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COLD SPRING HARBOR LABORATORY

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BANBURY CENTER 1979 Activities

Somewhat to the surprise of all concerned, the Banbury Center program of conferences and books on biological risk assessment approached its anticipated scope during only the second year of operation. The first two Banbury Reports were published (and the first of these, Assessing Chemical Mutagens: The Risk to Humans, sold out in the first 6 months after publication). Four technical conferences drew distinguished specialists to discuss mammalian cell mutagenesis tests, less hazardous cigarettes, health data from human populations at low risk of cancer, and ethylene dichloride. Each meeting disclosed interesting recent findings, such as the rapid maturation of the Chinese hamster ovary test for chemical mutagens; signs of a sharp reduction in lung-cancer risk to smokers, related to progressive changes in composition of cigarettes; progress in codifying genetic information about such well-defined populations as the Mormons; and a fascinating contradiction in the results of different tests designed to discover if ethylene dichloride, a major chemical industry intermediate, is carcinogenic. With the help of professionally prepared transcripts of the technical conferences, the pace of book production effectively doubled. Meanwhile, a beginning was made on a second major program: informational meetings for nontechnical groups having key roles in policy-making, with a session in June for scientists and congressional staff from Washington.

Support

Financial support of the Center's program, so generously begun in 1978 by the Alfred P. Sloan Foundation and the Esther A. and Joseph Klingenstein Fund, continued to be encouraging. Payment was received from the Environmental Protection Agency under a contract for its support of our May 1978 conference on assessing chemical mutagens and the publication of its proceedings. After months of uncertainty about the form of support from the National Cancer Institute for the 1979 program of technical conferences, a resolution appeared at year-end in a proposal to purchase volumes of proceedings of the meetings, based on the model of the Institute's purchase of many sets of the now-classic Cold Spring Harbor Laboratory work of 1978, Origins of Human Cancer. In November, the Banbury Center informational program received a splendid vote of confidence when the Sloan Foundation trustees appropriated half the projected cost of a 3-year program of meetings designed for groups of journalists and groups of legislative and congressional staff. As 1980 opened, we began planning sessions for the staffs of individual news organizations, inspired in part by the pioneering work of Fred W. Friendly of the Ford Foundation, who has staged a series of meetings for journalists and lawyers to thrash out legal issues that lately have beset the news-gathering profession.



Visitors

With the addition of five Banbury conferences to the 1979 schedule, which also included staging three summer courses in the neurosciences at Banbury and accommodating participants in no less than eight major conferences at the Cold Spring Harbor Laboratory, the use of Banbury facilities was heavier than ever. A roll of Robertson House guests that we sent to Mr. Charles S. Robertson, donor of the Banbury estate, carried the names of 295 scientists, including 60 from 17 foreign countries. As is traditional, the Banbury pool was the site of the annual outing of the Lloyd Harbor Village Police Department. The estate was also the site of two meetings of the Laboratory's Board of Trustees, of a special workshop on virus research organized by Dr. Joseph Sambrook, and dinners bidding farewell to several scientists and a member of the buildings and grounds department. An especially welcome event was the use of the Robertson House living room for a music recital by scientists participating in the summer course on RNA tumor viruses. Of great help to the entire program was the generous loan by the Wood family of the housing facilities of the dramatically sited Fort Hill estate on Lloyd Neck.

Physical Changes

Improvement of the Banbury property proceeded briskly. Two concealed parking areas were created near the new garage and the tennis court, and excavation began for Sammis Hall (scheduled for completion in 1980), which will provide 16 single bedrooms for Banbury guests. The start on Sammis Hall was made possible by generous grants from the Kresge and Fleischmann foundations.

Staff

There was a series of welcome additions to the staff, joining the director, Victor McElheny; the administrative assistant, Beatrice Toliver; the Robertson House housekeeper, Mary Hill; and the grounds keepers, Fred Pfeiffer and Peter Stahl. The new staff included two Banbury editors, Lynda Moran and Judith Cuddihy; an editorial assistant, Kathleen Kennedy; a resident hostess and cook at Robertson House, Katya Davey; and a resident watchman, Chris McEvoy of the Laboratory's buildings and grounds staff. It is a pleasure to record once again the Banbury Center's gratitude for support from every department of the Laboratory and, of particular importance in launching our publications effort, the unstinting help and supervision of Nancy Ford, Director of the Laboratory's Publications Department.



