The DiGESt Issue 2

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Fall 2015

the diGESt
Genetic Engineering and Society Center

A monthly newsletter detailing and highlighting the most recent Center news, activity and scholarship.

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Top News: Website Rebranding Complete

The GES Center has remodeled our online presence! If you haven't already, check out our new look on your computer, phone, or tablet. The site is live at *research.ncsu.edu/ges/*

Highlights from this issue:

Teaching
Two recent GES Center interns discuss how their experiences influenced their teaching.

De-Extinction
The first Issue Brief from our Sloan-Funded Synthetic Biology case studies has been released.

Recent Publications
The GES faculty has been hard at work on various scholarly articles and publications.

Modifying the Classroom

Internship with the GES Center transforms teachers' approach to curriculum.

For two years now the GES Center has played host to teachers completing their internships as part of the Kenan Fellows Program, a K-12 STEM initiative of the Kenan Institute for Engineering, Technology & Science at NC State University. Kenan Fellows partner with mentors in STEM fields to learn how their work can be made relevant to students.

Kelly Sears is an eighth grade teacher at Smith Middle School in Chapel Hill who completed her internship in the summer of 2014. Elizabeth Helms just recently completed her internship this past summer. She teaches Honors Biology and Freshman Seminar classes in the Freshman Leadership Academy at Knightdale High School of Collaborative Design.

These talented educators describe how their experiences with the GES Center have transformed the way they teach students about evolution and biotechnology.

“I really had no experience with biotechnology so seeing the different research that was being done and the scope of the investigation was very eye opening,” Kelly remarked. “The technology is growing so quickly that I don’t think a lot of people have had time to put much thought into it, so it was interesting to see what kinds of insights and feelings they had about it.”

Elizabeth said that what she learned most was how to access new and emerging research technologies that she could share with her students. “I learned more about technologies that I was unfamiliar with, and was able to observe how these new ideas are being used at universities, museums and in the business world.”

Upon completing her internship, Kelly was able to impart her newly acquired knowledge of genetic engineering to her own students. Last December, she covered a lesson titled, “How STEM Changed Evolution Today.” Though she had briefly covered evolution and extinction with her students before the unit, her internship with the Center allowed her to delve into the topic with greater depth.

“I definitely spend more time with the students on those particular topics looking at selection strategies. The internship gave me the background knowledge to feel confident teaching it.” Kelly said.

Elizabeth explained how working with the GES Center helped her to see the real importance of general knowledge and understanding of science for all citizens. “The GES Center does such a great job of interdisciplinary work, which is needed at all levels of education. Many of the students that I teach may not go into scientific fields, but it is important for them to understand general scientific principles that can help them better understand the world around them.”

The experience with the GES Center even inspired Kelly to write a grant with a partner teacher that aims to obtain materials for modeling the making of transgenic organisms. This grant would allow students to add fluorescent marker from jellyfish to E. coli, making the E. coli glow.

Each of these teachers recommended the learning experience they had at the GES Center to fellow educators, saying that it provides the opportunity to better understand careers in biotechnology and see both the the research process and scope of the field.

“It opens your mind to that area and inspires you to think about it in new and exciting ways,” Kelly said.

Elizabeth emphasized that her summer internship was full of new experiences that enhanced her scientific knowledge and gave her refreshed ideas to bring back to the

enhanced her scientific knowledge and gave her refreshed ideas to bring back to the classroom. “My summer helped me to be a better educational professional.”

By Alyssa Rudisill

De-Extinction Issue Brief

The first issue brief from our Sloan Foundation-funded Synthetic Biology research is now complete. This issue brief focuses on the subject of de-extinction, a SynBio project that attempts to recreate endangered and extinct species. You can access the entire brief here.

News

The GES Center welcomed two new members to our Executive Committee. Nick Haddad, a professor in the Biology department at NC State, and Heike Sederoff, an associate professor in the Department of Plant and Microbial Biology at NC State.

The Center is also pleased to have received two grants from the National Science Foundation:

Comparing Cultures of Responsible Innovation Across Bioengineering Communities

This action funds a three year standard grant in the cross-directorate program of Cultivating Cultures for Ethical STEM. Issues surrounding genetic engineering, biotechnology, and synthetic biology are contentious, especially when applied to food, the environment, and industrial applications for which direct human consent and medical benefits are not present.

Gene Drives: A Deliberative Workshop to Develop Frameworks for

Research and Governance

This award provides funding for a workshop that will take place February 24th - 26th. The conference is invitation-only and the topic will be the governance of gene drives. Gene drives are a subset of second generation genetic engineering technologies that are being developed with the aim of moving synthetic gene constructs into wild animal populations to protect, suppress or eliminate them.

