FEBRUARY 2008

MAINE INBRE

IDEA NETWORK OF BIOMEDICAL RESEARCH EXCELLENCE

NCRR Grant Brings High-Speed Connections to Maine INBRE

Maine students and scientists will soon be able to send more scientific data faster and participate in new high speed regional and national cyber-networks, thanks to a $294,000 grant from the National Center for Research Resources. Awarded to the Maine IDeA Network of Biomedical Research Excellence (INBRE), the funds will be used to connect member institutions to the high speed "cyber-connection" currently under development at The University of Maine.

Principal Investigator Dr. Patricia Hand called it "wonderful news," noting that "essentially, it will connect Maine INBRE institutions to the 'backbone' of high speed fiber optic network that Maine is building. Our students and faculty will be able to share the huge volume of data that today's research generates and have access to sophisticated equipment across the nation."

The NCRR grant will allow the extension of fiber optic cable to Bates, Bowdoin and Colby Colleges, College of the Atlantic and the Mount Desert Island Biological Laboratory (MDIBL).

Continued on page 3

LEFT TO RIGHT: PATRICIA HAND, ADMINISTRATIVE DIRECTOR, MDI BIOLOGICAL LABORATORY; JOHN HENDERSON, MID MAINE COMMUNICATIONS; RICHARD PATTENAUDE, CHANCELLOR, THE UNIVERSITY OF MAINE; SCOTT MCNEIL, CIO, THE JACKSON LABORATORY; ROBERT KENNEDY, PRESIDENT, UNIVERSITY OF MAINE; CHARLES HEWETT, VP AND COO, THE JACKSON LABORATORY; BILL OSBORN, MAINE DEPARTMENT OF ECONOMIC AND COMMUNITY DEVELOPMENT.

SAVE THE DATE!

Maine Biological and Medical Sciences Symposium

April 25th - 26th

See page 3 for information

In this Issue

Written by Hand . . .

W. Fred Taylor, PhD (standing), Director, IDeA Program, Division of Research Infrastructure, NCRR, presents overview of IDeA at NCRR Strategic Planning Forum. Far left: Irene Grissom, Director, NCRR Office of Grant Management. Seated Left to Right: INBRE PIs Patricia Hand, ME; Frank Waxman, OK; David Weir, DE.

I'm very happy to report to you that we continue to make progress towards our INBRE goal of improving Maine's capacity to conduct biomedical research. The announcement last December of the state's new Research and Education Network is a very exciting development for Maine students and researchers. The information technology infrastructure the network provides will greatly enhance our ability to conduct cutting edge research. Comparative Functional Genomics research relies on bioinformatics tools and the ability to compare and analyze large sets of data. The improved connectivity the network brings will allow our researchers to share data more easily, as well as equipment and other resources.

We are very grateful to the National Center for Research Resources for recognizing the critical need to improve our research infrastructure. With their help we will be able to connect geographically dispersed institutions around the state. Members of the North East Network Initiative (NENI), who met at our regional IDeA meeting in August, continue to work on identifying the technology gaps in our region.

INBRE Steering Committee member Barbara Knowles and I had an opportunity to share some of our thoughts on the needs of Maine and other IDeA states at NCRR's Strategic Planning forum a few months ago. The forum brought together diverse researchers from many of NCRR's program areas to provide their thoughts on NCRR's goals and directions. Collaborations will be key to advancing the goal of more quickly translating scientific discoveries into clinical practice. The continuing need to identify, encourage and educate the next generation of scientists was also identified as a priority.

Providing opportunities for undergraduates is one of the strengths of our INBRE. Our current round of laboratory trainings this winter included a new neuroscience course for Colby College undergraduates in which students learned techniques in both confocal and fluorescence microscopy. In another course for University of Maine students, participants used qPCR techniques to analyze the genes of calcium-deprived Maine fish.

You'll read in this issue about other exciting opportunities for INBRE student and faculty researchers. Junior Faculty researchers from around the state participated this January in a day-long workshop on qPCR to enhance their research techniques. Students and faculty are invited to submit abstracts for the 35th Annual Maine Biological and Medical Sciences Symposium, which promises to be a rich environment for sharing research results.

We're looking forward to another productive year and its prospects for many new collaborations and interactions as we continue to strengthen biomedical research in Maine.

