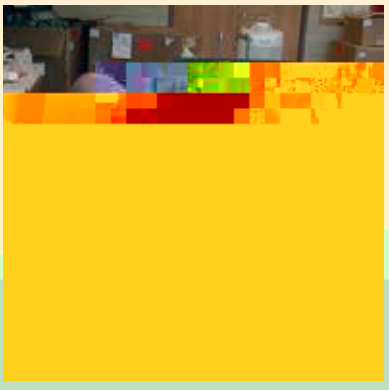
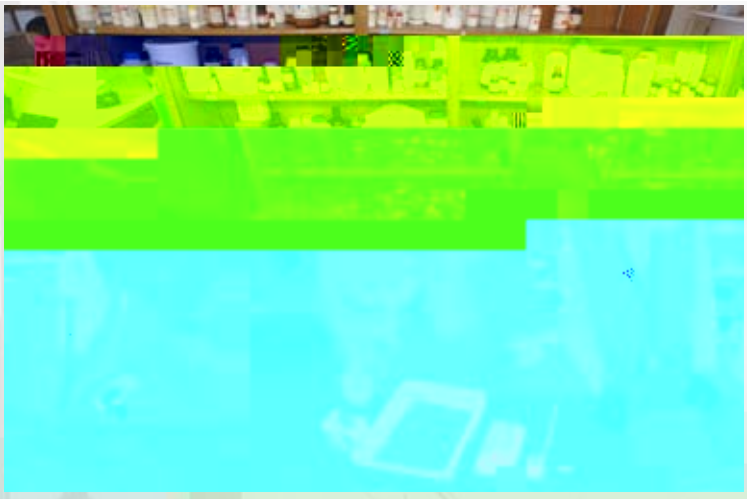
Dear Friends,

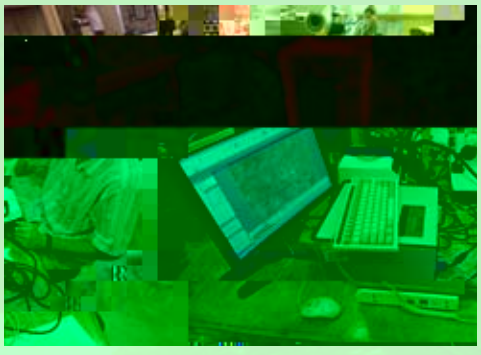
When I þrst came to the MBL as a graduate student in 1965, I couldnȯt have imagined how

