



DR. JACQUELINE MCLAUGHLIN'S PASSION FOR HANDS-ON SCIENTIFIC DISCOVERY WAS BORN RIGHT HERE IN SOUTHWEST FLORIDA.

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Natural LEGACY



BY TAKING SCIENTISTS AND SCIENCE EDUCATORS INTO THE FIELD, JACKIE MCLAUGHLIN IS WORKING TO CREATE A GENERATION OF EAGER AND ENTHUSIASTIC SCIENTISTS.

Midnight on the Caribbean coast of Costa Rica: A full moon shines above. A group of students walks along the shore, clad all in black and headlamps. They spot a female leatherback turtle crawling slowly out of the water. The largest of the living sea turtles, the endangered female is more than seven feet in length, with outsized flippers. She pulls herself to her chosen nesting area above the high-tide line, excavates a nest, and begins laying 80-100 eggs. As she does, she enters a Zen-like state. For the time being, she's unaware of her surroundings, which allows the students to spring into choreographed action.

One measures her carapace. Another two examine her body for tumors or growths. One student reaches underneath her to catch her eggs. This student suffers sand flea bites the whole

time, but he does not care and he does not budge. His job is to collect the eggs, which are sought-after by poachers who sell the eggs, thought to be aphrodisiacs. Instead, these eggs will be taken to a designated hatchery where student-researchers will monitor the nests around the clock. But right now the students work in total silence, except for the sound of the nesting female leatherback's labored breathing.

"She has lungs, you know," says Jacqueline McLaughlin, Ph.D., associate professor of biology at Penn State University, Lehigh Valley, and a Lely High School graduate (class of 1978). "Her breathing sounds like ours."

The student researchers are part of CHANCE (Connecting Humans and Nature through Conservation Experiences), a groundbreaking program McLaughlin founded 10 years ago to link students and educators with research scientists in the field. There on

the beach, in the tropical forest or beside a lake basin, scientific concepts are brought to life. Later those experiences are translated, by a team of researchers, students and IT pros, into online modules for use in (and freely accessible to) high school and undergraduate science classrooms across the world.

Participants in CHANCE are undergraduate science and science education majors, as well as in-service science teachers. Program courses follow a three-part model that includes a 17-day practicum in countries such as Costa Rica, Panama and China and partners with noted researchers who are focused on important environmental issues such as global warming, species extinction, and biodiversity. The program is conducted in partnership with 32 different entities, including the Organization of Tropical Studies, the Smithsonian, Dow Chemical, and China's Jiangnan University, among others.

“The environment is broken on local, state, national and global scales—most of which are a result of human impact on natural resources and ecosystems,” says McLaughlin. Through CHANCE’s field courses and online modules, she works to promote students’ conceptual understanding, interdisciplinary perspective, and diplomacy skills—skills that are needed to address real-world environmental issues.

FORMATIVE FIELDWORK

Originally developed as a partnership between the Pennsylvania Department of Education and Penn State to train the state’s high school science teachers in an innovative way, CHANCE uses real research data to transform students, teachers and tomorrow’s teachers into critically thinking, globally minded scientific investigators and citizens. Along the way, CHANCE has grown into an environmental education, professional development, and outreach program.

Although she’s spent most of her professional life in Pennsylvania, McLaughlin’s experiences in Florida shaped her work today. After graduating from Lely High School in 1978, she attended New College in Sarasota, where she expected to be pre-med.

“I remember to this day the moment that my career choice changed,” she recalls. “It was when I sat in my first cell biology class as a freshman.” That class was with noted biologist John B. Morrill, whom McLaughlin praised in a 2009 article in *The American Biology Teacher* entitled, “In Tribute to My Mentors.”

She vividly remembers when Morrill stomped into the classroom to deliver a lecture on cellular organelle ultra-structure. “He didn’t take a breath. He was exuberant. He

was amazing,” she recalls. “I had never seen such excitement about the living world before.”

Morrill’s passion for research was something he shared with his undergraduates, ensuring that they got hands-on experience in the field. When the tide came in during the students’ first foray into the mangrove ecosystem, she says, “He told us to start climbing the trees!”

“I just remember saying to myself, ‘He’s so cool,’ and, ‘I want to be just like him.’”

She got her wish. After earning her masters at Florida State University and studying sperm motility at Emory, McLaughlin earned her Ph.D. in cell and development biology at Rutgers State University/University of Medicine and Dentistry of New

Jersey. These days, she’s following in Morrill’s footsteps by focusing on providing undergraduates and other science educators with real-world applications. She has authored numerous academic articles, chapters and proceedings as well as online modules for the classroom. Perhaps more importantly, she has earned several awards for excellence in teaching, teacher professional development, and international programming and education.