Best wishes,
Patricia Hand, PhD
Principal Investigator

(Far Left): Maine INBRE Steering Committee Member, Barbara Knowles of the Jackson Laboratory, confers with other researchers at the NCRR Strategic Planning Forum

Continued from page one: NCRR Grant Brings High-Speed Connectivity

INBRE institutions will then be able to connect to the new Research and Education Network, funded earlier this year with a $3 million state supplemental budget appropriation to the University of Maine System. The Jackson Laboratory is also committing $1.9 million to extend the network to Bar Harbor.

The Network will significantly enhance high speed connectivity among research, education, healthcare, and government institutions in Maine and link them with other national networks. Data will be able to travel over the non-commercial "Internet2," the highly advanced worldwide network dedicated exclusively to scientific research and education. Access to Internet2 will mean data transmission speeds of 10 Gbps (gigabytes per second), rather than the current .5 Gbps.

"This network will improve enormously the capability of faculty and students to collaborate with researchers in Maine and around the world," explained Dr. Richard L. Pattenaude, Chancellor of the University of Maine System.

Most of the Maine INBRE institutions currently do not have sufficient bandwidth to use the R & E network. The installation of the new fiber cable funded by NCRR will allow them to take advantage of the network's resources. The high speed connection will also allow for the remote use of research equipment at distant locations, enabling institutions to share their equipment. Maine educational institutions that are not connected to the network will also benefit from the reduced competition for bandwidth at the current computer "hub" at the University of Maine.

"This network will improve enormously the capability of faculty and students to collaborate with researchers in Maine and around the world."

The grant will also provide for data storage upgrades at MDIBL, where data storage needs have tripled in the past two years because of new equipment and databases. The research theme of Maine INBRE is "Comparative Functional Genomics," determining the function of specific genes by studying them in a broad variety of species. New imaging techniques, databases, and an emphasis on bioinformatics have dramatically increased the need for better connectivity and more data storage capacity.

"This new infrastucture brings our genomics research into a national arena," notes Bowdoin College Dean for Academic Affairs Cristle Collins Judd, adding: "It also gives us access to complex scientific databases normally only found in large medical and research institutions."

35th Annual MBMSS April 25th - 26th, 2008: Call for Abstracts

Preparations for the 35th Annual Maine Biological and Medical Sciences Symposium (MBMSS) are underway. The symposium is a statewide gathering of researchers and students — an opportunity to share research results, exchange ideas, promote collaboration, and network with Maine scientists in a variety of disciplines.

Abstracts are due March 10, 2008. Any abstract in the biological and medical sciences is welcome, and students are particularly encouraged to attend. Student registration for the symposium is free, and travel stipends and on-campus housing are also available.

This year the MBMSS will also present student research awards at the close of the symposium.

Columbia University HHMI Professor Darcy Kelley, PhD, will be the keynote speaker. A nationally recognized neuroscientist and editor of the *Journal of Neurobiology*, Dr. Kelley is equally well-known for her efforts as an educator. The creator of Columbia's "Frontiers of Science" course, which is required for all incoming freshman whether science or non-science students, Dr. Kelley is now working to create an online site for educators in undergraduate science education. The site will disseminate course materials and create an interactive center for educators. The project seeks to increase the visibility of undergraduate teaching, while increasing student's interest in science by teaching the most interesting, state-of-the-art material.

Dr. Kelley's own lab research examines the neurobiology of social communication with the goal of determining how one brain communicates to another. Her studies of *Xenopus laevis* songs seek to determine how these vocal signals are produced by the nervous system and how acoustic information is decoded and acted upon. Dr. Kelley's research also examines how vocal communication becomes sexually differentiated.

Robert Braun, PhD, Associate Director and Research Chair at The Jackson Laboratory (TJL), will also present an invited lecture. Dr. Braun is a distinguished scientist in the field of reproductive genetics. Formerly a professor of genome sciences at the University of Washington School of Medicine, Dr. Braun joined TJL this past summer.

In addition, this year's MBMSS will feature a pre-symposium workshop on *in situ* hybridization for Junior Faculty researchers, as well as a meeting for Young Investigators. Please mark your calendars and join us for this stimulating research symposium.

