

Biomedic Researchers Savor Seafood Favorites

BY DONALD J. FREDERICK
National Geographic News Service
Today's shore dinner may be tomorrow's medical miracle.

Delicacies such as lobster, squid, monkfish and clams are as popular in research laboratories as they are in restaurants, and are yielding new insights into everything from epilepsy to the sense of smell.

"Biomedical researchers here and at facilities around the world study marine organisms because these relatively simple animals share one biology with us," says Harlyn O. Halvorson, retiring director of the Woods Hole Marine Biological Laboratory in Woods Hole, Massachusetts.

"But unlike humans and other higher animals, marine organisms have an elegantly simple physiology. Their basic life processes can be studied with greater ease and efficiency."

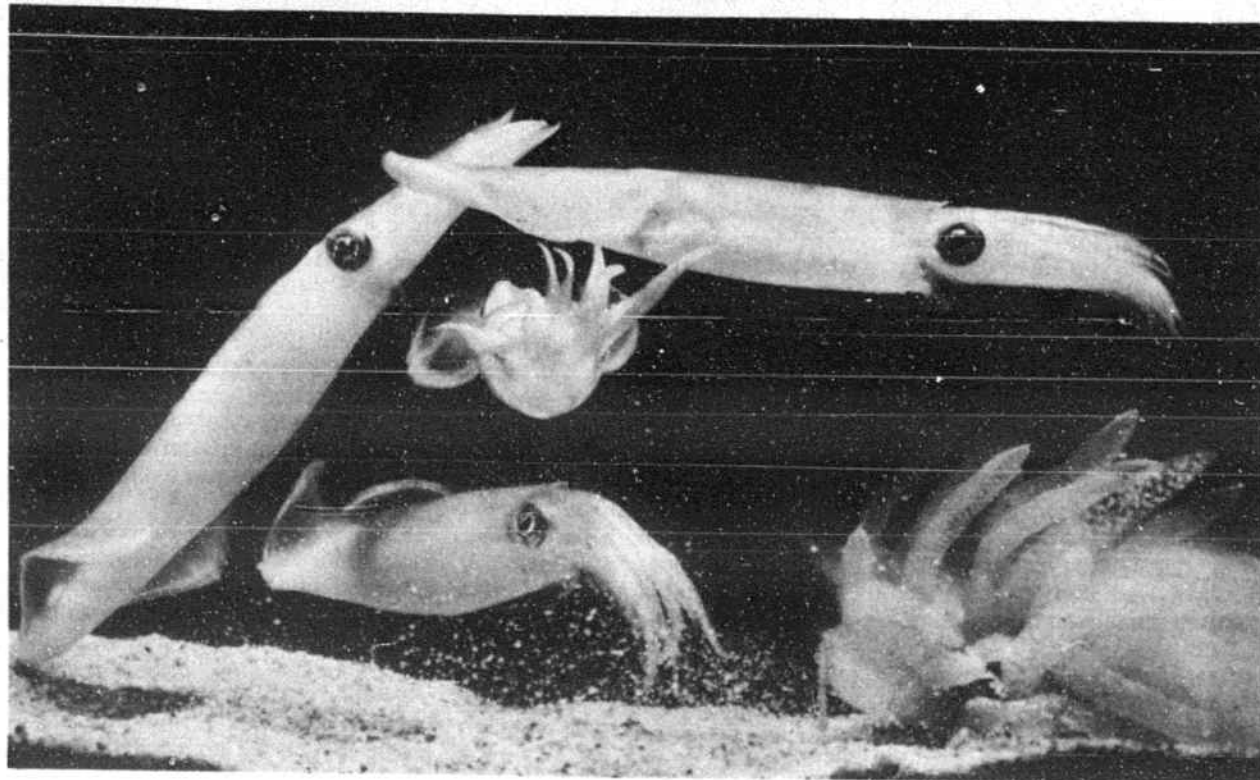
Lobsters soon may yield new information on the sense of smell. The big-clawed crustaceans smell with two small antennae located between their eyeballs, waving them constantly in the water, much as elephants sniff the air with their trunks.

"Humans do poorly at immediately locating the source of odors, but a lobster can sit there and sniff a little bit and say, 'Hm, I know the direction of this smell,'" says Jelle Atema, a Boston University biologist who is one of the scientists from many institutions who are doing research at the marine laboratory.

