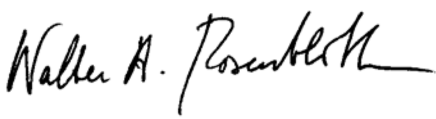
NATIONAL ACADEMY OF SCIENCES

WALTER ALTER ROSENBLITH
1913–2002

A Biographical Memoir by
PAUL E. GRAY

Biographical Memoir

Courtesy MIT Museum



WALTER ALTER ROSENBLITH

September 21, 1913–May 1, 2002

BY PAUL E. GRAY

WALTER ROSENBLITH SERVED the Massachusetts Institute of Technology, Harvard University, National Academies, American Academy of Arts and Sciences, University of California at Los Angeles, and South Dakota School of Mines and Technology. Fluent in several languages, including German and French, he was widely known and respected in the international academic community. His pioneering research in psychophysics (also called "communication biophysics," the term he preferred) led to important scientific discoveries. His service as chair of the faculty, associate provost, and provost at MIT produced permanent beneficial changes in that institution.

EARLY YEARS

Rosenblith was born in Vienna, Austria, on September 21, 1913. His father, David Alexander Rosenblith, migrated to Vienna from Russia via Siberia to escape the pogroms, and became a businessman in the food industry; his Viennese mother, Gabriele (nee Roth), was a concert pianist.[1] Rosenblith was exposed to classical performance—opera and ballet, in particular—from the age of two, and his younger brother, Eric, went on to become a noted violinist and music educator.

For business reasons the family moved to Berlin in 1924, where Rosenblith completed his public schooling and spent part of a semester at the University of Berlin. In the early 1930s they moved again, this time to Paris. During this period, Rosenblith spent a semester at the University of Lausanne and several semesters at the Sorbonne, studying mathematics, physics, psychology, and diplomatic history. He then enrolled at a technical school in Paris and later at the University of Bordeaux, where he earned a degree in communications engineering (*Ing. Radiotélégraphiste*) in 1936. He continued his studies at the École Supérieure d'Électricité, earning a second degree (*Ing. Radioélectricien*) in 1937.

When the Nazis annexed Austria, all Austrian passports were canceled. Rosenblith could have applied for a German passport, but this was not acceptable from his point of view, and was likely to be denied in any case, or for an "ex-Austrian" one, unrecognized by many countries, including the United States. As a stateless person resident in France, he encountered great difficulty in finding employment. For a time he worked at MGM in Paris to establish the proper acoustic environment for dubbing movies. In 1938 he was hired by an expert in occupational medicine, André Salmont of the Conservatoire National des Arts et Métiers, to assist in a study of the impact of high-noise industrial environments on workers' hearing. After a year, Salmont asked him to travel to the United States to gather more data. As a stateless person, however, he had trouble securing travel documents. Help came from a friend in the Hebrew Immigrant Aid Service who persuaded an officer at the American Embassy in Paris to grant him a temporary visa. Even though this document allowed for an extended stay, immigration officials in New York stamped his papers for one month only. He arrived only weeks before the opening salvo of World War II, when Germany invaded Poland. Rosenblith timed his travel to precede the arrival his parents' coming to America as permanent immigrants, to help them settle into their new lives in New York City.

Rosenblith had no hope for paid employment in the United States because of his non-immigrant status. For a year he did research in physics at the Bronx facility of New York University on the proverbial salary of one dollar per year (actually zero). This work, with Professor Richard Cox, involved measuring the velocity of the impulse that initiates voltage differentials in electric eels. During this time, he lived with his family in New York.

In the summer of 1940 he held a fellowship at Cold Spring Harbor, Long Island, where his studies of the electric eel continued. That fall he moved to Los Angeles to commence a fellowship in physics (with legal income) at the University of California at Los Angeles. While there he published both the electric eel work and his data on noise and hearing.

At a meeting of the UCLA International Club, Rosenblith met Judy Olcott Francis, an undergraduate in psychology at UCLA. He invited her to a picnic in the desert with a group of his friends. They married in September 1941, the start of a six-decade partnership as intellectual soul mates.

