in brief

Neal F. Lane, formerly professor of physics at Rice University, has become chancellor of the University of Colorado at Colorado Springs.

Namik K. Aras of the Middle East Technical University in Ankara, Turkey, has been awarded the 1984 Science Prize of the Scientific and Technical Research Council of Turkey for his contributions to nuclear chemistry.

Robert W. Wilson of Bell Laboratories last November was awarded the 19th Karl G. Jansky Lectureship of the National Radio Astronomy Observatory; his lecture was entitled "Millimeter-wave astronomy." For their discovery of the cosmic microwave background, Wilson and Arno Penzias shared the 1978 Nobel Prize in physics with Peter Kapitza.

obituaries

Mark Kac

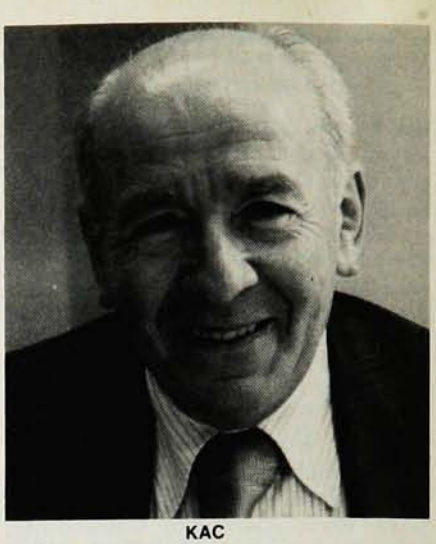
Mark Kac died 25 October 1984, in Los Angeles, where he had been a professor of mathematics at the University of Southern California for the last three years. Previous to his position at USC he was a professor at The Rockefeller University in New York for 20 years and a professor of mathematics at Cornell University for 22 years. Kac started as a mathematician in his native Poland, where he was born in 1914 in Krzemieniec. He earned his degree at the John Casimir University in Lwow, working with Hugo Steinhaus in 1937 on a doctoral thesis entitled "On the stochastic independence of functions."

In 1938 he came to the United States, where in 1943 he met the second figure to deeply influence his scientific career, George E. Uhlenbeck, at the Radiation Laboratory in Cambridge, Massachusetts. It was Uhlenbeck who polarized Kac to apply his enormous talents to fundamental problems in statistical mechanics. No doubt, Uhlenbeck had realized Kac's genius for solving very difficult problems and devising simple, instructive physical models. Kac had in common with Uhlenbeck's teacher, Paul Ehrenfest, a special gift for inventing models. Kac's predilection for the concrete rather than the formal and the abstract, as he once put it, must have given Uhlenbeck the hope—correctly as it turned out—that Kac might contribute to the solution of some of the basic open questions in statistical mechanics.

Kac's work in mathematics is extensive and extremely important, but here I will discuss only some of his contributions to statistical physics. In a beautiful paper of 1947 on random walks and Brownian motion, Kac solved the Ehrenfest urn (or dog–flea) model (for particle exchange, through an opening, between two volumes that contain initially an unequal number of particles) more completely than before, thus elucidating in much more detail the reconciliation between the irreversibility of Boltzmann's H-theorem and the reversibility of the equations of mechanics, for which it was invented. In 1949 his first formulation of the Feynman–Kac formula appeared, but in the following years Kac concentrated more and more on two fundamental problems in statistical mechanics: the approach to thermal equilibrium and the theory of phase transitions. As to the former, he was fascinated by the derivation of the Boltzmann equation from the master equation and he introduced there the notion of propagation of chaos. The point here is that one tries to prove that if a gas is initially in a disordered state, it remains so for all later times, in spite of the collisions that take place. His work on phase transitions started brilliantly in 1952, when together with T. H. Berlin he introduced the spherical model, a variant of the Ising model, and together with J. C. Ward he found an exact solution of the two-dimensional Ising model by a combinatorial method. This work considerably clarified the nature of the earlier exact solutions (obtained first by Lars Onsager in 1944 and then by Brurie Kaufman in 1949) by very clever but not very transparent methods. In 1959 he published the exact solution for the partition function of a one-dimensional gas, where the particles interact with what is now called the Baker–Kac potential. This led in the early 1960s to his work with Uhlenbeck and P. C. Hemmer on the Van der Waals gas. In the first half of the 1970s, he collaborated with Joaquin M. Luttinger, and later in the decade, with Uhlenbeck and R. Ziff on the ideal Bose–Einstein gas.

It is not possible to do justice to all of Kac's work in statistical physics here. His range was very broad, his methods—rooted in the mathematics he knew so well—were very original and clever, and the solutions he found were at the same time simple and elegant. All these features were also apparent in his publications and especially in his lectures. He would take the listener or reader by the hand, so to speak, and guide him through a difficult problem, reassuring him at every step, making everything logical and simple, and thus leading him gently to the solution.

The same features that graced Kac as a scientist, graced him also as a person.



KAC

He was a rare scholar as well as a consummate man of the world, who combined the charm and wit of the old world with the realism and common sense of the new. He had an eye for young talent, was an adviser to many aspiring scientists and became a highly respected elder statesman of science. He was honored by several prizes, including the Birkhoff Prize of the American Mathematical Society in 1978.

He never forgot the lot of minorities and the horrors of oppression that were part of his upbringing in Poland. Therefore it is not surprising that he was a very concerned scientist, full of compassion for those seeking a new home in America.

Many are the witty stories he liked to tell to others. It is perhaps less known how much he enjoyed those of others. Thus at a summer school in Poland, a young Russian physicist, who was very much impressed by Kac, gave him a bottle of wine wrapped in a copy of the newspaper *Pravda*. When Kac thanked him for his gift with the words "In vino veritas," the Russian answered immediately "No, the opposite," referring to the fact that "pravda" means "truth." Kac never got tired of telling this story.

For the papers with Uhlenbeck and Hemmer on the Van der Waals gas, Kac included as a motto a quotation from Shakespeare's *Macbeth*: "Who would have thought the old man to have had so much blood in him?" in reference to the renewed interest in Van der Waals's ideas on condensation. The editor of the journal to which these papers were submitted for publication could not allow the inclusion of this quotation. If ever in the future a paper inspired by Kac's seminal work is sent to a journal, bearing this motto, one must hope that the editor of that journal will include it. Mark would have loved it.

E. G. D. Cohen
The Rockefeller University