OCTOBER 2012

MAINE INBRE
IDeA NETWORK OF BIOMEDICAL RESEARCH EXCELLENCE

Maine Neuroscience Community Expands through INBRE

The Maine Neurogenetics Consortium, which began as a grassroots outreach effort in 2007 to connect Maine neuroscience researchers, was recently transformed into the Maine chapter for the Society of Neuroscience (SfN). The inclusion of Maine's neuroscientists into the national society was the result of a groundswell of interest at all of the universities, colleges and biomedical research institutions throughout Maine. Since then, Maine's community of neuroscientists has continued to expand, providing collaborative opportunities for faculty and undergraduate student research and education throughout the state.

The initiative to grow the consortium was conceived and led by Marie Hayes, PhD, a professor of Psychology in the Graduate School of Biomedical Sciences at the University of Maine and a senior scientist at the Maine Institute of Human Genetics & Health. Hayes enlisted Maine INBRE Principal Investigator Patricia Hand to assist with her efforts and says, "Hand's dedication to creating collaborative opportunities has been instrumental in the success of our statewide networking efforts." One result of this is the inclusion of neuroscience at the annual Maine Biological and Medical Science Symposium, an INBRE-sponsored gathering of Maine biomedical scientists designed to allow sharing of research and training ideas. As expected, the consortium initiative, which parallels the goals of the Maine INBRE program, is helping to connect the neuroscience community in Maine by promoting collaboration and the sharing of scientific information.

Hayes serves as a mentor for Melissa Glenn, PhD, INBRE investigator and Colby College Assistant Professor. Glenn's laboratory at Colby conducts research that seeks to understand the interplay between brain and behavior. The lab currently focuses on

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A poster session at the 2012 Society for Neuroscience annual meeting, held Oct 17-20 in New Orleans. Faculty and students from Maine's neuroscience community presented their research and led training sessions at the meeting.

Marie Hayes, Professor of Psychology in the Graduate School of Biomedical Sciences at the University of Maine, was instrumental in developing a neuroscience consortium in the state.

In This Issue

Written by Hand . . .

Principal Investigator Dr. Patricia Hand

As winter descends upon Maine, students and faculty are settled firmly into their fall studies. The Maine INBRE community continues to grow and evolve, and winter brings new faces and programs.

We say goodbye to a strong supporter of the INBRE program, former University of Maine at Presque Isle (UMPI) Professor Dr. Bonnie Wood, who helped integrate biomedical education at UMPI. Her essay on page 5 speaks to the impact the program has had on that institution.

We welcome a new investigator from the University of Maine at Machias. Read about Dr. Shallee Page on page 6. We expect that his research, which examines growth and cancer pathways using next generation sequencing approaches, will mesh well with our current initiative to enhance bioinformatics education efforts within our network.

We begin a new focus on the evaluation of our programs. A sneak peek into some of these efforts can be found in an article on our short course program on page 4. We will kick off the new year with two, one-week short courses in January at MDIBL: *Molecular Biology Research Techniques* for Southern Maine Community College and *Developmental Biology* for the University of Maine at Fort Kent and Presque Isle.

One of the goals of INBRE is to create biomedical connections in Maine that allow for the development of independent, stand-alone networks of scientists and educators. A shining example of this can be seen in our lead story about the neuroscience community in the state, which highlights the INBRE connections that have helped this group grow into a thriving entity with national support and impact.

I look forward sharing more news about our growing INBRE networks through the winter.

Northern New England Computing Grid Expands to Mount Desert Island Biological Laboratory

The Institute of Quantitative Biomedical Sciences (iQBS) at Dartmouth College is pleased to announce that their regional Northern New England Computing Grid has been expanded to include new servers hosted by Mount Desert Island Biological Laboratory (MDIBL) in Maine. A goal of the iQBS is to provide the regional computational infrastructure that biologists require to collaboratively analyze and interpret genomics data. This is accomplished through its NIH Center of Biomedical Research Excellence (COBRE) grant that includes scientists at Dartmouth, MDIBL, University of Maine and University of Southern Maine. The iQBS initially built the computing grid by placing servers at ten New Hampshire INBRE institutions. The three new servers are housed at MDIBL, the lead institution for Maine INBRE. They will be used for the research and training of faculty and students in Maine, regionally, and nationally. Studies include characterizing gene expression profiles from the analysis of high-throughput sequence data that involves hundreds of gigabytes of data from a single experiment. MDIBL has teamed with the the Geisel School of Medicine at Dartmouth, iQBS and University of Maine's Graduate School of Biomedical Sciences to develop the new Applied Bioinformatics Course (http://www.mdibl.org/courses/Applied_Bioinformatics/434/), held Oct. 4-9, 2012, to train biologists how to use the regional computing grid to analyze datasets.

