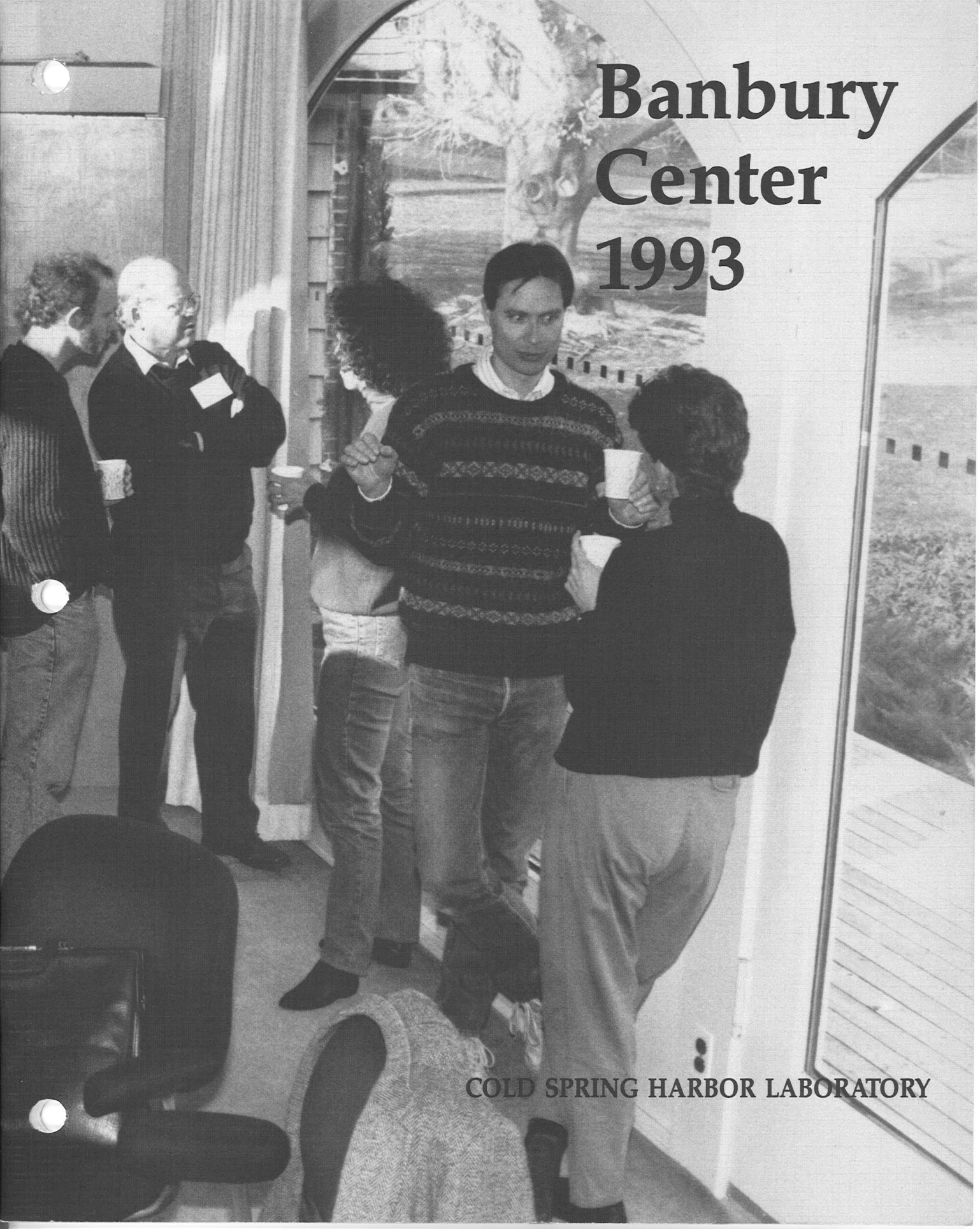


Banbury Center 1993

COLD SPRING HARBOR LABORATORY

BANBURY CENTER DIRECTOR'S REPORT

Banbury Center continues to be one of the premier sites in the world for small, workshop-style meetings. In 1993, there were 16 meetings at the Center, attended by 506 participants. In addition, five neurobiology courses were held over the summer months, and the Center was used for eight other meetings. As usual, the topics of the scientific meetings were diverse, ranging from highly technical subjects in molecular biology to Lyme disease to the genetics of manic-depressive illness.

Participants

We made some refinements to our database at the beginning of 1993, so for the first time, we can provide information about the geographical distribution of our visitors. Participants from the United States came from 31 states. California supplied the largest number (65), followed closely by New York (63), Massachusetts (44), and Maryland (40). These four states alone accounted for 42% of visitors to Banbury Center in 1993. Ninety participants (18%) came from 14 foreign countries. Most came from the United Kingdom, and it is striking that Japanese participants ranked joint second with those from France. This is due in part to the very strong support Japanese companies are providing to the Cold Spring Harbor Laboratory Corporate Sponsor Program. We would like to increase the numbers of scientists from abroad, especially from countries more distant than Europe; however, travel expenses weigh very heavily on the Center's finances.

Molecular Biology

One feature of Banbury Center meetings that contributes to their value and success is that they are interdisciplinary. We make a special effort to bring together scientists working on related topics from different points of view and in different organisms. The advantages of this approach were exemplified in the meeting **Epigenetic Mechanisms of Gene Regulation**. Originally intended to discuss some recent fascinating research in plants, it became clear that to do the subject justice, the meeting would have to include research on other organisms. In the end, maize, petunia, tobacco, yeast, fungi, fruit flies, mice, and human beings were included! It was a pleasure to have Amar Klar returning to his old haunts.

Once the amino acids of a protein have been put together in accordance with the instructions in its gene, the protein has still to assume its final three-dimensional shape. For a long while it was thought that the newly synthesized amino acid chain did this spontaneously, with no additional help. However, it became clear that other proteins were needed and these were called chaperones. Subsequent research has shown that chaperones are involved in many if not all stages of the life of a protein and have a key role in cellular metabolism. The **Molecular Chaperones** meeting discussed what is known of the roles of cellular chaperones and of how they function. How, for example, does a chaperone recognize its target protein? And having done so, how does it interact with the

Robertson House provides dining and housing accommodations at Banbury Center

protein? This was one of three 1993 Banbury Center meetings organized by Cold Spring Harbor Laboratory alumni. In this case it was Mary-Jane Gething who did the hard work of choosing the participants and preparing the program.

The **Apoptotic Cell Death: Functions and Mechanisms** meeting was notable on three counts. First, apoptosis is being recognized as a key phenomenon in an ever-increasing number of biological systems. It occurs as a programmed event during development in the nervous and immune systems and in response to agents such as radiation and cytotoxic drugs. Second, a number of genes, including genes involved in cancers, have been discovered that induce or suppress apoptosis, and this should speed understanding of the cellular mechanisms involved. Third, it is a striking example of the way in which an area of research can suddenly become a very "hot" topic. This was evident in the presence of a BBC film crew shooting material for a forthcoming program on cell death! The timing of the meeting was again just right, and we were able to attract all the top researchers in the field, including Andrew Wylie, who was the first to describe the phenomenon as long ago as 1972.

One of the great challenges in biology is to learn how the transcription of genes is regulated. An ever-increasing number of DNA sequences are being found that, when bound by specific proteins, control expression of genes. One of the best characterized of these elements is the κB element that is associated with a large number of viral and cellular genes. The Banbury Center meeting **κB-binding Proteins: Their Role in Development and Growth Control** was designed to examine this element, especially its control by Rel-related proteins.

The **In Vitro Selection from Combinatorial Libraries** meeting examined the latest strategies for producing molecules with new properties. This is very important for those searching for new drugs, but unfortunately it is difficult to do so systematically, in part because we do not know enough about the relationship between structure and function to make predictions from first principles. An alternative strategy makes use of combinatorial libraries of molecules together with selection of those forms that have enhanced function. And recently a mutational step has been included so that the process has parallels with Darwinian evolution. This was a fascinating meeting in the interplay of theoretical treatments of

generating molecular diversity and the experimental results of those trying to produce molecules.

Just a few years ago, the idea that nitric oxide could act as a messenger molecule would have seemed preposterous. But now it is clear that nitric oxide is a key intermediate in a variety of physiological processes, including mediating blood vessel relaxation and functioning as a novel form of neurotransmitter. It may even be involved in the development of long-term memory. There remain many interesting and perplexing features of nitric oxide and this meeting, **Nitric Oxide: Molecular Mechanisms of Synthesis and Action**, examined some of them, especially the regulation of nitric oxide synthase, the enzyme that makes nitric oxide.

Angiogenesis is the process by which new blood vessels are formed. This is a crucial part not only of normal development, but also of tumor growth. The **Mechanisms of Developmental and Tumor Angiogenesis** meeting reviewed the latest findings on how angiogenesis is controlled. A major emphasis of the meeting was on the evolving knowledge of proteins that influence normal and pathological angiogenesis. These include a variety of stimulatory growth factors as well as inhibitory factors such as thrombospondin. In addition, cell surface and extracellular matrix molecules have a role in determining how endothelial cells proliferate and form new blood vessels. This was the second of the Cold Spring Harbor Laboratory alumni meetings, and in this case, Doug Hanahan was one of the principal organizers.

Developments in Human Genetics

Diagnostic tests using DNA probes are proving to be extremely powerful because of their specificity, accuracy, and speed. The real impact of DNA-based diagnosis will come only when the tests can be used in routine clinical chemistry, microbiology, and pathology laboratories. This meeting, **The Future of DNA-based Diagnosis**, funded by Helix Partners Inc., was held to review some of the new research strategies being developed to move these mutation detection systems into routine large-scale application. Thus, a number of talks discussed the use of robot systems to increase the reliability and speed of tests, and there was a critical evaluation of advances in DNA sequencing by hybridization. It was a particular pleasure to have Ed Southern presenting his work in this area.

DNA-based diagnostics are all very well, but the ultimate goal of clinical geneticists is to treat individuals afflicted with genetic disorders. This goal has been achieved for the immunodeficiency caused by adenosine deaminase, where gene therapy is being used successfully. Duchenne muscular dystrophy (DMD) is a genetic disorder, affecting boys, in which the muscles degenerate. There is no treatment or cure and the boys die in their late teens or early twenties. We explored in this meeting, **Gene Reactivation as a Therapeutic Strategy for Duchenne and Becker Muscular Dystrophies**, a novel approach to treating DMD in which a muscle protein that is normally turned off in adult life might be turned on again and so take the place of the mutant protein that fails to work in DMD. The meeting included the world's authorities on the molecular biology of DMD and scientists who have been working on a similar strategy for treating the thalassemias. In part as a result of these deliberations, the Laboratory has entered into a collaboration with Oncogene Science, Inc., to search for drugs that could switch on the second protein.

The monies from the William Stamps Farish Fund are being used for the support of Banbury Center meetings on complex, polygenic disorders and the 1993 meeting in the series was the **Polygenic Basis of Cancer**. For many years, epidemiological data had suggested that cancers were the result of mutations in a number of genes, a prediction confirmed by the molecular analysis of mutations in oncogenes. We decided that the time was ripe to bring together scientists working on a wide variety of cancers to see what common themes are emerging as regards the mechanisms underlying the origin and selection of multiple genetic alterations in primary human tumors. A session of special interest was that discussing how the products of tumor suppressor genes were related to control of the cell cycle. The meeting was notable also for beginning on the day of the worst snow storm of the 1992–1993 winter. One participant made three attempts to come here from Boston before succeeding and arriving at the end of the first day!

