

The Signal

Monthly newsletter of the W. M. Keck Center for Behavioral Biology
at North Carolina State University
March, 2013, vol. 14, no.7.

A Celebration of Excellence



Participants at the Fourteenth Annual Student/Postdoc Symposium of the W. M. Keck Center for Behavioral Biology, from left to right, first row: Katherine Knudsen, Justa Heinen, Catherine McVey, Alyssa D'Addezio, Leah Wilson, Yvonne Matos; second row: Angela Bucci, Amy Savage, Ming Huang, Megan Garlapow, Ryan Wong, Alison Ossip-Klein, Ayako Wada-Katsumata; third row: Carlos Botero, Clint Penick, Emily Moore, Sarah Cash, Melissa Slane, Jessica Nye, Bryn Gaertner, John Shorter, Jeremy Heath. Not pictured: Lauren Dembeck, Michael Simone-Finstrom, Kirsty Ward, Victoria Pray and Matthew Geisz.(Photo by Shanshan Zhou)

The Fourteenth Annual Student/Postdoc Symposium of the W. M. Keck Center for Behavioral Biology was a showcase of academic excellence with 22 talks and a poster session by undergraduate students. "I know I say this every year, but this was the best symposium ever," said Keck Center Director, Robert Anholt. Clint Penick received the award for best presentation for his riveting talk

about ant hierarchies. Alison Ossip-Klein, visiting from Indiana University's Center for the Integrative Study of Animal Behavior received an honorary mention. Alyssa D'Addezio received the best poster award with Kirsty Ward an honorary mention.

For a full report of the symposium, see the article by Katherine Coyle and Chad Hunter on page 2 of this issue.

The Keck Center's 2013 Student Postdoc Symposium

by Katherine Coyle and Chad Hunter

The 14th Annual Keck Center symposium brought together graduate students and postdocs to share their research progress. Organisms on display ranged from beetles to sparrows and ants to tropical fish. The morning started with Jessica Nye showing videos of a *Drosophila*'s pumping heart in her presentation. Her search for polymorphisms related to variation in resting heart rate has led her to a promising suite of candidate genes with human homologs that could play a role in heart disease.

Ryan Wong followed with an analysis of stress-coping styles in zebrafish. He used RNAseq to obtain neurotranscriptome data and gene co-expression network analysis to search for differentially expressed genes between behaviorally "bold" and "shy" individuals.

Next, Clint Penick presented research from his previous laboratory at Arizona State University. He explained the impressive complexity of *Harpegnathos* ants' social ladder and different dominance interactions - dominance biting, policing, and antennal dueling - used to determine that hierarchy. A mathematical model demonstrated how different combinations of these interactions could ultimately lead to different dominance structures in a population.

Leah Wilson from the Center for the Integrative Study of Animal Behavior at Indiana University examined the relationship between hormones and seasonal flocking patterns in sparrows. According to her research, expression of Ile^8 -oxytocin and corticotropin releasing hormone is increased in response to social interactions and promotes winter flocking patterns.

Justa Heinen outlined plans to investigate the costs and benefits of honest signals in Bahamas mosquitofish. Using model fish to eliminate extra variables, she will investigate relationships between sexual signals, selective regimes, and ecological performance due to the bright coloration seen in male fins.

Next, Yvonne Matos showed how she mapped the spread of a population of cockroaches on our very own campus and used gas chromatography and molecular analyses to

identify the population as the invasive Asian cockroach. Moving forward, she plans to use microsatellite markers and population genetics to determine the relatedness of this species to the closely related German cockroach.

Carlos Botero discussed testing classical hypotheses about speciation caused by physiological barriers. It had been assumed that temperate environments select for broader physiological tolerances and that potential for speciation is highest around the tropics. By analyzing potential for speciation in terrestrial mammals and birds, Carlos found that harsher climates can actually promote speciation, perhaps by promoting faster evolution, and that unpredictable annual precipitation cycles in temperate and tropical environments may have a negative impact on subspecies richness. Overall, Carlos showed that the previously assumed simple relationship between latitude and speciation may be much more complex.

