

A look at work
from the labs
of CUMC's
graduate
programs

Graduate School *life*



Grad Students Go from Bench to Blackboard

While research and scholarship are the defining features of graduate student education, science communication is increasingly seen as a fundamental tool of a successful scientist. Two community service opportunities in particular have drawn graduate students away from the bench and into New York City classrooms to augment their communication skills by teaching to an eager crowd: Columbia University Neuroscience Outreach, or *CUNO*, and the Afterschool Science, Technology, Engineering, and Mathematics, or *STEM*, Mentoring Program sponsored by the New York Academy of Sciences.

Kelley Remole'11 Ph.D. was a doctoral student when she founded CUNO in 2006 to place graduate

student scientists in classrooms throughout New York City. CUNO has grown from three volunteers who visited one school to 34 CUNO volunteers who visited 16 schools in the 2010-2011 school year under current CUNO president Cate Jensen (doctoral candidate in the Department of Neuroscience). In that year alone, CUNO volunteers contributed to the education of nearly 1,000 New York City school students, who interacted with scientists, learned about the brain through hands-on lessons, and often touched a preserved human brain. Ms. Jensen explains the motivation behind the visits: "Neuroscience is a multidisciplinary field with broad public interest, so it is a handy tool for engaging even young children in science. Our goal at CUNO is not to

By Kelley Remole, Ph.D.,
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Kelley Remole, left,
and Heather McKellar

PHOTOGRAPH BY JORG MEYER

turn every child we meet into a future researcher, but instead to increase scientific awareness and understanding. We make the brain accessible and fun rather than mysterious and distant.”

Most CUNO projects are single sessions, but a new initiative is under way for multiple visits. Celia Gellman, a research technician in psychiatry at P&S and the New York State Psychiatric Institute, led pre- and post-doctoral scientists from Columbia and Mount Sinai School of Medicine in a series of visits to seventh grade science classes at the Hewitt School in Manhattan. Subject matter included the use of the scientific method and experiments investigating the human senses and earthworm behavior. Ms. Gellman hopes to continue the program in 2012.

In 2011 CUNO partnered with the Dana Foundation, a non-profit organization that promotes brain science research and education, to help

New York City high school students prepare for the regional competition of the International Brain Bee. Heather McKellar’11 Ph.D. organized 12 Columbia graduate students to run a preparation workshop attended by 30 high school students. CUNO hopes to expand the collaboration with the Dana Foundation next year.

Graduate students at P&S also sought teaching experiences outside the university by becoming science education fellows at the New York Academy of Sciences. In 2010, the academy partnered with New York City in the Afterschool STEM Mentoring program, in which graduate students and postdoc mentors in STEM fields are placed in underserved communities to engage middle schools students in science lessons. In the first year, 120 fellows from universities throughout New York City visited 84 sites that had more than 2,100 students. The largest cohort of fellows was from Columbia University; 27 mentors volunteered more than 650 hours to teach modules on life sciences, robotics, and ecology.

One fellow, Dr. McKellar, was a mentor at a fifth grade afterschool site at the Marble Hill Community Center in the South Bronx. She taught the genetics and cell biology curriculum supplied by NYAS and designed by Cold Spring Harbor Laboratory and augmented the curriculum with original lesson plans she developed as a CUNO volunteer.

Meghan Groome, Ph.D., director of K12 science education initiatives at NYAS, says the program has shared benefits. “The program helped Colum-

↙ MORE INFORMATION AND IDEAS ON HOW TO GET INVOLVED:

- CUNO** <http://blogs.cuit.columbia.edu/cuno/>
- NYAS** afterschool mentoring www.nyas.org/landing/afterschool.aspx
- Mott Hall** http://sklad.cumc.columbia.edu/gsas/interior.php?sub=5_4
- Dana Foundation** www.dana.org
- International Brain Bee** www.internationalbrainbee.com/
- Jerome L. Greene Science Center** <http://news.columbia.edu/mbbi>

