VOICES OF DISCOVERY
2011–2012

The College of Arts and Sciences at Elon University is committed to engaging students and the community in the excitement and wonder of discovery. During the past two decades, scores of discoveries in molecular biology, atomic physics and computer technology have changed the face of science and brought dramatic changes to our world.

The Voices of Discovery speaker series brings to campus preeminent scientists and mathematicians who have left an indelible mark on the way we view the world. They share their remarkable experiences and perspectives with Elon students and the community. This series plays a fundamental role in the university's commitment to create a science-conscious community and to help students be informed citizens.

Voices of Discovery is just one element of Elon's program to provide outstanding science education. At the Dalton L. McMichael Sr. Science Center, students work in modern laboratories with cutting-edge research tools. They focus on discovery-based learning, undergraduate research and collaboration among the sciences, developing an appreciation for the scientific enterprise and how we acquire new knowledge.

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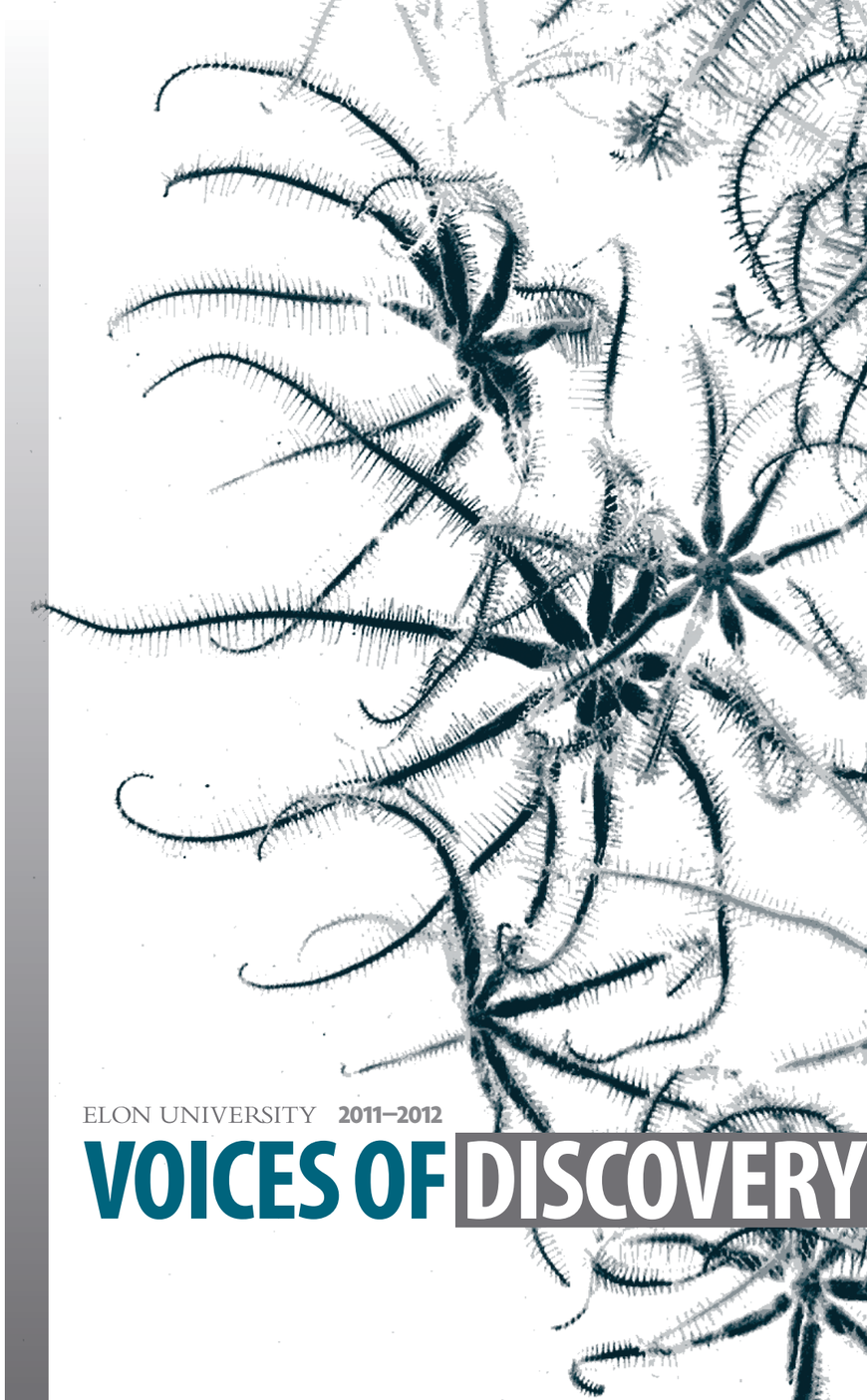

ELON UNIVERSITY 2011–2012

VOICES OF DISCOVERY

GOLD RUSH: DISCOVERY OF GOLD DEPOSITS IN THE DEEP SEA & THE EXTRAORDINARY ANIMALS THAT LIVE ON THEM

WEDNESDAY, SEPTEMBER 21, 2011 // MCCRARY THEATRE // 7:30 P.M.

Cindy L. Van Dover, Ph.D.

Harvey Smith Professor of Biological Oceanography, Duke University // Director, Duke University Marine Laboratory // Chair, Division of Marine Science & Conservation, Duke University's Nicholas School of the Environment

In the 1970s marine scientists discovered deep-sea hydrothermal vents in areas of tectonic plate activity. An unexpected feature of these warm deep sea floor "geysers" was the thriving and diverse community of marine organisms surrounding the openings. These vents represent a new frontier of study about novel processes and ecosystems and possibly about how and where life may have evolved on our planet.