"We're trying to learn how the animal's brain filters the right information and how that information is used to zero in on odor sources."

The researchers also hope to turn the lobster's olfactory sensitivity into a "nose" for a small, unmanned submarine.

"The nose would be in the form of an artificial intelligence program that we've developed from our lobster findings, and it would steer the underwater robot to odor sources,"



TRANSLUCENT AS PHANTOMS, squids speed through the darkness, aided by nerve fibers known as giant axons. Thousands of the squids' nerve fibers, the largest in the animal kingdom, are being studied at various research laboratories and have helped provide safer anesthetics and drugs for controlling epilepsy.

Atema tells National Geographic. "One obvious application would be to program it to find the source of dangerous underwater pollutants."

At the Marine Biological Laboratory, nothing has been studied more than the squid's giant axons. These nerve fibers, although only .02 inch in diameter, are the largest in the animal kingdom.

The giant fibers trigger the lightning-quick motions that enable the squid to jet away from danger. More than a mile of usable nerve fiber is collected annually from some 10,000 squid at the lab.

Axon research has contributed to safer anesthetics and to drugs for controlling epilepsy. Current work is expected to yield new knowledge about Alzheimer's, Parkinson's and

"We want to take the lead in breeding the white mice of the sea."

other crippling neurological disorders.

The humpbacked and ungainly-looking angler fish has joined the battle against diabetes. Known to seafood lovers as the monkfish, the creature has an organ that contains insulin-producing cells similar to those in humans. Too little insulin, or faulty insulin action, causes blood-sugar levels to rise and can result in diabetes.

Brian Noe, an Emory University professor of cell biology, is analyzing crucial hormones in the cells. "We're still learning basic answers to questions about how these cells normally do things," he says. "If you don't know the normal process, then you really don't have a basis upon which to ask questions about what causes it to be defective."

In addition to diabetes, Noe says, his work may shed new light on certain abnormalities in human reproductive systems.

Clam cells, too, are under the laboratory's microscopes. The sperm and eggs of the succulent mollusk are fertilized to study the process of cell division, important in cancer and fertility research.

"You can watch the major cell processes in real time on an ordinary light microscope," says Robert Palazzo, a University of Kansas cell biologist.

"We believe that if we can learn the intricacies of the cell-division mechanism, we can develop better therapeutics, better strategies to attack dividing cancer cells more precisely. That way we could also minimize the damage caused by chemotherapy to healthy cells which are not in the state of replication or division."

Some flounder and other cold-water fish produce a novel set of antifreeze proteins that bind tiny ice

crystals, lower the freezing point of blood and prevent the fish from freezing. Researchers think that someday the proteins might be useful in preserving human organs for transplants.

Most of the marine animals used in research at the Woods Hole laboratory have been captured in the wild, where their genetic background, reproductive state and general health are unknown.

To help remedy this deficiency, the lab recently opened its Marine Resources Center, where the creatures' health will be carefully monitored and pure genetic strains developed for biomedical research.

Alan M. Kuzarian, the laboratory's acting director, says, "We want to take the lead in breeding the white mice of the sea."

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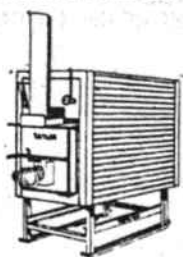
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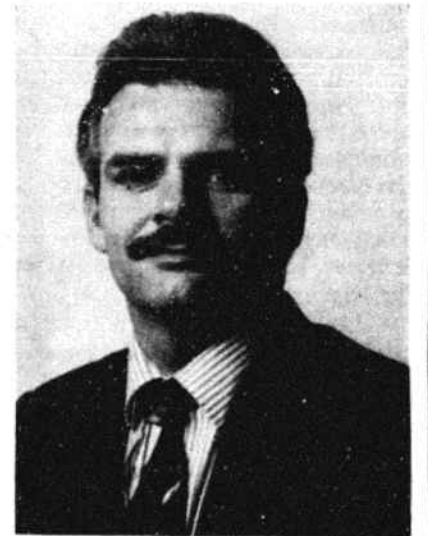
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