

MAINE

INBRE

IDEA NETWORK OF BIOMEDICAL RESEARCH EXCELLENCE

New Training Laboratory Opens at MDIBL

When INBRE students come to the Mount Desert Island Biological Laboratory (MDIBL) this year for intensive laboratory training, they'll conduct their experiments in the new Edwin S. Marks Teaching Laboratory.

The state-of-the-art teaching lab is on the ground floor of the MDIBL's new three-story building – the first research laboratory building in Maine to be LEED-certified by the U.S. Green Building Council – with windows looking out onto Frenchman's Bay. Designed for up to twenty-four students, the teaching lab will accommodate larger classes while increasing each student's access to a full research experience. The lab measures 1,254 square feet and includes twelve stations designed for two students each. It also offers five stations for bioinformatics and adjoins a conference room and office space. MDIBL's two confocal microscopes, used for advanced imaging techniques, are nearby in one of the building's facilities cores, as is the Marine DNA Sequencing Center, and the Bioinformatics Core.

(Continued on page 2)



THE NEW TEACHING LABORATORY AT MDI BIOLOGICAL LABORATORY OPENED THIS SUMMER WITH A COURSE ON QUANTITATIVE FLUORESCENT MICROSCOPY. INBRE FACULTY AND STUDENTS WILL USE THE LAB AND ITS EQUIPMENT FOR UPCOMING TRAINING SESSIONS

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Understanding NIH's Public Access Policy

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PRINCIPAL INVESTIGATOR, PATRICIA HAND, PHD,

As you'll see on these pages, Maine INBRE has had another fruitful year and we have a great deal of news to report.

The opening of a new green laboratory building at the MDI Biological Laboratory (MDIBL) in June – with MDIBL's first dedicated teaching lab – represents the growth and success of our INBRE's efforts to create a pipeline of young investigators for Maine's biomedical research. You'll read in this issue about Nina Griffin, University of Maine-Farmington '08, yet another INBRE alum to go to work in Maine's research

community. This issue also highlights some of the recent achievements of Maine's undergraduate institution researchers, through awards, publications and presentations.

One of the original goals of the National Center for Research Resources' Institutional Development Award (IDeA) program is to provide funding to states which have historically low levels of support from federal agencies for scientific research in order to improve their competitiveness for these types of grants. As you'll read, this has been very successful for our INBRE. Network institutions and individual researchers have been earning attention and grants from both private and governmental funding agencies – important support that complements our INBRE program and enhances both research capabilities and infrastructure, as well as our research training programs.

Over the summer, many in our network worked very hard to help us complete our application for a renewal of our INBRE funding. The process of putting the grant application together caused us to reflect on, and quantify, the outcomes of our program over the last four years. The results are very impressive. In the first four years of the grant, members of our network produced 237 research publications (98 with undergraduate authors) and gave 383 presentations (216 with undergraduate authors). Junior Faculty have applied for 44 grants, with 17 funded and six pending.

Since the program's inception in 2004, 253 undergraduates have partici-

pated in INBRE hands-on research training – 158 attended short courses at MDIBL, 49 completed summer research fellowships, and 46 participated in academic year research fellowships. Of the 100 student participants who have graduated since the program began, 89 are pursuing higher education in science or a science- or health-related career. Over one third are technicians in research laboratories, while others are pursuing a PhD, MD, DVM, public health or joint degree program in the biomedical sciences. Four are science teachers and one is a National Public Radio science writer.

These figures are truly remarkable and demonstrate the impact the INBRE program is having in providing students with better access to biomedical resources, and research and training opportunities. The program is succeeding in building a pipeline of the next generation of researchers.

The current generation of INBRE researchers and mentors is leading the way. You'll read in this issue of Junior Faculty members' success in obtaining National Science Foundation grants, their many new publications, and the mentorship they provided to students over this past summer.

I'm very proud of our INBRE's accomplishments and congratulate all Maine-INBRE participants on your achievements.

Best wishes,
Patricia Hand, PhD
Principal Investigator

Continued from page one: **New Training Laboratory Opens**

Proximity to these facilities enhances students' ability to conduct genetic experiments and make real contributions to scientific knowledge.

Throughout its history as a marine laboratory committed to both biomedical and environmental research, MDIBL has inspired Maine high school and college students with reality-based science programs that are engaging, meaningful, and effective. The completion of the training laboratory, part of MDIBL's new 15,000 square foot research facility, marks the

first time MDIBL has had laboratory space dedicated exclusively to teaching.

