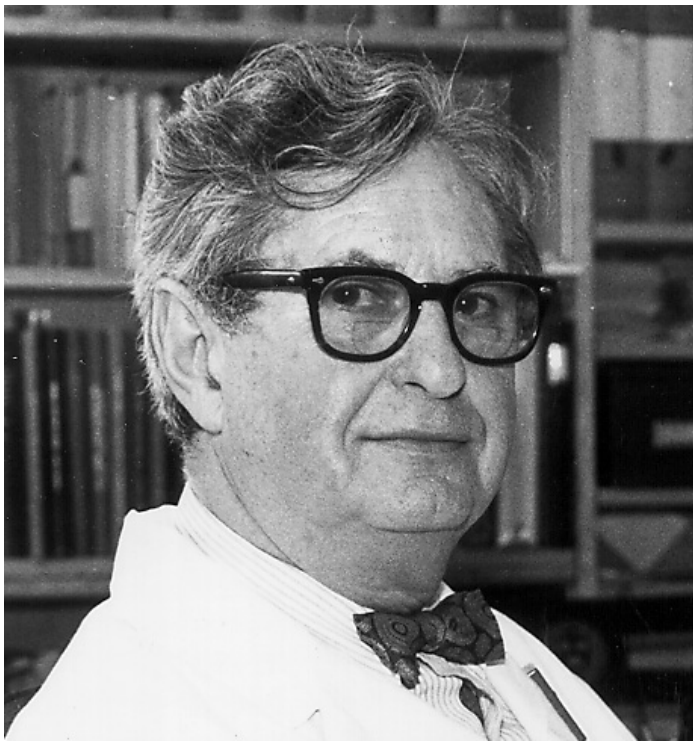
THE FACULTY OF MEDICINE
Harvard University

Manfred Leslie Karnovsky



Manfred Leslie Karnovsky, Harold T. White Professor of Biological Chemistry, died on January 7, 1999 at the age of eighty. Fifty classes of graduates of the Harvard Medical School and countless others were saddened to learn of his death. His lectures on intermediary metabolism formed the core of the first-year biochemistry course. They were delivered in the King's English, and embellished with his special brand of whimsical humor. Each year his lectures kept pace with the rapid advances in biochemistry and molecular biology, and Manfred captured the interest of his students by including exciting new advances without neglecting the solid essentials of classical biochemistry.

Manfred was born in South Africa in 1918, and obtained his early training in chemistry at the University of Witwatersrand in Johannesburg. During World War II, he served as chemist for the Ministry of Aircraft Production while he continued his graduate studies in chemistry at the University of Capetown. He received the Ph.D. degree in 1946.

Manfred was also well-educated in zoology, which laid the foundation for his broad range of interests in biological problems. He studied species as diverse as starfish, sharks, rodents and bacteria. As a student, he enjoyed collecting expeditions to Inhaca, an island off the coast of Mozambique rich in marine life, where his love of marine biology was fostered. This was reflected in the names of a succession of his sailboats, for instance *Asterias* (starfish) and *Tethys* (the sea-hare, a shell-less mollusk).

Following one year as a post-doctoral fellow in biochemistry at the University of Wisconsin, Manfred was invited to Harvard because of his expertise in the synthesis of metabolic substrates that contained radioactive atoms at designated positions. He was expected to provide the organic chemistry arm of the then new Biophysical Laboratory, which had been established to facilitate the use of isotopic tracers for

biomedical research at HMS and its affiliated hospitals. It soon became apparent, however, that Manfred was an exceptional teacher with the afore noted broad interests in the pre-clinical sciences. In 1951, he was selected to help organize and teach an experimental class Medical Sciences 201. In this course, all the pre-clinical sciences were presented in an integrated fashion by a closely coordinated team of assistant professors chosen from each of the pre-clinical departments. Although the project was designed primarily for first-year graduate students in the Division of Medical Sciences, it was also regarded as a forerunner of the major changes in pre-clinical curriculum that took place during the succeeding ten years.

Medical Sciences 201 became the starting point for Manfred's collaborative teaching and research with members of almost every department in the HMS quadrangle. From 1952 to 1998, for example, he published more than 200 research papers with some 150 students and staff, including members of the physiology, anatomy, pathology, microbiology and pharmacology departments. The diversity of his interests is reflected in the number of different prestigious journals that published his papers, including the *Journal of Biological Chemistry, Biochemical Journal, Nature, Science, American Journal of Physiology, Physiological Reviews, Journal of Neurochemistry* and *Peptide Research*.

