Banbury Center

COLD SPRING HARBOR LABORATORY

2000

BANBURY CENTER DIRECTOR'S REPORT

In 2000, there were 25 meetings at Banbury Center, exceeding by two the 1999 record. Laboratory staff used Banbury Center for 11 meetings, and a notable addition to the Banbury schedule was the first of the *Topics in Biology* courses of the Watson School of Biological Sciences. There were the usual five Summer Courses, and we made the Center available to community groups on seven occasions.

More than 700 visitors came to Banbury in 2000, and the geographical distribution of the participants was much the same as in previous years; 80% of participants came from the United States, and although New York, California, and Massachusetts accounted for 44% of the participants, 39 U.S. states were represented. There were 95 participants from Europe, the majority coming from the United Kingdom.

Eugenics on the Web

This, a joint project between the DNA Learning Center and Banbury Center, completed its first stage in January, 2000. Our Advisory Board came to Banbury to review and approve the final version of the site before we went to the National Human Genome Research Institute for authority to release it to the public. The Advisory Board was, as always, constructively critical and made valuable suggestions. They approved the site, and we presented them with a certificate thanking them for their help. We have obtained a second round of funding to expand the site further, by increasing the number of images and by extending it to include European eugenics.

Neuroscience

A significant feature of the 2000 program was the large number of neuroscience meetings. This came about partly by chance, but it also reflects the increasing role that neuroscience now has in the research life of Cold Spring Harbor Laboratory. Banbury Center is well known in the worlds of molecular biology, molecular genetics, and human genetics, and I hope that neuroscience meetings like those held this year will establish the Center's reputation in the neuroscience world as well.

The *Structure, Mechanism, and Function of CaMKII* meeting was organized by Hollis Cline (Cold Spring Harbor Laboratory) and John E. Lisman (Brandeis University) and funded by the Marie H. Robertson Memorial Fund. CaMKII is an enzyme that acts as a molecular switch at synapses, and it may have a key role in synaptic plasticity and memory. Interfering with CaMKII function disrupts developmental processes and learning itself, making CaMKII a leading candidate as the molecular storage molecule for memory. Participants in this meeting study CaMKII from a variety of perspectives: its molecular structure and intramolecular reactions, its presynaptic and postsynaptic targets, and its activities at the synapse. The goal of the meeting was to examine how these properties might account for its role in memory.

Toward Animal Models of Attention and Consciousness, organized by Christof Koch (California Institute of Technology) and Anthony Zador (Cold Spring Harbor Laboratory) and funded by The Swartz Initiative for Computational Neuroscience, dealt with the fascinating topics of visual selective attention and visual consciousness. These have been treated within the realm of philosophy, but new molecular and imaging tools have led many to argue that consciousness can now be approached in an empirical and reductionist manner. This meeting brought together neuroscientists who are undertaking this task through electrophysiological and functional MRI analyses of the visual system, studies of the visual psychophysics of attention, and the development of animal model systems to study consciousness.

Meier House provides accommodations for meeting participants at Banbury Center.

Sebastian Seung (Massachusetts Institute of Technology) and David Tank (Bell Laboratories, Lucent Technologies) organized the meeting *Persistent Neural Activity,* funded by grants from the Alfred P. Sloan Foundation and The Swartz Initiative for Computational Neuroscience. "Persistent neural activity" is evoked by a short sensory stimulus, but the response persists for as long as many seconds and is believed to be involved in establishing short-term memory. This meeting was designed to examine the question: By what physiological mechanisms does a transient input cause a persistent change in neural activity? New findings, both physiological and theoretical, made this the right time to bring together researchers using different techniques, different animals, and different models to survey the field and identify emerging questions for further research.

The idea of neural networks and their application in computing began in the mid 1980s. *Neural Networks and Cognition* was organized by Anthony Zador (Cold Spring Harbor Laboratory), Zachary Mainen (Cold Spring Harbor Laboratory), and Alex Pouget (University of Rochester) to discuss the current theories of network-level computation in the brain. The organizers brought together researchers in statistical learning theory, cognitive neuroscience, and other relevant areas. The meeting was funded by Handspring Inc., and we were very pleased that Jeff Hawkins—developer of the neural network-based handwriting recognition system for the *Palm Pilot* and cofounder of Handspring Inc.—participated.

Natural Stimulus Statistics was organized by Simon Laughlin (University of Cambridge) and Pamela Reinagel (Harvard Medical School) and funded by the Cold Spring Harbor Laboratory Corporate Sponsor Program. Sensory neurons receive signals from the external world and transmit information about them to the brain. It has been suggested that a major function of the sensory neurons is to remove unnecessary information; optimal neural codes would enable peripheral cells to send vastly more information to the brain. The meeting brought together an eclectic group of scientists with backgrounds in physics, mathematics, and neurophysiology, with the goal of drawing up a list of key problems that need immediate attention.

Studies on the molecular basis of learning and memory in vivo are making use of mice with mutations in specific genes. But to do these studies properly requires careful and standardized assessments of behavior, especially if correlates are to be established with human clinical conditions. *Mouse Behavioral Phenotyping* was supported by the National Institute for Mental Health to provide an opportunity for investigators being funded under a new program to meet and discuss their findings. Organized by Michela Gallagher (Johns Hopkins University), the meeting was intended to assist existing collaborations and to promote further collaborative activities.

A large inter-institutional project is being planned for research on *Signaling Network Control–Cell Interactions*. To be funded by the National Institutes of Health, the project involves several institutes, including Cold Spring Harbor Laboratory, scattered throughout the country. A planning meeting for the project was organized by Ravi Iyengar (Mount Sinai School of Medicine), and key investigators came to Banbury for 2 days of very hard work, away from the distractions at their own institutions.

Biological Studies

Ten years ago, Irwin Fridovich (Duke University) and John G. Scandalios (North Carolina State University) organized a meeting on free oxygen radicals. In 2000, they returned and organized a meeting on the *Molecular Biology of Oxidative Stress*, funded by the Cold Spring Harbor Laboratory Corporate Sponsor Program. The main change in the intervening period has been the application of molecular approaches, with the cloning and characterization of many of the antioxidant defense genes, together with the elucidation of stress response triggers and pathways. An interdisciplinary group of experts concerned with the basic molecular biology and genetics of oxidative stress came to Banbury to discuss common mechanisms operating across evolutionary lines and to set future research goals.

We have come some way since Bishop Wilberforce asked T.H. Huxley whether it was on his grandfather's or his grandmother's side that ape ancestry was to be found. But quite what that ape ancestry is—what the genetic relationships are between the great apes, and how these are reflected in differences in phenotypes—is still uncertain. *Great Apes: Phenotypes and Genotypes* was organized by Aravinda Chakravarti (Case Western Reserve University), Svante Paabo (Max-Planck Institute for Evolutionary Anthropology), and Jan Witkowski (Cold Spring Harbor Laboratory) and funded by the Cold Spring Harbor Laboratory Corporate Sponsor Program. The meeting reviewed phenotypic differences between the great apes and what is known currently of the genetic and genomic differences between these species and discussed the feasibility of an ape genome project.

Apoptosis is a conserved program used by organisms to get rid of cells that are in excess, in the way, or potentially dangerous. Although cell killing is being studied in detail, far less is known of the subsequent steps of *Getting Rid of the Bodies*. Organized by Giovanna Chimini (INSERM-CNRS, Marseille, France) and Michael Hengartner (Cold Spring Harbor Laboratory), this meeting examined questions such as: What are the "eat-me" signals, and how are these signals generated by the apoptotic cells? What are the "eat-me" receptors, and what are the signaling pathways downstream from them? What is different between an apoptotic and a necrotic cell corpse? The meeting was funded by the Cold Spring Harbor Laboratory Corporate Sponsor Program.

Two meetings were an interesting combination of fundamental research and applied biology. *Mammalian Cloning: Biology and Practice* was held 3 years after the cloning of Dolly to review critically the current status of cloning of cows, pigs, mice, and goats. Organized by Neal First (University of Wisconsin), Peter Mombaerts (The Rockefeller University), and Jan Witkowski (Cold Spring Harbor Laboratory), the meeting was funded by the Alfred P. Sloan Foundation. Questions examined included: Why is it that there is such a high failure rate? What is known of the biology underlying mammalian cloning? What can the biology tell us about the best strategies for cloning? Participants came from academic institutions and from companies, and included pioneers of mammalian cloning, Steen Willadsen, Ian Wilmut, and Keith Campbell.

The second of these two meetings was *RNA Silencing: Functions, Mechanisms, and Applications*, organized by David Baulcombe (John Innes Centre) and Greg Hannon (Cold Spring Harbor Laboratory)

and funded by the Cold Spring Harbor Laboratory Corporate Sponsor Program. RNA silencing is a remarkable phenomenon in which overexpression of an RNA can suppress expression of a gene. Originally discovered in plants, it has become clear that the phenomenon is ubiquitous in eukaryotes. This was the first meeting that made a deliberate effort to assemble researchers working on different aspects of RNA silencing in different organisms. This was an especially timely topic, producing a most interesting and lively meeting.

Regulation and Function of Heat Shock Proteins was a meeting organized by Betty Craig (University of Wisconsin), Carol Gross (University of California, San Francisco), and Rick Morimoto (Northwestern University) for friends and colleagues of Professor Takashi Yura. Professor Yura, who made significant contributions to the field, will be retiring from the HSP Institute in 2001. It was fitting that his retirement was marked by holding a scientific meeting that covered topics such as protein folding and the regulation of the heat shock response.

Plant Biology

Plants were featured in a number of meetings, but two meetings in 2000 were largely devoted to plant science. For example, although sugar production through photosynthesis is the most important activity in plant life, sugars have vital roles in all organisms. Mark Johnston (Washington University Medical School), Jenn Sheen (Massachusetts General Hospital), and Mark Stitt (University of Heidelberg) organized the meeting *Sugar Sensing and Signaling in Plants and Other Organisms*, funded by the Cold Spring Harbor Laboratory Corporate Sponsor Program. The purpose of the meeting was to highlight recent advances in our understanding of the molecular mechanisms underlying sugar sensing and signaling. Although the meeting focused on plants, research on other organisms—bacteria, yeast, mammals—was included. As with *RNA Silencing*, this was the first meeting to include such a diverse set of researches on sugar sensing.

Robertson House also provides housing accommodations at Banbury Center.

One of the great triumphs of the genome world came in December when the complete sequence of *Arabidopsis thaliana* was published. David Luke III (former Chairman of the Laboratory's Board of Trustees) and Westvaco, Inc. have long been supporters of the *Arabidopsis* genome project, and it was a particular pleasure that Mr. Luke attended the meeting *The Application of* Arabidopsis *Genomics to Forestry and Other Complex Plant Systems*, held the week before the sequence was published. The meeting was organized by Robert Martienssen (Cold Spring Harbor Laboratory) and Ronald Sederoff (North Carolina State University) and funded by the Cold Spring Harbor Laboratory Corporate Sponsor Program. Although completion of the *Arabidopsis* genome sequence promises to revolutionize the study of all plants, its application to the biology of complex plant genomes—such as those of forest trees—remains a significant challenge. This meeting took up this challenge and concluded with a discussion of the benefits that would come from sequencing a tree genome.

Bioinformatics

Having large amounts of sequence data will not be helpful if the information cannot be integrated into the existing body of biological knowledge. The Gene Ontology (GO) Consortium has recognized that a major obstacle to such biology-wide integration of information is the absence of a unified vocabulary that is recognized across the databases devoted to particular organisms. The GO is attempting to derive such a vocabulary and nomenclature. Michael Ashburner (European Bioinformatics Institute, Cambridge) organized *Gene Ontology Annotation and the Human Genome*, a small but very intensive workshop to discuss how to extend the GO concept to the human genome.

Human Genetic Disorders

Banbury Center continued its 17-year tradition of having meetings on human genetic disorders. The first in 2000 was on *Therapeutic Approaches in Mouse Models of ALS*, organized by M. Flint Beal (Weill Medical College, Cornell University) and Don W. Cleveland (University of California, San Diego). Mouse models of human genetic disorders are important for exploring the molecular pathology of diseases and for developing therapies, and this meeting focused on current strategies for testing therapeutic approaches in mouse models of amyotrophic lateral sclerosis (ALS) and other human neurodegenerative diseases. Topics that were covered included a survey of available models, potential therapeutic agents, and methods of drug delivery. The meeting was funded by the Amyotrophic Lateral Sclerosis Association.

A most significant advance in understanding the Fragile X syndrome came with the identification of the protein, FMRP. The title of the meeting *FMRP: What Does It Do?* described exactly the goals of the meeting organized by William Greenough (University of Illinois) and David Nelson (Baylor College of Medicine) and funded by the FRAXA Research Foundation. There are fascinating reports of the localization of FMRP to the dendrites of neurons, suggesting that the absence of FMRP leads to impaired communications between neurons, which leads to mental retardation. As there is now a broad range of scientific expertise involved in research on Fragile X—biochemistry, molecular biology, neuroimaging, and behavior—the meeting provided a forum for scientists working in these different areas to meet and interact.

