INSTITUTE FOR CELLULAR ENGINEERING

Fall 2011 ICE IGERT Newsletter - Vol. 2, No. 2

From the Director

This *Newsletter* highlights tremendous progress for the Institute for Cellular Engineering (ICE) Interdisciplinary Graduate Education and Research Traineeship (IGERT) program at the University of Massachusetts Amherst. We have a dynamic group of students and faculty who excel in research and training. We are excited to share with you some of our recent successes focusing on the innovative science and exceptional opportunities afforded affiliated students through our training grant program.

The mission of the ICE IGERT program is to exploit the synergistic interface between engineering and the life sciences to enable novel graduate training in areas of cellular form, function, and processing. I hope that you enjoy this update from ICE IGERT.

Susan Roberts, Director

ICE IGERT Students

Congratulations to new trainees:

Scott Eron, Chemistry
Kelly Haas, Microbiology
Will Herrick, Chem Eng.
Kathryne Medeiros, MCB
Judy Ventura, Chemistry

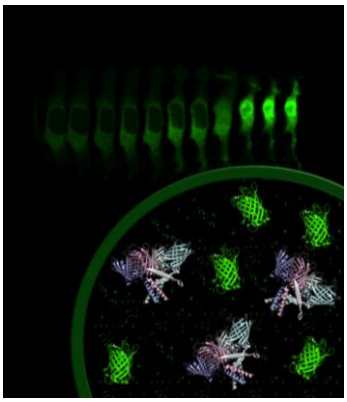
Welcome new associates:

Jesus Alvelo, Microbiology
Lotfi Bassa, VAS
Kevin Dagbay, Chemistry
Benjamin Johnson, MCB
Thuy Nguyen, Chem Eng.
Daniel Seeman, Chemistry
Abla Tannous, MCB
Stephanie Zimmers, MCB

New members are always welcome! Visit www.umass.edu/ice to learn more and to download an application.

The ICE IGERT program is supported by the National Science Foundation, DGE-0654128

Nicholls Paper Highlighted in *Findings*

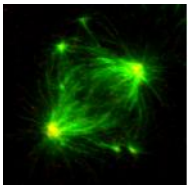


Originally published in the Journal of Biological Chemistry, Samantha Nicholls' paper entitled "Mechanism of Genetically Encoded Dark-to-Bright Reporter for Caspase Activity" was highlighted in *Findings,* an NIH magazine. In collaboration with Hardy and Tremblay (ICE IGERT Faculty) and Abbruzzese (ICE IGERT Associate), this former ICE IGERT trainee is studying apoptosis to help scientists track the molecular events that cause both normal and diseased cells to die. This team of ICE researchers has developed an apoptosis "reporter" that tracks the actions of caspases, molecular scissors that cut key proteins to kill cells. The group used green florescent protein and attached a small protein tail to keep it dark. When caspases are active, they chop the tail off and give scientists a glowing green view of cell death.

ICE IGERT Faculty Secure a Department of Energy ARPA-E Award

ICE IGERT faculty members Danny Schnell (Biochemistry & Molecular Biology), Jeffrey Blanchard (Microbiology), Jennifer Normanly (Biochemistry & Molecular Biology) and Om Parkash (Plant, Soil & Insect Sciences), in collaboration with Michelle Dacosta (Plant, Soil & Insect Sciences), A. Dhingra (Washington State University), and industrial partner, Metabolix (Cambridge, MA) have been awarded $1.48 million over 18 months from ARPA-E (Department of Energy). Entering an exciting new ARPA-E project area entitled *PETRO: Plants Engineered to Replace Oil*, the team plans to develop an improved oilseed crop that uses carbon more efficiently than traditional crops. The plant will incorporate features that significantly improve photosynthesis and also allow the plant to produce useful, high-energy fuel directly within leaves and stems, in addition to seeds, allowing a substantial increase in production of fuel per acre of planted land.

ICE IGERT Training Grant Leads to a Research Highlight



A paper co-authored by Janel Titus (ICE IGERT Associate, Wadsworth lab) and published in the Journal of Cell Biology was selected as a Research Highlight. In this paper, entitled "TPX2 regulates the localization and activity of Eg5 in the mammalian mitotic spindle," Janel measured the behavior of a mitotic motor protein to understand how the mitotic spindle works. After securing seed funds from ICE IGERT to initiate a new interdisciplinary research project, Janel (Biology) sought insect cell culture expertise from the Garman lab (Biochemistry & Molecular Biology) and biophysical characterization expertise from the Ross lab (Physics) to purify the mitotic motor protein, microtubules and a putative regulator to directly demonstrate how this motor contributes to mitosis.

UMass Awards its First Graduate Certificates in Cellular Engineering

The ICE IGERT community congratulates the first seven graduates to earn the UMass Amherst Graduate Certificate in Cellular Engineering (spring 2011): Robert Augustine, William Herrick, Paejonette Jacobs, Marty Kolewe, Rohan Patil, Adaris Rodriguez-Cortes, and Adam St. Jean. Hailed as the first campus graduate certificate to target the critical interface of engineering and the life sciences, this IGERT-inspired, 19-credit curriculum includes novel coursework, a diverse array of electives, a graduate seminar series, a student-run journal club and research seminar, ethics training, hands-on lab modules, and professional development courses and activities. All graduate students of ICE-affiliated departments/programs are encouraged to enroll – contact Shana for more information!

Abbruzzese awarded fellowship

Genevieve Abbruzzese (ICE IGERT Associate, Alfandari lab) has been honored with a 2011-2012 University of Massachusetts Amherst Graduate School Fellowship.