Lyme Disease

Banbury Center was the site of a very successful meeting on Lyme disease in 1991. Since that time, the pace of research on all aspects of the causative agent, a spirochaete called *Borrelia burgdorferi*, has accelerated, and the time was right to review what has and has not been achieved. For this reason, the meeting, **Molecular and Immunologic Aspects of Lyme Disease**, covered a wide range of topics, from molecular biology and immunology, through pathogenesis, detection, and diagnosis, to vaccine development. Unfortunately, many issues, especially in relation to diagnosis and treatment, remain unresolved.

Science Policy Meeting

One of the keys to the success of the Banbury Center is that we have the flexibility to put on meetings at very short notice. This is important for scientific meetings but even more so for meetings discussing science policy: We are able to respond very rapidly to new developments. An example of such a meeting was that on **Industrial Sponsorship of Research in Academic Institutions**, which was prompted by the controversy raised by the research agreement between the Scripps Research Institute and Sandoz. However, this controversy was not the focus of the meeting which reviewed and discussed the different types of arrangements being made between academic institutions and companies and the merits and demerits of these agreements. The meeting was notable in having representatives of academic institutions, large and small companies, congressional staff (including staff from the Congressional committee that is pursuing this matter and from the Vice President's office), the NSF Inspector-General, a deputy commissioner from the FDA, and eminent scientists. It is always hard to measure the success of such a meeting, but it was clear that the participants welcomed the opportunity to discuss the issues in a nonadversarial situation.

Baring Brothers/Dillon Read/Cold Spring Harbor Laboratory Meeting

This was the eighth in the series of Banbury Center meetings for senior executives of pharmaceutical, biotechnology, and venture capital companies. They are

Baring Bros./CSHL Conference (Francis Collins at dais)

extraordinary meetings and this year's meeting, **The Human Genome Project Including Its Commercial Application**, was no exception. We were fortunate to have as speakers eminent scientists who not only are at the forefront of their discipline, but are wonderful speakers as well. The meeting began with a talk by Francis Collins on the revolution that molecular human genetics is bringing about in clinical practice and finished with a vision of the future with a presentation by Kenneth Culver on gene therapy. This is the last of the present series to be funded by the London merchant bank Baring Brothers & Co. and Dillon Read, its American partner. It was especially pleasing that our collaboration ended on such a high note.

Charles A. Dana Foundation Project on Manic Depressive Illness

The Charles A. Dana Foundation made a very substantial grant to Cold Spring Harbor Laboratory as part of a new Dana initiative on research on the genetic basis of manic depressive illness. Our partners in the project are Johns Hopkins Medical School and Stanford University Medical School. Part of the Cold Spring Harbor Laboratory effort is to promote research through having meetings. The first of these, **The Genetics of Manic Depressive Illness**, held in December, brought together psychiatrists and geneticists who are working on this difficult problem to review current progress, to examine what makes this research so difficult, to suggest new strategies for genetic analysis, and to look to the future. It was very helpful in orientating the Cold Spring Harbor Laboratory database project and will, we hope, promote closer cooperation between all the groups pursuing this research.

Human Genetics and Genome Analysis Workshops

We held the last of the current series of Genetics Workshops for Nonscientists, funded by the Department of Energy, in February. These workshops, styled after the Sloan Foundation workshops but dealing exclusively with human genetics and doing so in more detail, have been very successful. A total of 92 participants from 28 states took part in the four workshops. They included teachers, Congressional staff, theologians, bioethicists, journalists, lawyers, and patient advocates. The workshops provided an opportunity for individuals with a special interest in human genetics to learn about the science of genetics and its application to human beings and what the consequences might be of our increasing knowledge of human genetics. Fortunately, the Department of Energy agrees with our assessment of the workshops and has decided to fund a further two workshops. We are going to hold the first of these for a section of society that needs to be brought up to speed on human genetics, namely, primary care physicians. Our first workshop will be for the directors of continuing medical education in local hospitals. We hope that they will be so enthused by modern human genetics that they will return to their colleagues and encourage them to take the same course.

Other Meetings

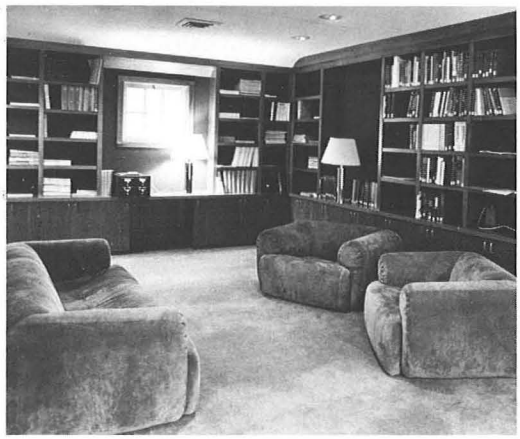
The Center has been used by local groups throughout the year. The Village of Lloyd Harbor held two seminars for residents in February and March. In May, the Cold Spring Harbor School District came here, and in August, West Side School held a faculty meeting here. The Board of Huntington Hospital held their annual review at Banbury in September, and the Lloyd Harbor Conservation Board hosted the North Shore Environmental Conference here in November.

Funding

Unfortunately, the costs of travel and board and lodging continue to rise. Fortunately, the generosity of the members of the Cold Spring Harbor Laboratory Corporate Sponsor Program, and other companies and foundations, enables us to continue our exciting program at Banbury Center. There is no doubt in my mind that this program would not survive if we had to rely on federal funding; the funding is not there and I would be buried under a mountain of grant applications. The Corporate Sponsors provided support for six meetings in 1993: **Nitric Oxide: Molecular Mechanisms of Synthesis and Action**; **Mechanisms of Developmental and Tumor Angiogenesis**; **κB-binding Proteins: Their Role in Development and Growth Control**; **Apoptotic Cell Death: Functions and Mechanisms**; **Molecular Chaperones**; and **Epigenetic Mechanisms of Gene Regulation.** An average of six scientists from Corporate Sponsor companies attended each of these meetings. Smith-Kline Beecham Pharmaceuticals very kindly allowed us to use funds remaining from an earlier meeting for the 1993 meeting **In Vitro Selection from Combinatorial Libraries**. Companies were especially generous in their support of the meeting **Molecular and Immunologic Aspects of Lyme Disease**. Abbott Laboratories, Allen & Hanburys, Connaught Laboratories, MedImmune Inc., and Pfizer Laboratories all helped to make this a successful meeting. Helix Partners Inc. sponsored **The Future of DNA-based Diagnosis**, a meeting of special interest in that we designed it to cover basic research and potential applications.

Foundations continue to be supportive of Banbury Center meetings. The William Stamps Farish Fund provided support for the second of the series of meetings on complex human genetics, and the Charles A. Dana Foundation funded the first in the series of meetings related to the genetics of manic depressive illness. Last year, I wrote a special tribute to the Alfred P. Sloan Foundation, which had, after 12 years, reluctantly declined to provide us with further support. However, the good that foundations do lives on after they are gone, and in this case, we had sufficient funds left to hold one last meeting, that on **Industrial Sponsorship of Research in Academic Institutions**. It was among the most interesting of the Sloan meetings that we have held. The Association Francaise contre Les Myopathies and the Muscular Dystrophy Association both contributed to the meeting, **Gene Reactivation as a Therapeutic Strategy for Duchenne and Becker Muscular Dystrophies**. Finally, the Office of Health and Environmental Research of the Department of Energy funded **The Workshop on Human Genetics and Genome Analysis,** a Genetic Workshop for Nonscientists. These have been very successful and we look forward to the new series of workshops funded by D.O.E.

Banbury Center Meeting House



Banbury Center Meeting Room and Library

Looking Forward to 1994

The 1994 Banbury Center program looks to be as interesting and varied as in previous years. We will continue to have meetings on topics that are at the cutting edge of research as well as meetings that deal with wider issues of research. I am looking forward especially to continuing the meetings related to manic depressive illness sponsored by the Charles A. Dana Foundation. The program includes public education, and this year we will be holding a workshop for journalists and Congressional staff. A second project of great promise is being supported by the Robert Wood Johnson Foundation. Gordon Hargraves (Development Office) and I persuaded the Foundation that human genetics should be a part of its health care program. Banbury Center has held many meetings on research aspects of human molecular genetics and now we are going to look at the provision of genetic services and the role of genetics in the modern health care system.

Finally, my thanks to Bea Toliver and Ellie Sidorenko in my office and to Katya Davey in Robertson House. They, as usual, have kept the whole operation running smoothly. Danny Miller and Andy Sauer have kept the Banbury Center grounds looking wonderful, one of the features of the Center that makes it unique.

Jan A. Witkowski

MEETINGS

The Future of DNA-based Diagnosis

January 10–January 13

FUNDED BY

Helix Partners

ARRANGED BY

C.T. Caskey, Howard Hughes Medical Institute, Baylor College of Medicine, Houston, Texas
J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory, New York

SESSION 1: Technical Advances I
Chairperson: E.M. Southern, University of Oxford, United Kingdom

J. Gordon, Abbott Laboratories, North Chicago, Illinois: The marriage of immunoassay technology to DNA-based diagnostics.
E.S. Winn-Dean, Applied Biosystems, Inc., Foster City, California: Applications of DNA probe ligation detection technology.
F.W. Studier, Brookhaven National Laboratory, Upton, New York: DNA sequencing by priming with strings of contiguous hexamers.
J. Quint, Beckman University, Fullerton, California: Robotic automation of dot blots.
M. Bywater-Ekegard, Pharmacia LKB Biotechnology AB, Uppsala, Sweden: Sequence-based diagnostics: A standardized system for the handling of multiple clinical samples.

SESSION 2: Technical Advances II
Chairperson: C.T. Caskey, Howard Hughes Medical Institute, Baylor College of Medicine, Houston, Texas

M.N. Kronick, Applied Biosystems, Inc., Foster City, California: Application of four-color fluorescent sequencing technology to new methods of mutation screening.
S.P.A. Fodor, Affymax, Palo Alto, California: Oligonucleotide arrays and parallel hybridization analysis.
E.M. Southern, University of Oxford, United Kingdom: Analysis of sequence differences by hybridization to array of oligonucleotides.
R. Crkvenjakov, Argonne National Laboratory, Illinois: Sequencing by hybridization (SHB) format I and DNA diagnostics: Present and future applications.
M. Eggers, Houston Advanced Research Center, The Woodlands, Texas: Microfabricated detection devices for automated diagnosis by hybridization (DbH).

D. Yardell, R. Gibbs

SESSION 3: Implementation: Consequences of Different Disorders I

Chairperson: A.G. Motulsky, University of Washington, Seattle

A. Cao, Universita Studi Cagliari, Sardinia, Italy: Application of DNA technology for screening and prenatal diagnosis of β-thalassemia in Sardinia.

D.R. Witt, Kaiser Permanente, San Jose, California: The status of population screening for cystic fibrosis.