Robertson House

QUANTITATIVE MAMMALIAN CELL MUTAGENESIS AND MUTAGEN SCREENING, May 6 - May 9

Proceedings published in December 1979 as Banbury Report 2, Mammalian Cell Mutagenesis: The Maturation of Test Systems.

The conference heard new evidence concerning such mammalian cell systems as the hypoxanthine-guanine phosphoribosyl transferase (HGPRT) locus in Chinese hamster ovaries (CHO) and the thymidine kinase (TK) locus in mouse lymphoma cells, which revealed that mutations can be experimentally induced and quantitatively analyzed. Unresolved questions were also explored, such as the actual range of mutational events being assayed and whether the events in cell culture reflect the cellular responses in intact animals and humans. Although the conference participants wrestled with a host of questions about means of activating cell systems for screening environmental mutagens, there was conviction that the systems have proved themselves workable, as evidenced by wide use in industrial toxicology and screening programs. The conference brought together leading developers of animal and human cell systems, geneticists using such systems for fundamental biological studies, and participants in industrial and government screening programs. Leading the organization of the meeting were Abraham Hsie and J. Patrick O'Neill of Oak Ridge National Laboratory.

Session 1: Gene Mutation—Exploring the Evidence for Mutation Events in Cultured Mammalian Cells, and the Criteria Utilized to Define Such Events

Chairperson: E. A. ADELBERG, Yale University School of Medicine, New Haven, Connecticut

- T. T. PUCK, University of Colorado Medical Center, Denver: Historical perspective of mutation studies with somatic mammalian cells.
- L. SIMINOVITCH, University of Toronto, Canada: Studies of mutation in CHO cells.
- C. T. CASKEY, Baylor College of Medicine, Houston, Texas: HGPRT mutants in Chinese hamster V79 cells.

Roundtable: Definition of Criteria to Define a Genetic Event

Chairperson: R. L. DAVIDSON, Children's Hospital Medical Center, Boston, Massachusetts

- E. A. ADELBERG, Yale University School of Medicine, New Haven, Connecticut
- R. J. ALBERTINI, University of Vermont College of Medicine, Burlington
- T. T. PUCK, University of Colorado Medical Center, Denver

L. SIMINOVITCH, University of Toronto, Canada

Session 2: Quantitative Mutagenesis with Rodent Cells

Chairperson: L. SIMINOVITCH, University of Toronto, Canada

- J. P. O'NEILL, Oak Ridge National Laboratory, Tennessee: CHO/HGPRT mutation assay—Experimental procedure.
- M. M. MOORE-BROWN* and D. CLIVE,⁺ *Environmental Protection Agency, Research Triangle Park, North Carolina; ⁺Burroughs Wellcome Co., Research Triangle Park, North Carolina: The L5178Y/TK^{+/-} mutagen assay system: *In situ* results.
- C. C. CHANG, Michigan State University, East Lansing: The use of Chinese hamster V79 cells for the detection of mutagens and tumor promoters or anti-promoters.

Roundtable: Quantitative Mutational Systems, Evidence for Genetic Events

Chairperson: L. A. CHASIN, Columbia University, New York, New.York

A. W. HSIE and J. P. O'NEILL, Oak Ridge National Laboratory, Tennessee

M. M. MOORE-BROWN, Environmental Protection Agency, Research Triangle Park, North Carolina

D. CLIVE, Burroughs Wellcome Co., Research Triangle Park, North Carolina

C. C. CHANG, Michigan State University, East Lansing

Session 3: Roundtable—Criteria for a Mutagen Screening System

Chairperson: D. A. CASCIANO, National Center for Toxicological Research, Jefferson, Arkansas

