

SMOKING *and* HEALTH

REPORT OF THE ADVISORY COMMITTEE
TO THE SURGEON GENERAL
OF THE PUBLIC HEALTH SERVICE



U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service

Public Health Service Publication No. 1103

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C., 20402 - Price \$1.25

**THE SURGEON GENERAL'S ADVISORY
COMMITTEE ON SMOKING
AND HEALTH**

Stanhope Bayne-Jones, M.D., LL.D.

Walter J. Burdette, M.D., Ph. D.

William G. Cochran, M.A.

Emmanuel Farber, M.D., Ph. D.

Louis F. Fieser, Ph. D.

Jacob Furth, M.D.

John B. Hickam, M.D.

Charles LeMaistre, M.D.

Leonard M. Schuman, M.D.

Maurice H. Seevers, M.D., Ph. D.

COMMITTEE STAFF

Professional Staff

| | |
|---|--|
| Eugene H. Guthrie, M.D., M.P.H. <i>Staff Director</i> | Peter V. V. Hamill, M.D., M.P.H. <i>Medical Coordinator</i> |
| Alexander Stavrides, M.D. <i>Special Assistant to the Director</i> | Jack Walden <i>Information Officer</i> |
| Mort Gilbert <i>Editorial Consultant</i> | Jane Stafford <i>Editorial Consultant</i> |
| Helen A. Johnson <i>Administrative Officer</i> | Benjamin E. Carroll <i>Biostatistical Consultant</i> |

Secretarial and Technical Staff

| | | |
|-----------------|------------------|------------------|
| Helen Bednarek | Alphonzo Jackson | Adele Rosen |
| Mildred Bull | Jennie Jennings | Margaret Shanley |
| Grace Cassidy | Martha King | Don R. Shopland |
| Rose Comer | Sue Myers | Elizabeth Welty |
| Jacqueline Copp | Irene Orkin | Edith Waupoose |

Foreword

Since the turn of the century, scientists have become increasingly interested in the effects of tobacco on health. Only within the past few decades, however, has a broad experimental and clinical approach to the subject been manifest; within this period the most extensive and definitive studies have been undertaken since 1950.

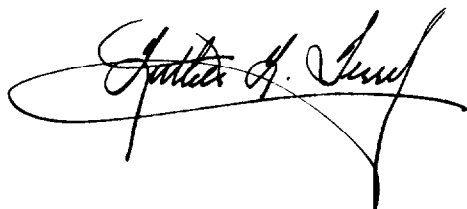
Few medical questions have stirred such public interest or created more scientific debate than the tobacco-health controversy. The interrelationships of smoking and health undoubtedly are complex. The subject does not lend itself to easy answers. Nevertheless, it has been increasingly apparent that answers must be found.

As the principal Federal agency concerned broadly with the health of the American people, the Public Health Service has been conscious of its deep responsibility for seeking these answers. As steps in that direction it has seemed necessary to determine, as precisely as possible, the direction of scientific evidence and to act in accordance with that evidence for the benefit of the people of the United States. In 1959, the Public Health Service assessed the then available evidence linking smoking with health and made its findings known to the professions and the public. The Service's review of the evidence and its statement at that time was largely focussed on the relationship of cigarette smoking to lung cancer. Since 1959 much additional data has accumulated on the whole subject.

Accordingly, I appointed a committee, drawn from all the pertinent scientific disciplines, to review and evaluate both this new and older data and, if possible, to reach some definitive conclusions on the relationship between smoking and health in general. The results of the Committee's study and evaluation are contained in this Report.

I pledge that the Public Health Service will undertake a prompt and thorough review of the Report to determine what action may be appropriate and necessary. I am confident that other Federal agencies and nonofficial agencies will do the same.

The Committee's assignment has been most difficult. The subject is complicated and the pressures of time on eminent men busy with many other duties has been great. I am aware of the difficulty in writing an involved technical report requiring evaluations and judgments from many different professional and technical points of view. The completion of the Committee's task has required the exercise of great professional skill and dedication of the highest order. I acknowledge a profound debt of gratitude to the Committee, the many consultants who have given their assistance, and the members of the staff. In doing so, I extend thanks not only for the Service but for the Nation as a whole.

