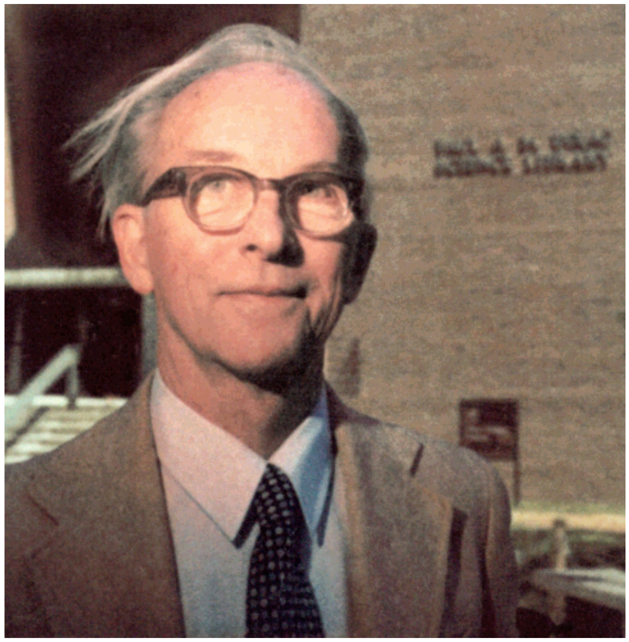
RECURSOS SUGERIDOS

Michael Kasha:

- Robin Hochstrasser and Jack Saltiel, Research Career of Michael Kasha, *The Journal of Physical Chemistry*, 2003, 107 (18), 3162
- http://www.jthbass.com/kasha.html
- http://dolcecano.blogspot.pt/2011_04_01_archive.html
- http://www.hep.fsu.edu/~berg/teach/phy3091/Talk3KashaGuitar.pdf



Research Career of Michael Kasha

Michael Kasha estimates that his 81st year is the most intensely productive and diverse research year of his career. Yet he is also known for the bold statement that his two most influential years (1950, 1952) as a researcher saw only one paper each (emphasizing to administrative bean counters that it is not the *number* of papers that count).

Professor Kasha's exposure to research started in a grand way in 1938 when he was employed in the Merck Research Laboratories in Rahway, New Jersey. His good fortune was to be selected as personal assistant by Karl Folkers, Director of the Pure Research Division, and later one of the world's most famous pharmacological chemists. Folkers said he literally "discovered" the latent talent in the 17-year-old high-school graduate and coached him in the ultramicro techniques needed in his erythryna alkaloid chemistry. After a vacation absence of 2 weeks, Folkers was surprised to find that his young assistant had fractionated a 10-g sample of a crude alkaloid mixture into seven pure components by the criteria of mp and optical-rotation standards. In the second year, the hunt for the then-unknown growth factor pantothenic acid was the big event. A large effort was made by the Merck Laboratories to develop the isolation and synthesis of this vitamin, having arranged with Roger Williams of Oregon to develop the research. This was a great research pursuit lesson for the eager young chemist. Michael Kasha joined the pilot-plant crew, reducing a 1000-lb batch of ground calf liver to a thick syrup by the end of a 12-h shift, involving a 137-gal kettle for the acetone−pyridine extraction, giant 2-m diameter clay filter pots, charcoal adsorption and elution steps, and so forth. At the end of the day, the charcoal-lined wrinkles on everyone's face made them look like characters out of a Dickens novel. Michael Kasha took the 5 p.m. train to New York City. (He was attending the Cooper Union Institute School of Engineering at night, during the 1938−1940 period.) That evening, the people eyed quizzically the paradoxical passenger, who looked simultaneously like a boy of 18 and a man of 100!

The adventure that year was to pursue the detailed research to its final success. Kasha did intermediate syntheses. The preparation of β,β-dimethylacrylic acid was so exothermic that when group leader John Keresztesy ordered a half-kilogram batch, it resulted in a major explosion in the cold room (no injuries but major devastation). Kasha also did the daily bioassays for growth factor activity. He had been initiated into the use of microbioassay techniques using *Streptococcus lactis*, and *Lactobacillus casei*, the turbidity developed by incubation overnight then compared with the logarithmic growth curve developed from standards. Months of "No activity" as his daily report, despite the efforts of several teams of organic chemists each trying for the Holy Grail of a first synthesis, finally led to a major crisis. Randolph T. Major was the overall director of the Pure and the Applied Research Divisions, and to him a complaint was made by a most skilled Dutch chemist (Wejlard) who was certain that he had now achieved the synthesis. In the closed emergency meeting, he stated, "Do we realize that an 18-year-old boy is monitoring the work of 40 of our finest synthetic chemists?" and demanded a termination. Answering the challenge, Keresztesy said, "The boy has been very reliable in everything he does." The decision was to confront Kasha with a mixture of good and null samples to test his methodology. They all came out right, prompting R. T. Major to order "Gentlemen, keep working." Finally, a couple of months later, Eric Stiller and Jacob Finkelstein used a mild alkaline condensation of their β-alanine and lactone moieties, and the bioassay went over the top. Stiller then requested a Sunday microphotography session by Kasha of all of the available B-complex vitamins, a technique that he had learned using his small $2^1/_2 \times 3^1/_2$ in. film Zeiss Maximar view camera (having pursued photography since the age of 12). Later, Merck had those films enlarged to 3×5 ft posters for their national conference

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meetings. Michael Kasha edited a microphotography book for Stiller and Finkelstein, the company, and himself (Crystal Photomicrography, Including the B-Complex Vitamins, Michael Kasha, Merck Research Laboratories, Rahway, N. J., May 1940).