J. A. BRADLAW, Food and Drug Administration, Washington, DC

B. E. BUTTERWORTH, Chemical Industry Institute of Toxicology, Research Triangle Park, North Carolina

L. D. KIER, Monsanto Chemical Company, St. Louis, Missouri

D. F. KRAHN, E. I. du Pont de Nemours & Company, Newark, Delaware

M. D. WATERS, Environmental Protection Agency, Research Triangle Park, North Carolina

E. ZEIGER, National Institute of Environmental Health Sciences, Research Triangle Park, North Carolina

Session 4: Genetic, Biochemical and Molecular Analysis of Mutation

Chairperson: P.O.P. Ts'O, Johns Hopkins University, Baltimore, Maryland

- E. A. ADELBERG, Yale University School of Medicine, New Haven, Connecticut: Selection methods for membrane transport mutants.
- L. H. THOMPSON, Lawrence Livermore Laboratory, Livermore, California: Analysis of temperature-sensitive mutants and quantitative assay of purine analog resistance in CHO cells.
- L. A. CHASIN, Columbia University, New York, New York: Selection of recessive mutants at diploid loci by titration of the gene product—CHO mutants deficient in dihydrofolate reductase activity.
- M. W. TAYLOR, Indiana University, Bloomington: An analysis of mutation at the APRT locus.
- R. L. DAVIDSON, Children's Hospital Medical Center, Boston, Massachusetts: Mechanisms of resistance to thymidine analogs in mammalian cells.
- R. M. BAKER, Massachusetts Institute of Technology, Cambridge: Nature and use of ouabain resistant mutants.

Session 5: Use of Mutagen Screening Systems

Chairperson: E. ZEIGER, National Institute of Environmental Health Sciences, Research Triangle Park, North Carolina

- D. F. KRAHN, E. I. du Pont de Nemours & Company, Newark, Delaware: Utilization of the CHO/HGPRT system—Metabolic activation and a method for testing gases.
- J. D. IRR, E. I. du Pont de Nemours & Company, Newark, Delaware: Statistical evaluation of mutagenicity with the CHO/HGPRT system.
- D. E. AMACHER, Pfizer, Inc., Groton, Connecticut: Utility of the mouse lymphoma L5178Y/TK assay for the detection of chemical mutagens.
- J. G. DENT, Chemical Industry Institute of Toxicology, Research Triangle Park, North Carolina: Choice of activating systems for in vitro mutagenesis assays.
- D. B. COUCH, Chemical Industry Institute of Toxicology, Research Triangle Park, North Carolina: The influence of activation systems on the metabolism of 2,4-dinitrotoluene and its mutagenicity to CHO cells.
- J. P. O'NEILL, Oak Ridge National Laboratory, Tennessee: The CHO/HGPRT mutation assay—Adaptation for mutagen screening.

Session 6: Quantitative Mutagenesis of Human Cells

Chairperson: J. P. O'NEILL, Oak Ridge National Laboratory, Tennessee

- R. DEMARS, University of Wisconsin, Madison: Suggestions for increasing the scope of direct testing for mutagens and carcinogens in intact humans and animals.
- W. G. THILLY, Massachusetts Institute of Technology, Cambridge: Study of mutagenesis in diploid human lymphoblasts.
- V. M. MAHER, Michigan State University College of Osteopathic Medicine, East Lansing: Comparing the frequency of mutations induced in strains and diploid human fibroblasts with different capacities for DNA repair.
- R. J. ALBERTINI, University of Vermont College of Medicine, Burlington: Direct mutagenicity testing with peripheral blood lymphocytes.

Session 7: Mutation, Cancer, and Progress with Mutagen Testing

Chairperson: J. A. BRADLAW, Food and Drug Administration, Washington, DC

- P. O. P. Ts'O, Johns Hopkins University, Baltimore, Maryland: Current progress in the study of basic mechanisms of neoplastic transformation.
- A. W. HSIE, Oak Ridge National Laboratory, Tennessee: The CHO/HGPRT mutation assay—Progress with quantitative mutagenesis and mutagen screening.
- D. CLIVE* and M. M. MOORE-BROWN,[†] *Burroughs Wellcome Co., Research Triangle Park, North Carolina; [†]Environmental Protection Agency, Research Triangle Park, North Carolina: The L5178Y/TK^{+/-} mutagen assay system—Mutant analysis.
- M. HOLLSTEIN, University of California, Berkeley: Evaluation of rapid screening methods that detect carcinogens and mutagens—Collation and comparison of test results.
- M. D. WATERS, Environmental Protection Agency, Research Triangle Park, North Carolina: The Gene-Tox Program.