Recent Publications

Anticipating Responsible innovation: Genetically Modified Trees and Conceptualizations of Technological and Regulatory Futures

This paper co-authored by Jason Delborne was presented at the Governance of Emerging Technologies: Law, Policy and Ethics in Scottsdale, AZ on May 27, 2015. It analyzes the Institute of Forest Bioscience (formerly Institute of Forest Biotechnology) programs and activities through the lens of scholarship on anticipatory governance and responsible innovation.

Heterogenerous Consumer Preferences for Nanotechnology and Genetic-Modification Technology in Foods

This study argues that the ethical, legal and societal implications research on synthetic biology should inform the processes and methods for the design and implementation of governance systems, as well as the policy and

Dual Use Life Science Research and Biosecurity in the 21st Century: Social, Technical, Policy, and Ethical Challenges

In September 2011, scientists announced new experimental findings that suggested the existence of a new airborne and highly lethal H5N1 virus that could cause a deadly global pandemic. In response, a series of international discussions on the nature of dual-use life science arose. This article co-edited by Kathleen Vogel explores the matirx of issues surrounding these findings from a variety of case study and international perspectives.

Heterogenerous Consumer Preferences for Nanotechnology and Genetic-Modification Technology in Foods

This study investigates heterogenerous consumer preferences for nanofood and GM food and the associated benefits using the results of choice experiments with 1,117 US consumers. We identified four different consumer groups, each with distinct demographic backgrounds,

technological choices made within them.

which generates deeper insights into the diversified public acceptance of nano-food and GM food.

Other GES Center publications:

Annual Report
Research Brief
Workshop Report

Director's Corner

By Dr. Fred Gould

On August 25th we had our first 2015 Fall Semester GES colloquium. Student and faculty participants gave brief summaries of what they had done since the end of the Spring semester. It was gratifying to witness the dynamism of the diverse GES people and activities. There is no way to discuss all of these activities in this short essay, but I will describe some and direct you to more detailed summaries.

The topic of responsible innovation was a major theme among participant activities. Dr. Jennifer Kuzma described two newly funded NSF grants in which she is PI, 'Gene Drives: A Deliberative Workshop to Develop Frameworks for Research and Governance' and 'Comparing Meanings of Responsible Innovation across Bioengineering Communities'

Dr. Jason Delborne is also investigating gene drive technologies. At the colloquium he described a grant proposal to the NSF, 'Moral Fiber: Genetically Modified Trees, Responsible Innovation, and Environmental Justice,' that he developed and submitted this summer with the help of graduate students and faculty (see Jayce Sudweeks Summary).

Other faculty have been involved in diverse projects such as:

- Epidemiological examination of the impacts of glyphosate on human health - *Jane Hoppin*

- Submission of an NSF grant to fund the GES History Archive Project - *Matthew Booker & Collaborators*
- Modeling gene drive dynamics using general and species specific approaches - *Alun Lloyd & Collaborators*
- Planning of the fall GES Documentary series - *Kathleen Vogel & Zack Brown*
- Analysis of industry efforts to increase compliance with GE crop refuges - *Zack Brown*

Our students were also very busy over the summer. The second IGERT cohort of students presented their cohort's website about this issue at the 21st International Symposium on Society and Resource Management in Charleston, SC. Some cohort members made other presentations: Rene Valdez presented his research on 'Content analysis of media for rodent eradications: from poison to gene modification.' Megan Serr co-presented a talk on 'Pathways to successful urban biodiversity conservation'. http://research.ncsu.edu/igert/about-us/students-3/

Jessica Barnes, a student in the third cohort that is focused on agricultural pests, attended the Association of American Geographers Annual Meeting.

Elizabeth Pitts presented her research on 'how iGEM participants describe the relationship between synthetic biology and social concerns' at the International Communication Association's annual conference in Puerto Rico.

Amanda Clayton returned to Peru at the Naval Medical Research Unit (NAMRU) outpost in the city of Iquitos where she collected data to add to her dissertation research.

Johanna Elsensohn was selected for the Entomological Society of America Science (ESA) Policy fellows program. Johanna will serve for two years and work on important issues facing the science of Entomology. With Fellow recognition, Johanna will travel to Washington DC twice each year to interact with policy makers.

Tim Antonelli started a tenure track position teaching probability and statistics at Worcester State University. In August, Tim successfully defended his thesis, 'Population Dynamics Models for Wolbachia and its Host, the Dengue Vector *Aedes aegypti.'*

These are only a few highlights from GES summer activities. Stay tuned as we move into an equally exciting Fall Semester.

Links to more detailed summaries of student work:

- Jayce Sudweeks
- Elizabeth Pitts
- Sheron King
- Amanda Clayton

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