

DEEP-SEA TRAWLING OFF BERMUDA ISLES ON THE 'CARYN'

By LOREN P. WOODS AND MARION GREY

(This is the story of the deep-sea operations of the Bermuda Deep-Sea Expedition, 1948, conducted jointly by the Museum and the Bermuda Biological Station for Research, Inc.—the shorefish collecting operations were the subject of an article in the September BULLETIN. The writers, Mr. Woods, Curator of Fishes, and Mrs. Grey, Associate in Fishes on the Museum staff, were both members of the expedition. The photographs are by Assistant Taxidermist Ronald J. Lambert. The expedition, largest sponsored by the Museum in recent years, was under the leadership of Dr. Fritz Haas, Curator of Lower Invertebrates. It has now completed its work in the field, and the long tasks of sorting and identifying study specimens, research, and preparation of exhibits are beginning. This article winds up those on collecting operations, but further articles on the results of the work will appear in future issues.)

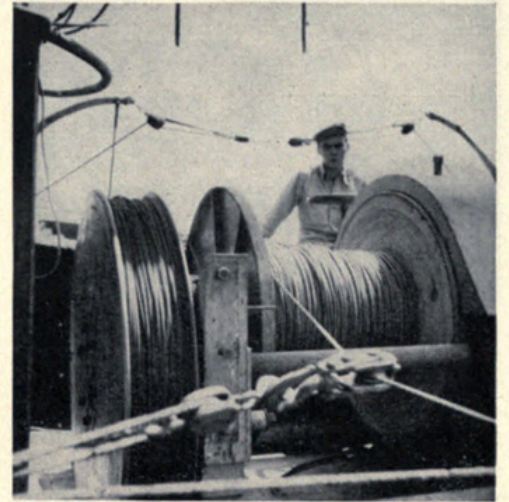
THE auxiliary ketch-yacht *Caryn*, used during the summer of 1948 by the Museum's Bermuda Deep-Sea Expedition, has been found to be admirably suited for deep-sea fishing because of its size (98 feet) and easily managed fore-and-aft rig. In ordinary seas towing can be carried on at a speed of about four or five knots. Owing to the ease with which the ship may be handled, few men are required to handle the gear.

The most essential piece of equipment used in deep-sea exploration is a large sturdy winch. The one on the *Caryn*, located amidships, carries slightly more than 12,000 feet of $\frac{3}{8}$ -inch steel cable, which is led over a series of three heavy, specially constructed pullies, arranged to relieve the strain both on net and winch. The nets used were 7- and 12-foot ring nets and 35- and 65-foot otter trawls, all small nets compared to

those used in commercial fishing operations. Into the end of each of these nets had been sewn a soft cone-shaped cloth supported by rings and capped at the apex with a straight-sided can. This modification of the nets has resulted in bringing soft-bodied fragile fishes and invertebrates to the surface in cold sea-water, protected from the mashing and rubbing effects of the net.

TRAWLING NEAR ABYSS

During the first month of operations the work was exploratory, with fishing in scattered localities off the southern and western parts of Bermuda. Less than ten miles off the southern shore the bottom dips to more than 1,000 fathoms (a depth of more than a mile) and it is in this near-by deep area that most of the previous deep-sea fishing around Bermuda has been carried on. Less than twenty-five miles to the