Conference Summary: L. A. CHASIN, Columbia University, New York, New York

WORKSHOP ON ENVIRONMENTAL HEALTH RISKS, June 8 – June 10

Staff from the offices of individual members of Congress, Congressional committees, research agencies of Congress and the legislative affairs office of an Executive Branch scientific agency heard and questioned intently a distinguished group of scientists who discussed techniques of detecting and assessing risks, the relationship between risk assessment and fundamental biological research, and such specific problems of risk assessment as food safety and the management of wastes from advanced technological industries. Attendees at the meeting, recruited over nearly a year, flew up from Washington during a busy legislative season for the weekend workshop, and promptly sent back comments that were both enthusiastic and helpful for future workshops, planned to be held at least once a year.

Session 1: Introduction

B. N. AMES, University of California, Berkeley: Identifying chemicals causing cancer and mutations.

Session 2: Risk Assessment in its Scientific Context

J. HIGHLAND, Environmental Defense Fund, Washington, DC: Neglected risks.

- J. LEDERBERG, Rockefeller University, New York, New York: Intellectual and technical limits of risk assessment.
- D. BALTIMORE, Massachusetts Institute of Technology, Cambridge: The relevance of fundamental biological studies of genes and viruses.

Session 3: Food Safety and Broader Concerns

- P. N. MAGEE, Temple University School of Medicine, Philadelphia, Pennsylvania: Possibilities of cancer prevention.
- S. R. TANNENBAUM, Massachusetts Institute of Technology, Cambridge: Unavoidable exposure to carcinogens—Nitrates, nitrites, pyrolysis products, and carcinogenic spices.



J. RODRICKS, Food and Drug Administration, Rockville, Maryland: Usefulness and pitfalls of using risk assessment in regulation.

Session 4: The Burden of Wastes

- B. J. PAIGEN, Roswell Park Memorial Institute, Buffalo, New York: Lessons of Love Canal.
- H. WHITESIDE, Environmental Protection Agency, Washington, DC: Low-level radiation from the nuclear fuel cycle—A political and scientific problem.
- R. WILSON, Harvard University, Cambridge, Massachusetts: Chemical and nuclear wastes; their differences and similarities.

TOWARD A LESS HAZARDOUS CIGARETTE, October 14 – October 16

Proceedings to be published in May 1980 as Banbury Report 3, A Safe Cigarette?

The conference heard presentations of evidence, such as declining lung cancer incidence among younger age groups in the United Kingdom, and United States studies reporting lower rates of lung cancer among filter-cigarette smokers and a reduced frequency of bronchial lesions in hospital patients of recent years (with known smoking frequencies) compared with similar groups of patients 15 years earlier. All of this evidence indicates that the risk of smoking-related lung cancer is being reduced by multiple changes in cigarettes whose combined effect has been to reduce the delivery of tar of the average cigarette by more than half in the last 20 years. Among other topics discussed was the recent sharp increase in the market share of cigarettes with less than 15 mg of tar (defined in the United States as low-tar cigarettes) from 24% in the first quarter of 1977 to more than 40% in the second quarter of 1979. Also discussed were studies of such possible continuing smoking risks as carbon monoxide, polonium 210, nitrosamines, and nicotine; and studies indicating that the tendency of smokers to compensate for reduced tar and nicotine by smoking more cigarettes is very moderate. Leading in the organization of the meeting was Gio B. Gori of the National Cancer Institute.

