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Biological Discovery in Woods Hole

SUMMER 2013

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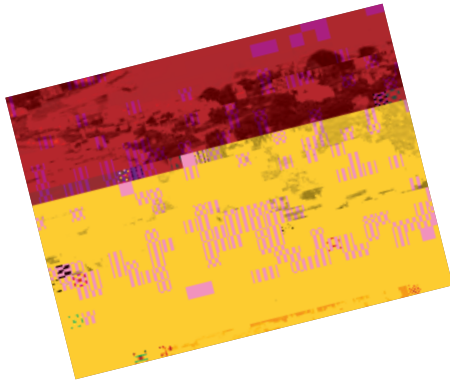
THE MBL'S 125TH ANNIVERSARY:
Celebrating the Next Generation



Dear Friends,

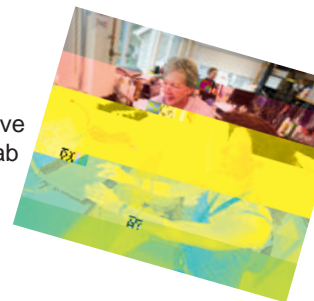
As the MBL celebrates its 125th anniversary, many of us have been thinking about what makes the MBL special. While relatively small in size, we are known internationally in several different ways: as a center for world-famous advanced, research-based courses; a destination for visiting scientists, many of whom come in the summer months to carry out collaborative research projects; and the home of several distinguished year-round research programs. Work at the MBL has a vast span, ranging from molecular evolution, cell division, embryonic development, and neural networks to nutrient cycling,





FEATURES

- 2 | The MBL's 125th Anniversary: Celebrating the Next Generation
At the height of a summer of scientific discovery, the MBL commemorates a milestone birthday.
- 4 | Traveling on a Woods Hole Passport
Dyche Mullins finds warm hospitality and hope in the global community whose capital is the MBL.
- 8 | A Collaboration Called the MBL
The MBL was founded on a vision of cooperative scientific inquiry, an ethos that permeates the lab to the present day.
- 10 | Inspired to a Life in Science
Scientists share their stories about MBL researchers or mentors who helped illuminate their investigative paths.



DEPARTMENTS

- 6 | NEWS & NOTES
The latest findings from our laboratories and field sites.
- 12 | MBL MOMENT
The Evolution of Immense Diversity
When Mitchell Sogin moved his laboratory to the MBL, he didn't foresee that his research would explode in a new direction.
- 14 | GIFTS & GRANTS
- 14 | ACCOLADES
- 15 | COOL TOOL
Making History at the MBL
All are invited to create the story of the MBL by participating in the Community Archives Project.
- 16 | SCIENTIST'S EYE VIEW
Predicting the Future of a Much-Changed World
Chris Neill and other Ecosystems Center scientists want to know how our changing planet interacts with climate, now and for years to come.
- 17 | MEMORABILIA
Seal of the Sea
While historical research continues, the origin of the double-seahorse design on the MBL's logo remains a mystery.

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celebratory, but this one is
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are at the MBL for a focused period of research, often with collaborators they don't see during the academic year. Besides a beautiful marine setting, the MBL has much to offer to them: excellent facilities, access to the expertise in the MBL courses, and the kind of collaborative company that inspires scientific growth.

Alongside the MBL's summer activities are its resident research and educational programs, the first of which was established in 1975. Some of them, such as the Cellular Dynamics Program, evolved naturally from the historical interests of MBL summer investigators and courses. Others, such as the Ecosystems Center and the Bay Paul Center, are world-class research centers that interact extensively with the other scientific institutions in Woods Hole and elsewhere.

Today, these three components of the MBL—its educational programs, Whitman Center for Visiting Research, and resident research centers—are deeply intertwined aspects of the lab's identity. As we celebrate the MBL's 125th anniversary in this issue of *MBL Catalyst*, we also celebrate the core values shared by everyone who engages in science at the MBL: open inquiry, a collaborative spirit, and an unwavering dedication to the pursuit of knowledge for the benefit of human health and a sustainable planet.

The MBL Welcomes President and Director Joan V. Ruderman

In November, Joan V. Ruderman was named the MBL's 14th President and Director. She is the first woman to direct the MBL in its 125-year history.