B. Weber, Howard Hughes Medical Institute, University of Michigan, Ann Arbor: Breast cancer DNA-based diagnosis: Moving from research to practice.

R.A. Gibbs, Baylor College of Medicine, Houston, Texas: Diagnostic DNA sequencing for genetics and infectious diseases.

C.T. Caskey, Howard Hughes Medical Institute, Baylor College of Medicine, Houston, Texas: Screening for premutation parents.

SESSION 4: Implementation: Consequences of Different Disorders II

Chairperson: C.T. Caskey, Howard Hughes Medical Institute, Baylor College of Medicine, Houston, Texas

A.G. Motulsky, University of Washington, Seattle: Late onset diseases.

S.T. Reeders, Howard Hughes Medical Institute, Yale University, New Haven, Connecticut: Adult polycystic kidney disease: Need for a test in a common late-onset disease.

D.W. Yandell, Massachusetts Eye & Ear Infirmary, Boston: DNA-based diagnostic testing for cancer predisposition: Experience to date with p53 and RB.

S.H. Friend, Massachusetts General Hospital Cancer Center, Charlestown: Functional assays of tumor suppressor genes.

D.C. Ward, Yale University School of Medicine, New Haven, Connecticut: Fluorescence in situ hybridization (FISH) as a tool for DNA-based diagnostics.

SESSION 5: Implementation: Economic Factors

Chairperson: J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory, New York

M. Wigler, Cold Spring Harbor Laboratory, New York: Genetic analysis of disease.

J.L. Cova, Health Insurance Association of America, Washington D.C.: Insurance companies coverage policy decisions: Present and future.

E.R.B. McCabe, Baylor College of Medicine, Houston, Texas: Regulation, certification, and public health.

P.G. Debenham, Cellmark Diagnostics, Abingdon, Oxon, United Kingdom: Development and experience with test trials of CF kits in Europe.

T.M. Tsakeris, FDA Office of Biotechnology, Rockville, Maryland: The FDA and DNA diagnostic kits.

T.J. White, Roche Molecular Systems, Inc., Alameda, California: Impact of FDA actions on diagnostic testing.

E. Southern

Workshop on Human Genetics and Genome Analysis

February 4–February 7

FUNDED BY

Ethical, Legal, and Social Issues Program of the Department of Energy Human Genome Initiative (Office of Health & Environmental Research)

ARRANGED BY

M. Bloom, DNA Learning Center, Cold Spring Harbor Laboratory, New York
D. Micklos, DNA Learning Center, Cold Spring Harbor Laboratory, New York
J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory, New York

SESSION 1

D. Micklos, DNA Learning Center, Cold Spring Harbor Laboratory, New York: Mendelian view of the gene.
M. Saxton, Massachusetts Office on Disability, Boston: Genetics and cultural attitudes to disability.
J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory, New York: Modern view of the gene.

SESSION 2

M. Bloom, DNA Learning Center, Cold Spring Harbor Laboratory, New York: Cloning genes.
D. Micklos, DNA Learning Center, Cold Spring Harbor Laboratory, New York: Using restriction enzymes and constructing chromosome maps.

SESSION 3

J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory, New York: RFLPs and PCR: What they are; what they do.
P. Ward, Institute of Molecular Genetics, Baylor College of Medicine, Houston, Texas: DNA-based diagnosis for human genetic diseases.
N. Holtzman, Johns Hopkins Medical Institute, Baltimore, Maryland: Map or maze: The future of human genetics.

SESSION 4

M. Bloom, DNA Learning Center, Cold Spring Harbor Laboratory, New York: Laboratory: Human DNA fingerprinting by polymerase chain reaction.
M. Bloom, DNA Learning Center, Cold Spring Harbor Laboratory, New York: Laboratory: Inserting DNA into bacteria and making gene libraries.

SESSION 5

M. Bloom, DNA Learning Center, Cold Spring Harbor Laboratory, New York: Laboratory results: Inserting DNA into bacteria and human DNA fingerprinting.
B. Weber, Howard Hughes Medical Institute, University of Michigan, Ann Arbor: Breast cancer genetics: Moving from research to practice.
K. Culver, National Institutes of Health, Bethesda, Maryland: The first human gene therapy trials.

Polygenic Basis of Cancer

February 21–February 24

FUNDED BY

The William Stamps Farish Fund

ARRANGED BY

E.R. Fearon, Yale University School of Medicine, New Haven, Connecticut

SESSION 1: Rate-limiting Mutations, Penetrance of Inherited Mutations, Cell Senescence, and Other Things We Do Not Understand About Carcinogenesis

J.C. Barrett, National Institute of Environmental Health Sciences, Research Triangle Park, North Carolina: Genetic basis for cell senescence, aging, and cancer.

SESSION 2: Multiple Genetic Alterations in Human Cancers

J.D. Minna, University of Texas, Dallas: Lung cancer requires multiple genetic lesions to become clinically evident.

B.J. Reid, University of Washington, Seattle: Barrett's esophagus: A human model of genetic instability in neoplastic progression.

W. Isaacs, Johns Hopkins Hospital, Baltimore, Maryland: Molecular and cellular biology of prostate cancer.

J. Yokota, National Cancer Center Research Institute, Tokyo, Japan: Biological significance of multiple genetic alterations in human cancer.

E.J. Stanbridge, University of California, Irvine, School of Medicine: Suppression of tumorigenicity by single chromosome transfer: Why are multiple genetic alterations selected for in human cancers?

SESSION 3: Role and Mechanisms of Tumor Suppressor Gene Inactivation in Human Cancers I

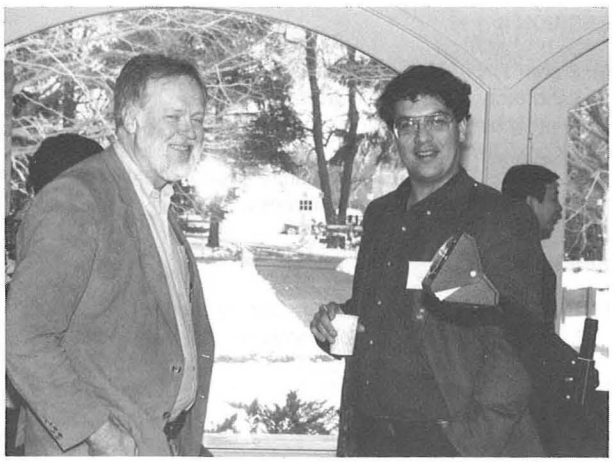
C.C. Harris, National Cancer Institute, Bethesda, Maryland: Mutational spectra of tumor suppressor genes: Hypothesis-generating clues to cancer etiology and mechanism.

S.H. Friend, Massachusetts General Hospital Cancer Center, Charlestown: Why *Rb* and *p53* germ-line mutations are rate-limiting in only certain tissues.

Y. Nakamura, Cancer Institute, Tokyo, Japan: Role of APC inactivation in human cancer.

J. Groden, Howard Hughes Medical Institute, University of Utah Medical Center, Salt Lake City: Relationship between *APC* germ-line mutations and the polyposis phenotype: Addressing *APC* function.

J. Witkowski, E. Lee, E. Fearon



C. Harris, F. Raucher

SESSION 4: Analysis of Tumor Suppressor Gene Function

D.W. Yandell, Massachusetts Eye & Ear Infirmary, Boston: A comprehensive analysis of mutations in retinoblastoma: Does the two-hit model fit?

T. Jacks, Massachusetts Institute of Technology, Cambridge: Analysis of mouse strains carrying mutations in the tumor suppressor genes *Rb, p53,* and *NF-1.*

A. Bradley, Baylor College of Medicine, Houston, Texas: Mutational analysis of tumor suppressor genes in mice.

E.Y.-H. Lee, University of Texas, San Antonio: Mechanism of the tissue-specific function of the retinoblastoma gene.

D. Haber, Massachusetts General Hospital, Charlestown: Mutational analysis and functional studies of WT-1.

F.J. Rauscher, The Wistar Institute, Philadelphia, Pennsylvania: Regulation of transcription by tumor suppressor gene products: Can a common set of target genes regulated by WT1, p53, and Rb be identified whose deregulation accompanies cell transformation?

SESSION 5: Genetic Instability and Alterations in Cell Cycle Control and Checkpoints in Cancer

T.A. Weinert, University of Arizona, Tucson: Speculation on compromised checkpoints and genetic instability.

D. Beach, Cold Spring Harbor Laboratory, New York: Cyclin D and cancer.

G.M. Wahl, The Salk Institute, San Diego, California: Altered G_1 control mediated by tumor suppressor genes: A prelude to chromosome instability.

T.D. Tlsty, University of North Carolina, Chapel Hill: The genetic regulation of gēnomic instability in normal and neoplastic cells.

M.B. Kastan, Johns Hopkins Hospital, Baltimore, Maryland: Consequences of abnormalities in p53 and other controls of a mammalian G_1 checkpoint.

Epigenetic Mechanisms of Gene Regulation

March 7–March 10

FUNDED BY

Cold Spring Harbor Laboratory Corporate Sponsor Program

ARRANGED BY

R. Jorgensen, University of California, Davis
A. Klar, National Cancer Institute–Frederick Cancer Research and Development Center, Maryland
R. Martienssen, Cold Spring Harbor Laboratory, New York

SESSION 1: Methylation

Chairperson: R. Martienssen, Cold Spring Harbor Laboratory, New York

R. Holliday, CSIRO Laboratory for Molecular Biology, North Ryde, Australia: Epigenetic inheritance based on DNA methylation.

T.H. Bestor, Harvard Medical School, Boston, Massachusetts: Regulation of DNA modification during mammalian development.

E. Richards, Washington University, St. Louis, Missouri: Plant DNA methylation mutants.

SESSION 2: Repeated Genes and Gene Silencing I

Chairperson: V.E.A. Russo, Max-Planck-Institute for Molecular Genetics, Berlin, Germany

E. Selker, University of Edinburgh, United Kingdom: DNA methylation and gene inactivation in neurospora.

J.-L. Rossignol, Universite Paris-Sud, France: Epimutation in the fungus *A. immerses*: Cytosine methylation and DNA repeats.

M. Matzke, Austrian Academy of Sciences, Salzburg, Austria: Interactions between unlinked, partially homologous transgene loci leading to inactivation and methylation of transgenes in tobacco.

A. Surami, D. Barlow, R. Martienssen, R. Holiday

SESSION 3: Repeated Genes and Gene Silencing II

Chairperson: M. Matzke, Austrian Academy of Sciences, Salzburg, Austria

O. Mittelsten Scheid, The Friedrich Miescher Institute, Basel, Switzerland: Interactions between multiple transgene copies in *A. thaliana*.

E. Signer, Massachusetts Institute of Technology, Cambridge: Epigenetic repeat-induced gene silencing in *A. thaliana*.

R. Fray, University of Nottingham, Loughborough, United Kingdom: Are sense inhibition and antisense down- regulation manifestations of the same phenomenon?

D. Inze, Laboratorium Voor Genetica, Gent, Belgium: Post-transcriptional co-suppression of endogenous and transgene β-glucanase gene expression.