Pathogens

In 1991, Banbury Center held its first meeting on Lyme Disease. At that time, Lyme Disease counted as a newly emerging pathogen, the causative agent (the spirochaete *Borrelia burgdoferi*) having been identified in the early 1980s. The West Nile virus, another previously unknown pathogen, appeared in the New York area in 1999. So, the meeting *Strategies for Identification and Characterization of Unknown Pathogens*, organized by Benjamin Luft (SUNY, Stony Brook), Steven Schutzer (UMDNJ/New Jersey Medical School), and Suzanne Vernon (Centers for Disease Control) and funded by the Centers

for Disease Control, was very timely. The meeting brought together scientists from diverse backgrounds including evolutionary and molecular biology, biochemistry, immunology, epidemiology, and infectious diseases to discuss the utilization of leading-edge biotechnology for the recognition of novel pathogens.

Newly emerging pathogens afflict not only human beings, but also livestock and crops. The Agricultural Research Service of the USDA funded a discussion meeting, *Meeting the Challenge of Infectious Diseases in the 21st Century* (organized by Roger Breeze, USDA), to help define a national capacity and strategy for dealing with unresolved issues in infectious diseases of animals and plants and to prepare for meeting all new and emerging threats, of which biological terrorism is the latest. The meeting focused on science rather than policy, considering, for example, the potential impact of microbial and host genomic information.

Vaccines

One of the most effective ways of combating pathogens is through vaccination, but vaccines with a limited market will not be developed by industry. *Social Venture Capital for Neglected Vaccines: Creating Successful Alliances* explored alternative sources of funding for vaccine development. The organizer was Melinda Moree (PATH/Malaria Vaccine Initiative), with co-chairs Regina Rabinovich (PATH/Malaria Vaccine Initiative) and Philip K. Russell (The Albert B. Sabin Vaccine Institute). The meeting was funded by the Albert B. Sabin Vaccine Institute, Inc., through a grant from the Bill and Melinda Gates Foundation. It was expected that the discussions would assist public sector vaccine programs by developing strategies for managing partnerships with industry and dealing with intellectual property and other contractual commitments to assure the availability of neglected vaccines for the developing world.

The J.P. Morgan and Cold Spring Harbor Laboratory Executives' Meeting

This was the 15th in the series of meetings for senior executives in the pharmaceutical, biotechnology, and financial worlds, and for the seventh year, we are very grateful to Sandy Warner and David Deming of J.P. Morgan, Inc., for their continuing support. These meetings are always remarkable occasions, but this year's meeting was exceptional even by past standards. Entitled *Human Intelligence and Consciousness*, we drew upon an wonderful roster of speakers. Oliver Sacks began the meeting by describing extraordinary autistic savants. Other speakers were Howard Gardner, Irene Pepperberg, Charles Murray, Stephen Pinker, Vilayanur Ramachandran, and Rodney Brooks.

The President's Council Meeting

Although most activities associated with James Watson's President's Council meeting take place on the main campus, the opening talk is held at Banbury and is followed by dinner at Robertson House. The topic for this year's meeting was *The Dog and Its Genetics: Breeds, Evolution & Behavior*, an unbeatable combination of cutting-edge genetic research and humanity's closest friend. Our speaker on Friday evening was Roger Caras, known for his encyclopedic knowledge of dogs that he puts to good use in his role of Master of Ceremonies at the annual Westminster Club Show. Sitting on a stool like a story teller, Mr. Caras gave a spell-binding talk on the special relationship between human beings and animals, especially dogs.

Watson School of Biological Sciences—Topics in Biology

The Watson School of Biological Sciences has a faculty with remarkably diverse interests, but there are some areas of biology in which we are lacking deep expertise. To ensure that our students receive

instruction in these areas, we have instituted a special *Topics in Biology* course, to be held each spring at the Banbury Center. The students are taken away from the laboratory bench, enabling them to devote themselves to a concentrated program. For 2000, the selected topic was immunology, and we were very fortunate to have Hidde Ploegh from Harvard Medical School come to teach the week-long course. Hidde is an inspiring teacher, and the course was a success beyond our already high expectations. The topic for 2001 is *Evolution*.

Other Meetings

Several Laboratory science groups came to Banbury for review and planning meetings, as did the DNA Learning Center and the Cold Spring Harbor Laboratory Press. As usual, we made the Center available to a small number of local community groups, notably Lloyd Harbor Village, Cold Spring Harbor School District, and Holiday House.

Funding

The Banbury Center and the scientists who participated in meetings here are very grateful for the generosity of all those institutions that provided support for the Banbury program. Foremost among these was the Cold Spring Harbor Laboratory Corporate Sponsor Program, which provided funds for six meetings. Federal funding came from five of the National Institutes of Health (NHGRI, NICHHD, NIGMS, NIMH, NIDCD); the Centers for Disease Control; and the Agricultural Research Service (United States Department of Agriculture). Nonfederal support came from the ALS Association; the FRAXA Research Foundation; Handspring Inc.; the Marie H. Robertson Memorial Fund for Neurobiology; the Albert B. Sabin Vaccine Institute; the Alfred P. Sloan Foundation; and The Swartz Initiative for Computational Neuroscience.

Acknowledgments

Once again, Banbury could not have had such a successful year without the invaluable contributions of Bea Toliver, Ellie Sidorenko, and Katya Davey to the operation of the Center. The Meetings Office has worked with us on the increasingly difficult task of interleaving the Grace Auditorium and Banbury Center meetings, the Audiovisual Department has kept presentations running smoothly, and Housekeeping has looked after all the visitors for us. Chris McEvoy, Andy Sauer, and Joe Ellis have kept the estate looking beautiful, contributing to the special ambience of the Center. Finally, the meetings depend on the enthusiasm and work of the organizers and the contributions made by all participants.

Jan Witkowski

MEETINGS

Fourth Meeting of the Editorial Advisory Panel: Digital Image Archive on the American Eugenics Movement

January 28–30

FUNDED BY **National Human Genome Research Institute, NIH**

ARRANGED BY **D. Micklos,** DNA Learning Center, Cold Spring Harbor Laboratory
J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory

SESSION 1

J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory: Welcome, general instructions, and hospitality.
D. Micklos, DNA Learning Center, Cold Spring Harbor Laboratory: Workshop objectives and other matters.
S. Lauter and M. Christensen, DNA Learning Center, Cold Spring Harbor Laboratory: Introduction to the new interface.
Computer Work: Reactions to the site and review images in assigned topics.

SESSION 2

Review topic narratives, draft new topic narratives, and draft essay on "European connections."
Discuss NIH restriction on images.

SESSION 3

Finalize list of essential items to be completed before opening the site and those that can be completed after opening the site.
Resolutions concerning NIH restriction and opening the site.
Future developments.

S. Lauter, M. Christensen, G. Allen, D. Micklos

Therapeutic Approaches in Mouse Models of ALS

February 13–16

FUNDED BY **Amyotrophic Lateral Sclerosis Association**

ARRANGED BY **M.F. Beal,** Weill Medical College, Cornell University, New York
D.W. Cleveland, University of California, San Diego

Introduction:
R.V. Abendroth, The ALS Association, Milwaukee, Wisconsin

SESSION 1: Pathogenesis of ALS
Chairperson: M.F. Beal, Weill Medical College,Cornell University, New York

R.H. Brown, Massachusetts General Hospital, Charlestown: Overview of theories of mechanisms of disease.
D.W. Cleveland, Ludwig Institute for Cancer Research, University of California, San Diego: Mechanisms of neuronal death in ALS: Axonal strangulation, catalysis by copper, protein aggregates, and chronic caspase activation.
M. Gurney, Pharmacia & Upjohn, Kalamazoo, Michigan: Gene expression profiling in FALS transgenic mice.
J.A. Johnston, Pharmacia & Upjohn, Kalamazoo, Michigan: Aggregation of mutant SOD1 is an early event in the pathogenesis of ALS motoneuron disease.
D.R. Borchelt, Johns Hopkins University School of Medicine, Baltimore, Maryland: Studies in transgenic mice.
J. Rothstein, Johns Hopkins University School of Medicine, Baltimore, Maryland: Overview of therapeutics in mice and men.

SESSION 2: Therapeutics in ALS Mice I
Chairperson: D.W. Cleveland, Ludwig Institute for Cancer Research, University of California, San Diego

S.E. Przedborski, Columbia University, New York: Programmed cell death in ALS.
J.P. Crow, University of Alabama at Birmingham: Pharmacologic intervention at onset: Intercepting the mediators of toxicity?
R.M. Friedlander, Brigham and Women's Hospital, Boston, Massachusetts: Caspase inhibition in the treatment of ALS.
M.F. Beal, Weill Medical College, Cornell University, New York: Therapeutics with creatine.
S.H. Appel, Baylor College of Medicine, Houston, Texas: Calcium alteration in motor neuron injury: Protective effects of parvalbumin.
E.Y. Snyder, Children's Hospital, Harvard Medical School, Boston, Massachusetts: Potential role of neural stem cells in motoneuron disease.

A. McMahon, D. Cleveland

SESSION 3: Therapeutics in ALS Mice II
Chairperson: R.H. Brown, Massachusetts General Hospital, Charlestown

L.A. Shinobu, Massachusetts General Hospital, Boston: Does overexpression of heat shock protein 70 alter the natural history of the G93A mouse model of ALS?

SESSION 4: Approaches Beyond ALS I
Chairperson: R.H. Brown, Massachusetts General Hospital, Charlestown

J. Morton, University of Cambridge, United Kingdom: How good is the medicine?: Measuring clinical improvements in mice.

G.A. Cox, The Jackson Laboratory, Bar Harbor, Maine: Tissue-specific transgenic rescue in the neuromuscular degeneration (nmd) mouse.

N.L. Heintz, HHMI, The Rockefeller University, New York: A novel pathway for glutamate receptor-mediated neuroregeneration.

M. Beaulieu, Montreal General Hospital Research Institute, Canada: Transgenic mice overexpressing peripherin: A new mouse model of motor neuron disease.

SESSION 5: Approaches Beyond ALS II
Chairperson: A.P. McMahon, Harvard University, Cambridge, Massachusetts

H. Mitsumoto, ALS Center, Columbia-Presbyterian Medical Center, New York, New York: An approach in a natural motor neuron disease (Wobbler mouse).

K. Duff, Nathan Kline Institute, Orangeburg, New York: MRI as a tool in the assessment of transgenic models of neurodegenerative disease.

S.M. Hersch, Emory University School of Medicine, Atlanta, Georgia: Neuropathology in Huntington's disease transgenic models.

W.T. Dauer, Neurological Institute of New York, New York: Regulatable animal models of neurological disease.

P. Wong, Johns Hopkins University School of Medicine, Baltimore, Maryland: Neurodegenerative disease: Lessons from transgenic models.

T. Williamson, Trophos S.A., Marseille, France: Purified neuronal cultures from mouse models: High-throughput screening on the cells at risk.

SESSION 6: Oxidative Injury and Copper Metabolism
Chairperson: S.H. Appel, Baylor College of Medicine, Houston, Texas

A.C. Kato, Centre Medical Universitaire, Geneva, Switzerland: Overview of the *pmn* mouse model for studies on ALS.

M. Cudkowicz, Massachusetts General Hospital, Boston: Effects of altered levels of GSHPx in the ALS on disease phenotype in the ALS mouse model (and other therapeutic studies).

Z. Xu, University of Massachusetts Medical School, Worcester: Therapeutic effects of creatine and SOD1 catalase mimetics in a mouse model of ALS.

R.J. Ferrante, Bedford VA Medical Center, Massachusetts: Mechanisms of neurodegeneration and therapeutic intervention in ALS.

Molecular Biology of Oxidative Stress

March 5–8

FUNDED BY **Cold Spring Harbor Laboratory Corporate Sponsor Program**

ARRANGED BY **J.G. Scandalios,** North Carolina State University, Raleigh
I. Fridovich, Duke University Medical Center, Durham, North Carolina

Introduction:
J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory
J.G. Scandalios, North Carolina State University, Raleigh

SESSION 1: Antioxidant Gene Structure, Regulation, and Expression (Prokaryotes)
Chairperson: D. Touati, Institut Jacques Monod, Paris, France

S.S. Wallace, University of Vermont, Burlington: Repair of oxidative DNA base lesions.
D. Touati, Institut Jacques Monod, Paris, France: Bacterial superoxide dismutases.
P.C. Loewen, University of Manitoba, Canada: Structure and function of bacterial catalases.
I. Fridovich, Duke University Medical Center, Durham, North Carolina: Sugars as target for O_2.
J. Imlay, University of Illinois, Urbana: Genetics and physiology of iron-sulfur-cluster damage and repair in *E. coli*.
I. Fita, CID, Council of Higher Scientific Investigation, Barcelona, Spain: Structure-function relationships of heme catalases.

SESSION 2: Antioxidant Gene Structure, Regulation, and Expression (Eukaryotes)
Chairperson: I. Fridovich, Duke University Medical Center, Durham, North Carolina

E.B. Gralla, University of California, Los Angeles: Iron and oxidative stress in yeast.
J.L. Pinkham, University of Massachusetts, Amherst: A single site in the promoter of the yeast *SOD2* gene mediates stress and heme-regulated transcription.
J.G. Scandalios, North Carolina State University, Raleigh: Antioxidant genes: Structure, regulation, and expression in response to oxidative stress.

