are the storage batteries in which this takes place. Just as in the motor-car, the recharging of these batteries is probably done by a reaction coupled to the main energy-yielding processes.

With this rather crude analogy in mind, let us examine two striking properties of the enzymic reduction of 'onium' salts which organisms may find useful. One is the ionic changes which result, and the other is the extraordinary speed of the reactions. When the quaternary ammonium compounds are converted into tertiary bases, or when sulphonium salts are similarly involved, one starts with a highly ionized but neutral salt, and ends with a weak tertiary base, which at physiological pH's is practically non-ionized. This fact arises from the strongly basic properties of quaternary ammonium bases, which are of the same order of basicity as is sodium hydroxide. Simultaneously with the obliteration of this ion, a hydrogen ion appears. The formation of acid, that is, a hydrogen ion, has, in fact, been used to measure both thiaminase¹⁶ and diphosphopyridine nucleotidase¹⁷. Lorente¹⁸ has recently remarked about similar ionic changes.

In the reduction of either thiamine or diphosphopyridine nucleotide, a relatively large organic ion disappears, and is replaced by a small hydrogen ion. Thus, not only is pH-control influenced, but also a more readily diffusible ion (the hydrogen ion) is suddenly formed.

The remarkable speed of the reduction of 'onium' salts warrants comment. Thus, the thiaminase of carp viscera will destroy all the added thiamine (provided the naturally occurring acceptor amines are in excess) in about five minutes^{6,7}. The diphosphopyridine nucleotidase of brain is said to destroy an amount of cozymase equal to the dry weight of the brain in an hour¹⁷. While these great activities could be said to result from an extraordinarily large concentration of the respective enzymes in the tissues, the fractionations which have been carried out show that this is probably not the case. Hence we must conclude that the enzymes act with great speed.

In physiology, at least two processes are known to be associated both with remarkable speed and with the shift of ions. These are the propagation of nerve impulses and the contraction of muscles. Thus, the action potential is associated with, and may even be said to result from, the migration of potassium and sodium ions. The contraction of muscles depends on the migration of calcium and magnesium ions to the contractile substances¹⁹. One pictures these essential ionic changes as being caused by diffusion. However, recent work²⁰ has shown that diffusion based on osmotic differentials is much too slow to account for the observed speed of neural and muscular action. It is possible that the disappearance of the organic ion and the generation, on the spot, of the more readily diffusible hydrogen ion, might contribute to the real mechanism. The extraordinarily high speed of the reductions of 'onium' salts would be compatible with such an involvement. Furthermore, the prominent occurrence of 'onium' salts such as acetylcholine, thiamine, and diphosphopyridine nucleotide in nerves, and of carnitine in muscles is suggestive. Creatine, the role of which in muscular contraction has long been ascribed to creatine phosphate, might assume a second role, because, as we have seen, it is synthesized in muscle by an enzyme which acts on the 'active' methionine, a sulphonium salt, with concomitant ionic changes.

There is no real proof that these enzymic processes have anything to do with nerve transmission or muscular contraction. Even if the reduction of 'onium' salts should be found to be of importance in these processes, the actual compounds may be different from those discussed here. Nevertheless, enough circumstantial evidence is at hand to warrant further study.

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OBITUARIES

Prof. T. C. Hodson

THOMAS CALLAN HODSON, who died at his home in Tisbury, Wiltshire, on January 26, aged eighty-one, was born at Hornsey, Middlesex, in December 1871. He was the son of Arthur Hodson, R.N., and Mary Catherine Hodson *née* Callan. The eldest of six children, he went to school at Christ's Hospital, where he became a Grecian, and left in 1890 to go to Queen's College, Oxford, with an Eglesfield scholarship. He took no degree at Oxford, but he competed successfully in 1893 for the Indian Civil Service and in 1894 went via Bengal to Assam. He served in the Khasia and Jaintia Hills, and was for some time personal assistant to the Chief Commissioner of Assam, Sir Henry Cotton. He served later on in the Manipur State, where he was president of the Durbar, but retired from the Service in 1901. He was registrar of East London (now Queen Mary) College during 1903-14; from 1914 until 1920 he served with the British Forces in France, and by 1919 had risen to the rank of colonel, and his services were mentioned in dispatches. During 1921-23 he was principal of Hornsey Rise Training College, and after that he lectured on anthropology in Oxford, London, Cambridge and Michigan, ultimately succeeding Dr. A. C. Haddon as reader in ethnology in Cambridge in 1926.

In 1932 the William Wyse chair of social anthropology was created in Cambridge, and Hodson was the first professor to hold it. He was elected to a

professorial fellowship at St. Catharine's College, where he became a resident fellow and shared with no little satisfaction to himself and to his colleagues in the corporate life of the College. He had been secretary of the Royal Anthropological Institute during 1912-14, and he was later an associate editor of the "Encyclopædia Britannica" (14th edition). He held the Silver Medal of the Royal Society of Arts.