MBL

veryone knows how life-changing some experiences can

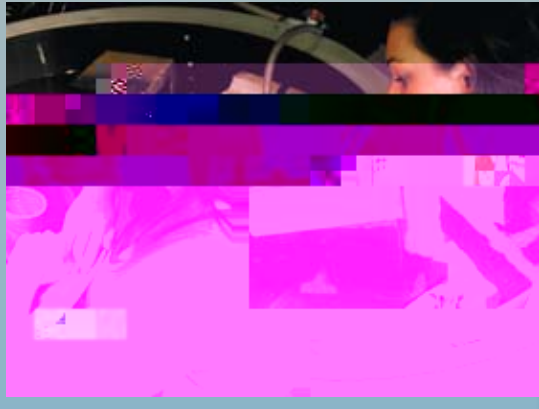




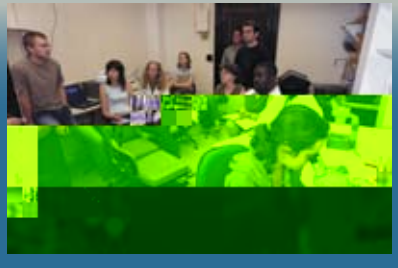


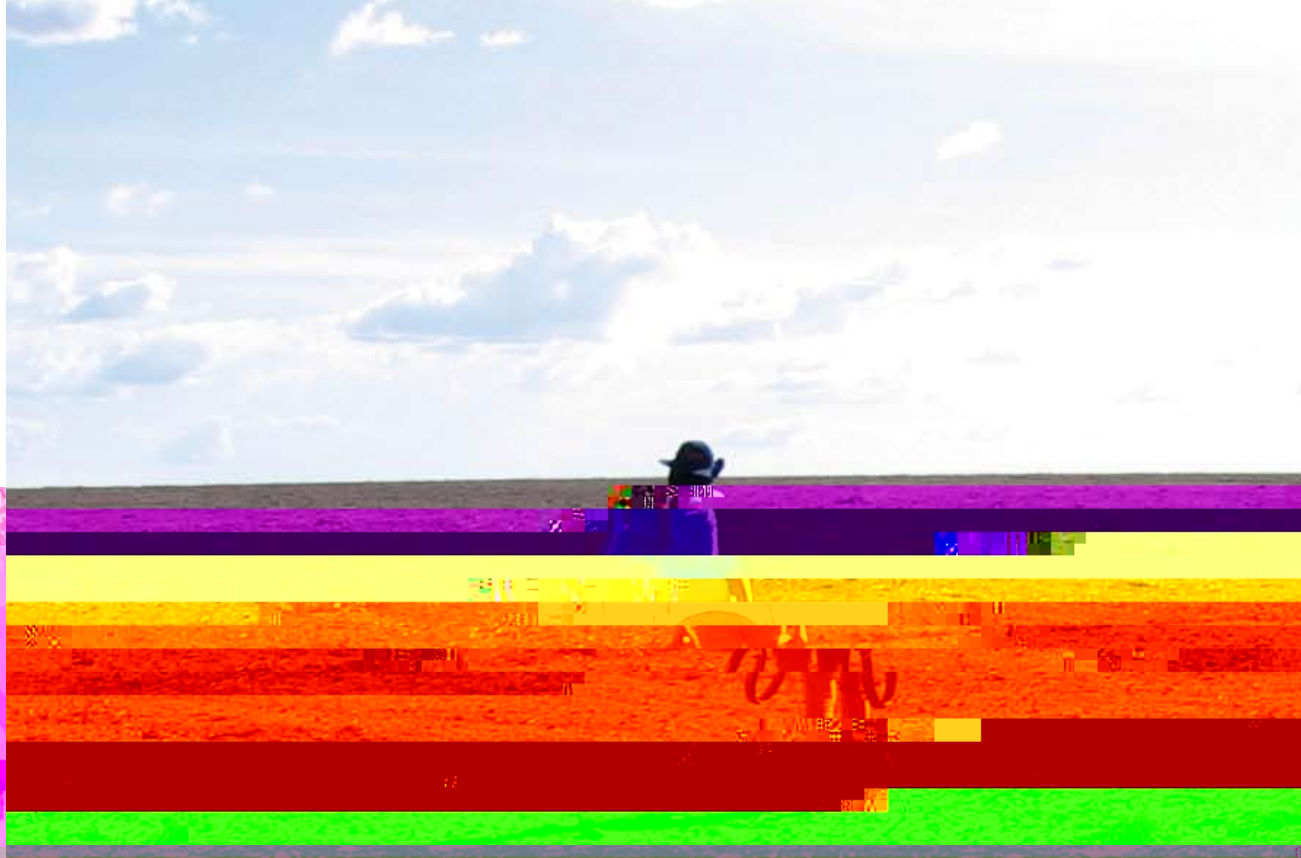
It Starts at the Top

"Other things being equal, the investigator is always the best instructor," wrote C.O. Whitman, the MBL's first director, and this vision has shaped education at the MBL for over a century. The directors of MBL summer courses are exceptional research scientists who are dedicated to training the



Students often leave the MBL with new mentors and collaborators, or even a job offer, and a close group of friends who will always connect over their shared experience in Woods Hole.





As I stand in a sweeping field of soybean crop that, just a few years ago, was native savanna, I realize I am in exactly the place I want to be.

Here, in the Brazilian Amazon, I am pursuing science I am passionate about in a socially relevant context. As I explore how the conversion to agriculture — which is rapidly altering the Amazon — impacts the release of greenhouse gases from soil, I can connect with Brazilian residents and their concerns. Here, I can put into action a lesson I have learned over many years:

The path that led me to the Brown-MBL graduate program — and to this leafy soybean field — began long ago. As a child, I spent hours combing the Oregon coast for small rocks to add to my collection. (No one guessed that I would become a geologist.) During high school, I taught soil sciences to middle-school students in an outdoor education program. I explored the woods, tidal pools, and rivers with strong mentors, gaining a sense of place, a passion for learning about the natural world, and a strong environmental ethic.

As a teenager, I witnessed the human-development aspects of environmental sustainability when I served as a supervisor for Amigos de las Americas. We helped communities in the Dominican Republic and Paraguay take on self-identified issues, including public health concerns that had a strong connection to the local environment (such as latrine construction). A few years later, as an undergraduate at Washington University, I spent a semester studying wildlife management in the greater Serengeti ecosystem in Tanzania, Africa. There, too, I saw firsthand that the health of the environment and of societies are closely coupled. Efforts towards environmental preservation are only sustainable if they include the wellbeing of neighboring communities.

I pursued an academic breadth in college — from the ecology of the Serengeti, to the geology of Hawaiian volcanoes, to environmental problems in U.S. history, to energy issues. I also worked in a NASA-funded remote sensing lab. These experiences reinforced for me the strength of spatial analysis in the environmental sciences, such as remote sensing and Geographic I

The Meeting of Minds

The MBL is a paradise for training in neuroscience. The trend began in 1951, when the first young Grass Fellows arrived for a summer of neuroscience research guided by faculty mentors. Since then, hundreds of postdoctoral fellows have found their legs as independent investigators in the Grass Lab at the MBL, which flourishes to this day through the support of the Grass Foundation. Collectively, the impact of these fellows on the growth of neuroscience worldwide has been extraordinary.

The next big event in MBL neuroscience training was the 1970 advent of the now-famous Neurobiology course, an intensive laboratory course focused on cellular and molecular approaches. Currently, eight neuroscience courses are offered at the MBL during the summer months, creating a stimulating intellectual confluence of the top neuroscientists in the field. Besides Neurobiology and NS&B, other courses T/T11 1 Tf9 0 0 9 24 98.12 Tm23.12 Tm[nadr)10(edTm()computon.)conroscience co;e

Ron Vale

MBL Do you agree that the Physiology course represents "a working model of the new cell biology," as one biophysicist describes it?