Session 1: Introduction and Epidemiological Trends

Chairperson: E. C. HAMMOND, American Cancer Society, New York, New York

- E. L. WYNDER, American Health Foundation, New York, New York: Epidemiological perspectives.
- E. C. HAMMOND, American Cancer Society, New York, New York: The long-term benefits of reducing tar and nicotine in cigarettes.
- L. GARFINKEL, American Cancer Society, New York, New York: Changes in the cigarette consumption of smokers in relation to changes in tar and nicotine content of cigarettes smoked.
- M. KUNZE, Hygiene-Institut, University of Vienna, Austria: Thresholds of tar exposure—Analysis of smoking histories of male lung cancer cases and controls.
- C. LYNCH, Enviro Control, Inc., Rockville, Maryland: Non-detectable risk levels in cigarette smoking.

Session 2: Toxicological Dimensions

Chairperson: F. G. BOCK, Roswell Park Memorial Institute, Orchard Park, New York

- S. P. BATTISTA, Arthur D. Little, Inc., Cambridge, Massachusetts: Inhalation studies of toxicity of tobacco smoke.
- M. C. BATTIGELLI, University of North Carolina, Chapel Hill: Reversible versus fixed obstructive disorder of the airways.
- L. DIAMOND, University of Kentucky College of Pharmacology, Lexington: Pulmonary toxicity of nitrogen oxides.
- P. ASTRUP, Rigshospitalet, Copenhagen, Denmark: Carbon monoxide as a contributor to the health hazards of cigarette smoking.
- C. J. SCHWARTZ, University of Texas Health Science Center, San Antonio: Cigarette smoking and cardiovascular diseases.
- N. HARLEY, Institute of Environmental Medicine, New York University Medical Center, New York: Polonium 210—A questionable risk factor in smoking-related carcinogenesis.

- B. L. VAN DUUREN, Institute of Environmental Medicine, New York University Medical Center, New York: Co-carcinogens in tobacco smoke.
- D. HOFFMANN, Naylor Dana Institute, American Health Foundation, Valhalla, New York: The role of volatiles and nonvolatiles and nitrosamines in tobacco carcinogenesis.
- F. G. BOCK, Roswell Park Memorial Institute, Orchard Park, New York: Co-carcinogenic properties of nicotine.
- L. GARFINKEL, American Cancer Society, New York, New York: Changes in bronchial epithelium in relation to cigarette smoking: 1955-60 versus 1970-77.

Session 3: Cigarette Engineering

- Chairperson: G. B. GORI, Division of Cancer Cause and Prevention, National Cancer Institute, Bethesda, Maryland
- T. C. Tso, Beltsville Agricultural Research Center, Maryland: Chemistry of tobacco, and the effects of agronomy and curing.
- M. R. GUERIN, Oak Ridge National Laboratory, Tennessee: Chemistry of tobacco smoke.
- W. SELKE, Schweitzer Division, Kimberly-Clark Corporation, Lee, Massachusetts: Reconstituted tobacco sheet.
- T. EICHER and F. MÜLLER, Bayer Industries, Dormagen, West Germany: A co-tobacco material, RCN.
- C. KEITH, Celanese Fibers Company, Charlotte, North Carolina: Physical methods in modification of tobacco smoke (filters, papers and ventilation).
- W. S. CAIN, Yale University School of Medicine, New Haven, Connecticut: Sensory attributes of cigarette smoking.
- E. J. LAVOIE, Naylor Dana Institute, American Health Foundation, Valhalla, New York: The less harmful cigarette and tobacco smoke flavors.
- G. B. GORI, Division of Cancer Cause and Prevention, National Cancer Institute, Bethesda, Maryland: Overview of changes in the cigarette product.

Session 4: Behavioral and Economic Issues

Chairperson: J. H. JAFFE, New York State Psychiatric Institute, New York

- S. M. SHIFFMAN, University of California, School of Medicine, Los Angeles: Reduced smoking, withdrawal symptoms, and cessation—A cautionary note.
- M. A. H. RUSSELL, Addiction Research Unit, Institute of Psychiatry, London, England: Dependency on nicotine—Relation of nicotine yield and blood nicotine levels.
- J. H. JAFFE, New York State Psychiatric Institute, New York: Preliminary observations of switchers—Some physiological and biological findings.
- J. C. MAXWELL, JR. Lehman Brothers Kuhn Loeb, Inc., New York, New York: Trends in cigarette consumption.
- J. E. HARRIS, Massachusetts Institute of Technology, Cambridge: Taxation of cigarettes according to tar and nicotine contents.
- B. RICHTER, Enviro Control, Inc., Rockville, Maryland: Macro-economics of the prevention of tobacco-related diseases.
- Conference Summary: G. B. GORI, Division of Cancer Cause and Prevention, National Cancer Institute, Bethesda, Maryland