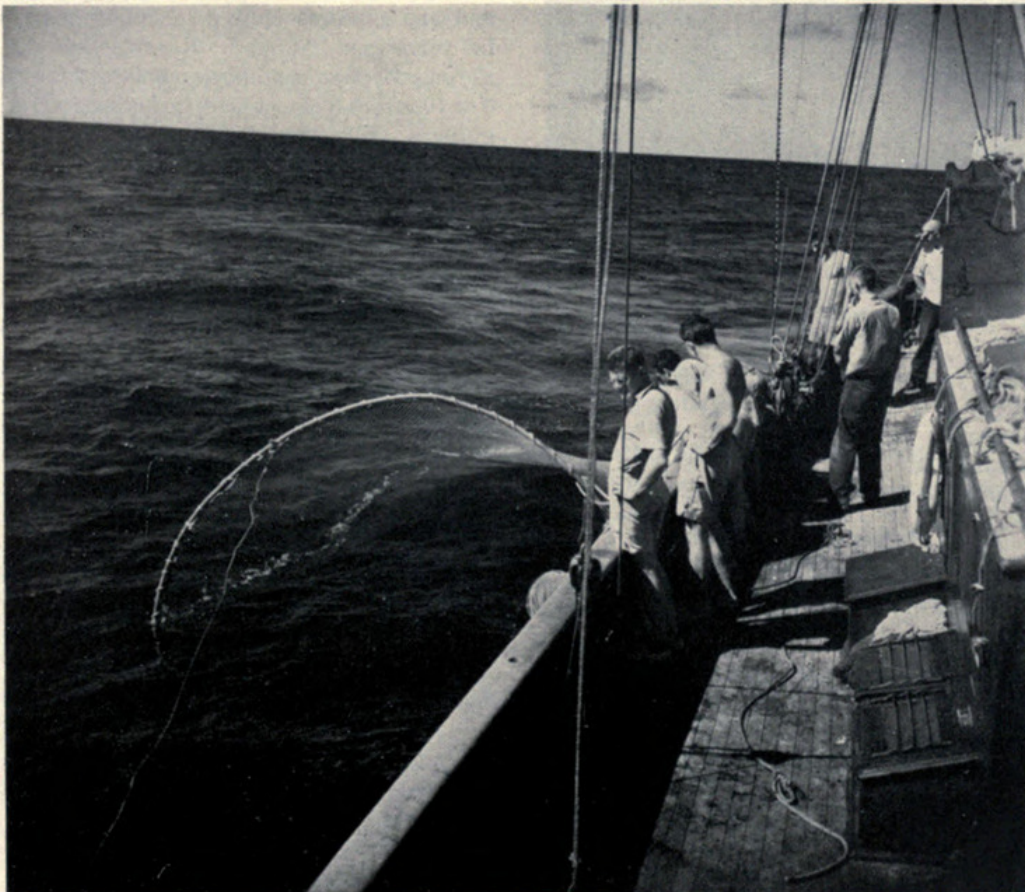
PRIMARY OCEANOGRAPHIC TOOL

On most ships the winch would be used chiefly for straining on hawsers or weighing the anchor, but on the "*Caryn*" its principal purpose is to haul in the trawls with specimens of deep-sea life desired for the expedition's scientific purposes.

southwest of the islands are two extensive banks, lying only twenty-three to twenty-six fathoms below the surface, surveyed seventy-five years ago by the famous Challenger Expedition. These banks have precipitous slopes dropping off to abyssal depths. The outlying position of these banks, combined with complicated currents surrounding them, makes them fishing grounds likely to be of considerable interest. Trawling by the *Caryn* was about equally divided between these two general areas and was carried on well above bottom between the depths of 250 and 800 fathoms.

The usual procedure was to leave St. George's Harbor in the afternoon, arriving in the area to be fished just before dark, thus allowing time for two or three hauls during the night. Night fishing in deep water is more productive than daylight work owing to the migration towards the surface of many kinds of animals during the dark hours. When the ship arrived over sufficiently deep water, we chose a course over which the net was to be hauled, giving due consideration to the bottom contour, the currents, so far as known, and the wind.

After the net has been carefully inspected at its attachment to the cable and the end where the fishes gather has been tightly tied, it is thrown overboard and subsequently dragged in a large circle until free from twists. At a signal from the captain, the winchman slowly pays out a few fathoms of cable and when the net is seen to be clear and in proper fishing position it is slowly lowered away. One to two hours are involved in lowering the net and it is hauled at its maximum depth for about the same length of time, while the ship labors and wallows with the increasing strain and pull of such a cumbersome sea-anchor. At least



TWELVE-FOOT RING NET GOING DOWN

Each time the net was hauled up, the scientific personnel aboard the "*Caryn*" had the prospect of surprises in the way of possible species hitherto unknown to science or at least of types of abyssal marine animals very much needed for the Museum's collections.