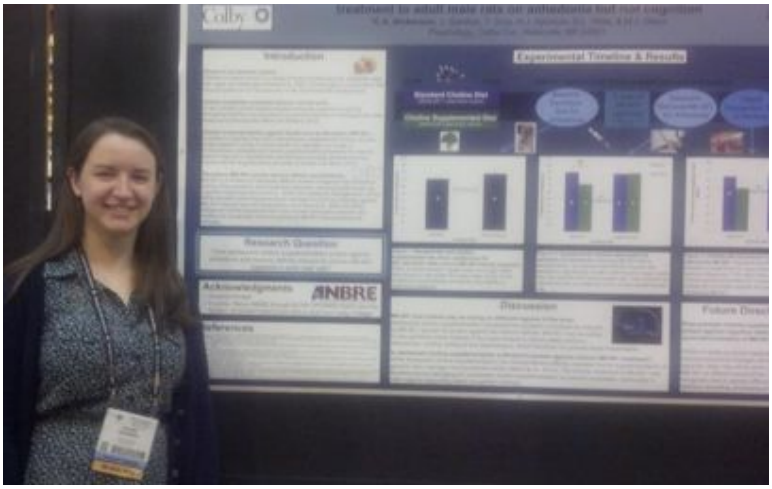
This is the first time INBRE programs in two states, Maine and New Hampshire, have physically shared computing hardware with the purpose of advancing biomedical research competitiveness in both states. The grid is designed to allow scientists to run analyses on any server that has free computing cycles regardless of where it is physically located. The grid is an excellent example of the new paradigm where scientists share resources and jointly build a resource that is larger than what any one institution could build. It relies on high-performance fiber-optic communication networks that link institutions and did not exist before substantial investments from the NIH, NSF and other Federal agencies. The five state North East Cyberinfrastructure Consortium (http://www.necyberconsortium.org/), which includes Delaware, Maine, New Hampshire, Rhode Island, and Vermont, has vastly expanded cyberinfrastructure in the region since it was established in 2007.

Neuroscience Network *(continued from page 1)*

learning how the dietary intake of choline, an essential nutrient, at different stages over the lifespan affects cognition, anxiety, stress reactivity, and neural function. Glenn has been leading a SfN initiative to redirect its focus to a younger audience. She has mentored over twenty-six students this past year and recently brought four of her current and former Colby students to the national meeting of the Society of Neuroscience, held in New Orleans. The Society's annual meeting is the largest gathering of neuroscientists worldwide, with as many as 35,000 scientists and students attending each year.

For the second year in a row, undergraduate students in Glenn's neuroscience lab at Colby were selected to publish an official SfN- endorsed "neuroblog", posting entries about their unique experiences at the annual meeting. Read their blog, *On Psychology and Neuroscience*, here: http://pychneuro.wordpress.com/sfn-2012-neuroblogger-themes-f-and-h/ Last year, four of Glenn's students became the first all-undergraduate group selected to blog as part of the pilot project for the society. Along with Glenn, Colby undergraduate student Chelsea Nickerson and recent graduates Kristen Erickson and John Gardner each presented posters about their research at this year's meeting. Derek Wise, who graduated from Colby's biology program in the spring, is a co-author on two of the posters.

Dr. Nancy Kleckner, a former INBRE investigator, was instrumental in developing the neuroscience program at Bates College and is an associate professor in the program.



Chelsea Nickerson, a Colby senior honors student, presents her poster at the Society for Neuroscience annual national meeting in New Orleans this month.

"The INBRE program has made it possible to involve many more students in my work because I can afford more of the supplies necessary for their research. It has allowed me to hire a technician to help oversee and manage them with me," says Glenn. "It has been tremendously satisfying to provide the students with substantive and positive research experiences that will continue to fuel their interest in and dedication to science for years to come."