HUMAN HEALTH DATA FROM DEFINED POPULATIONS, October 28 - October 31

Proceedings to be published in June 1980 as Banbury Report 4, Cancer Incidence in Defined Populations

Combined genetic and epidemiological investigations of defined groups, a number of them with cancer rates markedly different from that of the general population (according to presentations at the conference) form an important tool for quantifying the impact on cancer rates of such factors as variations in food in the diet, content of water or other drinks, or cigarettes. The conference also heard much evidence that new tools, such as computerized construction of pedigrees of such groups as the Mormons, molecular biological techniques of constructing libraries of stretches of human genetic material, and operation of national death registries, show great promise for deepening knowledge of well-defined populations in search of preventive measures against cancer. Leading in the organization of the conference were John Cairns of the Imperial Cancer Research Fund, Mill Hill Laboratories; J. L. Lyon of the Utah Cancer Registry; and Mark Skolnick of the University of Utah Medical Center.

Session 1: Cancer in Utah, Mortality Among Seventh Day Adventists

Chairperson: G. D. COPLEY, National Cancer Institute, Bethesda, Maryland

- J. L. LYON, University of Utah Medical Center, Salt Lake City: Overview of studies of cancer in Utah populations.
- D. WEST, Utah Cancer Registry, Salt Lake City: An assessment of cancer risk factors in Mormons and non-Mormons in Utah, with particular reference to cervix and colon cancer.
- A. SORENSON, University of Utah Medical Center, Salt Lake City: Methods and strategies in nutritional epidemiology studies, using a colon cancer study as a model.
- T. LOTZ, Loma Linda University, California: Death ascertainment among a defined population of California Seventh Day Adventists (SDAs) by computer-assisted matching to the California State Mortality File; and the problem of selection for comparison of mortality experience of SDAs to that of the general population.
- R. L. PHILLIPS, Loma Linda University, California: Mortality from cancer of the large bowel, breast, and stomach among SDAs with differing dietary habits.

Session 2: Cancer Among Mormons and Other Defined Populations

Chairperson: C. DAVERN, University of Utah, Salt Lake City

- J. E. ENSTROM, University of California, School of Public Health, Los Angeles: Health and dietary practices and cancer mortality among active California Mormons.
- M.-C. KING, University of California, Berkeley: Genetic epidemiology of breast cancer in Mormon kindreds.
- E. J. GARDNER, Utah State University College of Science, Logan: Prevention and cure for hereditary cancers.
- A. O. MARTIN, Prentice Women's Hospital and Maternity Center, Northwestern University Medical School, Chicago, Illinois: Use of a genealogically linked data base in the analysis of cancer in a human isolate.

H. SIGVALDASON, Icelandic Cancer Registry, Reykjavík: Human health data in Iceland.

Session 3: Epidemiology and Cancer Prevention

Chairperson: J. CAIRNS, Imperial Cancer Research Fund, London, England

R. W. RAWSON, University of Utah Research Institute, Salt Lake City: The total environment in the epidemiology of neoplastic disease—The obvious "ain't necessarily so." Discussion led by J. CAIRNS.

Session 4: Studies in Several Defined Populations, and an Examination of Associations between Radiation and Leukemia in Utah

Chairperson: R. W. RAWSON, University of Utah Research Institute, Salt Lake City

L. J. KINLEN, Cancer Research Campaign, Radcliffe Infirmary, Oxford, England: Abstinence from meat in relation to mortality among sisters in contemplative orders in the United Kingdom.