RV I think a big goal of the Physiology course is to explore what "the new cell biology" means and perhaps in a small way to help shape it. We have had many great successes over the years in biology: the genome has been sequenced, much of the ultrastructure of the cell is known. But I think it's fair to say we still don't really understand how cells work, how cells make decisions, how they take in information from their environment and respond appropriately. There are still basic mysteries to be solved, such as how a single fertilized cell develops by its miraculous internal programs into a complete organism. Part of what we all have to come to grips with is developing new technologies and even new ways of thinking that will get at these mysteries. Our philosophy for the Physiology course is, first of all, that we need to train biologists who are much broader thinkers than they have been in the past. They will have to be much more expansive, much more familiar with many disciplines of science, and with ways to integrate information. So we bring traditional biologists into the course, but also people who think in terms of physics (statistical mechanics, soft condensed matter physics), computational biologists, and people who think deeply about imaging. We mix these ingredients together by bringing in the right people, both in the faculty and in the student body. That is the key.

MBL Have you had difficulty attracting students to the course who aren't biologists?

RV At the beginning, Tim and I wondered if we would get even close to filling half the class with physics and computational students, which was our goal. Would they apply? Because if that didn't happen, the whole spirit and initial intention of the course would have failed. But the number and quality of applications from students in these disciplines have been truly remarkable. We are getting the most outstanding students you can imagine. These people are likely to be the future leaders in the interface between these various fields.

MBL Rather than spending a lot of time on training exercises, the course plunges the students into several different research situations. Why?

RV Our view is, while we do want to teach the students techniques, we more want to teach them how to think about science and experiments. We want to show them the elements of science that you can't get in a textbook or a protocols book. How do you pick problems in science, and once you start working on a problem and start your experiments, how do you interpret results, how do you prioritize what to do the next day in order to maximize your chance of discovery? Those are the untold secrets of science. These are the kind of things that we hope to convey by having students work in this very intense environment at the MBL. In this intellectual beehive, students, faculty, and teaching assistants (TAs) are all thinking about how to make discoveries on an incredibly short time scale. We do a lot of the preparation for the course research in advance — making the reagents, preparing the cell lines — so the students can come in and have fun. We bring them up to the discovery phase of the research. That's not totally realistic, but it's fun for everyone — the faculty and TAs included.

MBL A big part of the excitement must be that the inquiry is open-ended.

RV Oh, I totally agree. We tell the students that these are not exercises — this is real research. Some of the experiments will succeed and others will fail. Some projects get started in one direction and then take a very different U-turn — which is often student-driven — and the detour can turn out to be more interesting than the original project. The students experience a spectrum of what goes on in real research, only on an amazingly compressed time scale.

But you know why it is so good? I think

"I am sure that, once more, a cadre of future leaders in biology is in the making in the MBL Physiology course. Not just people who know how to run a gel, clone a gene, or adjust a microscope, but people who respect each other's approaches and know how to think straight, think deeply, and look for the tiny clues that lead to great, because quite unexpected, discoveries."

Accolades

• The **MBL** received the 2007 Distinguished Service Award from the Association for Neuroscience Departments and Programs, which represents 250 neuroscience programs in North America. The award, presented in November 2007 at the Society for Neuroscience Meeting, recognized the importance and significance of MBL's long-standing support of education and neuroscience education, in particular.

• MBL Embryology course alumnus **Mark Roth** (1980) was awarded a 2007 MacArthur Fellowship, known informally as a "genius grant." Roth is a cell biologist at Fred Hutchinson Cancer Research Center.

• MBL Whitman investigator **Lawrence Rome** (University of Pennsylvania) received a 2007 *Scientific American* "SciAm 50" award for his ergonomic backpack invention. The magazine annually publishes a list of outstanding people or teams for their achievements and leadership in shaping established and emerging technologies.

• MBL Distinguished SSr3llisor

The Rewards of Teaching at the MBL

John E. Dowling is the Gund Professor of Neurosciences at Harvard University, and a Trustee and immediate past President of the MBL Corporation. Dr. Dowling is the founding co-director of three MBL courses: Neurobiology, which he started with Michael Bennett in 1970; Fundamental Issues in Vision Research, co-founded with David Papermaster, then at University of Texas Health Science Center, in 1992; and Neural Development and Genetics of Zebrafish, co-founded with Nancy Hopkins of MIT in 1998. A distinguished vision researcher, Dowling has performed groundbreaking work on the functional organization of the retina, and is currently using zebrafish to study retinal development and genetic mutants specific to the visual system. He has been on the faculty of Harvard University since 1961, except for the period 1964-1971, when he was at Johns Hopkins University. Dowling is a member of the American Academy of Arts and Sciences, the National Academy of Sciences, and the American Philosophical Society. He is the author of four books and more than 250 publications. •