Graduate Students Awards, Fellowships, Honors, 2010-2011

(student name in bold; mentor noted by parentheses)

Dean’s Award for Excellence in Research:

Eleni P. Mimitou, “DNA end Resection in *Saccharomyces cerevisiae*: Mechanism and Implications” (Lorraine Symington); **Neal A. Paragas**, “NTBI Pathways in the Kidney: NGAL Scavenges Iron to Defend the Urinary System from Infection” (Jonathan Barasch)

Titus M. Coan Prize for Excellence in Research in Basic Cell & Molecular Biology:

Mari-Liis Visnapuu, “Real Time Visualization of Nucleosome Dynamics in a High-throughput Single Molecule Assay” (Eric Greene)

Titus M. Coan Prize for Excellence in Research in Translational Biology:

Alexander Kushnir, “Phosphorylation of the Ryanodine Receptor in the Cardiac Response to Acute Stress and Heart Failure” (Andrew Marks)

Integrated Program in Cellular, Molecular and Biomedical Studies:

Jayson Bastien,

NIH-NIGMS Fellowship, “The Study of Phosphatidic Acid and Phospholipase D in Membrane Trafficking” (Gil Di Paolo); **Paul Harvilla**, NSF Graduate Research Fellowship Honorable Mention, “Protein Dynamics of Thermophilic and Mesophilic Orotidine 5’-monophosphate Decarboxylase using Nuclear Magnetic Resonance Spectroscopy” (Arthur Palmer); **Tessa Hirschfeld-Stoler**, NSF Graduate Research Fellowship Honorable Mention, “Intercellular Propagation of Tau Aggregates: A Role in Tau Pathology Spread in the Brain” (Carol Troy); **Colleen Lau**, NSF Graduate Research Fellowship Honorable Mention, “*In vivo* Visualization of Hematopoietic Stem Cell Activity within the Mouse Bone Marrow” (Boris Reizis)

Genetics and Development: **Daniel Concepcion**, NIH-NICHD Fellowship, “The Role of TBX6 in the Determination

of Left-Right Asymmetry in Mice” (Ginny Papaioannou); **Ryan Lessard**, NSF Graduate Research Fellowship Award, “The Processing of Temperature Information in the *Drosophila* Brain” (Charles Zuker); **Tulsi Patel**, NSF Graduate Research Fellowship Award, “Molecular Mechanisms of Cell Fate Reprogramming” (Oliver Hobert)

Microbiology, Immunology and Infection:

Sarah Deng, NSF Graduate Research Fellowship Honorable Mention, “The Role of Exo1 in the Conversion and Repair of Camptothecin-Induced DNA Lesions” (Lorraine Symington); **Kanako Lewis**, Richard C. Parker Graduate Student Award (Boris Reizis)

Neurobiology and Behavior: **Scott Bolkan**, NSF Graduate Research Fellowship Honorable Mention, “Functional Circuitry

Putting graduate students in classrooms gives grade school, middle school, and high school students a chance to meet and learn from scientists

bia students gain confidence in their teaching ability while the impact on the kids they mentored is immeasurable. Imagine for a second what it must be like to have a real live scientist bring a human brain into your classroom or help you extract DNA from your cheek cells. The kids were so excited they forgot their preconceptions of science as being boring or hard.”

Richard Robinson, Ph.D., associate dean for graduate affairs, was involved in the initial planning of the NYAS STEM program and continues to work with the academy to improve the program and advocate for Columbia’s STEM mentors. He encourages graduate students to learn about and participate in these kinds of programs. “These programs not only provide an opportunity for our students to gain valuable experience and insight into the teaching of science, but also emphasize the importance of scientists giving back to their communities,” he says.

Columbia reinforced its commitment to science outreach by hiring Dr. Remole as director of neuroscience outreach for the future Jerome L. Greene

Science Center on the Manhattanville campus. Dr. Remole is planning the public education spaces in the center and designing programs to augment outreach activities on campus.