BERMUDA BIOLOGICAL STATION

This research institution at St. George's in the islands was joint sponsor with the Museum of the Bermuda Deep-Sea Expedition. Its laboratories and other facilities were of utmost usefulness to members of the Museum party.

another two hours are required to raise the gear back to the surface. Two or three hauls were usually made.

QUICK-FREEZE FOR SPECIMENS

The end of the net in which the specimens collect must be kept suspended upright and carefully untied so that neither the water nor its contents are spilled, an accomplishment sometimes presenting the handlers with considerable difficulty on the rolling, tossing deck. When the can is removed from the net it is held down in a large enamel tray while the catch is briefly inspected. Living material is placed in iced sea-water to be examined while the next haul is being made, at which time luminous organs are examined and colors noted. Certain fishes and invertebrates are selected for bacterial studies, luminous bacteria being collected by scraping the skin and squeezing out the contents of the intestines into nutrient solution. These bacteria are being investigated by E. R. and Martha Baylor, of Princeton University and Rockefeller Institute. When the rest of the material has been preserved or otherwise cared for, the animals left in the soft bag in the net are washed into a pail and placed in preservative. The net is then searched from end to end by all hands for any animals that may have become tangled in its meshes.

Back in the laboratory the living animals, chiefly prawns, which have been kept at a temperature of about 40 degrees, are returned to the refrigerator to be used in physiological and morphological studies by

Dr. Ralph Dennell of Manchester, England. Dr. Dennell, who has previously been working on luminescence in insects, has come to the Bermuda Biological Station to study the luminescence of deep-sea crustaceans. Light production in many deep-sea animals is accomplished through association with luminescent bacteria. Thus there has developed a symbiotic "mutual benefit" association of animal host with luminous guest bacteria that affords biological problems of intriguing interest.

Dr. Lyell J. Thomas, of the University of Illinois, engaged in examination of speci-



A DEEP-SEA DENIZEN

The luminous stalk-eyed squid from great depths. Most of its tentacles are greatly reduced in length compared to those of its relatives inhabiting the waters nearer the surface. It is about 3 inches long.

mens for parasites, both external and internal and co-operated in the work of the Museum party. His field of interest promises to be especially fruitful of novel results.

SORTING AND TAGGING

Preserved specimens are poured into flat-bottomed bowls and trays, and the invertebrate animals are sorted out by Dr. Fritz

Haas, leader of the expedition and Curator of Lower Invertebrates at the Museum, for special treatment and study. Specimens both of these and of fishes are set aside for photographing by Mr. Ronald J. Lambert, taxidermist, who will later take part in providing models for the projected new Hall of Deep-Sea Life.

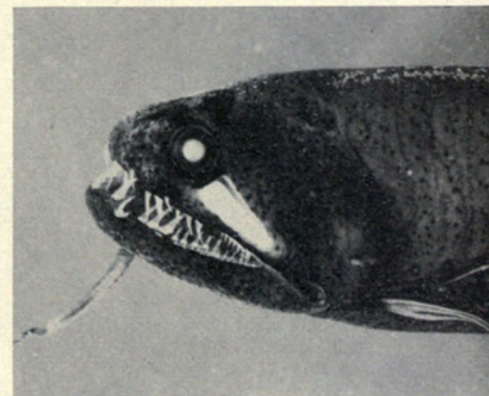
The collections are further sorted, tentative identifications made, and more detailed notes taken before the specimens are bottled up in containers of appropriate size for hardening in alcohol or formalin. Later they are loosely packed in cotton-stoppered vials, wrapped in cheesecloth, some braced with light strips of wood, and are stored in large containers until time to ship them to Chicago Natural History Museum for detailed study and description.

