OCEANOGRAPHY

Oceans' Strange Echo

Layer of "something" suspended deep in the seas may be a possible new source of food. Picked up as echo with sound gear, it is known as "deep scattering layer."

➤ IN THE oceans of the world there is an unknown thing, a mysterious moving mass of "something" suspended in the sea. For a hungry world, an entirely new source of food may be on the verge of discovery.

This is the hope of ocean scientists now studying a phenomenon which they refer to as the "deep scattering layer."

In Philadelphia recently, a paper by Dr. Lionel A. Walford, chief of fishery biology in the U. S. Fish and Wildlife Service, was read before the American Philosophical Society.

"This unknown thing, still unexploited, still unexplored, may prove to be an extravagantly large food resource," Dr. Walford wrote.

"The least result to be expected from research into the deep scattering layer would be an extension of human knowledge about the earth," he said. "The most valuable practical result might be undreamed of quantities of food."

During World War II, echo sounding instruments disclosed the presence of a layer of something between the bottom and the surface of the ocean.

It was found that when a sound was sent out from a ship, an echo returned not only from the bottom perhaps at thousands of fathoms, but also from something else at hundreds of fathoms. This false echo was sometimes so strong that navigators reported shoals where no shoals existed.

Schools of fish or whales often sent back echoes to destroyers hunting submarines with sonar. But this new echo seemed to occur everywhere in the ocean. During the day it was quite deep, up to half a mile down. At dusk it was found to move toward the surface and then disperse. Shortly before sunrise it would move again to the surface, then sink in a great layer as light flooded over the ocean's surface.

More Than One

Sometimes there was more than one layer, scientists of the University of California's Division of War Research reported in 1946. While working with new echo sounding gear in 1942 and 1943, they found two or three or even more scattering layers at certain places.

The California scientists said the echoes could be explained only by layers of material capable of reflecting sound waves. But at that time no one had ever heard of such layers.

In 1946 the National Geographic Society and the Woods Hole Oceanographic Institution of Massachusetts sent an expedition into the mid-Atlantic. Their scientists found the same mysterious echoes. In 1947 and every year thereafter, they found them again.

Scattering layer reports have come in from both Atlantic and Pacific Oceans, from the Gulf of Mexico, from the water approaches to Antarctica, from Hawaii to the Arctic.

"It now appears likely," Drs. J. B. Hersey and H. B. Moore of the Woods Hole Institution wrote, "that the main scattering layer is present universally in deep water throughout the area studied."

Cause Still Unknown

Other scientists agreed. They feel now that the deep scattering layer occurs everywhere in the oceans. But what causes this layer is still unknown.

They know that it must be some sort of biological life. Nothing inanimate, such as a layer of cold water, would consistently react to the amount of light present in the water.

Small creatures of the sea, called the "zooplankton," are sensitive to light. They rise and fall, following a vague boundary of perpetual twilight. So also do certain larger biological forms, such as the many-tentacled squid or giant eels.

The layer might be great schools of fish, living in regions of the sea where no one thought they could exist.

Many oceanographers, however, prefer the zooplankton theory. Some think the ocean's great "false bottom" is made up of countless tiny shrimp-like creatures, living together in great throngs.

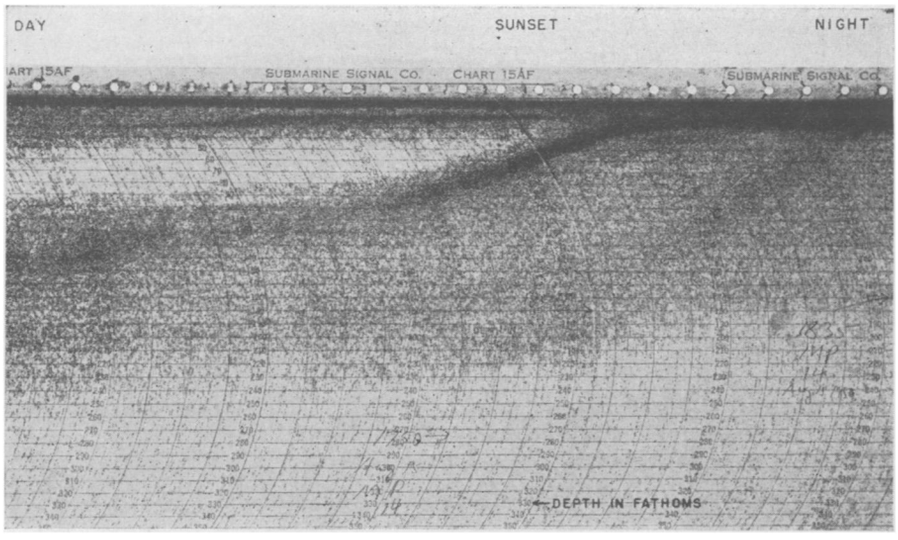
Euphausid Shrimp?

These are called euphausid shrimp. They are about an inch long, large enough to be caught by the echo-sounding signal. They react to light in the sea, coming up at night to feed on plant life in the waters near the surface.

