GEORGE BOGDAN KISTIAKOWSKY

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GEORGE BOGDAN KISTIAKOWSKY

BORN November 18, 1900

DIED December 7, 1982

George B. Kistiakowsky began an adventurous, vibrant, and highly successful career in Kiev, Russia, November 18, 1900, the son of a professor of international law. At his death on December 7, 1982, he was Abbott and James Lawrence Professor of Chemistry *Emeritus* at Harvard.

Kistiakowsky was an eminent scientist, a very loyal officer of this University, and a tireless battler for the proper application of science to public policy questions. In particular, he continued his vigorous crusade for the control of nuclear weapons right up to his last days.

His friends knew him as a truly exceptional man, courageous, dashing, witty, intelligent, and strong. Kistiakowsky was fearless and forceful in expressing his views, in public as well as in private. He held strong opinions about people as well as issues so that he inevitably made enemies, but he never let this interfere with his advocacy of courses of action he believed in. In fact, he seemed to thrive on controversy. Each of us has his favorite Kistiakowsky story, all marked by his unique brand of irreverent humor, which never left him.

After a series of hair-raising adventures as a member of the White Army in the Russian Revolution and a harrowing escape from the Crimea, Kistiakowsky's scientific career started in Berlin. There he began his lifetime study of chemical kinetics—the detailed steps by which chemicals react—under Professor Max Bodenstein, from whom he acquired his approach to chemical research: the primacy of experiment and the importance of a personal command of a broad range of laboratory and intellectual techniques.

Brought to Princeton in 1926 by Hugh Taylor, he contributed to the intense activity there in catalysis and photochemistry as branches of kinetics. He also chalked up a "first" by demonstrating (with W.T. Richards) that the velocity of sound could be used, as had been predicted by Einstein, to measure the rates of fast reactions.

After J. B. Conant, then Chairman of the Chemistry Department, lured him to Harvard in 1930, he revitalized physical chemistry here and began his long service as a teacher, an internationally known research scientist, and a most effective member of the Department of Chemistry.

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His deep interest in physical chemistry was not limited to kinetics and led him to make significant contributions to other areas. An example is the analysis of the rotational fine structure of the ultra-violet spectrum of formaldehyde (a work on which a leading tool for molecular structure determination was built).

Another illustration was the initiation and successful execution of a large program of thermodynamic measurements in part based on heats of hydrogenation instead of the traditional heats of combustion. His new methodology gave the extra accuracy needed to verify a leading and then controversial chemical theory, the theory of resonance. Part of the data from the same program helped show that there are usually forces acting inside molecules that restrict their capability to coil and uncoil freely, a concept crucial for the understanding of proteins.

His group was responsible for the measurement of the rates at which changes (known as cis-trans interconversions) occur in the geometry of certain organic compounds, and led to a quantitative understanding of the thermal stability of such compounds. These examples were also characteristic of his outlook: they all dealt with important unsettled questions and required very definite advances in technique for their success. It should be noted that most of these techniques involved ultimately the hands-on personal attention of Kistiakowsky to rescue an inexperienced student by providing the logical analysis of the difficulties, or the intuitive command of the situation needed to choose the right path. Perhaps sometimes his help could have been used earlier, but when he brought it to bear, everyone around knew that a major action was taking place.

His program of developing measurement techniques for the shock tube (a pipe down which an explosive wave or a steep pressure wave could be propagated) enabled chemical reactions to be studied under bizarre conditions of temperature and speed. Wholly different was the work with his student Herbert Gutowsky (authoritatively aided by George Pake and Edward Purcell), which was the first attempt to apply nuclear magnetic resonance (NMR) to chemistry. Today NMR is absolutely crucial in chemistry and is now beginning to be applied to humans for medical diagnostic purposes.

Although Kistiakowsky is credited with a remarkable number of original studies spread over an unusually broad range of fields, he always returned to his central interest, chemical kinetics. Thus, he and Robert Gomer developed the then novel but now standard method of pulsed photodissociation and so determined the absolute rate of recombination of two methyl radicals, a fundamental result that has proved most useful for determining the rates of other free-radical reactions. He also initiated a series of studies of the behavior of methylene radicals, a field of great activity to this day.

