, a beam trawl, a sounding machine (as well as the fathometer in the pilothouse), 6 reversing water bottles, 12 deep-sea thermometers, several types of bottom samplers, and bottom "core" apparatus.

The larger dredge (at least one extra always kept on the forward deck ready for use) is handled from the forward deck of the *Velero III* with a winch and cargo boom. The ⅝-inch steel cable from the dredge passes through a sheave, near the stem head, through a metal guide, and then through a second guide, by which the lateral position can be con-

trolled, to a 1,000-fathom cable capacity drum, operated by a winch, which allows for different speeds and is controlled by shift gears. A contact wheel meter is used to record the amount of cable let out or hauled in.

To lower the dredge to the surface of the water, or to raise it and bring it inboard so that the contents may be dumped on the screens, the cargo boom is used over the starboard side.

The dredge itself is much the usual type. It consists of two steel jaws, 3′ 6″ long, held 12″ apart by steel bars near each end. The steel arms are attached to the crossbars in such a way that they may swing through an arc. Eyes at the other end of the arms are lashed together by heavy twine, and the shackle from the cable is attached to one of the eyes.

The inner bag of the dredge is of ½-inch mesh, the outer of 1-inch heavy mesh. Both are closed at the bottom, when in use, by a rip cord. Within the larger inner net is a smaller burlap net, fastened to the inner net near its mouth, to retain some of the finer material that would pass through the meshes of both inner and outer nets, and a sample of the sand or mud through which the dredge may be hauled. The nets are protected by a steel chain net. Commonly (in recent trips, almost always), tangles are attached to the free edge of the chain net, instead of being used separately.

The screens used for sorting are three in number, the frame of one fitting exactly to the frame of the one below. The topmost has the coarsest mesh, and the lowest, the finest. The material is washed with a sea-water hose, and the usable material is picked out from each screen in turn and roughly sorted before it is taken to the laboratories for further sorting and preservation. If much fine stuff collects on the lowest screen, it may be put into buckets or jars for tray washing, so that as much of the material as is possible may be saved.

The small dredge, with jaws 2′ 6″ long and 8″ apart, is similar to the large dredge, but has not the inner bag. It is operated from one of the motor boats that has been especially fitted for the purpose with a winch and drum of 250 fathoms of cable, platform table, and an A-frame, movable through an arc, the block for the cable being at the angle of the A-frame. Aft of the winch there is a cockpit in which the dredge operators may stand, with the sorting table at suitable height. A small beam trawl, 6′ 0″ long, with an opening 15″ wide, is handled from the motorboat in the same way as the dredge, when bottom conditions are suitable.

The deep-sea water bottles with their reversing thermometers and the bottom samplers are operated from the port side of the *Velero III*.

The piano wire reeling apparatus and the meter are placed on the boat deck, but the instruments and the messengers are handled from the deck below.

Recently, a "core" sampler was constructed and is giving satisfactory results. It is handled from the forward deck in much the same way as the dredge; but, as it is heavier, more adjustment is necessary in getting it outboard and inboard. So far only a six-foot tube of 2½-inch diameter has been used, and samples have been obtained of almost that length; but a twelve-foot tube has been constructed in the hope of getting longer cores.

One of the 26-foot launches is especially fitted for fishing, but fishing is not confined to this boat. To bring live marine animals, e.g., fishes, back to port, there are aquaria available, where the water supply can be continuously renewed and temperature controlled. Mention has already been made of the space on the after boat deck that is used for terrestrial species.

It is not necessary to go further into detail of the structure and the equipment of the ship. Enough has been said to indicate that every provision possible has been made for the safety, convenience, and comfort of everyone who has gone to sea, or will go, to help make the expeditions of the *Velero III* a success.

The motor cruiser *Velero III,* together with equipment just described, was presented to The University of Southern California as a floating research laboratory in January, 1939. Captain Hancock continued to serve as Master of the ship and Director of subsequent expeditions conducted under University auspices.

PERSONNEL

Crew

The ship was constructed and ready for action; but, although she was well built and well equipped, of herself she could do nothing—the human element had to come into the operation. This job was too great, even for Captain Hancock. He may have been able to handle the *Cricket* alone, but the *Velero III* was not the *Cricket.* By taking some of the officers and operating crew that had served him on other vessels, and by making some additions, the Captain had a capable ship's company, ready for action when the ship was ready. Some of those men may boast of twenty-five years of service with Captain on these ships. They were fully familiar with their ship's duties from the start, but making proper use of the scientific equipment was something new. It did not long remain so, for soon everything was running without a hitch. During these years of experience, they became such masters of the situation as to be able and ready to make many a suggestion for the improvement of the apparatus, or of its operation, and, better still, have carried out these suggestions to the greater success of the operations.

To anyone who has recently watched these operations for the first time, they serve as a fine object lesson of how efficient work can be carried on smoothly and uninterruptedly. No one who has not been on one of the longer cruises can really appreciate how much this capable, cheerful attention to every need contributed to the success of the expeditions.

