available information indicates a variety of nutrients the presence of which goes far to explain many of the early claims. True, the albumoses and allied compounds, constituting about 14 per cent of the material, although supplying first-class protein, are of small quantitative significance in the diet. But the meat bases, creatine, creatinine, carnosine, anserine, purines, glutathiones and others, which together account for nearly 30 per cent of the total, are known to stimulate the flow of gastric secretions, to effect muscle metabolism, and to spare proteins from the task of supplying creatine.

It is, however, the vitamins of the B complex in meat extract that are of especial interest and importance.

VITAMIN-B COMPLEX IN FRESH BEEF AND BEEF EXTRACT (EXPRESSED AS μGM. PER GRAM)

	Beef	Beef extract
Vitamin B_1	0·9–3·0	0–1
Vitamin B_2	1·8–3·5	30–35
Nicotinic acid	24–102	1000–1200
Pyridoxine	0·77–4·0	5
Pantothenic acid	4·9–15	25
Choline	760	?
Biotin	0·02–0·03	?
Folic Acid	1·0	?
Inositol	115	?

It will be seen that the concentration of many, although not all, of these essential nutrients is high. A few grams of meat extract per day will supply no inconsiderable part of the daily requirements of the B complex. For example, a third or more of the nicotinic acid requirement is contained in 3–4 gm. of meat extract. This, coupled with the fact that nicotinic acid is now known to be concerned with stamina and mental alertness, provides a further instance in vindication of early claims. Finally, the close relation between the B vitamins and a healthy blood picture no doubt explains why meat extract has long been regarded as 'good for the blood'.

A short but interesting discussion followed, the most notable part of which centred on the vitamin-C content of walnuts. The chairman, Mr. A. L. Bacharach, asked Dr. Melville whether the vitamin-C content of walnuts increased significantly during germination, and if so, whether the shell, which Dr. Melville had envisaged as built up from vitamin-C-like molecules, might, in its immature stages, be the source of the vitamin C. In reply, Dr. Melville said that no work on germination had yet been carried out, but the suggestion would be borne in mind.

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OBITUARIES

Prof. W. B. Cannon, For.Mem.R.S.

By the death on October 2, 1945, of Walter Bradford Cannon, the United States and the world lost one who, for a whole generation, had been recognized as a great leader in his own chosen scientific field of physiology. Cannon was born on October 19, 1871 at Prairie du Chien, Wis., and received his schooling at Milwaukee and St. Paul, Minn. Entering Harvard in 1892, he remained with that University and its Medical School until his retirement in 1942 from the chair of physiology, to which he had been appointed in 1906; so that his association with Harvard, as student, graduate, instructor and professor, extended over just half a century.

One of Cannon's most practically fruitful discoveries, and the one from which he could trace, in logical sequence, the development of his later interest in other fields of research, was made when he was still a young graduate, beginning research in the Department of H. P. Bowditch, through whom Cannon could claim to be a 'scientific grandson' of Carl Ludwig. Röntgen's discovery of X-rays was a novelty, and Cannon was interested in using them to render visible, on a fluorescent screen, the passage of a metal ball down the œsophagus of a goose. The idea of mixing with food an insoluble bismuth salt, opaque to X-rays, presented itself to Cannon. With this technique he was able to follow the progress of a meal and its products through the alimentary canal of the normal cat; and thus he not only provided invaluable data for the normal physiology of digestion and absorption, but also furnished to medicine and surgery the principle of one of the most powerful items of modern diagnostic equipment.

In these studies on the visceral movements of a normal, un-narcotized cat, Cannon was early struck by the effects on them, and particularly the immediately depressant, inhibitory effect, of emotional excitement—reactions to sudden noises, or to any cause of fright or anger. These observations, in connexion with evidence then coming from other research centres, led Cannon to enter upon a long and fruitful series of researches on the sympathetic nerves and the control by them of the output of adrenaline from the suprarenal medulla, and on the physiological significance of a sudden output of adrenaline into the circulation, as providing favourable physiological conditions for effective flight or combat. The general outcome of this series was summarized by Cannon, for a circle wider than that of the specialists, in a book, now well known, on "Bodily Changes in Pain, Hunger, Fear and Rage".

Through these studies of the physiological concomitants of emotional reactions, Cannon became interested, as Claude Bernard had been before him, in the accuracy with which the mechanisms of adjustment at the disposal of the living body keep such physiological factors as the content of sugar and the alkalinity of the blood at constant average levels, restoring them rapidly thereto after functional fluctuations. Out of such further studies grew another book, of even wider appeal and more broadly philosophical outlook, entitled "The Wisdom of the Body".

In May 1917 Cannon was a member of the Harvard Hospital Unit which arrived, in advance of the American Army, to play its part in the War in France. After working at a casualty clearing station at Bethune, and gaining direct experience of the physiological factors involved in wound shock, he came to England in November of that year, and engaged, in collaboration with the late Sir William Bayliss, in laboratory experiments arising from his observations in the field. Out of this collaborative experience, together with the exchanges and discussions across the table of a Committee on Wound-Shock then sitting in London, came another book by Cannon. Whatever may be the permanence of results thus snatched to meet war's urgent demands, the experience gained, as Cannon himself was later to claim, helped to re-open an attack on such problems when a second world war made its new demand.