A handwritten signature in black ink, appearing to read "J. Lee Smith". The signature is fluid and cursive, with a large, sweeping underline that extends across the width of the signature.

SURGEON GENERAL

Table of Contents

| | Page |
|---|------|
| FOREWORD | v |
| ACKNOWLEDGMENTS | ix |
| PART I INTRODUCTION, SUMMARIES AND CONCLUSIONS | |
| Chapter 1 Introduction | 3 |
| Chapter 2 Conduct of the Study | 11 |
| Chapter 3 Criteria for Judgment | 17 |
| Chapter 4 Summaries and Conclusions | 23 |
| PART II EVIDENCE OF THE RELATIONSHIP OF SMOKING TO HEALTH | |
| Chapter 5 Consumption of Tobacco Products in the United States | 43 |
| Chapter 6 Chemical and Physical Characteristics of Tobacco and Tobacco Smoke | 47 |
| Chapter 7 Pharmacology and Toxicology of Nicotine | 67 |
| Chapter 8 Mortality | 77 |
| Chapter 9 Cancer | 121 |
| Chapter 10 Non-Neoplastic Respiratory Diseases, Particularly Chronic Bronchitis and Pulmonary Emphysema | 259 |
| Chapter 11 Cardiovascular Diseases | 315 |
| Chapter 12 Other Conditions | 335 |
| Chapter 13 Characterization of the Tobacco Habit and Beneficial Effects of Tobacco | 347 |
| Chapter 14 Psycho-Social Aspects of Smoking | 359 |
| Chapter 15 Morphological Constitution of Smokers | 381 |

ACKNOWLEDGMENTS

During this study the Advisory Committee on Smoking and Health has had the constant support of individuals, groups and institutions throughout a broad range of professional and technical occupations. In many cases the contributions of these individuals involved considerable personal, professional or financial sacrifice. In every case the contributions lessened the burden of the Committee and increased the authority and completeness of the Report. In this space it is impossible to assign priorities or special emphasis to individual contributions or contributors. The Committee, however, does acknowledge with gratitude and deep appreciation—and with sincere apologies to any individual inadvertently omitted—the substantial cooperation and assistance of the following:

- ACKERMAN, LAUREN, M.D.—Professor of Pathology, Washington University School of Medicine, St. Louis, Mo.
- ALBERT, ROY E., M.D.—Associate Professor, Department of Industrial Medicine, New York University Medical Center, New York, N.Y.
- ALLEN, GEORGE V.—President and Executive Director, The Tobacco Institute, Inc., Washington, D.C.
- ALLING, D. W., M.D.—Statistician, National Institute of Allergy and Infectious Diseases, U.S. Public Health Service, Bethesda, Md.
- AMERICAN CANCER SOCIETY, New York, N.Y.
- AMERICAN TOBACCO CO., New York, N.Y.
- ANDERSON, AUGUSTUS E., Jr., M.D.—Senior Attending Internist, Research Laboratory, Baptist Memorial Hospital, Jacksonville, Fla.
- ANDERVONT, HOWARD B., Sc. D.—Chief, Laboratory of Biology, National Cancer Institute, U.S. Public Health Service, Bethesda, Md.
- ARTHUR D. LITTLE, INC., Cambridge, Mass.
- ASCARI, WILLIAM, M.D.—Pathologist, Presbyterian Hospital, New York, N.Y.
- ASHFORD, THOMAS P., M.D.—Instructor in Surgery, College of Medicine, University of Utah, Salt Lake City, Utah.
- ASTIN, ALEXANDER W., Ph. D.—Research Associate, National Merit Scholarship Corporation, Evanston, Ill.
- AUERBACH, OSCAR, M.D.—Senior Medical Investigator, Veterans Administration Hospital, East Orange, N.J.
- BAILAR, JOHN C. III, M.D.—Head, Demography Section, Biometry Branch, National Cancer Institute, U.S. Public Health Service, Bethesda, Md.
- BATTISTA, S. P.—Pharmacologist, Arthur D. Little, Inc., Cambridge, Mass.
- BEARMAN, JACOB E., Ph. D.—Professor of Biostatistics, University of Minnesota School of Public Health, Minneapolis, Minn.
- BEEBE, GILBERT W., Ph. D.—Statistician, National Academy of Sciences, National Research Council, Washington, D.C.

