Student Profile: Liam Rattray, Public Policy
by Maya Oren

All too often, students do not know how to get involved with research on campus because they are unsure of what types of projects they will enjoy. This was not the case for Liam Rattray, who was already working as a farm hand on a small organic homestead in South England when he was just 16. This work sparked his interest for sustainable development and environmental justice. As a student in the School of Public Policy, Rattray understands that policy changes are the major roadblock to sustainable development. He has used his studies and research to change Georgia Tech’s campus, as well as many other Georgia Communities, for the benefit of all.

Rattray started his undergraduate research career as a PURA fellow, and was encouraged by his faculty advisors to begin an independent project to improve local and organic food access at Georgia Tech. This research quickly and efficiently resulted in the creation of The Georgia Institute of Technology Sustainable Food Committee, an agricultural partnership with two dozen Georgia farmers. According to Rattray, their efforts have not only placed local and organic foods in Georgia Tech’s dining halls, but have astoundingly "kept over $200,000 worth of produce purchases in the Georgia economy and diverted 600 tons of compost from landfills!" In conjunction with this, Liam co-founded Georgia Tech Students Organizing for Sustainability (SOS) in 2007.

As if this wasn’t enough, Rattray is currently working on research in partnership with Dr. Jenneatte Yen, the Director of the Center for Biologically Inspired Design and Mr. Joseph Goodman, a Research Engineer at the Georgia Tech Research Institute (GTRI) developing living machines to improve operating conditions in water, energy, and food infrastructures. Rattray states “In particular, I am currently conducting an experiment to analyze the impact that integrated algae photobio-reactors have on mushroom..."
Third year chemical and biomedical engineering student Daniel McGrail was interested in doing research simply because he thought it would be a fun experience. After working on various projects with his mentor Dr. Michelle Dawson in the Stem Cell Biophysics & Engineering Lab, McGrail’s research has proven to be so much more than that.

McGrail’s first project was to develop the methods to be used in the lab for multiple particles tracking microrheology (MPT). This meant taking many steps to find the appropriate way of injecting fluorescent polystyrene nanoparticles into a cell’s cytoskeleton without killing it. This procedure was captured with high spatio/temporal resolution videos and McGrail even developed his own MAT-LAB algorithm to calculate and assemble valuable and necessary data. McGrail continued to pioneer his way through the lab by developing more techniques for his next projects that “focused on the effect of tumor-secreted soluble factors on mesenchymal stem cells (MSC)… and then extending [these principles] to fibroblasts for comparison.” Amazingly, this means that McGrail is working on a faster, more effective and less evasive way to detect cancer cells. In addition to this research, McGrail has a number of other projects that aid in the goals of his mesenchymal stem cell research such as detecting molecules that reveal the aging of cells, making a correlation between intracellular mechanical properties and extracellular forces exerted by the cell, and using MSC’s in wound healing. Ultimately, these projects have implications for many various types of tissue engineering applications as well as other potential MSC cyotherapies. McGrail says that with his work, he hopes to create solutions for “everything from myocardial infarction (heart attacks) to brittle bone disease/bone repair, muscle repair, etc.” and also the chronic wound healing detailed above.

Chronic wound healing is still a major issue for burn victims and diabetics facing amputation.

Throughout all of his research, McGrail was strongly encouraged to work independently and without the help of his mentor Dr. Dawson. Even though McGrail came into the lab knowing nothing about stem cell research, Dr. Dawson always made herself available to answer questions, assist with problems, reinforce growing ideas, and even just to talk – something that seems rare at such a challenging school.
I was lucky enough to be invited to attend the ACC Meeting of the Minds conference as a representative from Georgia Tech this semester. I initially worried that I would feel out of place as a biology student from a school known for engineering, but I was happy to see that I was part of a very diverse group of researchers. The Georgia Tech group had students representing everything from engineering to liberal arts, often in my more focused studies back at school. Getting the opportunity to interact with people from other fields gave me some insight into how people outside biology tackle issues in their research, which will hopefully help me out in the future. And of course getting to see work from such a wide range of labs allowed me to make some great connections with people in and outside my field. By the end of the weekend I had made some great friends from all over the country, which I know will be a priceless resource as I move forward in the interconnected world of modern research.

Spring 2011 Research Option Graduates

Congratulations to the following Spring 2011 Research Option Graduates!