Megan Garlapow went back to the fruit fly model, using *Drosophila* to identify genes associated with variation in feeding behavior. She identified the EGF signaling pathway as a potential target that regulates variation in nutrient intake, with potential relevance to human obesity.

Melissa Slane described her recent work which was done in collaboration with colleagues in New Zealand to look at transcriptional changes that accompany socially induced sex change in the brains and gonads of Caribbean blue head wrasses.

The final talk before lunch was by Angela Bucci who described in detail the sequential arrival of different types of flies and beetles on decomposing dead pigs. She aims to elucidate the olfactory cues that emanate from the cadavers that sequentially attract different insects during the decomposition process.

Despite Angela's graphic description of decomposing pigs, participants enjoyed a lavish Lebanese lunch buffet, accompanied by poster viewing. Posters showed the effect of royal jelly on gene expression in *Drosophila* (Matthew Geisz), effects of exposure to ethanol on development time and survival in *Drosophila* (Victoria Pray), measurements of

equine facial expressions to determine temperament (Catherine McVey), a link between olfaction and aggression in *Drosophila* (Kirsty Ward), and the winning poster by Alyssa D'Addezio on the effects of bisphenol A on prosocial behavior and neural density in prairie voles.

The afternoon session opened with Ming Huang. Ming is interested in ant worker caste determination. In one experiment, he showed differences in head size, mandible morphology, head muscle volume, and bite force of different ants in the *Pheidole* genus.

The next talk was by Lauren Dembeck. She studies the cuticular hydrocarbons (CHCs) that are located on the cuticle of *Drosophila*. Using the *Drosophila melanogaster* Genetic Reference Panel, Lauren showed that the most prominent CHCs in females are 7,11-heptacosadiene and 7,11-nonacosadiene. Her future work includes verifying some of the genes from her genome wide association study linked to variation in CHC profiles, including a very interesting gene, which encodes desaturase 2, an enzyme involved in the biosynthesis of CHCs.

The third talk was by Katherine Knudsen, who works on the prairie vole, a monogamous and pair bonding mammal. A closely related vole, the meadow vole, is highly promiscuous. Katherine's future work will be looking at different aspects of what causes this change between species using the newly sequenced vole genome and investigating the possible role of seminal fluid proteins in modulating postmating physiology and behavior.

Ayako Wada-Katsumata talked about sugar aversion in cockroaches. Cockroach bait composition includes glucose. Ayako is working with a strain of cockroaches that averts glucose. Broadly, She found that sugar aversion may be mediated by a change in the specificity of a gustatory receptor that normally signals bitter taste.

John Shorter talked about the genetics of aggression in *Drosophila*. Using RNAi, John identified an odorant binding protein associated with aggression. His future work includes investigating the gene networks that contribute to variation in aggression and translating his results to human genetics.

Next Sarah Cash described the spread of the selfish genetic element *Medea* in populations

of red flour beetles. *Medea* supplies both a maternal toxin and an antidote to its progeny to increase its frequency in populations. Sarah hopes to understand more about this element for future pest management applications.

The last session started with Alison Ossip-Klein from CISAB at Indiana University. Alison is interested in sexually dimorphic color patterns of lizards across the United States. The color patterns differ when viewed under UV light. Alison seeks to understand the social significance of these rapidly evolving sexually dimorphic color patterns.

The next talk was by Jeremy J. Heath, who studies adaptive divergence and uses gall midges. Using both a within-host preference and accessory-gland carotenoid quality and quantity, Jeremy showed that gall midges are undergoing adaptive divergence.

Next, Emily Moore discussed behavioral diversity in African cichlid fish. Emily's enthusiastic talk also centered on adaptive radiation, focusing on African cichlids. She is beginning pioneering work to look at the effect of a polygenic sex determination system and how this affects behavior in different sexes.

Bryn Gaertner presented an exciting talk on defensive wing-flicking behavior in *Drosophila*. Like John, she is interested in aggression. Her work expands the classical aggression assay by looking at different types of aggressive acts. Recently, she found evidence that defensive wing-flicking behavior follows simple Mendelian genetics.

