# Banbury Center Cold Spring Harbor Laboratory





Banbury Center is a 55-acre estate adjoining the waters of Long Island Sound on the north shore of Long Island, barely 40 miles east of downtown Manhattan and some five miles from Cold Spring Harbor Laboratory. The estate was donated to the Laboratory in 1976 by Charles Sammis Robertson, together with funds for necessary architectural conversions and an endowment to cover upkeep of the grounds and the original estate structures. With the Laboratory's international reputation for research and education, the magnificent Banbury grounds and buildings are an ideal site for small conferences in the areas of molecular biology and genetics, especially as they relate to health, social, and policy issues.

What was once the estate's original seven-car garage is now the Conference Room, containing administrative offices, a small library, and—at its center—a room of an ideal shape and size for workshop-style discussion meetings. Complete with extensive, unobtrusive sound and projection facilities as well as wall-to-wall blackboard space, the room can accommodate as many as 40 participants while remaining equally conducive to either formal presentations or informal give-and-take.

The Robertsons' family house, situated on the final promontory before the grounds descend to the shore of Cold Spring Harbor, now serves as the center for participant accommodations and dining, while the extensive grounds, swimming pool, tennis court, and beach present ample recreational resources. On-site accommodations were supplemented by the opening in 1981 of the Sammis Hall guest house—a modern embodiment of the sixteenth century Palladian villas designed for the Center by the architectural firm of Moore Grover Harper. In 1997, the Meier House, opposite the Conference Center, was added to provide extra housing so that everyone attending a Banbury Center meeting can stay on the estate.



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### BANBURY CENTER EXECUTIVE DIRECTOR'S REPORT

Any account of the events of 2012 must begin with what is officially called "posttropical cyclone" Sandy, but more appropriately named "Superstorm Sandy." It reached the north shore of Long Island in the evening and night of Monday October 29 with devastating effects. Trees fell throughout the area bringing down power lines and causing extensive blackouts. More than 30 trees fell at Banbury including one that fell on the roof of Robertson House (see cover); fortunately, this was the only building damaged by the storm. We lost power in the evening of October 29, and the Banbury office thus moved into temporary quarters in the Meetings and Courses offices in Grace Auditorium. Because we could not move back to Banbury until November 14, two Banbury Center meetings had to be cancelled—the first time that we have had to do so in at least 25 years, and two meetings were moved to the main campus.

Nevertheless, 2012 was still a busy year for Banbury with 18 meetings, two Watson School of Biological Science courses, six summer courses, and 10 other events. The 517 meeting participants were drawn from 30 states in the U.S.A. and from 19 foreign countries.

There have been a number of Banbury Center meetings that have dealt with science-related issues rather than research topics. Among the most notable are those on patenting. The first meeting, *Patenting of Life Forms*, was held in October 1981, and the second, *Intellectual Property and Biotechnology*, was held in 1991. Norton Zinder was prescient when he spoke on "Using Data from the Human Genome Project" at the 1991 meeting. The patenting of human genes and gene sequences has become an area of great controversy, highlighted by the recent Myriad case involving patents covering the *BRCA* gene and the decision in the Prometheus case. Thus, the 2012 meeting on *Patenting Genes: New Developments, New Questions* was particularly timely, examining the current state of gene patents, especially those covering diagnostic tests and the implications of whole-genome sequencing.

Another meeting relating to human genetics was held in May. Jim Watson, Mila Pollock, and I have been advancing the argument that as the Human Genome Project (HGP) was one of the great scientific accomplishments, it more than justifies serious historical analysis. A major preliminary to such a study would be locating and cataloging materials relating to the HGP. This has been explored in collaboration with the Wellcome Trust Library. Another component must be recording the personal experiences of scientists who worked on key aspects of the HGP, and Watson proposed that this should be done as soon as possible. The Alfred P. Sloan Foundation became interested in the archival project and the book of essays about the HGP. The suggestion was made that we should explore a possible long-term project to produce a history (or histories) of the HGP which will be useful and interesting to the public and scholars. This meeting, Toward a History of the Human Genome Project, was funded by the Sloan Foundation with the goal of laying the groundwork for such a book and other media productions. We brought a particularly interesting set of participants for the discussions, including those involved with the HGP (scientists, bioethicists), as well as archivists, historians, and publishers of books and documentaries. The participants helped to define the purpose of the book, what would distinguish it from other HGP books, its audience, and style.

A third meeting that was not directly based on biomedical research was organized by Suzanne Nalbantian: *Interdisciplinary Symposium on Literature, Memory, and Neuroscience*. This was a follow-up to a meeting held in 2007 on *Memory in Neuroscience and the Humanities*, the thesis of which was that just as the neuroscientist explores the physical workings of the brain with the tools of electrophysiology and molecular biology, so writers and artists explore and record the mental experiences of human beings. The 2012 meeting, held under the auspices of the International Comparative Literature Association, continued this theme, with, for example, papers on "Marcel Proust and Memory: A Neuropsychological Perspective" and "Nonconscious Memory and the Surrealist Mind."

Cancer meetings continue to have a large role in the Banbury Center calendar and 2012 was no exception. The first cancer meeting, *Transcription and Cancer*, examined how the new insights in transcriptional and chromatin biology that have come with the application of modern analytical techniques may pave the way for the development of therapies directed against transcription factors. These have been traditionally thought of as undruggable, but participants in this meeting faced up to the challenge of developing direct-acting inhibitors of gene regulatory complexes.

The metabolism of cancer cells has held a fascination ever since Otto Warburg's observations in the early part of the 20th century that cancer cells metabolized glucose via glycolysis even in the presence of oxygen. This is a general metabolic feature of cancer cells, but its causal relationship to the origins of cancer cells and cancer progression is still unclear. However, understanding this process better could lead to the identification of new therapeutic targets. The main objectives of the meeting *Regulation of Metabolism in Cancer* were to discuss (1) biophysical and biochemical studies of the unique metabolic requirements and pathway utilizations of transformed cells, (2) emerging sequencing and computational technologies that can rapidly analyze cancer genomes and transcriptional profiles, and (3) biomedical informatic and physical approaches to integrating the metabolic, genomic, and transcriptional interactions of cancer.

It is generally thought that a key event in the development of cancer is the transformation of cells from an epithelial state to having the properties of mesenchymal cells. This epithelial-mesenchymal transition (EMT) is accompanied by the loss of epithelial cell junction proteins leading to weakening of cell adhesion and an increase in cell motility. Furthermore, cellular sensitivity to multiple targeted therapies, chemotherapy, and radiotherapy has been shown to be governed by the extent to which cells have undergone an EMT transition. Resistance associated with cellular plasticity and heterogeneity has been observed in multiple systems derived from adenocarcinomas and squamous carcinomas. Participants in the meeting *Cell Plasticity in Cancer Evolution* discussed data on the molecular and pathobiological significance of cellular plasticity in carcinomas, and how to explore, and exploit for treatments, the signaling pathways that promote cell plasticity.

The year of Superstorm Sandy was a hard one for us all. Janice Tozzo and Pat Iannotti continued the work of the Banbury office while Basia Polakowski had to cope with the tree that came crashing down on the Robertson House roof. It was the grounds crew of Sonny Leute, Fredy Vasquez, and Joseph McCoy, assisted by reinforcements from the main campus, who bore the brunt of the effects of the storm, and three months later, they were still removing tree trunks and branches. Jon Parsons and Connie Brukin continue to be indispensable for AV and photographs, respectively, and Culinary Services and Housekeeping cope admirably with the rapid turnover of guests.

> Jan Witkowski Executive Director



A stump remains



Tree brought down by storm



Clearing the mess



Downed power lines



Cutting up trees



Reduced to wood chips

### BANBURY CENTER MEETINGS

### **Communicating Science**

### February 10-15

funded by	Boehringer Ingelheim Fonds Foundation for Basic Research in Medicine, Heidesheim, Germany
ARRANGED BY	S. Schedler, Boehringer Ingelheim Fonds, Heidesheim, Germany C. Walther, Boehringer Ingelheim Fonds, Heidesheim, Germany

The Boehringer Ingelheim Fonds (BIF) has an international program of support for Ph.D. fellowships. It first brought its fellows to the Banbury Center for their annual North American retreat in 2005, and it has been a great pleasure to have them return. Their 2012 stay at Banbury was the fifth occasion that they have been here. At Banbury, fellows receive intensive instruction in matters such as giving presentations and writing papers, topics usually learned by default (and often poorly) during graduate research.

Opening Remarks and All About BIF: C. Walther, Boehringer Ingelheim Fonds, Heidesheim, Germany

SESSION 1: First Writing Assignment

W. Wells, Global Alliance for TB Drug Development, New York: Writing techniques and how to structure papers

SESSION 2: Presentation of Graphic Information and How to Prepare and Deliver a Scientific TalkW. Tansey, Vanderbilt University Medical Center, Nashville, Tennessee

**SESSION 3** 

Group A: Four-minute power point presentations and reviews.



SESSION 4: Second Writing Assignment

### **SESSION 5**

**Group B:** Four-minute power point presentations and reviews. **Group A:** Preparation of 3-minute power point presentations.

### **SESSION 6**

**Group B:** Preparation of 3-minute power point presentation.

### **SESSION 7**

Groups A and B: Three-minute power point presentations and reviews.

SESSION 8: What Makes Success in Science? G. Hannon, Cold Spring Harbor Laboratory

SESSION 9: How to Design Figures M. Hansen and M. Corral, *Nature* Publishing Group, New York

**SESSION 10:** Walking Tour of Cold Spring Harbor Laboratory Campus



Students hard at work



W. Tansey reviewing student presentations

### Leading Science Workshop

### February 24-27

funded by	The American Express Foundation, New York, New York
ARRANGED BY	C.M. Cohen, Science Management Associates, Newton, Massachusetts D. Kennedy, Worklab Consulting LLC, New York

This workshop, the second in a series supported by the American Express Foundation, brought together life scientists making, or recently having made, the transition to a leadership or managerial position in academia, not-for-profit organizations, or the private sector. It focused on the techniques, situations, and challenges that relate specifically to leading and managing in the scientific workplace. Participants were able to share their experiences and challenges with one another and to receive feedback and guidance from others with similar experience. The workshop helped participants identify areas where they needed guidance, as well as how to capitalize on areas of strength. Participants learned and developed the necessary skills to lead and interact effectively with others in both one-on-one and group settings.

### SESSION 1: Who We Are

Participants read 50–100-word essay "Who I am and what I hope to get from this workshop?" aloud to the entire group.

SESSION 2: Introduction: What Is Leadership and What Makes a Great Scientist/Leader?

Small groups proposed attributes of leadership especially in a scientific context and discussed examples of effective and ineffective leadership based on their own experience and observations. This was followed by the entire group deciding on attributes of excellent leaders.



### SESSION 3: Difficult Conversations and Interactions

The group reviewed the types of situations and interactions that scientists find difficult as they transition into leadership positions. There was discussion of the fundamental tools needed for negotiating difficult conversations with difficult people.