- BELL, FRANK A., Jr.—Program Director for the Engineer Career Development Committee, Office of the Chief Engineer, U.S. Public Health Service, Washington, D.C.
- BERKSON, JOSEPH, M.D.—Head, Division of Biometry and Medical Statistics, Mayo Clinic, Rochester, Minn.
- BEST, E. W. R., M.D., D.P.H.—Chief, Epidemiology Division, Department of National Health and Welfare, Ottawa, Canada.
- BLUMBERG, J., Brig. Gen.—Director, Armed Forces Institute of Pathology, Washington, D.C.
- BOCKER, DOROTHY, M.D.—Bibliographer, Reference Section, National Library of Medicine, U.S. Public Health Service, Bethesda, Md.
- BRAUNWALD, EUGENE, M.D.—Chief, Cardiology Branch, National Heart Institute, U.S. Public Health Service, Bethesda, Md.
- BRESLOW, LESTER, M.D.—Chief, Division of Preventive Medical Services, California Department of Public Health, Berkeley, Calif.
- BROWN AND WILLIAMSON TOBACCO CORP., Louisville, Ky.
- BROWN, BYRON WM., Jr., Ph. D.—Associate Professor, Biostatistics Division, School of Public Health, University of Minnesota, Minneapolis, Minn.
- BUTLER, WILLIAM T., M.D.—Clinical Investigator, Laboratory of Clinical Investigations, National Institute of Allergy and Infectious Diseases, U.S. Public Health Service, Bethesda, Md.
- CANADIAN DEPARTMENT OF NATIONAL HEALTH AND WELFARE, Ottawa, Canada.
- CANADIAN DEPARTMENT OF VETERANS AFFAIRS, Ottawa, Canada.
- CARON, Herbert S., Ph. D.—Cleveland Veterans Administration Hospital, Cleveland, Ohio
- CARNES, W. H., M.D.—Professor and Head of Department of Pathology, College of Medicine, University of Utah, Salt Lake City, Utah.
- CARRESE, LOUIS M.—Program Planning Officer, National Cancer Institute, U.S. Public Health Service, Bethesda, Md.
- CASTLEMAN, BENJAMIN, M.D.—Department of Pathology, Massachusetts General Hospital, Boston, Mass.
- CHADWICK, DONALD R., M.D.—Chief, Division of Radiological Health, U.S. Public Health Service, Washington, D.C.
- CLARK, KENNETH, Ph. D.—Consultant, Office of Science and Technology, Executive Office of the President, Washington, D.C.
- COBB, SIDNEY, M.D.—Program Director, Survey Research Center, University of Michigan, Ann Arbor, Mich.
- COMROE, JULIUS H., M.D.—Professor of Physiology and Director of the Cardiovascular Research Institute, University of California, San Francisco, Calif.
- COON, CARLETON S., Ph. D.—Curator of Ethnology, University of Pennsylvania Museum, Philadelphia, Pa.
- COOPER, W. CLARK, M.D.—Professor, Occupational Medicine, School of Public Health, Berkeley, Calif.
- CORNFIELD, JEROME—Acting Chief, Biometrics Research Branch, National Heart Institute, U.S. Public Health Service, Bethesda, Md.
- DAMON, ALBERT, M.D.—Associate Professor, Department of Epidemiology, Harvard University School of Public Health, Cambridge, Mass.