INBRE funds were used to equip the new training laboratory with two gradient-PCR machines, microfuges, computers, three stereomicroscopes, and an Axiovert 40C microscope, as well as durable supplies such as glassware and pipettes. The lab is fully outfitted with supplies and equipment for microscopy, molecular biology and wet bench techniques.

The laboratory is named in memory of Edwin Saul Marks, by his daughter,

Carolyn Marks Blackwood, who served as a Trustee of MDIBL from 2002 until 2007. She and her family have been generous supporters of MDIBL, and its educational programs in particular. Edwin Marks had a life-long interest in biomedical research, and helped establish the Boas-Marks Biomedical Research Center at the North Shore-Long Island Jewish Health System. Carolyn Marks Blackwood is a film producer and photographer and lives in Staatsburg, NY.

Undergraduate Summer Research Fellowships



Although the new academic year is just beginning, it's not too early to start looking forward to next summer. Applications for the INBRE Undergraduate Summer Research Fellowship are due January 19, 2009.

The fellowship program provides an 8 to 10 week intensive, hands-on biomedical research experience in which

students pursue a hypothesis-driven project in the laboratory of an INBRE mentor. Maine INBRE mentors conduct research in a variety of areas, from molecular toxicology, bioinformatics and genetics, to neuroscience.

Students treasure their summer experiences, and the new skills they develop in the lab. "This was a wonderful opportunity and I can't stress enough how rewarding it is to be able to participate in a laboratory environment with other students and researchers," wrote one. "It was one of the most valuable experiences I ever had."

In addition to their time in the laboratory, students benefit from attending scientific lectures, networking with researchers and other students, and experiencing the camaraderie of being part of a scientific community.

The summer program culminates in an annual Student Symposium – in which student researchers present their work to each other and the larger scientific community and hone their presentation skills – and a Student Recognition Dinner for participants, mentors and families.

More information is available at: <http://www.maineidea.net>. The website provides an overview of the program, a directory of mentors and their research projects, and application forms, as well as a list of the past year's summer fellows and their research projects.



Honors and Awards

INBRE External Advisory Committee Member **LEONARD ZON, MD**, was among 212 new members elected to the American Academy of Arts and Sciences in April. One of the nation's oldest and most prestigious honorary societies and independent policy research centers, the Academy convenes leaders from diverse perspectives to address the pressing issues of the day, and honors individuals who have made prominent contributions in their disciplines, including mathematics, physics, biological sciences, social science, humanities and the arts, public affairs and business.

Founded in 1780, the Academy's membership has included the finest scholars and leaders of each generation. Its current membership includes 200 Nobel laureates and more than 60 Pulitzer Prize winners.

Zon's laboratory uses zebrafish as a model for understanding vertebrate blood development, and as a screen for tumor-related genes and proteins. Dr. Zon is a Howard Hughes Medical Institute Investigator, the Director of the Stem Cell Research Program at Children's Hospital in Boston, and the Groubeck Professor in Hematology/Oncology at Harvard University.

2007 INBRE Summer Fellowship Student **JACQUELINE BROSANAN '08**, received the Copeland-Gross Biology Prize at this spring's Bowdoin College Honors Day awards ceremony.

KRISTEN HUBER '08 was also honored at the Bowdoin awards ceremony. A 2007 INBRE Summer Fellow in the laboratory of Patsy Dickinson, PhD, Huber was elected to Phi Beta Kappa.

In addition, Bowdoin announced at the ceremony the recipient of the 2008

INBRE Junior Biomedical Researcher Fellowship, **JACOB STEVENS '08**. Stevens will stay on at Bowdoin an additional year to pursue independent research and help mentor current undergraduate students in the lab.

INBRE Junior Faculty member, **CLARE BATES CONGDON, PhD**, was recently named Assistant Professor of Computer Science at the University of Southern Maine. The Institute of Electrical and Electronics Engineers (IEEE) – the world's largest professional association for the advancement of technology – also recently named her Senior Member of the Computational Intelligence Society, a recognition from peers of technical and professional excellence. IEEE, which publishes 1/3 of the world's literature in electrical engineering and computer science, is dedicated to fostering technological innovation.

Recent Grants from NCRR and HHMI Strengthen Maine INBRE

Over the past few months Maine INBRE institutions received several new grant awards which will enhance both the research and training aspects of the IDeA program. The more than \$2.5 million in new funding will support infrastructure improvements, enhance undergraduate faculty retraining, update science curricula, and improve opportunities for student scientists.