Glenn joined with Dr. Ed Bilsky from the University of New England to represent the Maine Chapter of the SfN at a sponsored workshop called "Creative Strategies and Leadership for Chapter Success." Dr. Bilsky is the Director of UNE's Center for Excellence in the Neurosciences. Patsy Dickinson, PhD, the Josiah Little Professor of Natural Sciences at Bowdoin College, also attended the annual meeting and organized a workshop, "Success in Academia."

Dickinson is another Maine scientist who develops neuroscience education communities in Maine through her work with the SfN and as a member of the Steering Committee for the INBRE program. Dickinson teaches physiology and neuroscience and runs a research lab at Bowdoin, where she studies the ways in which the nervous system controls behavior. Specifically, she and her students use the lobster to examine the ways in which several small peptides alter the activity of the nerve cells that control the rhythmic movements of the lobster stomach. Dickinson has mentored countless students at Bowdoin and collaborated with INBRE program directors to design undergraduate short courses for her students, providing unique, hands-on research experience in labs at Bowdoin and the Mount Desert Island Biological Laboratory.

Maine has been running its own Neuroscience Conference yearly since 2007, hosted by Bates College and Dr. Nancy Kleckner, an associate professor of Neuroscience at Bates and an INBRE investigator from 2004-2007. Kleckner helped develop the college's program in neuroscience, which allows students to major in neuroscience by combining coursework and research in biology, psychology, chemistry and philosophy. For the past two years, the University of New England's Center for Excellence in the Neurosciences, led by Dr. Bilsky, has hosted the Maine SfN at their campus in Biddeford. Bilsky says, "We are very excited to have so many colleges, universities and research institutions in Maine that have expertise in this exciting field."

Short Courses: Unique and Effective

With contributing writer Chris Smith, MDIBL

Since 2002, Maine INBRE faculty and students have been joining forces for one- or two-week intensive laboratory experiences we call short courses. The first short course was led by Bates College Biology Professor Glen Lawson and David Towle, a crustacean research scientist at MDIBL. This partnership and cross-pollination of ideas and methodology across institutions forged a path for others to follow and has become a model of success for the Maine INBRE network.

Under the guidance of MDIBL Education Director Mike McKernan and with the support of the entire INBRE network, the program has flourished. To date, over a dozen institutions across Maine have participated in short courses hosted at MDIBL. They are often held during spring breaks, vacations or as a part of a semester-long undergraduate course. Instructors visiting MDIBL share their research passion with students, gaining new and sometimes unexpected perspectives while exploring new techniques and tools to enhance research at their home laboratories and institutions. In 2012, eight short courses were offered at MDIBL.

INBRE Core Directors Mike McKernan and Charlie Wray, PhD, discuss plans for upcoming courses at MDIBL. McKernan is the Director of Education & Conferences and Wray is the Director of Research Resources at MDIBL.

A unique feature of Maine INBRE short courses is their dynamic nature. As student and institution needs change, the content of the courses is changed and the curriculum evolves. Likewise, a flexible system of evaluation and assessment parallels the courses to ensure that they continue to align with INBRE's mission. All short course participants complete a pre-and post-survey, which includes repeat questions to gauge learning progress and motivational aspects, such as: "Are you interested in pursuing an independent research project?" and "How do you rate your comfort level on X topic?" The overall effectiveness of these courses is assessed, in part, by tracking and comparing these pre- and post-course inquiries.

Evaluation results are used to

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The Top 4 Highlights of the Student Experience ...

The opportunity to share their new knowledge with peers and visitors at poster and oral presentations

The ability to give a smooth, cohesive, and understandable presentation that follows scientific method

The rare chance to work on experiments alongside professors

The unique hands-on nature of the training

INBRE and the University of Maine at Presque Isle

By Bonnie S. Wood, Ph.D., Professor of Biology

UMPI Biology Professor Bonnie Wood retired this past year.

On the eve of my retirement, as I sort through the crammed file cabinets in my office, I am reminded of the significance of the University of Maine at Presque Isle's (UMPI) connection with Maine INBRE and the Mount Desert Island Biological Laboratory. This collaboration not only enriched the undergraduate experience of nearly every biology major at UMPI, but also contributed to maintaining my own energy and excitement that come with learning. Since 2009, when UMPI became part of INBRE, groups of our students have eagerly and voluntarily spent vacation weeks at MDIBL participating in short courses on molecular biology research techniques and bioinformatics. Each course was unique so that, when space permitted, some students attended two or three courses. Each time students returned to campus they brought enthusiasm about their experiences, new laboratory skills, and the knowledge to put these skills to use.