Dr. Ruderman was previously the Marion V. Nelson Professor of Cell Biology at Harvard Medical School. She also served as Senior Science Advisor at the Radcliffe Institute for Advanced Study. She received her BA from Barnard College and her PhD from MIT, where she also did postdoctoral work. She joined the faculty at Harvard Medical School in 1976; moved to Duke University in 1986; and returned to Harvard in 1989.

Ruderman's major leadership positions include: Ellison Medical Foundation Scientific Advisory Board (2013-); Howard Hughes Medical Institute Medical Advisory Board (2000-2009); Whitehead Institute at MIT Scientific Advisory Board (1999-2002).

A longtime associate of the MBL, Ruderman's prior positions include: MBL Board of Trustees (1986-2012); Speaker of the Corporation (2008-2012); Visiting Scientist (1976-2000); and Embryology course student (1974), instructor (1976, 1982) and co-director (1978).

Discoveries: Ruderman is best known for her work on fertilization and on the molecular mechanisms that regulate mitosis, the last part of the cell division cycle. At the MBL in 1979, Ruderman, Tim Hunt, and Eric Rosenthal, working with clam eggs, first observed the synthesis of proteins later called the cyclins, key regulators of the cell division cycle. In seminal work at the MBL in the 1980s and 1990s, Ruderman's group cloned and expressed the first cyclin genes; demonstrated that cyclins regulate the cell division cycle; and discovered how cyclins work at the molecular level. With Avram Hershko, she identified and purified components of the ubiquitin ligase system that is responsible for the programmed destruction of cyclins during mitotic exit. Ruderman's later research investigated environmental contaminants that mimic estrogen. She has also focused on the role of water in areas ranging from human health to climate change.

1975 Ecosystems Center established
1977 James D. Ebert, MBL director
1978-1985 Paul R. Gross, MBL director
1980 Biology of Parasitism course founded
1986 J. Richard Whittaker, MBL director
1987-1991 Harlyn O. Halvorson, MBL director
1992-2000 John E. Burris, MBL director
1992 Cellular Dynamics Program founded
1997 Josephine Bay Paul Center established
1997 Semester in Environmental Science program founded

By Dyche Mullin

This summer, Clare Waterman and I once again relaunched the MBL Physiology course with a pair of orientation lectures. As has been our custom as course co-directors, Clare explained the nuts and bolts of the course and I described its history and philosophy. The students, primed by our tales of long hours and difficult experiments, listened nervously—their attention broken only by occasional attempts to get comfortable in the charming but uncompromising wooden chairs of Lillie Auditorium. This is an annual, Proustian, madeleines-in-weak-tea moment—one that recalls a Sunday evening in 1993, when I sat with a similar cadre of incoming students and listened nervously as Physiology faculty explained what would happen over the next two months. The recollection is jarring, probably because the Physiology course forms a kind of barrier that separates who I am now from who I was then. If my life could be described by a mathematical function, those two months would be a discontinuity, or even a singularity. I began the course as a student of mathematics and engineering but I ended it on a track that led to being a cell biologist.

Yet you do not have to change careers, as I did, to be transformed by the MBL. As far as I can tell, all you have to do is work very hard, with a group of very smart people, on a very hard problem. Clare Waterman and I met in 1993 as students in the Physiology course, where we learned—among many other things—microscopy from Tom Ford. I have always welcomed the many other

The Physiology course has, over the years, facilitated many such transformations. It was founded in 1892 by Jacques Loeb of University of Chicago to explore his principle that “Living organisms are machines and ... their reactions can only be explained according to the same principles which are used by physicists.” While the course has always welcomed the occasional physical science student who ventured

Thousands more come in the summer to vacation, take courses or conduct scientific research. And then there are the expatriates: thousands more whose lives have been altered by spending time at the MBL. They live in a diaspora, as citizens of a worldwide community whose capital is Woods Hole.

