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 2½ × 3½ 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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Kasha's involvement in pivotal research that has changed the
ultimately his parents appreciated what he was up to and what
Kasha's independence reigned supreme, and
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 association with three Nobel laureates: James Franck, the
molecular physicist; Robert Mulliken, the molecular spectros-
copist; and Albert Szent-Gyorgyi, the biological biochemist.
Kasha's early work with Lewis was very controversial and
opposed strongly by photochemists (Robert Livingston), physi-
cists (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 pres-
sures 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 col-
laborators join us in expressing their gratitude to him for his
unceasing inspiration, support, and friendship.

Robin Hochstrasser
University of Pennsylvania

Jack Saltiel
The Florida State University

Guest Editors