The results of the collecting have been gratifying, particularly in regard to variety of species and the excellent condition of the specimens obtained. Each net haul brought up species not previously caught by us, and nearly all are new additions to the Museum's study collection, which until now has contained very few deep-sea animals.

MOSTLY TINY CREATURES

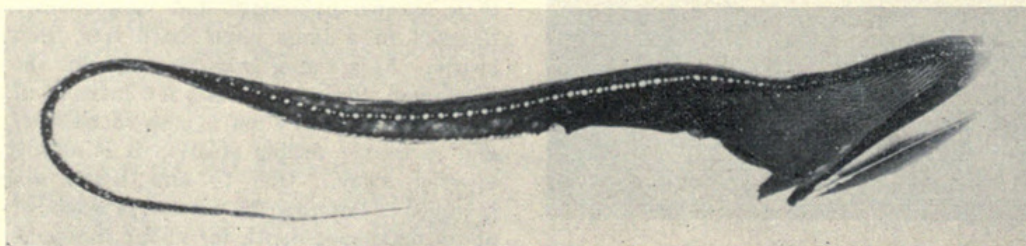
The outstanding difference between an ordinary catch of fish and a haul brought up from deep water is in the individual size of the specimens. Deep-sea nets capture mostly tiny, slow-moving, or young fishes and any specimen over 6 inches long may be considered "large." Nevertheless the Caryn collection contains a number of fishes 9 or 10 inches to 3 feet long, including several gulpers (*Eurypharynx*), deep-sea snake mackerels (*Thyrsopterus*), a fish named *Echiostoma*, which is equipped with a variety of luminous organs, and several kinds of eels.

Color is another striking characteristic of a haul of deep-sea fishes, particularly when



FISH THAT LIGHTS ITS WAY

The spiny-mouth, *Echiostoma*, has luminous fins, a luminous cheek light, luminous teeth, and two rows of luminous organs on the body. It ranges up to a length of 12 inches.



A STRANGE CREATURE IS THE GULPER

Its scientific name is *Eurypharynx*, Greek for wide-throat. Another good descriptive name is pelican fish. It grows to lengths of about 2 feet.

contrasted to a catch of reef fishes such as those found in the waters of Bermuda. Instead of the array of bright color patterns, specimens from the depths display an all-over black, drab gray, or silver hue; or they

are transparent or translucent white, the latter color usually found in larval and young forms. Bizarre form and luminous organs are characteristic of deep-sea animals, whether fishes, crustaceans, or squids.

Among the invertebrate animals brought up by the trawl, crustaceans predominate; and these creatures are as unlike their shallow-water relatives as are the deep-sea fishes. Deep-sea squids are especially remarkable, a notable example being the luminescent form with eyes at the ends of retractile stalks and with greatly modified tentacles, shown in one of the accompanying illustrations.

The work of the Bermuda Deep-Sea Expedition, 1948, has been assisted and expedited by Dr. Dugald E. S. Brown, Director of the Bermuda Biological Station, who has long been interested in the physiology of deep-sea animals. Acting in an advisory capacity, Dr. Brown has helped with the planning of each cruise, supplied miscellaneous equipment to increase the scope of the collecting, and contributed much information about deep-sea fishing in general and oceanographic conditions around Bermuda in particular. Mr. Noel Burland, of Bermuda, rendered invaluable assistance in all of the operations of the *Caryn*. Mr. Howard Taylor, of New York, an undergraduate student at Yale, worked faithfully as a volunteer and later joined the crew of the *Caryn*.

SATURDAY MORNING CHILDREN'S MOVIES

The James Nelson and Anna Louise Raymond Foundation will present its autumn series of free motion-picture programs for children on Saturday mornings, beginning October 2 and continuing through November 27. All of these programs will be given at 10:30 A.M. in the James Simpson Theatre of the Museum. In addition to motion pictures, lecturers will appear on five of the nine programs.

Children may come alone, accompanied by adults, or in groups from schools, etc. No tickets are needed.