SESSION 4: Nuclear Organization and Chromatin Structure I

Chairperson: S.C.R. Elgin, Washington University, St. Louis, Missouri

J.S.P. Heslop-Harrison, John Innes Center, Norwich, United Kingdom: Nuclear domains, gene expression, and transmission of expression patterns.

S. Henikoff, Howard Hughes Medical Institute, Fred Hutchinson Cancer Research Center, Seattle, Washington: Variegation phenomena involving somatic pairing in *Drosophila*.

N. Fedoroff, F. Meins

L. Hirschbein, S. Elgin

SESSION 5: Nuclear Organization and Chromatin Structure II

Chairperson: V. Pirrotta, University of Geneva, Switzerland

B. Stillman, Cold Spring Harbor Laboratory, New York: Possible epigenetic inheritance of the origin of recognition complex.

S.C.R. Elgin, Washington University, St. Louis, Missouri: Heterochromatic protein 1, a known participant in position-effect variegation in *Drosophila*, is a highly conserved chromosomal protein.

P. Avner, Institut Pasteur, Paris, France: X-inactivation and the X-inactivation center.

L. Hirschbein, Universite Paris-Sud, France: Archived DNA: Imprinting-like phenomenon in prokaryotic cells.

SESSION 6: *Trans*-acting Regulators

Chairperson: A. Klar, National Cancer Institute–Frederick Cancer Research and Development Center, Maryland

N.V. Fedoroff, Carnegie Institution of Washington, Baltimore, Maryland: Molecular dissection of the Spm transposable element's epigenetic control system in transgenic tobacco.

V. Pirrotta, University of Geneva, Switzerland: Zest and polycomb group genes: Relationship between transection, PEV, and maintenance of gene repression.

SESSION 7: Paramutation

Chairperson: E.R. Signer, Massachusetts Institute of Technology, Cambridge

J. Kermicle, University of Wisconsin, Madison: Gene duplication and maize R-locus paramutation.

V.L. Chandler, University of Oregon, Eugene: Paramutation at the *b* and *pl* loci in maize: A heritable alteration in the gene expression of one allele caused by the presence of another allele.

P. Meyer, Max-Delbruck-Laboratorium, Koln, Germany: A paramutation phenomenon in transgenic petunia associated with differences in DNA-methylation.

SESSION 8: Imprinting

Chairperson: J. Kermicle, University of Wisconsin, Madison

A. Surani, University of Cambridge, United Kingdom: Mechanism of gene regulation by chromosomal imprinting in mice.

D.P. Barlow, Research Institute of Molecular Pathology, Vienna, Austria: Methylation is the imprinting signal at the mouse Igf2r locus.

A. Klar, National Cancer Institute-Frederick Cancer Research and Development Center, Maryland: Regulation of cell-type switching and silencing the mating type genes in fission yeast.

SESSION 9: Epigenetic Patterns in Development

Chairperson: V.L. Chandler, University of Oregon, Eugene

V.E.A. Russo, Max-Planck-Institute for Molecular Genetics, Berlin, Germany: Methylation and reversible inactivation of a foreign gene in *N. crassa*.

K. Cone, University of Missouri, Columbia: Molecular genetic analysis of an antholyanin regulatory gene of maize that leads to variegated pigmentation.

R. Martienssen, Cold Spring Harbor Laboratory, New York: Developmental patterns of Mu transposon activity in maize.

M. Donoghue, Washington University Medical School, St. Louis, Missouri: Methylation as an imprint of rostrocaudal position in mice.

F. Meins, Jr., The Friedrich Miescher Institute, Basel, Switzerland: Developmental and environmental regulation of homologous gene expression in plants transformed with plant-defense-related genes.

R. Jorgensen, University of California, Davis: Novel flower color patterns can be elicited by pigment transgenes and reprogrammed by transmissible developmental imprints.

Molecular and Immunologic Aspects of Lyme Disease

March 28–March 31

FUNDED BY

Allen & Hansburys, Pfizer Labs, Abbott Laboratories, Connaught Laboratories, Inc., and MedImmune Inc.

ARRANGED BY

S.E. Schutzer, UMDNJ-New Jersey Medical School, Newark
J.J. Dunn, Brookhaven National Laboratory, Upton, New York

SESSION 1: Molecular Biology

Chairperson: J.J. Dunn, Brookhaven National Laboratory, Upton, New York

W.M. Huang, University of Utah Medical Center, Salt Lake City: The chromosome and gene organization of *B. burgdorferi.*

P. Rosa, National Institute of Allergy and Infectious Diseases, Hamilton, Montana: Molecular mechanisms of outer surface protein variation.

I. Schwartz, New York Medical College, Valhalla: Ribosomal genes of *B. burgdorferi.*

A. Sadziene, University of Texas Health Science Center, San Antonio: Resistant variants and application to immunity and pathogenesis.

J.L. Benach, State University of New York, Stony Brook: Point mutations in OspB result in escape variants and different monoclonal antibody reactivity.

D.E. Dykhuizen, State University of New York, Stony Brook: Genetic diversity and clonality.

SESSION 2: Immunology

Chairperson: P.K. Coyle, State University of New York, Stony Brook

R.J. Dattwyler, State University of New York, Stony Brook: Influence of antimicrobials on the immune response.

S.E. Schutzer, UMDNJ–New Jersey Medical School, Newark: Early antibody response to OspA.

F.S. Kantor and L.K. Bockenstedt, Yale University School of Medicine, New Haven, Connecticut: Mapping T-cell epitopes of OspA N40.

S.E. Malawista, Yale University School of Medicine, New Haven, Connecticut: The fate of *B. burgdorferi* in mouse macrophages: Destruction, survival, recovery.

SESSION 3: Vaccine

Chairperson: R.A. Flavell, Yale University School of Medicine, New Haven, Connecticut

L.E. Erdile, Connaught Laboratories, Inc., Swiftwater, Pennsylvania: Protective immune responses to OspA.

E. Fikrig, Yale University, New Haven, Connecticut: Immunization against tick-borne Lyme borreliosis.

G. Bansal, MedImmune Inc., Gaithersburg, Maryland: Protective response elicited by recombinant BCG expressing OspA lipoprotein: dA candidate Lyme disease vaccine.

J. Radolf, University of Texas Southwestern Medical Center, Dallas: New insights into the molecular architecture of *B. burgdorferi* relevant to Lyme disease pathogenesis and vaccine development.

SESSION 4: Animal Models

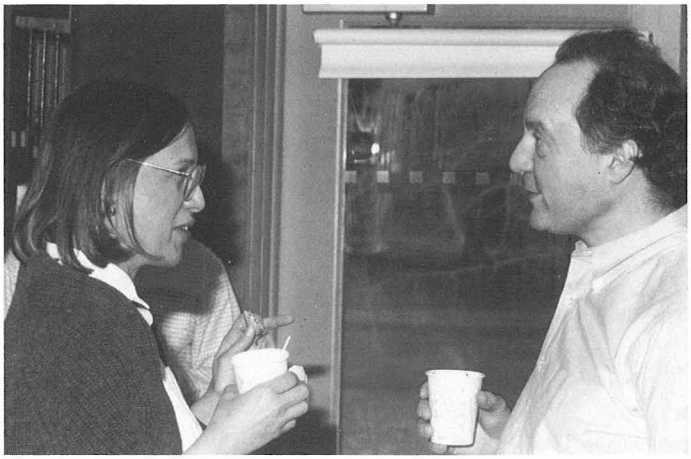
Chairperson: S.W. Barthold, Yale University School of Medicine, New Haven, Connecticut

J.L. Goodman, University of Minnesota, Minneapolis: Guinea pig model.

J.N. Miller, University of California, Los Angeles, School of Medicine: Erythema migrans-rabbit model.

J.J. Weis, University of Utah, Salt Lake City: Quantitation of spirochete number in severely and mildly arthritic congenic mice and mapping of an arthritis susceptibility locus.

M.T. Phillip, Tulane Regional Primate Research Center, Covington, Louisiana: Early Lyme disease in the rhesus monkey.



Participant, S. Schutzer

SESSION 5: Pathogenesis

Chairpersons: S.E. Schutzer, UMDNJ–New Jersey Medical School, Newark
F.S. Kantor, Yale University School of Medicine, New Haven, Connecticut

A. Spielman, Harvard School of Public Health, Boston, Massachusetts: Mode of transmission of the Lyme disease spirochete.

A.C. Steere, New England Medical Center, Boston, Massachusetts: Pathogenetic factors in chronic Lyme arthritis.

S. Batsford, Institute of Medical Microbiology, Freiburg, Germany: A role for outer surface proteins in Lyme arthritis.

J. Leung, New England Medical Center Hospital, Boston, Massachusetts: Adhesion of *B. burgdorferi* in pathogenesis.

A.R. Pachner, Georgetown University Hospital, Washington, D.C: Parallels between human and animal CNS *B. burgdorferi* infection.

L.H. Sigal, UMDNJ–Robert Wood Johnson Medical School, New Brunswick, New Jersey: Molecular mimicry in neurologic *B. burgdorferi* infection.

P.K. Coyle, State University of New York, Stony Brook: Evidence for early and persistent infection in neurologic Lyme disease.

SESSION 6: Detection and Diagnostics

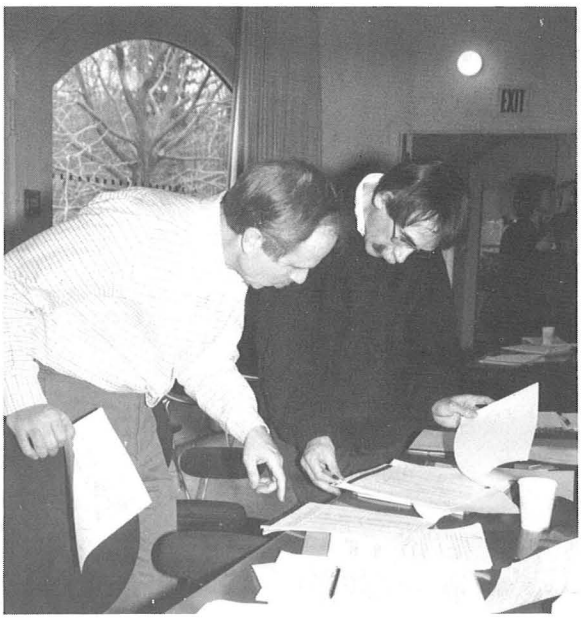
Chairperson: B.J. Luft, State University of New York, Stony Brook

D.H. Persing, Mayo Clinic, Rochester, Minnesota: Molecular diagnosis and monitoring of Lyme disease.

J.C. Hunt, Abbott Laboratories, Abbott Park, Illinois: Recombinant antigens as IgM and IgG serologic targets for detection of *B. burgdorferi.*

L.W. Mayer, Centers for Disease Control and Prevention, Fort Collins, Colorado: Design of new diagnostic tests for Lyme disease.

C.A. Norton-Hughes, University of Minnesota Medical School, Minneapolis: Scanning and quantification of Western blot staining.



