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WILLIAM O. BAKER

Transcript of an Interview  
Conducted by

Marcy Goldstein and Jeffrey L. Sturchio

at

AT&T Bell Laboratories  
Murray Hill, New Jersey

on

23 May and 18 June 1985

(With Subsequent Corrections and Additions)

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## WILLIAM O. BAKER

1915 Born in Chestertown, Maryland, on 15 July

### Education

1935 B.S., chemistry, Washington College  
1938 Ph.D., physical chemistry, Princeton University

### Professional Experience

AT&T Bell Laboratories  
1939-1948 Member, Technical Staff  
1948-1951 Head, Polymer Research and Development  
1951-1954 Assistant Director, Chemical and Metallurgical Research  
1954-1955 Executive Director, Physical Sciences Research  
1955-1973 Vice President, Research  
1973-1979 President  
1979-1980 Chairman of the Board

### Honors

1937-1938 Harvard University Fellow  
1938-1939 Procter Fellow  
1961 National Academy of Sciences  
1962 Honor Scroll, American Institute of Chemists  
1963 Perkin Medal, Society of Chemical Industry  
1966 Priestley Medal, American Chemical Society  
1967 Edgar Marburg Award  
1970 Industrial Research Institute Medal  
1972 Frederik Philips Award, Institute of Electrical and Electronics Engineers  
1973 Proctor Prize, Sigma Xi  
1973-1975 Institute of Medicine Council  
1975 Gold Medal, American Institute of Chemists  
1975 James Madison Medal, Princeton University  
1975 National Academy of Engineers  
1975 Mellon Institute Award  
1976 Charles Lathrop Parsons Award, American Chemical Society  
1977 Fahrney Medal, Franklin Institute  
1978 J. Willard Gibbs Medal

1978 von Hippel Award, Materials Research Society  
1980 Madison Marshall Award  
1981 Sarnoff Award, Armed Forces Communication and Electronics Association  
1981 Vannevar Bush Award, National Science Foundation  
1982 President's National Security Medal  
1984 Baker Award, Security Affairs Support Association  
1985 National Medal of Technology  
1986 Bueche Award, National Academy of Engineering  
1987 National Materials Advancement Award, Federation of Materials Societies  
1987 Thomas Alva Edison Medal for Science, State of New Jersey  
1988 National Medal of Science

## ABSTRACT

This interview with William O. Baker begins with a discussion of Baker's childhood on Maryland's Eastern Shore, where his parents were involved in raising fowl and developing therapy for turkey pathology; this, along with his father's work in minerals and mining, exposed Baker to both organic and inorganic chemistry. Upon completing high school, Baker attended Washington College, where he received a broad education in liberal arts while studying chemistry with K. S. Buxton and became oriented towards the Bell System and Laboratories through their educational and public affairs programs. He was attracted to Princeton University because of its size, strength in physical and organic chemistry, and links to European chemists, and in 1935 began graduate studies there amidst the College of Chemistry's creation of a new scientific frontier involving physical chemistry and Professors H. Taylor, H. Eyring, R. H. Fowler, and C. P. Smyth. Baker pursued study in physical chemistry, thermodynamics, chemical reactions, statistical mechanics, and quantum mechanics and also attended weekly seminars sponsored by Taylor, featuring major international figures in physical chemistry and physics. Following his interest in physical chemistry, Baker conducted Ph.D. research under Smyth, following a program on the dielectric properties of medium length chains and graduating in 1938. In 1939, following the advice of Smyth and others at MIT and his own interest in combining industrial and basic science and technology, he accepted a Bell Labs position as member of technical staff and began work with C. S. Fuller and J. H. Heiss on structures and properties of high polymeric substances. The interview discusses Baker's early career at the Labs, the atmosphere there, equipment availability, information exchange, and the use of technical memoranda to introduce technical findings to colleagues. Also discussed are relationships between Summit Labs and New York headquarters staff and within research groups; colleagues, including S. O. Morgan; and the use of literature research to monitor polymer chemistry developments at DuPont and in industry internationally.

The second interview begins with an overview of Bell Labs' role in the birth of the solid state era, and the use of Labs' resources for new research programs supporting telecommunications and information handling. Baker undertook a program of research first using x-ray diffraction techniques to study crystallinity of polymers, then synthesizing a range of polyesters and polyamides and investigating the relationship between chemical structure and physical properties. The interview describes application of these research findings to electronics and communications industries and the emergence of polyethylene and polyethylene-like materials throughout all industry; discussed in relation to this are the contributions of W. Carothers, W. J. Shackelton, P. Debye, W. A. Yager, K. K. Darrow, L. A. Wood, and others. In 1942, Bell Labs became the center of the U. S. Rubber Reserve, formed to conserve existing rubber and create synthetic rubber for use during World War II. Baker contributed to the Reserve's scientific planning and work by applying earlier research on crystalline cellulose esters, polyesters and polyamides. Bell Labs' R. R. Williams and Fuller recruited major industrial and university centers and researchers for the project, including I. M. Kolthoff, Debye, and others from Cornell, MIT, Harvard, Princeton, and U. S. Rubber. The interview describes work involving the discovery and use of microgel, a macromolecule crucial to the synthetic rubber program and later applied to electrical insulators and structural materials in communications, electronics, and throughout the rubber industry. Also described are meetings

of the Rubber Research Discussion Group involving academic and industrial scientists who later became leaders of postwar polymer science. A central section of the interview details postwar research involving polymers in microwave structures and as structural elements throughout U. S. industry, and Baker's involvement with transistors and solid state physics. Throughout the interview, scientific themes are related to changes in the organizational structure of Bell Labs, and to patterns of communication within relevant scientific communities. The final section of the interview focuses on Baker's administrative career, particularly his roles and philosophies as assistant director of the Chemical Laboratories from 1951 to 1954—while R. M. Burns was director—and as vice president of research from 1955 to 1973, with overall responsibility for all research programs. Baker also served as Bell Labs' president and chairman of the board.

## INTERVIEWERS

Jeffrey L. Sturchio is Executive Director, Public Affairs, Human Health—Europe, Middle East & Africa, at Merck & Co., Inc., where he is responsible for the development, coordination, and implementation of a range of policy and communications initiatives for the region. Before assuming his current position in 1995, he was Merck's Director, Science & Technology Policy, in the Corporate Public Affairs Department from 1993 to 1994; and Associate Director, Information Resources & Publishing, from 1992 to 1993. He joined Merck in June 1989 as the company's first Corporate Archivist. Previously Associate Director at the Beckman Center for the History of Chemistry from 1984 to 1988, he has also held positions at the AT&T Archives, the University of Pennsylvania, Rutgers University, and the New Jersey Institute of Technology.

Marcy Goldstein was formerly with the AT&T Archives.

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