- DAWSON, JOHN M.—Statistician, National Cancer Institute, U.S. Public Health Service, Bethesda, Md.
- DI PAOLO, JOSEPH A., Ph. D.—Senior Cancer Research Scientist, Roswell Park Memorial Institute, Buffalo, N.Y.
- DOBBS, GEORGE, M.D.—Associate Chief, Division of Scientific Opinions, Federal Trade Commission, Washington, D.C.
- DOLL, RICHARD, M.D.—Director, Medical Research Council's Statistical Research Unit, University College Hospital Medical School, London, England
- *DORN, HAROLD F.—Chief, Biometrics Research Branch, National Heart Institute, U.S. Public Health Service, Bethesda, Md.
- DOYLE, JOSEPH T., M.D.—Director, Cardiovascular Health Center, Albany Medical College, Union University, Albany, N.Y.
- DUNHAM, LUCIA J., M.D.—Medical Officer, Laboratory of Pathology, National Cancer Institute, U.S. Public Health Service, Bethesda, Md.
- EBERT, RICHARD V., M.D.—Professor and Head, Department of Medicine, University of Arkansas Medical Center, Little Rock, Ark.
- EDDY, NATHAN B., M.D.—Executive Secretary, Committee on Drug Addiction and Narcotics, National Academy of Sciences, National Research Council, Washington, D.C.
- EISENBERG, HENRY, M.D.—Director of Chronic Diseases, Connecticut State Department of Health, Hartford, Conn.
- ELLIOTT, JAMES LLOYD, M.D.—Assistant Chief, Bureau of Medical Services, U.S. Public Health Service, Silver Spring, Md.
- ENDICOTT, KENNETH M., M.D.—Director, National Cancer Institute, U.S. Public Health Service, Bethesda, Md.
- FALK, HANS L., Ph. D.—Acting Chief, Carcinogenesis Studies Branch, National Cancer Institute, U.S. Public Health Service, Bethesda, Md.
- FILLEY, GILES F., M.D.—Associate Professor of Medicine, University of Colorado Medical Center, Denver, Colo.
- FISHER, RUSSELL SYLVESTER, M.D.—Chief Medical Examiner, State of Maryland, Baltimore, Md.
- FORAKER, ALVAN G., M.D.—Pathologist, Baptist Memorial Hospital, Jacksonville, Fla.
- FOX, BERNARD H., Ph. D.—Research Psychologist, Division of Accident Prevention, U.S. Public Health Service, Washington, D.C.
- FRAZIER, TODD M., Sc. M.—Director, Bureau of Biostatistics, Baltimore City Health Department, Baltimore, Md.
- GARFINKEL, LAWRENCE, M.A.—Chief, Field and Special Projects, Statistical Research Section, Medical Affairs Department, American Cancer Society, Inc., New York, N.Y.
- *GILLIAM, ALEXANDER, M.D.—Professor of Epidemiology, The Johns Hopkins University, Baltimore, Md.
- GOLDBERG, IRVING D., M.P.H.—Assistant Chief, Biometrics Branch, National Institute of Neurological Diseases and Blindness, U.S. Public Health Service, Bethesda, Md.
- GOLDSMITH, JOHN, M.D.—Head, Air Pollution Medical Studies, California Department of Public Health, Berkeley, Calif.

*Deceased.