Coffee break

DISCUSSION AND FUTURE DIRECTIONS

Chairperson: R.L. Quackenbush, National Institute of Allergy and Infectious Diseases, Bethesda, Maryland

Molecular Chaperones

April 4–April 7

FUNDED BY

Cold Spring Harbor Laboratory Corporate Sponsor Program

ARRANGED BY

M.-J.H. Gething, Howard Hughes Medical Institute, University of Texas Southwestern Medical Center, Dallas

SESSION 1: Chaperones: Cooperation and Interactions

Chairperson: M.-J.H. Gething, Howard Hughes Medical Institute, University of Texas Southwestern Medical Center, Dallas

F.U. Hartl, Sloan-Kettering Institute, New York, New York: Cooperation of molecular chaperones in protein folding.

S. Wickner, National Cancer Institute, National Institutes of Health, Bethesda, Maryland: The function of DnaJ, DnaK, and GrpE in the monomerization of P1 RepA protein.

M. Zylicz, University of Gdansk, Poland: Different mechanisms for reactivation of heat-treated RNAP by two *E. coli* chaperone systems.

M.G. Douglas, University of North Carolina, Chapel Hill: Specificity and mechanism for regulation of polypeptide hsp70 by Ydj1p.

SESSION 2: Other Chaperones/Protein Folding "Catalysts"

Chairperson: L.M. Gierasch, University of Texas Southwestern Medical Center, Dallas

D.B. Williams, University of Toronto, Ontario, Canada: Participation of the chaperone-like molecule, p88 (calnexin) in the biogenesis of class I MHC molecules.

K. Nadeau, Harvard Medical School, Boston, Massachusetts: hsp90: Partner protein recognition and peptide interaction.

C.S. Zuker, Howard Hughes Medical Institute, University of California, San Diego, La Jolla: The in vivo role of the cyclophilin homolog, ninaA, in rhodopsin biogenesis.

A.A. Gatenby, DuPont Company, Wilmington, Delaware: Novel chaperones involved in the biosynthesis of cytosolic photoreceptors and plastids.

Relaxing/working during coffee break

A. Horwich, R. Morimoto

SESSION 3: Chaperone: Protein Interactions

Chairperson: F.U. Hartl, Sloan-Kettering Institute, New York, New York

L.M. Gierasch, University of Texas Southwestern Medical Center, Dallas: Chaperone/substrate recognition.

A. Gragerov, Columbia University, New York, New York: Interaction of DnaK and DnaJ with newly formed proteins and model peptides.

M.-J.H. Gething, Howard Hughes Medical Institute, University of Texas Southwestern Medical Center, Dallas: Peptide binding specificity of BiP.

L.E. Hightower, University of Connecticut, Storrs: Identification of hsc70-binding peptides selected from phage display libraries.

J.F. Dice, Tufts University School of Medicine, Boston, Massachusetts: A role for hsc70 in lysosomal degradation of intracellular proteins.

SESSION 4: Chaperones: Structure/Function Studies I

Chairperson: A. Horwich, Howard Hughes Medical Institute, Yale University School of Medicine, New Haven, Connecticut

D. MacKay, Stanford University School of Medicine, California: Structure and mechanism of a 70-kD heat shock cognate protein.

A.L. Fink, University of California, Santa Cruz: Molecular mechanism of hsp70: Substrate protein dissociation precedes ATP hydrolysis.

R.I. Morimoto, Northwestern University, Evanston, Illinois: Role of the carboxyl domain of hsp70 in substrate recognition and oligomerization.

L. Hendershot, St. Jude Children's Research Institute, Memphis, Tennessee: Characterization of the protein binding and dimerization domain of BiP.

SESSION 5: Chaperones: Structure/Function Studies II

Chairperson: L. Hendershot, St. Jude Children's Research Institute, Memphis, Tennessee

R. McMacken, Johns Hopkins University, Baltimore, Maryland: Mechanistic studies of the ATPase activity of DnaK and its modulation by peptides, DnaJ and GrpE.

M. Sherman, Harvard Medical School, Boston, Massachusetts: Heat-shock-induced phosphorylation of molecular chaperones DnaK and GroEL in *E. coli.*

G. Flynn, University of Oregon, Eugene: GroEL and protein assembly.

A. Horwich, Howard Hughes Medical Institute, Yale University School of Medicine, New Haven, Connecticut: Functional analyses of mutant forms of the GroEL chaperone, in vivo and in vitro.

Gene Reactivation as a Therapeutic Strategy for Duchenne and Becker Muscular Dystrophies

April 25–April 27

FUNDED BY

Association Francaise contre Les Myopathies and the Muscular Dystrophy Association

ARRANGED BY

K.P. Campbell, Howard Hughes Medical Institute, The University of Iowa College of Medicine, Iowa City
K.E. Davies, University of Oxford, United Kingdom
J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory, New York

SESSION 1: Factors in DMD Gene Therapy

Chairperson: L. Charash, Muscular Dystrophy Association Medical Advisory Committee, Hicksville, New York

T. Partridge, Charing Cross & Westminster Medical School, London, United Kingdom: Myogenesis and myogenic stem cells.

A.H.M. Burghes, Ohio State University, Columbus: Dystrophin production when it is not expected: Revertants in frame Duchennes and exon 3–7 deletions.

M. Perricaudet, Institut Gustave Roussy, CNRS, Villejuif, France: Adenovirus-mediated gene transfer to muscle fibers.

H. Gilgenkrantz, INSERM U129, Paris, France: Phenotype reversion of *mdx* muscle fibers, consecutive to a long-term adenovirus-mediated expression of minidystrophin.

I. Danko, University of Wisconsin, Madison: Direct injection of genes into muscle.

R.H. Brown, Jr., Massachusetts General Hospital East, Charlestown: Approaches to cell therapy in muscular dystrophy.

SESSION 2: Regulation of Dystrophin and Dystrophin-related Protein Gene Expression

Chairperson: D.A. Fischman, Cornell University Medical College, New York, New York

D. Helfman, Cold Spring Harbor Laboratory, New York: Alternative RNA processing in the control of gene expression in muscle and nonmuscle cells.

K.P. Campbell, Howard Hughes Medical Institute, The University of Iowa College of Medicine, Iowa City: Dystrophin and utrophin: Functional and comparative aspects.

K.E. Davies, University of Oxford, United Kingdom: Utrophin regulation in skeletal muscle.

R.G. Worton, Hospital for Sick Children, Toronto, Ontario, Canada: The DMD gene: Aspects of gene expression.

J.S. Chamberlain, University of Michigan Medical School, Ann Arbor: Dystrophin expression in wild-type, *mdx*, and transgenic mice.

G. Foulks, K. Davies

SESSION 3: Reactivation of Genes as a Therapeutic Strategy
Chairperson: S. Hauschka, University of Washington, Seattle

J.G. Foulkes, Oncogene Science, Inc., Uniondale, New York: Gene transcription as an approach to drug discovery.
M.D. Schneider, Baylor College of Medicine, Houston, Texas: Activation of a generic fetal program in cardiac myocytes by peptide growth factors.
P.A. Jones, University of Southern California, Los Angeles: Gene activation by 5-azacytidine.
F. Grosveld, National Institute for Medical Research, London, United Kingdom: Control of globin gene expression.
G.D. Ginder, University of Minnesota Medical School, Minneapolis: Pharmacologic activation of embryonic globin genes in adult erythroid cells.
G.J. Dover, Johns Hopkins University School of Medicine, Baltimore, Maryland: Reactivation of a fetal gene.
S. Perrine, Children's Hospital, Oakland, California: Activating fetal globin genes with arginine butyrate.

Industrial Sponsorship of Research in Academic Institutions

May 23–May 25

FUNDED BY

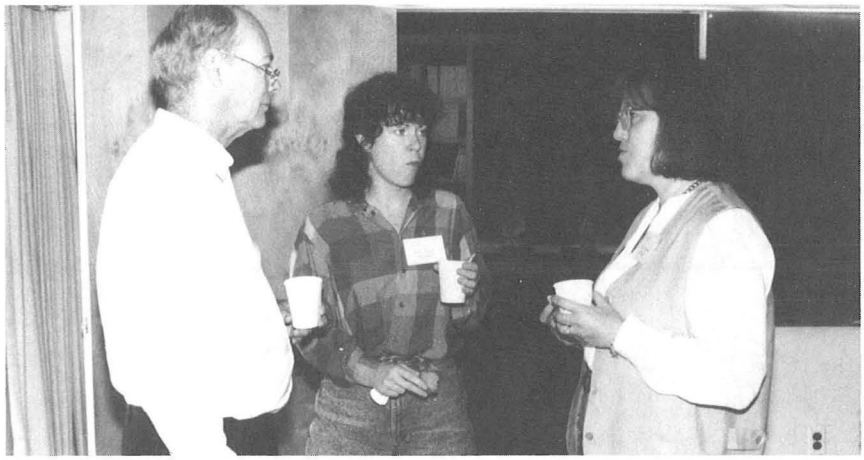
The Alfred P. Sloan Foundation

ARRANGED BY

J.D. Watson, Cold Spring Harbor Laboratory, New York
J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory, New York

SESSION 1: Development of Technology Transfer and Biotechnology Policy
Chairperson: J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory, New York

M.L. Williamson, Preston, Thorgrimson, Shidler, Gates and Ellis, Seattle, Washington: Development of federal technology transfer policy.
S. Brenner, The Scripps Research Institute, La Jolla, California: Biotechnology transfer in the United Kingdom.
H. Etzkowitz, Columbia University, New York, New York: Review of biotech technology and transfer.
E. Beutler, The Scripps Research Institute, La Jolla, California: Lessons from clinical science.



R. Herdman, K. Hudson, C. Scheman

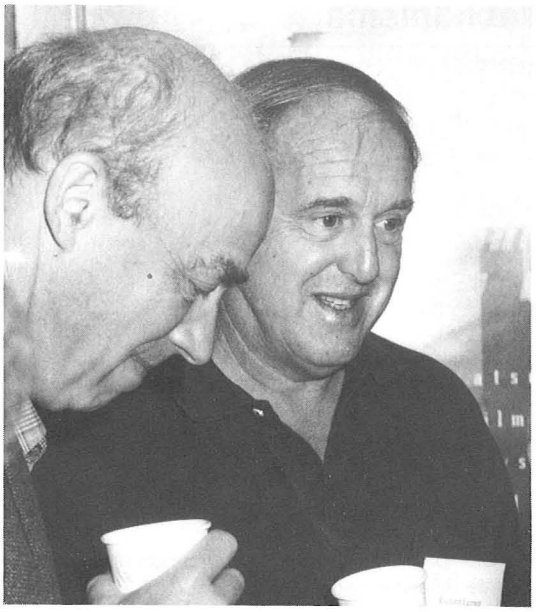
SESSION 2: Current Models for Large-scale Industrial-Academic Interactions I
Chairperson: D. Brown, Carnegie Institution of Washington, Baltimore, Maryland

D. Korn, Stanford University School of Medicine, California: Stanford University Medical School.
J.I. Gordon, Washington University School of Medicine, St. Louis, Missouri: Washington University School of Medicine.
G.R. Galluppi, Monsanto Company, St. Louis, Missouri: Monsanto Company.