This year marked the fourth time that a UMPI student has worked as INBRE summer research fellow in the laboratory of a MDIBL researcher. And for the past four Aprils, groups of our students attended the annual Maine Biological and Medical Sciences Symposium (MBMSS). This enhanced not only their scientific knowledge and laboratory expertise, but also their ability to deliver a scientific presentation. Our students gave poster presentations at the past three Symposia; and for the past four springs, at least one group of students has given hour-long talks on their MDIBL research at UMPI's annual University Day (a day of student presentations). I have watched with pride as our often naïve and unsophisticated first-year majors blossom into poised and articulate speakers who can explain complex scientific concepts to lay audiences as well as scientists.

Sometimes the MDIBL short courses were integrated into a regular course offering; sometimes they were separate, equally enriching, experiences. Over the years I have developed "lecture-free teaching" for all the courses I teach: I prepared genetics students for a short course in molecular biology research techniques by having individual students prepare and present to the class hands-on teaching models that demonstrated the procedures we would use during the short course. This worked beautifully to help them understand the purpose of the techniques they used at MDIBL.

UMPI's new biology faculty members plan research that complements and continues the work students do during the short courses. In particular, Dr. Rachael Hannah spent the summers of 2011 and 2012 at MDIBL developing a new model of traumatic brain injury in zebrafish that can be continued in a small research laboratory at the University and easily involve UMPI undergraduates.

Stephanie Corriveau, who graduated in May 2012, took full advantage of the INBRE collaboration by participating in three short courses, giving poster presentations at multiple MBMSS events, delivering hour-long presentations at two University Days at UMPI, and working last summer as an INBRE summer research fellow. Before college, she had never lived anywhere other than her small hometown, Van Buren, on the northern Canadian border. These activities contributed in major ways to her formal education, to her public speaking skills, and to her personal growth and maturity. She now attends the University of New England College of Osteopathic Medicine. Several other students, in cards congratulating me on my retirement, mentioned their appreciation for the opportunity to go to MDIBL.

I wish Maine INBRE success with a renewal of this vital grant, which is changing students' lives all over Maine, and I hope that the important and beneficial relationship with UMPI will continue to multiply opportunities for both our students and faculty.

Editor's note: UMPI was founded in 1903 in the small, rural town of Presque Isle in Aroostook County. The campus strives to be the region's premier learning institution while helping to stimulate cultural and economic development in Aroostook County and Maine. Last year, UMPI awarded 10 bachelor's and 6 associate's degrees in science and health-related fields. Over 70 students are currently pursuing bachelor's degrees in science.

Investigator Dr. Shallee Page Joins INBRE

RESEARCH:

Examines growth and cancer pathways using soft-shell clams, analyzing them at the DNA (genome) and RNA (transcriptome) levels to determine changes that have occurred as they have undergone classical genetic selection processes. Uses next-generation sequencing approach to gather and analyze data.

SIGNIFICANCE:

Since the clams (an isolated strain of fast-growing organisms) are unusually susceptible to acquiring cancer from environmental toxins, there is a possibility that the research will provide a framework for studying cancer initiation in general.

COLLABORATORS:

Brian Beal, PhD, Professor of Marine Ecology at UMaine-Machias (UMM) and Director of Research at the Downeast Institute for Applied Marine Research and Education
Charles Walker, PhD, Professor of Zoology at the University of New Hampshire.

MENTORING:

In June, Page took two UMM undergraduates to the Howard Hughes Medical Institute to present their research about annotating the genome of a novel bacteriophage.

Dr. Shallee Page, Associate Professor of Chemistry and Biochemistry at the University of Maine at Machias and new Maine INBRE investigator.

