Marine Biotechnology Research, Development and Education:

Florida Sea Grant Science Promotes and Adds Value to Ocean Resources

Florida life scientists are making advances in discovering and developing new products and processes from the ocean's natural bounty. Applications extend to healthcare, economic development and environmental conservation. In less than a decade, Florida Sea Grant has developed perhaps the largest marine biotechnology research theme among all Sea Grant programs nationally, and now is building an outreach capability to transfer the scientific knowledge base that its research has created.

BIOTECHNOLOGY'S NEW WAVE IN FLORIDA

Florida has a rightful place in the worldwide quest to discover new products and processes from the ocean's living resources. With an enormous natural storehouse of biodiversity and an extensive university-based network of scientific talent, Florida boasts advantages for developing new medicines, industrial products, methods of detecting contaminants and practices for restoring damaged environments, all adapted or derived from coastal and ocean systems. Florida Sea Grant is providing leadership to set the key priorities for this emerging field known as Marine Biotechnology, and is backing its commitment with funding according to a strategic plan.

SMALL FUND, BIG IMPACT

University faculty in Florida have received marine biotechnology research support through two sources of Sea Grant funding. The Florida Sea Grant "core" program sponsors an average of five research projects in marine biotechnology at any given time. This area of research receives about 25 percent of the program's total research budget, a budget that also supports six other theme areas. All Florida Sea Grant research preproposals and full proposals are peer-reviewed for rationale, scientific merit and potential applications. Florida researchers have also secured funds from "strategic initiatives" of the National Sea Grant Office, a part of the National Oceanic and Atmospheric Administration (NOAA). In one strategic initiative, Florida proposals secured 7.5 percent of the national allocation, competing with scientists from 30 other state Sea Grant programs.

ADVANCING OCEAN DISCOVERY AND APPLICATIONS

Florida Sea Grant requires that its investigators provide matching funds from external sources, such as agencies, nonprofit interests and businesses. Beneficiaries of results include industry and governmental stakeholders. For example:

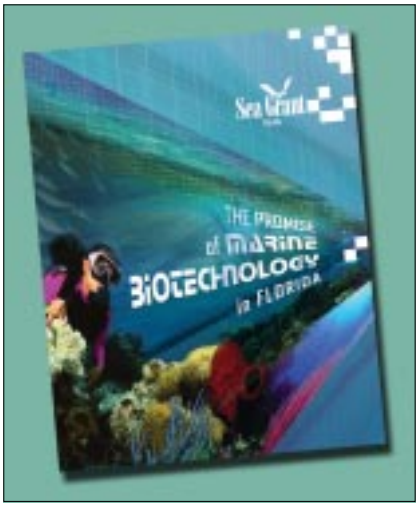
- Fisheries research faculty at Nova Southeastern University have perfected a genetic "fingerprinting" technique now used by a NOAA regulatory office to impose fines for illegal trade in shark parts from species captured for food and medicinal trade.
- Faculty and graduate students in food science at the University of Florida are working with the U.S. Food and Drug Administration on application of a new molecular probe for pathogens in oysters, which will save time and expense in quality control.
- Harbor Branch Oceanographic Institution scientists are characterizing the anti-cancer properties of bioactive marine compounds, while working with industry partners on screening of potential medicines and also development of new microarray-based technologies.
- A new means of probing for environmental contaminants has been discovered by oceanographic researchers at the University of South Florida.
- Florida Atlantic University teams have had multiple projects concerned with characterizing and synthesizing compounds from organisms including bryozoans, coral, and cone snails that have shown therapeutic properties.
- Medical faculty at the University of Florida are testing the anti-fouling properties of a marine worm toxin, to keep barnacles, algae and other organisms off boat hulls.
- In these lines of research, numerous graduate theses and scholarly papers have resulted; patents have been awarded, and patents are pending. Following successes in biosynthetic gene production, one group of investigators and collaborators formed a marine biotechnology company -- arguably a Florida "first".

A rapid and cost-effective DNA analysis technique developed by Florida Sea Grant researchers helps enforce shark conservation laws. (Tom Wright, UF/IFAS)

EDUCATION FOR WISE DECISIONS

Complementary to the research has been a concerted effort in communications and outreach. For scientists, Florida Sea Grant established the biennial Florida Marine Biotechnology Summit series and also hosts a listserve network for technical exchange among more than 75 subscribers. Its program managers gave an invited paper on outreach to a National Academy of Sciences workshop on marine biotechnology. In a national competition, a University of Florida professor and doctoral student won an industry fellowship related to shellfish pathogens.

Sea Grant staff have also organized two invited marine-related sessions for BioFlorida, the statewide life sciences trade association. Thus, economic development interests are beginning to hear the story of Florida research advances. A science writer's digest of all Florida Sea Grant research is the basis for a first-ever "corporate report" on Florida marine biotechnology, to educate business, government, citizens and media.



"The Promise of Marine Biotechnology" provides non-technical readers with a review of Florida Sea Grant marine biotechnology research and impacts to date.

BUILDING A NATIONAL CAPABILITY

Funding from Sea Grant is by no means adequate to develop this field. At most, Florida Sea Grant supplies $75,000 to a given project annually, which is supplemented by matching funds. Sometimes National Sea Grant competitions have larger budgets. In two sessions of the Florida Legislature bills for marine biotechnology support passed committees but not the whole body. More recent bills appropriating funds to individual institutions did pass, thus helping Florida Atlantic and Harbor Branch groups and allied schools partnering with them.

Collaboration between Florida Sea Grant — its university and marine research laboratory partners — and the Scripps Research Institute remains very real on the horizon. The State's investment and Scripps' commitment would appear to strengthen the future funding base for marine biotechnology research.

Clearly, several funding sources are assisting Florida scientists in this field, such as the National Institute of Health and the National Science Foundation, and to some degree the Small Business Investment Research program. Institutions not mentioned above, such as the University of Miami, Florida International University and Florida Gulf Coast University, have tapped such sources.

What Florida Sea Grant offers is a means of organizing a strategically planned and coordinated approach to marine biotechnology research, development and education, whereby the whole may be greater than the sum of the parts. As new funds can be developed, these capabilities can be further developed to help Florida garner the full effects of worldwide markets and a clean, high-wages enterprise.

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Florida Sea Grant is the only statewide, university-based coastal research, extension/outreach, education and communications program in Florida. The "virtual department of marine biotechnology" coordinated by Florida Sea Grant includes faculty from several of the following institutions that comprise the statewide program:

Florida A&M University
Florida Atlantic University
Florida Gulf Coast University
Florida Institute of Technology
Florida International University
Florida State University
Harbor Branch Oceanographic Institution
Mote Marine Laboratory
New College of Florida
Nova Southeastern University
University of Central Florida
University of Florida
University of Miami
University of North Florida
University of South Florida
University of West Florida

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