SESSION 3: Current Models for Large-scale Industrial-Academic Interactions II
Chairperson: B. Stillman, Cold Spring Harbor Laboratory, New York

R.A. Lerner, The Scripps Research Institute, La Jolla, California: Scripps Research Laboratory.
G.G. Dellenbaugh, Robert Wood Johnson Pharmaceutical Research Institute, Raritan, New Jersey: Johnson & Johnson.
D.M. Livingston, Dana-Farber Cancer Institute, Cambridge, Massachusetts: Dana-Farber Cancer Institute.
T.O. Poehler, Johns Hopkins University, Baltimore, Maryland: Johns Hopkins University.
R.B. Shelton, University of California, Davis: University of California.

J. Pratt, H. Halpern



D. Brown, R. Lerner

SESSION 4: Perspectives by Interested Parties I: Funding Bodies
Chairperson: J. Halpern, University of Chicago, Illinois

L.G. Sundro, National Science Foundation, Washington, D.C.: National Science Foundation.
G.J. Galasso, National Institutes of Health, Bethesda, Maryland: National Institutes of Health.
C.A. Alexander, Howard Hughes Medical Institute, Chevy Chase, Maryland: Howard Hughes Medical Institute.

SESSION 5: Perspectives by Interested Parties II: Scientists
Chairperson: R.C. Herdman, Office of Technology Assessment, Washington, D.C.

Discussants:
F. Grinnell, Southwestern Medical School, Dallas, Texas
D. Nathans, Johns Hopkins Medical School, Baltimore
D. Brown, Carnegie Institute, Washington, D.C.

SESSION 6: Perspectives by Interested Parties III: Biotechnology Companies
Chairperson: R.C. Herdman, Office of Technology Assessment, Washington, D.C.

Discussant:
B.S. Conta, Regeneron Pharmaceuticals, Inc., Tarrytown, New York

SESSION 7: Perspectives by Interested Parties IV: Washington
Chairperson: J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory, New York

Discussant:
S. Jenning, House Subcommittee on Regulation, Business Opportunities, and Technology, Washington, D.C.

Panel Discussion:
K. Hudson, Office of the Assistant Secretary of Health, Washington, D.C.
C. Scheman, Food and Drug Administration, Rockville, Maryland

Apoptotic Cell Death: Functions and Mechanisms

October 12–October 15

FUNDED BY

Cold Spring Harbor Laboratory Corporate Sponsor Program

ARRANGED BY

G. Evan, Imperial Cancer Research Fund, London, United Kingdom
D. Hockenbery, Fred Hutchinson Cancer Research Center, Seattle, Washington
M.C. Raff, M.R.C. Laboratory for Molecular Cell Biology, London, United Kingdom

SESSION 1: Endonucleases and Other Nuclear Events during Apoptosis
Chairperson: A.H. Wyllie, University Medical School, Edinburgh, United Kingdom

M.K.L. Collins, Chester Beatty Laboratories, London, United Kingdom: Characterization of an apoptotic nuclease from mouse bone marrow cells.
W.C. Earnshaw, Johns Hopkins University School of Medicine, Baltimore, Maryland: Nuclear events of apoptosis in a cell-free mitotic extract.
D. Ucker, Medical Biology Institute, La Jolla, California: Physiological cell death is an abortive mitosis.

SESSION 2: Cell Cycle Control
Chairperson: A.H. Wyllie, University Medical School, Edinburgh, United Kingdom

R.T. Schimke, Stanford University, California: A nested cell cycle progression as a signal for apoptosis: Potential mechanisms.
G. Evan, Imperial Cancer Research Fund, London, United Kingdom: *c-myc:* An oncogene and a tumor suppressor gene.
P. Neiman, Fred Hutchinson Cancer Research Center, Seattle, Washington: Apoptotic cell death during normal and neoplastic B-cell development in the bursa of fabrius.

SESSION 3: p53
Chairperson: G. Evan, Imperial Cancer Research Fund, London, United Kingdom

M.B. Kastan, Johns Hopkins Hospital, Baltimore, Maryland: Activation of a p53-dependent pathway by irradiation.
M. Oren, The Weizmann Institute, Rehovot, Israel: Role of p53 in apoptosis: Relevance to survival factor dependence.
T. Jacks, Massachusetts Institute of Technology Center for Cancer Research, Cambridge: On p53, cell death, and cancer.
A.H. Wyllie, University Medical School, Edinburgh, United Kingdom: Regulation of apoptosis by p53 in vitro and in vivo.
E. White, Rutgers University, Piscataway, New Jersey: Regulation of apoptosis by the transforming gene products of adenovirus.

SESSION 4: *bcl-2* and Related Genes
Chairperson: M.C. Raff, M.R.C. Laboratory for Molecular Cell Biology, London, United Kingdom

D. Hockenbery, Fred Hutchinson Cancer Research Center, Seattle, Washington: Bcl-2: A regulator of oxidant stress in programmed cell death pathways.
S.J. Korsmeyer, Howard Hughes Medical Institute, Washington University School of Medicine, St. Louis, Missouri: Regulation of programmed cell death: An endogenous rheostat of *bcl-2*/Bax.
D. Loh, Howard Hughes Medical Institute, Washington University School of Medicine, St. Louis, Missouri: T-cell development and cell death.
C.B. Thompson, Howard Hughes Medical Institute, University of Chicago, Illinois: *bcl-x*, a *bcl-2*-related gene that functioned as a dominant regulator of apoptotic cell death.
M. Hengartner, Massachusetts Institute of Technology, Cambridge: Molecular genetics of programmed cell death in *C. elegans.*

SESSION 5: Cooperative Gene Effects in Lymphoid Cells

Chairperson: M.C. Raff, M.R.C. Laboratory for Molecular Cell Biology, London, United Kingdom

S. Cory, The Walter and Eliza Hall Institute of Medical Research, Victoria, Australia: *bcl-2* in lymphopoiesis and lymphomagenesis.

A.B. Rickinson, The University of Birmingham Medical School, United Kingdom: Epstein-Barr virus genes protecting B cells from apoptosis.

SESSION 6: Social Controls

Chairperson: S.J. Korsmeyer, Howard Hughes Medical Institute, Washington University School of Medicine, St. Louis, Missouri

M.C. Raff, M.R.C. Laboratory for Molecular Cell Biology, London, United Kingdom: Social controls of cell survival and death.

J. Savill, Royal Postgraduate Medical School, London, United Kingdom: Phagocyte recognition and clearance of cells undergoing apoptosis.

SESSION 7: Apoptotic Signals in T-lymphocyte Interactions

Chairperson: S.J. Korsmeyer, Howard Hughes Medical Institute, Washington University School of Medicine, St. Louis, Missouri

S. Nagata, Osaka Bioscience Institute, Japan: Fas antigen-mediated cell death and death of animals.

J.H. Russell, Washington University School of Medicine, St. Louis, Missouri: fas/gld pathway couples TCR/CD3 stimulation to T-cell suicide in mature T cells.

P. Golstein, Centre d'Immunologie de Marseille-Luminy, Marseille, France: Molecular mechanisms of T-cell-mediated cell death.

SESSION 8: Effectors and Inhibitors in Cytolytic Pathways

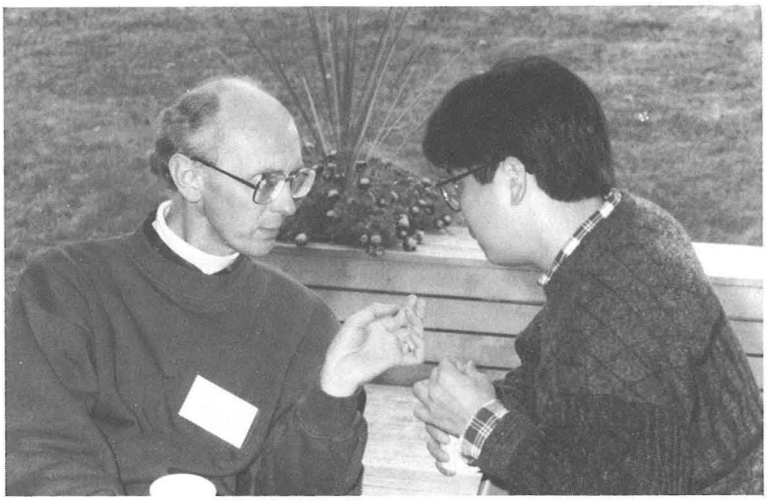
Chairperson: D. Hockenbery, Fred Hutchinson Cancer Research Center, Seattle, Washington

J.A. Ledbetter, Bristol-Myers Squibb Pharmaceutical Research Institute, Seattle, Washington: Superantigen-induced death of human T-cell clones requires adhesion mediated by β2-integrins.

P. Anderson, Dana-Farber Cancer Institute, Boston, Massachusetts: Cytotoxic-granule-associated RNA-binding proteins as mediators of apoptotic cell death.

M. Rothe, Genentech, Inc., South San Francisco, California: Individual roles and signaling mechanisms of the two TNF receptors.

V.M. Dixit, University of Michigan Medical School, Ann Arbor: A20, a novel cytokine inducible zinc finger protein that inhibits apoptosis.



A.H. Wyllie, R. Kobayashi

SESSION 9: Developmental Control of Cell Death

Chairperson: D. Hockenbery, Fred Hutchinson Cancer Research Center, Seattle, Washington

H. Steller, Howard Hughes Medical Institute, Massachusetts Institute of Technology, Cambridge: Programmed cell death in *Drosophila.*

J. Morgan, Roche Institute of Molecular Biology, Nutley, New Jersey: Role of immediate-early genes in programmed cell death.

N.M. Bonini and S. Benzer, California Institute of Technology, Pasadena: Cell death in the developing *Drosophila* eye.

In Vitro Selection from Combinatorial Libraries

October 17–October 20

FUNDED IN PART BY

SmithKline Beecham Pharmaceuticals

ARRANGED BY

G.F. Joyce, The Scripps Research Institute, La Jolla, California

SESSION 1: Theoretical Aspects

Chairperson: L.E. Orgel, The Salk Institute, San Diego, California

L.A. Loeb, University of Washington, Seattle: Evolution of herpes thymidine kinases for gene therapy.

S. Kauffman, The Santa Fe Institute, New Mexico: Search on high-dimensional molecular fitness landscapes.

J. McCaskill, Institute for Molecular Biotechnology, Jena, Germany: Spatially resolved amplification and selection.

P. Schuster, Institute for Molecular Biotechnology, Jena, Germany: The search for RNA structures.

G.D. Stormo, University of Colorado, Boulder: Nucleic acid libraries.

D.C. Youvan, Massachusetts Institute of Technology, Cambridge: Computational optimization of combinatorial mutagenesis.

SESSION 2: Nucleic Acid Libraries

Chairperson: J. Szostak, Massachusetts General Hospital, Boston

L. Gold, University of Colorado, Boulder: Novel oligonucleotides.

D.J. Ecker, ISIS Pharmaceuticals, Carlsbad, California: Rational screening of oligonucleotide combinatorial libraries for drug discovery.

A. Ellington, Indiana University, Bloomington: In vitro selection of aptames that bind to viral proteins.

J.D. Keene, Duke University Medical Center, Durham, North Carolina: Selection of nucleic acid epitopes to the antigen-combining sites of antibodies.

L. Leung, Gilead Sciences, Foster City, California: Discovery and development of a thrombin inhibitor selected from a combinatorial ssDNA library.

L.E. Orgel, The Salk Institute, San Diego, California: In vitro selection of DNAs with unusual reactivity.