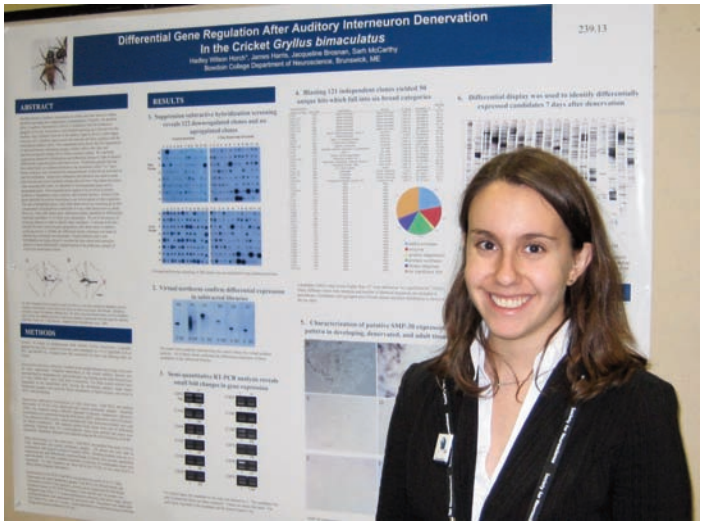
Registration, abstract guidelines and more information is available at:
www.mdibl.org/courses/mbmss08.shtml

INBRE Students Attend Society of Neuroscience Meeting

Among the more than 30,000 participants attending the annual Society for Neuroscience meeting in San Diego last November were eight INBRE-sponsored undergraduate students from Bowdoin College and their five faculty mentors. The group presented seven posters at the three-day meeting, which is the largest and most influential yearly gathering of neuroscientists.

Undergraduate participants included: Jacqueline Brosnan, Rachel Donahue, Emily Gabranski, Kristin Huber, Heidi Mills, Liza Schoenfeld and Jake Stevens. INBRE Junior Biomedical Researcher Christopher Cashman '07 was first author on a sophisticated project using both chemical (matrix-assisted laser desorption/ionization – Fourier transform mass spectrometry) and molecular biological techniques to identify neuropeptides in decapod crustaceans.

Other Bowdoin research presented at the meeting included an investigation of differential gene regulation after auditory interneuron denervation in the cricket *Gryllus bimaculatus,* done by the Horch lab, and a study of neural correlates of memory in the orbitofrontal cortex conducted by the Ramus lab.



Bowdoin College Senior Jacqueline Brosnan was among eight INBRE-sponsored undergraduates in attendance at the Society for Neuroscience Annual Meeting in November

Winter Laboratory Experiences for Undergraduates

Outreach course Participants at MDIBL in February

Thirteen Colby College students under the direction of Andrea Tilden, PhD, came to MDIBL in January for research training in *Imaging and Molecular Biology of the Brain*. This lab was designed as a capstone experience for advanced biology students, an intensive cell culture and microscopy course that included a small research project at the end. Students used crustacean x-organ cells as a model system to explore cell culture techniques, neuronal development, immunocytochemistry, light and fluorescence microscopy, and quantitative image analysis techniques. Microscopes for the course were very generously loaned to us by Zeiss.

Students learned to culture neurons and observe and quantify neurite outgrowth using phase microscopy and axiovision software. They also learned immunocytochemistry and fluorescence microscopy techniques, using a primary and a FITC-conjugated secondary antibody to localize tubulin in neurites, rhodamine-phalloidin to localize actin in growth cones, and DAPI for nuclear staining, and observed some of their cultures with confocal microscopy for comparison.

The final assignment for the course was the assembly of a portfolio of images using all of the techniques learned, including time-lapse recordings of neurite growth. These portfolios were presented as PowerPoint presentations on the final day of the course. Students also visited microscopy facilities at The Jackson Laboratory where they learned more about confocal microscopy and the lab's development of the 4pi microscope.

In February students from the campuses of University of Maine at Farmington, Machias and Presque Isle participated in another new research training experience at MDIBL. The course, entitled *Functional Genomics of Calcium Deficiency in Maine Brook Trout,* allowed students to investigate the genetic effects of a recognized clinical problem in Maine trout.

MDIBL course leader, Charles Wray, PhD, designed the course in collaboration with State of Maine Fish Pathologist Dr. Russell Danner, DVM, using trout as a model organism for studying the effects of vitamin and mineral deficiency. For several years, trout at the state fish hatchery have been producing low quality eggs and exhibiting significant cranio-facial bone deformities commonly called screamer disease. Previous research by Dr. Danner demonstrated that exceedingly low concentrations of environmental calcium in the hatchery water supply appeared to be the root cause of the problems. The INBRE Outreach students posed the question, which genes would be differentially regulated by shifts in calcium ion concentrations? Students were taught a variety of techniques necessary to assess gene regulation by qPCR, scientific tools and analysis important to studying similar deficiencies in humans.

INBRE External Advisory Committee Annual Meeting

Last December Barbara Beltz, PhD, Chair of the INBRE External Advisory Committee (EAC), hosted the group's annual meeting at Wellesley College outside of Boston. The EAC focused on reviewing the progress of Maine INBRE over the past year, and on suggesting improvements to strengthen Maine's biomedical research infrastructure.