Although Manfred worked in many areas of research, his chief contributions to science were in three major areas: the biochemistry of complex lipids; the biochemical basis of phagocytosis; and biochemical aspects of the biochemistry of sleep. His contributions to each of these areas led to many awards, invitations to participate in international symposia and requests for journal reviews and textbooks. Manfred was the recipient of a Lederle Medical Faculty Award, and the gold medal of the Reticulo-endothelial Society. Manfred was also a pioneer in the systematic study of the biochemical reactions that are activated in stimulated granulocytes. His investigations opened up the study of how phagocytes convert oxygen to reactive species that kill bacteria. Manfred's work in this field was honored with the Special Recognition Award of the Phagocyte Gordon Conference.

Beginning in the late 1960's, Manfred did ground-breaking work on the biochemistry of sleep, initially with Peter Reich, particularly with regard to glucose metabolism in the brain during sleep. Subsequently, a long-standing and fruitful collaboration with John Pappenheimer evolved, the focus being on the characterization of molecules involved in the humoral regulation of sleep. They initially characterized peptides in the cerebrospinal fluid that are sleep-inducing. Later, linking Manfred's interest in leucocytes and infection to the physiology of sleep, the roles of cytokines in the physiological regulation of sleep, and the sleepiness associated with infection, were identified in the fact that components of bacterial cell walls induce sleep through up-regulation of certain pro-inflammatory cytokines.

As a result of these many innovations, Manfred rose rapidly up the academic ladder, becoming full professor in the Department of Biological Chemistry in 1962. Later he served twice as chairman of this Department. Those administrative responsibilities never quenched his devotion to teaching and research. Thus, in 1985, he was honored with the HMS Prize for Excellence in Teaching. In addition, he carried

a heavy load of editorial responsibility for various journals including seven years as Associate Editor of the *Journal of Biological Chemistry*.

Manfred's activities within Harvard University extended to the College, where he taught popular undergraduate courses in biochemistry. One of these, which was taught several times, dealt with the underlying biochemistry of some unusual diseases such as poisoning from unripe Jamaican aki aki fruit. He was an active member of the Kirkland House Senior Common Room, and an enthusiastic chairman of one sub-committee of the Hoopes Prize Committee, which honors outstanding undergraduate research projects - a position he continued to hold well into his retirement. One of his great joys was membership on the Board of Syndics that reviews books submitted for publication by the Harvard University Press. The fellowship of the wider university community was a special source of h is pleasure in being a professor at Harvard for fifty years. He was a prime mover in the effort to link Harvard Medical School more closely to Harvard College by means of a shuttle bus. Its present success and proven usefulness exemplify both the practical and symbolic binding of the Medical School to the university as a whole, a tie dear to his heart.

Following World War II, academic research seemingly changed from being a joyous spare-time privilege to a driving professional obligation. Competition for research grants and fame generated conflicts within the academic community and challenges to the integrity of young faculty. In this changing environment, Manfred never lost his sense of balance; for him, teaching and research were blended in perfect academic proportions. The ambiance of scholarship and the enjoyment of research that pervaded his laboratory set life-long standards for the many graduate students, post-doctoral fellows and colleagues who were privileged to join the Karnovsky "family".

Even though Manfred became emeritus in 1989, he retained his investigative curiosity, and published a last scholarly paper in 1998.

Manfred's professional activities outside the university included service on a Chinese-American exchange program that brought more than fifty graduate students to the United States each year. On three occasions, he and his wife, Dr. Ann Karnovsky, traveled to China to interview candidates for the program and to develop qualifying examinations.

He was elected to the American Academy of Arts and Sciences in 1962, and for many years he served as its communication secretary with responsibility for writing and reading a summary of each monthly meeting. His sparkling summaries of academy lectures often surpassed the originals and delighted his sophisticated audience.

In the breadth of his interests in the literature of several languages, and in the arts, Manfred was an example of that increasingly rare species, the Renaissance man. He played the violin as a child, and retained a life-long love and encyclopedic knowledge of music. He also collected art-work; his many

friends enjoyed the prints and paintings that adorned his Cambridge home. He greatly enjoyed gourmet cooking and members of his laboratory were frequently treated to the Karnovsky version of seafood such as mussels marinara.

Witty and erudite, Manfred wrote light verse for the amusement of his friends and colleagues and to celebrate special occasions. Sometimes he posted his verse in the elevator of the Department, thus earning the sobriquet of "Poet-laureate of the Lift." The clerihew, a form of verse that makes a statement about some person whose name constitutes the first line, was one of his favorite forms.

In 1997, the Karnovskys established a permanent fund to support an annual fellowship in the HMS Division of Medical Sciences. Consequently, the Manfred L. Karnovsky Fellowship is an enduring tribute to one of the Medical School's great teachers.

In addition to his wife Ann, Manfred leaves his son Daniel, of Boston; a daughter-in-law Priscilla; two grandchildren; his brother Morris, the Shattuck Professor of Pathological Anatomy; and a sister Helene, of Sydney Australia.

Respectfully submitted,

Eugene Kennedy, *Chairperson*
John Badwey
Morris Karnovsky
Marjorie Lees
John Pappenheimer