As an anthropologist, Hodson was particularly interested in the linguistic side of his subject, and his first publication was a grammar of the Thado Kuki language (1906). His knowledge of Manipur and the Manipuris enabled him in 1908 to contribute a monograph on "The Meithei" to the Assam Government's tribal series, which he followed with "The Naga Tribes of Manipur" in 1911. His lectures at the London School of Oriental Studies, delivered in 1922, were published by the Forlong Fund as "The Primitive Culture of India".

Hodson was endowed with intense industry and an unquenchable activity and persistence. As holder of the chair in Cambridge, he set himself unequivocally to popularize the Tripos of Archaeology and Anthropology, and succeeded so well that when he retired in 1937 the numbers had gone up from about a dozen to quite four times that number. But it is on account of his own personality that he will be best remembered: decidedly irascible, very intolerant of control or of opposition, he never forgot a kindness shown to him, and all those who followed his varied and rather stormy vicissitudes combined in admiration of his tenacity and fortitude in what were often very difficult circumstances.

In his family life Hodson was extremely happy. His wife and children were as devoted to him as he was to them, and the successes of his children more than made up for the disappointments of the earlier part of his career.

J. H. HUTTON

Dr. H. G. Reeves

HARRY GORDON REEVES, senior lecturer in biochemistry in the Medical College of St. Bartholomew's

Hospital, London, died on November 22 at the age of fifty-eight, following a recurrence of the severe bronchitis which had caused him considerable discomfort and ill-health in recent winters.

Dr. Reeves's professional career can be divided into two distinct parts. He took his B.Sc. degree with honours in chemistry in 1920 at Birmingham, where he also took the degrees of M.Sc. (1921) and Ph.D. (1924). In the latter year he became a demonstrator in the Physiology Department at King's College, London, and in 1928 he took his D.Sc. degree and became a demonstrator in the Physiology Department at St. Bartholomew's Hospital, a post which entailed heavy and varied teaching duties. Thus Reeves had few further opportunities for doing research; but on the other hand, he acquired a knowledge of all branches of physiology which was to stand him in good stead during his career as a teacher of biochemistry. He made useful contributions to our knowledge of the metabolism of dihydroxyacetone in muscle and other tissues, but it is by his teaching that Gordon Reeves will be remembered.

It was during the second phase of his service at 'Barts', starting in 1936 with his transference to the newly created Department of Biochemistry and Chemistry, that Reeves grew to full stature as a university teacher. Promotion came fairly rapidly. After a short period as demonstrator, he became lecturer and then senior lecturer in biochemistry—a well-deserved recognition of the good work he did during the war-time housing of the Preclinical School at Cambridge and the subsequent period of rehabilitation and expansion in Charterhouse Square.

As a teacher of the fundamentals of biochemistry in relation to medicine, Reeves was first-rate. There is surely a place in academic life for senior teachers of his type, and fortunate is the head of any large department who can call at any time on the services of such a versatile, capable and loyal colleague. Many hundreds of students who have passed through the Preclinical School at 'Barts' have good reason to be grateful to him. His colleagues are the poorer by the loss of a cheerful and ever-willing beloved friend.

A. WORMALL

NEWS and VIEWS

Scientific Research and the Ministry of Supply:

Sir Harry Garner, K.B.E., C.B.

AFTER thirty-six years of government service, Sir Harry Garner retires on February 21 from his post as chief scientist of the Ministry of Supply, and will be succeeded by Dr. O. H. Wansbrough-Jones. Sir Harry had intended to become an astronomer; but in 1917 the demolishing of his office during an air-raid necessitated his transfer from the Royal Naval Air Service to the Royal Aircraft Factory (now Establishment), and it was there that, by virtue of his mathematical ability, he became known throughout the aeronautical world for his work on the 'Bristol' fighter aeroplane, in which he made the first measurements ever to be taken in flight on the aerodynamic rotary derivatives of an aircraft. He was the first to develop the fundamental techniques for testing sea-planes and flying-boats and of the hydrodynamics of hull design, and he has always been, and still is, a firm believer in the future of the flying-boat. In 1952 he gave the Wilbur Wright Lecture to the Royal Aeronautical Society, his

subject being "Prophecy and Achievement in Aeronautics". Sir Harry has been in turn the chief technical officer of the Marine Experimental Establishment, the Aeroplane and Armament Experimental Establishment and the Airborne Forces Experimental Establishment. In 1942 he was made deputy director of scientific research in the Ministry of Aircraft Production, later becoming principal director of scientific research (air) in the Ministry of Supply, and in 1949 he succeeded Sir Ben Lockspeiser as chief scientist. In this last office he has successfully tackled the difficult problem of building up the scientific staff of the Ministry of Supply, despite the severe shortage of scientific workers, and, though pressed to deploy more effort on applied problems, he has insisted that a proper proportion of the staff should continue to tackle fundamental research problems. He has played a leading part in the extension of the scheme for making promotions to the higher grades in the Ministry solely on the scientific merit of a person's work, and he also introduced a scheme whereby university staff are