Amy Savage took us from nature to the big city. Amy studies ant diversity in Manhattan. She found different species depending on the sampling site as well as a high prevalence of exotic species. Additionally, she found different preferences of trap solutions between ants living along the median of the road and those living in Central Park.

The last talk was by Michael Simone-Finstrom on oxidative stress in honey bees. Oxidative stress is associated with ageing and Michael's work centers on determining parameters of oxidative stress in bees. Using various assays looking at first-foraging behavior, cold tolerance and mobility, Michael is attempting to correlate these to better understand oxidative stress.

The symposium concluded with a gastronomic feast catered by Chefs of India!

Looking into the Dolphin's Mind

by Emily Moore

On Thursday, February 21st, 2013, Dr. Diana Reiss gave the Keck Center distinguished seminar on “Reflections of Animal Minds.” Reiss also gave a Science Connections public lecture at the North Carolina Museum of Natural Sciences on Friday, February 22nd, discussing her recent book “The Dolphin in the Mirror.” Reiss, a professor in the Department of Psychology at Hunter College in New York, is well known for her work understanding self-recognition in bottlenose dolphins (*Tursiops truncatus*). She began her lecture by discussing the current studies being undertaken in her lab, which includes studies of hippopotamus communication and self-recognition in Asian elephants, to illustrate that sophisticated cognitive processing is not limited to the great apes, as was presumed for many years.

One of the ways Reiss investigates cognitive sophistication is through the “mark test”, which is an assay developed by Gordon Gallup, Jr. to determine if chimpanzees recognize themselves in the mirror. Animals (including human children) go through different stages when confronted with a reflective image of themselves: they first treat the image as if it were a conspecific, then begin to do “contingency testing” behavior (making atypical movements to make sure the image will follow exactly the same action), and finally use the mirror as a tool to examine regions not normally visible (such as the inside of the mouth). The mark test is used to confirm that the animal has recognized itself by placing a mark in a non-visible location, and quantifying the amount of time the animal spends touching or examining the mark in the mirror. Dolphins that have been given a mark spend a significantly longer amount of time examining it in the mirror, and if given a “sham” mark at a later date, they will spend their time in front of the mirror attempting to find it. In addition to being interested in the mark, dolphins perform contingency testing behaviors when in the mirror portion of the enclosure and are silent, an atypical behavior for a dolphin interacting with another dolphin.

The dolphin pair that Reiss originally worked with had grown up in a reflective enclosure, thus had already become accustomed to mirror-like surfaces before the first controlled mark test; her laboratory is currently working with a new group



Dr. Diana Reiss

of dolphins to further support her findings and to discover at what age young dolphins develop the cognitive faculties necessary for mirror self-recognition. Reiss emphasized that the mark test is not the only method by which to test non-human animal cognition, and is just one of the many tools used to identify features of animal theory of mind. The work that has come out of the Reiss laboratory has been instrumental in developing a better understanding of the cognitive capabilities of social, non-human animals, and provides a way to examine the continuum of mind as it relates to both animals and humans.



Ignorance is Scientific Bliss

by Tiffany Garbutt

“We need to teach ignorance,” said Stuart Firestein during his talk in the NC State University library. He referenced a quote from Marie Curie: “One never notices what has to be done; one can only see what remains to be done.” According to Firestein it is the “what remains to be done” part that is important. This is the part that, “we have to start telling the students, the public, and ourselves about” said Firestein.

The revelation came to him during his dual role as a teacher and researcher at Columbia University. He found that teaching lacked the exhilaration of lab work. Furthermore, he realized that by the conclusion of his Cellular and Molecular Neuroscience course, students had gotten the impression that scientists already knew everything there was to know about neuroscience and had simply collected facts and placed them into one large “encyclopedia” of a textbook! That he said was just wrong. He argued that when scientists get together we do not talk about the things we know; we talk about the things we don’t know - things that still need to be done.

Firestein recently published a book titled, “Ignorance: How it drives science.” He admitted that he used the term ignorance to be “intentionally provocative.” He stated that he is aware that the use of the word is often accompanied by negative connotations, none of which are his intent. He quoted James Clerk Maxwell to clarify, “Thoroughly conscious ignorance is the prelude to every real advance to science.” In contrast to the common view that science is a well-organized system that adheres strictly to the principles of the scientific method, Firestein argued that in reality science is a less-organized-ignorant-fumbling-around-in-the-dark quest for knowledge and that better forms of ignorance will continue to lead us on a perpetual adventure.