- W. NANCE, Medical College of Virginia, Richmond: The value of population-based twin registries for genetic and epidemiologic research.
- R. WARD, University of Washington, Seattle: Pedigrees and blood pressure—Genetic epidemiology in a migrant isolate, Tokelau.
- K. M. WEISS, Center for Demographic and Population Genetics, University of Texas, Houston: Studies in Laredo, Texas.
- J. L. LYON, University of Utah Medical Center, Salt Lake City: Childhood leukemias associated with fallout from nuclear testing.
- J. E. ENSTROM, University of California, School of Public Health, Los Angeles: The nonassociation of fallout radiation with childhood leukemia in Utah.

Session 5: Genealogical Studies

- Chairperson: A. O. MARTIN, Prentice Women's Hospital and Maternity Center, Northwestern University Medical Center, Chicago, Illinois
- J. PETO, Imperial Cancer Research Fund, Oxford, England: The epidemiological study of hereditary cancer risks.
- J.-M. LALOUEL, University of Hawaii at Manoa, Honolulu: Relative merits and pitfalls of some strategies in genetic epidemiology.
- M. SKOLNICK, LDS Hospital, Salt Lake City, Utah: Genetic studies of Utah genealogy.
- J. R. HILL, LDS Hospital, Salt Lake City, Utah: Studies of coefficients of kinship for cancer in Utah Mormon genealogy.
- T. BISHOP, LDS Hospital, Salt Lake City, Utah: Analysis of the genetic predisposition to cancer in individual pedigrees.
- R. WILLIAMS, University of Utah Medical Center, Salt Lake City: Analysis of Mormon genealogical data for factors relating to heart disease.
- R. M. FINEMAN, University of Utah Medical Center, Salt Lake City: Utah registry for birth defects and genetic diseases.

Session 6: Problems of Genetic Epidemiology

Chairperson: E. JORDAN, National Institute of General Medical Sciences, Bethesda, Maryland

- R. L. WHITE, University of Massachusetts Medical School, Worcester: In search of DNA polymorphism in humans.
- M. SKOLNICK, LDS Hospital, Salt Lake City, Utah: Number of families needed to establish tight linkages for polymorphisms.
- T. BISHOP, LDS Hospital, Salt Lake City, Utah: Mathematical aspects of locating genes on chromosomes.
- R. S. SPARKES, University of California, School of Medicine, Los Angeles: Gene-mapping with retinoblastoma.



Session 7: National Death Registries

Chairperson: J. PETO, Imperial Cancer Research Fund, Oxford, England

- L. J. KINLEN, Cancer Research Campaign, Radcliffe Infirmary, Oxford, England: The National Health Service and death registration in the United Kingdom.
- J. PATTERSON, National Center for Health Statistics, Hyattsville, Maryland: Establishment of a National Death Registry in the United States.

Conference Summary: C. DAVERN, University of Utah, Salt Lake City

ETHYLENE DICHLORIDE: ECONOMIC IMPORTANCE AND POTENTIAL HEALTH RISKS, November 14 – November 17

Proceedings to be published in July 1980 as Banbury Report 5, Ethylene Dichloride: Economic Importance and Potential Health Risks.

Examination at the conference of the manufacture and uses of this major chemical industry intermediate, of which some 10 billion pounds is manufactured annually in the United States and most of which is converted to vinyl chloride monomer, showed that although there is a high volume of potential exposures to ethylene dichloride, largely within the chemical industry, the level of exposure is low from the industry point of view, whereas it is worrisome to researchers studying the mutagenicity of the compound (who hold that the ambient air levels likely to be inhaled by workers match up with levels sufficient to induce cancer in laboratory animals). The conference explored variations in the results of carcinogenicity tests on ethylene dichloride and other chlorinated hydrocarbons, particularly between tests by tube-feeding and by inhalation of ethylene dichloride. It also considered new information on the effects of metabolism and binding of chlorinated hydrocarbons in cells and animals, and also of age, on the outcome of short-term tests of the mutagenicity of such compounds. Leading in the organization of the Conference were Bruce Ames and Kim Hooper of the University of California at Berkeley, Peter Infante of the Occupational Safety and Health Administration, and Richard Reitz of the Dow Chemical Company.

