Obituary

Thomas Hughes Jukes (1906–99)

Vigour, both intellectual and physical, was the hallmark of Tom Jukes, who died on 1 November in California. He was habitually coy about his age, now revealed as 93. When asked his age, he would insist that he had been born this century; then, to demonstrate his youth, he would lead his visitors on a 'stroll' over the hills above Berkeley at such a pace that all but he would be out of the breath required to interrupt his running commentary on the state of science and the follies of some of its practitioners. But even before he had an artificial knee fitted in the early 1980s, Jukes did not tempt his visitors to the high Sierras, which were his great love.

He crammed several careers into his long life. Born in Hastings on the English south coast, he took off for Toronto in 1924, where in 1933 he earned a PhD in the department at which Frederick Banting and Charles Best had discovered insulin. His first career was as a nutritionist at the University of California, mostly at the Davis campus where, through feeding experiments with chickens, he was able to unravel the relationships between the different components of the B-vitamin complex. He was one of the authors of the first report that vitamin B₁₂ will cure the deficiency disease pellagra in human beings.

That experience was the platform for Jukes's second career, as an industrial scientist at the Lederle laboratories in New Jersey, initially as head of a programme on nutrition and physiology. There, he discovered the role of folic acid as a vitamin (the lack of which is now believed to be linked with the emergence of spina bifida in fetal development). This was also the period in which he launched the notion of antibiotics as growth promoters in animal husbandry. Given the concentration of folic acid in tumours, Jukes also developed the use of antagonists as chemotherapeutic agents, of which the best known (and used still) is methotrexate.

Then came the structure of DNA, in 1953. At a time in life when contemplation of pension entitlements is widely forgiven, Jukes (now back at Berkeley) had re-launched himself by the end of the decade as a molecular biologist. He contributed much to understanding the chemical intricacies of DNA replication, but is best remembered as the first advocate of the doctrine that most genetic mutations are neutral (*vis-à-vis* natural selection).

I first met him in 1960, when he was

Nutritionist turned molecular biologist, and polemicist

camping out in newly occupied quarters in a NASA laboratory on the bay shore on the Oakland side of Berkeley, and I was briefly a science reporter for *The Washington Post*. There was much talk of genetics and a little about the NASA lab's 'mission' (exobiology, I think it was), but much more about the wickedness of the creationists, then flexing their muscles for a fight with the School Board of California over Darwinism's place in the school curriculum.

Jukes had a passionate distaste for cant and, more important, a natural instinct for the effective conduct of a controversy. Excessive politeness, or even bare courtesy, towards opponents might often itself seem like cant. But the crucial determinant of the outcome of a controversy must be a factual foundation that cannot be denied. And then, the controversialist must be assiduous in seeking and using every possible means of making his message heard. Jukes was a past master of the art of formulating questions that his opponents had no hope of answering.

The controversies came thick and fast. Quack cancer cures (such as 'Laetrile', extracted from the inner stones or seeds of peaches) were an early object of his scorn. The rise of the environmental movement in the 1960s forced other targets on his attention, notably the decision of the US government to ban the use of DDT in

agriculture. There was a protracted row about the causes of the decline of the pelican population off the California coast in the early 1970s, which many attributed to the effects of pesticide residues on the thickness of the shells of pelicans' eggs. In the event, DDT was banned, the pelican population recovered — and the controversy was never settled and probably will now never be settled.

In the same spirit, Jukes quickly identified Linus Pauling's advocacy in the 1980s of massive doses of vitamin C as a general prophylactic of human disease, cancers included, as yet another attempt to sell snake-oil to a gullible public, and one that was all the more offensive because of the distinction of its author. For a decade, Jukes was Pauling's most outspoken critic on this score. Not for him the amused indulgence of a great man that marked the research community's general reaction to Pauling's aberration. In the absence of evidence that a snake-oil is effective, Jukes properly held that pretending otherwise is wicked.

Many of these issues were dealt with in Jukes's regular column in *Nature* between 1975 and 1980, but this skeletal version of his career may give the false impression that he was a talented scientist who turned into a cantankerous iconoclast in later life. The issues on which he seized were mostly prompted by his wide experience as a scientist, his knowledge of the importance of naturally occurring food additives (which is what vitamins are), and his deep suspicion that categorical statements of scientific 'fact' are usually exaggerations. His long battle against creationism had different roots — aversion to the misuse of data and the perversion of the style of argument in science. So far as I could tell, Jukes did not relish making enemies although the prospect held no terror for him. But he was a gregarious man, so that losing friends brought a sense of loss.

He was also a cultivated man, who claimed that his admiration for Mark Twain's writing had influenced his decision to move from Canada to the United States. I recall one animated conversation about James Joyce in which Jukes toyed with the argument that Joyce's innovations in the use of language were the equivalent in English literature of the structure of DNA in the life sciences. His conversation was invariably imaginative and a source of great surprise, even fun.

He is survived by his wife Marguerite, an excellent cook, and by three of his four children and by seven grandchildren, who have much to be proud of.

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