On the longer cruises, the full complement of officers and men consisted of two or three qualified officers, three mates, one radio operator, three engineers, three oilers, three seamen, two stewards, two cooks, and one messman, a total of eighteen persons. In home waters the number was slightly reduced.

Scientists

Needless to say, much of the success of the Expeditions depends upon the scientific personnel. This has included a rather extensive list of men who have had practical experience in marine investigation. Apart from those who are, or have been, directly connected with the Allan Hancock Foundation, very few have found it possible to leave their duties at their home institutions to take part in more than one expedition. This may be considered as either fortunate or unfortunate: fortunate because, with extensive changes from year to year, specialists in a greater number of groups of animals and plants have been included; unfortunate because

the experience gained in investigation on one expedition in the Eastern Pacific is all the more valuable for further work in this area.

Most of the members of the staff of the Foundation are younger men, and these men, going out year after year, obtain cumulative experience that helps much toward related continuity of the exploration.

On all the longer cruises, with the exception of the 1940 Expedition to the Gulf of California, there was a ship's doctor aboard to look after the health of the ship's company. Even though his duties were seldom onerous, the company would have been far from complete without him.

Photography has been an integral part of the work of the Expeditions. There was always an official photographer along, but amateur photography was not neglected.

First Expedition—December 3, 1931, to February 27, 1932.
John S. Garth, Leo G. Hertlein, Karl Koch, Edwin O. Palmer, Cyrus B. Perkins, Alvin Seale, George E. Stone. (See Chart 1 for route of Expedition 1, vol. 1, no. 3.)

Second Expedition—December 29, 1932, to March 23, 1933.
John S. Garth, Cyrus B. Perkins, Waldo L. Schmitt, Harry W. Wegeforth, Fred Ziesenhenne. (Chart 2, vol. 1, no. 3.)

Third Expedition—Decembr 30, 1933, to March 14, 1934.
C. McLean Fraser, John S. Garth, Emory Johnson, Harold W. Manter, Edwin O. Palmer, Waldo L. Schmitt, Wm. Randolph Taylor, Fred Ziesenhenne. (Chart 3, vol. 1, no. 3.)

Fourth Expedition—November 23, 1934, to April 12, 1935.
R. W. Craft, John S. Garth, Waldo L. Schmitt, Fred Ziesenhenne. (Chart 4, vol. 1, no. 3.)

Fifth Expedition—February 14, 1936, to March 26, 1936.
John S. Garth, J. Alex Hill, Emory Johnson, Edwin O. Palmer, Chas. Towers, Fred Ziesenhenne. (Chart 5, vol. 1, no. 3.)

Sixth Expedition—February 26, 1937, to April 8, 1937.
Bruce Crawford, John S. Garth, J. Alex Hill, Edward M. Pallette, P. J. Rempel, Charles B. Wade. (Chart 6, vol. 1, no. 3.)

Seventh Expedition—January 3, 1938, to March 13, 1938.
Granville Ashcraft, Hubert Lyman Clark, John S. Garth, J. Alex Hill, Karl Koch, George S. Myers, Edwin O. Palmer, Cyrus B. Perkins, Jr., Anker Petersen, Fred Ziesenhenne. (Chart 7, vol. 1, no.3.)

Eighth Expedition—March 12, 1939, to May 14, 1939.
Granville Ashcraft, Francis Elmore, John S. Garth, J. Alex Hill, C. L. Hogan, Karl Koch, Cyrus B. Perkins, Jr., Anker Petersen,

Waldo L. Schmitt, Wm. Randolph Taylor, Chas. B. Wade, Harry W. Wegeforth (return from Trinidad only), Fred Ziesenhenne. (Chart 8, vol. 1, no. 3.)

Ninth Expedition—January 17, 1940, to February 20, 1940.
Granville P. Ashcraft, Gustav F. Augustson, Yale Dawson, John S. Garth, J. Alex Hill, Anker Petersen, John Tyler, Chas. B. Wade, Fred Ziesenhenne. (Chart 9, vol. 1, no. 3.)

Tenth Expedition—February 22, 1941, to March 2, 1941.
Granville Ashcraft, Thomas Clements, C. McLean Fraser, John S. Garth, William Richardson, John Tyler, Henry Ward, Fred Ziesenhenne. (Chart 10, vol. 1, no. 3.)