Rosenblith was appointed a teaching fellow at UCLA in the fall of 1941. In December, soon after the United States declared war, he was assigned to teach physics to army and navy officers. In 1942 he resigned the fellowship to devote more time to teaching military officers. His wife, Judy, meanwhile found a National Youth Administration job with a professor of anthropology at UCLA.

In 1943 Rosenblith accepted an appointment as assistant professor at the South Dakota School of Mines in Rapid City. There he taught physics and one course in electrical engineering (up to 29 total hours per week) to recruits and draftees under the Army Specialized Training Program.

When he was asked to teach feedback control systems for fire control, he knew that it meant that he would have to go to the Servomechanisms Laboratory at MIT, the prime location for this new technology. He needed a security clearance, however, which as a noncitizen he could not easily obtain. He arrived in Cambridge with a letter in hand from the governor of South Dakota to the head of the laboratory, Gordon Brown, confirming that the School of Mines was a government-run institution and that Rosenblith's participation in Brown's program was essential to the war effort. Brown agreed and Rosenblith joined the next class.

When the training program ended, around the time of the Battle of the Bulge (December 1944), the School of Mines was left with only a few students. Rosenblith became the physics department head and continued teaching many subjects. He participated in a curriculum committee organized by the president of the school to plan for the return of students in greater numbers and to lay groundwork for hiring new faculty.

In the immediate postwar years he went statewide visiting service clubs, colleges, high schools, and women's and business groups, explaining to the lay public some of the consequences and implications of atomic energy. He once described this time, when he learned to connect with ordinary citizens, as "the Americanization of Walter Rosenblith."[2] Fittingly he was awarded U.S. citizenship while a resident of South Dakota.

The Rosenbliths—by now with two young children, Sandra and Ronald—were eager to move to a less provincial part of the country, somewhere his career could advance, and where Judy could enroll in a doctoral program. In South Dakota they were surprised by high levels of racial and ethnic prejudice toward Jews, Native Americans, African Americans, even Scandinavians. Judy read a study by a Harvard professor who had explored connections between life-background factors and prejudice, and was interested in adapting his questionnaire for a local study. At this time Rosenblith went to New York to visit his father, who had suffered a serious heart attack. He took a side trip to Cambridge to seek permission for Judy to adapt the questionnaire from the Harvard professor, who happened to be away on vacation. By sheer chance Rosenblith came across a sign for the Psycho-Acoustic Laboratory—PAL, for short—where he introduced himself and spent the day with the lab's director, Professor S. Smith ("Smitty") Stevens. Stevens went on to offer him a three-year appointment as a research fellow, later extended to four years. Judy had written and was permitted to adapt the questionnaires for her study. She was admitted to Harvard's Department of Social Relations, bringing 800 questionnaires from eight institutions around the state with her. In March 1947 the family packed up and drove cross-country to Cambridge, where Rosenblith lived and worked until his death.

AT HARVARD

At the Psycho-Acoustic Laboratory, Rosenblith joined a group of distinguished experimental psychologists, biophysicists, and others working together in a creative, interdisciplinary environment. His colleagues there, in addition to Smith, included J. C. R. Licklider (later at MIT) and Georg von Békésy. Rosenblith coauthored papers with Békésy on auditory subjects in 1948 and 1949. He also developed close personal and professional ties to a number of faculty in Harvard's psychology department, not all of whom were affiliated with PAL, such as Edwin Garigues Boring, Edwin Newman, George Miller, Robert Galambos, and B. F. Skinner. He was a coauthor with Miller and Galambos.

While some of these relationships were initiated because Rosenblith was experienced and knowledgeable about electronic instrumentation, his involvement went far beyond the technology. During his four years of research at PAL, Rosenblith was an author on 29 papers, including abstracts of presentations at professional meetings and book reviews. He had many coauthors.

At Harvard, Rosenblith's interests shifted from his early work in the effects of noise on hearing toward psychophysics and the neurophysiology of hearing, specifically how sounds affect the brain; "I got sucked into the brain through the ear," he once remarked.

Through his relationships with scientists in PAL and in the psychology department he got to know MIT's internationally renowned Norbert Wiener, author of the seminal *Cybernetics* (New York: John Wiley, 1948). Wiener organized and ran a supper seminar that met regularly at a restaurant (The Smith House) near MIT. Among the participants from Harvard's psychology group were Licklider, Smith, Miller, and Rosenblith. Many other disciplines were represented, and a number of MIT faculty—electrical engineers, acousticians, physicists, mathematicians, and linguists—showed up regularly.