I have experienced the hospitality of this community many times, including during a recent visit to Naples, Italy. One morning I decided to show up, unannounced, at the door of the Naples Marine Station (Stazione Zoologica)—a forerunner and sister institution of the MBL. I lurked by the front door and eventually buttonholed a woman entering the building. I presented her with a somewhat sketchy-looking letter of introduction, printed on MBL stationery. She disappeared into the building and I half expected the Carabinieri to roll up and take me away for questioning. Instead, she returned a few minutes later with one of the station's principal investigators, Salvatore d'Aniello. Salvatore studies the evolutionary development of marine invertebrates, specifically the worm-like amphioxus, and is an alumnus of the MBL Embryology course. Any animosity he might have felt over the outcome of the annual Embryology vs. Physiology softball game had clearly faded from memory and he welcomed me into the Stazione. He gave me a tour of the entire place—including the magnificent library and the damply atmospheric 19th-century aquarium. He also spent some time describing his research and latest experiments. For those few hours, I was no longer a tourist in a foreign city; I was back home among my people.

By far, the most potent symbols of the international Woods Hole community are two yellowed sheets of paper that are now displayed in the MBLWHOI Library. At the end of World War II, a lieutenant in the U.S. Navy found them tacked to the door of a small, Japanese naval installation on the Miura peninsula, south of Tokyo. The pages turned out to be a note, addressed in neat, black brush strokes, to approaching American forces:

The buildings were actually the Misaki Marine Biological Laboratory, converted for naval use during the war, and the "last one to go" was Katsuma Dan, a Japanese embryologist who had spent several summers at the MBL. Remarkably, the American naval officer who found the note also was familiar with the MBL. He understood at once

what sort of place this laboratory was, and he helped ensure that it was spared destruction. Moments like this, when the shared value of peaceful pursuit of knowledge links people in a way that cuts through their fear and hostility, give me hope for humanity. They may not be frequent enough to inspire outright optimism but, thankfully, they are common enough to preserve some hope. •

At left: Dyche Mullins in the library of the Stazione Zoologica in Naples, Italy.

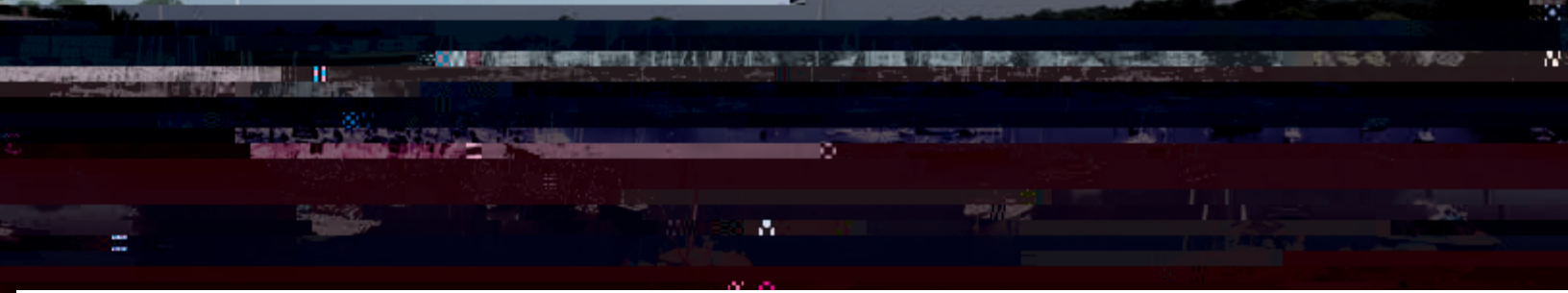
Above: At the close of World War II, embryologist Katsuma Dan tacked this note to the door of the Misaki Marine

Collaboration Yields Insight Into Lou Gehrig's Disease

Arthur Horwich studies the role of protein misfolding in the neurodegenerative disease amyotrophic lateral sclerosis (ALS, or Lou Gehrig's disease) at Yale School of Medicine, where he is a Howard Hughes Medical Institute Investigator. He typically uses the roundworm or the mouse as model organisms for his studies. But he has always wanted to test the effects of a

Microbial Diversity Course Designated “Milestones in Microbiology” Site

The MBL Microbial Diversity Course has been honored as the 2013 “Milestones in Microbiology Site” by the American Society for Microbiology (ASM). This designation recognizes places where major developments in microbiology occurred and/or where outstanding microbiologists made seminal discoveries. “The MBL Microbial Diversity course has trained many outstanding microbiologists from around the world, providing scientific tools that they have used to make many important discoveries,” says Stanley Maloy, a past president of ASM. “MBL has been a major place where scientists have gathered (mostly over the summer) to discuss and do research on marine biology, ecology, and development—and microbiology has influenced and been influenced by each of these areas. MBL, including the Microbial Diversity course, has had an important impact on our understanding of the critical role that microbes play in the environment, from the



At first, the team focused on aspects of regeneration relevant to Morgan's background in neurobiology and Bloom's in immunology. But then they happened to meet Joseph Buxbaum, an MBL visiting scientist from Mt. Sinai School of Medicine.



