pancreatic, anterior pituitary and adrenal hormones which regulate it. Dietary factors can affect the functional activity of the anterior pituitary and possibly of the adrenal cortex, and can also alter the sensitivity to insulin.

The foregoing evidence suggests that nutritional conditions are chiefly concerned in bringing about the observed peculiarities in intermediary metabolism and hormonal balance in ruminants. In conclusion, Mr. Garner suggested that the low blood-sugar level may be an adaptation of physiological importance in conserving carbohydrate for essential purposes.

A. G. Singleton

Balch, C. C., *Brit. J. Nutrit.*, **4**, 361 (1951).

OBITUARIES

Mr. R. Burne, F.R.S.

By the death of Richard Burne, British zoology has lost far more than the maker of minutely perfect dissections and the writer of accurate and beautifully illustrated descriptions of animal structures, whose working life was spent among John Hunter's specimens in the Royal College of Surgeons. Burne was a shy, quiet man, who avoided publicity and, probably owing to a slight stammer, rarely read papers before scientific societies or delivered lectures to students. Few really knew him well, and still fewer were in a position to appreciate his outstanding abilities as a comparative anatomist. It was not until he was in his sixtieth year that he was elected a Fellow of the Royal Society.

Burne carried the art of self-effacement to almost extreme lengths. He was always ready to credit to others the work that, as a matter of fact, he had himself accomplished. He worked in Lincoln's Inn Fields just as William Clift, more than a century before him, had done : a man whose whole purpose was the perpetuation of John Hunter's ideals as they were exemplified in his Museum. Like Clift, he had no care as to who was given the credit so long as the work was done. Burne also found a likeness to Clift in that he was at heart a Londoner who loved to seek out odd corners and old associations around Lincoln's Inn Fields and the Inns of Court. Probably some of his happiest times were spent when, in the genial company of his fellow comparative anatomist, Frederick Gymer Parsons, he wandered about the Inns of Court when the day's work was done and all was quiet in the deserted streets around the precincts of the Temple. An eminent zoologist he most certainly was ; but beyond that, all those who knew him best will always remember that he was a gentle and a generous man in whom no thought of self-interest ever intruded in the work to which he devoted his life.

Richard Higgins Burne, the son of a solicitor, was born in London on April 5, 1868. He was educated at Winchester and proceeded to Oriel College, Oxford, where he graduated in natural science in 1889. For two years after leaving Oxford he worked at the Royal College of Science in South Kensington and here came under the influence of that gifted teacher Thomas George Bond Howes, who was then assistant professor of zoology and succeeded Huxley in the professorship in 1895. In 1892, Burne was appointed as anatomical assistant at the Royal College of Surgeons and started his long and faithful service to the Museum that only terminated with his retirement in 1934. Charles Stewart was conservator when Burne joined the staff, and after his death in 1907 there began the long and happy association with Sir Arthur Keith that lasted for the next twenty-three years. In 1908, Burne's office was changed to that of assistant curator and in 1912 to physiological curator.

It is impossible to over-estimate the value of Burne's work in the service of the Hunterian Museum, and had it not been for his carefully compiled descriptive catalogues of the specimens, it would have been impossible to face the task of reconstruction after the terrible losses by enemy action in 1941. The Gold Medal of the College was awarded to him in 1925 and never was it better bestowed.

Among Burne's most important published works are probably those dealing with the minute ramifications of the vascular system of certain fishes. Moreover, these papers are the most characteristic, since they are founded on the minutely perfect dissections in the preparation of which he developed such extraordinary skill. A handbook of his dissections of the Cetacea, edited by Dr. F. C. Fraser, was issued by the British Museum last year. But Burne's real life-work is embodied in the catalogues of the Hunterian Museum and in the collection of unpublished notes and drawings preserved in the College. In 1937, he was appointed a Hunterian Trustee, and until his death his advice and his vast knowledge of the contents of the Museum were invaluable during the critical years of the Second World War and after the disaster that swept away so much of his life's work.

F. Wood Jones

Prof. L. Prandtl, For.Mem.R.S.

The death of Ludwig Prandtl on August 15 at Göttingen has taken from the aeronautical world one of its greatest pioneers, perhaps the greatest of them all in the field of theoretical aerodynamics. He was seventy-seven years of age, having been born in 1875. He was educated as an engineer. He occupied several teaching posts before going to Göttingen in 1907, where he spent the rest of his life and inaugurated a school of aerodynamics and hydrodynamics which soon became famous throughout the world. While he will be remembered chiefly for his theoretical work, he was also a brilliant experimentalist, and he set up at Göttingen a comprehensive aeronautical laboratory which contained the first really successful return-flow wind tunnel. Prandtl had appreciated the two essential features for steady flow in such a tunnel, namely, a fine-mesh honeycomb and a rapid contraction just ahead of the working section. In this tunnel he experimented with airship models at a time when the Germans believed that the heavier-than-air type of aircraft would have a great commercial future. He also studied the drag of spheres and cylinders and was apparently the first investigator to realize the importance of stream turbulence in connexion with the critical Reynolds number of such bodies.