- GOLDSTEIN, HYMAN, Ph. D.—Chief, Biometrics Branch, National Institute of Neurological Diseases and Blindness, U.S. Public Health Service, Bethesda, Md.
- GRAHAM, SAXON, M.D.—Associate Cancer Research Scientist, Roswell Park Memorial Institute, Buffalo, N.Y.
- GREENBERG, BERNARD G., Ph. D.—Professor of Biostatistics, School of Public Health, University of North Carolina, Chapel Hill, N.C.
- GROSS, PAUL, M.D.—Research Pathologist, Industrial Hygiene Foundation, Mellon Institute, Pittsburgh, Pa.
- HAENSZEL, WILLIAM—Chief, Biometry Branch, National Cancer Institute, U.S. Public Health Service, Bethesda, Md.
- HAINER, RAYMOND M., Ph. D.—Research Physical Chemist, A. D. Little Inc., Cambridge, Mass.
- HALL, ROBERT L., Ph. D.—Program Director, Sociology and Social Psychology, National Science Foundation, Washington, D.C.
- HALMSTAD, DAVID—Actuary, The National Center for Health Statistics, U.S. Public Health Service, Washington, D.C.
- HAMMOND, E. CUYLER, Sc. D.—Director, Statistical Research Section, Medical Affairs Department, American Cancer Society, Inc., New York, N.Y.
- HAMPERL, H., M.D.—Director of the Pathology Institute, University of Bonn, Bonn, Germany.
- HARTWELL, JONATHAN L., Ph. D.—Chief, Research Communications Branch, National Cancer Institute, U.S. Public Health Service, Silver Spring, Md.
- HAYDEN, ROBERT G., Ph. D.—Research Psychologist, Behavioral Sciences Section, Division of Community Health Services, U.S. Public Health Service, Washington, D.C.
- HEIMANN, HARRY, M.D.—Chief, Division of Occupational Health, U.S. Public Health Service, Washington, D.C.
- HEINZELMANN, FRED, Ph. D.—Assistant Chief, Behavioral Sciences Section, Division of Community Health Services, U.S. Public Health Service, Washington, D.C.
- HELLER, JOHN R., Jr., M.D.—President and Chief Executive Officer, Sloan-Kettering Institute for Cancer Research, New York, N.Y.
- HERMAN, DORIS L., M.D.—Pathologist, Tumor Tissue Registry, Cancer Commission, California Medical Association, Los Angeles, Calif.
- HERROLD, KATHERINE, M.D.—Medical Director, Laboratory of Pathology, National Cancer Institute, U.S. Public Health Service, Bethesda, Md.
- HESTON, WALTER E., M.D., Ph. D.—Chief, Laboratory of Biology, National Cancer Institute, U.S. Public Health Service, Bethesda, Md.
- HIGGINS, IAN T. T., M.D.—Professor of Epidemiology and Microbiology, University of Pittsburgh Graduate School of Public Health, Pittsburgh, Pa.
- HOCHBAUM, GODFREY, Ph. D.—Chief, Behavioral Sciences Section, Division of Community Health Services, U.S. Public Health Service, Washington, D.C.
- HOCKETT, ROBERT C., Ph. D.—Associate Scientific Director, Tobacco Industry Research Committee, New York, N.Y.
- HORN, DANIEL, Ph. D.—Assistant Chief for Research, Cancer Control Program, Division of Chronic Diseases, U.S. Public Health Service, Washington, D.C.

- HORTON, ROBERT, J. M., M.D.—Chief, Field Studies Branch, Division of Air Pollution, U.S. Public Health Service, Cincinnati, Ohio.
- HUEPER, WILHELM C., M.D.—Chief, Environmental Cancer Section, National Cancer Institute, U.S. Public Health Service, Bethesda, Md.
- IPSEN, JOHANNES, Ph. D.—Professor of Medical Statistics, Henry Phipps Institute, University of Pennsylvania, Philadelphia, Pa.
- ISBELL, HARRIS, M.D.—Professor of Clinical Pharmacology, University of Kentucky Medical School, Lexington, Ky.
- ISKRANT, ALBERT P.—Chief, Developmental Research Section, Division of Accident Prevention, U.S. Public Health Service, Washington, D.C.
- JANUS, ZELDA—Statistician, National Cancer Institute, U.S. Public Health Service, Bethesda, Md.
- JOSIE, G. H., Sc. D., M.P.H.—Chief, Epidemiology Division, Department of National Health and Welfare, Ottawa, Canada.
- KAHN, HAROLD A.—Statistician, Biometrics Research Branch, National Heart Institute, U.S. Public Health Service, Bethesda, Md.
- KANNEL, W. B., M.D.—Associate Director, Heart Disease Epidemiology Study, National Heart Institute, U.S. Public Health Service, Framingham, Mass.
- KELEMEN, GEORGE, M.D.—Research Associate, Massachusetts Eye and Ear Infirmary, Harvard University Medical School, Boston, Mass.
- KELLEY, HAROLD H., Ph. D.—Professor, Department of Psychology, University of California, Los Angeles, Calif.
- KENSLER, CHARLES J., Ph. D.—Senior Vice President, Life Sciences Division, Arthur D. Little, Inc., Cambridge, Mass.
- KESSELMAN, AVIVA—Statistician, National Cancer Institute, U.S. Public Health Service, Bethesda, Md.
- KLEINERMAN, JEROME, M.D.—Associate Director, Medical Research Department, St. Luke's Hospital, Cleveland, Ohio
- KNIGHT, VERNON, M.D.—Clinical Director, National Institute of Allergy and Infectious Diseases, U.S. Public Health Service, Bethesda, Md.
- KNUTTI, RALPH E., M.D.—Director, National Heart Institute, U.S. Public Health Service, Bethesda, Md.
- KOTIN, PAUL, M.D.—Associate Director of Field Studies, National Cancer Institute, U.S. Public Health Service, Bethesda, Md.
- KREYBERG, LEIV, M.D.—Director of Institute for General and Experimental Pathology, University of Oslo, Oslo, Norway
- KRUEGER, DEAN E.—Statistician, Biometrics Research Branch, National Heart Institute, U.S. Public Health Service, Bethesda, Md.
- KUSCHNER, MARVIN, M.D.—Professor of Pathology and Director of Laboratories, Bellevue Hospital Center, New York University Medical Center, New York, N.Y.
- LARSON, PAUL S., Ph. D.—Professor and Chairman of Department of Pharmacology, Medical College of Virginia, Richmond, Va.
- LEITER, JOSEPH, Ph. D.—Chief, Cancer Chemotherapy National Service Center, U.S. Public Health Service, Silver Spring, Md.
- LEUCHTENBERGER, CECILIE, M.D., Ph. D.—Professor, Eidgenössische Technische Hochschule, Institut für Allgemeine Botanik, Zurich, Switzerland