### SESSION 4: Keynote Speaker: K. Barker

The author and laboratory management expert spoke of her experiences.

### SESSION 5: Science in the Public Eye

Facilitator: K.R. Miller, Brown University, Providence, Rhode Island

Dr. Miller reviewed what he has learned debating complex scientific issues in sometimes contentious circumstances. He led the group in an exercise stimulating a lively public interchange about the teaching of evolution in public schools. Participants got first-hand experience in dealing with a public audience and received valuable guidance and pointers on how to comport themselves in such circumstances.

### SESSION 6: Group Dynamics and Meetings

- How to run and lead meetings
- How to structure and encourage open discussion, ensuring participation

- How to deal with silence and nonparticipants
- How to recognize and manage impediments to effective group problem solving

### SESSION 7: Projecting Leadership

Volunteers were selected to deliver a "pitch" about their institution, department, or group, with participants providing feedback in the context of what had been learned so far in the workshop.

### SESSION 8: Case Studies

Attendees were instructed to bring a one-page case study describing a difficult management situation or leadership challenge they faced or are facing. In small groups, each attendee read their case aloud. A structured discussion guide was used to elicit comments, discussion, and suggestions from the group, which then selected one case that best illustrated a key leadership challenge for presentation in summary to meeting.

### SESSION 9: Concluding Group Discussion

Participants reviewed the definition of leadership constructed at the beginning of the workshop and asked "What did we learn?" and "What didn't we learn that we would have liked to learn?"



Entrance to the Banbury Center

### The Fourth NIMH-Sponsored Brain Camp

### March 16-18

FUNDED BY	National Institute of Mental Health, Bethesda, Maryland
ARRANGED BY	M. Akil, National Institute of Mental Health, Bethesda, Maryland T. Insel, National Institute of Mental Health, Bethesda, Maryland

Once again, we were delighted to host the National Institute of Mental Health (NIMH)-sponsored "Brain Camp." The goal of the Brain Camp is to identify areas of neuroscience that are of interest and relevance to psychiatrists and to communicate these to a small group of outstanding psychiatry residents and research fellows. Some of the most distinguished and thoughtful neuroscientists in the country came as guest speakers to the meeting. The goal of the series of meetings is to develop a neuroscience curriculum that can eventually be shared with psychiatry training programs around the country.

Opening Remarks: M. Akil, National Institute of Mental Health, Bethesda, Maryland

SESSION 1: Developmental Neurobiology

F. Lee, Weill Cornell Medical College, New York: Role of neurotrophins in psychiatric disorders: A neurodevelopmental approach. D. Amaral, University of California, Davis: Neurobiological and neuroimmune approaches to understanding autism.

Introduction and Charge: T. Insel, National Institute of Mental Health, Bethesda, Maryland

Special Lecture: Studies of Rett Syndrome and MeCP2 and Their Relevance to Neuropsychiatric Disorders H. Zoghbi, Baylor College of Medicine, Houston, Texas



### SESSION 2: Innovators in Psychiatry

- S. Lisanby, Columbia University, New York: Innovations in brain stimulation: Game changer for clinical neuroscience.
- X. Castellanos, New York University Child Study Center, New York: Spontaneous neural/BOLD fluctuations reveal intrinsic functional connectivity circuits.
- **SESSION 3:** The Rational Development of Novel Therapeutics
- K. Ressler, Emory University, Atlanta, Georgia: Targeting neural plasticity to treat fear and anxiety.
- R. Duman, Yale University School of Medicine, New Haven, Connecticut: Keeping neurons alive, healthy, and connected.

### Special Lecture: Cognitive Neuroscience: Tools that Facilitate Research on Novel Therapeutics

**B. Cuthbert**, National Institute of Mental Health, Rockville, Maryland; New cognitive neuroscience tools for novel therapeutics: Dimensions and data sets.

### SESSION 4: Neuroscience and Psychiatry

J. Krystal, Yale University School of Medicine, New Haven, Connecticut: Glutamatergic treatment strategies for schizophrenia: A translational neuroscience perspective.

### SESSION 5: Development of Novel Therapeutics

S. Paul, Weill Cornell Medical College, New York: Drug discovery and development: Current challenges and opportunities. "It is the worst of times—It is the best of times."

### Round Table Discussion with All Speakers and NIMH Staff

How to sustain the research careers of physician scientists in psychiatry.

#### **SESSION 6:** Development of Novel Therapeutics

C. Austin, National Human Genome Research Institute, Bethesda, Maryland: Translational therapeutics development at the NIH.



H. Zoghbi

### April 1-3

FUNDED BY	The Alfred P. Sloan Foundation and The Rockefeller University, New York, New York
ARRANGED BY	<ul> <li>C. Feltes, The Rockefeller University, New York</li> <li>D. Gibson, Memorial Sloan-Kettering Cancer Center, New York</li> <li>C. Norton, Marine Biological Laboratory, Woods Hole, Massachusetts</li> <li>L. Pollock, Cold Spring Harbor Laboratory</li> </ul>

As a result of social, economic, and technological factors, the role of libraries in society and academia is changing rapidly and significantly. As key service providers, libraries are expected to be up-to-date technologically and to adapt to changing circumstances and the changing needs of their users. This is particularly true of libraries catering to scientists where the changes in science publishing have been remarkable, and where the users are more likely to expect the latest technologies. This has been a source of conflict, uncertainty, and concern at many institutions. For this reason, this meeting brought together librarians, researchers, administrators, and experts in various topics relating to future developments in library science to discuss the future of science libraries at academic research institutions.

Welcoming Remarks: J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory Introduction: L. Pollock, Library and Archives, Cold Spring Harbor Laboratory

SESSION 1: Overview of Scientific Research Libraries

Chairperson: C. Rinaldo, Ernst Mayr Library of the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts



- C. Feltes, The Rockefeller University, New York and F. Norman, National Institute for Medical Research, Mill Hill, London: The current state of scientific research libraries in the U.S. and the U.K.
- K. Douglas, California Institute of Technology, Pasadena: Economic factors affecting scientific research libraries.
- A. Raymond-Denise, Pasteur Institute, Paris, France: Research libraries in France: A future in progress.
- K. Holmes, Washington University, St Louis, Missouri: Understanding research impact on the individual, group, and organization level: A critical role for libraries.
- R. James King, National Institutes of Health Library, Bethesda, Maryland: Facilitating collaboration with researchers and clinicians.
- **SESSION 2:** Our Changing System of Scholarly Communication
- Chairperson: R. Akerman, National Research Council National Science Library, Ontario, Canada
- T.S. Plutchak, University of Alabama at Birmingham: What is the true value of scientific literature?
- J. Neal, Columbia University, New York: Disseminating new scientific and medical findings.
- M. Ackerman, National Library of Medicine, Bethesda, Maryland: The image as the future primary research data source.

SESSION 3: Transforming Scientific Research Libraries

- Chairperson: K. Chad, Kenchad Consulting, United Kingdom
- Moderators: P. Mitra, Cold Spring Harbor Laboratory, and P. Thibodeau, Duke University, Durham, North Carolina
- Discussion: Researchers' Expectations for Future Library Collections and Services
- M. Tennant, University of Florida, Gainesville: Looking forward: A critical role for the library in research, education, and assessment.
- R. Luce, Emory University, Atlanta, Georgia: Transforming research library roles into workflow support.
- SESSION 4: Envisioning the Future of Scientific Research Libraries
- Chairperson: D. Gibson, Memorial Sloan-Kettering Cancer Center, New York
- M. Marlino, National Center for Atmospheric Research, Boulder, Colorado: Seven times around Jericho: How do we bring down the walls?
- F. Heath, University of Texas, Austin: A model for scientific research libraries of the future.
- T. Hickerson, University of Calgary, Alberta, Canada: Shared mission, converged programs: Libraries, archives, and the scientific record.

H. Miller, Marine Biological Laboratory, Woods Hole Oceanographic Institute, Woods Hole, Massachusetts: Data and informatics: A new realm for libraries.

### General Discussion and Future Direction

M. Pollock, Cold Spring Harbor Laboratory



C. DeRosa, H. Miller



M. Marlino, R. Luce

### Transcription and Cancer

### April 9-12

FUNDED BY	Cold Harbor Laboratory Corporate Sponsor Program
ARRANGED BY	J. Bradner, Dana-Farber Cancer Institute, Boston, Massachusetts R. Young, Whitehead Institute for Biomedical Research, Cambridge, Massachusetts

Genetic alterations that alter signaling, transcription, and chromatin are hallmarks of cancer. New insights in transcriptional and chromatin biology, coupled with technical advances in discovery chemistry, have allowed unprecedented progress toward therapeutics that target this traditionally undruggable class of proteins. Motivated by the historic and pressing challenge of developing direct-acting inhibitors of gene regulatory complexes, participants in this meeting included leaders in the fields of transcriptional biology, chromatin biology, protein biochemistry, and cancer drug discovery.

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

Introductory Remarks: J.D. Watson, Cold Spring Harbor Laboratory



A. Koehler, J. Bradner

SESSION 1: Biology of Transcription in Cancer

M. Ptashne, Memorial Sloan-Kettering Cancer Center, New York: Nucleosomes and the logic of gene regulation.K. Adelman, National Institute of Environmental Health,

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Research Triangle Park, North Carolina: Pol II pausing at genes involved in cell proliferation.
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K. Jones, Salk Institute for Biological Studies, La Jolla, California: SKIP connects signaling to P-TEFb elongation and splicing.

- J. Espinosa, University of Colorado, Boulder, Colorado: The role of mediator in oncogenesis.
- A. Shilatifard, Stowers Institute for Medical Research, Kanas City, Missouri: Trithorax/MLL (COMPASS) family of H3K4 methylases in cancer.
- S. Orkin, Harvard Medical School, Boston, Massachusetts: Polycomb complex and cancer.

### SESSION 2: Targeting Transcription Factors

- A. Mapp, University of Michigan, Ann Arbor: Small-molecule transcriptional modulators.
- A. Koehler, Broad Institute of Harvard and Massachusetts Institute of Technology, Cambridge, Massachusetts: Small-molecule probe development for transcription factors.
- J. Toretsky, Georgetown University, Washington, D.C.: Small-molecule targeting of fusion protein transcription factors and the biochemistry of intrinsically disordered proteins.

SESSION 3: Myc: A Master Regulator of Cancer Pathogenesis

G. Evan, University of Cambridge, United Kingdom: The role of Myc in tumor maintenance.

R. Young, Whitehead Institute for Biomedical Research, Cambridge, Massachusetts: Transcriptional amplification in tumor cells with elevated c-Myc.

### SESSION 4: Epigenetic Reader Proteins

- J. Bradner, Dana-Farber Cancer Institute, Boston, Massachusetts: Targeting epigenetic reader proteins.
- S. Frye, University of North Carolina, Chapel Hill: Chemical biology of methyl lysine.

