MARINE BIOLOGY

Weird Fishes Discovered

Some forms previously unknown in the Pacific are being dredged up from ocean's depths by special sort of deep-sea fishing net, the mid-water trawl.

➤ WEIRD DEEP-SEA fishes—some of them not previously found in the Pacific, others totally unknown to science—are being dredged up out of the cold black depths of the ocean by a new scientific tool of revolutionary design called a "mid-water trawl."

A special sort of deep-sea fishing net, the midwater trawl was devised by Dr. Carl L. Hubbs, John D. Isaacs and Lewis W. Kidd, of the University of California's Scripps Institution of Oceanography.

Though still in developmental stages, the new trawl has already been towed to a depth of 9,000 feet—almost two miles below the surface of the sea. Future plans call for even larger trawls to dredge up animal life from the floor of the ocean.

New to the Pacific, and previously found only infrequently elsewhere, is the gulper, a small marine fish in whose design nature curiously anticipated the development of the new trawl. The gulper's skull, excluding the jaw, is the size of a man's thumb. Its mouth, however, is larger than a human mouth. The jaw is shaped very similarly to the specially designed vane that is the chief new element of the midwater trawl.

In the mid-depths of the Pacific live weirdly specialized marine creatures. Most are equipped with light organs. A species of lantern fish, unknown heretofore off California, has minute bluish pinpoint light sources, and two "eyes in reverse," one on the upper, one on the lower surface, near the tail fin. These organs consist of a source, reflector and lens.

One purpose of the light organs, scientists think, is to attract other unwary fishes for food. Survival is a bitter business in the mid-depths. No plants grow there. The ferocity of the struggle is reflected in the dragon-like appearance of the creatures found. Most of them are quite small.

As another example of the work the trawl is doing, Dr. Hubbs cited the recent finding of snipe eels. Only two individual snipe eels had appeared in collections before, and these were of the same species. In the preliminary trials of the new trawl, 50 specimens of four distinct species have been collected.

A fish with a neck has also been found. This is *Derichthys serpentinus,* a sort of eel. It has not been reported previously from the Pacific area.

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PHYSICS

The Birth of a Flame

See Front Cover

➤ WHEN A match is struck a flame is born. The action is instantaneous to the human eye but not so to the camera. There are "stages" to the process, a recent camera study shows. To show the stages, a camera was used which made a series of pictures at intervals only a few millionths of a second apart.

These unusual photographs were made in the Applied Physics Laboratory of Johns Hopkins University at Silver Spring, Md., where such notable work as the development of the ram-jet engine and the proximity fuse was carried out. They were taken by Dr. H. Lowell Olsen, Robert B. Edmonson and Everett L. Gayhart in conjunction with combustion studies.

In the work a tiny jet of hydrogen was used as fuel. Ignition was made with a tiny electric spark between two fine pin points. Photos were made by the so-called Schlieren method, a method of making visible optical irregularities in transparent substances such as glass or a gas. This Schlieren system is probably best known from its use in photographing the shock waves formed by air passing at great speeds over airplane models in wind tunnels.

In the first of these pictures taken at the Applied Physics Laboratory of the flame when 5.8 millionths of a second old, that is at 5.8 microseconds, there is a circle around the tiny globule of burning hydrogen that is the shock wave produced by the spark. A photograph at 9.1 microseconds shows that the wave has spread out and weakened to become a sound wave.

A picture at 457 microseconds indicates that the flame core is much developed and that it has left the spark gap and begun to move in the stream of gas. Another picture at 1,112 microseconds shows that combustion in mid-stream has expanded rapidly and the kernel has spread into the turbulent sides of the stream and been broken up. Combustion will be at least 2,000 microseconds old before it reaches the entire boundaries of the hydrogen stream, according to these Johns Hopkins scientists.

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