W. Orr, D. Touati, N. Cole, J. Scandalios

H. Ruis, Institute of Biochemistry and Molecular Cell Biology, Vienna, Austria: Nuclear protein transport in stress signaling from the cellular environment to the nucleus.
L.M. Guan, North Carolina State University, Raleigh: Regulation of maize antioxidant catalase genes in response to environmental stress.
A.J. Slusarenko, Institut fuer Biologie III, Aachen, Germany: Role of reactive oxygen intermediates in the resistance of *Arabidopsis* to infection.

SESSION 3: Signal Perception and Transcriptional Regulation
Chairperson: J.G. Scandalios, North Carolina State University, Raleigh

G. Storz, NICHD, NIH, Bethesda, Maryland: The redox-sensitive *OxyR* transcription factor.
S.W. Ryter, University of Southern Illinois School of Medicine, Springfield: Heme metabolism and oxidative stress.
R. Kahl, University of Dusseldorf, Germany: Regulation of antioxidant enzymes.
F.C. Fang, University of Colorado Health Sciences Center, Denver: Subversion of the NADPH phagocyte oxidase by *Salmonella*.
C. Richter, ETH Zentrum, Zurich, Switzerland: Nitric oxide and peroxynitrite in mitochondria.
N. Smirnoff, University of Exeter, United Kingdom: The metabolism and function of ascorbic acid in plants.
A. Puga, University of Cincinnati Medical Center, Ohio: The Aryl hydrocarbon receptor: An environmental sensor that signals oxidative stress and cell cycle arrest.

SESSION 4: Oxidative Stress and the Aging Process
Chairperson: N.J. Holbrook, National Institute on Aging, NIH, Baltimore, Maryland

N.J. Holbrook, National Institute on Aging, NIH, Baltimore, Maryland: Signaling pathways activated by oxidative stress: Links to cell survival and aging.
W.C. Orr, Southern Methodist University, Dallas, Texas: Regulation of antioxidant gene expression in *Drosophila*.
G. Pastori, IACR-Rothamsted, Hertfordshire, United Kingdom: ROS and plant senescence.
R. Levine, National Heart, Lung, and Blood Institute, NIH, Bethesda, Maryland: Methionine oxidation.

SESSION 5: Biomedical Aspects of Oxidative Stress
Chairperson: S.S. Wallace, University of Vermont, Burlington

M.D. Jacobson, Millennium Pharmaceuticals, Inc., Cambridge, Massachusetts: Role of ROS in cell death.
M.A. Beck, University of North Carolina, Chapel Hill: Influence of oxidative stress on viral pathogenicity: Changes in the viral genome.
D. St. Clair, University of Kentucky, Louisville: Transcriptional regulation of the human *MnSOD* gene.
S.J. Chanock, National Cancer Institute, NIH, Gaithersburg, Maryland: Genetic polymorphisms and functional/biological implications of oxidative stress.

Mammalian Cloning: Biology and Practice

March 12–15

FUNDED BY **Alfred P. Sloan Foundation**

ARRANGED BY **N.L. First,** University of Wisconsin, Madison
P. Mombaerts, The Rockefeller University, New York
J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory

Introduction and Overview:
J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory
I. Wilmut, Geron-BioMed, Midlothian, United Kingdom

SESSION 1: Biology of Early Development
Chairperson: R. Lovell-Badge, National Institute for Medical Research, London, United Kingdom

B. Knowles, The Jackson Laboratory, Bar Harbor, Maine: Nuclear reprogramming: Molecular mechanisms controlling the oocyte to embryo transition.
M.A. Surani, University of Cambridge, United Kingdom: Germ line, stem cells, and genomic imprinting.
A.P. Wolffe, National Institute of Child Health & Human Development, Bethesda, Maryland: The biochemical basis of nuclear reprogramming.
K.E. Latham, Temple University School of Medicine, Philadelphia, Pennsylvania: Transcriptional responses of nuclei to 1-cell cytoplasm.
R.M. Schultz, University of Pennsylvania, Philadelphia: Differential effects of culture on imprinted gene expression in the preimplantation mouse embryo: Implications for cloning of mammals.

SESSION 2: Cloning of Rodents I
Chairperson: P. Mombaerts, The Rockefeller University, New York

T. Wakayama, The Rockefeller University, New York: Cloning mice.
R. Jaenisch, Whitehead Institute for Biomedical Research, Cambridge, Massachusetts: Methylation, imprinting, and nuclear cloning.
P.M. Iannaccone, Northwestern University Medical School, Chicago, Illinois: Rat blastocyst formation following nuclear transfer to adult or fetal nuclei.

H. Nagashima, I. Wilmut, H. Varmus

SESSION 3: Societal Issues
Chairperson: P. Mombaerts, The Rockefeller University, New York

L.M. Silver, Princeton University, New Jersey: Cloning: Implications for human reproduction.

SESSION 4: Cloning of Rodents II
Chairperson: N.L. First, University of Wisconsin, Madison

E. Overstrom, Tufts University School of Veterinary Medicine, North Grafton, Massachusetts: Modified oocyte activation and enucleation paradigms enhance mammalian cloning efficiency.

SESSION 5: Cloning of Cattle
Chairperson: N.L. First, University of Wisconsin, Madison

J.M. Robl, University of Massachusetts, Amherst: Factors influencing variability in cloning success.
M.D. Bishop, Infigen, Inc., DeForest, Wisconsin: Cloning, reprogramming, and rearing.
M.E. Westhusin, Texas A&M University, College Station: Characterization of developmental abnormalities in embryos and fetuses produced by nuclear transfer/cloning.
Y. Tsunoda, Kinki University, Nara, Japan: In vitro and in vivo development of nuclear transferred bovine oocytes receiving somatic cells from various tissues of adults, newborns, and fetuses.
X. Yang, University of Connecticut, Storrs: Cloning adult cows and bulls: Biological factors.

SESSION 6: Cloning of Sheep and Pigs
Chairperson: N. Zinder, The Rockefeller University, New York

A. Colman, PPI Therapeutics plc, Edinburgh, United Kingdom: Successful gene targeting in livestock.
K.H. Campbell, University of Nottingham, Leicestershire, United Kingdom: Donor cell cycle stages: Successes and problems.
H. Nagashima, Meiji University, Tokyo, Japan: Pig cloning by the Honolulu method.
R.S. Prather, University of Missouri, Columbia: Nuclear transfer in pigs.

SESSION 7: Philosophical Issues
Chairperson: P. Mombaerts, The Rockefeller University, New York

J. Burley, Queen's College, Oxford, United Kingdom: Is human cloning morally permissible?

SESSION 8: Manipulation of Primate Embryos
Chairperson: H.E. Varmus, National Institutes of Health, Bethesda, Maryland

D.P. Wolf, Oregon Regional Primate Research Center, Beaverton: Cloning by nuclear transfer and blastomere separation in rhesus macaques.
G.E. Schatten, Oregon Regional Primate Research Center, Beaverton: Cloned, transgenic, and stem-cell-derived non-human primates as human disease models.
J. Cohen, Saint Barnabas Medical Center, Livingston, New Jersey: Role of mitochondria in human embryos and after cytoplasmic transplantation.
J.A. Thomson, University of Wisconsin, Madison: Human ES cells: The problem of graft rejection.
J.B. Cibelli, Advanced Cell Technology, Worcester, Massachusetts: Lifespan extension of primary cells by somatic cell cloning in cattle.
P. Mombaerts, The Rockefeller University, New York, and N.L. First, University of Wisconsin, Madison: Concluding discussion and summary.
S.M. Willadsen, Saint Barnabas Medical Center, Livingston, New Jersey: Concluding remarks.

Great Apes: Phenotypes and Genotypes

March 19–22

FUNDED BY **Cold Spring Harbor Laboratory Corporate Sponsor Program**

ARRANGED BY **A. Chakravarti,** Case Western Reserve University, Cleveland, Ohio
S. Paabo, Max-Planck Institute for Evolutionary Anthropology, Leipzig, Germany
J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory

Introduction:
J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory
S. Paabo, Max-Planck Institute for Evolutionary Anthropology, Leipzig, Germany

SESSION 1: Neural Phenotypes
Chairperson: S. Paabo, Max-Planck Institute for Evolutionary Anthropology, Leipzig, Germany

P. Rakic, Yale University School of Medicine, New Haven, Connecticut: Evolution of neocortical expansion in primates.
J.K. Rilling, Emory University, Atlanta, Georgia: What's unique about the human brain? Comparative neuroimaging studies of anthropoid primates.
K. Semendeferi, University of California, San Diego, La Jolla: Hominoid neural specializations.
S. Rice, Yale University, New Haven, Connecticut: Distinguishing novelty from heterochrony in primate brain evolution.
B.T. Shea, Northwestern University, Chicago, Illinois: Heterochrony and phenotypic variation among the large-bodied hominoids.

SESSION 2: Chromosomal Phenotypes
Chairperson: A. Varki, University of California, San Diego

E.E. Eichler, Case Western Reserve University, Cleveland, Ohio: The paralogous nature of the hominoid genome: Novel patterns of primate gene evolution.
M. Rocchi, Istituto di Genetica, Bari, Italy: Primate genome plasticity: A cytogenetic point of view.
D.L. Nelson, Baylor College of Medicine, Houston, Texas: Defining chromosome rearrangements amongst the great apes: Sequence at a chromosome 12 pericentric inversion.
M. Pagel, University of Reading, United Kingdom: LINE-1 elements and genome organization: Ancient genome-wide infections.

A. Motulsky, M.-C. King, M. Goodman

SESSION 3: Molecular Evolution
Chairperson: D.L. Nelson, Baylor College of Medicine, Houston, Texas

M. Goodman, Wayne State University School of Medicine, Detroit, Michigan: Comparative primate genomics: A search for positively selected mutations in humankind's evolutionary history.
S. Paabo, Max-Planck Institute for Evolutionary Anthropology, Leipzig, Germany: Molecular approaches to comparing humans and apes.
A. Varki, University of California, San Diego: Studies of humans as great ape "knockouts" for CMP-sialic acid hydroxylase.
P.A. Morin, Max-Planck Institute for Evolutionary Anthropology, Leipzig, Germany: Chimp SNPs from CATS: Beginning a chimpanzee SNP map.
J. Lenz, Albert Einstein College of Medicine, Bronx, New York: HERV-K, the replicating, germ line retrovirus of hominoids.

SESSION 4: Population Genetics
Chairperson: M.-C. King, University of Washington, Seattle

E.B. Hey, Rutgers University, Piscataway, New Jersey: Comparative population genetics of humans and great apes.
P. Oefner, Stanford University, Palo Alto, California: Comparative analysis of autosomal and Y chromosome genes in human and great apes.
A. Smit, University of Washington, Seattle: Repeat elements predating ape evolution.
A. Eyre-Walker, University of Sussex, Brighton, United Kingdom: Deleterious mutation rates in humans, great apes, and other animals.

SESSION 5: General Issues
Chairperson: A.G. Motulsky, University of Washington School of Medicine, Seattle

W.-H. Li, University of Chicago, Illinois: How different are human, chimp, and gorilla genomes?
N. Saitou, National Institute of Genetics, Mishima, Japan: Silver: Ape genome sequencing project.
S. Rozen, Whitehead Institute for Biomedical Research, Cambridge, Massachusetts: Sequence of the human Y chromosome: Genes, gene families, and phenotypes.
M.-C. King, University of Washington, Seattle: The consequences of being a hastily made-over ape.

General Discussion:
Co-Chairpersons: S. Brenner, The Molecular Sciences Institute, Inc. Berkeley, California, and **A.G. Motulsky,** University of Washington School of Medicine, Seattle

Strategies for Identification and Characterization of Unknown Pathogens

April 2–5

FUNDED BY **National Center for Infectious Diseases, Centers for Disease Control Prevention, with additional support from Aventes Pharma AG**

ARRANGED BY **B.J. Luft**, State University of New York, Stony Brook
S.E. Schutzer, UMDNJ/New Jersey Medical School, Newark
S. Vernon, Centers for Disease Control & Prevention, Atlanta, Georgia

Introduction:
J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory
S. Vernon, Centers for Disease Control & Prevention, Atlanta, Georgia

SESSION 1: Success Stories/Lessons Learned
Co-Chairpersons: B.J. Luft, State University of New York, Stony Brook, and
R. Breeze, U.S. Department of Agriculture, Athens, Georgia

D.H. Persing, Corixa Corporation, Seattle, Washington: Detection of novel pathogen-specific nucleic acids in human cancers and chronic inflammatory diseases.
G.H. Cassell, Eli Lilly and Company, Indianapolis, Indiana: Role of infection in chronic lung disease and arthritis.
S.B. Fisher-Hoch, Laboratoire Jean Merieux, Lyon, France: Ecology and epidemiology of emerging diseases.
M. Koopmans, Laboratory of Infectious Diseases, Bilthoven, The Netherlands: Animal pathogens infecting humans.
R.L. Berkelman, Emory University, Atlanta, Georgia: Emerging infectious diseases: A historical perspective.
J. Ellner, Case Western Reserve University, Cleveland, Ohio: How the epidemic of HIV infection changed the face of tuberculosis.
E.R. Unger, Centers for Disease Control & Prevention, Atlanta, Georgia: The sample as a window on disease: Problems in the absence of lesion.