- Nader Aboujamous, BME
- Aakanksha Angra, Biol
- Katie Ashley, Biol
- Denise Bringslid, HTS
- Wendy Brown, BME
- Dustin Burns, Physics
- Bhanu Chiguluri, AE
- Andy Chung, Psych
- Igor Coropceanu, Chem
- Frederick Damen, BME
- Eleanor DeHitta, BME
- Mary C Delvin, Biol
- Hannah M Farhan, HTS
- Christopher Giardina, BME
- Della Hall, HTS
- Samiya Hussain, Chem
- Christopher Jackman, BME
- Abhishek Jain, CS
- Amy Kendig, Biol
- Bo Hao Li, CS
- Gita Mahmoudabadi, BME
- Michael Norsworthy, Biol
- Derek Podowitz, EAS
- James Small, Biol
- Carrie Stallings, Biol
- Gowthami Tamilselvan, ChBE
- Matthew Taylor, Biol
- Kathleen Warrell, EAS
- Joana Yu, Biol
- Mark Zeller, BME

To learn more about the Research Option, please visit http://www.undergradresearch.gatech.edu/research_option/index.php
It’s a great honor to be able to join Georgia Tech as its first Director of Undergraduate Research and Student Innovation. These first 5 months have flown by and I have been amazed at the work of our undergraduates and the faculty and graduate students that mentor them. We have had a very busy semester and the staff and I at UROP would like to take this opportunity to share with you some of the undergraduate research activities that occurred this spring.

In March, UROP hosted a reception for 100 of the highest sought after high school students in the Atlanta area and their guests prior to the final round of The InVenture Prize Competition. Faculty and student members of 20 different labs demonstrated their various works, which included robots, software, medical devices, etc. Our guests then joined the packed audience to watch the InVenture Prize Competition.

On April 5th, UROP hosted its 6th Annual Undergraduate Research Spring Symposium. Kudos to all the students participating and their mentors! We had over 130 students present their research and gave out 22 awards to those that were judged as exemplary in their research endeavors (enclosed we recognize the winners as well as interview two of our Outstanding Undergraduate Researchers). Also, we owe a big thanks to many in the Tech community that volunteered to serve as judges, specifically our faculty, graduate students and postdocs, as well as those that served as moderators, scorers, greeters, set up personnel and much more. Thanks also to the many student groups that were key to the success of the symposium and associated research awards, specifically the Student Activities Board for Undergraduate Research (SABUR), the Tower and the Biomedical Research and Opportunities Society (BROS). This event would not be possible without the members of the Georgia Tech community contributing their time to make this event the success it has become.

Also, this April Georgia Tech sent 7 undergraduate students to represent Georgia Tech at the ACC Meeting of the Minds Conference held in Miami, FL. The students certainly stood out and were stellar in their presentations. In this issue, you will see the perspective of one our student representatives who attended the conference and discusses the benefits of attending.

We encourage each of you to get involved in undergraduate research either as a student researcher or as a mentor. We are reminded on a daily basis of the great rewards students earn from their research experience. Please contact our office for additional information on getting involved and the support we offer for research. You can also visit our website at www.undergradresearch.gatech.edu or follow us on Facebook or Twitter.

Many thanks to those who have welcomed me so warmly to Tech! I have thoroughly enjoyed my first few months and look forward to many more with you.

Best regards,
Chris

Christopher W. Reaves
Director of Undergraduate Research & Student Innovation
production performance. We currently use embedded environmental sensors to monitor and control our 1000 ft² green roof, solar panels, composting operation, irrigation operation, and solar sanitation system.” The ultimate goal of this project is to build a gourmet urban mushroom farm in downtown Atlanta that will use waste biomass collected from local businesses. Both medicinal and edible gourmet mushrooms will be produced and sold at local farmers markets and restaurants. Within three years, Rattray plans to be able to offer a container-based “eco-business-in-a-box” kit (that will effectively create the ideal conditions for cultivating mushrooms) to domestic and international investors (rendering shown below).

In another effort to better the Georgia community, Rattray has undertaken a PURA funded independent study designed to discover the history and organizational structure of “hackerspaces.” Hackerspaces are community innovation centers where people with common interests can come and socialize or collaborate. He cofounded a new hackerspace in Atlanta called MASS that provides public studios and laboratories to musicians, artists, scientists and engineers and encourages them to collaborate on projects. The space is scheduled to open in July 2011 in a 22,000 ft² warehouse in the Castleberry Hill’s Arts District. With these projects, Rattray reminds us that “Georgia Tech’s mission statement is clear- we are here to improve the quality of life for Georgia’s residents.” As advice to other students, he encourage students to “pursue your own interests by applying for PURA fellowships and securing independent study courses through your free electives” both inside and outside your field of study.

McGrail says that the number one thing he gained from doing research is instead of learning how to answer a question, he learned how to figure out what the question was asking. McGrail took this lesson to heart by frequently using “a good combination of brainstorming, reading, and trying some ‘I wonder what happens if...’ experiments.” In addition, doing research lead McGrail to choose to continue on with masters and doctorate work in a similar area after completing his undergraduate degree next year. McGrail has presented his work in approximately fifteen different local, national, and international conferences, and is currently working on publishing a paper with either Proceedings of the National Academy of Sciences or Stem Cells. Other accomplishments include recently winning the Outstanding Undergraduate Researcher award for the College of Engineering at the Undergraduate Research Spring Symposium.
Undergraduate Research News

2011 Undergraduate Spring Symposium & Awards
Photo Gallery
Undergraduate Research Spring Symposium & Awards
April 5, 2011

