Fig. 3. Electrophoretic patterns of: (A) normal mouse leg extract; (B) extract from legs 1 hr. after release of 2-hr. tourniquets; (C) mixture of normal tissue extract (5 parts) and normal serum (1 part)

obtained by combining normal tissue extract with normal serum. The dissimilarity of Figs. 3B and 3C indicates that the extract from the injured leg is not a simple mixture of serum and tissue proteins. The data of the table indicate that there is as much protein lost from the injured area as there is gained. The patterns obtained on the serum of animals in shock also indicate a large gain of proteins having low mobility. By means of photometric and ultracentrifugal analysis, it was found that the new proteins in the serum consisted of tissue proteins, haemoglobin, and products of digestion. It was further shown that haemolysis occurs when fresh tissue is mixed with whole blood or separated erythrocytes. If the tissue is not fresh or has been heated, haemolysis does not occur. Logaras¹⁶ has shown that urea inhibits the severity of shock following the release of tourniquets in rats. We have shown that 0.04 M urea in 0.11 M sodium chloride inhibits the lysis of erythrocytes by fresh tissue.

The details of this work will be published elsewhere.

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OBITUARIES

Prof. F. W. Twort, F.R.S.

PROF. FREDERICK WILLIAM TWORT, who died on March 20 at the age of seventy-two, will rank as one of the major workers in bacteriology on account of his discovery of the bacteriophage.

Born in 1877, the son of Dr. William Henry Twort, he qualified M.R.C.S., L.R.C.P. from St. Thomas's Hospital in 1900. His bacteriological career started forthwith, first in the clinical laboratory at St. Thomas's, then at the London Hospital, and finally, during 1909-44, as superintendent of the Brown Institution, University of London. His first major contribution to bacteriology was the study which he and G. L. Y. Ingram made of the etiology of Johne's disease of cattle. In 1910, they isolated the *Mycobacterium* known as Johne's bacillus by the ingenious method of growing it on a medium containing heat-killed bodies of other acid-fast bacteria. They further showed that the growth-factor present in acid-fast bacilli is widely distributed in other substances such as various fruits, linseed and a fungus; but they were unable to identify it chemically with certainty. Twort also demonstrated allergic reactions in diseased cattle by means of extracts of his cultures, paving the way for the later development of the Johnin test.

The discovery of bacteriophage, or 'bacterial virus', was outstanding. Twort first detected bacteriophage action in colonies of staphylococci isolated from vaccine lymph. He published his first observations in 1915, but was unable to follow them up at once on account of the First World War, in which he served as officer-in-charge of the base laboratories in Salonika and as bacteriologist to the Northern Ireland Command.

Twort at first, and for many years, regarded the nature of bacteriophage as unsettled. He considered from the first the analogy between bacteriophage and viruses, but kept an open mind on the question as to how far the analogy should be pressed, on the evidence then available.

D'Herelle's extensive researches on bacteriophage (for the name of which he was responsible) followed Twort's original discovery in point of time, and d'Herelle's interpretation of the phenomenon from the first corresponded more closely to present-day views; d'Herelle's publications attracted more immediate attention than Twort's first paper had done, so that d'Herelle's name is commonly associated with Twort's in the description of bacteriophage as 'the Twort-d'Herelle' phenomenon. Nevertheless, the priority of discovery was Twort's, and there are some aspects of bacteriophage behaviour which to this day leave open a possibility that the analogy between bacteriophage and virus can be pressed too far.

Twort's contributions to bacteriological science were recognized when in 1929 he was elected a fellow of the Royal Society, and by the conferment of the title of professor of bacteriology in the University of London. He leaves a widow, a son and three daughters.

Prof. R. A. S. Macalister

THE death of Prof. R. A. S. Macalister in his eightieth year brings to an end an unusually long, varied and distinguished career of archaeological teaching and research. Son of the anatomist, Prof. Alexander Macalister, R. A. S. Macalister entered his

father's College, St. John's College, Cambridge, and graduated in 1892. From the first his interests in archaeology were divided between Biblical archaeology and the prehistoric and early historic archaeology of his native Ireland. He worked under the auspices of the Palestine Exploration Fund and dug at Gezer and elsewhere. From the last decade of the nineteenth century until the mid-twenties of the present century, his excavation and publication were equally divided between Palestinian and Irish archaeology; but from the middle twenties onwards he confined himself to the archaeology of western Britain and more especially the prehistory and the early Christian monuments of Ireland, where during 1909-42 he held the chair of Celtic archaeology at University College, Dublin. Among his main published works were "Studies in Irish Epigraphy" (1897-1907), "A History of Civilization in Palestine" (1912), "The Excavations at Gezer" (1912), "The Philistines" (1913), "The Archaeology of Ireland" (1928), and "Tara" (1931). The enumeration of these few from the two dozen or more books which he wrote suffices to indicate the wideness of his interests, his industry and his devotion to the cause of scholarly exposition. His scholarship earned him appropriate recognition in the world of learning; he held senior doctorates of the Univer-

sities of Cambridge, Dublin, Glasgow and Wales, and was in his time president of the Royal Irish Academy, the Royal Society of Antiquaries of Ireland, and the Cambrian Archaeological Association.