ARRIVAL AT MIT

In the course of the Wiener seminars Rosenblith struck up a friendship with Jerome Wiesner, director of MIT's Research Laboratory of Electronics (RLE). In 1951 when Rosenblith's four-year Harvard appointment ended, Licklider recommended him for a faculty appointment at MIT. Wiesner supported that suggestion and arranged laboratory space for Rosenblith in RLE. MIT's electrical engineering department offered to appoint him associate professor of electrical engineering, but he asked instead for the title associate professor of communications biophysics. He was told that he would have to seek approval from Professor Francis Schmitt, head of the biology department. Schmitt queried

Rosenblith about his plans and gave his approval but asked him, "Haven't you come 200 years too early?"[3]

Rosenblith kept an office in the electrical engineering department, where he initially taught circuit theory, as well as one in RLE, where most of his time was spent, near his laboratory. He was studying the electrical activity of the nervous system, using experiments in which sounds—including clicks—stimulated the brains of anesthetized hamsters and cats. In this work he became a pioneer in the application of early digital computers to biological research. Evoked responses in the nervous system and the brain are stochastic in nature. The computer-based statistical models he developed became an important new tool in psychophysics.

This work required an anechoic chamber. He began in the anechoic chamber in the Acoustics Laboratory and this use soon produced conflict. Other users of the chamber were unhappy about the smells and other related consequences of research using live animals. RLE resolved this problem by building a separate anechoic chamber for use by the communications biophysics group. While this special purpose facility was under construction Rosenblith did studies on human subjects in the original larger chamber.

In these early years RLE was liberally supported by the federal government. Its mission was described colloquially as the study of electronics "in a non-narrow sense."4 It developed a multidisciplinary character that was very well suited to Rosenblith's keen, wide-ranging interests and intellect. Some of his colleagues in the Electrical Engineering Department were surprised by his interests, which predated by at least two decades the present strong coupling of engineering and the life sciences.

Together Rosenblith and linguist Morris Halle, a professor in the Department of Humanities, created a new graduate subject: hearing, speech, and language. This effort was a precursor of a vibrant Department of Linguistics that would bring Noam Chomsky, Roman Jakobson, and other top scholars in the field to MIT, via RLE.[5]

Rosenblith's research and teaching program was interdisciplinary and, increasingly, international. In addition to a growing cadre of graduate students in the RLE Communications Biophysics Laboratory (CBL), he brought to MIT many postdoctoral fellows. The Office of Scientific Research of the U.S. Air Force developed an interest in CBL and provided support for an international symposium on sensory communications. In the summer of 1958 he traveled widely in Europe to visit laboratories and decide whom to invite to a symposium. The symposium in 1959 included 39 invited participants, of which 18 were from abroad. After the meeting he edited the symposia proceedings and published the book *Sensory Communications*.[6] The care with which he selected participants and edited the papers received wide attention, and the book was reprinted several times, influencing generations of students and scientists. This activity, influenced by the work of the CBL itself, opened new areas of research for Rosenblith and his collaborators.

The paragraphs below express the schema of his group's research on the electrophysical properties of the nervous system in the 1950s and early 1960s.

> It is here that our lack of understanding of the organizational principles and the mechanisms of the nervous system is felt most seriously. The organizational structure of the nonhomogeneous medium that consists of large numbers of highly specific elements has so far defied useful description in terms of the overall physical properties of the medium. Much effort has gone into analyzing the fine structure of its various components in terms of current biophysical and biochemical knowledge, but up to the present these efforts have not yielded an approach that is capable of dealing with the unique properties that characterize the nervous system of the higher animals. Here is a system that is composed of many interacting units (all of which are by no means alike), that is organized both flexibly and hierarchically,

that consist of subsystems (enjoying various degrees of autonomy) that are capable of fulfilling specific and/or nonspecific functions. Here is a system that reacts more reliably and predictably to informationally rich stimuli than to "simple" ones. Here is a system that is capable of learning and of giving reasonably reliable performance throughout an extended period of time, with all the safely factors and maintenance and repair requirements that such performance demands.