### SESSION 5: Structural Insights into Gene Regulatory Complexes

- C. Arrowsmith, University of Toronto, Canada: Structural and chemical biology of the readers and writers of histone marks.
- D. Patel, Memorial Sloan-Kettering Cancer Center, New York: Structural biology of maintenance DNA methylation in mammals.
- C. Wolberger, Johns Hopkins School of Medicine, Baltimore, Maryland: Structural insights into the assembly and activation of SAGA.
- M. Lei, University of Michigan Medical Center, Ann Arbor: The same pocket in menin binds both MLL and JunD but oppositely regulates transcription.
- M. Luo, Memorial Sloan-Kettering Cancer Center, New York: Profile nonhistone targets of protein methyltransferases.



K. Adelman



D. Weinberg, M. Ptashne, J. Darnell, R. Young

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**SESSION 6:** Identification and Targeting of Tumor Dependencies

- C. Vakoc, Cold Spring Harbor Laboratory: RNAi screening to identify roles for chromatin regulators in cancer.
- S. Armstrong, Dana-Farber Cancer Institute, Boston, Massachusetts: Targeting DOT1L in MLL-rearranged leukemias.
- V. Richon, Epizyme, Inc., Cambridge, Massachusetts: Targeting histone methyltransferases.
- J. Grembecka, University of Michigan, Ann Arbor: Therapeutic targeting of MLL fusion proteins in leukemia.
- J. Jin, University of North Carolina, Chapel Hill: Discovery of chemical probes for histone methyltransferases.

### **Review and Summary**



A presentation at the meeting

### Phage and Phage-Based Therapies

April 15-17

FUNDED BY	GangaGen, Inc., Newark, California
ARRANGED BY	<ul> <li>S. Adhya, National Cancer Institute, Bethesda, Maryland</li> <li>J. Ramachandran, GangaGen Inc., Palo Alto, California</li> <li>G. Schoolnik, Stanford University Medical Center, Palo Alto, California</li> </ul>

The first Banbury conference on phage therapy was held in November 2002. Since that discussion of the potential value of phage therapy and the challenges it faced, there has been much progress in both phage science and the development of phage-based therapies. As more and more pathogens are developing resistance to the current antibiotics, there is a pressing and ever increasing need for new therapies. This second conference on Phage Therapy was organized to review the progress in phage science, the preclinical development of phage-based therapies and clinical experience.

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

Introduction: J.D. Watson, Cold Spring Harbor Laboratory

SESSION 1: Phage Genomics and Evolution

- Chairperson: D. Court, National Cancer Institute, National Institutes of Health, Bethesda, Maryland
- A. Kuchment, *Scientific American*, New York: Cowboy medicine.G. Hatfull, University of Pittsburgh, Pennsylvania: Phage genomics and evolution.
- M. Krupovic, Institute Pasteur, Paris, France: Diversity of prokaryotic viruses.
- S. Moineau, Université Laval, Quebec, Canada: Phage resistance.
- J. Gill, Texas A&M University, College Station: Informing phage therapy with phage genomics.



- I. Connerton, University of Nottingham, Leicestershire, United Kingdom: The ecology of campylobacter phages and the carrier state.
- E. Semenova, Waksman Institute, Piscataway, New Jersey: CRISPR/Cas: Bacterial adaptive immunity and memory system guided by short RNAs.

### SESSION 2: Efficacy of Phage-Derived Products

Chairperson: S. Adhya, National Cancer Institute, National Institutes of Health, Bethesda, Maryland

- J. Ramachandran, GangaGen Inc, Palo Alto, California: Lysis-deficient phages and phage tails: Potential therapeutics.
- B. Sriram, GangaGen Biotechnologies Pvt Ltd., Bangalore, India: Development of a novel phage-derived antistaphylococcal protein.
- V.A. Fischetti, The Rockefeller University, New York: Exploiting a billion years of phage evolution to develop novel antiinfectives.
- B. Peddie, University of Maryland, College Park: Engineering phage as a drug delivery vector.

R. Danner, National Institutes of Health, Bethesda, Maryland: Hospital outbreak of *Klebsiella pneumoniae* producing carapenemase (KPC).

### SESSION 3: Phage Therapy

Chairperson: G.K. Schoolnik, Stanford University, California

- R. Adamia, Eliava Institute, Tbilsi, Georgia: Prospects of phage therapy: East and west.
- E. Stibitz, Food and Drug Administration, Bethesda, Maryland: FDA's perspective on phage therapy and specific issues involved in these proposals.
- H. Brussow, Nestle Research Center, Lausanne, Switzerland: Toward a treatment of *E. coli* diarrhea with T4 phages.
- A. Gorski, Polish Academy of Sciences, Warsaw, Poland: Immunomodulating effects of phage: Their implications for therapy.
- J.A. Fralick, Texas Tech University Health Sciences Center, Lubbock: Applemans protocol for the generation of therapeutic bacteriophages.
- B. Biswas, Naval Medical Research Center, Fort Detrick, Maryland: Applications of phage therapy in military medicine.

#### General Discussion and Future Directions



E. Ching, S. Subramani

E. Semenova

## Interdisciplinary Symposium on Literature, Memory, and Neuroscience

### April 19-21

FUNDED BY	Haig R. Nalbantian, New York, New York The Satenik and Adom Ourian Educational Foundation, New York, New York Mr. and Mrs. Howard Phipps, Jr., Westbury, New York The Daniel and Joanna S. Rose Fund, Inc., New York, New York
ARRANGED BY	S. Nalbantian, Long Island University, Brookville, New York

It is now more than 50 years since C.P. Snow gave his controversial Reith Lectures on *The Two Cultures*, discussing the gulf, as Snow saw it, between the humanities and science. Snow was making specific reference to the British education system, but the phrase soon came into wide spread use. This meeting, held under the auspices of the International Comparative Literature Association, might be regarded as a contribution to uniting the two cultures. Its purpose was to create cross-disciplinary exchange and collaboration between neuroscientists and literary scholars on topics of memory, emotion, consciousness, and creativity.

Keynote Speaker: S. Park, University of Oxford, United Kingdom: Cognitive Literary Criticism and the Two Cultures: With Reference to T.S. Eliot, Virginia Woolf, and Samuel Beckett.

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

Background and Introduction to the Meeting: S. Nalbantian, Chair of ICLA Research Committee on Literature & Neuroscience, Long Island University, Brookville, New York



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### **SESSION 1**

- L. Squire, University of California, San Diego: Conscious and unconscious memory systems of the mammalian brain.
- H. Mancing, Purdue University, West Lafayette, Indiana: Struggling with memory in Spanish fiction: Miguel de Unamuno, Camilo José Cela, and Carmen Martin Gaite.
- R. Epstein, University of Pennsylvania, Philadelphia: Marcel Proust and memory: A neuropsychological perspective.

### **SESSION 2**

- P. Matthews, GlaxoSmithKline, United Kingdom, and Imperial College, London, United Kingdom: Alzheimer's disease and fragmentation of the self.
- J. Bickle, Mississippi State University, Mississippi State: Manipulating brain genes and proteins to affect social learning and memory.

F. Vidal, Max-Planck Institute for the History of Science, Berlin, Germany and F. Ortega, State University of Rio de Janeiro, Brazil: Brains in literature/literature in the brain: Memory and identity in Anglo-American neurofiction.

### Visit to Cold Spring Harbor Laboratory Main Campus

### **SESSION 3**

- R. Stickgold, Harvard University, Boston, Massachusetts: Nonconscious memory processing in sleep and dreams.
- S. Nalbantian, Long Island University, Brookville, New York: Nonconscious memory and the surrealist mind.
- G. Starr, New York University, New York: Memory and aesthetics: Probing the role of imagery in literature and the visual arts.



G. Starr, L. Squire



R. Stickgold, S. Nalbantian

### Patenting Genes: New Developments, New Questions

### April 22-25

funded by	Baxter Healthcare Corporation of Westlake Village, California
	DRI Capital, Inc., Vancouver, British Columbia, Canada
	Eli Lilly & Company, Indianapolis, Indiana
	Genentech, Inc., South San Francisco, California
	Jones Day LLP , New York, New York
	Kaye Scholer LLP, New York, New York
	King & Spalding, LLP, New York, New York
	Novartis Pharma AG, Basel, Switzerland
	Novo Nordisk Inc., Princeton, New Jersey
	Ropes & Gray
ARRANGED BY	K. Sonnenfeld, King & Spalding, LLP, New York
	M. Brivanlou, King & Spalding, LLP, New York

In 1981, more than 30 years ago and soon after the Supreme Court's decision in Diamond v. Chakrabarty, the Banbury Center held a discussion meeting called *Patenting of Life Forms*. A second meeting in 1991 was held, and now, 20 years later, many of those very same issues raised at those two meetings continue to be contentious and the subject of intense debate. They have been brought into sharp focus by the recent Myriad case involving patents covering the *BRCA* gene and so it seemed the right time to convene a third meeting. By bringing together lawyers, judges, clinicians, scientists, academicians, investors, and others who are directly impacted by gene patents, the conference provided a unique opportunity to examine fundamental assumptions that have provided fuel on both sides of the debate for or against gene patents.

Welcoming Remarks: J.A. Witkowski, Director, Banbury Center, Cold Spring Harbor Laboratory

Introduction: K. Sonnenfeld and M. Brivanlou, King & Spalding, New York, and S. Brenner, Salk Institute for Biological Studies, San Diego, California



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SESSION 1: Gene Patents: Where Are We Now?

Chairperson: L. Coruzzi, Jones Day, LLP, New York

- T. Stanek Rea, United States Patent and Trademark Office, Alexandria, Virginia: PTO perspective after Prometheus.
- H. Sauer, Biotechnology Industry Organization, Washington, D.C.: Reflections on the right and wrong of gene patenting: Normative considerations in ethics and law.
- D. Leonard, Weil Cornell Medical College, New York: SACGHS task force on gene patents.
- B. Barrett, Eli Lilly & Company, Indianapolis, Indiana: Patenting genes: A biopharmaceutical company's perspective.
- SESSION 2: Gene Patents Covering Diagnostics: Different Approaches
- Chairperson: P. Fehlner, Novartis Pharma AG, Basel, Switzerland
- R. Cook-Deegan, Duke University, Durham, North Carolina: Gene patents and diagnostics: The many paths not taken.
- W. Grody, American College of Medical Genetics, Los Angeles, California: Impact of gene patents on an academic medical center laboratory.
- D. Brenner, Dysautonomia Foundation, Inc., New York: Strategic use of patents by nonprofits.
- P. Fehlner, Novartis Pharma AG, Basel, Switzerland: Accelerating personalized medicine: Pools, consortia, and open innovation.
- R. Marsh, Myriad Genetics, Inc., Salt Lake City, Utah: The Myriad perspective.

### Panel: Follow-Up Discussion of Session

SESSION 3: Gene Patents: Relevance to Development

Chairperson: C. Shepherd, DRI Capital Inc., Toronto, Canada

- S. Chandrasekharan, Duke University, Durham, North Carolina: The shadow of patent thickets on emerging genomic diagnostics and whole-genome sequencing: What do empirical studies tell us?
- F. Toneguzzo, Partners HealthCare, Charlestown, Massachusetts: Gene patents and implementation of diagnostic tests.
- J. Elliott, Genentech, South San Francisco, California: Gene patents and business concerns.
- C. Shepherd, DRI Capital Inc., Toronto, Canada: Relevance of patent claims to life sciences investing.