MBL M O M E N T

with ...

Mitchell Sogin

Founding Director, Josephine Bay Paul Center
for Comparative Molecular Biology and Evolution

Mitchell Sogin joined the MBL in 1989 and eight years later founded the Bay Paul Center. He is also on the

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As director of the MBL's Bay Paul Center, Mitchell Sogin oversees a flourishing range of research on the evolution and diversity of microorganisms, and how they interact with other life forms and the planet. Sogin has played key roles in landmark, large-scale collaborations including the first International Census of Marine Microbes and surveys of microbial populations in the human body. He was recently named co-chair of the Deep Carbon Observatory's Deep Life Directorate, an international program to explore the microbes that live beneath the subsea floor and continental surfaces. With his Bay Paul Center colleagues, Sogin has made major methodological contributions to the study of the microbial world, and has offered fundamental insights on its structure and evolution.





ACCOLADES

John Gurdon (Embryology course faculty and Lillie Fellow in 1983) was awarded the 2012 Nobel Prize in Physiology or Medicine “for the discovery that mature cells can be reprogrammed to become pluripotent.”

MBL Distinguished Scientist and 2008 Nobel Laureate Osamu Shimomura was elected to the National Academy of Sciences.

Ecosystems Center scientists Jerry Melillo and Gaius Shaver were in the first cohort of Fellows of the Ecological Society of America, who were recognized for “the many ways they contribute to ecological research and discovery, education and pedagogy, and to management and policy.”

Mónica Bettencourt-Dias of Instituto Gulbenkian de Ciência (former MBL visiting scientist and Physiology course faculty) received the Keith R. Porter Award from the American Society for Cell Biology. This award recognizes the outstanding work of a cell biologist at the beginning or middle of his or her scientific career.

Dyche Mullins of University of California-San Francisco, current co-director of the MBL Physiology course, was named a Howard Hughes Medical Institute (HHMI) Investigator.

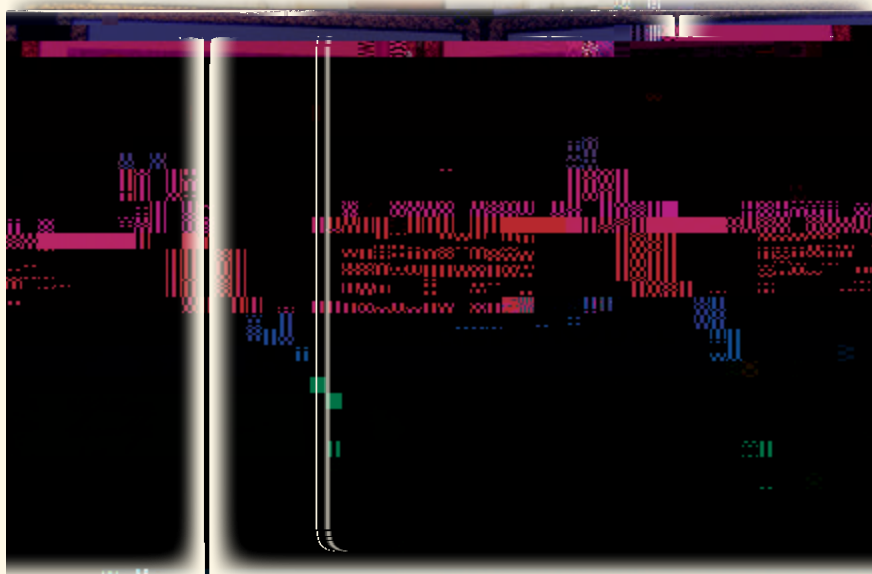
Christopher Neill, MBL senior scientist and the Phyllis and Charles M. Rosenthal Director of the Brown-MBL Partnership, was named director of the Ecosystems Center.

Jonathan Gitlin, MBL senior scientist, was named director of the Bell Center for Regenerative Biology and Tissue Engineering.

