

Scripps Institution of Oceanography Launches Scripps Genome Center

Terry Gaasterland leads new program with research thrusts in a variety of areas; Birch Aquarium at Scripps preparing to unveil new genomics exhibit

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Advancing further into its second century of discovery, Scripps Institution of Oceanography at UCSD, has unveiled a new research center aimed at the burgeoning science of genomics.

The Scripps Genome Center will harness the vast potential of studying genomes and genetic coding by combining the latest in computer and information technology with the existing biological and marine science leadership at Scripps. The Scripps Genome Center will address important ocean issues as well as those related to human health, the environment and other areas.

"The Scripps Genome Center is a testament to the strength of the biological and marine sciences that have made Scripps famous," said Marye Anne Fox, chancellor of UCSD. "The center is the latest example of the innovative research conducted at Scripps and UCSD that is proving vital for science and society."

Leading the new center is Terry Gaasterland, professor of computational genomics, who comes to Scripps after gaining broad notoriety for creating the Rockefeller University's Laboratory of Computational Genomics in New York City.

"Terry's appointment pioneers a new research area and captures for marine and environmental research the enormous power of modern biology and information science," said Charles Kennel, director of Scripps Institution of Oceanography. "The fact that she can move from one of the world's great centers of medical research to one of the world's great centers of marine research clearly illustrates the unity of all biological systems that is being revealed in today's research."

The center is focusing on three research programs: marine genomics, comparative genomics and environmental genomics.

Researchers involved in the center are already active in projects that will probe individual genomes, not unlike recent achievements in mapping the human genome, in an effort to understand fundamental issues in areas such as evolutionary biology. But investigators also will move beyond the individual genome to study groups of genomes to evaluate and understand differences in the DNA structures of various organisms.

"This center will bridge the gap between generating DNA and determining what experiments to do next," said Gaasterland.

Gaasterland's research involves using computer software and computational methods to study how genes "express" data and the conditions under which individual genes are turned on and off. Her common phrase for this area is the study of what "regulates the regulators."

Gaasterland's move to Scripps, she says, was motivated by the opportunity to work with the institution's strong base of biological experts in Scripps's Marine Biology Research Division, Center for Marine Biotechnology and Biomedicine and Center for Marine Biodiversity and Conservation. Adding to the appeal was the institution's interdisciplinary mix of chemists, physicists and other marine scientists.

Gaasterland also highlighted the Scripps Genome Center's advantage of close proximity to San Diego's robust biotechnology community.

"Moving to Scripps is allowing me to take research that's primarily lab based and put it into an environmental context," Gaasterland says. "I see this center as an opportunity to bring questions about the human genome together with questions about evolution and biodiversity, an area in which I have a long-standing interest. This is a unique opportunity to probe genomics systematically in a global evolutionary context."

Biomedical initiatives for the Scripps Genome Center will include diagnostic and monitoring applications, such as comparing which genes turn "on" and "off" in healthy tissue and those afflicted with diseases such as cancer. Research in the new center also will produce genomic tools important in drug development, particularly in identifying compounds with potential to intervene in physiological healing.

The Scripps Genome Center also will address a range of environmental issues. Genomics can aid in determining the breadth of organisms in a particular area, Gaasterland says, such as how many strains of sea urchins exist in a certain area.

"If we take this one step further we can use genomics as a diagnostic indicator of environmental diseases," said Gaasterland. "We can work with Scripps experts in biodiversity to look into how many microbial bacteria are present on the surface of a very healthy coral reef and compare that with a diseased coral reef."

Working with experts in microbiology, scientists can measure environmental change with genomics. For example, they can sample a bucket of ocean water, then capture another the following week, and investigate how the genetic makeup of a given area is changing over time.

Scripps scientist Douglas Bartlett has used innovations in genomics research to begin to develop an accurate portrayal of deep-sea life forms and how they survive in the harsh conditions of the marine abyss. Bartlett and his colleagues revealed the first genetic blueprint for bacterial life in a cold deep-sea environment and he is now analyzing the genetic sequence of another member of the same species.

Scripps' Brian Palenik is analyzing and annotating an organism called *ostreococcus*, which at one micron is the smallest known phytoplankton and one of the smallest of all the eukaryotes, the organisms such as humans or yeast that have internal cell structures such as mitochondria. *Ostreococcus* is abundant off the Scripps Pier and other areas of the world's oceans.

Other scientists in the Scripps Genome Center are working on new projects such as the comparison of human, mouse, rat, sea urchin and sea squirt genes in research that carries both biomedical and evolutionary implications. Other planned research involves the complete sequencing of 75 microbial marine genomes.

"Many marine organisms serve as 'models' for studying biological processes such as fertilization in ways that are relevant to humans," said Gaasterland.

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