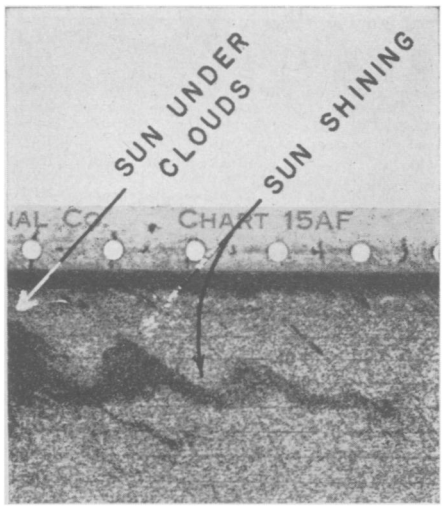
Larger fish of the sea feed on the zooplankton. Those which are not predators on other fish depend upon such small creatures for food. It has been suggested that the deep scattering layer consists not only of slow-moving zooplankton, but also of great numbers of fish feeding upon them.

Little is yet known of fish at these depths because it is next to impossible to catch them there. Nets cannot be towed fast enough at such deep settings to catch up with the fish.

The motorship "Horizon" of the Scripps Institution of Oceanography in California



LAYER—Echoes picked up by marine sound gear have revealed a layer of something which rises and falls, according to the amount of light at the surface of the ocean. The layer shows up here as a wide black streak on the graph, at between 600 and 1200 feet below the surface during the day. At sunset it rises rapidly toward the surface, where it disperses. At daybreak it once again sinks into the depths.



REACTION TO LIGHT—When a cloud moves over the sun, the deep scattering layer rises. Such reaction to light is characteristic of animal organisms called zooplankton.

and a Navy research vessel took sounding readings last summer over 29,000 miles of Pacific waterways between San Diego and the Marshall Islands.

They found that sometimes there are as many as five or six sound-scattering layers.

"The impression that we gained was that the upper layers of the ocean between the surface and 400 fathoms (about half a mile) teem with many kinds of organisms," Dr. Roger Revelle, acting director of the Scripps Institution, said.

"Sometimes these organisms are concentrated in layers," he said, "and at other times they are spread out through the entire upper part of the ocean."

If further research reveals that these organisms are fish or other creatures edible by man or livestock, it would force a complete revaluation of the amount of potential food available from the oceans.

The wealth of the seas is only dimly realized. In the deep scattering layer, as Dr. Walford of the Fish and Wildlife Service said, there may indeed be new, undreamed-of riches.

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MEDICINE

Forecasts Better Weapons Against Germ Warfare

➤ BETTER weapons with which to counter bacteriological warfare attacks against this country are foreseen by Dr. Norman H. Topping of the U. S. National Institutes of Health, Bethesda, Md.

These weapons, he said, will stem in part from work done in the Cornell Research Laboratory for Diseases of Dogs, dedicated at Ithaca, N. Y.

It does not matter, Dr. Topping stated, whether the laboratory includes the words "dog," "cattle" or "man" in its name. Answers to many of our civil defense problems against bacteriological warfare can come from such laboratories.

There is a large number of dangerous pathogens, he said, that any enemy could introduce into the air or into our water, milk or food supply. This warfare, he pointed out, could also be directed against livestock and agricultural crops.

Finding specific treatments for diseases caused by the smaller viruses, learning how to sterilize large masses of air and methods of mass immunization less cumbersome than injection of each individual are among the civil defense problems requiring intensified research, Dr. Topping said. The results would be of value to peace-time health and medical services as well as to civil defense.

Dr. Topping described the processes now known by which a virus survives. He cited the common cold virus as an example of the type that makes sure of its continuing life by attacking us again and again.

Other virus strains survive by "merely putting you into the hospital instead of the grave," thus insuring a supply of future hosts for its offspring. The virus of fever blisters or cold sores, *Herpes simplex,* is an example of one that has survived for centuries by causing minimum damage.

A third group of viruses depends upon the strategy of remaining quiet and unnoticed in our cells until they crop out again under suitable stress.

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AERONAUTICS

British Jet-Propelled Flying-Boat Tested

➤ A JET-PROPELLED fighter airplane of the flying-boat type is now under flight tests in England. It is believed to be the first aircraft of this type yet developed. If American aviation is working on a similar craft, the matter is still secret.

The advantage of this type of craft is that no landing field is necessary for its use. The flying-boat takes off and lands on water. The need for an attack plane that can operate from bays and inlets became evident during the war in the Pacific with Japan.

The need is again evident in the Korean situation. Landing on nearby water for refueling from supply tankers would save travel to distant airports.

This British water-based jet fighter, built by Saunders-Roe and known as the SR/A1, is the successor of two earlier models whose trials were brought to a standstill by accidents. It is powered by two straight-jet engines, the Beryl, built by Metropolitan Vickers. Each has a thrust of 4,000 pounds.

The two engines are built side by side with a single air intake in the bow. The jet outlets are aft of the wing trailing edge on either side of the fuselage. In speed, the SR/A1 is in the 600-miles-per-hour class.

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