RECENT PUBLICATION:

Co-authored a paper with the North East Bioinformatics Collaborative Curation Team in *Database* about annotating the mitochondrion of the little skate. (2012 Mar 20; PMID 22434832)

EDUCATION:

PhD on the protein-protein interactions in cholesterol metabolism in the Bensadoun lab from Cornell University
MA in Science Education from Fairleigh-Dickinson University
AB from Bowdoin College

MOST UNUSUAL RESEARCH EXPERIENCE:

A summer spent in the cloud forests of Ecuador, isolating pheromones from Arctiid moths

IN HIS SPARE TIME:

Dr. Page lives in Machiasport, Maine, between two public beaches with his wife and two boys, building pirate ships and booby-traps.

Alumnus Nishad Jayasundara, PhD

Nishad Jayasundara visited his old stomping grounds this fall while attending a killifish genome annotation workshop hosted by MDIBL. Jayasundara, originally from Sri Lanka, attended the College of the Atlantic as an undergraduate, participated in INBRE programs there, and worked as a research assistant in Dr. David Towle's MDIBL lab in 2008-09. Jayasundara recently received his PhD from Stanford University and is starting a postdoctoral fellowship at Duke University.

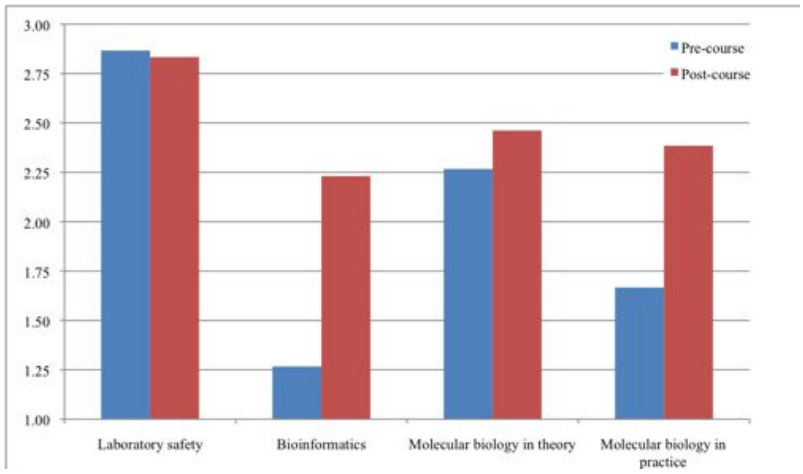
Given the demonstrated success of the INBRE-supported skate genome analysis workshop at MDIBL last year, scientists were selected to host a similar workshop for the killifish, funded by the National Science Foundation. Bioinformatics Core Co-Director Ben King served as faculty for the workshop, which was held September 14-19, 2012.

The workshop gave faculty and students another opportunity to learn about state-of-the-art techniques in analyzing genome sequence data from a specimen obtained from Northeast Creek near Salisbury Cove, Maine.

Evaluation of Short Courses *(continued from page 4)*

make changes to course content, preparation, or logistics. Students are encouraged to suggest changes and those suggestions are often implemented. A case in point: acting on a student suggestion, the course instructors now hold a debriefing session to conclude each course to answer any outstanding questions, connect hypotheses, experiments and observations from the week, and make sure that departing students have "the big picture."

The results show that the short courses are providing a substantial, unique benefit to Maine's students.



Graphical representation of pre- and post- course student surveys reflecting knowledge gained in particular areas during a short course this past summer.

What the Students Have to Say ...

"It is a perfect combination of lab and lecture."

"Before the program I was considering both medical school and a career in research, and now I am fairly certain that I want to pursue a career in research, particularly in the area of the molecular basis of human disease."

Chris Smith, Training Lab and DNA Sequencing Center Manager at MDIBL,assists Colby College graduates with a summer project as part of Colby's Biology Honors Research Program. Smith is leading the evaluation efforts for INBRE programs.

IDeA Network of Biomedical Research Excellence

Research Institutions:
Mount Desert Island Biological Laboratory
The Jackson Laboratory
University of Maine

Academic Institutions:
Bates College
Bowdoin College
Colby College
College of the Atlantic
Southern Maine Community College
University of Maine Honors College
University of Maine at Farmington
University of Maine at Fort Kent
University of Maine at Machias
University of Maine at Presque Isle

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Maine INBRE Program Coordinator:
James Coffman, PhD