After 2 years in engineering night school, Folkers urged Michael Kasha to go to a good midwestern university to continue to study chemistry. Taking this advice, Kasha decided to go to the University of Michigan where he had two high-school friends. He turned down a full scholarship offered by Merck consultant and Professor Lee I. Smith of the University of Minnesota. Kasha felt that he might then have an ethical obligation to return to Merck and exercised his strong sense of independence.

The early research exposure at Merck was a giant inspiration to the young chemist Kasha and served as a lifetime stimulus. It is not easy to describe that influence in the immigrant environment into which Michael Kasha was born. His father and mother had been sent to the U.S. in their early teens by their parents in 1912−1913 to seek a better life. Their part of the world consisted of Ukrainian villages in the then Austrio-Hungarian Empire, a region that later became the western tip of the Carpatho-Ukraine. Michael Kasha's father had 3 years of formal schooling, and his mother had but 4. Two World Wars devastated that poorest part of Europe, and those along with the Great Depression after 1929 annihilated their plans to return. Living in a Ukrainian colony in the U.S. with a Ukrainian Catholic Church, Church School, and so forth., it could be fairly said that English was a foreign language there. After the depression, all immigrant parents urged their children to get a job to survive. Schooling was not admired or favored. Enormous psychological hurdles in the family had to be overcome before Kasha was granted permission to go to New York (30 miles!), then Michigan (850 miles!), then the ultimate—California (3000 miles!). Michael Kasha's independence reigned supreme, and ultimately his parents appreciated what he was up to and what he had achieved.

The scientific world has no difficulty in following Michael Kasha's career through his publications. His great fortune in having G. N. Lewis as his mentor at Berkeley led to the first of Kasha's involvement in pivotal research that has changed the science of molecular photophysics and its derivatives. Kasha's exciting research experiences with G. N. Lewis are recorded in two biographical articles (No. 108, 1984; No. 130, 1990). The latter also describes his good fortune to have some close associations with three Nobel laureates: James Franck, the molecular physicist; Robert Mulliken, the molecular spectroscopist; and Albert Szent-Gyorgyi, the biological biochemist. Kasha's early work with Lewis was very controversial and opposed strongly by photochemists (Robert Livingston), physicists (J. Franck), quantum theoreticians (Edward Teller), and photobiologists (Eugene Rabinowitch). The completion of research by Kasha's research associates led finally to a universal acceptance of the early work after 10 years! The roots of the dilemma were analyzed in several papers by Kasha (No. 17, 1950; No. 116, 1987; No. 149, 1999). The last of these especially hit at the root of the physicists' perplexity that such a forbidden state as the lowest triplet state in most molecules should be populated so easily. It was not the quantum mechanics that was divergent; it was the ultrafast excitation dynamics of the polyatomic molecule that led the intersystem-crossing rate to overcome the million-fold restriction against singlet−triplet excitation in molecules containing low-*Z* atoms (C, N, O). It was not some strangely elevated spin−orbital coupling.

Michael Kasha came to Berkeley in February 1943 and was the only graduate student working with Lewis. The same year he was required to shift to the wartime Manhattan District Plutonium Project, working under Robert Connick. The reaction chemistry of plutonium research under intense war-time pressures required 65-h weeks. Research with Lewis on molecular phosphorescence was done in that second year in the evening hours of 7 to 11 and 12-h Saturdays and Sundays. Kasha completed his Ph.D. degree in February 1945. The rest of 1945 was spent entirely on the Plutonium Project.

Kasha came to Florida State University in 1951, which he joined as professor of physical chemistry. He established the Institute of Molecular Biophysics in 1960 and was Director for 20 years. The Institute is flourishing and has led Kasha into a career in Health Physiology and molecular electronic aspects of biomolecules as two of his current research pursuits.

In 1996 Kasha was appointed University Professor and had his last of 42 Ph.D. students complete work in June 2001 but continues research with colleagues and occasional research associates (career total of 40), especially at the Universidad Autonoma de Madrid. Recently he was appointed Associate in The Geophysical Fluid Dynamics Institute (FSU) and is pursuing research in astrophysics on the effects of solar proton storms on geophysical phenomena.

Kasha, a Courtesy Professor in the School of Music, is very deeply involved in a program in its Center of Music Research at the Florida State University. This involves using a new design anechoic chamber for absolute sound spectrum recordings of new violins, violas, cellos, base viols, harps, and guitars of his own revolutionary design. The designs involve internal mechano-acoustical innovation, the first in 150 years (guitar family), 200 years (violin family), and 5000 years (classical harp). The revolutionary design instruments are made by ultraskilled craftsmen and evaluated by virtuoso performers.

Mike's students, postdoctoral fellows, colleagues, and collaborators join us in expressing their gratitute to him for his unceasing inspiration, support, and friendship.

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Guest Editors