Session 1: Mutagenicity and Carcinogenicity of Ethylene Dichloride

Chairperson: R. REITZ, Dow Chemical Company, Midland, Michigan

- C. MALTONI, Istituto di Oncologia e Centro Tumori, Bologna, Italy: Long-term carcinogenicity bioassays on ethylene dichloride, administered by inhalation to rats and mice.
- J. M. WARD, National Toxicology Program, National Cancer Institute, Bethesda, Maryland: The National Cancer Institute bioassay of ethylene dichloride.
- B. N. AMES, University of California, Berkeley: Carcinogenic potency.
- K. HOOPER, University of California, Berkeley: Ethylene dichloride as a mutagen.
- U. RANNUG, Wallenberg Laboratoriet, Stockholms Universitet, Sweden: The use of different metabolising systems in the elucidation of the mutagenic effects of 1,2 dichloroethane in *Salmonella*.
- V. F. SIMMON, Genex Corporation, Rockville, Maryland: Review of nonbacterial tests of the mutagenicity of ethylene dichloride.

Session 2: Toxicology and Other Topics

- Chairperson: P. INFANTE, Office of Carcinogen Identification and Classification, Occupational Safety and Health Administration, Washington, DC
- F. SPREAFICO, Istituto di Ricerche Farmacologiche "Mario Negri," Milan, Italy: Clinical chemistry of animals inhaling ethylene dichloride.
- R. REITZ, Dow Chemical Company, Midland, Michigan: Pharmacokinetics and macromolecular interactions of ethylene dichloride; comparison of oral and inhalation exposures.
- K. S. RAO, Dow Chemical Company, Midland, Michigan: Teratogenic and reproductive effects of ethylene dichloride in rats.
- G. TER HAAR, Ethyl Corporation, Baton Rouge, Louisiana: An investigation of possible sterility and health effects of ethylene dibromide.

Session 3: Uses of Ethylene Dichloride; Worker Exposure

Chairperson: R. K. HINDERER, B. F. Goodrich Company, Cleveland, Ohio

- L. GOLD, University of California, Berkeley: Uses of ethylene dichloride.
- L. FISHBEIN, National Center for Toxicological Research, Jefferson, Arkansas: Uses and environmental fate of ethylene dichloride.
- E. S. JACOBS, E. I. du Pont de Nemours & Company, Wilmington, Delaware: Scavengers for use in leaded gasoline.
- M. N. JOHNSON, B. F. Goodrich Company, Akron, Ohio: Medical aspects of ethylene dichloride in the workplace.
- R. KELLAM, Environmental Protection Agency, Research Triangle Park, North Carolina: Human exposure to ethylene dichloride—Potential for regulation as an airborne carcinogen.
- B. L. VAN DUUREN, Institute of Environmental Medicine, New York University Medical Center, New York: Carcinogenicity and metabolism of halogenated olefinic and aliphatic hydrocarbons.

Session 4: Related Chemicals

Chairperson: K. HOOPER, University of California, Berkeley

- W. M. BUSEY, Experimental Pathology Laboratories, Inc., Herndon, Virginia: The inhalation carcinogenesis of vinyl bromide.
- H. B. PLOTNICK, Center for Disease Control, National Institute for Occupational Safety and Health, Cincinnati, Ohio: The effect of dietary disulfuram upon the toxicity of 1,2 dibromoethane.
- P. INFANTE, Office of Carcinogen Identification and Classification, Occupational Safety and Health Administration, Washington, DC: Evidence for the carcinogenicity of some structural analogs of ethylene dichloride.
- J. D. FABRICANT, University of Texas Medical Branch, Galveston: Evidence of the mutagenicity of 1,2 dichloroethane and related structural analogs.
- P. MARLOW, Office of Carcinogen Identification and Classification, Occupational Safety and Health Administration, Washington, DC: Assessment of animal studies of ethylene dichloride and related compounds.
- M. W. ANDERS, University of Minnesota Twin Cities Medical School, Minneapolis: Metabolism of dihalides to ethylene.

Conference Summary: R. K. HINDERER, B. F. Goodrich Company, Cleveland, Ohio