M. Koopmans, S. Vernon

SESSION 2: Nervous System as a Target and Sampling Site
Co-Chairpersons: S. Cook, UMDNJ/New Jersey Medical School, Newark, and **J.L. Benach**, State University of New York, Stony Brook

P.K. Coyle, State University of New York, Stony Brook: Infectious versus autoimmune causes.
J. Wages, Etiogen Pharmaceuticals, Inc., Mountain View, California: Applying viral sequence tags to hunting for viruses.
W.I. Lipkin, University of California, Irvine: Lessons from Borna, Kawasaki, and West Nile. A retrospective analysis and algorithm for future work.
R.S. Fujinami, University of Utah School of Medicine, Salt Lake City: Virus can silently prime for autoimmune disease which can be triggered by infection.
M. Sha, Ciphergen Biosystems, Inc., Palo Alto, California: Detection and identification of protein biomarkers in pathogenic and other diseases.
S.E. Schutzer, UMDNJ/New Jersey Medical School, Newark: Identification of infections by protein microchip analysis.

SESSION 3: Factors Implicating Infectious Etiology
Co-Chairpersons: A. Steinberg, Mitretek Systems, McLean, Virginia, and **R.J. Dattwyler**, State University of New York, Stony Brook

W.C. Reeves, Centers for Disease Control & Prevention, Atlanta, Georgia: Epidemiology as a tool to identify infectious agents.
J.W. Casey, Cornell University, Ithaca, New York: Identification of new retroviruses and herpesviruses associated with neoplasias in aquatic animals.
D.N. Frank, University of Colorado, Boulder: rRNA-based community analysis of human inflammatory diseases of uncertain etiology.
G.P. Smith, University of Missouri, Columbia: Mimics of pathogen epitopes obtained without knowledge of the pathogen.
D.L. Rock, USDA Agricultural Research Service, Greenport, New York: Functional genomics of microbial threat agents.

SESSION 4: Successful Molecular Methods for Identification of Unknown Pathogens
Co-Chairpersons: B.J. Luft, State University of New York, Stony Brook, and **W.C. Reeves,** Centers for Disease Control & Prevention, Atlanta, Georgia

A.B. Pardee, Dana-Farber Cancer Institute, Boston, Massachusetts: Identification of pathogens by RT-PCR methods.
J.J. Dunn, Brookhaven National Laboratory, Upton, New York: SAGE-type protocol for identifying pathogens.
P.A. Demirev, University of Maryland, College Park: Identification of microorganisms by mass spectrometry and proteome.
P.J. Jackson, Los Alamos National Laboratory, New Mexico: Phylogenetic methods of detecting and characterizing new and previously identified infectious agents.
W.A. Bryden, Johns Hopkins University, Laurel, Maryland: MALDI-TOF mass spectrometry for biodetection and pathogen identification.
E.S. Raveche, UMDNJ/New Jersey Medical School, Newark: Antisense strategies in disease.
M.A. Hollis, Massachusetts Institute of Technology, Lexington: B-cell-based identification sensor.

SESSION 5: Novel Molecular Approaches to Identify Pathogens
Co-Chairpersons: S. Vernon, Centers for Disease Control & Prevention, Atlanta, Georgia, and **S.E. Schutzer**, UMDNJ/New Jersey Medical School, Newark

B. Kreider, Phylos, Inc., Lexington, Massachusetts: Utilization of PROfusion™ technology for the creation of highly sensitive detectors.
D.H. Farkas, Clinical Micro Sensors, Inc., Pasadena, California: Bioelectronic detection of nucleic acids.
A. Alizadeh, HHMI, Stanford University Medical School, California: Genome-wide expression profiling reveals molecular fingerprints of normal and malignant immune cells.
J. Boldrick, HHMI, Stanford University Medical School, California: Exploring host responses to infection using cDNA microarrays.
S. Salzberg, The Institute for Genomic Research, Rockville, Maryland: Computational methods for detecting unusual DNA sequences.

RNA Silencing: Functions, Mechanisms, and Applications

April 9–12

FUNDED BY **Cold Spring Harbor Laboratory Corporate Sponsor Program**

ARRANGED BY **D.C. Baulcombe,** John Innes Centre, Norwich, United Kingdom
G. Hannon, Cold Spring Harbor Laboratory

Introduction and Overview:
J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory
D.C. Baulcombe, John Innes Centre, Norwich, United Kingdom

SESSION 1: RNA Silencing in Diverse Systems
Chairperson: D.C. Baulcombe, John Innes Centre, Norwich, United Kingdom

E. Ullu, Yale University School of Medicine, New Haven, Connecticut: Insights into the mechanism of RNAi in trypanosomes.
L. Timmons, Carnegie Institution of Washington, Baltimore, Maryland: RNAi in *C. elegans*.
R. Carthew, University of Pittsburgh, Pennsylvania: RNAi in *Drosophila melanogaster*.
M. Zernicka-Goetz, Wellcome/CRC Institute, Cambridge, United Kingdom: Specific interference with gene function by dsRNA in early mouse development.
P.M. Waterhouse, CSIRO Plant Industry, Canberra, Australia: PTGS in plants is very efficiently induced by hairpin RNA and independent of methylation.
A.J. Maule, John Innes Centre, Norwich, United Kingdom: How low can you get? Size restraints on virus-induced gene silencing.
R. Jorgensen, University of Arizona, Tucson: Genetic determinants of patterns of cosuppression of pigment genes in petunia flowers.

SESSION 2: Spread and Maintenance of RNA Silencing
Chairperson: J.A. Birchler, University of Missouri, Columbia

A. Grishok, University of Massachusetts Medical Center, Worcester: Inheritance of RNA-induced gene silencing in *C. elegans*.
W.J. Lucas, University of California, Davis: Phloem long-distance translocation of RNA: Mechanisms and functions.
M. Kiebler, Max-Planck Institut fur Entwicklungsbiologie, Tubingen, Germany: Insights into mRNA transport and local translation in the mammalian nervous system.

L. Timmons, A. Grishok

SESSION 3: dsRNA and Transcriptional Silencing
Chairperson: P.M. Waterhouse, CSIRO Plant Industry, Canberra, Australia

J.A. Birchler, University of Missouri, Columbia: Transcriptional and posttranscriptional silencing of dispersed transgenes in *Drosophila*.
M. Matzke, Institute of Molecular Biology, Salzburg, Austria: RNA-directed methylation of plant promoter sequences.
M. Wassenegger, Fraunhofer Institut, Martinsried, Germany. RNA-directed RNA methylation.

SESSION 4: Biochemical and Molecular Approaches to Mechanism
Chairperson: E. Ullu, Yale University School of Medicine, New Haven, Connecticut

V.B. Vance, University of South Carolina, Columbia: A calmodulin-related protein suppresses posttranscriptional gene silencing in plants.
J.M. Kooter, Institute for Molecular Biological Sciences, Amsterdam, The Netherlands: Gene silencing in petunia by inverted repeats involves double-stranded RNAs and is associated with the production of small sense and antisense RNAs.
B.L. Bass, HHMI, University of Utah, Salt Lake City: Adenosine deaminases that act on RNA and their double-stranded RNA substrates.
S.M. Freier, ISIS Pharmaceuticals, Inc., Carlsbad, California: Mechanisms for regulation of mRNA expression in mammalian cells using synthetic oligonucleotides.
G. Hannon, Cold Spring Harbor Laboratory: Mechanistic studies of posttranscriptional gene silencing.
P. Zamore, University of Massachusetts, Worcester: RNAi: dsRNA directs the ATP-dependent cleavage of mRNA at 21–23-nucleotide intervals.
P. Green, Michigan State University, East Lansing: Determinants of mRNA stability in *Arabidopsis*.

SESSION 5: Genetical Approaches to Mechanism
Chairperson: R. Martienssen, Cold Spring Harbor Laboratory

M.B. Mathews, UMDNJ/New Jersey Medical School, Newark: Human dsRNa-binding proteins.
H. Cerutti, University of Nebraska, Lincoln: Posttranscriptional silencing of transgenes and transposons in a green alga: Role of an RNA helicase.
J.-B. Morel, Laboratorire de Biologie Cellulaire, Versailles, France: Characterization of *Arabidopsis* SGS genes involved in posttranscriptional (trans) gene silencing and virus resistance.
R.H. Plasterk, The Netherlands Cancer Institute, Amsterdam: Genetic links between mechanisms for transposon silencing, RNAi, and cosuppression in *C. elegans*.
D.C. Baulcombe, John Innes Centre, Norwich, United Kingdom: Genetic and biochemical dissection of RNA silencing in *Arabidopsis*.

SESSION 6: Biological Roles of RNA Silencing
Chairperson: G. Hannon, Cold Spring Harbor Laboratory

J. Carrington, Washington State University, Pullman: Viruses and RNA silencing: Stealth and sabotage.
S.-W. Ding, Institute of Molecular Agrobiology, Singapore: Silencing suppression by a nuclear protein.
S. Jensen, Institute Gustave Roussy, Villejuif, France: Cosuppression of transposable elements in *Drosophila*.
H. Lin, Duke University Medical Center, Durham, North Carolina: Role of *piwi* family genes in stem cell division and germ line development.
E.M. Maine, Syracuse University, New York: A possible function for RNA silencing in development of the *C. elegans* germ line.
R. Martienssen, Cold Spring Harbor Laboratory: Argonaute genetics in *Arabidopsis* and yeast.

SESSION 7: Overview
Chairpersons: G. Hannon, Cold Spring Harbor Laboratory; and **D.M. Glover,** University of Cambridge, United Kingdom

FMRP: What Does It Do?

April 16–19

FUNDED BY **FRAXA Research Foundation, with additional support from the National Institute of Child Health and Human Development, NIH, and National Institute of Mental Heath, NIH**

ARRANGED BY **W.T. Greenough,** University of Illinois, Urbana
D.L. Nelson, Baylor College of Medicine, Houston

Introduction and Overview:
J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory: Introduction.
W.T. Greenough, University of Illinois, Urbana: Fragile X syndrome: Neural and behavioral characteristics.
D.L. Nelson, Baylor College of Medicine, Houston, Texas: Fragile X syndrome: Molecular and genetic characteristics.

SESSION 1: Fragile X Mental Retardation Protein: Insights into Neuronal Plasticity
Chairperson: D.L. Nelson, Baylor College of Medicine, Houston, Texas

J. Eberwine, University of Pennsylvania Medical School, Philadelphia: Single-cell molecular biology insights into dendritic functioning and human disease.
W.T. Greenough, University of Illinois, Urbana: Synaptic protein synthesis and FMRP.
C. Bagni, Universita' di Roma, Tor Vergata, Roma, Italy: Study of FMR1 mRNA localization and translation at the synapses.

SESSION 2: Characterization of FMRP: Genetics and Expression
Chairperson: S.T. Warren, HHMI, Emory University School of Medicine, Atlanta, Georgia

D.L. Nelson, Baylor College of Medicine, Houston, Texas: Consequences of altered FMRP expression in mice and flies.
D. Reines, Emory University School of Medicine, Atlanta, Georgia: Chromatin structure and the silent FMR1 locus in patients.
S. Adinolfi, National Institute of Medical Research, London, United Kingdom: Dissecting Fragile X mental retardation

E. Kandel, J. Yin, D. Nelson, S. Warren

protein (FMRP) in its structural and functional domains.
R.P. Bauchwitz, Columbia University, New York: Analysis of human FMR1 transgenic and fmr1(tm1Cgr) knockout mice.
E.W. Khandjian, Laval University, Quebec, Canada: Complex expression of the Fragile-X-related 1 gene in mammals.
A.T. Hoogeveen, Erasmus University Medical School, Rotterdam, The Netherlands: FMRP and the Fragile-X-related proteins (FXR1P and FXR2P).

SESSION 3: Transport and Translational Regulation
Chairperson: R.B. Darnell, The Rockefeller University, New York

A. Tartakoff, Case Western Reserve University, Cleveland, Ohio: Nucleocytoplasmic transport of RNA-binding proteins.
G.J. Bassell, Albert Einstein University, Bronx, New York: Mechanisms of mRNA targeting to neuronal dendrites and spines.
J. Esteban, Cold Spring Harbor Laboratory: Driving AMPA receptors into synapses.
B. Bardoni, CNRS/INSERM, Illkirch, France: Novel FMRP interacting proteins.
A.J. Scheetz, Yale University, New Haven, Connecticut: Cytoskeletal dynamics and translational control at developing synapses.

SESSION 4: Functional Aspects of FMRP
Chairperson: W.T. Greenough, University of Illinois, Urbana

M. Segal, The Weizmann Institute, Rehovot, Israel: FMRP involvement in formation of synapses among cultured hippocampal neurons.
E. Nimchinsky, Cold Spring Harbor Laboratory: Dendritic development in FMR1 knockout mice.
R.B. Darnell, Rockefeller University, New York: Identification of high-affinity RNA ligands for the KH-type neuronal RNA-binding proteins Nova and FMRP.
J.R. Fallon, Brown University, Providence, Rhode Island: CPEB-mediated cytoplasmic polyadenylation: A mechanism for experience-dependent local mRNA translation at synapses.
E.R. Kandel, HHMI, Columbia University, New York: Role of local protein synthesis in synapse-specific facilitation.
S.T. Warren, HHMI, Emory University School of Medicine, Atlanta, Georgia: Biochemical and neurobiological aspects of FMRP function.