The EAC felt that the INBRE is a program that is working very well and that the progress of the Maine INBRE has been outstanding. Short undergraduate laboratory experiences, new instrumentation, student research fellowships and junior faculty research were all cited as significant strengths.

The EAC was also pleased with the progress made by INBRE junior faculty researchers. Over the past fall, EAC members reviewed detailed research reports from each junior faculty project leader. EAC members then met with individual junior faculty and their mentors, and gave advice and direction for the coming year.

Principal Investigator, Patricia Hand, expressed her gratitude to the EAC for the support they provide to our INBRE, noting that she feels "very fortunate to be able to benefit from the committee's expertise and wisdom."

INBRE EAC and Staff: (left to right) Front row: James Gentile, ResCorp, and Barbara Beltz, EAC Chair, Wellesley College. Back Row: David Barnes, INBRE Program Coordinator; Lynette Hirschman, Mitre Corporation; Patricia Hand, INBRE Principal Investigator; Christopher Bayne, Oregon State University, and John Hildebrand, Arizona Research Laboratories.

Update on Maine INBRE Progress

Since our last annual progress report to NCRR in February 2007, Maine INBRE faculty and students have been extraordinarily productive with:

- 86 publications, and another 41 in press;
- Over 140 scientific presentations.

Honors and Awards

Three INBRE undergraduate participants from Bowdoin College were recognized as Sarah and James Bowdoin Scholars this past fall.

Among those honored were 2007 INBRE Undergraduate Summer Fellowship recipients, **JACQUELINE BROSNAN** '08 and **ROBERTA DENNISON** '08, and 2006 INBRE Academic Year Fellowship recipient **PEI HUANG** '08. The Sarah and James Bowdoin award is presented annually to those students in the top 20 percent of their class.

INBRE Principal Investigator **PATRICIA HAND**, PhD, was elected Vice Chair of the Maine Innovation Economy Advisory Board. INBRE Steering Committee member **PAMELA BAKER**, PhD, of Bates College also serves on the board whose members are appointed by Governor John Baldacci. The Maine Innovation Economy Advisory Board, which was established by the Maine Legislature, is responsible for the development and implementation of the State Science and Technology Action Plan.

MIEAB's other duties include assisting policymakers in advancing research and development initiatives; facilitating research opportunities that create sustained, inter-institutional projects; interacting with the State Science Director and assisting the Director with the preparation of a biannual report to the Governor on strategies and initiatives for the advancement of scientific and technological development in the state of Maine; and advocating for the state's R&D interests.

HAND was also recently elected Vice-Chair of the National EPSCoR/IDeA Foundation.

Do you have INBRE news?

Please let us know about upcoming events, items of interest and your program accomplishments.

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2008 Laboratory Short Courses for Undergraduates

Imaging and Molecular Biology of the Brain

January 14 – January 25, 2008

Host: MDIBL, for Colby College students

Faculty: Andrea Tilden, Ph.D., and MDIBL Course leaders

Functional Genomics of Calcium Deficiency in Maine Brook Trout

February 18 – February 22, 2008

Host: MDIBL, for UMaine Farmington, Machias, and Presque Isle students

Faculty: Charles Wray, Ph.D., MDIBL Course Leader

Functional Genomics of Membrane Transport

March 3 – March 14, 2008

Host: MDIBL for UMaine Orono Honors College students

Faculty: Denry Sato Ph.D., Course Director, and MDIBL Course leaders

Environmental Toxicogenomics

March 10 – March 21, 2008

Host: MDIBL, for Bowdoin College students

Faculty: Tony Planchart, Ph.D

Evolutionary Molecular Genetics

March 17 – March 28, 2008

Host: MDIBL, for College of the Atlantic students

Faculty: Christopher Petersen, PhD, College of the Atlantic
Charles Wray, Ph.D., MDIBL

Bates College Laboratory training

May 5 – May 16, 2008

Host: MDIBL, for Bates College students

Faculty: Pamela Baker, Ph.D., Course Director, and MDIBL Course leaders

Upcoming Events

March 13, 10:30 am, The Jackson Laboratory

Dr. Thomas Cremer, Department of Biology,
Ludwig-Maximilians-University Munich, Germany

"Chromosome territories and nuclear organization: structural, functional and evolutionary aspects

April 25th - 26th, MDI Biological Laboratory

35th Annual Maine Biological and Medical Sciences Symposium

IDeA Network of Biomedical Research Excellence

Research Institutions:

Mount Desert Island Biological Laboratory
The Jackson Laboratory

Baccalaureate Institutions:

Bates College
Bowdoin College
Colby College
College of the Atlantic
The University of Maine

Outreach Baccalaureate Institutions:

University of Maine at Farmington
University of Maine at Machias

Maine INBRE Director:

Patricia Hand, Ph.D.

