

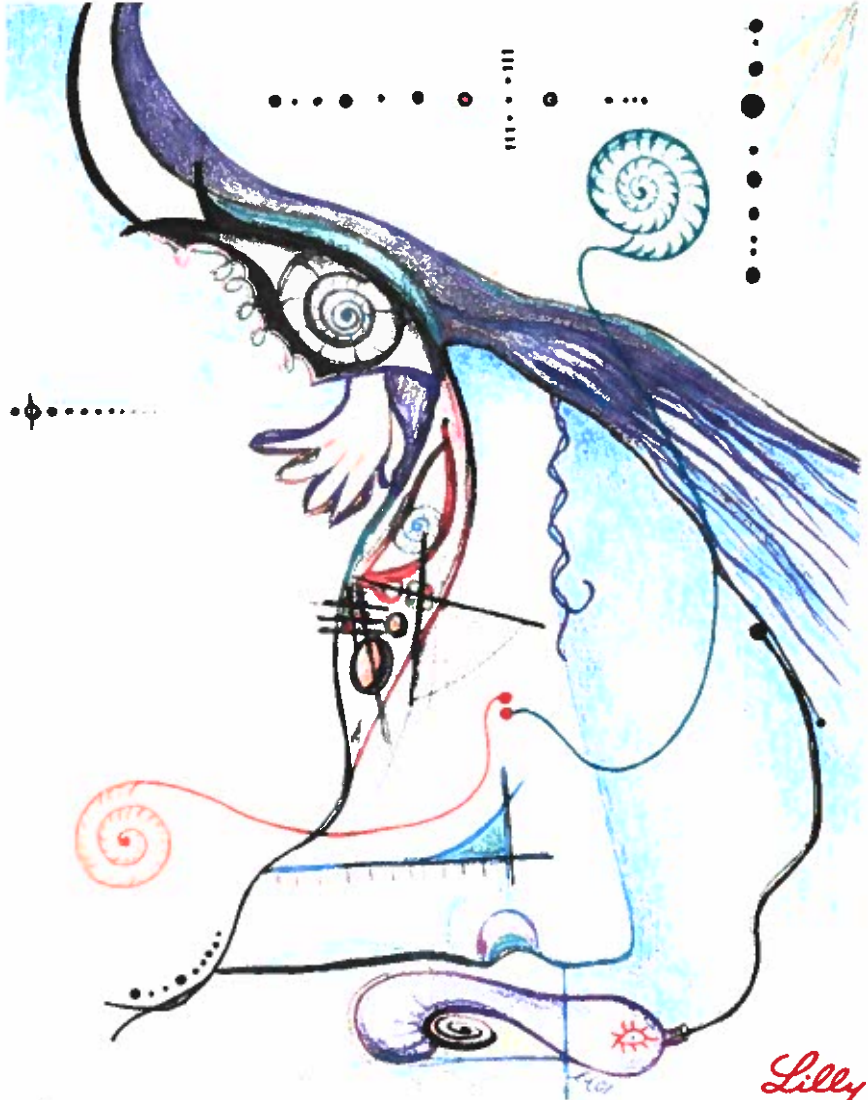


BECKMAN SYMPOSIUM

Sponsored by:  
ELI LILLY AND COMPANY

# KEEPING IN TOUCH: THE BIOLOGY AND GENOMICS OF THE SENSES

Friday November 16, 2001 9:00 - 5:30 Fairchild Auditorium, Stanford Medical Center



Organized by: Matthew Scott and David Kingsley

*Lilly*  
Answers That Matter.



BECKMAN SYMPOSIUM

***Keeping in Touch:  
The Biology and Genomics of the Senses***

- 9:00 am Lucy Shapiro, Stanford University  
Greeting and Introduction
- Matthew Scott, Stanford University**  
Opening Remarks
- 9:15 am **Richard Axel, HHMI/Columbia University**  
Representations of Smell and Taste in the Brain
- 10:00 am **Bonnie Bassler, Princeton University**  
How Bacteria Talk to Each Other
- 10:45 am **BREAK**
- 11:00 am **Cori Bargmann, University of California at San Francisco**  
Integrating Signals in Olfactory Behavior
- 11:45 am **Martin Chalfie, Columbia University**  
Mechanosensation in *C. elegans*
- 12:30 pm **LUNCH**
- 2:00 pm **David Corey, Harvard Medical School**  
Dancing on the Head of a Pin: Myosins and Sensory Adaptation in Auditory Hair Cells
- 2:45 pm **David Julius, University of California at San Francisco**  
The Molecular Biology of Nociception and Pain
- 3:30 pm **Jeremy Nathans, Johns Hopkins University**  
The Genetics and Evolution of Trichromatic Color Vision in Higher Primates
- 4:15 pm **David Kingsley, Stanford University**  
Closing Remarks
- 4:20 **RECEPTION**