SESSION 3: Selection of Ribozymes

Chairperson: L.A. Loeb, University of Washington, Seattle

J.M. Burke, University of Vermont, Burlington: In vitro selection of hairpin ribozymes.

C. Drlica, Public Health Research Institute, New York, New York: Biological considerations concerning hammerhead ribozyme selection.

R. Green, University of California, Santa Cruz: Ribozyme selections as structural probes.

G.F. Joyce, The Scripps Research Institute, La Jolla, California: Better ribozymes through evolutionary chemistry.

O.C. Uhlenbeck, University of Colorado, Boulder: Using in vitro selection to study tRNA folding.

SESSION 4: Phage Presentation Libraries

Chairperson: L. Gold, University of Colorado, Boulder

C.F. Barbas, The Scripps Research Institute, La Jolla, California: Synthetic antibodies and their use as scaffolds for the design of conformationally constrained peptides.

H.R. Hoogenboom, Cambridge Antibody Technology Limited, United Kingdom: Antibodies without immunization from phage display libraries.

R.C. Ladner, Protein Engineering Corporation, Cambridge, Massachusetts: Selection of binding proteins.

R.A. Lerner, The Scripps Research Institute, La Jolla, California: Direct selection for catalytic mechanisms.

H. Lowman, Genentech, Inc., South San Francisco, California: Affinity maturation of human growth hormone using additive and combinatorial strategies.

G. Zhong, University of Missouri, Columbia: Conformational mimicry of a chlamydia neutralization epitope on filamentous phage.

SESSION 5: Selection of Peptides and Small Organics

Chairperson: R.A. Lerner, The Scripps Research Institute, La Jolla, California

A. Schwienhorst, Max-Planck-Institute for Biophysical Chemistry, Gottingen, Germany: Experimental approaches to function space.

P. Schatz, Affymax Research Institute, Palo Alto, California: Peptide libraries linked to DNA-binding proteins.

R.A. Houghten, Torrey Pines Institute for Molecular Studies, San Diego, California: The broad utility in in vitro and in vivo assays of soluble combinatorial libraries.

K.S. Lam, Arizona Cancer Center, Tucson: Application of selective technology in various model systems.

M. Gallop, Affymax Research Institute, Palo Alto, California: Encoded synthetic libraries.

κB-binding Proteins: Their Role in Development and Growth Control

October 25–October 28

FUNDED BY

Cold Spring Harbor Laboratory Corporate Sponsor Program

ARRANGED BY

P.A. Baeuerle, Gene Center, Martinsried, Germany
R. Franza, Cold Spring Harbor Laboratory, New York
G.J. Nabel, Howard Hughes Medical Institute, University of Michigan, Ann Arbor

SESSION 1: NF-κB/REL Subunits: Biochemistry and Transcriptional Regulation I
Chairperson: P.A. Baeuerle, Gene Center, Martinsried, Germany

T. Maniatis, Harvard University, Cambridge, Massachusetts: The role of NF-κB in virus induction of the human B-interferon gene and the involvement of the high-mobility-group-protein HMG I (Y).
A. Israel, Institut Pasteur, Paris, France: The RBP-Jκ family represents κB-site-specific transcriptional activators.
R. Franza, Cold Spring Harbor Laboratory, New York: Alteration of Rel in a disease model.
G.J. Nabel, Howard Hughes Medical Institute, University of Michigan, Ann Arbor: NF-κB and HIV replication.
D.W. Ballard, Vanderbilt University School of Medicine, Nashville, Tennessee: A novel NF-κB complex containing p65 homodimers: Implications for transcriptional control at the level of subunit dimerization.

SESSION 2: NF-κB/REL Subunits: Biochemistry and Transcriptional Regulation II
Chairperson: T. Maniatis, Harvard University, Cambridge, Massachusetts

M.J. Lenardo, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, Maryland: NF-κB regulation of differentiation genes that control early T-cell development in the mouse thymus.
S. Ghosh, Yale University, New Haven, Connecticut: Regulation of NF-κB during B-lymphocyte differentiation.
I.M. Verma, The Salk Institute, San Diego, California: Regulation of κB/IκB protein and direct association of Rel with TBP required for κB-driven transcription.
E. Serfling, University of Wurzburg, Germany: The κB-like site of the interleukin-2 promoter is a target of suppression of IL-2 transcription in T cells by agonists of protein kinase A.
C. Scheidereit, Max-Planck-Institute for Molecular Genetics, Berlin, Germany: Nuclear translocation control of NF-κB: Functional domains and role of phosphorylation.

Coffee break

SESSION 3: Dorsal Development and Signal Transduction

Chairperson: G.J. Nabel, Howard Hughes Medical Institute, University of Michigan, Ann Arbor

S.A. Wasserman, University of Texas Southwestern Medical Center, Dallas: Regulation of dorsal nuclear import.

R. Steward, Princeton University, New Jersey: Function of the cactus and dorsal protein.

B. Sha, The Rockefeller University, New York, New York: Analysis of mice deficient in NF-IκB.

R. Bravo, Bristol-Myers Squibb Pharmaceutical Research Institute, Princeton, New Jersey: RelB: Role in mouse development?

M. Levine, University of California, San Diego, La Jolla: Characterization of DAF: A Rel protein in *Drosophila* that mediates an acute phase response.

Y. Engstrom, Stockholm University, Sweden: κB-binding proteins regulate the immune response in *Drosophila* and other insects.

SESSION 4: REL, p65, and Oncogenesis I

Chairperson: R.G. Roeder, The Rockefeller University, New York, New York

U. Schindler, Tularik, Inc. South San Francisco, California: The involvement of NF-κB in cytokine induction of cell adhesion molecules.

A. Manning, The Upjohn Company, Kalamazoo, Michigan: Inhibition of NF-κB activation in endothelial cells: Inhibition of leukocyte adhesion.

U.K. Siebenlist, National Institutes of Health, Bethesda, Maryland: Bcl-3, IκB-2 regulation of κB-binding complexes.

SESSION 5: REL, p65, and Oncogenesis II

Chairperson: R. Franza, Cold Spring Harbor Laboratory, New York

T.D. Gilmore, Boston University, Massachusetts: v-*rel* transformation: Functions required for transformation of chicken spleen cells by the v-*rel* oncogene.

P.J. Enrietto, State University of New York, Stony Brook: The role of c-*rel* in normal avian development and cell growth.

R. Dalla-Favera, Columbia University, New York, New York: Chromosomal translocations involving the NF-κB-2/LYT-10 gene in lymphoid neoplasia.

SESSION 6: IκB, Structural Motif, Protein/Protein Interactions

Chairperson: P.J. Enrietto, State University of New York, Stony Brook

P.A. Baeuerle, Gene Center, Martinsried, Germany: How is IκB released from NF-κB?

A.S. Baldwin, University of North Carolina, Chapel Hill: Regulation of NF-κB activity by cytoplasmic and nuclear mechanisms.

N.R. Rice, National Cancer Institute–Frederick Cancer Research and Development Center, Maryland: IκB.

Baring Brothers/Cold Spring Harbor Laboratory Executive Conference on The Human Genome Project Including Its Commercial Application

October 29–October 31

ARRANGED BY

J.D. Watson, Cold Spring Harbor Laboratory, New York
J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory, New York

SESSION 1: Overview of Human Molecular Genetics

F.C. Collins, National Center for Human Genome Research, National Institutes of Health, Bethesda, Maryland: Human molecular genetics and its impact on clinical genetics.

SESSION 2: Mapping, Sequencing, and Cloning Genes

E. Lander, Whitehead Institute for Medical Research, Cambridge, Massachusetts: How to find genes.
J. Sulston, Sanger Centre, Cambridge, United Kingdom: Sequencing DNA and why do it for a worm?
M.-C. King, University of California, Berkeley: The molecular genetics of human cancers.

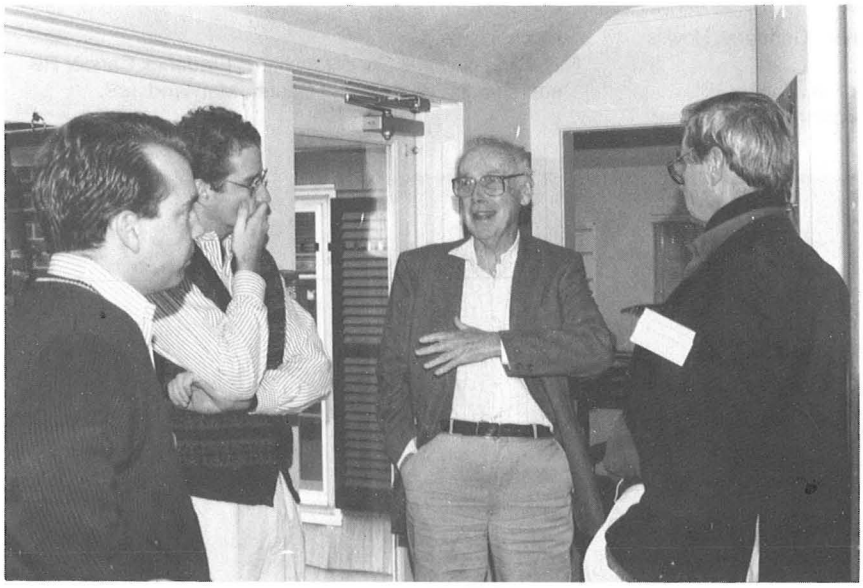
SESSION 3: Genomes and Computers

T. Marr, Cold Spring Harbor Laboratory, New York: Genome informatics: What it does and a hands-on experiment.

SESSION 4: Applications and Consequences of Molecular Human Genetics

C.T. Caskey, Howard Hughes Medical Institute, Baylor College of Medicine, Houston, Texas: DNA-based diagnostics: Technical advances and commercial developments.
K. Culver, Gene Therapy Institute, Iowa City, Iowa: Human gene therapy: Present status and future developments.
N. Wexler, Columbia Univérsity, New York, New York: Society aspects of human genetics.

Roundtable Discussion:
The human genome and biotechnology.



T. Perkins, E.W. Roberts, J.D. Watson, J.C. Chambers

Mechanisms of Developmental and Tumor Angiogenesis

November 7–November 10

FUNDED BY

Cold Spring Harbor Laboratory Corporate Sponsor Program

ARRANGED BY

D. Hanahan, University of California, San Francisco
J. Folkman, Children's Hospital, Boston, Massachusetts: Introduction.

SESSION 1: Developmental Angiogenesis
Chairperson: R. Auerbach, University of Wisconsin, Madison

F. Dieterlen, Institut d'embryologie cellulaire et moleculaire du CNRS, Nogent Sur Marne, France: Ontogenic emergence of the endothelial network analyzed in the avian model.
W. Risau, Max-Planck-Institute, Bad Nauheim, Germany: Molecular mechanisms of vasculogenesis and embryonic brain angiogenesis.
M.L. Breitman, Mount Sinai Hospital, Toronto, Canada: The Tek endothelial receptor tyrosine kinase is required for mouse development.
D. Coffin, McLaughlin Research Institute, Great Falls, Montana: Growth factors in vascular morphogenesis.

