Obituary

Kent R. Wilson (1937–2000)

Kent Wilson, who died on 27 March, developed innovative laser techniques to probe the molecular dynamics of chemical and biochemical reactions. A remarkably wide-ranging physical chemist, he also contributed much seminal work, both theoretical and experimental, to several other fields.

In the past few years, Wilson's group at the University of California, San Diego, opened up three frontiers. Each required development of powerful new apparatus, exemplifying Wilson's architectural vision. One machine achieves 'quantum control' of photochemical processes, using iterative feedback to automatically tailor laser excitation pulses for optimum effect. Another, the culmination of long endeavour, enables direct observation of atomic motions by means of ultrafast X-ray diffraction and spectroscopy. Most recently, the group has built a laser microscope that can obtain very-high-resolution images of living tissue without killing the cells.

Wilson was born on 14 January 1937 in Philadelphia, and grew up in a nearby village, Bryn Gweled Homesteads. This was a mostly Quaker community, which his parents had helped to found, designed to foster communal living. Encouraged by scientists in the village, by the age of eight Wilson had made a rudimentary radio receiver. Later, his family spent winters in Washington DC, where his father headed a Quaker organization working for disarmament and civil rights. Wilson became an avid visitor to the Smithsonian Museums and the Library of Congress; he credited that with "saving my academic career from ruin" because he "did very little of the assigned homework in school".

At Harvard College, Wilson began as a government major studying chiefly history and political science. However, he was captivated by a chemistry course given by the fabled Leonard Nash. That led Wilson to switch his major to chemistry and physics. After completing a bachelor of arts degree in 1958, he went to the University of Strasbourg for a year and wrote a *Diplome* thesis in economics. He then decided to pursue graduate study in chemistry, and moved to the University of California at Berkeley. Susceptible to evangelical fervour, he joined my fledgling research group just as we were beginning crossed-molecular-beam studies of the reactions between alkali atoms. His doctoral thesis, completed in 1964,

MARC TULE

Inspiring architect of laser chemistry

described the design and construction of a state-of-the-art apparatus and presented data mapping out the generic relations between product angular distributions and electronic structure of the reactant molecules.

In 1965, Wilson moved to San Diego and began building his own research group. He undertook the development of laser experiments to elucidate the dynamics of molecular photodissociation. The techniques of ordinary spectroscopy put almost exclusive emphasis on stable excited states, but in molecules there are many more dissociative excited states. Wilson's technique of photofragment spectroscopy opened up a vast lode of information about such states and repulsive intermolecular forces.

Although his later research explored quite diverse areas, his *leitmotif* remained molecular dynamics. In the 1980s, by combining ultrafast laser experiments with computer simulations, Wilson markedly advanced the understanding of reaction dynamics in solution, bringing out connections to gas-phase dynamics. In the 1990s, his ultrafast X-ray laser apparatus revealed unexpected dynamical aspects of the transition between solid and liquid phases, in a phenomenon termed 'non-thermal melting'. In striving for his ultimate goal of quantum control, he hoped to conduct 'conversations' with molecules through laser light pulses, enabling the molecules to teach experimenters how to negotiate a desired chemical choreography of atomic motions.

For Wilson, teaching and mentoring were adventures in both intellectual and social dynamics. He dubbed a unique part of his research group the 'Senses Bureau', to which he recruited first-year undergraduates "young enough so that they do not yet know the meaning of the word impossible". Over 35 years, they created software and hardware for computer animation and produced many educational films and interactive virtual-reality devices. A classic film explicated protein synthesis with the aid of 200 dancers, poetry and a jazz-rock band. The bureau also had a large part in Wilson's studies of air pollution in California and Mexico, and in the use of chemical archaeology to trace trade routes in Africa.

In mid-career, Wilson became increasingly frustrated with the time and tribulation of applying for research grants. On a sabbatical leave in 1985, he came up with an extraordinary solution, discovering "a mapping between parts of physics and economics". Boldly betting on his theory, over the next few years he invested in the stock markets of 25 countries. This succeeded so well that he was able to resign all his federal grants, thereafter using his own funds to support his sizeable research group and provide laser and computer instrumentation.

Late in 1998, Wilson learned he had incurable, late-stage prostate cancer. For the remaining 14 months of his life he dealt with this as his "most challenging experiment", organizing a team of biochemists to work with physicians in pursuing new therapeutic approaches. Last December, the *Journal of Physical Chemistry* published a special issue honouring Wilson. He contributed an autobiographical essay, a poignant and wise "love letter to posterity". The closing paragraph describes his joy in visiting wild flowers along a favourite trail, akin to his pleasure in the blooming of his scientific projects and progeny. In this, and in other ways, Wilson was an heir of Max Planck, whose study of the interaction of light and matter led to the discovery of quantum physics a century ago. In a letter to a friend, Planck wrote:

What you have picked, what I have picked
These we will bind together,
Entwining thus a fair bouquet
From gifts we send each other.

Dudley Herschbach

Dudley Herschbach is in the Department of Chemistry and Chemical Biology, Harvard University, 12 Oxford Street, Cambridge, Massachusetts 02138, USA.
e-mail: herschbach@chemistry.harvard.edu