- LEUCHTENBERGER, RUDOLF, M.D.—Professor Eidgenössische Technische Hochschule, Institut für Allgemeine Botanik, Zurich, Switzerland
- LEVIN, MORTON L., M.D.—Professor of Epidemiology, Roswell Park Memorial Institute, Buffalo, N.Y.
- LIEBOW, AVERILL A., M.D.—Professor of Pathology, Yale University School of Medicine, New Haven, Conn.
- LIGGETT & MYERS, INC., New York, N.Y.
- LILIENFELD, ABRAHAM, M.D.—Professor of Chronic Diseases, The Johns Hopkins School of Hygiene and Public Health, Baltimore, Md.
- LISCO, HERMAN, M.D.—Cancer Research Institute, New England Deaconess Hospital, Boston, Mass.
- LITTLE, CLARENCE COOK, M.D.—Scientific Director, Tobacco Institute Research Committee, New York, N.Y.
- LOUDON, R. G., M.B.—Assistant Professor of Internal Medicine, The University of Texas Southwestern Medical School, Dallas, Tex.
- MANOS, NICHOLAS E.—Statistician, Division of Occupational Health, U.S. Public Health Service, Washington, D.C.
- MARDER, MARTIN, Ph. D.—Research Psychologist, Behavioral Sciences Section, Division of Community Health Services, U.S. Public Health Service, Washington, D.C.
- MATARAZZO, J. D., Ph. D.—Professor of Medical Psychology, Department of Medical Psychology, University of Oregon Medical School, Portland, Oreg.
- MCFARLAND, JAMES J., M.D.—Professor of Otolaryngology, School of Medicine, George Washington University Hospital, Washington, D.C.
- MCGILL, HENRY C., M.D.—Professor of Pathology, Louisiana State University School of Medicine, New Orleans, La.
- MCHUGH, RICHARD B., Ph. D.—Associate Professor of Biostatistics, School of Public Health, University of Minnesota, Minneapolis, Minn.
- MCKENNIS, HERBERT, Jr.—Professor of Pharmacology, Medical College of Virginia, Richmond, Va.
- MEDALIA, NAHUM Z., Ph. D.—Executive Secretary, Mental Health Small Grants Committee, National Institute of Mental Health, U.S. Public Health Service, Bethesda, Md.
- MEHLER, MRS. ANN—Research Assistant, National Cancer Institute, U.S. Public Health Service, Bethesda, Md.
- MILLER, JACK, M.D.—Research Fellow in Medicine, The University of Texas Southwestern Medical School, Dallas, Tex.
- MILLER, ROBERT W., M.D.—Chief, Epidemiology Section, National Cancer Institute, U.S. Public Health Service, Bethesda, Md.
- MILLER, WILLIAM F., M.D.—Associate Professor of Internal Medicine, The University of Texas Southwestern Medical School, Dallas, Tex.
- MITCHELL, ROGER S., M.D.—Associate Professor, University of Colorado School of Medicine, Denver, Colo.
- MURPHY, EDMOND A., M.D.—Attending Physician, The Moore Clinic, The Johns Hopkins University Hospital, Baltimore, Md.
- NASH, HARVEY, Ph. D.—Illinois State Psychiatric Institute, Northwestern University Medical School, Chicago, Ill.