Panel: Follow-Up Discussion of Session

SESSION 4: Enforcement of Gene Patents

Chairperson: P. Eagleman, Baxter Healthcare Corporation, Westlake Village, California

- K. Sonnenfeld, King & Spalding, LLP, New York: Mayo v Prometheus: Implications of the Supreme Court's decision.
- R. Dreyfuss, New York University School of Law, New York: Interpreting the opinions of the Federal Circuit in the Myriad case: Will the Supreme Court grant review?
- L. Ben-Ami, Kaye Scholer, LLP, New York: Litigating the genome: What the future holds for patent litigation.

#### Panel: Follow-Up Discussion of Session



K. Sonnenfeld, S. Brenner



J. Elliot

Patenting Genes: New Developments, New Questions 21

SESSION 5: Claiming Genes: In the Beginning and Today

Chairperson: M. Brivanlou, King & Spalding, New York

- J. Haley, Jr., Ropes & Gray LLP, New York: Changes in claim language since Chakrabarty.
- H.-R. Jaenichen, Vossius & Partner, Munich, Germany: The patenting of genes by the European Patent Office.
- J. Broughton and R. Bizley, Avidity IP, Epping, United Kingdom: Whose genes are they anyway?
- J. Cherry, Freehills Patent & Trade Mark Attorneys, Melbourne, Australia: Gene patents in Australia: Past, present and future.

Panel: Follow-Up Discussion of Session

SESSION 6: Where Next?

**Review and Summary** 



T. Rea



R. Desnick

### A History of the Human Genome Project

### May 3-5

FUNDED BYThe Alfred P. Sloan Foundation, New York, New YorkARRANGED BYL. Pollock, Cold Spring Harbor Laboratory<br/>J.A. Witkowski, Cold Spring Harbor Laboratory

The International Human Genome Project (HGP) was one of the great scientific accomplishments, ranking with the Manhattan Project, the Hubble Telescope, and the Large Hadron Collider. However, it is only during the past few years that a movement has begun to lay the groundwork for a history of the HGP. As a first step, CSHL and the Wellcome Trust initiated a project to locate and catalog primary materials relating to the origins of the HGP by holding a meeting at Banbury in 2009. This 2012 meeting reviewed the current state of the HGP history project and plans for producing a book on the HGP, what might be needed for a long-term project, and the goals and organization of long-term projects. Participants included scientists, writers, documentary directors, social scientists, media experts, historians, and archivists.



J. Witkowski

Welcoming Remarks and Background: J.A. Witkowski, Banbury Center, Cold Spring Harbor



SESSION 1: The History of the HGP and the Public Communication

This session reviewed and discussed current projects under way relating to the history of the HGP and how these are expected to contribute to the long-term public communication about the HGP.

- L. Pollock, Cold Spring Harbor Laboratory: HGP original materials.
- R. Aspin and J. Shaw, Wellcome Trust, London, United Kingdom: HGP original materials.
- R. Cook-Deegan, Duke University, Durham, North Carolina: DNA sequencing: Technology history, sharing practices, and applications to medicine and personal genomics.
- J. Durant, Massachusetts Institute of Technology, Cambridge: Museum Genomics Consortium.

General Discussion: The opportunities for long-term public communication on the history of the HGP and its impact.

SESSION 2: General Issues and Current Book Outline

This session began with a brief review of the current book outline and then moved on to examine topics for chapters based on lists made by participants. This was a free-flowing session and each discussion ran for as long as necessary.

G. Weinstock, Washington University, St. Louis, Missouri: Introduction to the book. Discussion of the scope of the book and the current book outline.

- C.T. Caskey, Baylor College of Medicine, Houston, Texas: Origins of the HGP in the United States.
- J. Weissenbach, Centre National de Sequençage, Evry, France: Origins of the HGP in France.
- M. Olson, University of Washington, Seattle: Cloning and mapping.
- L. Smith, University of Wisconsin, Madison: Development of automated sequencing.
- M. Adams, J. Craig Venter Institute, San Diego, California: Shotgun sequencing.
- J. Rogers, Genome Analysis Centre, Norwich,
- United Kingdom: Completing the genome.
- W.R. McCombie, Cold Spring Harbor Laboratory: Computational/bioinformatics.
- R. Cook-Deegan, Duke University, Durham, North Carolina: Social-legal issues.
- K. Davies, Cambridge Healthtech Institute, Needham, Massachusetts: Current and future genomic science and medicine.

### SESSION 3: Wrap-Up and Future Developments

The Sloan Foundation has expressed an interest in a longterm project on the history of the HGP and for bringing the achievements of the HGP and future implications for health to the public. The discussions in the session could focus on the question: What advice would participants give to the Sloan Foundation about what a long-term project might include?



M. Olson, G. Weinstock

J. Rogers, J. Shaw

### Regulation of Metabolism in Cancer

### May 14-17

FUNDED BYBrown Cancer Center, University of Louisville, KentuckyARRANGED BYJ. Chesney, University of Louisville, Louisville, KentuckyJ.D. Watson, Cold Spring Harbor Laboratory

Genetic and epigenetic alterations of transformed cells confer selective advantages that ultimately change their metabolic phenotype. For example, transformed cells transport increased glucose for energetic and anabolic pathways. Approaches to integrate the metabolic with the genomic, epigenetic, and transcriptional alterations of cancer should lead to the identification of novel cancer therapeutic targets. The main objectives of this meeting were to discuss (1) the biophysical and biochemical studies of the unique metabolic requirements and pathway utilizations of transformed cells, (2) emerging sequencing and computational technologies that can rapidly analyze cancer genomes and transcriptional profiles, and (3) biomedical informatics and physical approaches to integrating the metabolic, genomic, and transcriptional interactions of cancer.



R. Kalluri, J. Watson

Introduction: The Basics and Some History: J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory

Welcoming Remarks: Origins of the Banbury Center and Concept Behind Its Conference Center: J.D. Watson, Cold Spring Harbor Laboratory



Brief Introductory Comments: J. Chesney, Brown Cancer Center, University of Louisville, Louisville, Kentucky

Comments: Warburg, Keilin, and Energy Metabolism: W. Koppenol, Swiss Federal Institute of Technology, Zurich, Switzerland

SESSION 1: Approaches to Understanding Metabolic Networks in Cancers

Chairperson: D. Miller, University of Louisville, Kentucky

- G. Stephanopoulos, Massachusetts Institute of Technology, Cambridge: Linking cancer and metabolism via isotopic labeling and metabolic network analysis.
- M. Cascante, Universitat De Barcelona, Barcelona, Spain: Metabolic flux alterations associated with cancer: Application to target discovery.
- A. Lane, University of Louisville, Kentucky: Tracer methodologies, platforms, and models for cancer metabolism.
- T. Fan, University of Louisville, Kentucky: How can stable isotope-resolved metabolomics bridge bench-to-bedside understanding of human cancer?

SESSION 2: Systems Biology and Epigenomics of Cancer

Chairperson: T. Rouault, National Institute of Child Health and Development, NIH, Bethesda, Maryland

A. Califano, Columbia University Medical Center, New York: Cancer systems biology: Assembling and interrogating the regulatory logic of the cancer cell.

J. Ernst, University of California, Los Angeles: Epigenomic signatures for interpreting disease associated genomic loci.

**SESSION 3:** Cancer Metabolism I (Imaging, mTOR and H+ATP Synthase)

Chairperson: C. Dang, University of Pennsylvania, Philadelphia

- J. Koutcher, Memorial Sloan-Kettering Cancer Center, New York: Noninvasive magnetic resonance studies of tumor metabolism and inhibition.
- D. Sabatini, Whitehead Institute, Masschusetts Institute of Technology, Cambridge: Regulation of growth by the mTOR pathway.
- J. Manuel Cuezva, Universidad Autonoma de Madrid, Spain: The mitochondrial H+ATP synthase in cancer.

SESSION 4: Cancer Metabolism II (PI3K, Myc, and Rb)

- Chairperson: C. Thompson, Memorial Sloan-Kettering Cancer Center, New York
- F. Morrish, Fred Hutchinson Cancer Research Center, Seattle, Washington: Metabolic circuit flexibility in triple-negative breast cancer cells.
- M. Yuneva, University of California, San Francisco: Glucose and glutamine metabolism as targets for cancer therapy.

- C. Dang, University of Pennsylvania, Philadelphia: Targeting oncogenic alterations of glucose and glutamine metabolism.
- B. Clem, University of Louisville, Kentucky: Retinoblastoma protein regulation of glucose and glutamine metabolism.
- R. Kalluri, Beth Israel Deaconess Medical Center, Boston, Massachusetts: Metabolism and metastasis.
- C. Thompson, Memorial Sloan-Kettering Cancer Center, New York: Where does NADPH come from?
- SESSION 5: Tumor Microenvironment, Nutrient Sensing, and AMPK

Chairperson: L. Cantley, Harvard Medical School, Boston, Massachusetts

- T. Schroeder, Duke University School of Medicine, Durham, North Carolina: The metabolic tumor microenvironment as a synthetic lethal condition.
- D. Carling, MRC Clinical Sciences Centre, London, England: Regulation of lipid metabolism and role of AMPK in cancer cells.
- D. Ayer, University of Utah, Salt Lake City: Integrating nutrient sensing and growth control.
- N. Hay, University of Illinois, Chicago: AMPK regulates NADPH homeostasis to promote tumor cell survival during energy stress.
- L. Cantley, Harvard Medical School, Boston, Massachusetts: PI3 K and cancer metabolism.
- SESSION 6: Metabolism of Noncancer Cells in Neoplastic Tumors
- Chairperson: T. Schroeder, Duke University School of Medicine, Durham, North Carolina
- P. Carmeliet, Katholieke Universiteit, Leuven, Belgium: Targeting endothelial cell metabolism.
- J. Rathmell, Duke University Medical Center, Durham, North Carolina: Lymphocyte metabolism in immunity and leukemogenesis.
- **SESSION 7:** Fumarate Hydratase, 6-Phosphofructo-Kinase, and Metabolic Therapeutics

Chairperson: J. Eaton, University of Louisville, Kentucky

T. Rouault, National Institute of Child Health and Development, NIH, Bethesda, Maryland: Remodeling of metabolism

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- in familial renal cancer caused by mutations of fumarate hydratase (HLRCC) and SDHB.
- E. Gottlieb, The Beatson Institute for Cancer Research, Glasgow, Scotland: Revealing metabolic adaptations and therapeutic strategies to renal cancer with fumarate hydratase mutations.
- S. Telang, University of Louisville, Kentucky: Regulation of glycolysis by fructose-2,6-bisphosphate.
- J. Chesney, University of Louisville, Kentucky: Development of small-molecule inhibitors of 6-phosphofructo-2kinases.