He achieved these scientific accomplishments in close collaboration with the many—over 100—superlative graduate students and postdoctoral fellows that Harvard attracts. His highly informal coffee breaks

were a joyous forum for discussions of chemistry and a broad range of other topics. His classroom teaching was mainly in chemical thermodynamics and introductory physical chemistry, where he was not adverse to the use of pyrotechnics to capture his students' attention.

Kistiakowsky's wisdom, judgment, and decisiveness made him a powerful leader in the councils of the Chemistry Department, especially during his chairmanship. His participation greatly enhanced the standing of the Department worldwide. He was also a strong force in University affairs. For example, he led a very controversial campaign to revise the admissions procedures of Harvard College, which he felt were biased against students interested in science; at the same time, he very happily served on the Committee on Athletics.

In 1941, with Hitler's armies sweeping all before them, Kistiakowsky joined in a program to fill the huge gaps in the U.S. capability for defense. The sinking of ships by submarines in sight of our coasts was finally stopped by new technological developments. One among these was the acceptance by the Navy of a new and more powerful explosive called RDX that was introduced by the British. The American product was manufactured by a new process, was effectively desensitized to avoid accidents, and thoroughly tested in air and in water by scientists working in programs that Kistiakowsky, as Chief of the Explosives Division of the National Defense Research Committee, helped plan, and for which he was ultimately responsible. Later, he transferred to Los Alamos where his section developed the explosive lens for the atomic bomb. He himself assembled, with his own hands, the device for the awesome first nuclear explosion at Alamogordo.

The memories of that event never left him as his career in and out of government gradually turned him to a full-time crusader for the control of nuclear weapons.

He became the trusted Science Advisor of President Eisenhower and was thrust, not unwillingly, into the battle then raging over the test ban issue and the initiation of a government agency set up to coordinate the technical political and military issues of nuclear disarmament. Although arms control and national security matters were dominant concerns, Kistiakowsky took special pride in promoting policies to support science education and basic research. This period is documented in his published diary *A Scientist at the White House*.

The Vietnam War pushed him more deeply into public policy questions. At first he agreed to advise the military in an effort to de-escalate the war and reduce the bombing of North Vietnam. He was actively involved in developing the so-called "electronic fence" intended to keep men and supplies from entering South Vietnam. Eventually he felt that this plan was being sabotaged by the military. This triggered his vocal and full opposition to the war and his complete resignation from all his numerous federal advisory posts.

In 1965 he was elected Vice President of the National Academy of Sciences (having refused to allow his name to be put in nomination for the Presidency). His two terms in this office were extremely important for the Academy. He set up its main group for the study of truly major public issues, such as the world population problem. He also very significantly revised the machinery for reviewing Academy reports, making them more responsible and less subject to bias. Evidently, his forthrightness and dedication did not decrease with age.

It is hard to understand how George managed to combine in one life so much original research, so much teaching and guidance to his graduate students, such fun in skiing and sailing and all aspects of life, yet such a great amount of most effective public policy activity.

In 1977 he accepted the Chairmanship of the Council for a Livable World, an organization devoted to the prevention of nuclear war. He threw himself into this activity with characteristic energy and effectiveness. The risk of total destruction of the human race has probably never been greater, but at least there is an increased awareness of the danger, thanks to a handful of people like George Kistiakowsky. He would be proud to know that his daughter Vera, Physics Professor at MIT, is now serving on the board of the Council for a Livable World, and that his two grandchildren are choosing scientific careers.

A long list of prestigious medals and prizes, honorary degrees and memberships in learned societies acknowledged his accomplishments. He received, among other awards, the Presidential Medal for Freedom, the Exceptional Service Award of the Air Force, the National Medal of Science, the Parsons Award for Outstanding Public Service, and the Nichols, Willard Gibbs, Richards, and Debye awards of the American Chemical Society for his scientific achievements. He was elected a Foreign Member of the Royal Society and received honorary degrees from Harvard, Oxford, Princeton, University of Pennsylvania, Carnegie Institute of Technology, Williams, Columbia, Brandeis, and other universities.

George Kistiakowsky married three times; the first two marriages ended in divorce. In our best memories, we associate him with his third wife, Elaine Mahoney Kistiakowsky, with whom he enjoyed wonderful years of shared pleasures and thoughts, and who supported him unfailingly in his last battle.

J. Kenneth Galbraith
Dudley Herschbach
William Klemperer
Frank Westheimer
E. Bright Wilson (*Chairman*)