## Biographies

**Dr. Richard Axel** is a University Professor, Columbia University, and Investigator, Howard Hughes Medical Institute at the College of Physicians and Surgeons, Columbia University. He did his undergraduate training at Columbia University, his medical training at Johns Hopkins University, and his postdoctoral research with Dr. Sol Spiegelman at Columbia and Dr. Gary Felsenfeld at the National Institutes of Health. In early work, Axel and his colleagues developed gene transfer techniques which permit the introduction of virtually any gene into any cell, allowing the analysis of gene function *in vivo*. These experiments led to the isolation and functional analysis of the gene for the cellular receptor for HIV. Dr. Axel, entering the field of neurobiology, identified the peptide genes responsible for eliciting an innate behavior in a marine snail, *Aplysia* addressing the problem of how diverse behavioral patterns may be inherited from parent to offspring. More recently, he has worked on the molecular logic of olfactory perception, providing insight into how the recognition of odors is translated into an internal representation of sensory quality in the brain. Dr. Axel is a member of the National Academy of Sciences and the American Academy of Arts and Sciences.

**Dr. Bonnie Bassler** is an Associate Professor of Molecular Biology at Princeton University. She did her undergraduate studies with Drs. Fredrick Troy and Eric Vimr at the University of California at Davis, and her graduate work with Dr. Saul Roseman at the Johns Hopkins University. She began to study the luminescence of *Vibrio harveyi* in 1990 as a postdoctoral fellow at the Agouron Institute in La Jolla, California, with Dr. Michael Silverman. She joined the Department of Molecular Biology at Princeton in 1994. Working on the control of luminescence led her to quorum sensing and communication between cells. Her discovery of systems for interspecific quorum sensing has made her a leader in the field of signaling between cells. She has been recognized with a National Science Foundation Career Development Award.

**Dr. Cornelia Bargmann** is a Professor in the Departments of Anatomy and of Biochemistry and Biophysics at the University of California, San Francisco, and an Investigator of the Howard Hughes Medical Institute. She did undergraduate studies at the University of Georgia, graduate work with Dr. Robert Weinberg at the Massachusetts Institute of Technology, and postdoctoral studies with Dr. Robert Horvitz at M.I.T. As a graduate student, Dr. Bargmann showed how mutations in a gene encoding a growth factor receptor could lead to cancer. As a postdoctoral fellow, she began studying sensory behavior in the nematode worm *Caenorhabditis elegans*, and identified specific genes and neurons required for particular chemosensory responses. She has identified the cellular and molecular basis of many different sensory responses, including a large family of olfactory receptors, mechanisms that control asymmetry in odorant receptor expression in neurons, and the basis of natural variation in food response and social behavior. Dr. Bargmann has received the Takasago Award for Research in Olfaction, the W. Alden Spencer Award for Neuroscience Research, the Faculty Mentorship Award from the UCSF Graduate Student Association, and the Charles J. Herrick Award from the American Association of Anatomists.

**Dr. Martin Chalfie** is a Professor of Biological Sciences at Columbia University. Dr. Chalfie did both his undergraduate and graduate training at Harvard University, carrying out his Ph.D. research in the laboratory of Dr. Robert Perlman. He was a postdoctoral fellow with Dr. Sydney Brenner in the Laboratory of Molecular Biology at the MRC in Cambridge, England. It was here that he began his pioneering work using a genetically tractable experimental system, the nematode *Caenorhabditis elegans*, to investigate how organisms sense and respond to mechanical stimuli. His work has been instrumental in defining the neural circuitry underlying mechanosensation, in understanding the structure and function of touch receptor neurons, and in elucidating the pathways for their differentiation. In addition to his leading role in the field of touch reception, Dr. Chalfie introduced the use of Green Fluorescent Protein as a marker for following gene expression patterns and protein localization in live organisms, a contribution that has revolutionized the fields of cell and developmental biology.