SESSION 2: Positive Controls of Angiogenesis I
Chairperson: H.F. Dvorak, Harvard Medical School, Boston, Massachusetts

E. Keshet, The Hebrew University, Jerusalem, Israel: Role of VEGF in ischemia-induced angiogenesis.
N. Ferrara, Genentech, Inc., South San Francisco, California: VEGF: A paracrine mediator of tumor growth in vivo.
K.H. Plate, Philipps-Universitat Marburg, Germany: Molecular mechanisms involved in glioma angiogenesis.
P.A. D'Amore, Harvard Medical School, Boston, Massachusetts: Endothelial cell–pericyte interactions in the vasculature.

SESSION 3: Positive Controls of Angiogenesis II

Chairperson: M. Klagsbrun, Harvard Medical School, Boston, Massachusetts

T. Maciag, American Red Cross, Rockville, Maryland: Mechanisms of fibroblast growth factor action.

G. Christofori, University of California, San Francisco: The angiogenic switch: Angiogenic factors and molecular events in multistage tumor development.

K. Alitalo, University of Helsinki, Finland: Roles of Tie and FLT4 receptor tyrosine kinases in megakaryoblastic differentiation and angiogenesis.

M. Bernfield, Harvard Medical School, Boston, Massachusetts: The Syndecans: A family of cell surface co-receptors for matrix and growth factors.

SESSION 4: Complex Controls of Angiogenesis

Chairperson: S.M. Schwartz, University of Washington, Seattle

E.H. Sage, University of Washington, Seattle: Regulation of angiogenesis by SPARC and type I collagen.

E.F. Wagner, IMP Research Institute, Vienna, Austria: Polyoma middle T expression and the control of endothelial cell growth.

V. Bautch, University of North Carolina, Chapel Hill: Transgenic mouse models of angiogenesis.

M.S. Pepper, University of Geneva, Switzerland: Angiogenesis in vitro: Cytokine interactions and extracellular proteolysis.

SESSION 5: Negative Control of Angiogenesis

Chairperson: D. Hanahan, University of California, San Francisco

N.P. Bouck, Northwestern University, Chicago, Illinois: Tumor suppressor gene control of thrombospondin and angiogenesis.

R. Weiner, University of California, San Francisco: The 16-kD amino-terminal fragment of prolactin: An inhibitor of angiogenesis.

J. Folkman, Children's Hospital, Boston, Massachusetts: Circulating endothelial inhibitors.

Nitric Oxide: Molecular Mechanisms of Synthesis and Action

November 14–November 17

FUNDED BY

Cold Spring Harbor Laboratory Corporate Sponsor Program

ARRANGED BY

M.A. Marletta, University of Michigan College of Pharmacy, Ann Arbor

SESSION 1: NOS: Regulation and Expression

Chairperson: S.R. Tannenbaum, Massachusetts Institute of Technology, Cambridge

C.F. Nathan, Cornell University Medical College, New York, New York: Inducible NOS: Molecular aspects of regulation.

T. Michel, Brigham & Women's Hospital, Boston, Massachusetts: Biosynthesis and molecular regulation of endothelial nitric oxide synthase.

T.R. Billiar, Presbyterian University Hospital, Pittsburgh, Pennsylvania: From rodents to humans: Characterization of hepatic inducible NOS.

J. Cohen, Royal Postgraduate Medical School, London, United Kingdom: Cytosine interactions with the inducible NOS.

J.M. Cunningham, Brigham & Women's Hospital, Boston, Massachusetts: Regulation of arginine transport.

T. Michel, S. Tannenbaum, M. Marletta, J. Corbin

SESSION 2: NOS: Mechanism

Chairperson: T. Michel, Brigham & Women's Hospital, Boston, Massachusetts

M.A. Marletta, University of Michigan College of Pharmacy, Ann Arbor: Current studies on NOS.

S. Kaufman, National Institute of Mental Health, National Institutes of Health, Bethesda, Maryland: Studies on mechanisms of rat brain NOS.

B.M. Mayer, Universitat Graz, Austria: Characterization of NOS-binding domains for L-arginine and tetrahydrobiopterin.

B.S.S. Masters, The University of Texas Health Science Center at San Antonio: Molecular aspects of the constitutive cerebellar NOS.

D.J. Stuehr, Cleveland Clinic, Ohio: Characteristics of macrophage NOS subunits and their assembly into functional dimeric enzyme.

SESSION 3: In Vivo Reactions of NO

Chairperson: C.F. Nathan, Cornell University Medical College, New York, New York

B. Demple, Harvard School of Public Health, Boston, Massachusetts: An NO-sensing gene regulator controlling resistance to activated macrophages.

S.R. Tannenbaum, Massachusetts Institute of Technology, Cambridge: The chemistry of NO in relation to toxicity and carcinogenesis.

L.K. Keefer, National Cancer Institute, National Institutes of Health, Frederick, Maryland: Genotoxicity of NO and its progenitors: An update.

E.M. Schuman, California Institute of Technology, Pasadena: NO, ADP ribosyltransferase activity, and intercellular signaling in long-term potentiation.

J. Moss, National Heart, Lung, and Blood Institute, National Institutes of Health, Bethesda, Maryland: Effects of NO on modification of proteins by NAD and ADP-ribose.

G. Enikopolov, Cold Spring Harbor Laboratory, New York: NO and gene expression in neuronal cells.

SESSION 4: NO/Guanylate Cyclase System

Chairperson: M.A. Marletta, University of Michigan College of Pharmacy, Ann Arbor

F. Murad, Molecular Geriatrics, Lake Bluff, Illinois: The NO-cGMP signal transduction system.

J. Burstyn, University of Wisconsin, Madison: Mechanisms of activation of soluble guanylyl cyclase.

J.R. Stone, University of Michigan, Ann Arbor: Purification of soluble guanylate cyclase from bovine lung and initial spectral characterization.

J. Corbin, Vanderbilt University, Nashville, Tennessee: Specificity and mechanisms of cGMP receptors.

J.M.C. Ribeiro, University of Arizona, Tucson: NO synthesis, storage, and delivery in the salivary glands of a blood sucking bug, *Rhodnius prolixus*.

SESSION 5: NO: Metal Complexes

Chairperson: L.K. Keefer, National Cancer Institute, National Institutes of Health, Frederick, Maryland

F.T. Bonner, State University of New York, Stony Brook: Aspects of aqueous NO chemistry.

W.B. Tolman, University of Minnesota, Minneapolis: Chemical modeling of the interactions of NO with copper sites in biology: Binding and activation of NO by biomimetic copper complexes.

V.S. Sharma, University of California, San Diego, La Jolla: Reactions of NO with heme-proteins.

D.J. Singel, Harvard University, Cambridge, Massachusetts: Magnetic resonance studies of NO biochemistry.

The Genetics of Manic Depressive Illness

December 8–December 11

FUNDED BY

The Charles A. Dana Foundation

ARRANGED BY

J.R. DePaulo, The Johns Hopkins Hospital, Baltimore, Maryland
K.R. Jamison, The Johns Hopkins Hospital, Baltimore, Maryland
J. Mallet, Centre National de la Recherche Scientifique, Cedex, France
P. McGuffin, University of Wales College of Medicine, Cardiff, United Kingdom
R.M. Post, National Institute of Mental Health, National Institutes of Health, Bethesda, Maryland
J.A. Witkowski, Banbury Center, Cold Spring Harbor Laboratory, New York.

SESSION 1: Brief Reports of Current Genetic Studies

Chairperson: D. Botstein, Stanford University School of Medicine, California

W.F. Byerley, University of Utah School of Medicine, Salt Lake City

N.B. Freimer, University of California, San Francisco

D.S. Gerhard, Washington University School of Medicine, St. Louis, Missouri

E.S. Gershon, National Institute of Mental Health, National Institutes of Health, Bethesda, Maryland

C. Gilliam, New York State Psychiatric Institute, Columbia University, New York

J.R. Kelsoe, University of California, San Diego, La Jolla

J. Mallet, Centre National de la Recherche Scientifique, Gif-sur-Yvette Cedex, France
P. McGuffin, University of Wales College of Medicine, Cardiff, United Kingdom
J.I. Nurnberger, Indiana University School of Medicine, Indianapolis
R.A. Price, University of Pennsylvania, Philadelphia
O.C. Stine, The Johns Hopkins Hospital, Baltimore, Maryland

SESSION 2: Issues in Diagnosis

Chairperson: R.M. Post, National Institute of Mental Health, National Institutes of Health, Bethesda, Maryland

S. Simpson, The Johns Hopkins Hospital, Baltimore, Maryland: Defining the bipolar phenotype.
J.A. Egeland, University of Miami North Research Office, Hershey, Pennsylvania: Variable age of onset and diagnostic stability for BP1 disorder.
K.R. Jamison, The Johns Hopkins Hospital, Baltimore, Maryland: Clinical description of manic-depressive illness.
V. Reus, University of California, San Francisco: Children of bipolar probands: A longitudinal high-risk study.
W.C. Drevets, Washington University School of Medicine, St. Louis, Missouri: PET imaging of mood disorders: Implications for family studies.
R.M. Post, National Institute of Mental Health, National Institutes of Health, Bethesda, Maryland: Roundtable discussion.

SESSION 3: Candidate Gene Approach

Chairperson: C. Gilliam, New York State Psychiatric Institute, Columbia University, New York

A.J. Lewy, Oregon Health Sciences University, Portland: Biological markers in circadian phase disorders.
R.R. Crowe, University of Iowa Hospitals and Clinics, Iowa City: Discuss candidate gene approaches.
D. Schaid, Mayo Clinic, Rochester, Minneapolis: Relative risk methods for candidate genes using cases and their parents.
J.C. Hall, Brandeis University, Waltham, Massachusetts: Rhythm disorders in *Drosophila*.
T.A. Wehr, National Institute of Mental Health, National Institutes of Health, Bethesda, Maryland: Biological rhythms.

SESSION 4: Genetic Strategies I

Chairperson: N.J. Risch, Yale University School of Medicine, New Haven, Connecticut

M. Wigler, Cold Spring Harbor Laboratory, New York: New approaches to genetic analysis.
D.R. Cox, Stanford University School of Medicine, California: Development of efficient strategies for linkage analysis using meiotic maps spanning the human genome.
J. Ott, Columbia University, New York, New York: Linkage analysis with multilocus diseases.
L.A. Sandkuijl, Delft, The Netherlands: Exclusion of linkage under heterogeneity: Measuring informativeness before testing.
T. Reich, Jewish Hospital, St. Louis, Missouri: The power of the genebank database to detect genes of moderate effect (oligogenes).

N. Risch, D. Cox

SESSION 5: Genetic Strategies II

Chairperson: J. Mallet, Centre National de la Recherche Scientifique, Gif-sur-Yvette Cedex, France

R. Plomin, Pennsylvania State University, University Park: Quantitative trait loci: Is manic-depression a dimension or disorder?

R.A. Price, University of Pennsylvania, Philadelphia

Polygenic (QTL) approaches to identifying genes for depression.

D.W. Fulker, University of Colorado, Boulder: A sib-pair approach to interval mapping of quantitative trait loci.

SESSION 6: Future Developments

Chairpersons: D.R. Cox, Stanford University School of Medicine, California

P. McGuffin, University of Wales College of Medicine, Cardiff, United Kingdom

J. Egeland