A feature length film inspired by the life of pioneering geneticist Calvin Bridges. Told from the perspective of Bridges’ daughter Betsey, the film centers around her two-day experience being with her father in his laboratory – the fly room. At first Betsey feels closer to her father than she ever has, but she ultimately discovers secrets about him that will transform their relationship forever.

October 1, 7:00 pm, North Carolina Museum of Natural Sciences
Construction and Deconstruction in Education

by Jennifer Baltzegar

The W. M. Keck Center, Program in Genetics, and the GES-IGERT program co-hosted Dr. Utpal Banerjee to give the inaugural undergraduate teaching seminar. Banerjee is a professor and chair of the Department of Molecular, Cell, and Developmental Biology at the University of California, Los Angeles (UCLA). His research includes blood stem cell maintenance, stress response systems, and metabolic control in cancer pathways. In addition, he has distinguished himself in the scientific community with research on innovative teaching methods. His talk was titled “Construction and Deconstruction: A comprehensive research program for the early undergraduate at UCLA.”

Banerjee explained the difference between construction and deconstruction with respect to teaching. A constructionist takes many small observations and builds up to the big picture, while a deconstructionist will begin with the whole structure of an idea and cut it down into small pieces. The two main questions that Banerjee wanted to address were 1) What is the best way to prepare students for careers in science? and 2) What is the best way to make research part of the core curriculum?

One of his motivating reasonings is that he noticed if undergraduates were encouraged properly that they could achieve a lot. In addition, graduate entrance exams are now requiring students to understand scientific inquiry and some groups are actively advocating for standard laboratory courses to be replaced with discovery-based research programs.

In traditional methods students will not enter a lab until their third or fourth year, but Banerjee believes that this is not enough time to learn or do anything useful and he began to figure out how to get students into laboratories earlier – even within their first year. Part of the program that he developed gets students into the laboratory as freshmen.

The UCLA Biomedical Research Program consists of three components: 1) hands-on instruction, 2) research deconstruction, and 3) a minor in Biomedical Research. Since its inception, 3000 students have taken part in this program.

The hands-on instruction component of this program was sponsored by the Howard Hughes Medical Institute as the UCLA Undergrad Research Consortium for Functional Genomics and has served 800 students. This track of the program begins with a 10-week course that includes didactic, laboratory, computational, and writing instruction. Students enter a lab and work on one small part of a central, but difficult research question. They use simple approaches and in the end compile a large number of small observations from many students into one useful paper. Some projects that have been completed by students in this track include the mosaic analysis of essential genes during eye development, gene expression base lineage analysis, and an RNAi screen for hematopoiesis. STEM retention rates for students in this program are dramatically higher than the national and UCLA average, especially for minority students.

The research deconstruction component of this program introduces students to science by teaching the scientific story. The advantage of this method is that it is less expensive and can be scaled for different size and discipline needs. The concept is that a guest speaker presents a seminar targeted to a mature scientific audience to students at the beginning of the course. Over the course the presentation, which is videotaped, is broken down into smaller parts and the students are given instruction on how to interpret the information. At the end of the course the speaker is invited back to the class to answer questions. This approach has also been very successful, but the retention of students in STEM is not as high as the hands-on program. In contrast, this approach can reach more students.

Overall, the main take home points from Dr. Banerjee’s talk are that the hands-on approach is more successful than the deconstruction approach, but that both are more successful than traditional teaching methods at retaining students in STEM careers. In addition, Dr. Banerjee emphasized that the real key is to get students into laboratories as early as possible and that undergraduates are capable of producing good quality work.
From September 6-9, the 2015 Cichlid Science conference in Graz, Austria, was well attended by both European and American researchers of cichlid fishes, including members of the Roberts’ Lab at NCSU. Undergraduate researcher M. Kaitlyn Stanley presented a poster “Polygenic sex determination in Astatotilapia burtoni,” while graduate student Emily Moore gave a talk on “Detection of species-specific behavioral patterns in how Malawi cichlids use their environments.” Reade B. Roberts and post-doctoral researcher Amanda Cass both gave talks on using the cichlid model to study gut microbiota and gut development, “Lake Malawi cichlids as a model of dietary response and host-microbiota interactions” and “Molecular characterization of cryptic gut regionalization in trophically divergent cichlids from Lake Malawi.”

Of particular interest to the Keck Center, many researchers presented ongoing experiments examining cichlid behaviors in the wild and in the laboratory. Many of the talks featured work using the cooperatively breeding Tanganykian cichlid Neolamprologus pulcher as a model, where unrelated, smaller ‘helper’ individuals assist a pair of larger, reproductively active fish in rearing offspring. Karoline Fritzsche from Graz, Austria, revealed a new project using genetic parentage testing in wild cichlids to assess whether the ‘helper’ N. pulcher are getting to produce offspring using “sneaker” tactics. Claudia Kasper from Bern, Switzerland, measured the repeatability and heritability of egg cleaning, one of the ‘helping’ tasks in N. pulcher brood care, and found that while the behavior is highly repeatable, its narrow sense heritability is 0. She is investigating possible environmental triggers of this behavior. Filipa Saraiva from Vienna tested the effects of isotocin, vasotocin, and Manning compound on group dynamics in N. pulcher, finding that isotocin and Manning compound both increased appeasement behaviors of ‘helper’ fish to dominant fish, potentially increasing breeding group cohesion. Joachim Frommen from Bern compared environment use in N. pulcher to substrate grain, territory availability, and predation risk, finding that an increased number of ‘helpers’ in each breeding group is associated with fine substrate type, but is likewise associated with increased predation risk.

