

# *The Signal*

Monthly newsletter of the W. M. Keck Center for Behavioral Biology  
at North Carolina State University  
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## *2014: A New Year with Exciting Prospects Message from the Director*

Dear Friends and Colleagues,

The year 2014 promises to be an exciting year for the W. M. Keck Center for Behavioral Biology. The newly reorganized Department for Biological Sciences is recruiting a permanent Department Head and all three candidates for the position are stellar scientists with excellent administrative expertise and areas of interest that mesh well with the Keck Center. Thus, the successful candidate will most certainly help strengthen the Center.

The Fall 2013 semester of our Center's activities was filled with outstanding seminars in our Distinguished Speaker series and the year 2014 already has a slate of equally impressive speakers. We will also continue our outreach programs through interactions with the North Carolina Museum of Natural Sciences.

Our annual student/postdoc symposium is scheduled for February 21, 2014 and once again we look forward to hosting our exchange visitors from the Center for Integrative Study of Animal Behavior at Indiana University, a long standing treasured tradition.

In September 2014 we look forward to co-hosting a workshop on "Science and Society" with the IGERT program on Genetics Pest management and the NCSU Program for Genetics.

In 2014, the Keck Center and the Genetics Program will also take initiatives to strengthen our ties with our alumni.

The year 2013 was a difficult one for science with greatly restricted funding budgets, low pay lines at NSF and NIH, a government shutdown and the continuing shadow of sequestration looming big over the scientific community. Keck Center members have navigated these troubled waters remarkably well and obtained substantial extramural support, a credit to our Center's high quality of scientific research. The year 2014 is an election year and hopefully will result in members of Congress trying to get their act together



and hopefully realize that strong support for basic research is the foundation for the future welfare and economic well-being of the United States.

During the last year, our Center has received generous support from the College of Sciences and the College of Agriculture and Life Sciences and from our corporate sponsors, BASF, Epicentre, Qiagen and Kappa Biosystems. This generous support has enabled us to maintain a vigorous program to promote a creative, interactive and stimulating research environment.

Finally, the active participation by all of you, faculty, students, postdocs and staff members, is what makes our Center such a unique and invigorating organization. I wish each and every one of you a Happy, Healthy, Successful, and Productive New Year!

Robert Anholt  
Center Director

# The Tickling of Nematodes

By Katherine Knudsen Myers

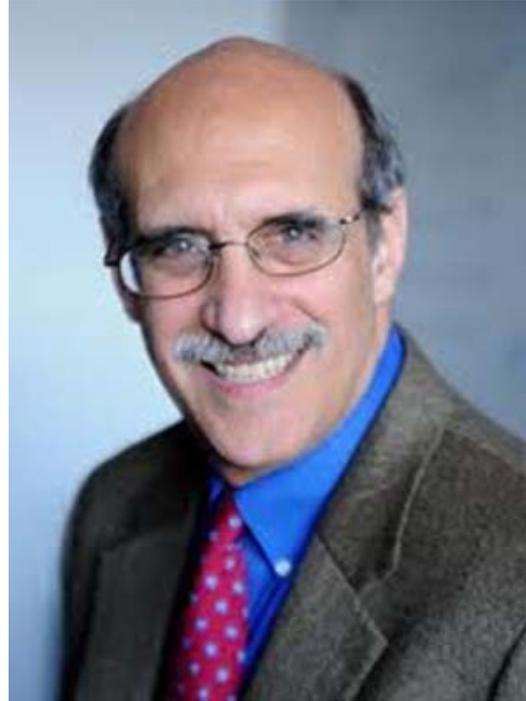
The final 2013 installment of the W. M. Keck Center for Behavioral Biology distinguished seminar series occurred on December 5<sup>th</sup> and featured Dr. Martin L. Chalfie from the Department of Biological Sciences at Columbia University. Chalfie is well known as a 2008 Nobel laureate in Chemistry for his role in the discovery and development of green fluorescent protein. Aside from his work with GFP, Chalfie has extensively studied nerve cell development and touch sensitivity in the nematode *Caenorhabditis elegans*. Chalfie mentioned that he most likely would never have given GFP a second thought if he had not been working with this transparent model organism.

Before winning the Nobel Prize, which he humbly claimed was a product of “dumb luck” and “being in the right place at the right time,” Chalfie attended Harvard University as an undergraduate where he majored in Biochemistry and captained the swim team, graduating in 1969. After a stint of teaching, Chalfie returned to research in 1971 for a summer at Yale University, resulting in his first publication and a renewed interest in pursuing a career in science. He earned his Ph.D. in Neurobiology from Harvard in 1977, and conducted postdoctoral research at the Laboratory of Molecular Biology in Cambridge, England. Chalfie published “The Neural Circuit for Touch Sensitivity in *C. elegans*” in 1985, which has been cited over 500 times. After leaving the LMB, he took a faculty position at Columbia University and was elected to the National Academy of Sciences in 2004.