While he argued that ignorance is a bigger topic, he did not downgrade the importance of knowledge. He explained that new knowledge and data are continually being added. He gave the example that approximately three new scientific papers are published a minute! However, facts can change as new knowledge is gained.

Science is often imagined as pieces of a puzzle slowly coming together; but Firestein says this gives the impression that there is some final

solution to the puzzle. Other images of science are that of peeling layers of an onion or Russian dolls, both of which give the impression that a final end goal is achievable. Firestein suggested an alternative image, a magic well in which every time one bucket of water is removed the well refills. He also painted the image of a ripple in a pond where knowledge is at the center, but as the ripples expand they come in contact with a circumference of ignorance. He used George Bernard Shaw’s quote to explain, “Science is always wrong, it never solves a problem without creating ten more.” Firestein reasoned that ignorance does not precede knowledge as is commonly thought, but that knowledge precedes ignorance. There are things that we know we know. There are also things that we know we don’t know, but Firestein stressed through a quote by Donald Rumsfeld that there are also “...unknown unknowns - the ones we don’t know we don’t know.” In a discussion after his talk, Firestein clarified that ignorance is not just asking a question, but it is a way of framing questions, both the ones we know how to ask and the ones we have not thought to ask yet.

In a strange twist, this leads us to conclude that the scientific progress generates ignorance, that ignorance generates uncertainty, and that uncertainty generates doubt. Then, does science create a bunch of uncertainty and doubt? Firestein answered yes. He explained that, “uncertainty is not the same as unreliability and unsettled science is not the same as unsound science.” Scientific data remain true and effective under the regime in which they were first discovered and revision is not a failure, but a victory for science.

In a discussion with the audience, Firestein stated that it is the responsibility of scientists to teach this new method of thinking about science to the public and non-science majors alike, because those are the individuals who will make our policies. Firestein said, “Learning to live with uncertainty and ambiguity in science and how to make use of that is one of the most important things we can do as scientists and interacting with the public.” Firestein’s talk was colorful, anecdotal, inspiring, and filled with insightful quotes that left his audience feeling a bit smarter, while yearning to be more ignorant.

Examining Darwin's Legacy

by Gabriel Zilnik

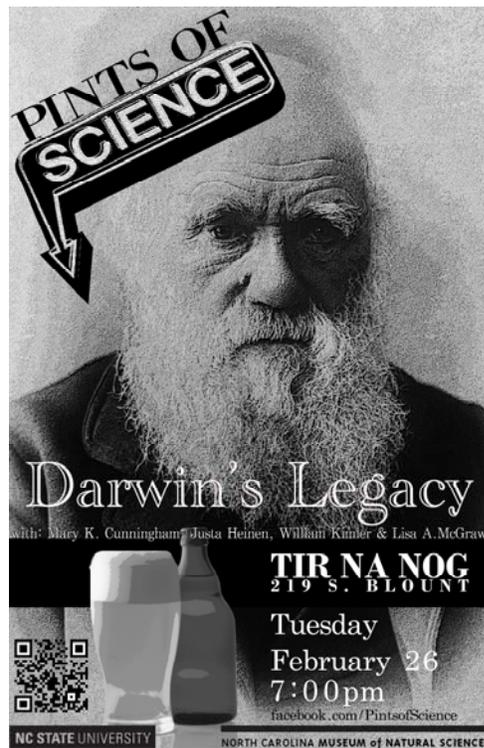
On a hot, humid July day in the wilds of the Peruvian Amazon, a new NC State outreach effort was born. "Pints of Science," as Gabriel Zilnik labeled the effort and which with Andrew R. Binder (Department of Communication) would bring scientists and researchers out of the university and to a broader audience. Motivated by a passion for public engagement and fulfillment of NCSU's land-grant mission to serve the citizens of North Carolina, Binder and Zilnik set out to find how they could make this a reality.