SESSION 5: The Fragile X Syndrome and Mouse Models
Chairperson: I.J. Weiler, University of Illinois, Urbana-Champaign

L. Crnic, University of Colorado Health Sciences Center, Denver: Startle responses in Fragile X mice.
R. Denman, New York State Institute for Basic Research, Staten Island: The ligands of FMRP: Toward an understanding of Fragile X syndrome.
F. Tassone, University of Colorado School of Medicine, Denver: FMR1 mRNA and protein expression.
W.T. Brown, New York State Institute for Basic Research, Staten Island: Modifier genes and the Fragile X syndrome.
R.E. Paylor, Baylor College of Medicine, Houston, Texas: Behavioral characterization of *fmr1* and *fmr2* mutant mice.
M. Toth, Cornell University Medical College, New York: Abnormal processing of auditory stimuli and audiogenic seizures of FMRP knockout mice.

Regulation and Function of Heat Shock Proteins

May 2–3

ARRANGED BY **E. Craig,** University of Wisconsin, Madison
C. Gross, University of California, San Francisco
R.I. Morimoto, Northwestern University, Evanston, Illinois

SESSION 1
Chairperson: C.A. Gross, University of California, San Francisco

R.I. Morimoto, Northwestern University, Evanston, Illinois: The stress of misfolded proteins.
E.A. Craig, University of Wisconsin, Madison: Multiple Hsp70s: Clues regarding specialization.
K. Mori, Kyoto University, Japan: Analysis of the unfolded protein response.

SESSION 2
Chairperson: L.E. Hightower, University of Connecticut, Storrs

K. Nagata, Kyoto University, Japan: Substrate recognition by HSP47 and its possible functions in the collagen biosynthesis.
H. Kubota, Kyoto, Japan: Cytosolic chaperone in CCT and its eight different subunits in mammalian cells.
B. Bukau, University of Freiburg, Germany: The *E. coli* heat shock response.
T. Yura, Kyoto University, Japan: Slides

SESSION 3
Chairperson: K. Nagata, Kyoto University, Japan

S. Wickner, National Cancer Institute, NIH, Bethesda, Maryland: Protein recognition and unfolding by ClpA and degradation by ClpAP.
K. Ito, Kyoto University, Japan: Machinery for the forward and reverse movement of proteins across the *E. coli* membrane.
A.D. Grossman, Massachusetts Institute of Technology, Cambridge: DNA replication, cell cycle, and development.

SESSION 4
Chairperson: K. Mori, Kyoto University, Japan

C.A. Gross, University of California, San Francisco: Role of σ^{32} in the heat shock response.
T. Yura, Kyoto University, Japan: Heat shock response in bacteria: Recollection.
L.E. Hightower, University of Connecticut, Storrs: Bacterium meets mammal: A greeting from the heat shock response.

Toward Animal Models of Attention and Consciousness

May 14–17

FUNDED BY **The Swartz Initiative for Computational Neuroscience**

ARRANGED BY **C. Koch,** California Institute of Technology, Pasadena
A.M. Zador, Cold Spring Harbor Laboratory

SESSION 1

J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory: Introductory remarks.
C. Koch, California Institute of Technology, Pasadena: A framework for discovering the neuronal basis of consciousness.
D.J. Heeger, Stanford University, California: Attentional modulation and stimulus-evoked activity in human primary visual cortex.
G.E. Rees, California Institute of Technology, Pasadena: Linking visual attention and awareness with functional MRI.
D.A. Leopold, Max-Planck Institute for Biological Cybernetics, Tubingen, Germany: Neural correlates of multistable visual perception.
S.L. Macknik, Harvard Medical School, Boston, Massachusetts: The visibility and invisibility of spatiotemporal edges in the primate visual system.

SESSION 2

G. Tononi, The Neurosciences Institute, San Diego, California: Consciousness and complexity.
C. Brody, New York University, New York: The "unified percept" hypothesis and its quantitative neurophysiological consequences.
E.K. Miller, Massachusetts Institute of Technology, Cambridge: Executive function: The neural basis of cognitive control.
V.A.F. Lamme, Academical Medical Center, Amsterdam, The Netherlands: Neural correlates of visual awareness in Vi.
J.D. Schall, Vanderbilt University, Nashville, Tennessee: Antecedents and correlates of visual attention and awareness in prefrontal cortex.

D. Heeger, J. Reynolds, M. Sherman

SESSION 3

S.M. Sherman, State University of New York, Stony Brook: Don't forget the thalamus.
C.D. Gilbert, The Rockefeller University, New York: Attention and learning in the primary visual cortex.
P.R. Adams, State University of New York, Stony Brook: Neocortical plasticity control, thalamic bursting, and awareness.
A.K. Engel, Max-Planck-Institute for Brain Research, Frankfurt, Germany: The possible role of temporal binding for consciousness.
A.M. Zador, Cold Spring Harbor Laboratory: Is the simunculus just watching TV?

SESSION 4

Y. Miyashita, University of Tokyo School of Medicine, Japan: Top-down activation of higher-order visual representations.
N.G. Kanwisher, Massachusetts Institute of Technology, Cambridge: Mechanisms of attention in human visual cortex.
I. Fried, University of California Los Angeles School of Medicine: Single-unit recordings in the human temporal lobe during encoding and retrieval of visual stimuli.
L.R. Squire, University of California, San Diego: Conscious and nonconscious memory systems.
A.C. Nobre, University of Oxford, United Kingdom: Brain-imaging/ERP studies of attention or flexible modulation of sensor/motor processing by selective expectancies.
J.H. Reynolds, National Institute of Mental Health, NIH, Bethesda, Maryland: Visual salience, competition, and selective attention.
J. Braun, California Institute of Technology, Pasadena: Neural basis of "early" selection.
A. Pouget, University of Rochester, New York: Statistical constraints on theories of attention.
M.A. Goodale, University of Western Ontario, Canada: Dissociations between conscious visual perception and the visual control of action in neurological patients and normal observers.
C. Koch, California Institute of Technology, Pasadena: Wrap up.

Discussion: Toward Animal Models of Consciousness

Front view of Banbury Conference Center.

Mouse Behavioral Phenotyping

August 27–30

FUNDED BY **National Institute of Mental Health, NIH**

ARRANGED BY **M. Gallagher,** Johns Hopkins University, Baltimore, Maryland

Introduction:
J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory
M. Gallagher, Johns Hopkins University, Baltimore, Maryland

SESSION 1
Chairperson: J.L. Noebels, Baylor College of Medicine, Houston, Texas

Y. Benjamini, Tel Aviv University, Israel: Controlling the false discovery rate in behavior research.

W.A. Falls, University of Vermont, Burlington: Screening for sensory, motor, learning, and anxiety phenotypes in mice using startle reflex methodology.

W.N. Frankel, The Jackson Laboratory, Bar Harbor, Maine: Assessment of electroconvulsive seizure thresholds of mouse strains.

M. Gallagher, Johns Hopkins University, Baltimore, Maryland: Learning and memory assessments in mice.

SESSION 2
Chairperson: W.A. Falls, University of Vermont, Burlington

J.I. Glendinning, Columbia University, New York: High-throughput screens for assessing taste sensitivity in mice.

I. Golani, Tel Aviv University, Israel: Computerized visualization, algorithmic definition, and measurement of mouse exploratory behavior.

J. Noebels, Y. Benjamini

SESSION 3
Chairperson: B.M. Slotnick, American University, Washington, D.C.

T.A. Jones, University of Missouri, Columbia: Balance behaviors and vestibular function in four mutant strains (B6 inbred background).
D. Goldowitz, University of Tennessee, Memphis: Structure and function: Histological phenotyping of the nervous system.
G.K. Martin, University of Miami, Florida: Distortion-product otoacoustic emissions in mouse models of susceptibility to aging and noise.

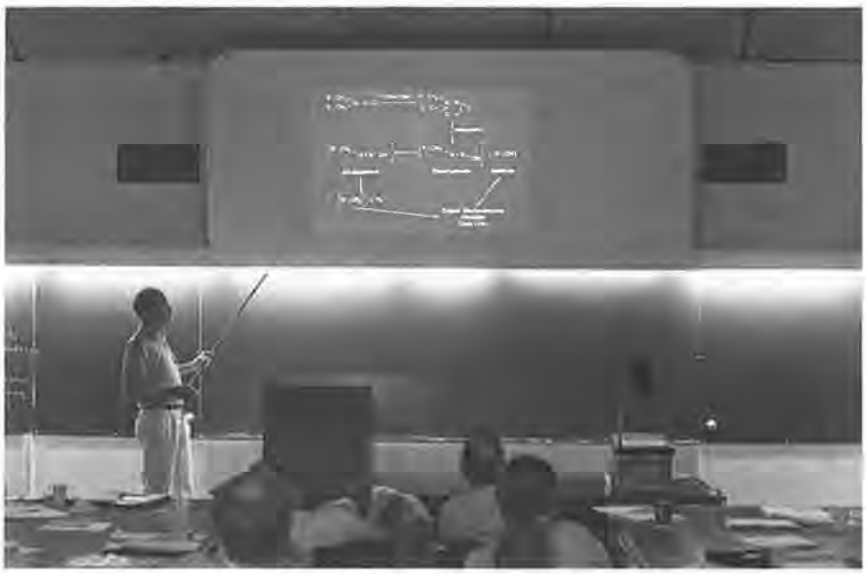
SESSION 4
Chairperson: P.C. Holland, Duke University, Durham, North Carolina

J.L. Noebels, Baylor College of Medicine, Houston, Texas: Mutational analysis of brain rhythms and cortical excitability.
B.F. O'Hara, Stanford University, California: A high throughput piezoelectric system for monitoring sleep and wake.
R.E. Paylor, Baylor College of Medicine, Houston, Texas: Organismic and experiential factors influencing the behavioral characterization of inbred mice.
E. Pugh, University of Pennsylvania, Philadelphia: Phenotyping the mouse visual system.

SESSION 5
Chairperson: R.E. Paylor, Baylor College of Medicine, Houston, Texas

B.M. Slotnick, American University, Washington, D.C.: Mouse olfaction assessed using conditioned avoidance and by olfactometry.
M.G. Tordoff, Monell Chemical Senses Center, Philadelphia, Pennsylvania: Use of the two-bottle choice test to assess mouse taste preferences.
R.W. Williams, University of Tennessee, Memphis: Efficient mapping of neuroanatomical and behavioral QTLs with sub-centimorgan prevision using 5000 isogenic RIX lines.

Summary and Future Plans



Overhead slide projection presentation.

Neural Networks and Cognition

September 10–13

FUNDED BY **Handspring Inc.**

ARRANGED BY **A.M. Zador,** Cold Spring Harbor Laboratory
Z.F. Mainen, Cold Spring Harbor Laboratory
A. Pouget, University of Rochester, New York

Introduction:
J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory

SESSION 1
Chairperson: A. Pouget, University of Rochester, New York

A.M. Zador, Cold Spring Harbor Laboratory: Dynamic computation in the cortex: The cocktail party problem.
M.J. Tarr, Brown University, Providence, Rhode Island: Cortical brain networks automatized by expertise.
R.S. Zemel, University of Arizona, Tucson: Bayesian inference using population codes.
J. Tenenbaum, Stanford University, California: Bayesian inference in human cognition.
M. Mozer, University of Colorado, Boulder: Temporal dynamics of information transmission in a Bayesian cognitive architecture.
Y. Weiss, University of California, Berkeley: Bayesian inference in distributed networks: From psychophysics to error-correcting codes.

SESSION 2
Chairperson: Z.F. Mainen, Cold Spring Harbor Laboratory

J.C. Hawkins, Handspring Inc., Mountain View, California: Neural networks and cognition.
P. Kanerva, Swedish Institute of Computer Science, Kista, Sweden: Stochastic pattern computing as a model of computing by the brain.
J. Kristoferson, Swedish Institute of Computer Science, Kista, Sweden: On different latent semantic techniques to construct high-dimensional distributed representations of words in large corpora.
G. Sjodin, Swedish Institute of Computer Science, Kista, Sweden: Raising the abstraction level and finding semantic/syntactic concepts in large corpora by using latent semantic techniques.
B.A. Pearlmutter, University of New Mexico, Albuquerque: Independent components analysis.
S. Roweis, University College London, United Kingdom: Unsupervised learning of nonlinear manifolds.

P. Latham, A. Koulakov, Z. Mainen

SESSION 3
Chairperson: D. Chklovskii, Cold Spring Harbor Laboratory

J.J. Hopfield, Princeton University, New Jersey: Large N representations, algorithms, and dynamics.
P. Latham, University of California, Los Angeles: Attractors in realistic neuronal networks: Can they exist?
A. Koulakov, Salk Institute, La Jolla, California: A sandpile model of neural integrator.
P. Dayan, University College, London, United Kingdom: Statistical model of attention and conditioning.
Z. Li, University College, London, United Kingdom: Vision in V1, a network model for the theory of pre-attentive vision.
T. Hely, The Santa Fe Institute, New Mexico: Role of feedback in information processing in the brain.

