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Sea Grant
National Sea Grant College Program

MARINE PHARMACOLOGY

U.S. Scientists Lead Way In Marine Pharmacology

Despite sweeping changes in health care, the drug industry remains one of the strongest sectors of the U.S. economy. In fact, high value-added chemical exports such as pharmaceuticals represent one of the nation's strongest positive trade areas.

The U.S. Office of Technology Assessment predicts that the pharmaceutical industry will be "the first and perhaps most intensive proving ground for U.S. competitive strength in biotechnology." Like any competitive industry with its basis in science, however, this industry's future strength requires continued breakthroughs in research and development.

With support from the National Sea Grant College Program, U.S. university scientists have led the way in developing a particularly promising area of pharmacology: marine pharmacology.

A program organized by the California Sea Grant College in 1979 and continuing today was the first systematic effort within the United States to discover and develop new drugs from marine plants, animals and bacteria.

An Untapped Resource

The interdisciplinary research conducted as part of this program by scientists at several campuses of the University of California is based on two major rationales. First, the number of new compounds being discovered from traditional drug sources — land plants and bacteria — has declined sharply at a time when a number of infectious organisms have developed drug-resistant strains. Second, marine organisms have never been surveyed for their biomedical potential, even though 80 percent of all life forms on Earth inhabit the oceans.

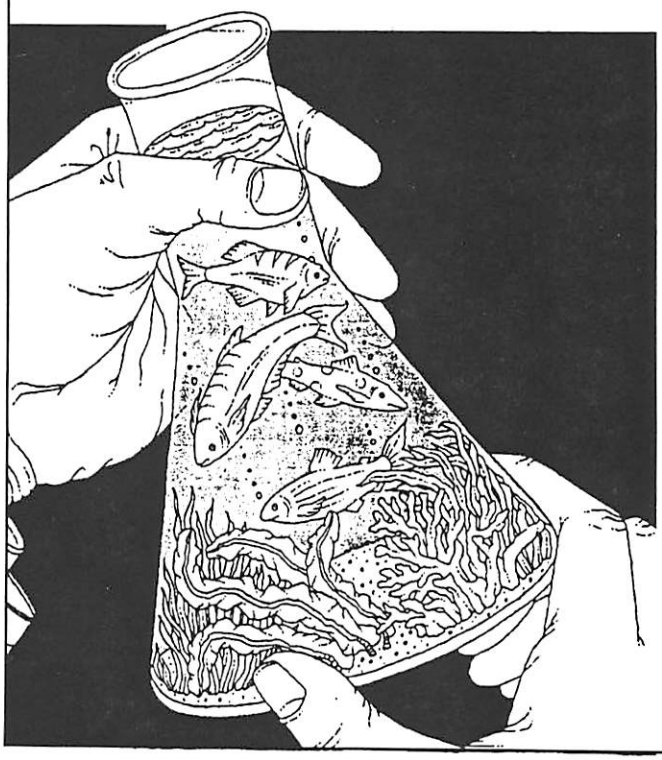
In a pioneering effort, Sea Grant-supported scientists collected sponges, soft coral and other marine organisms in the Pacific Ocean and the Caribbean Sea and extracted promising compounds for extensive testing.

Early on, researchers were impressed not only with the variety of marine organisms that produced promising compounds, but also with the fact that these molecules have unique structures and behave in novel ways.

Cooperation with Industry

Because an effective program of technology transfer requires participation of industry, scientists were aggressive in introducing pharmaceutical companies to their work. The researchers have continued to interact closely with industry to make, patent and develop numerous discoveries.

Firms associated with the



With Sea Grant support, U.S. university scientists have led the way in developing marine pharmacology. California Sea Grant has become the primary resource for marine compounds being developed to treat inflammatory diseases, such as arthritis, asthma, psoriasis and headache pain.

marine pharmacology program are impressive: Eli Lilly, Hoffman-La Roche, Allergan, Syntex, Bristol-Myers Squibb, Sterling Drug, Smith Kline Beecham, Ligand Pharmaceuticals and others. A number of firms also are marketing marine natural products discovered by this program for research purposes.

Today, the California Sea Grant group lays claim to having discovered and described more than 1,000 compounds, and 14 patents have been awarded to the University of California for this work. Marine-derived compounds with preclinical or clinical potential are emerging for many important disease areas, including cancer, infectious diseases and inflammation.

California Sea Grant's marine pharmacology program has become the primary resource for marine compounds being developed to treat inflammatory diseases. Scientists have identified more than 50 compounds with significant potential to treat arthritis, asthma, psoriasis and a host of less serious inflammatory conditions like injuries and headache pain.

A new collaboration with OsteoArthritis Sciences, Inc., seeks treatments for arthritis using pseudopterosin, a compound developed by this program. Another compound, manoalide, has proved to be the model for a whole class of nonsteroidal anti-inflammatory drugs.

Future Investment

Sea Grant recognizes that educating students is an effective mechanism for technology transfer. Over the past 15 years, California Sea Grant has helped train more than 80 graduate students in this dynamic new field, thereby contributing to the "intellectual infrastructure" needed if the United States is to maintain its competitive position in this field.

Along with the Sea Grant programs in Hawaii and Puerto Rico, California Sea Grant also sponsored development of a proposed national research strategy in marine pharmacology and bio-organic chemistry. The results were incorporated into a national Sea Grant initiative in marine biotechnology that received Congressional support in 1994.

For nearly two decades, the National Sea Grant College Program has been the single major funding source for marine pharmaceutical research and development. Sea Grant has provided the U.S. drug industry with a competitive edge in using marine resources and will help ensure that our nation retains its leadership in marine pharmacology.

CALIFORNIA SEA GRANT

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