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Ryan Bavis, PhD, Bates
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Patsy Dickinson, PhD, Bowdoin
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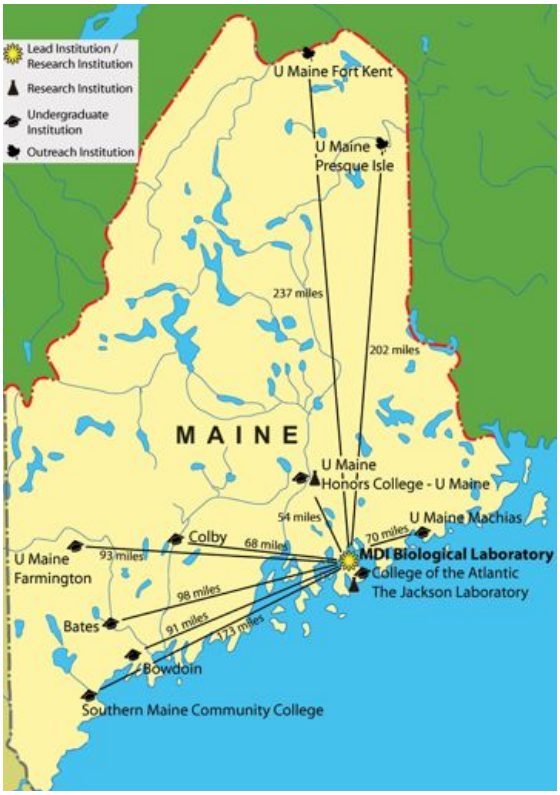
Jean Doty, PhD, UMaine at Farmington
Michael Eckardt, PhD, UMaine
Elizabeth Ehrenfeld, PhD, SMCC
Mary Ann Handel, PhD, The Jackson Laboratory
Ken Hill, PhD, College of the Atlantic
Keith Hutchison, PhD, UMaine
Cristle Collins Judd, PhD, Bowdoin
Lori Kletzer, PhD, Colby
Chris Petersen, PhD, College of the Atlantic
Sherrie Sprangers, PhD, UMaine at Machias
Barbara Tennent, PhD, The Jackson Laboratory
Andrea Tilden, PhD, Colby

Core Directors:
John Gregory, EdD
Benjamin King, MS
Michael McKernan
Charles Wray, PhD

Who We Are

The Maine IDeA Network of Biomedical Research Excellence (INBRE) is an NIH-supported network of Maine institutions including Mount Desert Island Biological Laboratory as lead institution, Bates College, Bowdoin College, Colby College, College of the Atlantic, The Jackson Laboratory, Southern Maine Community College, UMaine-Farmington, UMaine Honors College, UMaine-Machias, UMaine-Fort Kent, UMaine-Presque Isle, and the University of Maine.
The overall goal of the Maine INBRE is to strengthen Maine's capacity to conduct NIH competitive biomedical research. Maine's INBRE provides research support and core facilities to junior faculty, creates research and training opportunities for undergraduate and graduate students, serves as a pipeline for students to pursue health research careers, and enhances the scientific and technical knowledge of Maine's workforce.



News and Photo Submissions are Welcome
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Maine INBRE is supported by the National Center for Research Resources and the National Institute of General Medical Sciences of the National Institutes of Health through Grant Number P20RR016463/P20GM103423

In Memorium: Charlie Slavin

Charles Slavin, dean of the University of Maine Honors College and an associate professor of mathematics, died unexpectedly on September 27 in his Orono home. He was 58.

Slavin joined the University of Maine mathematics faculty in 1984 and was named director of the Honors Program in 1997. Among the many achievements during his tenure as director was the transition of the Honors Program, one of the country's oldest, into a college in 2002.

Charlie served as the UMaine Honors College representative on the Maine INBRE Steering Committee and was instrumental in launching the INBRE program at the University. He provided great enthusiasm for the INBRE program, vision for the Honors College, and tireless support of his students, and he will be missed. To honor his dedication and efforts to provide educational opportunities for his students, future UMaine Honors College summer INBRE research fellowships will be named after Charlie.

Susan Hunter, senior vice president for academic affairs and provost, said Slavin was a beloved figure on campus. "He was absolutely dedicated to the mission of the University of Maine and the Honors College," she said. "He will be sorely missed by his students and his colleagues." A special memorial ceremony was held on September 14 at the UMaine campus in Orono.

Slavin is survived by his wife Nancy Hall, an associate professor of communication sciences and disorders at UMaine, and his children.