Is there a moral that imposes itself on the basis of…the tedious and yet incomplete enumerations of problems that one faces in this type of research? We believe there is, and we believe that it can be stated in a single word: pluralism. Only a pluralistic strategy guarantees, at this stage of our knowledge of the nervous system, that we shall not blind ourselves to useful approaches because we have oversold ourselves on one of them…Given the biases of interest that we—as a group—have, given the physical and intellectual surroundings in which we work, we have developed certain methods of data processing and certain types of mathematical models. We believe that these techniques are capable of coming to grips with the statistical character of neural activity which is one of the essential features of the nervous system.[7]

ENGINEERING AND LIVING SYSTEMS

In the early 1960s Gordon Brown, dean of engineering at MIT, ascertained that a considerable number of engineering faculty were active in research connected to health or to health-related human needs, such as prosthetic devices, artificial skin, and blood rheology. Much of this research was carried on in collaboration with physicians in Boston-area teaching hospitals or with faculty at local medical schools. Brown estimated that this type of research could eventually engage 10 percent to 20 percent of all engineering faculty. To help define projections more precisely he asked Rosenblith in May 1964 to assemble and chair the Committee on Engineering and Living Systems; the idea was to assess the consequences of space and laboratory needs as well future faculty and research appointments.

Two years later James Shannon, director of the National Institutes of Health, and Colin MacLeod, deputy director of the Office of Science and Technology Policy, visited MIT[8] to encourage MIT to establish a "new health care school." This request was motivated by congressional concern that large increases in funding for NIH had not produced significant results for the nation's health, and by recognition of the growing impact of science and technology on health and medical care. Shannon and Macleod proposed funding on the order of $50 million over a five-year period. Rosenblith was charged by MIT President Howard Johnson and Provost Jerome B. Wiesner with crafting a response. After discussing the issues with many MIT faculty members and with others at Harvard Medical School (where he held courtesy appointments) and at several teaching hospitals, he recommended that MIT decline the offer. Rosenblith concluded that at least twice the amount offered would be needed; that all of it would have to be new money, so as not to imperil MIT's existing NIH research support; and that although the proposed venture "was not to be a traditional medical school, MIT lacked a basic competence in the traditional emphases of medical education."[9] His recommendation was accepted.

The question of MIT's possible role in medical education, however, resonated on other levels with Johnson, Wiesner, and Rosenblith. On Rosenblith's suggestion MIT applied for a $30,000 planning grant from the Commonwealth Foundation to support a two-week summer study in June 1967. This study was conducted at Brandegee House in Brookline, then the home of the American Academy of Arts and Sciences, with more than 100 scholars and health policy experts in attendance: 71 from MIT and 54 from other institutes, colleges, and universities (including 26 from Harvard Medical School), hospitals, foundations, and government agencies. One participant, George W. Thorn, chief of medicine at Beth Israel Hospital and a senior MIT trustee, suggested after the conference that a new, quasi-independent organization be created with Harvard Medical School and MIT as incorporators.[10]

On September 12, 1967, a press release issued by MIT and Harvard announced the formation of the Joint Liaison Committee on Engineering and Living Systems. “The ultimate goal of the Harvard-MIT Program is the effective use of all available resources in the maintenance of health, the prevention of disease and disability, the treatment of illness, and the postponement of untimely death.”[11] Rosenblith recommended Irving M. London, an able administrator and skilled researcher, for the post of director, accountable to the presidents of Harvard and MIT.

By November 1969 London had prepared a detailed proposal to establish a School of Health Sciences and Technology (HST) governed jointly by Harvard and MIT. New funding would be required, and the faculty of the new school would retain appointments in either MIT or the Harvard Medical School. HST subjects taught at MIT were designed to have strong science and technology components, as well as emphasis on the “human sciences” (psychology, sociology, and ecology); students would complete the hospital side of their training alongside third- and fourth-year medical school students.