D. Sabatini



J. Nelson, I. Jain

### Emerging Approaches in Oncology: A Brainstorming Think Tank

June 13-15

funded by	University of Southern California, NCI Physical Sciences in Oncology Center, Los Angeles
ARRANGED BY	<ul> <li>D. Hillis, Applied Minds, Inc. Glendale, California</li> <li>D. Agus, University of Southern California, Los Angeles</li> <li>P. Mallick, Stanford School of Medicine, California</li> <li>T. Tombrello, California Institute of Technology, Pasadena</li> </ul>

The goal of this meeting was to identify critical challenges in oncology and to evaluate the potential of innovative approaches for solving them. The meeting had a rather unusual structure for a Banbury Center meeting. Prior to the meeting, each participant was assigned to two groups (biological/clinical or technology/engineering) and selected a collaborator from the other who could engage in the project. Unlike traditional meetings, in which people present their findings, it was hoped that this would be an opportunity for participants to share emerging research challenges and to identify and evaluate creative approaches for solving them. Team meetings were held in the Conference Room and Meier House, followed by joint sessions in the Conference Room.

SESSION 1: Presentations of Teams 1 and 2

Team 1: N. Marko, Cancer Research UK, Cambridge Research Institute, United Kingdom; S. Maurer, D.E. Shaw & Co., New York.

Team 2: L. Xie, Hunter College, New York; J. Brody, Thomas Jefferson University, Philadelphia, Pennsylvania; A. Tito Fojo, National Cancer Institute, Bethesda, Maryland. SESSION 2: Presentations of Teams 3 and 4

Team 3: D. Ruderman, University of Southern California, Los Angeles; J. Schnitzer, Proteogenomics Research Institute for Systems Medicine, San Diego, California.

Team 4: D. Levitin, McGill University, Montreal, Quebec, Canada; D. Agus, University of Southern California, Beverly Hills.



S. Hingorani



P. Mallick

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SESSION 3: Presentations of Teams 5 and 6

Team 5: A. Lo, Massachusetts Institute of Technology, Cambridge; L. Nagahara, National Cancer Institute, Bethesda, Maryland.

Team 6: M. Gross, University of Southern California, Westside Cancer Center, Beverly Hills; E. Gradman, Eric Gradman, Inc., Los Angeles, California.

SESSION 4: Presentations of Teams 7, 8, and 9

Team 7: M. Meyer, University of Utah, Salt Lake City; P. Mallick, Stanford School of Medicine, California; S. Hingorani, Fred Hutchinson Cancer Research Center, Seattle, Washington.

Team 8: A. Sharif, Daedalus Software, Inc., Cambridge, Massachusetts; M. Vander Heiden, Massachusetts Institute of Technology, Cambridge; D. Byrd, Seattle Cancer Care Alliance, Washington.

Team 9: B. Chaudhry, Healthcare Analytics IBM Research, Washington, DC; A. Minn, University of Pennsylvania, Philadelphia; S. Hanlon, National Cancer Institute, NIH, Bethesda, Maryland.

SESSION 5: Presentations by Teams 1-4

Team 1: N. Marko, Cancer Research UK, Cambridge Research Institute, United Kingdom; S. Maurer, D.E. Shaw & Co., New York

Team 2: L. Xie, Hunter College, New York; J. Brody, Thomas Jefferson University, Philadelphia, Pennsylvania; A. Tito Fojo, National Cancer Institute, Bethesda, Maryland. Team 3: D. Ruderman, University of Southern California, Los Angeles; J. Schnitzer, Proteogenomics Research Institute for Systems Medicine, San Diego, California.

Team 4: D. Levitin, McGill University, Montreal, Quebec, Canada; D. Agus, University of Southern California, Beverly Hills.

**SESSION 6:** Presentations by Teams 5–9

Team 5: A. Lo, Massachusetts Institute of Technology, Cambridge; L. Nagahara, National Cancer Institute, Bethesda, Maryland.

Team 6: M. Gross, University of Southern California, Westside Cancer Center, Beverly Hills; E. Gradman, Eric Gradman, Inc., Los Angeles, California.

Team 7: M. Meyer, University of Utah, Salt Lake City;P. Mallick, Stanford School of Medicine, California;S. Hingorani, Fred Hutchinson Cancer Research Center, Seattle, Washington.

Team 8: A. Sharif, Daedalus Software, Inc., Cambridge, Massachusetts; M. Vander Heiden, Massachusetts Institute of Technology, Cambridge; D. Byrd, Seattle Cancer Care Alliance, Washington.

Team 9: B. Chaudhry, Healthcare Analytics IBM Research, Washington, DC; A. Minn, University of Pennsylvania, Philadelphia; S. Hanlon, National Cancer Institute, NIH, Bethesda, Maryland.

General Discussion and Wrap-Up



E. Gradman

# Systems Biology of Autism: From Basic Science to Therapeutic Strategies

### September 9-12

funded by	Marie Robertson Research Fund and Roberston Research Fund, Cold Spring Harbor Laboratory, New York; Pfizer Inc., Memphis, Tennessee; Simons Foundation, New York, New York; Certerra, Inc., Cold Spring Harbor, New York
ARRANGED BY	P. Osten, Cold Spring Harbor Laboratory M. Sur, Massachusetts Institute of Technology, Cambridge

Genetic analyses of autism have identified a confusingly large number of genes associated with autism. One way of trying to bring some order to the field is to try to group these genes based on common pathways. A combination of different systems biology methods (mouse and other animal models, human iPS cells, genetics, and bioinformatics) could result in a powerful research synergy and lead to a formulation of generalizable hypotheses about neurodevelopmental changes in autism. This meeting explored whether this was feasible. Ultimately, the goal of such research must be to develop therapies, and this requires deciding on what experimental endophenotypes will provide the most useful platforms for drug discovery. Participants included scientists studying autism genes in animal models and using human iPS cells for screening of cellular functions; geneticists and bioinformaticists; representatives from pharmaceutical companies interested in autism drug development; and systems neuroscientists.

Introduction: P. Osten, Cold Spring Harbor Laboratory

SESSION 1: Genetics and Gene Networks

*Theme:* There are many genes implicated in autism. How to guide the selection of the best candidates?

M. Wigler, Cold Spring Harbor Laboratory: What to do with candidate gene data?

Chairperson: M. Wigler, Cold Spring Harbor Laboratory

I. Iossifov, Cold Spring Harbor Laboratory: Role of de novo and rare variants in the genetics of autism.





J. Darnell

D. Geschwind, G. Dawson

- D. Vitkup, Columbia University, New York: Discovering gene networks associated with ASD.
- J. Darnell, The Rockefeller University, New York: Genomewide identification of mRNA targets of translational repression by the fragile-X mental retardation protein, FMRP.
- D. Geschwind, University of California, Los Angeles: Pathway convergence in autism: What might it mean?
- J. Gillis, Cold Spring Harbor Laboratory: Assessing bias in network analysis of gene function.

**SESSION 2:** Genetics and Epigenetics in Cell and Animal Models

*Continued Theme:* There are many genes implicated in autism. How to guide the selection of the best candidates? **Chairperson: L. Kadiri,** Certerra, Inc., Cold Spring Harbor

- H. Song, Johns Hopkins University, Baltimore, Maryland: Systems biology of epigenetic mechanisms in autism.
- P. Jin, Emory University School of Medicine, Atlanta, Georgia: New DNA modification(s) in neurodevelopment and autism.
- R. Dolmetsch, Stanford University, California: Using stem cells and mice to study genetic forms of autism.
- F. Vaccarino, Yale University, New Haven, Connecticut: Induced pluripotent stem cells to study autism: Promise and challenges.
- R. Greenspan, University of California, San Diego: Exploring the broad network of behavioral gene interactions.

SESSION 3: Animal Models: Genes, Brain Circuits, and Synapses

*Theme:* Mouse models of selected autism genes are beginning to show a broad range of circuit and synaptic phenotypes. How to interpret the results? How to address the differences between the animal and human brain?

Chairperson: G. Fischbach, Simons Foundation, New York

- Z.J. Huang, Cold Spring Harbor Laboratory: Altered maturation of GABAergic interneurons, critical period plasticity, and visual perception in a mouse model of Rett syndrome.
- A. Mills, Cold Spring Harbor Laboratory: Engineered mouse models of 16p11.2CNVs.
- D. Page, The Scripps Research Institute, Jupiter, Florida: Toward a mechanistic understanding of autism-relevant phenotypes in Pten haploinsufficient mice.
- R. Tsien, New York University, New York: Deciphering underpinnings of autism and oxytocin enhancement of circuit signal to noiseK. Huber, University of Texas Southwestern Medical Center, Dallas: Destabilized mGluR5 synaptic scaffolds, fragile X, and autism.

SESSION 4: Animal Models: Behavioral Studies and Translational Opportunities

*Theme:* Can animal behavior and other animal assays be used as biomarkers in preclinical drug discovery?

- Chairperson: C. Schutt, Princeton University, The Nancy Lurie Marks Family Foundation, New Jersey
- H. Sive, Whitehead Institute, Cambridge, Massachusetts: Lessons from zebra fish.
- J. Crawley, University of California, Davis, Sacramento: Pharmacological reversal of social deficits and repetitive behaviors in mouse models of autism.
- A. Kepecs, Cold Spring Harbor Laboratory: Sniff and decide: Quantitative assessments of social behavior in mice.
- M. Sur, Massachusetts Institute of Technology, Cambridge: Signals that affect synapses in autism: Insights from Rett syndrome.
- P. Osten, Cold Spring Harbor Laboratory: Mapping brain circuits in genetic mouse models of autism and preclinical drug discovery.

L. Young, Emory University, Atlanta, Georgia: Oxytocin and social cognition: Implications for novel therapies for autism.

SESSION 5: Therapeutic Work and Clinical Trials

*Theme:* How basic research can help and guide clinical work and starting clinical trials? **Chairperson: W. Chung,** Columbia University, New York

Chairperson: w. Chung, Columbia University, New York

- J. Spiro, Simons Foundation, New York and W. Chung, Columbia University, New York: Studying ASD through the context of an identified recurrent genetic event (16p11.2).
- A. Healy, Seaside Therapeutics, Cambridge, Massachusetts: Clinical trials in FXS: Effects on neurobehavioral function and strategies to develop molecular biomarkers
- E. Anagnostou, Bloorview Research Institute, Toronto, Canada: Oxytocin and social cognition/function: Early clinical studies.
- G. Dawson, University of North Carolina, Autism Speaks, Chapel Hill: Autism spectrum disorders: Challenges in bridging the gap from preclinical research to clinical trials.
- G. Lyon, Cold Spring Harbor Laboratory: Clinical progress in autism genetics and treatment.