Chalfie’s talk, entitled “Mechanosensory transduction and its modification in *C. elegans*,” began with the question of why anyone would care about touch sensitivity in a 1 mm length nematode. Chalfie explained that we have at least five types of cells in our skin that respond to different types of touch, but no idea how they work. *C. elegans* is a great model due to its transparency and known cell fate map.

Chalfie’s talk focused on the six touch receptor neurons that sense touch. Specimens can be tickled with “an eyebrow hair on a toothpick” and will respond by moving away from the touch. Chalfie joked, “if a specimen does not respond to this tickling, it may be touch insensitive or it might be dead.” His lab has ~500 touch insensitive strains that can be studied.

Chalfie mentioned how touch sensitivity can be modulated through habituation to touch through exposure to vibration from car stereo speakers or modification of salt or oxygen content in their environ-



*Dr. Martin L. Chalfie*

ment. These different ways of modulating touch sensitivity allow the mechanisms of touch to be examined through exposure of the touch insensitive mutant strains to different environments or stimuli. Chalfie has identified 17 genes associated with touch sensitivity, 5 of which are involved in development and 12 in function. His talk focused on several MEC genes, specifically *mec-2*, *mec-4*, *mec-6*, *mec-10* and the MEC-4 channel complex that transduces touch. These genes have been examined through both loss of function and gain of function experiments to assess their role in touch sensitivity. Chalfie identified distinct transduction pathways that control reciprocal inhibitory and excitatory neuronal circuits that direct forward or backward movement with different mechanisms responding to stimulus onset and offset and persistent touch stimulation.

During his visit, Chalfie met with graduate students and gave excellent advice for planning and achieving goals in a scientific career. He discussed doubts he experienced early on in his career and reminded students that there is no secret to winning a Nobel Prize. According to Dr. Chalfie, “Winning a Nobel Prize is a lot of fun. You should all try it!”

## Seminars

On **January 13**, 1:30 pm, 1:30 pm, Dr. John R. Carlson from the Department of Molecular, Cellular and Developmental Biology at Yale University will present a seminar titled "Chemosensory perception in the fly." The seminar will be in 3503 Thomas Hall.

On **January 30**, 3:30 pm, Dr. Russell S. Lande from the Division of Biology at Imperial College London will present a seminar titled "Phenotypic plasticity, adaptation, and extinction in a changing environment." The seminar will be in 101 David Clark Laboratories.

## Publications

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

Riesch, R., Plath, M., Schlupp, I., Tobler, M. and Langerhans, R. B. (2014) Colonization of toxic environments drives predictable life-history evolution in livebearing fishes (Poeciliidae). *Ecol. Lett.* **17**: 65-71.

Patisaul, H. B. (2013). Effects of environmental toxicants and phytoestrogens on the kisspeptin system. In: Kisspeptin Signaling in Reproductive Biology. *Adv Exp Med Biol.* **784**: 455-479.

Mackay, T. F. C. (2014) Epistasis and quantitative traits: using model organisms to study gene-gene interactions. *Nat. Rev. Genet.* **15**: 22-33.

Legros, M., Xu, C., Morrison, A., Scott, T. W., Lloyd, A. L. and Gould, F. (2013) Modeling the dynamics of a non-limited and a self-limited gene drive system in structured *Aedes aegypti* populations. *PLoS One* **8**: e83354.

## Of note...

**David Aylor** presented seminars at the New York University Center for Systems Biology and Genomics on genetic reproductive incompatibilities in diverse laboratory mice, and at East Carolina University and the National Institute of Environmental Health Sciences on experimental designs for mammalian systems genetics.

**Austin Bath** presented a poster with **Sandra Losa-Ward** and **Heather Patisaul** at the Sigma Xi Student Research Symposium, titled "Neonatal exposure to the soy phytoestrogen genistein modifies estrogen sensitive gene expression in the adult female rat brain and ovary."

**Ming Hua Huang** will join the Agrosience Services Division at Eurofins Inc. as a Research Scientist.

**Heather Patisaul** gave a seminar at Duke University (Durham, NC) on "brain chemistry: environmental influences on neuroendocrine development and behavior." She also participated in a working group hosted by the Environmental Defense Fund called "Advisors Meeting on Scientific Engagement in New Federal Chemical Testing Efforts."

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 Biological Sciences, Box 7617, North Carolina State University, Raleigh, NC 27695-7617, tel. (919) 515-1173, anholt@ncsu.edu.

Visit our website: <http://keck.sciences.ncsu.edu/>

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