Following is an outline of the programs:

October 2—MIDNIGHT MOVIES IN ANIMALLAND

Lecture by Howard Cleaves

October 9—RUGGED ROAD TO CAPE HORN

Auto adventuring down South America

Also a cartoon

October 16—STRANGE NEIGHBORS

Lecture by William G. Hassler, Nashville Children's Museum

October 23—FUN WITH FRIENDS OF FUR AND FEATHER

Lecture by Cleveland P. Grant

STEWARTIA—SHE'S 'MISS AMERICA' OF THE SHRUBS

By JULIAN A. STEYERMARK
ASSOCIATE CURATOR OF THE HERBARIUM

MOST people appreciate and love beautiful objects in nature, but frequently don't know where to find them. Sometimes they gain the impression that they must travel to distant lands or to inaccessible mountain tops in the hope of locating unusual plants and animals. They will, therefore, be pleasantly surprised to learn that some of the most beautiful plants can be found in the United States, and only about 650 miles by auto roads from the heart of Chicago.

In this instance, I refer to a shrub, native in the southern Appalachian Mountains. Although its relatives, camellia and tea, are well known, camellia for its prominence as an ornamental plant, and tea for the drink prepared from its leaves, the shrub of the southern Appalachians is relatively little known. Like most of the members of the tea family (*Theaceae*), it has large showy flowers. This beautiful shrub, called mountain *Stewartia* (also spelled *Stuartia*) or mountain camellia, its scientific name being *Stewartia pentagyna*, easily ranks as one of the showiest and most attractive of native shrubs in the United States.

Growing to a height of nearly 15 feet, this shrub is covered during the months of June to August with large blossoms about 3 inches across. The five to six spreading cream-colored or white petals have a lavender or pinkish tinge on the outside and surround a central mass of numerous purple stamens. From a distance they resemble a large white rose or even a flower-

ing dogwood. Unlike the dogwood, however, the flowers appear when the leaves are fully developed.

By keeping a close watch along some of the roads in the Great Smoky Mountain National Park at elevations between 1,000 and 1,500 feet, or at similar elevations in parts of the Blue Ridge and Piedmont Plateau, travelers are likely to find this beautiful shrub in the forests, generally near streams and in rich woods. A closely related species, known as silky camellia or Virginia *Stewartia* (*Stewartia Malachodendron*), grows at lower elevations near and in the coastal plain from Virginia southward and westward. Four other species are known from eastern Asia, principally Japan. The latter country, incidentally, is the home of some species of the true camellia, although that genus is represented in other parts of the Orient and some of the Philippine and Celebes Islands.

It is most fitting that a great patron of botany, John Stuart, the Marquis of Bute, should be commemorated by such a striking plant. When people rave about the camellia gardens of the southern states, they should remember that camellias were introduced



Photo by Cora Steyermark

'MOUNTAIN CAMELLIA'

Otherwise known as *Stewartia pentagyna*. Picture shows a branch with flower. The petals are creamy white and surround a mass of purple filaments.

into horticulture from the Old World and that they actually have a rival, belonging to the same family, but less known, in the mountain camellia or *Stewartia*, a plant native in the United States.

Four paintings of modern whaling methods and a large mural of whaling in the days of "Moby Dick" are features in the Hall of Whales (Hall N-1).

October 30—THE FOUR SEASONS

Also a cartoon

November 6—THE PEIPING FAMILY

A middle-class family in China

Also a cartoon

November 13—BACKYARD ADVENTURE

Lecture by Allan Cruickshank, National Audubon Society

November 20—JERRY PULLS THE STRINGS

The story of coffee told by puppets in a color motion picture

November 27—BACKYARD SAFARI

Animals close to your home

Lecture by Murl Deusing, Milwaukee Public Museum

Growing year by year, the Museum Library now contains approximately 128,000 volumes, all covering phases of the sciences within the scope of the Museum. It is the largest library in its specialized field west of the Alleghenies.



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