Bowdoin and Colby Colleges each received grants from the Howard Hughes Medical Institute (HHMI), which focuses on reinvigorating life science education and engaging leading scientists in teaching. Of 224 colleges and universities invited to submit proposals, Bowdoin and Colby were two of only 48 approved for funding this year. Both institutions' HHMI programs will provide important support for pre-college science programs not currently funded by Maine's INBRE.

The MDI Biological Laboratory recently received an award from the National Center for Research Resources Developing and Improving Institutional Animal Resources program to upgrade its marine and aquatic holding facilities for research animals.

"We are thrilled at the increased support being given to the scientific and educational needs of Maine," says INBRE Principal Investigator Patricia Hand, PhD, "These grants will provide a boost to our ongoing efforts to build research capacity in the state and encourage more students to continue in science."

Bowdoin College

HHMI awarded Bowdoin \$1.1 million to enrich classroom, laboratory and co-curricular biosciences activities for students. The program will reinforce the College's strong record of preparing future scientists for graduate and health sciences programs and careers in these fields.

Bowdoin will use HHMI funds to support a one-week laboratory immersion summer program for matriculating students under-represented in the sciences, as well as a peer mentoring science program. The goal is to have many of these students

become involved in research laboratories as early as their first year of college.

To encourage more Maine high school students to continue in science, under the HHMI award, Bowdoin science faculty will continue and expand their program of summer workshops for high school teachers and students. In addition to the summer training, Bowdoin will furnish equipment and supplies to enable teachers to incorporate the labs into their classrooms. To help the more complex labs work smoothly, Bowdoin students will travel to many of these schools to work directly with the teachers and students for short periods of time during the academic year.

"These grants will provide a boost to our ongoing efforts to build research capacity in the state and encourage more students to continue in science."

The new grant will also provide two graduating seniors with the opportunity to spend three months to a year continuing their research at Bowdoin post-graduation. The objective is to keep promising young researchers' work moving forward with the goal of publication in a peer-reviewed journal. These pre-doctoral fellows will also mentor other undergraduates in the laboratory to provide another level of leadership. Bowdoin has already successfully modeled this pre-doctoral fellow program through their INBRE grant funding, supporting two graduates in finishing their research.

Colby College

Many new college students – particularly first generation students and those from minority groups already underrepresented in science – struggle with the "gateway" courses in biology,

chemistry and mathematics. Getting students through the fundamentals and giving them a taste of their own research is one of the prime goals of Colby College's \$1.1 million HHMI funded effort to improve undergraduate science education.

The project will begin with a six-week summer program for high school graduates prior to beginning college, which will include an intense research experience with close faculty mentorship and a review of basic math and chemistry skills. Once the school year begins, students will continue their mentored research in the laboratory, and support each other through social gatherings and special workshops.

The college, which has always had a close relationship with the local public schools, will also support more "scientists in the classroom" units in Waterville, Maine's 4th and 5th grade classrooms. The program gives small grants directly to science teachers, while loaning them lab equipment and hiring more high school students as research assistants.

MDI Biological Laboratory

The National Center for Research Resources recently awarded \$472,136 to MDIBL to upgrade its marine and aquatic facilities. The improvements will enclose one open air marine holding building, and upgrade its infrastructure and that of one indoor animal holding facility, installing modern recirculating seawater and freshwater systems that have environmental controls (for temperature, salinity, and light). These renovations will advance the lab's ability to maintain many species, as well as improving its capacity to over-winter marine animals. This will facilitate student research throughout the academic year, as well as providing researchers with the ability to conduct experiments in carefully controlled environmental conditions.

Bates College's Nancy Kleckner, PhD, Awarded NSF Grant



BATES COLLEGE PROFESSOR NANCY KLECKNER WITH NEIL MARYA, BATES '08

Nancy Kleckner, PhD, a past INBRE Pilot Project Investigator and Chair of Bates College's Biology Department, has been awarded a National Science Foundation grant for three years of support for her project "Characterization of Glutamate Receptors in the Pond Snails, *Helisoma trivolvis* and *Biomphalaria glabrata*."

Under the grant Dr. Kleckner will continue her research to better understand the pharmacology, biophysics, structure and function of neurotransmitter receptors that respond to the amino acid glutamate. These receptors exist in the nervous systems of both vertebrate and invertebrate animals, and contribute to their everyday function. In pond

snails glutamate controls the pattern of feeding behavior. The project's central question is how glutamate activates and inhibits certain neurons to cause the muscular movements that define normal feeding behavior. These receptors can be compared to those found in vertebrate animals to determine how they have changed (or not) during evolution.