**Review and Summary** 



C. Schutt, R. Greenspan

### Inspire2Live

### September 14–16

FUNDED BY	Inspire2Live, Utrecht, Netherlands
ARRANGED BY	Inspire2Live Discovery Network Team, Amsterdam, Cambridge, Oxford, Paris, New York, Boston, Seattle

The Inspire2Live Foundation was created with the aim of motivating as many people as possible to constantly challenge and expand their boundaries and to raise funds to fight cancer by organizing fund-raising events. The Foundation has shifted its funding strategy toward mobilizing a team of committed sponsors. To this end, the presidents of the Alp d'HuZes fund raiser and the Dutch Cancer Foundation KWF came to Banbury Center together with senior members of the cancer research community. The meeting began with updates on the scientific research of the Foundation's program, followed by presentations on the clinical aspects of the program. Discussion then turned to the Foundation's funding plans, followed by a detailed focus on setting up the organizational necessities needed in 2012 in preparation for 2013.

Welcoming Remarks: J.A. Witkowski, Director, Banbury Center, Cold Spring Harbor Laboratory

SESSION 1: Update on the Scientific Parts

- Moderator: A. Eggermont, President, Institut Gustave Roussey, Paris, France
- M. Stratton, Sanger Institute, Cambridge: Overall program need and impact.
- H. Clevers, The Hebrecht Institute, The Netherlands: Organoids.
- M. Stratton, The Sanger Institute, Cambridge, United Kingdom: Screening.
- M. Meyerson, Dana-Farber Cancer Institute, Boston, Massachusetts: Sequencing.
- S. Friend, Sage Bionetworks, Seattle, Washington: Model sharing.



### SESSION 2: Update on the Clinical Parts

- J. Baselga, Massachusetts General Hospital, Boston: Plan of a breast program and team incorporating organoids, other models, screening, sequencing, and trials.
- D. Tuveson, Cold Spring Harbor Laboratory: Plan of the pancreas program and team incorporating organoids, other models, screening, sequencing, and trials.
- C. Sawyers, Memorial Sloan-Kettering Cancer Center, New York: Plan of the prostate program and team incorporating organoids, other models, screening, sequencing, and trials.
- E. Coen van Veenendaal/Rob Snelders, Inspire2Live Foundation: Overall program approach and funding requests.

The Science Team met in the conference room and focused on setting up the organization and planning for the program.

#### Moderators: H. Clevers, S. Friend, P. Kapitein

The Funders Team discussed the necessary steps during 2012 to get the program up and running in 2013 and beyond.

Moderators: A. Eggermont, E. Coen van Veenendaal, R. Snelders

Feedback of Funders Team and Science Team Moderators on Their Approach

General Wrap-Up Discussion



J. Watson, E. Coen van Veenendaal, A. Trounson



B. Conley

### Plant–Environment Interactions

### September 18-21

FUNDED BY	CSHL/DuPont Pioneer Joint Collaborative
ARRANGED BY	M. Timmermans, Cold Spring Harbor Laboratory M. Komatsu, DuPont Pioneer, Wilmington, Delaware R. Martienssen, Cold Spring Harbor Laboratory S. Tingey, DuPont Pioneer, Wilmington, Delaware

The goals of this meeting were to review the latest advances in our understanding of the plant's responses to abiotic environmental cues and pathogens, and during the establishment of symbiotic associations. These reviews were expected to drive discussions on current research addressing natural variation and adaptation to biotic and abiotic stresses. The meeting included, in addition to members of the CSHL/DuPont Pioneer Joint Collaborative, speakers from outside the collaboration.

Welcoming Remarks: J.A. Witkowski, Director, Banbury Center, Cold Spring Harbor

Introduction: M. Komatsu, DuPont Pioneer, Wilmington, Delaware

### **SESSION 1:** Inflorescence Development

- Chairperson: M. Komatsu, DuPont Pioneer, Wilmington, Delaware
- Z. Lippman, Cold Spring Harbor Laboratory: A surprising link between meristem maintenance and pollen development in tomato and *Arabidopsis*.
- B. Il Je, Cold Spring Harbor Laboratory: Fasciated ear3, a potential new CLAVATA receptor.
- O. Danilevskaya, DuPont Pioneer, Johnston, Iowa: Maize ear development under drought stress.



SESSION 2: Small RNAs and Cell Fate Specification

Chairperson: D. Ware, Cold Spring Harbor Laboratory

- F. Van Ex, Cold Spring Harbor Laboratory: Argonautes, small RNA, and germ cell fate.
- M. Dotto, Cold Spring Harbor Laboratory: Update on collaborative projects: tasiR-RNA pathways in maize and new players in leaf polarity.
- M. Timmermans, Cold Spring Harbor Laboratory: Small RNAs as instructive signals in development.

#### SESSION 3: Regulation of Yield

- Chairperson: B. Williams, DuPont Pioneer, Wilmington, Delaware
- D. Jackson, Cold Spring Harbor Laboratory: Maize meristem signaling and yield.
- A. Mohanty, DuPont Pioneer, Hyderabad, India: Mapping of novel genetic loci in rice for improvement of hybrid producibility and defensive traits.
- R. Williams, Dupont Pioneer, Wilmington, Delaware: Drought lead characterization: Using *Arabidopsis* as a model to support Ag traits.
- K. Jiang, Cold Spring Harbor Laboratory: Molecular dynamics of dosage in tomato single gene heterosis.

#### SESSION 4: Epigenetic Gene Regulation

Chairperson: Z. Lippman, Cold Spring Harbor Laboratory

J. Reinders, DuPont Pioneer, Wilmington, Delaware: Maize methylome project: Pilot study review and update on epigenetic variation induced by drought stress.

- A. Olson, Cold Spring Harbor Laboratory: Building and classifying coding and noncoding gene models with transcriptome and methylome sequencing data.
- R. Martienssen, Cold Spring Harbor Laboratory: The maize methylome.

SESSION 5: Responses to Abiotic Environmental Cues

Chairperson: M. Timmermans, Cold Spring Harbor Laboratory

- C. Fankhauser, University of Lausanne, Switzerland: Light regulation of plant growth and development.
- J. Dinneny, Stanford University, California: Spatiotemporal control of environmental response.
- J. Schroeder, University of California, San Diego: Drought/ abscisic acid signaling and chemical genetic dissection of immune: ABA interference mechanisms.
- T. Mitchell-Olds, Duke University, Durham, North Carolina: Complex traits in complex environments.
- D. Ware, Cold Spring Harbor Laboratory: Understanding stress-related traits through root-specific gene networks.

SESSION 6: Symbiosis and Biotic Stress Responses

- Chairperson: M. Komatsu, DuPont Pioneer, Wilmington, Delaware
- U. Paszkowski, University of Lausanne, Switzerland: *Arbuscular mycorrhizal* symbiosis in cereals.
- H. Bouwmeester, Wageningen University, The Netherlands: The role of strigolactones in plant-environment interaction.



M. Timmermans, H. Bouwmeester

M. Albertsen, Z. Lippman

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- G. Oldroyd, John Innes Center, BBSRC, Norwich, United Kingdom: Nutrient acquisition by plants through symbiotic associations.
- D. Bulgarelli, Max-Planck Institute, Koln, Germany: Structure and functional significance of the root-inhabiting bacterial microbiota.
- P. Wolters, DuPont Pioneer, Wilmington, Delaware: Disease resistance in maize: Identification of genes involved in resistance to *Colletotrichum graminicola* and their use in maize breeding.
- G. Rairdan, DuPont Pioneer, Wilmington, Delaware: Exploiting the plant-pathogen "arms race" to engineer resistance to Asian soybean rust.

### SESSION 7: Molecular Analysis of Developmental Progressions

- Chairperson: P. Wolters, DuPont Pioneer, Wilmington, Delaware
- S.-J. Park, Cold Spring Harbor Laboratory: Genetic and molecular dissection of tomato shoot architecture.
- M. Javelle, Cold Spring Harbor Laboratory: An expression atlas of functional domains in the shoot apical meristem.
- J. Calarco, Cold Spring Harbor Laboratory: The pollen methylome.
- A. Eveland, Cold Spring Harbor Laboratory: Unraveling the developmental networks controlling determinacy and inflorescence architecture in maize.

General Discussion: S. Tingey and R. Martienssen



H. Bouwmeester, P. Wolters



O. Danilevskaya, D. Jackson

### September 30-October 3

FUNDED BY	CFIDS Association of America, Charlotte, North Carolina, Centers for Disease Control and Prevention, Atlanta, Georgia	
ARRANGED BY	<b>S. Vernon</b> , CFIDS Association of America, Charlotte, North Carolina <b>R. Silverman</b> , Cleveland Clinic Lerner Research Institute, Ohio	
	E. Unger, Centers for Disease Control and Prevention, Atlanta, Georgia	
	J.A. Witkowski, Cold Spring Harbor Laboratory	

The focus of this meeting was on chronic fatigue syndrome treatment trials. Chronic fatigue syndrome, now referred to as ME/CFS (myalgic encephalomyelitis/chronic fatigue syndrome), is a severe and debilitating illness characterized by a constellation of nonspecific symptoms including fatigue, cognitive impairment, muscle pain, joint pain, disturbed sleep, and general weakness. The objective of this workshop was to review the science behind the efficacy or lack of efficacy of treatment trials in ME/CFS. This was to be accomplished by bringing investigators who have conducted ME/CFS pharmacological randomized controlled trials (RCTs) that have a high level of evidence together with experts in clinical methodology, pharmacology, molecular biology, and ME/CFS. The outcome of this meeting is to be a peer-reviewed publication describing the workshop findings and proposing a set of guidelines that will help optimize study design and clinical methodology of future RCTs for ME/CFS.

### SESSION 1: Background and Clinical Impressions

Chairpersons: R. Dodd, American Red Cross, Rockville, Maryland, and A. Waring (rapporteur), University of California, Los Angeles, Torrance

Guidelines for Session 1: Chairpersons captured key points from each presentation to use these during the breakout

sessions. Speakers included relevance of topic to CFS characteristics of CFS populations and cohorts being discussed.

J.A. Witkowski, Director, Banbury Center, Cold Spring Harbor Laboratory: Welcoming remarks.



- V. Racaniello, Columbia University, New York: Viruses and chronic disease.
- K.K. McCleary, CFIDS Association, Charlotte, North Carolina: Evidence for and against microbial pathogens in CFS.
- J.-M. Lin, Centers for Disease Control and Prevention, Atlanta, Georgia: Healthcare utilization in CFS.
- M. Cooperstock, University of Missouri Health Care, Columbia: Clinical perspectives on pediatric postinfection CFS.
- F. Maldarelli, National Cancer Institute, Bethesda, Maryland: Clinical perspectives on an adult CFS population selected to study XMRV.
- D. Cook, University of Wisconsin, Madison: The metabolic profile of PEM.

SESSION 2: Lessons Learned from CFS Treatment Trials

Chairpersons: V. Racaniello, Columbia University, New York, and K.K. McCleary (rapporteur), CFIDS Association of America, Charlotte, North Carolina

*Guidelines for Session 2:* Chairpersons captured key points from each presentation to use these during the breakout sessions. Speakers described study design (e.g, case/control), selection of study subjects (e.g., volunteer and advertisement), inclusion/exclusion criteria, trial setting, and outcome measures and characteristics of CFS populations/cohort being discussed.