These science outreach programs plus other efforts at the medical center, such as the Mott Hall Science Mentoring Program, benefit the volunteers and mentors by supplying organizational structure, pedagogy training, and curriculum ideas while also allowing graduate students to move beyond supplied lesson plans. This flexibility for creativity fosters a sense of ownership of the materials and encourages scientists to continue their educational efforts. For the school students taught by graduate students, lessons supplement their science education and provide them with the rare opportunity to meet and learn from scientists. It is our hope that the continued support of the Columbia administration and the increased exposure of these programs across campus will allow more members of the community to help us enhance science education throughout New York City.

Kelley Remole, who received her Ph.D. from Columbia in 2011, is director of neuroscience outreach and can be reached at ker40@columbia.edu. Heather McKellar, who received her Ph.D. from Columbia in 2011, is program assistant at the NYU Neuroscience Institute; she can be reached at heather.mckellar@nyumc.org.

of Spatial Working Memory in the Mouse”; **Rebecca Brachman**, NSF Graduate Research Fellowship Honorable Mention, “Novel Optogenetic Manipulation of Hippocampal-dependent Contextual Fear Conditioning Memory”; **Anita Burgos**, NSF Graduate Research Fellowship Award, “Characterizing the Serotonergic Brain Regions and Neuronal Pathways Implicated in Zebrafish Aggression”; **Gist Croft**, Brunie Prize in Neural Stem Cell Research (Christopher Henderson); **Burcin Ikiz**, Brunie Prize in Neural Stem Cell Research (Serge Przedborski); **Matthew Lovett-Barron**, NSF Graduate Research Fellowship Honorable Mention, “Inhibitory Control of Neuronal Output Mode in Hippocampal Pyramidal Neurons” (Attila Losonczy); **Timothy Machado**, NSF Graduate Research Fellowship Award, “Dissecting Spinal Motor Circuits by Fast Optical Imaging of Identified Interneurons” (Thomas Jessell);

Benjamin Matthews, Kavli Graduate Thesis Award, “Dendrite Self-Avoidance is Controlled by Dscam and Counterbalanced Attractive Guidance Signaling in *Drosophila*” (Wesley Grueber); **Derek Oakley**, NIH-NIA Fellowship, “Modifiers of Age of Onset in ALS Studies Using Patient IPS-Derived Motor Neurons” (Christopher Henderson); **Krista Spiller**, NSF Graduate Research Fellowship Award, “Role of PHD3 in Developmental Motor Neuron Death” (Christopher Henderson); **Martin Vignovich**, NSF Graduate Research Fellowship Honorable Mention, “*Drosophila* Courtship Behavior: A Model for Sensory Integration and Decision Making”; **Yixing Xu**, Dean’s Day Steiner Award for Research, “The Oculomotor System Does Not Use Visual Gain Fields to Calculate Saccade Target Positions”

Nutritional and Metabolic Biology: **Dianne Dapito**, NIH-NIDDK Fellowship, “The

Contribution of Activated Hepatic Stellate Cells to Hepatocarcinogenesis” (Robert Schwabe); **Elizabeth Millings**, NSF Graduate Research Fellowship Award, “Investigating Variations in Gene Expression Between the Fed and Fasted States in Liver-specific Knockouts of FoxO1”

Pathobiology and Molecular Medicine:

Kimberly Robinson, NIH-NINDS Fellowship, “Phospholipase D1 in Alzheimer’s Precursor Protein Trafficking and Processing” (Gil Di Paolo)

Pharmacology and Molecular Signaling:

Douglas Barrows, NSF Graduate Research Fellowship Honorable Mention, “Novel Regulation of PTEN Mediated by PH Domain Driven Interactions” (Ramon Parsons); **Mi Wang**, Brian F. Hoffman Award for Excellence in Graduate Studies in Pharmacology