While the last few years have seen a rise in popularity of science presentations at coffee houses and restaurants, Binder and Zilnik realized that these "science cafés" could often take on a lecture-like formality that lacked the type of spontaneous energy people might associate more with stand-up comedy or open-mic music nights. The two wanted to find a local bar where they might find a balance between the wonder of scientific discovery and the spontaneity of a speaker alone on stage with a microphone. With the assistance of staff members Katey Ahmann and David Kroll of the NC Museum of Natural Sciences, with their wealth of experience in coordinating public outreach *Pints of Science* found a receptive home at Tir Na Nog, an Irish pub and ideal venue in downtown Raleigh.

On a temperate September evening, Rob Dunn inaugurated *Pints of Science* with tales of fungus, ants, and - most important - beer. A lively discussion followed by the crowd of about 35 people. Since then, every fourth Tuesday of the month, *Pints of Science* has brought a range of speakers and perspectives to the patrons of Tir Na Nog. Several Keck Center members have participated over the last few months and the audience continues to grow each month.

For February, *Pints of Science* planned its most ambitious event: An examination of Darwin's legacy. Lisa McGraw, William Kimler and Justa Heinen with Mary Kath Cunningham covered a variety of topics from the biological sciences and humanities.

Bravely kicking off the evening Justa Heinen spun a tale of medieval torture devices and arms races—this being the best way to describe the astounding variation in genital morphology. The packed house erupted with laughter when Heinen proclaimed, "When you look at human genitalia, they're kind of boring." She explained that genitalia are under intense selective



pressure leading to the wide variation that became a favorite area of study for biologists from Darwin to E.O. Wilson. Her graduate work involves studying sexual selection of fish in the genus *Gambusia*.

When someone thinks of evolution Darwin is the visage that often comes to mind. Kimler explored the often forgotten contributions, at least in the public consciousness, of Alfred Russell Wallace. Wallace's growing spirituality stemmed from a seeming implausibility that natural selection could produce the human brain, according to Kimler. Naturalists struggled explaining selection's role in producing music and art to calculus. Much of this would be elucidated after Wallace's

death. Kimler described a growing movement to reexamine his contributions to evolutionary theory as the centennial of his death approaches.

Continuing in the vein of often forgotten aspects of evolution, Lisa McGraw held up a copy of *The Descent of Man, and Selection in Relation to Sex*. The most prominent symbol of sexual selection is the tails of male peacocks. However, thousands of examples have been described in nature said McGraw. These early research experiences led McGraw to study the genetic basis for monogamy in voles.

"Evolution is *only* a theory!" said Cunningham as she illustrated a timeworn misconception held among evolution deniers. Also aiming a critical eye at academia, Cunningham targeted those antagonizing religions or those who concede to teach evolution along creationism and intelligent design. The key to keeping evolution in the science classroom and religion out according to Cunningham is to enlist the help of religious groups that want evolution to be taught, but tend to be less vocal with their opinions.

The speakers concluded the evening by collectively answering questions from the audience.

Those unable to make it out a video of the evening will be uploaded to the *Pints* Facebook page. Reade Roberts will be speaking on genetics on March 26th. The final event of the 2012-2013 season *Pints* will host an evening of climate change in collaboration with the Southeast Climate Center.

Outreach

Keck Center Outreach for Teachers and Students

by David Threadgill

The Keck Center and the Department of Genetics provided training for updated NC Department of Education science standards in genetics and heritability and population similarity and differences to 5th grade teachers in Onslow County on January 22nd. Onslow County is one of the most underserved counties in North Carolina. Most of the students come from families who do not have education beyond high school, and many with less.

Faculty David Threadgill and Pat Estes, and graduate students April Wynn and Sarah Cash spent the day at Jacksonville Commons Elementary School in Onslow County with almost 20 teachers to provide training in genetics of individuals and populations. Additionally, several potential class activities were presented that teachers could use to demonstrate the concepts to their 5th grade classes.

As a follow-up to class sections on genetics, over 100 5th graders from Onslow County traveled by school bus on February 19th to spend the day visiting the Keck Center and NCSU. Faculty, staff, graduate students, and undergraduates in Keck Center laboratories developed four modules for the visiting students. The students were split into four groups and then rotated through the different modules.

