

Marilyn Esther Jacox **FREE**

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Marilyn Esther Jacox

Marilyn Esther Jacox, scientist emeritus at NIST, died on 30 October 2013 in Rockville, Maryland, of a respiratory infection. A physical chemist, she was known internationally for her discoveries of the structure and bonding properties of free radicals and molecular ions and for greatly expanding the field of cryogenic matrix isolation spectroscopy.

Marilyn was born on 26 April 1929 in Utica, New York, and at an early age developed a fascination with astronomy and light. In 1951 she received a BA in chemistry from Utica College of Syracuse University. She moved to Cornell University to work with Simon Bauer and received her PhD in 1956 with the thesis "Collisional energy exchange in gases: Use of the spectrophone for studying relaxation processes in carbon dioxide." For the next two years she carried out postdoctoral research with Oscar Rice at the University of North Carolina at Chapel Hill.

In 1958 Marilyn joined the Mellon Institute of Industrial Research (later merged into Carnegie Mellon University) in Pittsburgh, Pennsylvania, as an independent researcher. There she became acquainted with Dolphus Milligan and his IR studies of free radicals. Milligan was using a technique, matrix isolation, for trapping reactive species in frozen inert gases; he had brought the method from George Pimentel's group at the University of California, Berkeley. The pair began collaborating in those studies at Mellon and continued at the National Bureau of Standards (NBS, now NIST), where both received appointments, Marilyn in 1962 and Milligan a year later.

Despite the extra obstacles facing a woman and an African American man at that time, the two scientists achieved great success in producing and trapping numerous free radicals and molecular ions by using the low-temperature matrix isolation technique. They probed the trapped species using IR spectroscopy and were adept at using isotopic substitution to support sometimes bold assignments of molecular spectra. Many of their publications were landmark studies and became standard reading for graduate students.

Colleagues at NBS were supportive against prejudicial obstacles. In the early 1960s, NBS moved from Washington, DC, to new laboratories at the pres-



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ent site in Gaithersburg, Maryland. Bureau scientists were required to inspect the buildings and provide instructions for the layout of utilities, but a strict rule prohibited women from the construction site. Marilyn hid under the dashboard of a pickup truck while two colleagues signed her in as "Dr. Jacox." She performed her inspection covered by a lab coat, with her hair and face concealed by a hard hat.

Milligan died, tragically, in 1973. Marilyn succeeded him as chief of the photochemistry section and the next year was appointed chief of the environmental chemical processes section, where she served until 1978. Though saddened by the loss of her colleague, Marilyn continued the work they had begun together. She developed a novel neon discharge technique, involving both photoionization and Penning ionization, that greatly expanded her portfolio of ions available to study. Photolysis within the matrix, controlled using cutoff filters, was another powerful innovation of Marilyn's for assigning spectra. She was soon established as a world leader in molecular spectroscopy. Some of her studies brought her into vigorous competition with other scientists, but she was consistently objective, honest, and constructive. Her critical comments on manuscripts during peer review will be missed; they yielded more improvements than reports from most other referees.

Concurrently with her research projects, Marilyn maintained an ever-growing bibliography of published spectroscopic data on small transient molecules. She issued a series of critically evaluated

tabulations that culminated in 1994 in a thick book entitled *Vibrational and Electronic Energy Levels of Polyatomic Transient Molecules*. She updated the database regularly, and it has been available online since 1998. The compilation stands as a monument to Marilyn's determination, which is legendary at NIST. One colleague called her "unstoppable" after she missed only two and a half days of work following major surgery for breast cancer. Although nominally retired in 1996, she maintained a full research program until her final illness.

Catherine Lugez, a former postdoctoral researcher with Marilyn, regards her with great affection and respect. "For a lot of people, Marilyn was a giant in the world of spectroscopy. For me, she was a giant in the world of mentoring and supporting young scientists and women." Marilyn received many awards and honors, including a festschrift in 2000, but she never gained patience for declarations that gender bias in science has disappeared.

An avid world traveler, Marilyn would return home with copious photos and video to share with friends. (One of us has a family photo, taken by Marilyn at a conference, that was shared in a year-end letter to friends.) She participated in piano, book, and photography clubs; published genealogical books; was active in her church; and favored red, sporty cars. Marilyn earned great respect for her scientific contributions, and she will be fondly remembered for her adventurous spirit, her work ethic, and the warmth of her personality.

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Fridtjof Kavli

Fridtjof "Fred" Kavli died in Santa Barbara, California, on 21 November 2013 of a rare form of cancer (cholangiocarcinoma) that he had been battling for about a year. Trained as a physicist, Kavli made his living as an entrepreneur and engineer. He later realized his lifelong passion for science by supporting basic research in astrophysics, nanoscience, and neuroscience, the fields he called the most exciting of the 21st century. With Kavli's enduring belief in the transformational power of science, the foundation he established