SESSION 4
Chairperson: B.W. Mel, University of Southern California, Los Angeles

B.W. Mel, University of Southern California, Los Angeles: Dendrites may be why you're so smart.
D. Chklovskii, Cold Spring Harbor Laboratory: Wire length minimization is a powerful tool for uncovering brain circuits.
B. Olshausen, University of California, Davis: Sparse coding of images in space and time.
N. Tishby, The Hebrew University, Jerusalem, Israel: Analysis of neural codes via the information bottleneck method.
A.V.M. Herz, Homboldt University, Berlin, Germany: Interplay of firing rates, firing times, and adaptation.
A. Pouget, University of Rochester, New York: Efficient computation and cue integration with population codes.

SESSION 5
Chairperson: A.M. Zador, Cold Spring Harbor Laboratory

D. Willshaw, University of Edinburgh, United Kingdom: Role of the subthalamic nucleus in the basal ganglia.
E. Todorov, University College London, United Kingdom: Constraints on neural processing in the motor system imposed by properties of the motor periphery.
D.D. Lee, Bell Laboratories, Murray Hill, New Jersey: Making a robotic dog see and hear.

E. Ziff, J. Lisman

Structure, Mechanism, and Function of CaMKII

September 17–20

FUNDED BY **Marie H. Robertson Memorial Fund for Neurobiology**

ARRANGED BY **H. Cline,** Cold Spring Harbor Laboratory
J.E. Lisman, Brandeis University, Waltham, Massachusetts

SESSION 1
Chairperson: A. Nairn, The Rockefeller University, New York

A. Nairn, The Rockefeller University, New York: CaM kinase: Structure and mechanism.
N. Waxham, University of Texas Health Science Center, Houston: The three-dimensional structure of CaMKII reveals its unique subunit organization.

SESSION 2
Chairperson: S. Halpain, The Scripps Research Institute, La Jolla, California

S. Halpain, The Scripps Research Institute, La Jolla, California: Multifunctional MAP2 as a target of multifunctional CaMKII.
T. Meyer, Duke University Medical Center, Durham, North Carolina: Molecular memory by translocation priming and postsynaptic trapping of CaMKII.
T.S. Reese, National Institute of Neurological Disorders and Stroke, NIH, Bethesda, Maryland: Distribution of CaMKII at the postsynaptic density (at rest and during activity).
A. Dosemeci, Marine Biological Laboratory, Woods Hole, Massachusetts: CaMKII clustering: Mechanism and function.

SESSION 3
Chairperson: M.H. Sheng, Massachusetts General Hospital, Boston

M.H. Sheng, Massachusetts General Hospital, Boston: Phosphorylation of PSD proteins by CaMKII.
M.B. Kennedy, California Institute of Technology, Pasadena: Postsynaptic targets for phosphorylation by CaMKII.
R.J. Colbran, Vanderbilt University School of Medicine, Nashville, Tennessee: Mechanisms of CaMKII association with postsynaptic densities.
J.W. Hell, University of Wisconsin, Madison: Regulation and physiological significance of the interaction between CaMKII and the NMDA receptor.

A. Dosemeci, S. Halpain

SESSION 4
Chairperson: H. Schulman, Stanford University School of Medicine, California

H. Schulman, Stanford University School of Medicine, California: Activity-dependent targeting and autophosphorylation both switch the functional state of CaMKII.

J.E. Lisman, Brandeis University, Waltham, Massachusetts: New mechanisms for PSD CaMKII as a memory element.

SESSION 5
Chairperson: R.A. Nicoll, University of California, San Francisco

T.R. Soderling, Oregon Health Sciences University, Portland, Oregon: Regulation of AMPA-Rs by CaMKII in LTP.

R. Malinow, Cold Spring Harbor Laboratory: CaMKII controls synaptic delivery of GluR1.

R.L. Huganir, HHMI, Johns Hopkins University, Baltimore, Maryland: Regulation of AMPA receptors and synaptic plasticity.

R. Nicoll, University of California, San Francisco: Role of CaMKII in Ca channel and non-NMDA receptor-dependent synaptic plasticity.

K. Fukunaga, Kumamoto University School of Medicine, Japan: Molecular targets of CaMKII involved in the hippocampal LTP.

SESSION 6
Chairperson: J.E. Lisman, Brandeis University, Waltham, Massachusetts

E.M. Landau, Mt. Sinai School of Medicine, New York: Regulation of CaMKII activity in transmitter-dependent LTP.

R.H. Kramer, University of Miami School of Medicine, Florida: Role of CaMKII in long-term plasticity of cyclic nucleotide metabolism revealed with the "patch-cramming" technique.

N. Otmakhov, Brandeis University, Waltham, Massa-chusetts: Is persistent activity of calcium/calmodulin-dependent kinase required for the maintenance of LTP?

L.C. Griffith, Brandeis University, Waltham, Massachusetts: Genetic manipulation of CaMKII and its targets.

A.J. Silva, University of California, Los Angeles: CaMKII's role in short-term plasticity, LTP, and memory.

M.R. Mayford, University of California, La Jolla: CaMKII function in dendrites and during development.

SESSION 7
Chairperson: H. Cline, Cold Spring Harbor Laboratory

K. Fox, Cardiff University, Wales: Role of CaMKII in plasticity in vivo.

J.R. Fallon, Brown University, Providence, Rhode Island: Regulation of CaMKII translation at synapses.

M. Constantine-Paton, Massachusetts Institute of Technology, Cambridge: NMDAR control of CaMKII during nervous system development.

H. Cline, Cold Spring Harbor Laboratory: CaMKII mediates maturation of the visual system in vivo.

T. Reese, M. Kennedy, S. Halpain

Persistent Neural Activity

October 1–4

FUNDED BY **Alfred P. Sloan Foundation and The Swartz Initiative for Computational Neuroscience**

ARRANGED BY **H.S. Seung,** Massachusetts Institute of Technology, Cambridge
D.W. Tank, Bell Laboratories, Lucent Technologies, Murray Hill, New Jersey

Introduction:
J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory

SESSION 1
Chairperson: C. Brody, New York University, New York

P.S. Goldman-Rakic, Yale University School of Medicine, New Haven, Connecticut: Prefrontal microcircuits and the temporal dynamics of working memory.
M. D'Esposito, University of California, Berkeley: Toward understanding the role of prefrontal cortex in working memory: Evidence from functional MRI.
X.-J. Wang, Brandeis University, Waltham, Massachusetts: Synaptic and cellular mechanisms of working memory: Stable persistent activity and NMDA receptors.
M. Bodner, University of California, Los Angeles: Cortical attractors in working memory.
D. Durstewitz, Salk Institute for Biological Studies, La Jolla, California: Modulatory control of and transitions in working memory.

SESSION 2
Chairperson: P.S. Goldman-Rakic, Yale University School of Medicine, New Haven, Connecticut

R.A. Andersen, California Institute of Technology, Pasadena: The nature of delay activity in the posterior parietal cortex.
P.W. Mitra, Lucent Technologies, Murray Hill, New Jersey: Tuned temporal structure in neural activity during working memory.
E. Zohary, Hebrew University, Jerusalem, Israel: Strategies of visual memory: Behavioral, neuronal, and computational perspectives.
M. Griniasty, Intel Cellular Communication Division, Givat Shmuel, Israel: Correlations between patterns of persistent neural activity and the Hopfield model.
J.E. Lisman, Brandeis University, Waltham, Massachusetts: Mechanisms of multi-item working memory.

Posters:

A. Koulakov, Salk Institute, La Jolla, California: A sandpile model of neural integrator.

A. Renart, Brandeis University, Waltham, Massachusetts: Low rate and highly variable persistent activity in a micro-columnar LIF network model.

B. Pesaran, California Institute of Technology, Pasadena: Spectral measures of temporal structure in neuronal activity.

SESSION 3

Chairperson: J.E. Lisman, Brandeis University, Waltham, Massachusetts

C. Brody, New York University, New York: Single and multi-electrode recordings in primate prefrontal cortex during parametric working memory tasks.

H.I. Sompolinsky, The Hebrew University, Jerusalem, Israel: Balanced states and multiple attractors in cortical networks.

G.B. Ermentrout, University of Pittsburgh, Pennsylvania: Mechanisms underlying maintained activity.

S. Wise, National Institutes of Health, Bethesda, Maryland: Empirical dissociation of confounded spatial variables in instructed-delay tasks: Attention vs. memory vs. gaze vs. intention vs. cue vs. target.

W. Schultz, University Fribourg, Switzerland: Predictive coding of behavioral outcomes in primate basal ganglia and frontal cortex.

SESSION 4

Chairperson: M.N. Shadlen, University of Washington, Seattle

C.R. Gallistel, Rutgers University, Piscataway, New Jersey: Various behaviors that appear to require integration with respect to time.

C. Kaneko, University of Washington, Seattle: Neural integration in the oculomotor system of the alert monkey.

H.S. Seung, Massachusetts Institute of Technology, Cambridge: Recurrent network models of the oculomotor integrator.

D.W. Tank, Lucent Technologies, Murray Hill, New Jersey: Persistent activity in a goldfish oculomotor neural integrator.

R. Baker, New York University School of Medicine, New York: Neural basis and function of eye velocity storage.

E.E. Fetz, University Washington School of Medicine, Seattle: Neural mechanisms mediating persistent activity in primate motorcortical and spinal circuits.

J.J. Hopfield, Princeton University, New Jersey: What is a moment? "Cortical" sensory integration over a brief interval.

SESSION 5

Chairperson: R.A. Andersen, California Institute of Technology, Pasadena

J.S. Taube, Dartmouth College, Hanover, New Hampshire: Persistent neural activity in the head-direction cell network.

K. Zhang, The Salk Institute, La Jolla, California: Attractor theories of the head-direction system: Necessary features and difficulties.

B.L. McNaughton, University of Arizona, Tucson: Continuous and discontinuous attractor dynamics in the hippocampus.

D.S. Touretzky, Carnegie-Mellon University, Pittsburgh, Pennsylvania: Attractor maps in the rodent hippocampus.

D.A. McCormick, Yale University School of Medicine, New Haven, Connecticut: Cellular basis for recurrent and rhythmic spontaneous activity in the cerebral cortex.

SESSION 6

Chairperson: S. Wise, National Institutes of Health, Bethesda, Maryland

M.N. Shadlen, University of Washington, Seattle: Neural integration in the parietal cortex: Accumulating the evidence.

C. Chow, University of Pittsburgh, Pennsylvania: A spiking neuron model of binocular rivalry.

Social Venture Capital for Neglected Vaccines: Creating Successful Alliances

October 10–12

FUNDED BY **Albert B. Sabin Vaccine Institute, Inc., through a grant from the Bill and Melinda Gates Foundation**

ARRANGED BY **M. Moree,** PATH/Malaria Vaccine Initiative, Seattle, Washington
R. Rabinovich, PATH/Malaria Vaccine Initiative, Rockville, Maryland
P.K. Russell, Albert B. Sabin Vaccine Institute, Inc., New Canaan, Connecticut

Introduction and Charge to the Conference:
J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory
H.R. Shepherd, Albert B. Sabin Vaccine Institute, New Canaan, Connecticut
P.K. Russell, Albert B. Sabin Vaccine Institute, Inc., New Canaan, Connecticut
R. Rabinovich, PATH/Malaria Vaccine Initiative, Rockville, Maryland

SESSION 1: Perspectives on the Development of Neglected Vaccines

M. Moree, PATH/Malaria Vaccine Initiative, Seattle, Washington: Public sector.
L.K. Gordon, OraVax Inc., Cambridge, Massachusetts: Industry.
J.V. Scott, New York University, New York: Academia.
S.M. Ferguson, Office of Technology Transfer, National Institutes of Health, Rockville, Maryland: Government.

SESSION 2: Mechanisms for Public-Private Partnerships

H. Kettler, Office of Health Economics, London, United Kingdom: Narrowing the gap between provision and need for vaccines in developing countries.
C. Elias, PATH/Malaria Vaccine Initiative, Seattle, Washington: Public-private partnerships for contraceptives and microbicides.

SESSION 3: Alliance Management

M. McDade, Corixa Corporation, Seattle, Washington: Industry.
L. Nelsen, Massachusetts Institute of Technology, Cambridge, Massachusetts: Academia.

SESSION 4: Commitments to Ensure Availability and Accessibility of Vaccines for Developing Country Markets

P. Young, AlphaVax, Durham, North Carolina: Biotech.
L. Barreto, Aventis Pasteur, Lyon, France: Pharma.
R.P. Eddy, U.S. Mission to the United Nations, New York: News from the White House.
J.-F. Martin, Parteurop S.A., Lyon, France: The Global Children's Vaccine Fund.