Maine INBRE Program Coordinator:

David Barnes, Ph.D.

INBRE External Advisory Committee:

Barbara Beltz, Ph.D., Chair
Christopher Bayne, Ph.D.
James Gentile, Ph.D.
John G. Hildebrand, Ph.D.
Lynette Hirschman, Ph.D.
Leonard I. Zon, M.D.

INBRE Steering Committee:

Pamela Baker, Ph.D., Bates
Patsy Dickinson, Ph.D., Bowdoin
Keith Hutchison, Ph.D., U of Maine
Barbara Knowles, Ph.D., The Jackson Laboratory
Chris Petersen, Ph.D., COA
Edward Yeterian, Ph.D., Colby

Core Directors:

John Gregory, Ed.D.
Carolyn Mattingly, Ph.D.
Michael McKernan
David Towle, Ph.D.
Charles Wray, Ph.D.

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National Institutes of Health

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Maine STEM Initiative

There's a new initiative in the State of Maine that is part of a growing number of programs working toward improving the research infrastructure of the state. The Maine STEM (Science Technology Engineering and Mathematics) initiative kicked off its efforts with a January 24th conference in Augusta. The new endeavor which seeks to bridge business, education and research through partnerships in Maine, brought together state government officials, local school boards, K-12 educators, higher education faculty, researchers and industry representatives for a day of strategy.

The goal the group set for itself is to increase by 10 percent the number of students entering into STEM fields beyond high school by the year 2011.

INBRE Principal Investigator, Patricia Hand, applauds the effort which she says "shares many of the same goals as the INBRE program. We look forward to working with STEM to provide information about the programs and resources available to students through INBRE."

Partners at the January conference discussed strategies to inspire and engage students to pursue STEM careers. As a first step towards its ambitious three-year goal, the group inaugurated a website which synthesizes the resources of many partner organizations in one place. The site provides a wealth of information for students, parents, educators and policy makers. It includes a database of events (searchable by region and field of interest), information on research and education opportunities, as well as profiles of STEM partner organizations. There are links provided to other helpful resources covering topics from resume-writing and interviewing tips to selecting an advisor.

For more information, visit the website at: **WWW.MAINESTEM.ORG**

QPCR Workshop for INBRE Researchers

Fourteen INBRE Junior Faculty and Research Assistants Converged on the MDI Biological Laboratory in December for a day-long qPCR Workshop

This past December the MDI Biological Laboratory hosted a one-day training in quantitative real-time polymerase chain reaction (qPCR) for INBRE Junior Faculty and their research assistants. The hands-on workshop was the first in a series organized by the Junior Faculty on topics and techniques to help them advance their research. Investigators and lab technicians from Colby, Bates and Bowdoin Colleges and MDIBL came together to learn qPCR and share their challenges and experiences in the lab.

The workshop was organized by Dr. Tony Planchart, an INBRE Junior Faculty member. Additional qPCR machines were sent from the manufacturer, Stratagene, along with a technician, Scott Leppanen. "Scott was very knowledgeable," said MDIBL Scientist Carolyn Mattingly. "We walked through qPCR step-by-step, from designing and running an experiment to analyzing our data."

While some of the participants had never used qPCR, others came to the workshop with specific questions that stemmed from their own research projects. The small size of the workshop group allowed them to address problematic topics relevant to their research such as primer-dimer formation and how to minimize it, or the challenges of data analysis and interpretation.

Junior Faculty investigators are organizing a second workshop that will focus on *in situ* hybridization and will coincide with April's Maine Biological and Medical Sciences Symposium at MDIBL.

Who we are

The Maine IDeA Network of Biomedical Research Excellence (INBRE) is an NCRR/NIH-supported network of ten Maine institutions including Mount Desert Island Biological Laboratory (lead institution), Bates College, Bowdoin College, Colby College, College of the Atlantic, The Jackson Laboratory, and The University of Maine. Maine INBRE outreach institutions include The University of Maine at Farmington and The University of Maine at Machias.

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 undergraduates, serves as a pipeline for undergraduate students to pursue health research careers and enhances the scientific and technical knowledge of Maine's workforce.

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