The first module was in Trudy Mackay and Robert Anholt's laboratories on 'Fruit Fly Variation'. Students were introduced to the fruit fly and were able to see various flies under the microscope. They learned how to sex the flies and to observe variation in eye and body color. The students then got to observe how flies are prepared for DNA extraction. The highlight for the students was seeing all the smoke coming off the liquid nitrogen that flies were being frozen in.

The second module was in David Threadgill's lab on "*Mus musculus*: Why Mice Matter'. Here the students were introduced to the mouse as a model. They were able to see different strains with a wide variety of behaviors and coat colors and even perform 'test' matings to learn Mendelian inheritance patterns of mouse coat colors.

The third module was in Anna Stepanova and Jose Alonso's lab on 'Genetics of Plants'. In this module the students learned about plant growth and how the environment can alter growth patterns. They also planted their own Arabidopsis plants in yogurt cups to take home so they could observe growth of the plants in different lighting conditions.

The final module was presented by graduate students on 'Banana DNA and Your Traits'. In this module the students talked about how traits like tongue rolling, earlobe attachment and hair color differ between people and populations, and how these are inherited from your parents. The students then extracted banana DNA using simple household items like baggies, salt, rubbing alcohol and a plastic cup. All were excited to see the slimy DNA they were able to get from a small piece of banana. The visit to NCSU ended with a walking tour of the campus by the graduate students, which concluded at Fountain Dining Hall where the students had lunch in a college cafeteria before loading the busses for the trip home.



Students learn to extract banana DNA during their visit at NC State University

Reaching Out: Stories of Science Outreach

*by Lea Shell, Dunn Lab & Your Wild Life,
Department of Biology*

February was full of wonderful outreach opportunities for the Your Wild Life team (yourwildlife.org). We are interested in engaging the public in the appreciation and study of the biodiversity in our daily lives - be it the camel crickets in one's basement or the tiny mite living in the pores on one's face. We employ diverse channels - Twitter and Facebook, our blog, visits to local classrooms, outreach events at museums and science festivals - to engage diverse audiences. We are also motivated to get the science we do in the lab accessible to teachers in the classroom - with the goal of having students get involved in citizen science projects early and often (like collecting ants for the School of Ants project).

From a poster competition at Research Triangle High School to Darwin Day festivities and a teacher workshop at the NC Museum of Natural Sciences, this month has been full of amazing ways to connect

entomology to K-12 education. When I started working with the Dunn Lab and joined the Your Wild Life team just over a month ago, I never imagined that I would be involved in all of the wonderful things I have been a part of over the past several weeks. What makes the outreach that we have done recently so special, is that it was not all our idea – it was a response to many requests we have received from teachers to find ways to incorporate our citizen science into their classrooms.



Forehead mite collecting at Darwin Day at the Nature Research Center (Photo by Lea Shell)

Our team spent several hours at the Efland-Cheeks Elementary School on their Math and Science Night talking about insect research, video-projecting live ants under a microscope and showing off live camel crickets. Being able to get the parents involved in their children's education was very rewarding. Parents (and even some teachers) were clued into the notion that science does not have to be expensive nor inaccessible. We helped them to understand that they live in a lab - they can make important scientific discoveries in their backyard, in their refrigerator and even in their belly button.

And so a conversation was started... A week later many of those teachers from Orange County, NC, drove almost an hour to attend a special workshop hosted at the museum to discuss ways to incorporate School of Ants (and ant biology, in general) into their curriculum, in a way that also satisfies their state-mandated standards. Our goal was to come up with at least one ant example for each of the life science standards; I think we far exceeded that goal! With just a brief overview of ant biology and the School of Ants protocol, the K-5 teachers were well on their way to brainstorming ways to incorporate ants into their science curriculum, as well as into their mathematics, language, literature and even art lessons.

On a snowy Saturday in mid-February, we took our Your Wild Life citizen science show on the road back to the museum's Nature Research Center. Our team set-up shop in labs on two floors, and spent the day talking about camel crickets, recruiting ideas for a

common name for a common ant, discussing and showing off arthropods collected in homes, and sampling for face mites in celebration of Darwin's 204th birthday. February outreach has been more fun than I ever imagined, and I cannot wait for the future - in March I will be doing ant outreach from New York City medians - Stay tuned!