- P. Rowe, Johns Hopkins University, Baltimore, Maryland: Lessons from the florinef trial.
- C.-G. Gottfries, Gottfries Clinic, Moindal, Sweden: The use of dopaminergic stabilizer OSU6162 in treatment of fatigue.

- K. Rowe, The Royal Children's Hospital, Victoria, Australia: Lessons from gamma globulin treatment trial.
- J. G. Montoya, Palo Alto Medical Foundation, California: Viral and immune profiles of responders to valcyte.
- L. Bateman, The Fatigue Consultation Clinic, Salt Lake City, Utah: Lessons from treatment of CFS patients with ampligen.
- N. Klimas, University of Miami School of Medicine, Florida: Can response to drugs help us reverse-engineer CFS?

SESSION 3: Considerations for CFS Treatment Trial Design

Chairpersons: R. Bromley, TRAC Consulting, Redwood City, California, and K. Morren, ServiceSource, Denver, Colorado

*Guidelines for Session 3:* Chairpersons captured key points from each presentation to use these during the breakout sessions. Speakers described aspects of the clinical trial study design impacted by their presentation topic.

- Ø. Fluge, Department of Oncology and Medical Physics, Haukeland University Hospital, Bergen, Norway: Benefit from B-cell depletion in CFS.
- E. Crawley, University of Bristol, United Kingdom: Considerations when planning trials in children with ME/CFS.
- J. Jones, Center for Disease Control and Prevention, Atlanta, Georgia: Choice of control subjects in CFS clinical trials.
- L. Chang, David Geffen School of Medicine at UCLA, Los Angeles, California: Comorbid conditions and impact of CFS treatment trials.



M. Cooperstock, S. Vernon, L. Bateman, K. Rowe

- E. Unger, Centers for Disease Control and Prevention, Atlanta, Georgia: Deconstructing CFS: Search for endophenotypes reflecting pathogenesis.
- M. Demitrack, Neuronetics, Inc., Malvern, Pennsylvania: Treatment resistance: Real or just not the right drug?

#### SESSION 4: Plausible Therapeutic Targets

Chairpersons: S. Deftereos, Biovista, Inc., Charlottesville, Virginia, and A Persidis (rapporteur), Biovista Inc., Charlottesville, Virginia

*Guidelines for Session 4:* Chairpersons captured key points from each presentation to use these during the breakout sessions. Speakers described where in the biomarker and clinical trial pipeline the data in their presentation "fits" and what is required to move it to the next phase.

- I. Biaggioni, Vanderbilt University School of Medicine, Nashville, Tennessee: Is sympathetic tone a target in CFS?
- G. Broderick, University of Alberta, Canada: Network analysis for druggable target identification.
- S. Shukla, Marshfield Clinic Research Foundation, Marshfield, Wisconsin: The "CFS" microbiome as a possible therapeutic target.
- M. Medow, New York Medical College, Hawthorne, New York: Brain blood flow and brain fog in CFS.
- P. McGowan, University of Toronto, Scarborough, Canada: Targeting methylation as a CFS treatment.
- S. Deftereos, Biovista Inc., Charlottesville, Virginia: Preliminary drug repurposing findings in CFS.
- B. Munos, InnoThink Center for Research in Biomedical Innovation, Indianapolis, Indiana: How to energize drug innovation for CFS.

SESSION 5: Advancing the Science of Medicine for CFS

Three breakout groups met from 9 am to 10 am to brainstorm questions and issues generated by the session chairpersons. Each group produced an outline that was presented to the workshop participants following the break.

**Breakout Group 1:** Subtypes vs. symptoms: What is the best strategy for CFS treatment trials? (Sessions 1 and 3)

Led By: I. Biaggioni and L. Bateman

Group 1 Participants: M. Cooperstock, E. Crawley, C.-G. Gottfries, M. Medow, K. Rowe, P. Rowe, E. Unger, A. Waring

**Breakout Group 2:** Moving treatment forward now: How and who are the players? (Session 2)

Led By: B. Munos and N. Klimas

Group 2 Participants: M. Demitrack, S. Deftereos, R. Dodd, J. Jones, N. Klimas, F. Maldarelli, K.K. McCleary, J. Montoya, S. Vernon

**Breakout Group 3:** Strategies for data analysis to identify therapeutic targets. (Session 4)

Led By: R. Bromley and A. Persidis

Group 3 Participants: G. Broderick, D. Cook, J.-M. Lin, P. McGowan, K. Morren, V. Racaniello, S. Shukla, R. Silverman, A. Waring

Presentation and Discussion of Group 1 Report: L. Bateman Presentation and Discussion of Group 2 Report: N. Klimas Presentation and Discussion of Group 3 Report: A. Persidis

Review of Workshop Outcome(s): S. Vernon



S. Vernon, S. Shukla

K.K. McCleary

### Grand Challenges in Organismal Biology

### November 8-11

FUNDED BY	National Science Foundation through a grant to Stony Brook University
ARRANGED BY	D. Padilla, Stony Brook University, New York B. Swalla, University of Washington, Seattle B. Tsukimura, California State University, Fresno

The National Research Foundation has established Research Coordination Networks (RCNs) in various fields, intended to "...advance a field or create new directions in research or education by supporting groups of investigators to communicate and coordinate their research, training, and educational activities across disciplinary, organizational, geographic, and international boundaries." Investigators came to Banbury to consider the potential value of an RCN for metazoan organismal biology, specifically the issue "How organisms walk the tightrope between stability and change" and, more broadly, "What will be needed as far as infrastructure to solve complex problems and interactions across scales?" One of the goals of the meeting was to plan a full-scale workshop on the topic.

Welcoming Remarks: J.A. Witkowski, Director, Banbury Center, Cold Spring Harbor Laboratory

SESSION 1: Goals of Meeting, Introductions, and Approaches to Answering Big Questions

D. Padilla, Stony Brook University, New York: Background and goals; Introductions–Who are we?B. Swalla, University of Washington, Seattle: What is an RCN and how can they work? EDEN-the Evo-Devo-Eco Network RCN.

D. Padilla, Stony Brook University, New York: Synthesis Centers.



B. Tsukimura, California State University, Fresno: iPlant.

- D. Manahan, University of Southern California, Los Angeles: Thinking integratively in organismic biology: Lessons from decade-long NSF graduate training programs.
- T. Daniel, University of Washington, Seattle: New approaches needed to address big questions.
- Group Discussion: Think big—"Blue sky" ideas about needs associated with specific plans of attack on the GCOB.

### SESSION 2: Break Out Groups

Priorities for making progress on this GCOB (more data, more cross disciplinary collaboration, a new generation of thinkers?), and best paths to getting there (cyberinfrastructure, synthesis of existing data, new mathematical models?).

### Wrap-Up Discussion

SESSION 3: Agenda for the Next Workshop

General Discussion: Setting agenda for the big workshop, types of participants, and scientific expertise needed.

Breakout Groups: Recommendations, narrowing scope.

**Reports and Discussion:** Agenda for workshop, homework for workshop participants, recommended areas of expertise, and action plan for Steering Committee.

**Breakout Groups:** Additional elements that need to be included.

### Group Discussion

**Breakout Groups:** Agenda for workshop and homework for workshop participants.

Report Out and Group Discussion

SESSION 4: Finalize Action Plans

For agenda, homework, and types of scientists to include in next workshop. For Steering Committee.

### Wrap-Up Discussion

Final Thoughts: Set dates for the workshop, nominating participants/research areas



C. Hayashi

T. Daniel, W. Zamer

### Cell Plasticity in Cancer Evolution

### November 11-14

FUNDED BY	Astellas-OSI Oncology, Farmingdale, New York
ARRANGED BY	J. Condeelis, Albert Einstein College of Medicine, Bronx, New York D. Epstein, Astellas-OSI Oncology, Farmingdale, New York J. Haley, Astellas-OSI Oncology, Farmingdale, New York

Banbury Center has been the location for several meetings on the epithelial-mesenchymal transition (EMT) in cancer. This is the most studied form of cellular plasticity and is characterized by the combined loss of epithelial cell junction proteins and cell polarity and the gain of mesenchymal markers. More recently, EMTs have been characterized where the interconversion of vessels and fibroblastic elements can contribute to cancer pathogenesis and fibrosis. These findings have important implications for cancer treatment and prevention. For example, cellular sensitivity to multiple targeted therapies, chemotherapy, and radiotherapy was shown to be governed by the extent to which cells have undergone an EMT-like transition. Resistance associated with cellular plasticity and heterogeneity has been observed in multiple systems derived from adenocarcinomas and squamous carcinomas. The aim of this conference was to explore the molecular and pathobiological significance of cellular plasticity in carcinomas and to the elucidation of signaling pathways which promote plasticity.

Welcoming Remarks: J.A. Witkowski, Director, Banbury Center, Cold Spring Harbor Laboratory

Introduction: R. Kalluri, Harvard Medical School, Boston, Massachusetts



- **SESSION 1:** Epithelial, Endothelial and Neuroendocrine Plasticity
- R. Kalluri, Harvard Medical School, Boston, Massachusetts: Cell plasticity and its energy requirements.
- D. Lyden, Weill Cornell Medical College, New York: Tumorderived exosomes promote plasticity at the premetastatic niche.
- J. Condeelis, Albert Einstein College of Medicine, Bronx, New York: EMT and *trans*-endothelial migration during breast tumor cell dissemination.
- W. Lowry, University of California, Los Angeles: Molecular mechanisms of stem-cell-initiated carcinoma.
- T. Brabletz, University of Freiburg Medical Center, Germany: MicroRNAS, EMT, and cancer stem cells.

#### **General Discussion**

#### SESSION 2: Cell Plasticity in Model Systems

- B. Stanger, University of Pennsylvania, Philadelphia: Analysis of cellular plasticity in an autochthonous model of pancreatic cancer.
- A. Biddle, University of London, England: Developing an in vitro model for characterization of heterogeneous and plastic cancer stem cell phenotypes, and for therapeutic development.
- W. Guo, Albert Einstein College of Medicine, Bronx, New York: Plasticity of epithelial cell hierarchy: induction of the stem-cell state in the breast.
- A. Patsialou, Albert Einstein College of Medicine, Bronx, New York: Cell plasticity in breast tumor invasion: The cell's decision to go or grow.

#### **General Discussion**

### SESSION 3: Signaling Networks in EMT and CSCs

- A. Cano, Instituto de Investigaciones Biomedicas, Madrid, Spain: Regulation of cellular plasticity and the tumor microenvironment by lysyl oxidases (LOX, LOXL1-4).
- D. McClay, Duke University, Durham, North Carolina: Transcriptional control of EMT-subcircuits control each cell biological component.
- R. Carstens, University of Pennsylvania, Philadelphia: The role of alternative splicing in EMT and cancer.
- H. Nakagawa, University of Pennsylvania, Philadelphia: Notch regulation in squamous cancer cell plasticity and mitochondrial functions.

P. Keely, University of Wisconsin, Madison: Matrix stiffness in regulating the proliferation and metabolic plasticity of cancer cells.