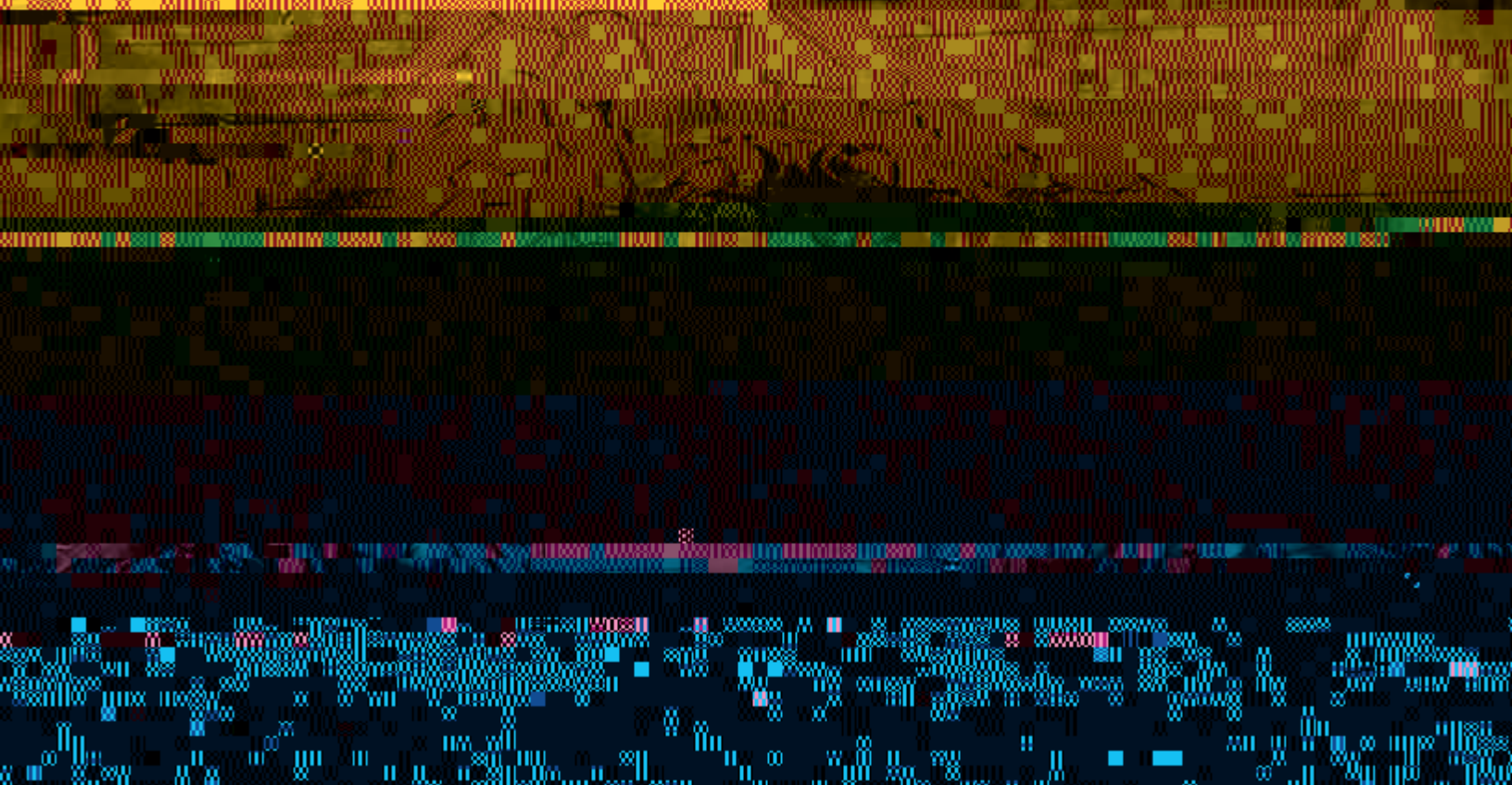
Shelby Riskin, Susanna Theroux, Anupriya Dutta, and Yuko Hasegawa successfully defended their PhD dissertations at MBL. The Brown-BDLP 2020 cohort includes Graduate Program Biologist MChD 153 EnkBDG 02022 of the BS (Sar

Barbara Morgan Roberts remembers when there was a Nobel Prize kept in a secret place in her childhood home. It had belonged to her grandfather, the genetics pioneer Thomas Hunt Morgan, a longtime MBL trustee and visiting scientist from Columbia University. Morgan was very modest, Roberts says, and he never spoke about his prize. “We never showed it to anyone because that would be bragging!” she recalls.