Precious metal-containing sulfide deposits have also been found around the vents and are becoming increasingly attractive for deep-sea mining. As one of the first scientists to study hydrothermal vents in the Atlantic and Pacific oceans, Dr. Cindy Van Dover has dedicated much of her work to determine how extracting minerals from sea floor vents might disrupt the environment and the organisms that are part of these rich ecosystems.

In 1989, Dr. Van Dover described a photoreceptor in a vent invertebrate, suggesting that vent organisms detect and probably use light energy. Photosynthetic bacteria were subsequently identified that use geothermal light or dim light from chemical reactions near the vents to make organic molecules that can be used as food by other creatures.

Dr. Van Dover received her master's degree in ecology from the University of California, Los Angeles in 1985 and Ph.D. in 1989 from the Massachusetts Institute of Technology and Woods Hole Oceanographic Institution Joint Program in Biological Oceanography. She has published more than 70 peer-reviewed journal articles and is the author of the first textbook on hydrothermal vents. Dr. Van Dover's work has been featured in *Science New*, *Discover Magazine* and *The New York Times*. She has received a Career Award from the National Science Foundation and is the current director of the Duke University Marine Laboratory in Beaufort, N.C.

THE POWER OF NEURONAL POPULATIONS

MONDAY, NOVEMBER 7, 2011 // MCCRARY THEATRE // 7:30 P.M.

Andrew B. Schwartz, Ph.D.

Professor of Neurobiology, University of Pittsburgh School of Medicine // Member, Center for Neural Basis of Cognition, McGowan Institute // Member, Robotics Institute, Carnegie Mellon University

Imagine a person who despite being paralyzed by a spinal cord injury can use his or her own thoughts to control an artificial limb. This new frontier that connects the human nervous system to computers and robotic extensions is the world of Dr. Andrew Schwartz, professor of neurobiology at the University of Pittsburgh.

From hearing aids to heart valves to artificial limbs, prosthetic devices will increasingly enable humans to overcome specific challenges and have greater quantity and quality of life. Dr. Schwartz research focuses on learning more about how the brain controls voluntary movements of the arm and also how the brain can control a neural prosthesis that directs voluntary movement of an artificial limb.

The relatively new field of neuroprosthetics combines neuroscience with biomedical engineering and is producing devices that can substitute for missing or damaged sensory, motor or cognitive function and also expand our knowledge of how the nervous system works.

Using a monkey model, Dr. Schwartz is determining patterns of cortical neuron activity associated with specific goal-oriented movement of the arm. To date he has shown that monkeys with the brain-machine interface can learn to control a prosthetic limb using their thoughts to make the artificial limb reach for, grab and retrieve food. There is also evidence that the monkeys' brains have "adopted the mechanical appendage as their own, refining its movement." Such findings provide hope that in the future, humans with functioning brains, but paralyzed bodies, may be able to regain a degree of activity and control of their lives.

Dr. Schwartz received his Ph.D. from the University of Minnesota in 1984. Four years later he began his independent research career at the Barrow Neurological Institute in Phoenix. He joined the University of Pittsburgh in 2002.

INCOGNITO: THE BRAINS BEHIND THE MIND

MONDAY, MARCH 12, 2012 // MCCRARY THEATRE // 7:30 P.M.

David M. Eagleman, Ph.D.

Assistant Professor, Department of Neuroscience and Menninger Department of Psychiatry and Behavioral Sciences, Baylor College of Medicine

It's not very difficult to imagine that a lot of brain activity must be happening outside of one's awareness and capacity for reflection. Examples of unconscious mind activity include fairly common experiences, such as reacting to a situation before being aware of it, making certain decisions that are, on hindsight, difficult to rationalize and having an amazing "aha!" moment.

The unconscious mind is being viewed as a vast and complex array of mental phenomena that includes unconscious thoughts, emotions, reactions and much more. Neuroscientists increasingly believe that within the human brain, consisting of billions of neurons and trillions of synapses, conscious thought probably represents the tip of the iceberg of brain activity, with unconscious thought representing the rest.

Dr. David Eagleman, a renowned neuroscientist who has a joint appointment in neuroscience and psychiatry at Baylor College of Medicine in Texas, has conducted extensive research on understanding the workings of the unconscious mind, how the brain perceives time and how new developments in neuroscience might impact our criminal justice system. He was recently awarded a prestigious Guggenheim Fellowship to support his continued research of synesthesia, a perceptual condition in which information between the senses is blended.

Dr. Engleman earned his Ph.D. in neuroscience at Baylor in 1998 and is currently the director of its Laboratory for Perception and Action. In addition to numerous journal publications, Dr. Eagleman is the author of several neuroscience books, including the recent bestseller *Incognito: The Secret Lives of the Unconscious Brain* and *Live-Wired: The Dynamically Reorganizing Brain*. He also co-authored a book titled *Cognitive Neuroscience*. He has written for *The New York Times*, *Discover Magazine*, *Slate* and *New Scientist*. He also appears regularly on National Public Radio and the BBC.

For more information about the departments of biology, physics, chemistry, mathematics, engineering, environmental studies and computing sciences, or the Voices of Discovery speaker series, call the Office of the Dean of Elon College, the College of Arts and Sciences, at 336-278-6263.