SESSION 5: What should be done to move the development of neglected vaccines forward? How do we form better partnerships?
Chairperson: R. Rabinovich, PATH/Malaria Vaccine Initiative, Rockville, Maryland

PANEL:
R.J. Saldarini, Mahwah, New Jersey
C. McFadden, Dewey Ballantine, Washington, D.C.
C. Nacy, Sequella, Inc., Rockville, Maryland
T. Lakavage, SmithKline Beecham Biologicals, Rixensart, Belgium

A. Batson, W. Koff, T. Elliott

Meeting the Challenge of Infectious Diseases in the 21st Century

October 15–18

FUNDED BY **Agricultural Research Service, U.S. Department of Agriculture**

ARRANGED BY **R. Breeze,** U.S. Department of Agriculture, Athens, Georgia

Introduction:
J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory
R. Breeze, U.S. Department of Agriculture, Athens, Georgia

SESSION 1: Microbial Genomics and Pathogenesis

D.L. Rock, USDA Agricultural Research Service, Greenport, New York: Functional genomics of viruses.
L.W.J. Baillie, Defence Evaluation Research Agency, Salisbury, United Kingdom: Functional genomics of bacteria.
R. Dean, North Carolina State University, Raleigh: Functional genomics of fungi.
B. Sobral, Virginia Polytechnic Institute & State University, Blacksburg: Role of bioinformatics in biosafety.

SESSION 2: Pathogenesis, Prevention, and Control of Infectious Diseases: The Next 10 Years: Plants

S. Leath, North Carolina State University, Raleigh: Improving disease resistance of crops through breeding and genomics.
E. Buckler, North Carolina State University, Raleigh: Structural and functional genomics of complex traits in field crops.
H.C. Kistler, University of Minnesota, St. Paul: Fungal plant pathogenicity: Future directions.
S.A. Lommel, North Carolina State University, Raleigh: Plant virus pathogenicity: State of the art and future directions.
R.P. Niedz, U.S. Horticultural Research Laboratory, Ft. Pierce, Florida: Woody perennials: Biological considerations and genomic applications.

SESSION 3: Pathogenesis, Prevention, and Control of Infectious Diseases: The Next 10 Years: Animals

W. Laegreid, USDA Agricultural Research Service, Clay Center, Nebraska: Functional genomics and disease control in livestock.
G. Letchworth, USDA Agricultural Research Service, ABADRL, Laramie, Wyoming: Functional genomics of pathogen infection, replication, survival, and transmittal in vectors: Ideas for disease intervention.
M. Jutila, Montana State University, Bozeman: Analysis of bovine γ/δ T cells: Gene expression and function.
T.J. Leighton, University of California, Berkeley: Anthrax: Solving pathobiology problems with genomic information.
D. Knowles, ARS-USDA, Washington State University, Pullman: *Anaplasma marginale:* Efficient use of a small genome to generate antigenic diversity.
B.J. Luft, State University of New York, Stony Brook: Rational vaccine design.
J.J. Dunn and S. Swaminathan, Brookhaven National Laboratory, Upton, New York: OspC of *Borrelia burgdorferi:* Clues to biochemical function from genomics and structural analysis.
J.N. MacLachlan, University of California, Davis: New and emerging virus diseases: What horses can tell us.
D.E. Swayne, USDA Agricultural Research Service, Athens, Georgia: Viral ecology and pathogenesis in future diagnosis and control of avian influenza.

SESSION 4: Detection, Identification, Forensics, and Diagnosis I

W.A. Bryden, Johns Hopkins University, Laurel, Maryland and J. Jackman, Johns Hopkins University, Laurel, Maryland: MALDI-TOF mass spectrometry for biodetection and pathogen identification.

P. Keim, Northern Arizona University, Flagstaff: High-resolution pathogen typing: Epidemiological implications.

Interim Discussion:

Chairperson: R. Breeze, U.S. Department of Agriculture, Athens, Georgia

SESSION 5: Detection, Identification, Forensics, and Diagnosis II

T.J. Leighton, University of California, Berkeley: Ab initio construction of definitive anthrax group diagnostic reagents.

W.I. Lipkin, University of California, Irvine: Pathogen discovery: From Borna to West Nile and beyond.

K. Lohman, AFIERA, San Antonio, Texas: Rapid identification of pathogens from clinical specimens using real-time fluorescent PCR.

J. Mullet, Texas A&M University, College Station: Use of remote sensing and satellite imaging in conjunction with DNA diagnostics for early detection of plant pathogens.

S.E. Schutzer, UMDNJ/New Jersey Medical School, Newark: Detection of the unknown pathogen: Methods and approach.

Summing Up:

Chairperson: R. Breeze, U.S. Department of Agriculture, Athens, Georgia

Slide presentation during a meeting.

J.P. Morgan & Co., Incorporated/Cold Spring Harbor Laboratory Executive Conference on Human Intelligence and Consciousness

October 19–21

ARRANGED BY **J.D. Watson,** Cold Spring Harbor Laboratory
J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory

SESSION 1

J.D. Watson, Cold Spring Harbor Laboratory: Welcoming remarks.
O. Sacks, Department of Neurology, Albert Einstein College of Medicine, Bronx, New York: Prodigies.

SESSION 2

H. Gardner, Harvard University Graduate School of Education, Cambridge, Massachusetts: How much of intelligence is in the brain?
I. Pepperberg, University of Arizona, Tucson: Cognitive and communicative abilities of Alex the Grey Parrot.

SESSION 3

C. Murray, American Enterprise Institute for Public Policy Research, Washington, D.C.: The intersection of intelligence and policy: Two approaching problems.

SESSION 4

Z.F. Mainen, Cold Spring Harbor Laboratory: Olfaction: A complex sensory function.
A.M. Zador, Cold Spring Harbor Laboratory: Selective hearing: The "cocktail party problem."

SESSION 5

S. Pinker, Brain and Cognitive Sciences, Massachusetts Institute of Technology, Cambridge: Words and rules: The ingredients of language.
V.S. Ramachandran, University of California, San Diego: What neurology can tell us about human nature, synethesia, and the meaning of art.
R.A. Brooks, Artificial Intelligence Laboratory, Massachusetts Institute of Technology, Cambridge: Building intelligent sociable machines: Understanding human intelligence.

Discussion and Closing Remarks:
J.D. Watson, Cold Spring Harbor Laboratory

J.D. Watson, C. Murray

A. Berry, J. Hawkins

R. Brooks, H. Gardner, D. Pakianathan

Natural Stimulus Statistics

October 22–25

FUNDED BY **Cold Spring Harbor Laboratory Corporate Sponsor Program**

ARRANGED BY **S. Laughlin,** University of Cambridge, United Kingdom
P. Reinagel, Harvard Medical School, Boston, Massachusetts

Introduction:
J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory
S. Laughlin, University of Cambridge, United Kingdom,
P. Reinagel, Harvard Medical School, Boston, Massachusetts

SESSION 1
Chairperson: D.L. Donoho, Stanford University, California

W. Bialek, NEC Research Institute, Inc., Princeton, New Jersey: Finding relevant features in natural signals.
H. Barlow, University of Cambridge, United Kingdom: Help and hindrance from redundancy.
D. Mumford, Brown University, Providence, Rhode Island: Searching for an explicit stochastic model for natural scene image patches.
B. Olshausen, University of California, Davis: Sparse coding of natural images: Space, time, and color.
D. Tolhurst, University of Cambridge, United Kingdom: Measuring sparse coding: Definitions and confusions.

SESSION 2
Chairperson: S. Laughlin, University of Cambridge, United Kingdom

Y. Gousseau, CNRS-ENS Cachan, France: Morphological statistics of natural images.
E. Simoncelli, New York University, New York: Image statistics, Gaussian scale mixture models, and divisive normalization.
D.W. Dong, Florida Atlantic University, Boca Raton: Eye movements and spatiotemporal input statistics during free-viewing natural time-varying images.
K. Kording, Institute for Neuroinformatik, Zurich, Switzerland: What a cat sees and what algorithms can learn from this.
R. Kern, Universitat Bielefeld, Germany: Representation of behaviorally generated optic flow in a fly visual interneuron.
R. de Ruyter, NEC Research Institute, Inc., Princeton, New Jersey: Motion detection in the wild: Natural stimuli and information transmission in a blowfly motion-sensitive neuron.

B. Olshausen, H. Barlow, W. Geisler

SESSION 3
Chairperson: M. Meister, Harvard University, Cambridge, Massachusetts

A. Fairhall, NEC Research Institute, Inc., Princeton, New Jersey: Olfaction from the point of view of physics.
F. Grasso, Boston University Marine Program, Woods Hole, Massachusetts: Olfaction, turbulence, and odor plumes: Structure from concentration dynamics.
G. Laurent, California Institute of Technology, Pasadena: Reformatting and optimization of odor representations in the zebrafish olfactory bulb.
M.S. Lewicki, Carnegie-Mellon University, Pittsburgh, Pennsylvania: Learning efficient codes for natural scenes and sounds: A principle for sensory coding.
P. Penev, The Rockefeller University, New York: Factorial transmission of time-varying natural stimuli with sparse, interacting unitary events: Spiking for speech and movies.

SESSION 4
Chairperson: D.J. Field, Cornell University, Ithaca, New York

F. Theunissen, University of California, Berkeley: Analyzing auditory neurons with natural and synthetic sounds.
K. Sen, University of California, San Francisco: Hierarchical processing of natural sounds in the songbird auditory forebrain.
E. Nelken, Hebrew University-Hadassah Medical School, Jerusalem, Israel: Coding of foregrounds and backgrounds in auditory scenes.
P. Reinagel, Harvard Medical School, Boston, Massachusetts: Coding of temporal visual information by LGN neurons.
Y. Dan, University of California, Berkeley: Analysis of visual coding in the LGN and V1.
J.L. Gallant, University of California, Berkeley: Using natural scenes to reveal coding properties in visual cortex.

SESSION 5
Chairperson: D. Osorio, University of Sussex, Brighton, United Kingdom

W.S. Geisler, University of Texas, Austin: Perceptual grouping and the Bayesian co-occurrence statistics of features in natural images.
J. Malik, University of California, Berkeley: Ecological statistics of Gestalt grouping factors.
M. Vorobyev, University of Maryland, Baltimore: Color coding of signals and backgrounds.
E.H. Adelson, Massachusetts Institute of Technology, Cambridge: Statistical aspects of lightness estimation.

D. Field, E. Simoncelli

Sugar Sensing and Signaling in Plants and Other Organisms

October 29–November 1

FUNDED BY **Cold Spring Harbor Laboratory Corporate Sponsor Program**

ARRANGED BY **M. Johnston,** Washington University Medical School, St. Louis, Missouri
J. Sheen, Massachusetts General Hospital, Boston
M. Stitt, University of Heidelberg, Germany

Introduction:
J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory

SESSION 1: Transporter Proteins, GPCR, and Protein *Kinases* in Glucose Signaling
Chairperson: M. Johnston, Washington University Medical School, St. Louis, Missouri

M. Johnston, Washington University Medical School, St. Louis, Missouri: Metabolic and receptor-mediated glucose signals regulate gene expression in yeast by different mechanisms.
S. Ozcan, University of Kentucky College of Medicine, Lexington: Regulation of gene expression by glucose in yeast and in mammalian cells.
M. Carlson, Columbia University, New York: Snf1 protein kinase and glucose signaling in yeast.
G. Hardie, University of Dundee, United Kingdom: SNF1/AMP-activated protein kinases: Highly conserved kinase cascades involved in sugar sensing in plants, animals, and yeast.
J. Thevelein, Catholic University of Louvain, Belgium: Both a G-protein-coupled receptor system and glucose phosphorylation are required for glucose activation of the cAMP-PKA pathway in yeast.

SESSION 2: Glucose, Mannose, and Sucrose Sensing and Signaling in Plants I
Chairperson: K.E. Koch, University of Florida, Gainesville

C. MacKintosh, University of Dundee, United Kingdom: 14-3-3s regulate the global cleavage of their diverse binding partners in sugar-starved *Arabidopsis* cells.
U. Wobus, Institute Pflanzenetik und Kulturpflanzenforschung, Gatersleben, Germany: Sugar gradients, sugar metabolism, and sugar sensing in developing plants seeds.
K.E. Koch, University of Florida, Gainesville: A central role for sucrose metabolism in sugar signaling: A whole plant context.
I. Graham, University of York, Sand Hutton, United Kingdom: Why is trehalose metabolism essential for *Arabidopsis* seed development?
T. Roitsch, University of Regensburg, Germany: Differential regulation of source and sink metabolism by sugars.
D.R. Bush, University of Illinois, Urbana: Sucrose signaling and phloem loading.
J.-C. Jang, Ohio State University, Columbus: Signal transduction of glucose-regulated cell expansion.
M. Bevan, John Innes Centre, Norwich, United Kingdom: Genetic analysis of sucrose-mediated transcription of genes encoding enzymes of starch biosynthesis.

M. Bevan

SESSION 3: Glucose, Mannose, and Sucrose Sensing and Signaling in Plants II
Chairperson: W.-B. Frommer, University of Tubingen, Germany

S.C. Huber, North Carolina State University, Raleigh: Sucrose synthase and SNF1-related protein kinases: New components of sugar sensing in plants?
W.-B. Frommer, University of Tubingen, Germany: Sucrose transporters and sugar sensing.
P.S. Chourey, University of Florida, Gainesville: Mannose induces global gene repression in maize through a signaling pathway that is independent from sugar depletion.