The proposal was approved in 1970 by the faculties of Harvard Medical School and MIT, and the approval of the governing boards followed soon afterward. The first class of 25 students, selected from about 400 applicants, was admitted in the fall of 1971. On June 1, 1977, in a joint press release Derek Bok, president of Harvard, and Jerry Wiesner, president of MIT, announced the creation of the interuniversity Division of Health Sciences and Technology. “[Its] purpose,” they wrote, “is to apply the complementary strengths of both universities to the development of new kinds of physicians and other health professionals and to the application of modern science and technology to health and medical problems."[12]

In 1978 programs in medical science and medical physics at the master's and doctoral levels were introduced. About half the students who entered the M.D. program also completed requirements for a Ph.D. granted by either Harvard or MIT. According to Walter Abelmann, a member of the medical school faculty who taught in these programs for several years, "HST students in general tend to be more penetrating in their analytical thinking and questioning, tend to be more rigorous in their pursuit of the mechanisms of underlying disease and management, while showing no evidence of being less adept at acquiring the art of medicine."[13] Career patterns among the many graduates provide solid evidence of the value of the program, with its uniquely rigorous components in the physical and human sciences. The program increased the number of physicians produced each year, one of Shannon's original objectives in proposing a medical school at MIT. More importantly, these physicians acquired an education deeply rooted in science, thanks to Rosenblith, Wiesner, London, and others who took the lead in this forward-looking enterprise.

CAREER CHANGES AND NEW VENTURES

In 1966 Rosenblith was elected to a two-year term as chair of the faculty at MIT, an indicator of the respect that his colleagues felt toward him. The chair of the faculty is a member of the Academic Council—composed of deans and vice presidents, provost, and president—and helps to forge essential lines of communication between faculty and senior administrators. Several significant changes in policies affecting undergraduate education occurred during his term.

The MIT-Wellesley College Exchange Program was established, and Pass-No Credit grading for first-year undergraduates was adopted. Rosenblith used his keen political instincts to shepherd these innovations, which were not without controversy, through the essential faculty committees and at the decisive faculty meetings.

In the fall of 1968 Rosenblith became associate provost under Wiesner just as protests against the war in Viet Nam were on the rise. At the same time there were increasing expressions of concern about activities at MIT seen by some as supportive of the war. Those activities were the Instrumentation Laboratory (since 1971 the independent Charles Stark Draper Laboratory), the Lincoln Laboratory, the Center for International Studies, and the three-services Reserve Officer Training Program (all three of which still exist). Between 1968 and 1972 there were numerous rallies, marches, and protests, often with the odor of tear gas in the air, as well as an attempt to set fire to the building housing the ROTC and a bomb explosion in the Center for International Studies. In these years there were several critical, well-attended faculty meetings, held in MIT's Kresge Auditorium, which drew not only many members of the faculty but many nonfaculty observers as well. These meetings were often contentious and fractious, and President Johnson relied on Rosenblith to ensure that the rules of the faculty prevailed and that MIT business moved forward effectively.

In 1971 when Wiesner was elected president of MIT, one of his first acts was to name Rosenblith as provost, the position he held for nine years, until his (and Wiesner's) retirement in 1980. Among the innovations in which he played a key role during this period were the creation of the Center for Materials Research in Archaeology and Ethnology (CMRAE); the Program in Science, Technology; and Society (STS), a component of the School of Humanities, Arts, and Social Sciences; and the continuing development of HST.

CMRAE originated in an idea proposed by MIT professors Cyril Stanley Smith and Heather Lechtman, both archaeologists and materials scientists concerned with the application of modern analytical techniques to ancient materials. A grant from the National Endowment for the Humanities in October 1977 provided means for the center to begin, with participation from eight Boston-area institutions: five Boston universities along with Wellesley College, the Museum of Fine Arts, and the Robert S. Peabody Foundation for Archaeology. Rosenblith, who had been instrumental in forging the alliance, described the center's goals this way: "MIT welcomes this new cooperative venture with neighboring institutions, not only for its potential contributions to archaeology and related disciplines, but also as a unique experiment in how, by sharing intellectual and other resources, a group of educational, research and cultural institutions may undertake more comprehensive and innovative programs than any one might undertake by itself."[14] The center is a "virtual organization," or coordinating mechanism with no facilities or staff of its own. Its continued funding has proven problematic, but CMRAE continues with bachelor's, master's, and doctoral students with courses taught by faculty from member institutions.