Through her research, Dr. Kleckner has been able to provide many laboratory opportunities for Bates students. Three undergraduates will conduct summer research on her NSF-funded project, and several others will conduct thesis research on the project during the academic year.

Dr. Kleckner's laboratory recently published a paper on their findings. "PHARMACOLOGY OF IONOTROPIC AND METABOTROPIC GLUTAMATE RECEPTORS ON NEURONS INVOLVED IN FEEDING BEHAVIOR IN THE POND SNAIL, *HELISOMA TRIVOLVIS*," authors *Scannell, E., *Dell'Ova, C., Quinlan, E., Murphy, A. D., and Kleckner, N. W., is in the *Journal of Experimental Biology*, Volume 211, 824-833, 2008.

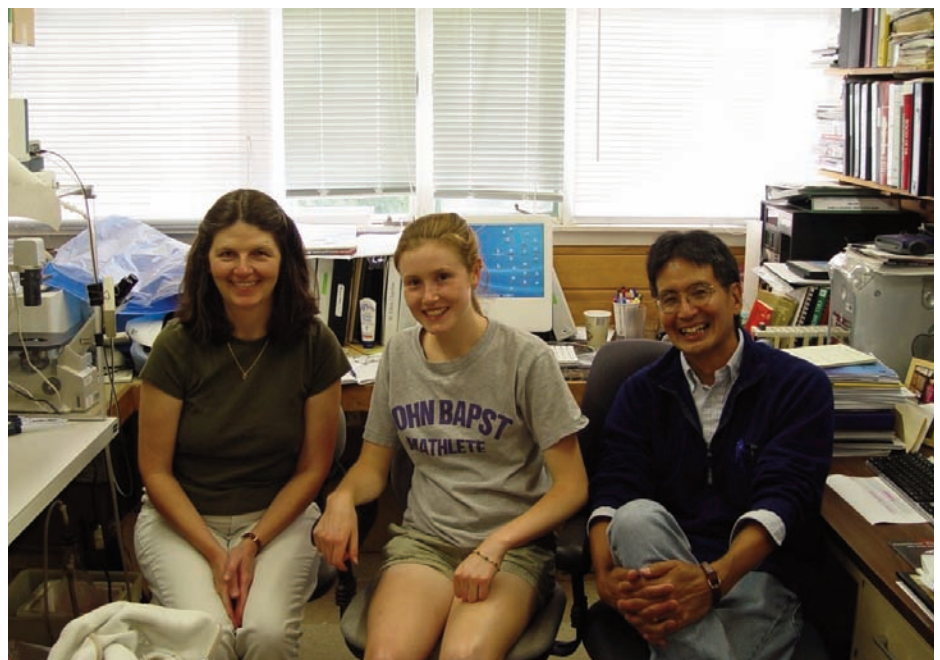
* Indicates undergraduate co-authors.

J. Denry Sato, D Phil, Honored for Student Mentorship

INBRE Junior Faculty J. Denry Sato, D Phil, became the first recipient of the inaugural "Outstanding Summer Mentor" Award, an honor to be given annually at the MDI Biological Laboratory.

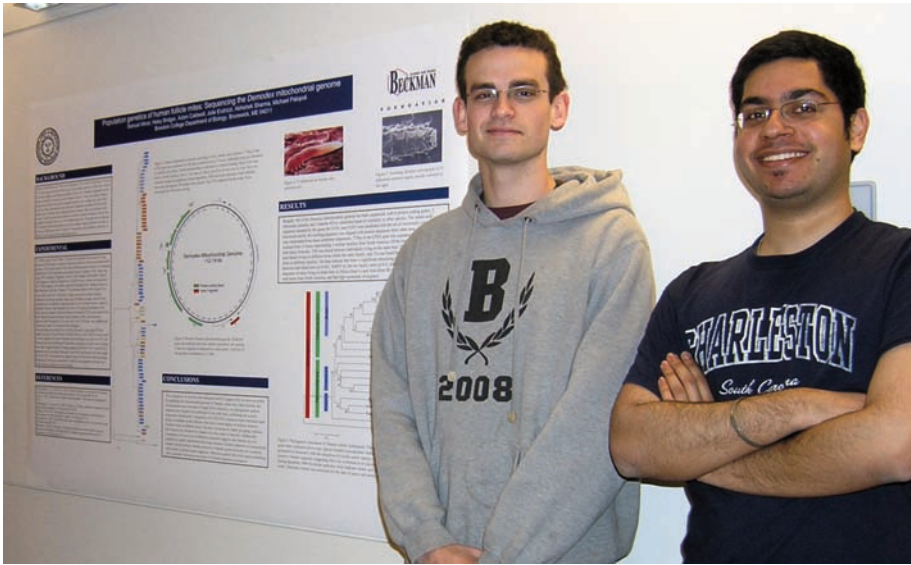
Acknowledging the importance of the student-mentor relationship, the award recognizes the commitment mentors make to the training and education of their students. Student fellows were asked to write an essay on their research experience and interaction with their mentor.