Through his studies on sympathetic and adrenal adjustments of bodily function, Cannon was led to his last main series of researches, dealing with the transmission of nervous effects by chemical agents. Observations of the transmission by the blood, to a denervated heart, of effects produced by stimulation of distant sympathetic nerves, would seem to have led him to the verge of a discovery which O. Loewi was to make, just at this juncture, by a simpler and direct method. In Cannon's remaining active years he was largely concerned with evidence as to the nature of the sympathetic transmitter 'sympathin', which he believed to be not identical with adrenaline.

No mere account of Cannon's varied and uninterrupted contribution to the growth of physiological knowledge, over all these years, can give any adequate idea of the man, or of his stimulating influence on scientific research in his own country and widely beyond it. His character was drawn on large and simple lines; he was capable of deep and loyal friendships, and readily moved to sympathy and indignation by suffering and injustice. He was a man of sensitive conscience, full of the traditions and the ideals of his native land. He has himself attributed high importance to physical health as a factor of success in an investigator; and in his youth he must have had great strength and endurance. From middle life onwards, however, his health was marred by various allergies, and eventually by a slowly malignant condition, which he suspected to be an after-result of his early experiments with X-rays, in the days before the potential dangers of these were known. His work, however, seemed to be little affected by conditions which must greatly have interfered with his bodily ease and broken his rest.

Cannon was early married to Cornelia James, who had been his schoolfellow. Apart from her own literary activities and social work, Mrs. Cannon shared intimately in her husband's interests, and their household, with a son and four daughters, was radiant with affection and quiet happiness. Cannon's last book, "The Way of an Investigator", is a delightfully discursive talk on the life of research and on the genesis of scientific discovery. It has an autobiographical basis, and an intimate and ingenuous quality which allows a friend almost to hear the tone of Cannon's voice as he reads.

H. H. D.

Mr. J. L. Baird

JOHN LODIE BAIRD, a pioneer of television, died on June 14, at the age of fifty-eight, after an illness which began in February, up to which time he had been actively engaged in research in various problems in television in the laboratories of his own company.

Baird was the son of a Scottish minister and received his scientific education at the Royal Technical College, Glasgow, where he won an associate scholarship in electrical engineering. Experimental research had always been his hobby, and in the early days of his training he devised an improved pattern of selenium cell, which led him to develop a crude form of television.

When Baird was compelled by ill-health to abandon an active business career, he devoted himself exclusively to a study of the problem of television. He became a pioneer in this field in the early days of sound broadcasting, and was undoubtedly responsible for initiating public interest in this art.

The basic problem of television, as it was correctly appreciated by Baird, consists in the provision of means for scanning an image by subdividing it into tiny elements, transforming the resulting light variations into electrical impulses for transmission by line or radio to the receiver, where the impulses are reconverted back into light for the reconstruction of the picture. Some means for synchronizing the transmitter and receiver must also be provided. For the scanning process, Baird first used a revolving disk carrying a series of suitably placed lenses, and a synchronously driven disk at the receiving end. Very intense illumination was required on the subject to be televized, while the variation in the illumination obtained from a neon lamp was used to reproduce the picture at the receiving end. Working on these lines, Baird gave a demonstration of television on January 27, 1926; this was claimed to be the first demonstration of true television ever witnessed. The original apparatus was afterwards exhibited in the Science Museum at South Kensington.

In the following years, many details of the system were improved and are described in a series of patent specifications. These covered such items as the means of illumination of the subject and even of the use of infra-red radiation to reduce the glare, which the subject found to be unpleasant; accurate methods of synchronizing transmitter and receiver; and an increase in the rapidity of scanning with a corresponding improvement in the definition of the reproduced pictures. Baird's demonstrations of the possibilities of television by radio led to the successful transmission of television across the Atlantic in February 1928, followed a few weeks later by experiments on board s.s. *Berengaria* while the receiving equipment was being brought back from New York.

The first step towards the inauguration of a television service in Great Britain was taken in 1929, when the B.B.C. decided to give Messrs. Baird Television, Ltd., facilities for experimental transmissions through the medium-wave London station. These transmissions, which were afterwards referred to as 'low-definition', employed 30 scanning lines and 12½ pictures per second, the programmes originating in the Baird studios in Long Acre, London. After about a year, these 30-line transmissions were considered to be of sufficient technical interest for the B.B.C. to equip a studio in Broadcasting House with Baird apparatus; and this was put into use in 1932. At this time the development of improved standards of definition was progressing rapidly, and several organisations were experimenting with systems using 120 lines.

In May 1934, the Postmaster-General appointed a committee to report on the relative merits of the several systems of 'high-definition' television, and to consider the conditions under which a public service might be provided using ultra-short waves to accommodate the large band-width necessary for the transmission of such systems. Among the Committee's recommendations was one to the effect that the first station should be in London, and that the two selected systems, Baird and Marconi–E.M.I., should each supply their own apparatus for alternative operation; the cost being borne by the revenue from the existing licence fee. Accordingly, towards the end of 1936, a public service was opened from Alexandra Palace, the two systems of transmission being used in alternate weeks. The Baird system provided 240 lines, 25 pictures per second with sequential scanning; whereas the Marconi–E.M.I. system used 405 lines, and 25 pictures per second with interlaced scanning. After a few months' experience, the Television Advisory Committee recommended that the experimental period should be terminated, and that the standards to be adopted for the London station should be those provided by