2013 PANAMA FIELD COURSE: MCLAUGHLIN MEASURES THE BEAK OF A HERMIT HUMMINGBIRD IN GAMBOA; STUDENTS RELEASE NEWLY HATCHED BABY LEATHERBACKS IN BOCA DEL TORO.



CREATIVE ENVIRONMENTS

On any given day, McLaughlin might be teaching undergraduate biology courses, leading undergraduate research projects, organizing CHANCE field programs, or spearheading a host of partnerships with academic and research institutions—all in an effort to transform science education.

And hers is a proven approach. As McLaughlin’s friend and Emory professor emeritus Robert DeHaan writes in a report on the state of undergraduate science education in the U.S., “Using real research strategies to teach has profound effects on student learning, and could have profound effects in promoting a scientifically literate society and a reinvigorated research enterprise.”

Dr. Richard Alley, Evan Pugh professor of Geosciences at the Pennsylvania State University, agrees. The world-renowned expert on climate change—one of several scientists on the United Nations Intergovernmental Panel on Climate that shared the 2007 Nobel prize with Al Gore—notes that McLaughlin’s efforts are particularly notable for their ability to reach a broad swath of individuals.

“First, she’s reaching a lot of people directly—students, and especially teachers who reach students,” Alley explains. “She gets as many people as possible into the action, and then tries to capture the action through modules and in other ways to extend the reach, because she can’t take everyone to Costa Rica or China!”

Having worked with McLaughlin on CHANCE, including an upcoming joint-endeavor with *Science* magazine—A CHANCE for *Science*—that translates peer-reviewed scientific articles into online modules geared toward AP biology

students and undergraduates, Alley says McLaughlin’s work mirrors her passion. “Endless commitment to go with endless energy! Jackie dares to do the work that makes the leading edge possible.”

McLaughlin has spent her life helping educators to break-free from the boundaries of didactic education and allow students to do actual scientific research around the world—and her timing couldn’t be better. So great is the need for innovative, evidence-based teaching practices in undergraduate science education, that the American Association for the Advancement of Science, along with the National Science Foundation, has launched an aggressive “Vision and Change” program to outline and examine novel approaches to biology education nationwide.

Thanks to McLaughlin, there are now more than 130 educators and 150 undergraduate CHANCE fellows working in science classrooms around the nation and the world. She encourages high school and undergraduate biology and environmental science teachers to visit the CHANCE website and incorporate the research-based modules into their classrooms—and notes that CHANCE is accepting applications right now for the 2014 summer program (see resource box). But CHANCE is just one element of what McLaughlin views as her life’s work: passing on the lessons of her mentors.

To this day, she says, she works to bring that spirit of adventure into her classrooms and into science classrooms everywhere. “These scientists instilled in me the importance of creativity in, and dedication to, biological research. They pushed me to my limits and, most of all, challenged me to think like a true scientist.” ❁



For more information, visit: CHANCE: www.chance.psu.edu
(for online modules, see <http://www.chance.psu.edu/online-modules.html>)

Check it Out

If you’re seeking inspiration, Dr. McLaughlin recommends these entertaining and informative science-based pastimes.

Letters to a Young Scientist, by Edward O. Wilson (Liveright 2013). Renowned naturalist and Harvard professor emeritus Wilson reflects in this book on his coming-of-age as a young, bug-loving boy in the South. Using anecdotes and illustrations, Wilson explains how success in the sciences does not depend on mathematical skill, but rather on a passion for finding and solving problems.

Radio Lab, WNYC (public radio). A Peabody-winning radio program that illuminates ideas while blurring the boundaries between science, philosophy and human experience. Hosted by Jad Abumrad and Robert Krulwich, *Radio Lab* covers universe-spanning issues such as time, space, and the “Dinocalypse” in an entertaining yet evocative way. It’s broadcast locally on WGPU (Monday night at 8 p.m.); listen to past shows at www.radiolab.org.

Earth: The Operators’ Manual, PBS (available on DVD and Blu-ray). This 2012 PBS show, hosted by Dr. Richard Alley (whom the *New York Times* calls “a cross between Woody Allen and Carl Sagan”), dispenses with politics, polemics and punditry to present an objective, accessible assessment of the Earth’s problems as well as possibilities for change. Visit earththeoperatorsmanual.com.