Outside of Lake Tanganyika, researchers are finding interesting behavioral patterns as well. Rhea Burton from Bangor, UK, is examining a newly radiating species pair of Astatotilapia in Lake Massoko to identify depth-related changes to mate-choice, foraging, and exploratory behaviors. Holger Zimmerman from Graz has expanded work examining color-based mate choice in Lake Victoria Tropheus species, finding that assortative mating patterns measured in the lab can break down in a naturalistic setting, possibly because males of one color seem to gain access to better territories. Alexandra Tyers from Bangor examined parentage of F1 offspring from allopatric crater lake Astatotilapia spp. and found no evidence for assortative mating in the lab, which may be consistent with expectations of a young species divergence event. Ola Svensson from Gothenburg, Sweden, reported preliminary results from an F2 cross of Pundamillia sister species with regards to mate choice, finding that vision-related opsin genotype seems to be associated with female mating preference.

The conference also featured many talks that explored cichlid evolution and adaptive strategies; recently developed cichlid genomic resources have provided more researchers with the tools to ask questions about phenotypic divergence and evolutionary histories at the level of the genome, epitomized by the keynote addresses from Craig Albertson (Massachusetts, USA) and Walter Salzburger (Bern, Switzerland). It was an exciting chance to hear all about the newest findings in the varied and wonderful field of cichlid research.
**Seminars**

On **October 1**, 7:00 pm, movie director Alexis Gambis will present his feature movie “The Fly Room” at the North Carolina Museum for Natural Sciences.

On **October 5**, 11:15 am, Dr. Lindy McBride from the Department of Ecology and Evolutionary Biology at Princeton University, Princeton, NJ, will present a seminar titled “Molecular Insights into the Evolution of Mosquito Preference of Human Odor”. The seminar will be in 3503 Thomas Hall.

**Grants**

David Tarpy received a five-year $1,250,000 AREAwide grant from the United States Department of Agriculture to develop an Areawide approach to improving honeybee queen quality and colony survival. He is also a collaborator with O. Rueppell and M. K. Strand on a four-year $396,617 grant from the United States Army Research Laboratory to study the plasticity of stress defense induction in the social honeybee model.

Coby Schal, Astrid Groot, Jeremy Heath and Michiel Van Wijk received a 3-year $580,000 grant from the National Science Foundation to study the role of male sex pheromones in mate choice and sex pheromone evolution in moths.

Jeremy Heath received a 2-year $150,000 postdoctoral fellowship from USDA’s National Institute of Food and Agriculture (NIFA) to investigate the effect of volatile plant compounds on soybean yield. The project will be a collaboration with Coby Schal and Dominic Reisig.

**Publications**

The following publications from the W. M. Keck Center for Behavioral Biology have appeared in print:


Of note...


Alexis Barbarin, NSF Postdocoral Fellow in the Schal lab, was selected to participate in the NextProf Science 2015 Workshop, a program at the University of Michigan designed to encourage talented scientists with a demonstrated commitment to diversity to consider academia.

Amanda Cass, Emily Moore and Reade Roberts gave talks at the Cichlid Science conference in Graz, Austria.

Johanna Elsensohn, a Ph.D student with Hannah Burrack and Coby Schal was selected for the Entomological Society of America Science Policy Fellows Program. The ESA’s science policy initiatives focus on raising awareness of the importance of the entomological sciences in policy discussions, educating policymakers, and providing our members with a voice in science policy debates. Fellows have a great opportunity to help develop science policy for the society. Johanna will serve for two years and work on important issues facing the science of Entomology. She will travel to Washington DC twice each year to interact with policy makers.

Fred Gould attended a Penn State workshop on applied evolutionary biology and gave a talk about “Resistance management for disease vectors: lessons from agriculture.”

Jamora Hamilton, a starting Ph.D. student with Coby Schal, was awarded an IMSD Fellowship.
Alex Ko, a Ph.D student with Jules Silverman and Coby Schal completed a summer internship with Bayer CropScience.

Christie Lee of Leslie Sombers’ lab presented a poster at the Gordon Conference on Catecholamines in Sunday River, ME.

Trudy Mackay gave an invited talk at the European Molecular Biology Organization meeting in Birmingham, UK, and a plenary lecture at the European Drosophila Research Conference in Heidelberg, Germany.

Heather Patisaul gave a Senate Briefing on behalf of the Endocrine Society organized by Diane Feinstein on the endocrine disrupting chemicals in personal care contacts.

M. Kaitlyn Stanley presented a poster at the Cichlid Science conference in Graz, Austria.