SESSION 4: Glucose and *Galactose* Sensing and Signaling in Yeast/Mammals
Chairperson: M. Carlson, Columbia University, New York

C. Michels, Queens College of CUNY, Flushing, New York: Maltose sensing and signaling in *Saccharomyces* and its glucose regulation.
J.E. Hopper, Pennsylvania State University, Hershey: The Gal3p-Gal80p-Gal4p transcription switch of the yeast, *Saccharomyces cerevisiae:* A galactose-sensing switch.
C. Hoffman, Boston College, Chestnut Hill, Massachusetts: Glucose detection and adenylate cyclase activation in fission yeast.
W. Heideman, University of Wisconsin, Madison: Trying to connect the effects of glucose on growth with effects on the cell cycle in yeast.

SESSION 5: Glucokinases and Hexokinases
Chairperson: J. Sheen, Massachusetts General Hospital, Boston

M.A. Magnuson, Vanderbilt University School of Medicine, Nashville, Tennessee: Glucokinase: Role as glucose signal mediator in mammals.
D. Granot, Agricultural Research Organization, Bet Dagan, Israel: Comparative roles of hexokinase and fructokinase in tomato sugar sensing.
J. Sheen, Massachusetts General Hospital, Boston: Plant hexokinases: Novel features and functions.

SESSION 6: Sugar and Hormones and Nitrogens
Chairperson: G. Coruzzi, New York University, New York

S.C. Smeekens, University of Utrecht, The Netherlands: Interactions between sugar and hormonal signaling pathways in plants.
P. Leon, Instituto de Biotechnologia, UNAM, Morelos, Mexico: Sugar sensing and signaling in plants and other organisms.
D.R. Bush, University of Illinois, Urbana: Sucrose signaling in phloem loading.
A. Krapp, University of Heidelberg, Germany: Metabolic signaling in C/N interaction.
G. Coruzzi, New York University, New York: Sugar signaling and C:N regulation of amino acid biosynthesis in *Arabidopsis*.

M. Magnuson, K. Koch

Getting Rid of the Bodies

November 12–15

FUNDED BY **Cold Spring Harbor Laboratory Corporate Sponsor Program**

ARRANGED BY **G. Chimini,** INSERM-CNRS, Marseille, France
M. Hengartner, Cold Spring Harbor Laboratory

Introduction:
J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory

SESSION 1: Membrane Events
Chairperson: J. Savill, Royal Infirmary, Edinburgh, United Kingdom

J. Borst, The Netherlands Cancer Institute, Amsterdam: Mechanism and relevance of sphingomyelin hydrolysis during apoptosis.
P. Williamson, Amherst College, Massachusetts: Phospholipid scramblase activation in apoptotic lymphocytes.
C.J. Fielding, University of California, San Francisco: Modification of cell surface phospholipids.
G. Chimini, INSERM-CNRS de Marseille Luminy, France: Membrane lipid architecture and competence to engulf.
R.A. Schlegel, Pennsylvania State University, University Park: Necessity and sufficiency of loss of phospholipid asymmetry by target cells and macrophages for phagocytosis.

SESSION 2: Apoptotic Receptors and Downstream Signaling
Chairperson: M. Hengartner, Cold Spring Harbor Laboratory

V.A. Fadok, National Jewish Medical and Research Center, Denver, Colorado: Engagement of a new receptor for phosphatidylserine is required for engulfment of apoptotic cells by phagocytes.
G. Matsushima, University of North Carolina, Chapel Hill: Role of Mer in macrophages and autoimmunity.
C.D. Gregory, University of Nottingham Medical School, United Kingdom: Role of CD14 in apoptotic-cell clearance.
S.C. Finnemann, Weill Medical College of Cornell University, New York: Focal adhesion kinase dynamics during $\alpha 1\beta 5$ integrin-dependent photoreceptor phagocytosis by the retinal pigment epithelium.
K. Ravichandran, University of Virginia, Charlottesville: Role for CrkII and lipid raft domains in engulfment of apoptotic cells.
M.L. Albert, The Rockefeller University, New York: Vivir La Muerte: The $\alpha v B5$ integrin recruits the CrkII/DOCK 180 molecular switch for phagocytosis of apoptotic cells.

N. Franc, P. Williamson, G. Chimini

SESSION 3: Modulation of Phagocytosis
Chairperson: C.D. Gregory, University of Nottingham Medical School, United Kingdom

S. Gallucci, National Institutes of Allergy and Infectious Diseases, NIH, Bethesda, Maryland: Induction of apoptosis in dendritic cells by an exogenous danger signal.
G. Randolph, Mt. Sinai School of Medicine, New York: Differentiation of monocytes into migratory dendritic cells after delivery of a phagocytic stimulus.
I. Dransfield, University of Edinburgh Medical School, United Kingdom: Regulation of macrophage capacity for phagocytosis of apoptotic cells.
D. Mevorach, Tel Aviv Medical Center, Israel: Getting rid of the bodies: The milieu determines patterns of uptake.

SESSION 4: Invertebrate Systems
Chairperson: S. Nagata, Osaka University Medical School, Japan

M. Hengartner, Cold Spring Harbor Laboratory: Engulfment genes cooperate with *ced-3* to promote apoptosis in *C. elegans*.
Z. Zhou, Massachusetts Institute of Technology, Cambridge: *C. elegans* CED-1 is a transmembrane receptor that recognizes cell corpses and initiates their engulfment.
M.A. Driscoll, Rutgers, State University of New Jersey, Piscataway: A monopoly of undertakers: A common set of genes mediate the removal of both apoptotic and necrotic cellcorpses in *C. elegans*.
N.C. Franc, Massachusetts General Hospital, East Charlestown: Phagocytosis of apoptotic cells by *Drosophila* (getting rid of the bodies and fly away).

SESSION 5: In Vivo Models
Chairperson: G. Chimini, INSERM-CNRS, Marseille, France

J. Savill, Royal Infirmary, Edinburgh, United Kingdom: Comparison of clearance in vitro and in vivo.
M. Botto, Imperial College School of Medicine, London, United Kingdom: Complement, apoptosis, and autoimmunity.
P.B. Martin, University College London, United Kingdom: Clearance of apoptotic debris in macrophageless PPU.1 KO mice.
S. Nagata, Osaka University Medical School, Japan: DNA fragmentation by phagocytes and its abnormality.
G. Bokoch, The Scripps Research Institute, La Jolla, California: Macropinocytosis.

Points for Discussion
Chairperson: M. Hengartner, Cold Spring Harbor Laboratory

Universality of the Apoptotic Process
Diseases and Apoptosis
Other Points

Signaling Network Control-Cell Interactions: Phase II Meeting

November 27–29

FUNDED BY **National Institute of General Medical Sciences, NIH**

ARRANGED BY **R. Iyengar,** Mount Sinai School of Medicine, New York

Overview:
R. Iyengar, Mount Sinai School of Medicine, New York

Opening:
Comments by Bridging Grant Clusters Leaders
Open Discussion (Data Exchange)

Break Out Sessions for the five Bridging Grant Clusters I
Report back of the Break Out Sessions (Integration I)
Break Out Sessions for the five Bridging Grant Clusters II
(Members participating in two Bridging Grant Clusters can switch groups in the two sessions)
Report back of the Break Out Sessions (Integration II)

Talks:
B. Ray, Science, Washington, D.C.
J.D. Scott, Oregon Health Sciences University, Portland, Oregon
R.W. Tsien, Stanford University School of Medicine, California

Role of the Facilities
Discussion Leaders:
H.E. Hamm, Northwestern University Medical School, Chicago, Illinois
H. Weinstein, Mount Sinai School of Medicine, New York

RALs and Their Relationships to Bridging Grant Clusters
Discussion Leaders:
M.P. Sheetz, Columbia University, New York
T.C. Sudhof, University of Texsas Southwestern Medical Center, Dallas

Open Discussion (Integration III and Data Exchange)

Talks:
G. Mandel, HHMI, State University of New York, Stony Brook
K. Svoboda, Cold Spring Harbor Laboratory

Project Organization and Administration
Discussion Leaders:
R. Goodman, Oregon Health Sciences University, Portland
M.P. Sheetz, Columbia University, New York

Topics:
Administrative and Project Management Plans
Administrative Facility
Education and Data Dissemination

Phase II Grant Organization
Writing and Internal Review Assignments

Back view of Banbury Conference Center.

The Application of *Arabidopsis* Genomics to Forestry and Other Complex Plant Systems

December 4–7

FUNDED BY **Cold Spring Harbor Laboratory Corporate Sponsor Program**

ARRANGED BY **R. Martienssen,** Cold Spring Harbor Laboratory
R.R. Sederoff, North Carolina State University, Raleigh

SESSION 1: Comparative Genomics I

R. Martienssen, Cold Spring Harbor Laboratory: The *Arabidopsis* genome.
D.B. Neale, University of California, Davis: Comparative genetic mapping in pine.
S.H. Strauss, Oregon State University, Corvallis: Poplar as a tool for functional genomics of trees.
G. Sandberg, Swedish University of Agricultural Sciences, Umea, Sweden: *Arabidopsis:* A necessity for the success of the Swedish poplar functional genomics program.
R.J. Kodrzycki, Westvaco Corporation, Summerville, South Carolina: Functional genomics in forest trees: An industry perspective.

SESSION 2: Comparative Xylogenesis I

M. McCann, John Innes Centre, Norwich, United Kingdom: Analysis of gene expression patterns as mesophyll cells of *Zinnia elegans trans*-differentiate to tracheary elements.
A. Jones, University of North Carolina, Chapel Hill: Signal transduction pathways in plant cell elongation, division, and differentiation.
A. Groover, University of California, Davis: Dissecting vascular development in herbaceous and woody plants using gene traps.
D. Horvath, USDA/ARS/BRL, Fargo, North Dakota: Use of *Arabidopsis* microarrays for study of heterologous systems.
S. Lev-Yadun, University of Haifa at Oranim, Tivon, Israel: Wood and fiber formation in *Arabidopsis*.

D. Luke, R. Sederoff

SESSION 3: Comparative Genomics II

V. Irish, Yale University, New Haven, Connecticut: Evolution of floral developmental mechanisms.
S. Tingey, DuPont Company, Newark, Delaware: Comparative genomics between *E. grandis* and *A. thaliana, O. sativa*, and *Z. mays*.
T. Mitchell-Olds, Max-Planck Institute for Chemical Ecology, Jena, Germany: Quantitative genetics and comparative genomics of *Arabidopsis*.
C. Loopstra, Texas A&M University, College Station: Arabinogalactan proteins and wood development: The *Arabidopsis* genome.

SESSION 4: Discussion of Policy Issues
Chairperson: R.R. Sederoff, North Carolina State University, Raleigh

SESSION 5: Comparative Xylogenesis II

E. Beers, Virginia Polytechnic Institute & State University, Blacksburg: *Arabidopsis* as a model for the study of protease function in vascular tissues.
S. Wyatt, Ohio University, Athens: Reaction wood and *Arabidopsis:* A developing model.
B.R. Franke, Purdue University, West Lafayette, Indiana: Lignin engineering with P450s.
M. Campbell, University of Oxford, United Kingdom: The developmental control of lignification.

SESSION 6: Woody Plant Systems

W. Boerjan, University of Gent, Belgium: Mapping and genetic engineering in *Populus*.
R. Alscher, Virginia Polytechnic Institute & State University, Blacksburg: Toward understanding stress response mechanism in loblolly pine: A systems approach.
R.R. Sederoff, North Carolina State University, Raleigh: The pine genome project: Comparative genomics.
J.E. Carlson, Pennsylvania State University, University Park: Environmental genomics and hardwood forests.

Robertson House

Gene Ontology Annotation and the Human Genome

December 10–12

ARRANGED BY **M. Ashburner,** University of Cambridge, United Kingdom

SESSION 1: Presentations from the Gene Ontology Consortium

M. Ashburner, University of Cambridge, United Kingdom
J. Blake, The Jackson Laboratory, Bar Harbor, Maine
S. Lewis, University of California, Berkeley

SESSION 2: Presentations from Other Public Domain Groups

R. Apweiler, European Bioinformatics Institute, Cambridge, United Kingdom
M. Clamp, Sanger Centre, Cambridge, United Kingdom
D. Maglott, National Center for Biotechnology Information, Bethesda, Maryland
S. Povey, University College London, United Kingdom

SESSION 3: Presentations from Companies

K. Roberg-Perez, Proteome, Inc., Beverly, Massachusetts
R. Mural, Celera Genomic Research, Rockville, Maryland
D. Gietzen, Incyte Pharmaceuticals, Inc., Palo Alto, California
A. Kasarskis, DoubleTwist Inc., Oakland, California
K. Fasman, AstraZeneca Inc., Waltham, Massachusetts

SESSION 4: General Discussion

L. Brooks, National Human Genome Research Institute, Bethesda, Maryland
J. Cherry, Stanford University School, Palo Alto, California
J. Eppig, The Jackson Laboratory, Bar Harbor, Maine
D. Hill, The Jackson Laboratory, Bar Harbor, Maine
M. Ringwald, The Jackson Laboratory, Bar Harbor, Maine
L. Stein, Cold Spring Harbor Laboratory, New York
P. Thomas, Celera Genomic Research, Rockville, Maryland
J. Wortman, Celera Genomic Research, Rockville, Maryland

S. Lewis, M. Ashburner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