STS took shape in 1976 when Wiesner and Rosenblith brought to the faculty Gerald Holton, Leo Marx, and Kenneth Keniston to form the nucleus of a new educational and research program aimed at addressing the relationships between science and technology, the societies that support them, and their diverse social consequences. With funding from the Hewlett, Mellon, and Sloan foundations STS began in 1977 under the leadership of Donald L. M. Blackmer, an MIT political scientist. By 1980 the curriculum had grown to about 40 subjects. With a faculty of 15 professors and 8 to 10 visiting scholars the program enrolls undergraduate majors as well as students who minor in STS. In 1988 the program introduced, in collaboration with the faculties of history and anthropology, a doctoral program in history, anthropology, and science, technology, and society. Rosenblith, who kept an office in STS during his decades of retirement, continued to exercise critical leadership in this pioneering program, as he had done with so many others at MIT in earlier decades.

In 1970 Rosenblith was elected a member of the newly formed Institute of Medicine of the National Academies. He was elected to membership in the National Academy of Engineering in 1973 and to the National Academy of Sciences (NAS) in 1976. With this third election he became only the fourth person honored by membership in all three branches of the National Academies, independent testimony to the scope of his interests and the breadth of his intellect. In 1975 he was appointed institute professor, the highest honor that MIT bestows on a member of its faculty. In 1988 the Engineering Academy of Japan elected him a foreign associate.

The assignments he undertook on behalf of the NAS were so manifold and diversified as to make him one of the most important contributors in the history of the NAS.[15] From 1977 to 1986 he was a member of the Committee on Scholarly Communication with the People's Republic of China. This committee led the way in renewing academic relations with China during the 1970s and 1980s. Rosenblith traveled to China several times for this group and became very interested in the renewal of higher education in China. In 1982 he was elected foreign secretary of the NAS. As member of the NAS Council he served on the Governing Board of the National Research Council, which had oversight of all NRC activities. He was foreign secretary at a time of difficult relationships produced by the Cold War and the opening of

China. He served on the Committee on International Security and Arms Control and on the Steering Committee for the Science, Technology, and Economic Development Program with China. He was involved in the creation of joint programs with other honorific societies, such as the Royal Society of the United Kingdom. He established and maintained contacts with scientists in the Soviet Union, China, and developing countries. At the close of his term as foreign secretary he was appointed as chair of the World Bank's International Committee, working with a Chinese counterpart to aid in reestablishing the Chinese universities after the period of the Cultural Revolution. As foreign secretary of the NAS he was vice president of the International Council for Science (ICSU), where his work was very highly valued.

> [I]n addition to the countless ways he contributed to the development of the organization, twice he was requested to convene key meetings to reflect upon the future of ICSU and of international science. The first of these was the seminal Ringberg Conference, held in 1985 near Munich, to discuss International Science and the Role of ICSU: a Contemporary Agenda. Five Years later ICSU asked Walter to once again lend his wisdom and vision to a new reflection, this time focusing on ICSU's role in the world. A meeting was held in Visegrád, Hungary on International Science and its Partners. Important foundation stones for ICSU's later work were laid at these two meetings: the links between the pure and the applied sciences; ethics and the social responsibility of science; the need to involve scientists in issues of concern to society and to communicate science better to society, as well as the desire to work with a variety of partners from the social, engineering and medical sciences. It is impossible to think back on these important meetings without a great deal of gratitude for Walter Rosenblith's leadership and commitment to international science.[16]

During his years as MIT provost and later, Rosenblith assumed multiple public responsibilities. In 1973 he was appointed a founding trustee of the private foundation that annually awards the John and Alice Tyler Prize for environmental achievement, "the premier award for environmental science, environmental health and energy conferring great benefit upon mankind." In appointing him the board was drawn to his breadth of scientific knowledge and his commitment to understanding the impact of science and technology on living systems. He helped arrange a permanent institutional home for the foundation at the University of Southern California.[17]

