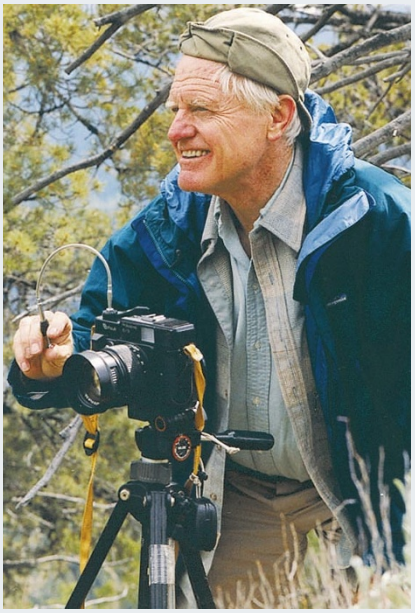
Obituary

Henry W. Kendall (1926-99)

High-energy physicist and activist



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The range of Henry Kendall's accomplishments and avocations is reminiscent of that of a prodigiously energetic and versatile Victorian. He was a key figure in a fundamental discovery in physics, a world-class mountaineer in his younger years, a photographer and diver at the professional level, and an inspiring leader in bringing the concerns of scientists, about the social impact of technology, to the attention of the American body politic.

Kendall was born in Boston in 1926. In his own words, "[I] developed — or had been born with, an active curiosity and interest in things mechanical, chemical and electrical, and do not remember when I was not fascinated with them and devoted to their exploration". Following a mathematics degree from Amherst College, he obtained his doctorate at the Massachusetts Institute of Technology (MIT) in 1954 with a difficult experiment on the spectrum of positronium, the atom formed by an electron and positron, which had recently been discovered by his research advisor Martin Deutsch.

After a postdoctoral fellowship, he joined the Stanford University physics department in 1956. There he met Jerome Friedman and Richard Taylor, who were to become his long-term scientific collaborators. Friedman and Kendall joined the MIT faculty in 1960–61, but maintained a connection with experimental work at Stanford.

The Stanford Linear Accelerator (SLAC), completed in 1966, produced 20 GeV electrons, and provided the means for examining the internal structure of the proton with unprecedented resolution. But it was far from obvious that this technique would yield anything of interest. Protons of the highest available energy were judged by most to be the tool of choice, because at that time it was the widely held view that the proton had no substructure. True enough, Murray Gell-Mann and George Zweig had, independently, already proposed the quark model — the conjecture that the proton is a composite of three spin-½ objects with charges smaller than that of the proton. But most physicists viewed the model as an intriguing, but abstract, algorithm, and were loath to ascribe physical reality to quarks, let alone a point-like structure.

Kendall was as adventurous in physics as in his other passions, and was undeterred by this received wisdom. With Friedman and Taylor, he led the MIT–SLAC collaboration in building a pair of gigantic magnetic spectrometers, and he played a key role in the design and construction of the particle detectors and electronics. The team systematically explored highly inelastic electron–proton scattering, which most expected would yield abysmally few data of no interest. What they found, however, were copious data that indicated the proton to be a composite of point-like charges. A deeper analysis suggested by James Bjorken revealed that these objects were loosely bound, and the group later showed they had spin ½. The group's conclusions have, therefore, been compared to Rutherford's realization that the surprisingly large number of back-scattered alpha particles resulting from alpha-particle bombardment of matter implied a point-like nucleus within the atom.

The MIT–SLAC results were a watershed. In combination with subsequent neutrino scattering data from CERN in Geneva, they gave the first clear evidence for the existence of quarks, and provided a foundation for today's remarkably successful theory of the fundamental constitution of matter — the so-called Standard Model of particle physics. In 1990, Friedman, Kendall and Taylor were awarded a Nobel prize for this achievement.

Kendall was as impressed as anyone with the benefits of science. But he came to harbour concerns about the risks that can accompany technological innovation, and developed a growing commitment to address them. As did many physicists of his generation, he first focused on nuclear weapons: "At the start of the 1960s, troubled by the massive build-up of the superpowers' nuclear arsenals, I joined a group of academic scientists advising the US Defense Department." But he eventually withdrew from classified work and joined colleagues who were founding the Union of Concerned Scientists (UCS). In 1969, UCS mounted a nationwide protest against government policies that "present a major threat to the existence of mankind".

The UCS, which then had no funds or staff, would have been a one-day wonder but for the leadership that Kendall then assumed. His critique of the safety of nuclear power plants brought UCS into high-profile conflict with the Atomic Energy Commission, and contributed to the formation of the Nuclear Regulatory Commission. In the 1980s, UCS was a major player in the Star Wars controversy. By then it had some 100,000 supporters and a sizeable full-time staff.

During the past decade, Kendall's own efforts and those of UCS were guided by his belief that "human beings and the natural world are on a collision course" (the opening words in his 1992 World Scientists Warning to Humanity). This declaration, signed by some 1,700 leading scientists from 70 countries, is a synoptic assessment of the factors leading to this collision and a call to action. Kendall ceaselessly sought support for this endeavour, and devoted his own relentless energy, first to the issue of food and water resources, then to climate change and most recently to species extinction.

Kendall had never been on a rope when he first went to Stanford, but within two years he had become a top-flight climber in Yosemite, and a member of expeditions to the Andes. Perhaps his greatest climb was that of the notorious Walker Spur on the Grandes Jorasses in the Alps, with Gary Heming in 1962, the first ascent by Americans and the swiftest by far up to that time. For 50 years he was a serious diver, summer and winter off the New England coast, and as far afield as the Falklands and South Georgia. He died on 15 February 1999, while fresh-water diving in Florida.

He will be remembered as a man who always strove to scale the greatest and most formidable heights, whether in science, in the mountains or in the pursuit of human welfare, with indomitable courage and a cheerful smile for his companions.

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