Wilson receives training at the Van Eck lab, Cornell University

Sarah Wilson (ICE IGERT Trainee, Roberts lab), is part of a team working to establish a stable transformation procedure for *Taxus* cell suspension lines, required to metabolically engineer cells to overproduce the anti-cancer agent Taxol™. This work involves collaboration with the Van Eck lab at the Boyce Thompson Institute for Plant Research at Cornell University. Sarah visited the Van Eck lab in July for advanced training on transformation techniques and cell expression assays critical for metabolic engineering efforts, and has successfully translated this technology to the UMass team. Sarah's training was supported by an ICE IGERT Student Training Grant.

Toley and 3D Therapeutics secure second place prize in UMass Innovation Challenge

On the heels of his 2010-2011 Eugene M. Isenberg Award, Bhushan Toley (ICE IGERT Associate, Forbes lab) led 3D Therapeutics to a prize of $20,000. Based on research originating in the Forbes lab, 3D Therapeutics streamlines and accelerates pre-clinical drug development by providing a more realistic understanding of how human tissues absorb and excrete drugs.

Francescone hits the press!

The Shao lab has discovered that a protein called YKL-40 plays a major role in the development of glioblastoma, the most common type of brain cancer and the most fatal cancer overall. YKL-40 contributes to the resistance of glioblastoma against radiation therapy and increases the blood supply to tumors through angiogenesis. Francescone (ICE IGERT Associate) and his team have developed an antibody against this protein and have seen great promise in pre-clinical treatments in mice. Since April, his team has published in the Journal of Biological Chemistry, Molecular Cancer Therapeutics, and Journal of Visualized Experiments.

Saffer Selected for Genzyme Co-Op

Erika Saffer, ICE IGERT trainee, accepted a fall co-op position at Genzyme to develop novel products for adhesion prevention. At Genzyme, Erika is defining and executing *in vitro* experiments to characterize and identify lead candidates for *in vivo* evaluation. This unique opportunity allows Erika to test-drive industry while working on a project with direct relevance to her biomaterials thesis research.

ICE IGERT Associates Capitalize on Student Training Grants

Last year, more than $12,000 was awarded to ICE IGERT Associates to support interdisciplinary professional development initiatives in cellular engineering. Two students received training at National Laboratories, six participated in a three-day workshop at the Human Stem Cell Bank (Worcester), nine presented their research at conferences and one developed a new laboratory module. All ICE IGERT students are encouraged to apply for these grants! The next deadline is February 1st!

Jacobs Awarded NIAID Postdoctoral Fellowship

Paejonette Jacobs, former ICE IGERT trainee, has been awarded a two year postdoctoral fellowship at the National Institute of Allergy and Infectious Diseases (NIAID), NIH. Jacobs comments, "I believe that my ICE IGERT training significantly impacted my selection for this highly competitive fellowship. In fact, my potential mentor at NIAID was particularly interested in me because of my interdisciplinary research with cell penetrating molecules." Jacobs is finishing up her final year, and hopes to head to NIH early next summer.

Kolewe Joins Harvard-MIT Division of Health Sciences & Technology

Marty Kolewe, former ICE IGERT trainee and graduate of Chemical Engineering (Roberts and Henson labs) has accepted a postdoctoral associate position in the lab of esteemed MIT Institute Professor Robert Langer in the Harvard-MIT Division of Health Sciences and Technology, under the direction of PI Lisa Freed, M.D., Ph.D. In a project entitled "Scalable Units for Building Vascularized Cardiac Grafts," Marty will combine microfluidics, biomaterials, and advanced microfabrication technology with his cell culture process and modeling expertise to help develop cellularized, implantable devices to aid heart attack recovery.

Vasalou Heads to Novartis

Christina Vasalou, former ICE IGERT trainee and graduate of Chemical Engineering (Henson lab), has accepted a Visiting Scientist position at Novartis, where she will simulate pharmacokinetics (what the *body* does to a drug) and pharmacodynamics (what the *drug* does to the body). Christina's thesis work, entitled "A mathematical model of circadian rhythm generation and synchronization in modeling of networked circadian pacemaker synchronization" was instrumental in securing additional NIH-funding to carry her team's research forward.

Yadava, Heuck, and Seahorse Bioscience Secure Translational Grant

John Adams Investigators Alejandro Heuck (ICE IGERT Faculty) and Nagendra Yadava (PVLSI) have partnered with Seahorse Bioscience, Inc. to secure the first Translational Grant awarded by the Center of Excellence in Apoptosis Research (CEAR) at the Pioneer Valley Life Sciences Institute (PVLSI). The team will utilize PVLSI intellectual property to create a new reagent kit for the Seahorse XF Analyzer, an instrument that measures different aspects of cell metabolism. By simplifying mitochondrial assays, the team aims to expand the understanding of the role of mitochondrial dysfunction in aging and disease.

ICE IGERT Lab Module at the Human Stem Cell Bank - A Big Hit!

ICE IGERT sponsored a lab module entitled *Basic Human Embryonic Stem Cell Culture* at the Massachusetts Human Stem Cell Bank. Eleven students learned culture techniques for both human and induced-pluripotent stem cells, including methods to maintain pluripotency. The module focused on the use of mouse embryonic fibroblast feeder layers, sub-culturing, and picking-to-keep versus picking-to-discard selection strategies. Proficient in the culture of stem cells from human and non-human sources, students are ready to implement these methods across the broader research community.