High School Fellow Erin Flynn, a 2008 graduate of John Bapst High School in Bangor, nominated Dr. Sato, whom she credits with teaching her to love science and research, inspiring her, and including her in every step of the research process. Previously unsure of her career goals, Erin is now seriously considering scientific research or medicine, and plans to take as many biology-related courses as possible when she starts college this month.



SATO LAB (LEFT TO RIGHT): RESEARCH ASSISTANT CHRIS CHAPLINE, MS; HIGH SCHOOL FELLOWSHIP STUDENT ERIN FLYNN; AND INBRE JUNIOR FACULTY DENRY SATO, D PHIL

35th Annual Maine Biological & Medical Sciences Symposium



The 35th Maine Biological and Medical Sciences Symposium, held at MDI Biological Laboratory April 25th – 26th, was by all accounts “the best ever.” Over 145 researchers from 20 Maine institutions gathered to share research results, promote collaboration, exchange ideas and network at this unique statewide event. Participants presented a broad array of research in the areas of genetics, genomics, neuroscience and physiology in 21 platform presentations and 46 posters.

Preceding the symposium’s opening, two special meetings were held: a gathering of the Maine Neurogenetics Consortium, and an intensive workshop for Junior Faculty on *in situ* hybridization organized by MDIBL INBRE researcher Antonio Planchart. As part of the two-day event, there was also a special networking session for Junior Faculty. Four of these new investigators gave platform talks during the symposium.

Among the participants and presenters were forty-seven undergraduate students and nineteen graduate students. Their research presentations were praised as “impressive” and “sophisticated.” Participants especially enjoyed the mix of faculty and student speakers, the diversity of subjects and the fact that “undergraduates, graduates and professionals intermingled, presented, and learned together at this conference.

Columbia University HHMI Professor Darcy Kelley, PhD, gave an engaging and informative keynote lecture entitled “HEARING TO UTTERANCE: THE NEUROBIOLOGY OF VOCAL COMMUNICATION.” Dr. Kelley’s research examines the neurobiology of social communication with the goal of determining how one brain communicates with 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 Chair of Research at The Jackson Laboratory (TJL), also presented an invited lecture, ANDROGEN REGULATION OF THE BLOOD/TESTIS BARRIER. 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 in 2007.

New at the symposium this year was the first annual award for Best Student Presentation. First author Sam Minot, Bowdoin ’08, accepted the award on behalf of his research group. The study – EVOLUTIONARY HISTORY AND POPULATION GENETICS OF THE HUMAN FOLLICLE MITE, *DEMODEX FOLLICULORUM*, authors Minot, A. Sharma, J. Endrizzi, H. Bridger, A. Caldwell, and Bowdoin Associate Professor Mike Palopoli – sequenced the mitochondrial genome of *D. folliculorum* in order to provide a glimpse into the population and evolutionary dynamics of this organism. Using cytochrome oxidase-3 DNA sequence from numerous mites, their study indicated that follicle mites colonize their human hosts within family groups and among humans in close contact such that the relationship between mites correlates closely with the social networks humans form.



PHOTOS: TOP LEFT: SAM MINOT AND ABISHEK SHARMA, BOWDOIN '08, WITH THEIR AWARD WINNING POSTER.

BOTTOM RIGHT: JAKE STEVENS OF BOWDOIN COLLEGE EXPLAINS HIS RESEARCH

2008 INBRE Summer Fellowships

Talented undergraduates are invited to participate in summer research programs of established scientists in a network-wide competitive program. Selection of students is based on a combination of prior academic success, letters of recommendation and research interests. Below are our 2008 undergraduate student research fellows, their institutional affiliation, and mentor.