In 1980 he became a founding member of the Boston-based Health Effects Institute (HEI), an independent research institute with a focus on the science of air pollution as it affects health. HEI is funded jointly by the U. S. Environmental Protection Agency and the worldwide motor vehicle industry. He served as the chair of its Research Committee from 1980 to 1989, when he became a member of the Board of Directors of HEI, serving until 1996. HEI describes his contribution to that organization in these terms:

> Professor Rosenblith's vision of science and standard of excellence enabled HEI to quickly develop a strong scientific program. At his urging, HEI developed a program that not only funds research that would contribute needed scientific information for regulation, but also research to strengthen the fundamental science related to environmental issues. Professor Rosenblith supported activities intended to attract people engaged in more basic scientific research so that they might bring new tools and new ideas to environmental questions."[18]

In 1998 HEI created the Walter A. Rosenblith New Investigator Award, which has been presented annually since 1999 "to bring new, creative investigators into active research on the health effects of air pollution. It will provide three years of funding for a small project relevant to HEI's research interests to a new investigator with outstanding promise at the assistant professor or equivalent level."[19]

FINAL CHAPTER

In retirement Rosenblith continued working on studies and reports for the National Academies and the American Academy of Arts and Sciences, and traveled widely. On his return from trips he always brought news, information, insights, and narratives about colleagues and institutions overseas, eagerly shared with colleagues back home. Smitty Stevens once said of him: "For Walter, the most natural form of breathing is talking." He was very good at listening as well; the accuracy of his predictions, invariably based on astute observation, was remarkable. In his mid-80s he began a biography of his best friend, Jerry Wiesner, completed posthumously by his wife, Judy, and published as *Jerry Wiesner: Scientist, Statesman, Humanist* (MIT Press, 2003).

In 1994 MIT created the Walter A. Rosenblith Professorship in Neuroscience. Its first holder was Professor Ann M. Graybiel of the Department of Brain and Cognitive Sciences, an internationally renowned neuroscientist. Four years later MIT established Rosenblith graduate fellowships shared among its five schools, in recognition of the breadth and depth of his accomplishments.

In 1999 he was awarded the Okawa Prize of Japan, "intended to pay tribute to and make public recognition of persons who have made outstanding contributions to research, technological development and business management in the information and telecommunications fields, internationally." The citation reads: "For outstanding and pioneering contributions to the progress of biomedical engineering, especially the use of 'on line' computer analysis of brain activity, and to auditory biophysics as well as to the promotion of international scientific cooperation."[20]

Walter A. Rosenblith died on May 1, 2002, at age 88. He had witnessed two world wars, several regional conflicts, the Great Depression, the flowering of research at American universities, and remarkable advances in science and technology, including the transformation of MIT from the premier engineering school to a science-based research university. An inspiring, vigorous teacher, he was a willing, helpful mentor to junior colleagues, a distinguished contributor to the field of communication biophysics, a wise adviser to universities and organizations around the world, and a splendid friend. We who had the good fortune to work with him at MIT are but a small fraction of those who benefited from his friendship, his collegiality, his extraordinary breadth of intellect and experience, and his highly productive life.

He had certainly not "come two hundred years to soon."

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NOTES

1. This section was informed by an oral history created in 2000: MIT archives, Walter A. Rosenblith, MC55, Box 7.
2. Oral history, session 1, p. 39.
3. Ibid., session 1, p. 64.
4. Ibid., session 2, p. 4, Attribution to Professor Jerrold Zacharias.
5. Ibid., session 2, p. 9.
6. *Sensory Communication.* New York: MIT Press and John Wiley, 1961.
7. MIT archives, Rosenblith paper, MC55, Box 8.
8. Ibid., pp. 13-23.
9. Ibid., p. 31.
10. Ibid., p. 35.
11. Ibid., p. 35.
12. MIT archives, Office of the Provost, AC7, Box 45.
13. Ibid., Abelmann.
14. Ibid., CMRAE.
15. Private letter from Frank Press, former president of NAS, March 2010.
16. From an obituary written for ICSU by Julia Marton-Lefevre, then executive secretary of ICSU.
17. *Http://www.usc.edu/dept/LAS/tylerprize/.*
18. *Http://www.healtheffects.org/index.html.*
19. *Http://www.healtheffects.org/rosenblith.html.*
20. *Http://ww.okawa-foundation.or.jp/e/oka/index.html.*

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