NELSON, NORTON, Ph. D.—Professor and Chairman, Department of Industrial Medicine, New York University Medical Center, New York, N.Y.

ORCHIN, MILTON, Ph. D.—Professor of Chemistry, University of Cincinnati, Cincinnati, Ohio.

P. LORILLARD Co., New York, N.Y.

PAFFENBARGER, RALPH S., Jr., M.D.—Medical Director, Field Epidemiology Research Section, National Heart Institute, U.S. Public Health Service, Framingham, Mass.

PAUL, OGLESBY, M.D.—Chairman, Committee on Epidemiological Studies, Passavant Memorial Hospital, Chicago, Ill.

PFAELZER, ANNE I.—Concord, Mass.

PHILLIP MORRIS, INC., New York, N.Y.

PICKREN, JOHN W., M.D.—Chief, Department of Pathology, Roswell Park Memorial Institute, Buffalo, N.Y.

PIERCE, JOHN A., M.D.—Associate Professor, Department of Medicine, University of Arkansas Medical Center, Little Rock, Ark.

POTTS, ALBERT M., M.D.—Professor of Ophthalmology, University of Chicago School of Medicine, Chicago, Ill.

PRINDLE, RICHARD A., M.D.—Chief, Division of Public Health Methods, U.S. Public Health Service, Washington, D.C.

R. J. REYNOLDS TOBACCO Co., Winston-Salem, N.C.

REED, SHELDON C., Ph. D.—Professor of Zoology, Department of Zoology, University of Minnesota, Minneapolis, Minn.

REMINGTON RAND, LTD. (Ottawa)

ROOS, CHARLES A.—Head, Reference Services Section, National Library of Medicine, U.S. Public Health Service, Bethesda, Md.

ROSEN, SAMUEL, M.D.—Chief, Pulmonary Mediastinal and ENT Pathology Branch, Armed Forces Institute of Pathology, Washington, D.C.

ROSENBLATT, MILTON B., M.D.—Associate Clinical Professor of Medicine, New York Medical College, and Visiting Physician, Metropolitan Hospital, New York, N.Y.

ROSS, JOSEPH, M.D.—Associate Professor of Medicine, University of Indiana School of Medicine and Head of Chest Division, Robert Long Hospital, Indianapolis, Ind.

SANFORD, J. P., M.D.—Associate Professor of Internal Medicine, The University of Texas Southwestern Medical School, Dallas, Tex.

SAVAGE, I. RICHARD, Ph. D.—Professor of Statistics, Florida State University, Tallahassee, Fla.

SCHIFFMAN, ZELDA—Special Assistant to Executive Officer, National Cancer Institute, U.S. Public Health Service, Bethesda, Md.

SCHNEIDERMAN, MARVIN. A—Associate Chief, Biometry Branch, National Cancer Institute, U.S. Public Health Service, Bethesda, Md.

SCHWARTZ, JOHN THEODORE, M.D.—Head, Ophthalmology Project, National Institute of Neurological Diseases and Blindness, U.S. Public Health Service, Bethesda, Md.

SCOTT, OWEN—Executive Officer, National Institute of General Medical Sciences, U.S. Public Health Service, Bethesda, Md.

SELIGMAN, ARNOLD M., M.D.—Chairman, Department of Surgery, Sinai Hospital, Baltimore, Md.

