

# OBITUARIES

## Robert Floyd Curl Jr

**R**obert Floyd Curl Jr, a codiscoverer of the hollow-cage carbon compounds called fullerenes, passed away on 3 July 2022 in Houston, Texas, at age 88.

Bob was born on 23 August 1933 in Alice, Texas, a small town that has produced two Nobel laureates, James Allison and Bob. His parents gave him a chemistry set to spur his childhood interest in science. Although Bob's experiments nearly destroyed his mother's stove, it inspired him to be a chemist. The family moved frequently before settling in San Antonio, where Bob attended high school. When his chemistry teacher recognized Bob's talent and encouraged him to build a Cottrell precipitator as a special project, it hooked him on science.

Bob attended Rice University (then Rice Institute), a school known for its science and engineering focus and free (!) tuition. At Rice, Bob developed a lifelong interest in molecular structure by taking Natural Products, a course taught by Richard Turner, an innovator in determining heats of hydrogenation. Turner emphasized how rotation about single bonds could interchange conformations in steroids and produce large physiological effects.

After earning his BA from Rice in 1954 as one of the top two students in his class, Bob moved to the University of California, Berkeley, for graduate study with Kenneth Pitzer, a physical chemist and pioneer in molecular conformational studies. Pitzer apparently considered conformations a solved problem and advised Bob to extend the law of corresponding states to predict thermodynamic properties. The resulting Curl-Pitzer method gave entropies of vaporization that were accurate to within about 0.5%, which proved so useful for chemical-plant design that the Institution of Mechanical Engineers in London awarded the two men a James Clayton Fund Prize for a

paper they wrote while Bob was still a graduate student. To satisfy Berkeley's expectation that PhD students must conduct experiments, Bob measured matrix-isolation spectra of samples cooled to 20 K by liquid hydrogen and determined that the silicon-oxygen-silicon bond of disiloxane was bent. He gave credit to Dolphus Milligan for helping to avert disaster during his hydrogen transfers.

Bob received his PhD in chemistry from Berkeley in 1957 and moved to Harvard University for postdoctoral research on molecular conformations with E. Bright Wilson Jr. His stay at Harvard was cut short when George Bird, a former Wilson student, left the Rice faculty and Bob was recruited to take his place. He thus returned to Rice as an assistant professor of chemistry in 1958, just four years after leaving with his bachelor's degree. Bob inherited not only Bird's microwave spectrometer but also a brilliant graduate student, James Kinsey, who later became chair of the MIT chemistry department before returning to Rice as dean of natural sciences. On the occasion of Bob's retirement in 2008, Kinsey said, "He's scary smart, but he is also an extraordinarily decent human being, a sweet person."

At Rice, Bob published 63 papers on microwave spectra of various free radicals. As lasers advanced in the 1970s, he expanded his studies into gas-phase IR spectroscopy; chemical kinetics, with Graham Glass; laser development, with Frank Tittel; and reaction transition states, with one of us (Brooks). In the mid 1970s, Bob was instrumental in recruiting a brilliant young colleague, Richard Smalley, who accepted largely because of Bob's presence. Their first joint publication was a photoionization study of semiconductor clusters produced in Smalley's cooled molecular-beam apparatus.

Bob had long been intrigued by the origin of the diffuse interstellar bands. Upon learning of Harold Kroto's studies on carbon molecules thought to be formed near red giants, he invited Kroto to Rice to study carbon clusters and then convinced Smalley to participate. Their initial experiments with graduate students James Heath, Sean O'Brien, and Yuan Liu showed a mass spectrum peak indicating 60 carbon atoms. Within days they deduced that  $C_{60}$  had a cage structure



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resembling a soccer ball. They named it buckminsterfullerene in reference to the architect Buckminster Fuller, who popularized the geodesic dome. Their discovery launched the new field of fullerene chemistry, leading to the publication of more than 100 000 papers and the award of the 1996 Nobel Prize in Chemistry to Bob, Smalley, and Kroto.

Bob contributed enormously to Rice during his 64 years as an active and emeritus professor. He and his wife, Jonel, were the first magisters (resident supervisors) of the Lovett residential college, from 1968 to 1972, and provided guidance, especially during student unrest of that period. He served as chair of the chemistry department, lent his wisdom to countless university and national committees, and lobbied the Texas legislature on behalf of science. Bob was famously humble as well. One former student commented, "He listened. He really listened." After the Nobel award, Rice's president asked Bob if the university could do "anything" to make him happy. He modestly replied that it would be nice to have a bicycle rack installed near his building.

Bob's many friends, students, and colleagues deeply miss this exceptionally brilliant and decent man.

**R. Bruce Weisman**  
**Philip R. Brooks**  
*Rice University*  
*Houston, Texas*

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