In the theoretical field, Prandtl's original thinking illuminated almost all the fundamental problems of aerodynamics and opened new paths to the many scientists at Göttingen and elsewhere who were able to appreciate his ideas and to follow them up. Among his earlier investigations was the study of the behaviour of an aerofoil of finite span, in which he gave mathematical precision to the ideas outlined years before in Britain by F. W. Lanchester, and showed how to calculate the effects of aspect ratio of wings, and the interference between the two wings of a biplane or between wings and tailplane. It was a long time before the full significance of this work was appreciated in Britain, perhaps because few of the original workers here had a good knowledge of German; indeed, it was not until the late Hermann Glauert translated and expounded Prandtl's papers that we began to see how great and important were Prandtl's contributions to aerodynamic theory.

It is impossible, in a brief notice, to mention all Prandtl's major contributions; one must be content to single out one or two of the most fundamental of them. He studied the flow of compressible fluids and established the basis of what has now become an investigation of immense extent and of the greatest importance in these days of transonic and supersonic flight. But perhaps his greatest contribution was his concept of the boundary layer and his brilliant mathematical treatment of it. By making certain assumptions which were approximately true in the thin layer of retarded fluid close to the surface of a body, he was able to reduce the intractable general equations of viscous flow to a form which, though still far from simple, was at least amenable to analytical solution in some cases, and to numerical integration in many more. This work led to an understanding of the phenomena underlying the drag of bodies of fine form, such as constitute the wings and fuselages of aircraft, and incidentally explained the diverse results which had been obtained in different wind tunnels in terms of differences in the transition from laminar to turbulent flow in the boundary layer. In the hands of many who have followed Prandtl's lead, we now have a fairly complete theory of aerodynamic drag which is of inestimable value to the aircraft designer.

While the highest tribute is due to Prandtl for his own original researches, no less is due to his outstanding success as a teacher and leader of thought. Among those who have passed through his hands at Göttingen are to be numbered some of the most illustrious original thinkers and research workers in the aeronautical field; to mention but one name, Theodor von Kármán, who has done so much to extend Prandtl's boundary-layer work. Prandtl received many honours in recognition of his work; in Great Britain he was awarded the Gold Medal and the honorary fellowship of the Royal Aeronautical Society, the foreign membership of the Royal Society and an honorary degree of the University of Cambridge.

With his death a very great man has passed from among us and his loss will be mourned by many who knew him personally—and by still more who knew only the value of his work—in all countries where aeronautical science is an important activity.

ERNEST F. RELF

NEWS and VIEWS

Nobel Prize for Medicine and Physiology for 1953

THE Nobel Prize for Medicine and Physiology for 1953 has been awarded jointly to Prof. H. A. Krebs, professor of physiology in the University of Sheffield and director of the Medical Research Council Unit for Research in Cell Metabolism, and Dr. F. Lipmann, head of the Biochemical Research Laboratories, Massachussetts General Hospital.

Prof. H. A. Krebs, F.R.S.

Prof. Krebs has mostly been concerned with the study of metabolic processes by experiments *in vitro*. The first of his two greatest contributions to biochemistry was from Freiburg in 1932, when he elucidated the mechanism of urea synthesis in the liver, by discovering the participation of ornithine, citrulline and arginine through a cyclical process—a concept of unprecedented nature. His subsequent observations on the deamination of amino-acids demonstrated D-amino-acid oxidase, and laid foundations for future studies of the L-acids. In Cambridge in 1935 he proved the synthesis of glutamine from glutamic acid and ammonia in tissue slices. After moving to Sheffield, he announced in 1937 his second major contribution, the citric-acid cycle. Before this, the path of oxidation of carbohydrate from pyruvate onward was unknown; although information was available, its significance was not appreciated. Krebs supplied the missing evidence and the idea, again that of a cycle, and the problem was solved. The citric-acid cycle has stood the test of time, requiring only amplification of detail; it is concerned with oxidation of fat and protein as well as carbohydrate, provides paths for gluconeogenesis and amino-acid synthesis, and is the chief source of metabolic energy. In recent years Krebs's laboratory has been particularly concerned with the movement of substances across biological membranes, and he has studied the uptake of glutamic acid and potassium by tissue cells, processes driven by energy from metabolism. He has also employed isotopes in the quantitative investigation of oxidative phosphorylation and ion transfer.

Dr. Fritz Lipmann

After studying problems of muscle metabolism in Meyerhof's laboratory and of fermentation in the Carlsberg laboratory, Lipmann set the pattern for his future work when in 1937 he began to analyse the oxidation of pyruvate to acetate by bacteria. He found that the oxidation is accompanied by phosphorylation, and announced from Cornell University in 1939 that the 'energy-rich' ester acetyl phosphate is an intermediate. His celebrated article "Metabolic Generation and Utilisation of Phosphate Bond Energy" (1941) organized and developed existing ideas and had the most profound influence on subsequent biochemical thought and research. Moving to Boston, Lipmann realized that acetyl phosphate is not formed in pyruvate oxidation in animal tissues; some other substance had to be sought. By a happy coincidence his own researches led to its identification. Studying the biological acetylation of sulphanilamide, he discovered a new coenzyme, coenzyme *A* (coenzyme of acetylation). Finding that it is a derivative of the vitamin pantothenic acid and a general constituent of living organisms, he quickly realized that it is of fundamental importance in carbohydrate and fat metabolism. By 1946 it was clear that some acetyl derivative stood at the entry to the citric-acid cycle, on the paths of carbohydrate and fat oxidation and ketone-body formation. The idea grew that this was the acetyl derivative of coenzyme *A*,