JUDI AZEVEDO, THE UNIVERSITY OF MAINE

MENTOR: *CLARISSA HENRY, PHD, THE UNIVERSITY OF MAINE*

EMILYNNE BELL, THE UNIVERSITY OF NEW ENGLAND

MENTOR: *SHARON ASHWORTH, PHD, MDI BIOLOGICAL LABORATORY AND THE UNIVERSITY OF MAINE*

NAVEED DAVOODIAN, COLLEGE OF THE ATLANTIC

MENTOR: *ANDREW CHRISTIE, PHD, MDI BIOLOGICAL LABORATORY*

CHRISTOPHER DURKIN, THE UNIVERSITY OF MAINE-FARMINGTON

MENTOR: *DAVID BARNES, PHD, MDI BIOLOGICAL LABORATORY*

EMILY GABRANSKI, BOWDOIN COLLEGE

MENTOR: *PATSY DICKINSON, PHD, BOWDOIN COLLEGE*

ASHLEY GARD, THE UNIVERSITY OF MAINE

MENTOR: *ANDREW CHRISTIE, PHD, MDI BIOLOGICAL LABORATORY AND UNIVERSITY OF HAWAII*

NINA GRIFFIN, THE UNIVERSITY OF MAINE-FARMINGTON

MENTOR: *ROBERT PRESTON, PHD, MDI BIOLOGICAL LABORATORY AND ILLINOIS STATE UNIVERSITY*

KATHERINE HARMON, COLBY COLLEGE

MENTOR: *JOSHUA KAVALER, PHD, COLBY COLLEGE*

NATHANIEL JILLETTE, THE UNIVERSITY OF MAINE-MACHIAS

MENTOR: *DAVID TOWLE, PHD, MDI BIOLOGICAL LABORATORY*

ALISON KIEFFER, THE UNIVERSITY OF MAINE-PREQUE ISLE

MENTOR: *CHARLES WRAY, PHD, MDI BIOLOGICAL LABORATORY*

ESCAR KUSEMA, COLBY COLLEGE

MENTOR: *ANDREA TILDEN, PHD, COLBY COLLEGE*

MOLLY KWIATKOWSKI, BOWDOIN COLLEGE

MENTOR: *ANDREW CHRISTIE, PHD, MDI BIOLOGICAL LABORATORY AND UNIVERSITY OF HAWAII*

LAUREN OKANO, BATES COLLEGE

MENTOR: *PAMELA BAKER, PHD, BATES COLLEGE*

MAXWELL SIMARD, THE UNIVERSITY OF MAINE-AUGUSTA

MENTOR: *CHRISTOPHER LAGE, PHD, MDI BIOLOGICAL LABORATORY AND UNIVERSITY OF MAINE-AUGUSTA*

SUSANNAH STONE, BATES COLLEGE

MENTOR: *ERIK SWENSON, MD, MDI BIOLOGICAL LABORATORY AND THE UNIVERSITY OF WASHINGTON*

MENTOR: *NICOLE THEODOSIOU, PHD, MDI BIOLOGICAL LABORATORY AND UNION COLLEGE*

CECILY SWINBURNE, COLLEGE OF THE ATLANTIC

MENTOR: *BRUCE STANTON, PHD, MDI BIOLOGICAL LABORATORY AND DARTMOUTH MEDICAL SCHOOL*

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SUBMISSIONS OF NEWS OR PHOTOS ARE WELCOME, AND MAY BE MAILED TO THE EDITOR AT THE ABOVE ADDRESS

OR SENT ELECTRONICALLY TO APICARD@MDIBL.ORG

The Jackson Laboratory's Lindsay Shopland, PhD, Awarded NSF Research Grant



INBRE Project Leader, Lindsay Shopland, PhD, of The Jackson Laboratory (JAX), has been awarded a National Science Foundation grant to continue her research into the role of gene deserts in genome organization in the nucleus.

Dr. Shopland's laboratory focuses on the three-dimensional architecture of the cell nucleus, which depends on the complex relationships between gene expression, chromosome organization and chromosome structure. The expression status of a gene corresponds to the cell's 3-D structure, and the gene's activity can be influenced both by its physical location in the nucleus and its physical interactions with other genes. While the existence of these structure-function relationships are known, the basic mechanisms of genome 3-D organization and the extent of physical interactions among genes across the genome are largely unknown.

Shopland's enthusiasm for her work comes in part from pursuing this unknown. "There's so much we don't know," she says. "We don't know how changes in the structure of one nuclear compartment affect the others. We don't know how the structures in the nucleus change as we age."

Her current research is examining the nuclear periphery, often regarded as a location of inactive genes, but which has a very particular architecture that has active genes associated with it. Shopland notes that the notion that a physically distant chromosome organization can be part of another gene's expression "calls into question the nature of what we call a gene."