GRANVILLE P. ASHCRAFT—Allan Hancock Foundation
Field Collector, birds, mammals

GUSTAV F. AUGUSTSON—Allan Hancock Foundation
Field Collector, ecto- and endo-parasites

HUBERT LYMAN CLARK—Museum of Comparative Zoology at Harvard College
Echinoderms

THOMAS CLEMENTS—The University of Southern California
Geology, sedimentation

R. W. CRAFT—Pasadena
Ship's Doctor

BRUCE CRAWFORD—The University of Southern California
Field Collector, cestodes

E. YALE DAWSON—University of California, Berkeley, California
Field Collector, algae

FRANCIS ELMORE—The University of Southern California
Anthropology

C. MCLEAN FRASER—University of British Columbia, Allan Hancock Foundation
Hydroids

JOHN S. GARTH—Allan Hancock Foundation
Arthropods

LEO G. HERTLEIN—California Academy of Sciences
Paleontologist, mollusks

J. ALEX HILL—Allan Hancock Foundation
Field Collector, echinoderms

C. L. HOGAN—The University of Southern California
Geology, photographer

KARL KOCH—San Diego Zoological Gardens
Collector, live birds
HAROLD W. MANTER—University of Nebraska
Zoology, fish parasites
GEORGE S. MYERS—Natural History Museum, Stanford University
Ichthyology
EDWARD M. PALLETTE—Los Angeles
Ship's Doctor
EDWIN O. PALMER—Hollywood
Ship's Doctor
CYRUS B. PERKINS—San Diego Zoological Gardens
Herpetologist
CYRUS B. PERKINS, JR.—San Diego Zoological Gardens
Field Collector, reptiles
ANKER PETERSEN—Allan Hancock Foundation
Staff Artist
P. J. REMPEL—The University of Southern California
Botany, land plants
WILLIAM RICHARDSON—Portersville, California
Field Collector, mammals
WALDO L. SCHMITT—United States National Museum
Crustacea
ALVIN SEALE—Steinhardt Aquarium, Golden Gate Park, San Francisco
Fishes
WM. RANDOLPH TAYLOR—University of Michigan
Botany, algalogist
CHAS. TOWERS—The University of Southern California
Field Collector
JOHN TYLER—Allan Hancock Foundation
Biologist, photographer
CHARLES B. WADE—Allan Hancock Foundation
Field Collector, fishes
HENRY C. WARD—Santa Monica
Ship's Doctor
HARRY W. WEGEFORTH—San Diego Zoological Gardens, *President*
Ship's Doctor
M. WOODBRIDGE WILLIAMS—The University of Southern California,
Zoology
Field Collector, mollusks
FRED ZIESENHENNE—Allan Hancock Foundation
Field Collector, echinoderms

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Exploration which is international in scope cannot be accomplished without the closest cooperation of the various agencies of the countries visited. This is particularly true in the field of marine biology and ornithology, where valuable commercial species are protected by national and sometimes by international law. In all cases the work of the *Velero III* was welcomed by the Latin-American governments, who saw in it an opportunity to gain important information upon their flora and fauna (and to aid international scientific research). The government of Mexico, through its Department of Fish and Game, not only generously issued permits for exploration at Guadalupe Island and in the Gulf of California but made available the services of a staff member, well acquainted with local conditions, to accompany these cruises. The Ecuadorian government, through its Minister of Foreign Relations, not only issued the desired permits allowing the *Velero III* to visit the Galapagos Islands but generously waived the customary fees levied against both private and commercial vessels visiting Ecuadorian waters. The Peruvian *Compañia Administradora del Guano,* which controls valuable guano concessions, twice issued permits for the *Velero III* to conduct exploration in the vicinity of the Bird Islands of Peru. To these governments and their agencies in particular, as well as to those of other countries at which Allan Hancock Expeditions stopped for less extensive operations, acknowledgment is gratefully tendered.

Before the permits mentioned above could be issued, certain diplomatic representations had to be made. On cruises in which the U.S. National Museum participated, these were made through the U.S. Department of State; on other cruises, through the office of the Director-General of the Pan American Union. The personal interest taken by United States Minister Dawson in Ecuador and by Ambassador Lawrence Steinhardt in Peru, and the services rendered by the United States consulates at Guayaquil and Callao greatly facilitated the work of the expeditions in South America. The same is true of representatives of the State Department at Central American ports of call of the *Velero III.*

The Department of Commerce issues, through the U.S. Coast and Geodetic Survey, the navigational charts used in plotting *Velero III* station locations, and the *U. S. Coast Pilot,* excerpts from which are freely quoted in the geographical section of this account. The U.S. Bureau of Fisheries (now the Fish and Wildlife Service of the Department of the

Interior) was responsible for the loan of valuable oceanographic equipment used in surveying the Humboldt Current in 1934.

Again it is desired to call attention to the valuable assistance of the San Diego Zoological Society under the late Dr. Harry W. Wegeforth and the valuable assistance of the California Academy of Sciences at San Francisco, for doing so much to initiate the scientific work of the *Velero III* in the Eastern Pacific.

Under ordinary circumstances personal acknowledgments would loom large in a publication such as this; but, as all the obligations that there may be depend upon the good will of those directly associated with the Allan Hancock Foundation, it may be well to call this an All-Foundation product rather than to credit individually the workers who have made it possible.