

Independent 26-Apr-2003

Professor Sir Bernard Katz

Biophysicist who arrived in England with £4 and went on to win a Nobel Prize

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Bernard Katz, biophysicist: born Leipzig, Germany 26 March 1911; Henry Head Fellow of the Royal Society and Assistant Director of Research, Biophysics Research Unit, University College London 1946-50, Reader in Physiology 1950-51, Head of the Biophysics Department 1952-78, Professor 1952-78 (Emeritus), Honorary Research Fellow 1978-2003; FRS 1952; Kt 1969; Nobel Prize in Physiology and Medicine (jointly with Ulf von Euler and Julius Axelrod) 1970; married 1945 Marguerite Penly (died 1999; two sons); died London 20 April 2003.

Bernard Katz was an icon of post-war biophysics. He was one of the last of the generation of distinguished physiologists who were refugees from the Third Reich and who contributed immeasurably to the scientific reputation of their adopted country. In 1970 he won the Nobel Prize in Physiology or Medicine.

He was born and brought up in Leipzig, though he was never a German citizen. His father, Max, was a fur merchant who had left Russia in 1904, and met his wife, Eugenie Rabinowitz, who was of Polish origin, in Germany. Until he was six, Katz was a citizen of Tsarist Russia, but then, because of the Russian Revolution, became stateless, and remained so until he was 30 when he became a naturalised British citizen.

In Leipzig, Katz was brought up in what he himself described as a "completely 'unorthodox' and liberal way", but nevertheless had his first experience of being an alien Jew in 1920, at the age of nine, when he was refused entrance to the Schiller Real-Gymnasium, and consequently had a classical education at the König Albert Gymnasium. There he chose to learn Latin and Greek rather than the more mathematical option

(because, he said, it gave him more time to play chess in the cafés of Leipzig), though he acquired a good level of mathematics anyway.

Despite his love of chess, and despite increasingly menacing anti-Semitic experiences, he did well at school and went to the University of Leipzig in 1929 to study medicine. After his preclinical exams he combined part-time physiological research (under Martin Gildermeister) with his undergraduate work, and for this work he was awarded the Siegfried Garten prize. This was in 1933, the year Hitler came to power, and Gildermeister was forced to announce publicly that the prize could not be given to a "non-Aryan" student, though he later gave Katz the prize money in private. At some risk, Katz decided to complete his medical degree in Leipzig, but not long after graduating he set off for England, carrying his League of Nations stateless-persons pass, a letter of recommendation from Martin Gildermeister and £4.

His destination was the laboratory of A.V. Hill at University College London. Hill was a remarkable man, not only a great scientist (he had received the Nobel prize, with Otto Meyerhof, in 1922), but also a statesman who took a large role in helping refugees in the pre-war period. Katz described these first years in Hill's lab, between 1935 and 1939, as "the most inspiring period of my life", and said, "Hill's personality had a profound influence on me." Shortly after getting his PhD, and a month before the start of the Second World War, he left UCL for Australia, where he worked with John Eccles, another renowned physiologist of the time.

Katz remained in Australia from 1939 to 1945, and in 1941 became a naturalised British citizen, so obtaining his first real passport. Soon after, he enlisted with the Royal Australian Air Force, and served as a radar officer in New Guinea. Later he met Marguerite Penly, known as Rita, who, incidentally, was not Jewish. They were married straight after the war. A month after the wedding he got a telegram from A.V. Hill inviting him to return to UCL as Henry Head Fellow of the Royal Society and assistant director of research in biophysics. In 1952 he succeeded Hill as Professor of Biophysics at UCL, and he headed a department of outstanding distinction until 1978.

His work at UCL was concerned largely with the way in which a nerve impulse is transmitted from a nerve fibre to a muscle fibre, as occurs each time the brain "tells" a muscle to contract. The work of Henry Dale and others had led to acceptance of the idea of "chemical communication". This means that there is not a direct connection between the nerve fibre and the muscle fibre, but when a nerve impulse reaches the end of a nerve it releases a chemical, acetylcholine, which diffuses across the very narrow gap between the nerve ending and the muscle fibre, and combines with protein molecules (receptors) in the muscle-fibre membrane.

Katz, with Paul Fatt, established that these receptors, when stimulated by acetylcholine, open "aqueous pores" in the muscle membrane that allow an electrical current (carried by sodium and other ions) to flow into the cell. It is this current that eventually causes the muscle to contract. The receptor proteins of this sort, which were later to be called "ion channels", are the basis of all nervous activity and of much else besides. Together with

Ricardo Miledi and others, Katz established that acetylcholine is not released in a continuous stream, but comes in small packets (quanta), each of which produces a very brief signal in the muscle fibre.

His last major works, published in the 1970s, gave the first insight into how a single ion channel behaved, and paved the way for Bert Sakmann, who was at UCL with Katz in the early 1970s, to record from one single channel – work, done with Erwin Neher, that also got a Nobel Prize in 1991.

At UCL all the important features of synaptic transmission were established, and subsequently many of these principles have been found to be true in the brain too. The influence of his work is inestimable, not only in physiology, but also in pharmacology, in which he (and his fellow refugee at UCL Heinz Schild) laid down some of the most important fundamental principles. He was rewarded, among many other honours, by election to the Royal Society in 1952 and, 18 years later, by the Nobel Prize, jointly with Ulf von Euler (of Sweden) and Julius Axelrod (of the United States), "for their discoveries concerning the humoral transmitters in the nerve terminals and the mechanism for their storage, release and inactivation".

Surprisingly, BK – as he was known among his scientific colleagues – himself supervised only five* PhD students, Paul Fatt, John Nichols, Liam Burke, Bob Martin and Donald Jenkinson, all of whom went on to do eminent work. But his department became a Mecca for postdoctoral students from all over the world. His influence on the training of a large number of the world's greatest scientists was huge. Although his seriousness could make him appear forbidding, and presenting to him the first draft of a paper could be a "baptism of fire", it was the universal experience of his colleagues that he was a person with enormous enthusiasm, always willing to discuss with the most junior of them the details of their work and to offer advice. There can be few in the field of synaptic transmission and ion channels who have not benefited from his wisdom.

Although Katz spoke little English when he first arrived at UCL, his writing style was exemplary, and he was able and willing to correct the execrable style adopted by some native speakers of English. His prose was simple, straightforward and unpretentious, yet his papers show astonishing prescience. He had an uncanny knack for picking the important part of a problem, and to leave the rest of us dotting "i"s and crossing "t"s. Every new entrant into the field should read his work from beginning to end.

David Colquhoun

**Correction to printed version*