Despite the fact that her lab is one of only a few in the region working in this relatively new field of studying the dynamic organization of nuclear function, Shopland finds JAX the perfect place for her work. The lab's enormous resource of catalogued mouse chromosomes with a range of genetic and disease variations, gives her a wealth of cells for comparison. Studying chromosome 3-D structure both in normal cell development and in cancer cell development, Shopland's lab is collaborating with Kevin Mills, PhD, to characterize chromosome rearrangements in a mouse model of progenitor B cell lymphoma.

With the assistance of colleague and collaborator, Joerg Bewersdorf, PhD, Shopland is also taking advantage of JAX's new 4 Pi confocal microscope, which can clarify objects at the nuclear periphery that are only 100 – 200 nanometers apart, making it possible to see the specific molecular signature of a cell. They co-edited a special issue of the journal *Chromosome Research* (May 2008) which focused on emerging technologies for the study of cell nuclei and chromosomes. This month Shopland will share some of her research with colleagues at "Dynamic Organization of Nuclear Function," the premier gathering of researchers in this important new field.

"Understanding the fundamental principles of cell structure," Shopland says "is the critical backbone to disease research. The research we're doing now is a long-term investment in understanding how to treat diseases in the future."

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

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Maine INBRE Program Coordinator:

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INBRE Alumna, Nina Griffin, University of Maine-Farmington '08



NEW MDIBL RESEARCH ASSISTANT,

NINA GRIFFIN, UMAINE-FARMINGTON '08

While her colleagues in the 2008 INBRE Undergraduate Research Fellowship program have left the MDI Biological Laboratory (MDIBL) with the end of summer, Nina Griffin has stayed on. Griffin, a June graduate of the University of Maine-Farmington, started work this week as a research assistant for INBRE Junior Faculty Carolyn Mattingly, PhD. She'll be working with Dr. Mattingly and Dr. Tony Planchart (another INBRE Junior Faculty member) to collect data for a project investigating the effects of arsenic on developmental gene expression networks.

Griffin's new position marks another step in the evolution of her career goals and interests. Drawn to math and physics in high-school, she initially enrolled at Trinity College to pursue a degree in biomedical or environmental engineering. But as her studies progressed Griffin found herself more engaged by the biology courses she took, and she transferred to the University of Maine-Farmington whose diverse biology department allowed her

to explore the discipline. She finished her college career with a Bachelor of Science degree in Environmental Science.

Along the way, Griffin worked in Oregon on an REU fellowship during the summer of 2007, studying the effects of various disturbances on plant species diversity in montane meadow systems. This summer she came to MDIBL on an INBRE Undergraduate Research Fellowship to work in the lab of Dr. Robert Preston, PhD, investigating the effects of a range of environmental factors on embryo development in killifish.

Griffin also participated last winter in "Molecular Biology Research Techniques," an INBRE outreach course for students from the University of Maine at Farmington, Machias, and Presque Isle. Although Griffin admits she thought twice about giving up her vacation week to participate, "it was well worth it," she says, "one of the best experiences I ever had." The hands-on laboratory course focused on molecular experimental procedures including RNA and DNA extraction, Polymerase Chain Reaction and DNA sequencing. Students used newly learned techniques to look for differential gene expression in normal versus calcium deficient Brook Trout. While the curriculum at her alma mater is broad and deep, Griffin credits the INBRE course with giving her a start with the more advanced molecular techniques she'll use in her new position in Dr. Mattingly's lab.

The collaborative research project in which Griffin will be involved examines how arsenic-mediated gene expression changes during embryonic development may heighten risk for diseases later in life. Arsenic is a major health threat worldwide, and is especially prevalent in New England groundwater. While the Environmental Protection Agency has set a standard of 10 parts-per-billion as the maximum allowable exposure for arsenic in drinking water,

an embryo's smaller body mass and volume may make it vulnerable to even smaller doses of arsenic – in effect concentrating the toxin and amplifying its effects. Mattingly's research is exploring this margin, seeking to determine whether "safe" levels of arsenic are really safe for an embryo.

For Griffin, the project marries her interest in the environment with her desire to do research that has the potential of having a direct effect on human life. An avid outdoor enthusiast who enjoys skiing, snowshoeing and kayaking, she's excited about her life on Mount Desert Island and her work at the lab. Toxicology, Griffin says, is a field that combines her environmental concerns with her desire to contribute to biomedical research. She's thrilled to have a chance to explore the field through her work with Drs. Mattingly and Planchart while contemplating graduate school and her future endeavors.