Orange County School K-5 teachers looking for ants on the North Carolina State Capitol Grounds. (Photo by Lea Shell)

Electrifying Chemistry

by Leslie Sombers

The Sombers lab is heading out to East Lee Middle School, in Lee County, for two days to do some cool experiments, including but not limited to electrochemistry, with the kids. We sent them our 'Intro to the Sombers lab' video, and did a Skype Q&A session with each class. Now, we are heading out to convince them that chemistry is awesome, and very important when you want to understand how the brain works.

Partnerships with the North Carolina Museum for Natural Sciences

by Robert Anholt

The Keck Center sponsored a Science Connections public lecture at the North Carolina Museum for Natural sciences by Dr. Diana Reiss from Hunter College in New York. Author of the book "The Dolphin in the Mirror" Reiss gave an inspiring talk to an audience of all ages that filled the auditorium to capacity, followed by a book signing. Diana Reiss is one of the world's leading experts on dolphin intelligence who has helped lead the revolution in dolphin understanding for three decades. In addition, as an activist, she is a leading rescuer who continues to campaign against the annual Japanese slaughters. She

described dolphins' astonishing sonar capabilities; their sophisticated, lifelong playfulness; their emotional intelligence; and their ability to bond with other species, including humans. In Reiss's most famous experiments, she used a mirror to prove that dolphins are self-aware, and even self-conscious. Reiss also gave a research seminar, which is summarized on page 4 in this issue of The Signal by Emily Moore.



Dr. Stuart Firestein

The Keck Center also sponsored a Science Café evening in the Daily Planet Café of the Nature Research Center at the museum, followed by a book signing by Stuart Firestein, author of “Ignorance: How it drives science.” A crowd of more than 90 people filled the café to capacity. For a summary of Firestein’s presentation on the same topic in the NCSU library, see the article of Tiffany Garbutt on page 5 in this issue of The Signal.

To contribute to The Signal, to be placed on our mailing list or for information about the W. M. Keck Center for Behavioral Biology, contact Dr. Robert Anholt, Department of Biology, Box 7617, North Carolina State University, Raleigh, NC 27695-7617, tel. (919) 515-1173, anholt@ncsu.edu.

Seminars

On Monday, **March 18**, at 11:15 am, Dr. Allen Moore from the Department of Genetics at the University of Georgia will present a seminar titled “Quantitative to Molecular Genetics of Parenting.”

The seminar will be in 3503 Thomas Hall.

Publications

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

Cao, J. and Patisaul, H. B. (2013) Sex-specific expression of estrogen receptors α and β and Kiss1 in the postnatal rat amygdala. *J. Comp. Neurol.* **521**: 465-478.

Of note...

Robert Anholt served on an NIH study section to review predoctoral F31 and postdoctoral F32 applications.

Carlos Botero was interviewed by a local TV channel highlighting Latino leaders in the Triangle area. The interview ran on a bi-lingual program called 'Hola North Carolina' on February 17th on Fox 50.

Bryn Gaertner, Jason Peiffer and Wen Huang attended and presented posters at the Gordon Research Conference in Quantitative Genetics in Galveston, TX.

Trudy Mackay was a plenary speaker at the Gordon Research Seminar on Quantitative Genetics in Galveston, TX.

Heather Patisaul gave an invited talk at the Department of Animal Sciences at Rutgers University entitled “Endocrine Disruption of Neuroendocrine Pathways and Behaviors.” She also participated in an Environmental Defense Fund meeting “Chemical Testing in the 21st Century.”

Leslie Somers attended the Winter Brain Research Conference in Breckenridge (CO), where she gave a presentation authored by Somers, L. A., Schmidt, A.C, and McCarty G. S., titled “the Voltammetric Detection and Characterization of Met-Enkephalin in Brain Tissue.” She won the conference race in the snowboard category!

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<https://harvest.cals.ncsu.edu/giving/index.cfm?AllocationCodeList=011355>