- SELTZER, RAYMOND, M.D.—The Johns Hopkins University School of Public Health, Baltimore, Md.
- SELTZER, CARL C., Ph. D.—Research Associate in Physical Anthropology, Peabody Museum, Harvard University, Cambridge, Mass.
- SHAPIRO, HARRY, M.D.—Curator of Anthropology, American Museum of Natural History, New York, N.Y.
- SHUBIK, PHILLIPE, M.D.—Professor of Oncology, Chicago Medical School, Chicago, Ill.
- SILVETTE, HERBERT, Ph. D.—Visiting Professor of Pharmacology, Medical College of Virginia, Richmond, Va.
- SIRKEN, MONROE, Ph. D.—Acting Chief, Division of Health Records, The National Center for Health Statistics, U.S. Public Health Service, Washington, D.C.
- SLOAN, MARGARET H., M.D.—Special Assistant to Director, National Cancer Institute, U.S. Public Health Service, Bethesda, Md.
- SPIEGELMAN, MORTIMER—Associate Statistician, Metropolitan Life Insurance Company, New York, N.Y.
- STALLONES, REUEL, M.D.—University of California School of Public Health, Berkeley, Calif.
- STEINBERG, ARTHUR, Ph. D.—Biologist, Professor in Department of Biology, Western Reserve University, Cleveland, Ohio
- STEWART, HAROLD L., M.D.—Chief, Laboratory of Pathology, National Cancer Institute, U.S. Public Health Service, Bethesda, Md.
- STOCKS, PERCY, M.D.—World Health Organization Consultant, Former Chief Medical Statistician in the Office of the General Registrar (1933–50), London, England
- STOUT, ARTHUR P., M.D.—Professor Emeritus of Surgery, Laboratory of Surgical Pathology, College of Physicians and Surgeons, Columbia University, New York, N.Y.
- STOWELL, ROBERT, M.D., Ph. D.—Scientific Director, Armed Forces Institute of Pathology, Washington, D.C.
- SYME, SHERMAN LEONARD—Sociologist, San Francisco Field and Training Station, U.S. Public Health Service Hospital, San Francisco, Calif.
- TAEUBER, K. E.—Research Associate, Population Research and Training Center, University of Chicago, Chicago, Ill.
- TOBACCO INSTITUTE, INC., Washington, D.C.
- TOBACCO INSTITUTE RESEARCH COMMITTEE, New York, N.Y.
- TOKUHATA, GEORGE, Ph. D., D.P.H.—Chief of Epidemiology, St. Jude Research Hospital, Institute of Biology and Pediatrics, Memphis, Tenn., and Assistant Professor of Preventive Medicine, University of Tennessee, College of Medicine, Memphis, Tenn.
- TOMPSETT, RALPH, M.D.—Professor of Internal Medicine, The University of Texas Southwestern Medical School, Dallas, Tex., and Director of Medical Education, Baylor University Medical Center, Dallas, Tex.
- TOTTEN, ROBERT S., M.D.—Associate Professor of Pathology, University of Pittsburgh School of Medicine, Pittsburgh, Pa.
- TURNER, CLAUDE G.—Director, Tobacco Policy Staff, Agriculture Stabilization and Conservation Service, United States Department of Agriculture, Washington, D.C.

- VINCENT, WILLIAM J.—Student, University of California, Los Angeles, Calif.
- VON SALLMANN, LUDWIG, M.D.—Chief, Ophthalmology Branch, National Institute of Neurological Diseases and Blindness, U.S. Public Health Service, Bethesda, Md.
- VORWALD, ARTHUR, M.D.—Chairman, Department of Industrial Medicine and Hygiene, Wayne University College of Medicine, Detroit, Mich.
- WALKER, C. B., B.A.—Biostatistics Section, Research and Statistics Division, Department of National Health and Welfare, Ottawa, Canada
- WALLENSTEIN, MERRILL, Ph. D.—Chief, Physical Chemistry Division, National Bureau of Standards, Washington, D.C.
- WEBB, BLAIR M., M.D.—Otolaryngologist and ENT Consultant at the National Institutes of Health, U.S. Public Health Service, Bethesda, Md.
- WEINSTEIN, HOWARD I., M.D.—Director, Division of Medical Review, Food and Drug Administration, Washington, D.C.
- WOOLSEY, THEODORE D.—Assistant Director, National Center for Health Statistics, U.S. Public Health Service, Washington, D.C.
- WYATT, JOHN P., M.D.—Professor of Pathology, St. Louis University School of Medicine, St. Louis, Mo.
- ZERZAVY, FRED M., M.D.—Department of Maternal and Child Health, The Johns Hopkins School of Public Health, Baltimore, Md.
- ZUKEL, WILLIAM, M.D.—Associate Director, Collaborative Studies, National Cancer Institute, U.S. Public Health Service, Bethesda, Md.