#### General Discussion

#### SESSION 4: Epigenetics and Cellular Conversions

- S. Baylin, Johns Hopkins University, Baltimore, Maryland: DNA methylation, cancer stem cells and implications for cell plasticity.
- C. Chaffer, Whitehead Institute for Biomedical Research, Cambridge, Massachusetts: Cellular plasticity: The role of epigenetics in generating CSCs from non-CSCs.
- C. Kleer, University of Michigan Medical School, Ann Arbor: Role of the epigenetic regulator EZH2 in breast cancer initiation and progression.
- R. Thompson, St. Vincents Hospital, Melbourne, Australia: Epithelial Mesenchymal Plasticity (EMP) in Breast Cancer Dissemination–What to target and when?
- G. Van der Pluijm, Leiden University Medical Centre, The Netherlands: BMP7, epithelial plasticity, and metastasis.

### **General Discussion**

SESSION 5: Impacts of Cell Conversion on Cancer Therapy

- J. Engelman, Massachusetts General Hospital, Charlestown: Evolution of cancers through tyrosine kinase inhibitors in lung cancer.
- R. Sordella, Cold Spring Harbor Laboratory: An epigenetic switch modulates cancer cell-state plasticity by regulating Mir-335 expression.
- J. Rosen, Baylor College of Medicine, Houston, Texas: EMT programs, therapeutic resistance, and cancer stem cells.
- J. Haley, Astellas-OSI Oncology, Farmingdale, New York: Cell plasticity and drug resistance.
- S. Alford, Massachusetts Institute of Technology Center for Cancer Research, Cambridge: Dysregulation of EGFR signaling during invasion and metastasis.
- J. Condeelis, Albert Einstein College of Medicine, Bronx, New York:

Wrap-Up: Specific Issues and Priorities

### Inflammation, Cancer, and Metabolism

### November 26-29

funded by	Cold Spring Harbor Laboratory Corporate Sponsor Program
ARRANGED BY	D. Green, St. Jude Children's Hospital, Memphis, Tennessee L. O'Neill, Trinity College, Dublin, Ireland

Otto Warburg showed that tumor cells performed aerobic glycolysis and proposed that this metabolic change was fundamental for pathogenesis of cancer. Mutations in important metabolic enzymes have been shown to be important for tumorigenesis, and more recently, molecular insights into the basis of the Warburg effect have emerged, including the roles of the transcription factor HIF-1 $\alpha$  and also enzymes such as PKM2. Immunologists have also recently turned their attention to changes in immune cell function, and the Warburg effect is now known to occur in activated macrophages and certain T-cell lineages. Other metabolic processes, including those involving AMP kinase and mTOR, are also now seen as important for the immune and inflammatory processes. A number of questions arise. Why are these metabolic changes occurring and what is their mechanistic basis? Might changes in metabolism during cancer and inflammation be critical for disease development? Might these metabolic changes provide an explanation for the link between inflammation and cancer? Is there a prospect here that new treatments might emerge from these insights?

Welcoming Remarks: J.A. Witkowski, Director, Banbury Center, Cold Spring Harbor

Introduction and Meeting Goals: L. O'Neill, Trinity College, Dublin, Ireland

### SESSION 1: Cancer

- E. Gottlieb, Beatson Institute for Cancer Research, Glasgow, United Kingdom: Metabolomics approaches in cancer research.
- R. DeBerardinis, University of Texas Southwestern Medical Center, Dallas, Texas: Diversity of core metabolic pathways in human cancer cells.



- M. VanderHeiden, Massachusetts Institute of Technology, Cambridge: Regulation of anabolic metabolism.
- G. Kroemer, Institut Gustave Roussy, Villejuif, France: Immunosurveillance induced by conventional anticancer therapies: Metabolism matters.

### **General Discussion**

### SESSION 2: Macrophages/TLRs

- L. O'Neill, Trinity College, Dublin, Ireland: Metabolic regulation of inflammatory signaling by Toll-like receptors and inflammasomes.
- D. Underhill, Cedars-Sinai Medical Center, Los Angeles, California: Linking phagocytosis and microbial degradation to inflammatory signaling.
- D. Green, St Jude Children's Research Hospital, Memphis, Tennessee: Noncanonical autophagy in innate immunity.
- M. Netea, Radboud University, Nijmegen, The Netherlands: Trained immunity: Metabolic pathways involved in innate monocyte reprogramming.

#### **General Discussion**

#### SESSION 3: Microbiome, Inflammation, and Obesity

- M. Murphy, University of Cambridge, United Kingdom: How mitochondrial ROS can modulate metabolism.
- J. Ayres, Salk Institute for Biological Studies, San Diego, California: Host-microbiota interactions in health and disease.
- M. Saleh, McGill University, Montreal, Canada: Innate detection mechanisms and inflammation in obesity and type-2 diabetes.
- V. Stambolic, University of Toronto, Princess Margaret Hospital, Ontario, Canada: The relationship between obesity and cancer: The insulin connection.

### **General Discussion**

### SESSION 4: T Cells

- R. Xavier, Massachusetts General Hospital, Boston: Metabolic pathways in immunity.
- D. Cantrell, University of Dundee, Scotland: Metabolism, migration, and memory in cytotoxic T cells.
- N. Chandel, Northwestern University, Chicago, Illinois: Mitochondrial ROS regulate T cells.
- R. Siegel, National Institute of Arthritis and Musculoskeletal and Skin diseases, NIH, Bethesda, Maryland: Mitochondrial reactive oxygen species and autoinflammatory disease.
- G. Matarese, University of Salerno, Italy: Oscillatory intracellular metabolic pathways control immune tolerance.

### General Discussion

### SESSION 5: T Cells

- H. Chi, St Jude Children's Research Hospital, Memphis, Tennessee: mTOR and metabolic pathways in T-cell fate decisions.
- J. Powell, Johns Hopkins University, Baltimore, Maryland: mTOR: Master integrator of T-cell metabolism, differentiation, and function.
- J. Rathmell, Duke University Medical Center, Durham, North Carolina: Glucose uptake in lymphocyte activation and subsets.
- E. Pearce, Washington University School of Medicine, St Louis, Missouri: Posttranscriptional control of T-cell function by Warburg metabolism.
- M. Karin, University of California, San Diego: Virchow explained: The origin of tumor elicited inflammation and its significance.

**General Discussion** 



M. Saleh



R. Xavier, M. Murphy

### **BANBURY CENTER GRANTS**

Grantor	Program	Duration of Grant	2012 Funding
FEDERAL SUPPORT			
Centers for Disease Control and Prevention	Decoding Clinical Trials to Improve Treatment of ME/CES	2012	\$18,440
NIH–National Institute of Mental Health National Science Foundation through a grant to Stony Brook University	The Fourth Annual NIMH Brain Camp Grand Challenges in Organismal Biology	2012 2012	35,662 9,045
NONFEDERAL SUPPORT			
Astellas-OSI Oncology	Cell Plasticity in Cancer Evolution	2012	49,602
Baxter Healthcare Corporation	Patenting Genes: New Developments, New Ouestions	2012	5,000
Boehringer Ingelheim Fonds	Communicating Science	2012	50,549
Certerra, Inc.	Systems Biology of Autism: From Basic Science to Therapeutic Strategies	2012	4,266
CFIDS Association of America	Decoding Clinical Trials to Improve Treatment of ME/CFS	2012	39,107
Cold Spring Harbor Laboratory Corporate Sponsor Program	Transcription and Cancer	2012	43,261
Cold Spring Harbor Laboratory Corporate Sponsor Program	Inflammation, Cancer, and Metabolism	2012	46,068
Cold Spring Harbor Laboratory Library and Archives	Envisioning the Future of Science Libraries at Academic Research Institutions	2012	4,512
Cold Spring Harbor Laboratory/DuPont Pioneer Joint Collaborative	Plant–Environment Interactions	2012	50,000
Discovery Network	Inspire2Live	2012	21,203
DRI Capital, Inc.	Patenting Genes: New Developments, New Questions	2012	7,500
GangaGen, Inc.	Phage and Phage-Based Therapies	2012	39,857
Genentech, Inc.	Patenting Genes: New Developments, New Questions	2012	10,000
Individual participants	The Fourth Annual NIMH Brain Camp	2012	8,070
Individual participants	Patenting Genes: New Developments, New Questions	2012	1,335
Individual participants	Emerging Approaches in Oncology: A Brainstorming Think Tank	2012	2,000
Individual participants	Grand Challenges in Organismal Biology	2012	1,005
Individual participants	Decoding Clinical Trials to Improve Treatment of ME/CFS	2012	2,982
Jones Day LLP	Patenting Genes: New Developments, New Questions	2012	2,000
Kaye Scholer LLP	Patenting Genes: New Developments, New Questions	2012	5,000
King & Spalding, LLP	Patenting Genes: New Developments, New Questions	2012	5,000
Eli Lilly & Company	Patenting Genes: New Developments, New Questions	2012	5,000
Haig R. Nalbantian	Interdisciplinary Symposium on Literature, Memory, and Neuroscience	2012	1,000
Novartis Pharma AG	Patenting Genes: New Developments, New Questions	2012	5,000
Novo Nordisk Inc.	Patenting Genes: New Developments, New Questions	2012	5,000
Pfizer, Inc.	Systems Biology of Autism: From Basic Science to Therapeutic Strategies	2012	5,000
Mr. and Mrs. Howard Phipps, Jr.	Interdisciplinary Symposium on Literature, Memory, and Neuroscience	2012	10,000
Marie Robertson Research Fund	Systems Biology of Autism: From Basic Science to Therapeutic Strategies	2012	20,000
Robertson Fund	Systems Biology of Autism: From Basic Science to Therapeutic Strategies	2012	10,000
The Rockefeller University	Envisioning the Future of Science Libraries at Academic Research Institutions	2012	15,000

### BANBURY CENTER GRANTS (Continued)

Grantor	Program	Duration of Grant	2012 Funding
Ropes & Gray	Patenting Genes: New Developments, New Questions	2012	5,000
The Daniel and Joanna S. Rose Fund, Inc.	Interdisciplinary Symposium on Literature, Memory, and Neuroscience	2012	10,000
The Satenik and Adom Ourian Educational Foundation	Interdisciplinary Symposium on Literature, Memory, and Neuroscience	2012	1,000
Simons Foundation	Systems Biology of Autism: From Basic Science to Therapeutic Strategies	2012	10,000
The Alfred P. Sloan Foundation	A History of the Human Genome Project	2012	50,000
The Alfred P. Sloan Foundation	Envisioning the Future of Science Libraries at Academic Research Institutions	2012	20,000
University of Louisville, Brown Cancer Center	Regulation of Metabolism in Cancer	2012	45,625
University of Southern California, NCI Physical Sciences in Oncology Center	Emerging Approaches in Oncology: A Brainstorming Think Tank	2012	32,663

### Banbury Center Staff

Jan A. Witkowski, Executive Director Janice Tozzo, Executive Assistant Patricia Iannotti, Secretary Barbara Polakowski, Hostess Walter Leute, Supervisor, Grounds Fredy Vasquez, Groundskeeper Joseph McCoy, Groundskeeper