

DALE SANDERS

Jack Dainty
1919-2009



Jack Dainty, who has died aged 90, was a pioneer in the field of plant biophysics. As a trained physicist, he argued successfully that the same sort of quantitative physical principles that had so successfully been applied to understanding how animals function could also be applied to plants. Dainty formulated some of the essential physical concepts that describe movement of ions and water into and through plant cells, and ultimately through the plant itself. These plant-related issues pertain to drought and salt stress, and, in the context of global warming, affect us all.

When, in the 1950s, Dainty transferred his research attentions from physics to plants, plant physiological research had, a reputation for being rather woolly. Dainty's lucid thinking helped to transform the phenomenological into the hypothesis-driven. His lasting legacy has been, through his research papers and through his mentorship of researchers, to get plant physiologists to think quantitatively.

Dainty was born and brought up in a Yorkshire mining community, in Mexborough, near Sheffield, and educated at Mexborough grammar school. He was a precocious child, excelling in two fields: mathematics and football. He was also interested in natural history and read widely around the subject. This interest, fuelled by long walks in the countryside, ignited his later professional interest in biology.

Nobody in Dainty's family had pursued education beyond 14, yet he obtained a scholarship to Queens' College, Cambridge, to study mathematics, transferring to physics because he felt the former subject too narrow. At the beginning and end of each term, he would cycle the 120 miles or so between Mexborough and Cambridge.

After the end of his undergraduate course in 1940, Dainty was recruited in Cambridge to work on nuclear fission. The issue was clear: the prospect of a British atomic bomb. But Dainty realised was that this was not so much a research problem as a technological one. With some scientists spirited off to Los Alamos, and the Manhattan Project, Dainty was left heading the cyclotron team. After a period at the Canadian atomic energy laboratories at Chalk River, Ontario (1946-49), Dainty returned to an academic position in physics at Edinburgh University. He lectured on relativity, quantum theory, and the theory of errors. And then something happened.

In 1952, Dainty was asked to teach physics to a class of 300 medical, dental and veterinary students. Initially, he declined, on the basis that he would not wish to teach students who were not interested in physics. An enlightened head of department, the nuclear physicist Norman Feather, negotiated with the university that there could be a department of biophysics as a *quid pro quo*, with Dainty as its head, were Dainty to undertake the teaching. The department was established in an old chicken shed, and thus Dainty changed career.

Although he researched for a short time on ion transport across nerve cell membranes, Dainty wanted to develop novel systems, and viewed plants as an opportunity. Little was known about

the physical principles that underpinned the movement of ions and water across plant cell membranes, and Dainty, together with his first graduate student, Enid MacRobbie, established, through the application of radioisotopes (to measure ion fluxes), in which direction the transport of the ions sodium and chloride was energised. A key critical finding at that time was in alerting investigators to the nature of unstirred layers - a principle familiar to physicists and engineers, but widely ignored by biologists.

In 1963, Dainty moved to the University of East Anglia to become one of the four founding chairs in what is now a thriving school of biological sciences. There, he was able to integrate biophysics as a key element in a biology curriculum. In the ensuing six years, Dainty established UEA as a centre for plant biophysics. He moved, in 1969, to take academic positions in California before accepting the chair in botany at the University of Toronto in 1972. He spent the final two decades of his career there.

Dainty was an avid reader of novels and perhaps it was this love of literature that made him also an outstanding communicator of science. Some authoritative reviews in the early 1960s not only made accessible to the average plant biologist the biophysical concepts of ion and water transport in plants: they also inspired considerable research in the field.

Dainty was, above all, a modest person. A lifelong socialist, he always remembered his origins and never sought recognition - being much more interested in talking about science than gossiping about accolades. Even so, he was elected to the national science academies of Canada, Italy, France and Scotland. He was also elected as a Fellow of the Royal Society in 1978.

Besides his love of literature and music, Dainty played semi-professional football before the Second World War and had a trial, as a schoolboy, for Huddersfield Town. He could converse in Italian, French and Czech.

*Written by Dale Sanders
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(Author's title given as of the time of writing)