Sir Frederick Gowland Hopkins: Nobel Laureate and pioneer British biochemist

This year marks the 150th anniversary of the birth, on 20 June 1861, of Frederick Gowland Hopkins, a father figure of modern biochemistry, which started around the beginning of the 20th century.

So often the story of the famous men and women that have been recorded in this series of anniversaries commences with the early promise of a brilliant future. Paul Langerhans described the islands of tissue which bear his name scattered through, but histologically distinct from, the glandular tissue proper of the pancreas in his inaugural student dissertation in Berlin, while Sir James Paget, as a first year medical student at St Bartholomew's Hospital, showed that the little specks sometimes seen in human muscle in the dissecting room and called 'bony spicules' were, in fact, the little worm *Trichina spiralis*, curled up and surrounded by a capsule. The story of the first couple of decades of the life of this month's subject was far from a promising one, and might prove of some comfort to late starters in their medical career.

Hopkins was born in Eastbourne, the son of a bookseller. His second name, Gowland, was his mother's maiden name. His father died while Frederick was in his infancy and his mother moved to Enfield. He attended the City of London School but absconded at the age of 14 years. He was sent for a while to a private school, then spent time clerking in an insurance office before working in a consultant analyst's office in the City.

At the age of 20 years, he studied chemistry at the Royal School of Mines and then at University College. Here at last he showed his future promise. He did well in his examination for the Institute of Chemistry and attracted the notice of Thomas Stevenson, Home Office analyst and lecturer in forensic medicine at Guy's Hospital, who offered him a post as his assistant at Guy's, which he readily accepted. He then enrolled as a medical student in 1888 and qualified in medicine in 1894. Even while a rather mature student, Hopkins demonstrated his research abilities; in 1891 he published in the Guy's Hospital Reports a method of measuring the uric acid concentration in urine which became the standard technique for many years.

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After qualifying in medicine, Hopkins was appointed assistant in the department of physiology at Guy's and, as well as teaching, researched such topics as crystallization of the albumins of egg white and blood serum.

In 1898, the year he married, Hopkins was invited to Cambridge as lecturer in 'chemical physiology', as the young science of biochemistry was often called. Here in Cambridge he was to spend the remainder of his career, becoming Professor of Biochemistry in 1914, corresponding with the opening of a fine new building for the department. In 1921 the department moved again into the Dunn Institute of Biochemistry, endowed by the trustees of Sir William Dunn. Hopkins remained head of the department until his retirement in 1943, although he continued to visit the department as long as he was physically able.

One of his early classical studies was carried out with Walter Mosley Fisher, later the first secretary of the Medical Research Council. This was on lactic acid accumulation in muscle contraction which, at a certain concentration inhibits the muscle's action.

In 1906, Hopkins published the results of an important series of experiments. Rats fed on a diet of carbohydrates, fat and protein in their crude form maintained their growth and health. However, when fed on these substances in a highly purified state, their growth ceased, but was restored when a minute amount of milk was added to the diet. This was found to be caused by the casein in the milk. When this was substituted by zein, the protein in maize, most of the animals died, whereas if tryptophan (the amino acid isolated by Hopkins and Sydney Cole during their research on tryptic digestion of protein) was added, the survival rate greatly improved.

These studies led to the feeding experiments of Osborne and Mendel and of McCollum in the USA, which went on to show that a group of amino acids were 'essential', and were not able to be synthesized by the body, in contrast to the non-essential amino acids.

The award of the Nobel Prize for Medicine in 1929 to Hopkins and to Eijkman recognized the importance of these fundamental studies. (Christian Eijkman, director of the research laboratory at Batavia in the Dutch East Indies, had shown, in the 1890s, that a peripheral neuritis in fowls, which closely resembled beri-beri, could be produced by feeding them on a diet exclusively of polished rice. Rice hulks are a rich source of the B vitamins.) Hopkins' work can be summed up as the exploration of the chemistry of intermediate metabolism. He established biochemistry as a discipline concerned with the chemistry of living processes and not just with defining its fuels and their end products.

Hopkins received many honours in addition to his becoming a Nobel Laureate. He was elected Fellow of the Royal Society in 1905 (served as its President from 1930–5), he was knighted in 1925 and was appointed to the Order of Merit in 1935. Sadly, in his last few years he suffered increasing disability, including loss of his eyesight, although he continued to visit the department with the help of his old colleagues. He died at his home in 1947. **BJHM**

Conflict of interest: none.