**Dr. David Corey** is a Professor of Neurobiology at Harvard Medical School and an also Investigator of the Howard Hughes Medical Institute. Dr. Corey did his undergraduate studies at Amherst College, his graduate work with Dr. A. James Hudspeth at the California Institute of Technology, and his postdoctoral research with Dr. Charles Stevens at Yale University. He is Co-Director of the Harvard Medical School Center for Hereditary Deafness. Dr. Corey's research focuses on understanding how mechanical forces open ion channels. In his early work, he studied how auditory stimuli produce electrical responses from hair cells in the inner ear. By developing novel technology that allowed the application and measurement of ultrarapid stimuli and responses of only tens of microseconds, he predicted the existence of the fine tip links in stereocilia whose shear triggers the opening of ion channels that transduce auditory stimuli. Dr. Corey then studied the adaption mechanisms that come into play during a sustained auditory stimulus, identifying a myosin-mediated mechanism that relaxes this tip link shear. More recently, his lab has turned to genomic approaches to study genetic hearing disorders in mouse and men, as well as to physiological studies of other types of mechanosensitive channels such as those in the skin underlying touch sensation. Dr. Corey was awarded the Harvard Medical School A. Clifford Barger Excellence in Mentoring Award and the Mirmelstein-Kresge Award for Excellence in Hearing Science.

**Dr. David Julius** is a Professor of Cellular and Molecular Pharmacology at the University of California, San Francisco. He did his undergraduate studies at the Massachusetts Institute of Technology, his graduate work with Drs. Jeremy Thorner and Randy Schekman at University of California at Berkeley, and his postdoctoral work with Dr. Richard Axel at Columbia University. As an undergraduate, he worked on the isomeric specificity of tRNA aminoacylation with Dr. Alexander Rich at M.I.T. As a graduate student, Dr. Julius characterized the processing and secretion of alpha mating factor in yeast. His work identified many similarities between this process and the generation of secreted hormones in mammals, and led to the isolation of the gene encoding a key protease required for maturation. As a postdoctoral fellow, Dr. Julius characterized the molecular nature of serotonin receptors with Dr. Richard Axel. He has subsequently identified both the structure and function of a number of other key receptors, including a cell surface receptor that is activated by the capsaicin molecule found in hot chili peppers. His receptor studies have helped identify a molecular basis for several different sensations, including taste, heat, and pain pathways. Dr. Julius has received numerous honors and awards for his work, including the UCSF Brook Byers Award and Sandler Award in Basic Science, the Syntex Prize in Receptor Pharmacology, and the First Perl-UNC Neuroscience Prize.

**Dr. Jeremy Nathans** is a Professor of Molecular Biology and Genetics at the Johns Hopkins School of Medicine. He is also a member of the Departments of Neuroscience and Ophthalmology, and an Investigator of the Howard Hughes Medical Institute. Dr. Nathans did his undergraduate training at M.I.T., his graduate training with Dr. David Hogness of the Stanford Departments of Developmental Biology and Biochemistry, and postdoctoral training with Dr. Axel Ullrich at Genentech. As an undergraduate with Dr. Alex Rich, Dr. Nathans worked on the crystal structure of DNA complexed with an intercalated base pair, and on the isolation of the gene for parathyroid hormone. In graduate school, working in David Hogness lab, Dr. Nathans isolated the bovine and human genes for rhodopsin, the light-sensitive protein upon which our vision is based. He then isolated the genes for blue, green, and red pigments and in so doing pioneered the molecular genetics of human color vision. In his own laboratory Dr. Nathans has done extensive studies of the genetic control of human color vision. He has also done extensive studies of the genetic control of development, including a collaboration with Dr. Roel Nusse of Stanford's Department of Developmental Biology to identify for the first time the Wnt signaling protein receptors. Dr. Nathans has been recognized with many honors, including the Passano Foundation Young Investigator award and the Young Investigator Award of the Society for Neuroscience. Dr. Nathans is a member of the National Academy of Sciences and the American Academy of Arts and Sciences.





Artwork by Ljiljana Mienkovic