He was, indeed, at the time of his death, unquestionably, the grand old man of Irish archaeology. But he did not spend the years of his retirement in Cambridge, from 1942 onwards, in looking back over the record of a long career of original work. He always had several books on hand, and he was busily engaged in writing and revising up to the time of his last illness. He will long be remembered as a teacher, a prodigious worker and an energetic and discursive talker. He was a pioneer of the interpretation of Ireland's past in terms of the comparative archaeology of western Europe, and every worker in this field must take his work into account, although his theories were sometimes of an originality which few could follow. Macalister was also a musician of no mean gifts; an associate of the Royal College of Organists, he was for many years organist of a church in Dublin and wrote, among other works, a suite for piano and violin. His humanity, his enthusiasm and his breadth of interests testify to his stature even more than any single contribution to learning.

GLYN E. DANIEL

NEWS and VIEWS

Natural History at St. Andrews: Mr. H. G. Callan

MR. H. G. CALLAN, of the Agricultural Research Council's Animal Breeding and Genetics Research Organisation, has been elected to the chair of natural history in the University of St. Andrews, which has been vacant since the death of the late Sir D'Arcy Thompson. Mr. Callan is one of the brilliant group of zoologists who were trained in Oxford shortly before the Second World War. His own interests have lain mainly in the fields of cytology and marine biology and to the Oxford tradition he has been able to add those of two other world-famous centres of biology—the Stazione Zoologica at Naples and the John Innes Horticultural Institution at Merton. After a few years of work mainly devoted to classical nuclear and chromosomal cytology, Mr. Callan, like so many others, suffered the prolonged interruption of the War, during which he spent five years as a radar officer. In his case, the experience seems not to have been without value for his physiological work, and, since the War, he has been prominent among those who have been applying the new technical devices made available by physics to the study of fundamental biological problems. Selecting the germinal vesicle of the amphibian egg as a suitable material, he has, with the aid of a number of collaborators, attacked the problems of its structure and composition from several different angles. This work, which is not yet fully published, has aroused considerable interest at scientific meetings at which it has been expounded. His colleagues will wish Mr. Callan every success in the opportunities he will now have to develop this most promising and important field of biology.

Engineering at Southampton:

Prof. T. R. Cave-Browne-Cave, C.B.E.

WING-COMMANDER T. R. CAVE-BROWNE-CAVE, who retires this summer from the chair of engineering in University College, Southampton, received his early training in the Royal Navy, and served as an

engineer officer until 1913. In that year he was seconded to the Royal Naval Air Service, later absorbed into the Royal Air Force, and for the next eighteen years devoted himself to the design, construction and operation of airships. The three non-rigid types, *S.S.*, *Coastal* and *N.S.* (North Sea), which did good service in patrolling the coasts of Great Britain during 1915-18, were designed and built by him and his staff; and he was responsible for the machinery and mooring arrangements of the British rigid airships, until the tragic crash of *R 101* caused the abandonment of airship construction in Britain. Wing-Commander Cave-Browne-Cave became professor at Southampton in 1931, and the school of engineering has grown sturdily under his direction, including a Department of Aeronautical Engineering which will have its own chair this year. A large range of workshops, a new block of classrooms, and a wind tunnel has been built during his tenure of the chair.

Wing-Commander T. R. Cave-Browne-Cave has also found time and energy for many other interests. Since 1935, he has taken an active part in solving technical problems of noise abatement; and he served during 1938-39 on the committee for structural air-raid precautions of the Ministry of Home Security. On the outbreak of the Second World War, the Royal Air Force claimed him, until in 1941 he was appointed director of camouflage and chairman of the inter-Services camouflage committee; but although away from Southampton most of his time, he was able to supervise, in the College, a number of researches on special problems for the fighting Services. Since the War he has developed a supersonic wind tunnel driven by steam, the cost of which is trifling compared with that of the conventional high-speed tunnels using compressed air; and as a result of a study of the flow of air in motor buses, he has developed a new system of heating and ventilating these vehicles, using warm air from behind the radiator. He has served on the Council of the Institution of Mechanical