Biography

Edgar Douglas Adrian was born on November 30, 1889, in London. He was the second son of Alfred Douglas Adrian, C.B., K.C., legal adviser to the British Local Government Board. Adrian went to school at Westminster School, London, and in 1908 he went to Trinity College, Cambridge, at which College he had won a Scholarship in Science. At Cambridge University he studied physiology and the other subjects of the Natural Sciences Tripos and in 1911 he took his B.A. degree with first classes in five separate subjects.

In 1913 he was elected to a Fellowship of Trinity College on account of his investigation of the «all or none» principle in nerve. He then studied medicine, doing his clinical work at St. Bartholomew's Hospital, London, and taking his medical degree in 1915. After working for a time on clinical neurology, he returned to Cambridge in 1919, to lecture on the nervous system. He was made Fellow of the Royal Society in 1923. In 1925 he began investigating the sense organs by electrical methods.

In 1929 he was elected Foulerton Professor of the Royal Society. In 1937 he succeeded Sir Joseph Barcroft as Professor of Physiology at the University of Cambridge, a post which he held until 1951.

In 1951 Adrian was elected Master of Trinity College, Cambridge, a post which he still, at the time of writing, holds.

When Adrian graduated at Cambridge, the Department of Physiology there included several distinguished research workers. Among them were J. N. Langley (1852-1925), who had succeeded Sir Michael Foster (1836-1907), W. H. Gaskeh (1847-1914), Sir Hugh K. Anderson (1865-1928), Sir Walter Morley Fletcher (1873-1933), Sir Joseph Barcroft (1872-1947), Keith Lucas (1879-1916) and Archibald Vivian Hill (b. 1886) who was then beginning his work on heat production in muscle. Sir Frederick Gowland Hopkins (1861-1947) was then doing his pioneer work on the vitamins.

Adrian's first research work was done with Keith Lucas, who was working on the impulses transmitted by motor nerves; he showed that, when a muscle fibre contracts, the passage of the nerve impulse that causes the contractions leaves the motor nerve in a state of diminished excitability. Keith Lucas was, at the time of the First World War, thinking of improving the study of the electrical currents in nerves by amplifying them by means of valves, a method which Adrian was later to employ.

First, however, Adrian went to London to take his medical degree and was, until the end

of the First World War occupied with work on military patients suffering from nerve injuries or nervous disorders. Returning to Cambridge in 1919 to take over Keith Lucas's laboratory, he began the work with which his name will always be associated. In order to obtain a more sensitive detection of nerve impulses, he used the cathode ray tube, the capillary electrometer and amplification of the electrical impulses by means of thermionic valves, and was thus able to amplify them 5,000 times. He succeeded in setting up a preparation consisting of a single end organ in a muscle of the frog, together with the single nerve fibre related to it and he found that, when the end organ is stimulated, the nerve fibre showed regular impulses with a variable frequency.

With this apparatus he was able to record the electrical discharges in single nerve fibres which were produced by tension on the muscle, pressure on it, touch, the movement of a hair and pricking with a needle. By 1928 he was able to publish his conclusion that a stimulus of constant intensity applied to the skin, immediately excites the end organ, but that this excitation progressively decreases for as long as the stimulation continues. At the same time sensory impulses of constant intensity pass along the nerve from the end organ. These sensory impulses are at first very frequent, but their frequency gradually decreases and as they decrease the sensation in the brain progressively diminishes. As A. V. Hill (The Ethical Dilemma of Science, 1960) has said, Adrian, by thus showing that the afferent effect in a given neurone depends on the pattern in time of the impulses travelling in it, has provided a new quantitative basis of nervous behaviour.

Later Adrian extended his investigations to a study of the electrical impulses caused by stimuli likely to cause pain, he concluded that, as Sir Henry Head had postulated as a result of his clinical studies, the nerve fibres which conduct impulses excited by pain probably do not pass further into the brain than the optic thalamus, but that all other sensory impulses can be distinguished in the sensory area of the cortex of the brain and he showed that the part of the cerebral cortex devoted to any particular kind of end organ is related to the special needs of the animal concerned. Thus in man and the monkey the sensory area of the cerebral cortex devoted to the face and hand is relatively large, and relatively little is given to the trunk of the body. In the pony the area devoted to the nostrils is as large as that devoted to the rest of the body; in the pig almost the whole of the sensory area of the cerebral cortex devoted to the sense of touch is given to fibres from the snout, which the pig uses to explore its environment.

Subsequently, Adrian studied the sense of smell and the electrical activity of the brain and the variations and abnormalities of waves shown in the encephalogram, which Hans Berger, of Jena, had described in 1929. This work opened up new fields of investigation in the study of epilepsy and other lesions of the brain.

For his work about the functions of neurones Adrian was awarded, jointly with Sir Charles Sherrington, the Nobel Prize for 1932.

The results of Adrian's brilliant researches on the electrophysiology of the brain and nervous system were published in numerous scientific papers and in his three books, *The Basis of Sensation* (1927), *The Mechanism of Nervous Action* (1932) and *The Physical*

Basis of Perception (1947). With others he wrote *Factors Determining Human Behaviour* (1937).

Adrian had numerous honours bestowed upon him. During 1950-1955 he was President of the Royal Society, and during 1960-1962 of the Royal Society of Medicine. In 1954, he was President of the British Association for the Advancement of Science. He is Chevalier of the French Legion of Honour and a trustee of the Rockefeller Institute. He holds honorary degrees, memberships, and fellowships of numerous universities and other learned bodies. He was knighted Baron of Cambridge in 1955.

A man of tireless energy and continuous industry, Adrian has, throughout his busy life, and as a Member of the Medical Research Council and many other scientific advisory bodies, exerted great influence, not only on his pupils and collaborators, but also on the development of physiological research and the sciences in general.

To the citizens of Cambridge he has long been familiar as a lean, small figure, dominated by the forward thrust of the nose and chin and the set expression of purpose, as he threads his way at high speed on a bicycle through the crowded streets of the city. An expert fencer, he is also an enthusiastic mountaineer, a recreation which he shares with Lady Adrian, who is a Justice of the Peace and does much social work in the City. Among Lord Adrian's other recreations are sailing and his great interest in the arts. A superb after-dinner speaker, all his lectures and speeches have been the result of very careful preparation.

In 1923 Adrian married Hester Agnes Pinsent, daughter of the late Hume Pinsent of Birmingham, England, and a descendant of the philosoper David Hume. They have one son and two daughters.

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Edgar Adrian died on August 8, 1977.