Outstanding Oral Presentations

**College of Computing**
Bethany Summer, CS *Designing for Music Consumption in an Internet Age*

**College of Engineering**
1st Place
- Frederick Damen, BME, *Mapping Anatomical Connectivity of the Cerebral Cortex and Its Applications in Evolution of Aging in Primates*

2nd Place

3rd Place
- Katy Hammersmith, BME, *Engineering the Microenvironment of Embryoid Bodies via Heparin-Modified Gelatin Microparticle Incorporation*

**Ivan Allen College**
Stephen Brincks, Econ, *Have the Diversification Benefits of International Investing Declined Due to Global and Regional Macroeconomic Integration?*

**College of Sciences**
Pamela Chi, BioChem, *Application of SYPRO® Orange, a Fluorescent Hydophobic Dye, for a High-Throughput Ligand Binding Assay for Proteins of Unknown Structure and/or Function*

Poster Session - Outstanding Posters

**College of Computing**

**College of Engineering**
1st Place
- Samiya Hussain, Chem, *Effects of Nitric Oxide Synthase and Reactive Oxygen Species in Cadiac Heart Valves*

2nd Place
- Benjamin Bingham, ME, *Designing Microscale Self-Propelling Swimmers*

3rd Place
- Sina Mostaghi, BME, *Comparing Quantitative Models of Microtubule Dynamics for Cancer Drug Treatment*

**Ivan Allen College**
- Kristen Seiloff, Mgmt, *Girls Excelling in Math and Science (GEMS)*

**College of Sciences**
1st Place
- Michelle Delcourt, Discrete Mathematics, *Sum-set Bounds on Graphs*

2nd Place
- Eryn Bernardy, Applied Biol, *Characterization of Quorum Sensing and Natural Competence in Environmental Isolates of Vibrio Cholerae*

Outstanding Undergraduate Researcher Awards

**College of Architecture** - Daniel Chaney, ID
**College of Computing** - Sauvik Das, CS, Antonio Blanca-Pimentel, CS
**College of Sciences** - Michelle Delcourt, Discrete Mathematics
**Ivan Allen College** - Liam Rattray, PubP
**College of Engineering** - Natasha Barbely, AE; Daniel McGrail, ChBE; Abby Hill, BME; Caitlin Henegar, ME
Undergraduate Research Opportunities Program (UROP)

Christopher W. Reaves, Ph.D  Bio

The New Year brought a new director to the Undergraduate Research Opportunities Program with the announcement of Dr. Christopher W. Reaves to the position of Director of Undergraduate Research and Student Innovation at Georgia Tech. A specialist in community and local economic development, public policy and program evaluation, Dr. Reaves’ research has covered topics as diverse as public transit compliance of disability standards, effectiveness of domestic violence prevention initiatives, educational delivery systems and economic development programs. For the last fourteen years, he has been actively engaged in environmental and sustainable development research and practice, specifically assisting local governments in building their capacity to redevelop contaminated properties.

Prior to coming to Tech, he was director of the Office for Undergraduate Research at the University of Alabama at Birmingham, where he was charged with planning and implementing programs for undergraduate researchers, promoting and informing students about the benefits and opportunities for undergraduate research, designing new support programs, coordinating with departments and central administration, and monitoring and reporting program statistics and learning outcomes.

Dr. Reaves received his Ph.D. in Urban and Public Affairs from the University of Louisville and an M.A in Public Administration and B.S. in Education from Jacksonville State University. While at Louisville, Kentucky, he was actively involved in policy research pertaining to brownfield (contaminated property) redevelopment. Dr. Reaves’ professional interests include, student research/innovation/creative activities, program evaluation, public policy in sustainable development and urban planning, among others. He reports being excited about the new position at Georgia Tech and is eager to lead the institute’s existing emphasis on undergraduate research and burgeoning focus on undergraduate and graduate student innovation.

Let Your Voice Be Heard!!

The Student Activities Board for Undergraduate Research (SABUR) works toward implementing new ideas for programs and resources for students interested in research. Please visit the SABUR website at www.gtsabur.weebly.com to find additional information or to learn ways you can get involved. Freshman, sophomores, and juniors are particularly encouraged to join us!

WE WANT TO HEAR FROM YOU!!!!

UROP Facebook Page
Interested in hearing more about upcoming Undergraduate Research events, news, funding, etc.? Then join the GT Undergraduate Research Opportunities Program (UROP) Group on Facebook.

Listserv
To receive information and announcements from Georgia Tech’s Undergraduate Research Opportunities Program (UROP), join the urop-news listserv. To join: Send an e-mail to sympa@lists.gatech.edu with a subject of “subscribe urop-news”.

Undergraduate Research Opportunities Program
Georgia Institute of Technology
MC 0740
Atlanta, GA 30332-0740
Phone: 404-385-7325
Fax: 404-385-6940
E-mail: urop@gatech.edu
www.undergradresearch.gatech.edu