Last summer, when Roberts and her sisters gathered in Woods Hole, as they have for decades, the conversation turned to where to archive Morgan’s Nobel Prize medal and diploma. “We were struck by this brilliant idea. What better place than the MBL?” she says. “Woods Hole has had a central place



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The double-seahorse design on the MBL's seal is familiar to generations of biologists, but its origins are obscure. Its first known appearance was in 1925 on the façade of the newly constructed Main Brick Building, later renamed the Lillie Building in honor of the MBL's second director, Frank R. Lillie. The building was designed by architect Charles Coolidge of the Boston firm Coolidge and Shattuck, which today is known as Shepley Bulfinch. As that firm's archives reveal, original drawings for Lillie show a simple, cast-stone urn in the pediment. At some point during construction, however, the urn was replaced by the more ornate design of symmetrical seahorses encircled by marine organisms, with the head of Neptune, Roman god of the sea, centered below. This striking photo of the ornament, still in the artist's workshop, has been preserved, but the Shepley Bulfinch archives are silent on the designer or sculptor's name. It's interesting to note that the Stazione Zoologica in Naples, a scientific ancestor to the MBL, also has a seahorse in its logo. But as to the artist or scientist who presciently drew the core of the memorable MBL seal? It's a name yet to be discovered. •

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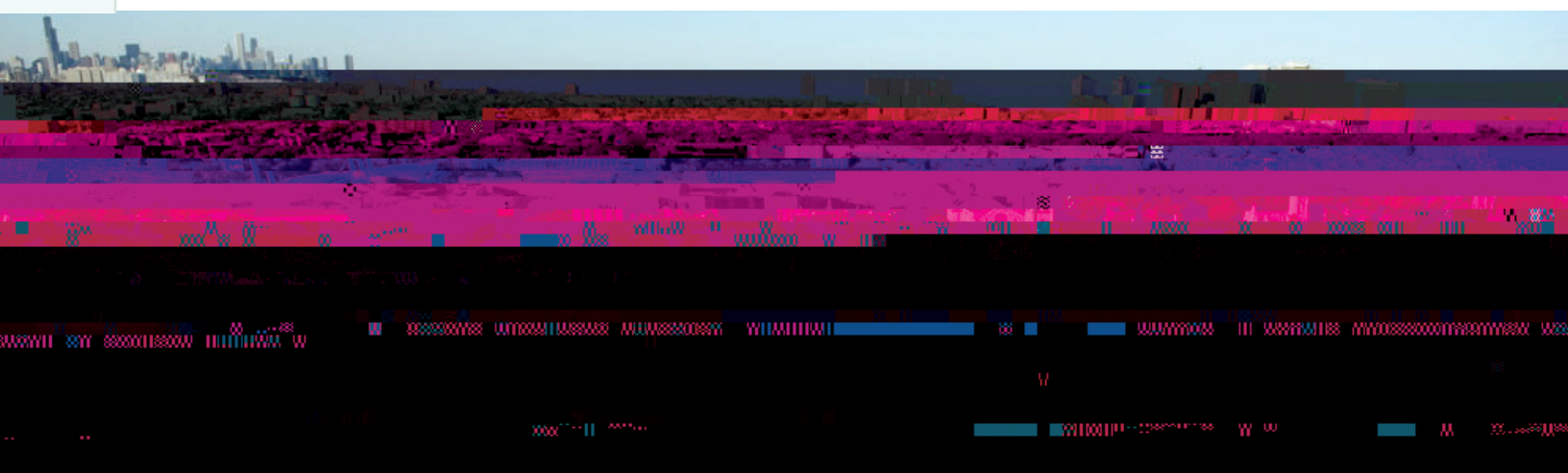
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IN THE NEXT *MBL CATALYST*



The Chicago Connection

The MBL began an exciting new chapter this year by formally affiliating with the University of Chicago. The next issue of MBL Catalyst will explore the partners' shared history, values, and missions of leadership and innovation in scientific research and education.