CLOCKWISE FROM TOP LEFT: PI ROBERT PRESTON, ILLINOIS STATE UNIVERSITY AND MDIBL, HIGH SCHOOL FELLOW EDAL FONTANE, REU UNDERGRADUATE FELLOW ELIZABETH GARY, AND INBRE UNDERGRADUATE FELLOW NINA GRIFFIN.

National IDeA Symposium of Biomedical Research Excellence

Members of Maine's INBRE attended the 2nd Biennial National IDeA Symposium of Biomedical Research Excellence (NISBRE) in Washington, D.C., August 6 - 8. The three-day event, which attracted over 1,000 registrants from INBRE and COBRE states, featured scientific sessions as well as workshops on scientific writing, grantsmanship, mentoring and career development.

This year's symposium included several new events focusing on students, including a student-oriented poster session, student travel awards for meritorious abstracts, and the first Sidney McNairy Lecture, recognizing the contributions of both Dr. McNairy and a deserving INBRE faculty mentor. INBRE Undergraduate Fellow, Christopher Durkin, University of Maine-Farmington '09, was among the many students attending and presented two posters.

Maine INBRE Junior Faculty Members Rebecca Sommer, PhD, Bates College, and J. Denry Sato, D Phil, MDI Biological Laboratory, moderated scientific sessions on Cardiovascular Diseases and Genetics and Genomics, respectively. Posters presented by the Maine INBRE contingent are listed below.

"GAMI: A GENETIC ALGORITHMS APPROACH TO REGULATORY MOTIF DISCOVERY," Congdon CB, Aman J, *Leighton B, *Teo R, *Thete J and Mattingly CJ

"EVOLUTIONARY DISTRIBUTION OF OST-ALPHA IN FISH," *Durkin C, *Kong C-C, Hwang J-H, Parton A, and Barnes D

"A FUNCTIONAL ANALYSIS OF HIGHLY CONSERVED 3' UTR SEQUENCES," *Durkin C, Parton A, and Barnes D

"MUTATIONS IN SGK-1 DOMAINS ENHANCE ACTIVITY OF HUMAN CYSTIC FIBROSIS TRANSMEMBRANE CONDUCTANCE REGULATOR," Sato JD, Chapline MC, Lewarchik C, *VanderHeide J, LaCasse T, Frizzell RA and Stanton BA

* indicates undergraduate author

NIH Update: Understanding the Public Access Policy

Each year over 80,000 scientific manuscripts are published based on research funded by the National Institutes of Health. In an effort to ensure that both the public and scientists worldwide have access to these research results, NIH now requires that researchers submit their peer-reviewed publications to PubMed Central.

The NIH Public Access Policy instituted this past spring applies to all manuscripts accepted for publication since April 7, 2008.

Researchers must submit publications arising from NIH funding to PubMed Central no later than 12 months after the official date of publication. The policy applies to all peer-reviewed journal manuscripts, but does not apply to non-peer-reviewed materials such as editorials and book chapters.

Before researchers sign publication or copyright transfer agreements it is important that they make sure that the contract allows the paper to be submitted to NIH in accordance with this policy.

Many journals will submit manuscripts for you automatically. A full list of cooperating journals is available at: <http://publicaccess.nih.gov/>.

You may also submit manuscripts yourself at <http://www.nihms.nih.gov/> where tutorials and step-by-step instructions are available.

It is critical to note that PubMed and PubMed Central are not the same. PubMed includes only citations and abstracts, while PubMed Central carries the full text of the paper. The NIH Public Access Policy requires submission of publications to PubMed Central.

Please also remember that all grants submitted after May 25, 2008 must include the PubMed Central reference number (PMCID) in each reference citation. Publications submitted to PubMed Central but not yet assigned a reference

number can be included by indicating "PMCID: PMC Journal – In Process" at the end of the citation, or by indicating the NIHMS ID number (the confirmation number given by the NIH Manuscript Submission System when a publication is submitted to the PubMed Central database).

It is critical to note that PubMed and PubMed Central are not the same. PubMed includes only citations and abstracts of articles, while PubMed Central carries the full text of the paper. The NIH Public Access Policy requires submission of publications to PubMed Central and the inclusion of the PMCID, not a PMID, in citations.

For more information and answers to "Frequently Asked Questions" please visit <http://publicaccess.nih.gov/>.

Do you have INBRE news?

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

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New In Print: 2008 Maine INBRE Publications

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* indicates current or prior INBRE undergraduate

Who we are

The Maine IDeA Network of Biomedical Research Excellence (INBRE) is an NCR/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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