the following passage in concluding a short review of the work (NATURE, Dec. 18, 1926): "The striking similarity established by Meyerhof between the changes of carbohydrates in muscle and in the yeast cell is seen to be much closer than has been believed. The remarkable phenomena accompanying alcoholic fermentation are now duplicated in the case of lactic acid production, and it may reasonably be expected that most of the fermentative decompositions of the sugars will be found to be initiated in a similar manner."

Direct proof is still wanting in many cases, but some instances are known among bacteria (Virtanen), moulds (Euler and Kullberg), and higher plants (Ivanoff, Bodnar). It is not too much to say that the fundamental biological mode of attack on carbohydrates is that revealed by the study of alcoholic fermentation.

OSSIFICATION.

Another biochemical function of the hexosephosphates which is shared by other hydrolysable phosphoric esters is that of a potential source of phosphate ions. I am happy to say that one of the most beautiful and important developments of this idea has been worked out quite independently at the Lister Institute by Dr. Robison as a direct consequence of his work on the hexosemonophosphate of yeast juice. "During my investigation of the hexosemonophosphoric acid isolated from the products of fermentation", he said (*Biochem. J.*, **17**, 286; 1923), "the hydrolysis of the ester by enzymes was studied. In some experiments in which the readily soluble calcium and barium salts were used as substrates, the progress of the hydrolysis was shown by the formation of a precipitate of sparingly soluble calcium or barium phosphate $C_6H_{11}O_5PO_4Ca + H_2O \rightarrow C_6H_{12}O_6 + CaHPO_4$.

The formation of this precipitate suggested to me the query whether some such reaction might conceivably be concerned in the deposition of calcium phosphate during the formation of bone in the animal body. In the first place I sought for an enzyme capable of effecting hydrolysis in the bones of growing animals."

The search was successful, a 'bone phosphatase' was found in the ossifying cartilage of young animals and a series of interesting and important investigations has followed; as a result of which I have little doubt that their author is on the highway to the biochemical explanation of the process of ossification—a good instance of the far-reaching and unexpected results flowing from observations made for quite a different purpose.

Obituary.

PROF. J. M. DUNCAN SCOTT.

DR. JAMES MATTHEWS DUNCAN SCOTT, professor of physiology in the University of Saskatchewan, died at Saskatoon on Jan. 28 last. Prof. Duncan Scott's career as a physiologist was a relatively short one. After taking an arts degree at St. Andrews, and qualifying in medicine with honours at Edinburgh, he joined the forces during the War and served in Egypt. At the conclusion of the War he suffered ill health for some years, owing to a troublesome frontal sinus infection which necessitated surgical intervention.

After practising for a time in South Africa, Duncan Scott felt called to undertake scientific work, which had always had a strong attraction for him, and in 1921 he proceeded to Cambridge, where he held a John Lucas Walker Studentship for research in pathology. His work at Cambridge was largely concerned with the regeneration of the red blood cells in anæmia. Becoming interested in physiology, and particularly in the teaching of it, he obtained in 1924 a teaching post at St. Bartholomew's Medical College as junior demonstrator, and afterwards became lecturer in physiology. There he continued some investigations which had been commenced at Cambridge in collaboration with Dr. Ffrangcon Roberts, on the situation and connexions of vagal and vasomotor centres in the medulla. This work he prosecuted with great assiduity and considerable skill, as a research scholar of the British Medical Association. As an outcome of his teaching work he also became interested in the physical chemistry of colloids, and held highly original, though not generally acceptable, views on that subject.

In 1926, Duncan Scott was invited to the University of Saskatchewan to occupy the newly created chair of physiology. This was an opportunity for the display of those fine qualities of orderliness and strict classification which had always characterised Duncan Scott. Before leaving England and proceeding to found and equip a physiological laboratory under conditions of relative isolation, he prepared a list, accurately classified down to the smallest detail, of every article which would be required in such a laboratory. He regarded his work there in a pioneering spirit, and as a field of high endeavour; he was, on the whole, well gratified with the results which came out of it so far as the organisation of the department was concerned. The duties of organisation and teaching naturally distracted him temporarily from his research work, though he never entirely lost touch with this, and when at the annual Physiological Congress at Boston in 1929, at which he gave two demonstrations, he expressed the opinion that the first labours of organisation had now been definitely completed, and would, he hoped, leave him free to continue his research work.

The passing of so courteous a colleague and of so keen a teacher and investigator will leave a gap among the physiologists of two continents. Dr. Duncan Scott leaves behind him a widow and three sons, to whom all his friends will extend their warmest sympathy.

MR. F. W. DOOTSON.

MR. FREDERICK WILLIAM DOOTSON, who died in Cambridge on Dec. 12, 1929, after a very short illness, was born in Manchester on Aug. 10, 1863.

His long connexion with the University Chemical Laboratory at Cambridge dates from 1891, when he entered the University as an undergraduate at Fitzwilliam Hall. After graduating in the Natural Sciences Tripos, he attached himself to Trinity Hall, and for many years was a successful private tutor. He was also engaged in the teaching work of the Chemical Department, first as demonstrator and in later years as a University lecturer.

In conjunction with the late W. J. Sell, Dootson published a paper on citrazinic acid, which was followed by a systematic series of investigations on the chlorine derivatives of pyridine. He also published papers on derivatives of acetone dicarboxylic esters, in one of which he demonstrated a very simple method for transforming an aliphatic into a benzenoid compound. His last paper, published jointly with Dr. S. Chapman, was entitled "A Note on Thermal Diffusion".

In later years, the gradual increase in his administrative duties drew Dootson away from research. During the period of the War, however, he was occupied with experimental preparative work on various substances of national importance. His success as a teacher continued to the end; indeed many generations of Cambridge students will remember with gratitude his kindly and unsparing help, and his friends among the teaching staff will mourn the loss of a congenial and gifted colleague.

A. J. BERRY.

DR. DONALD H. A. HUTCHINSON.

DR. DONALD H. A. HUTCHINSON, a master of the art of photomicrography, died of cancer on Feb. 1, at the age of fifty-six years. An ardent naturalist all his life, he concerned himself latterly with the photography of living microscopic animals by means of both still and moving pictures. Many will remember the remarkable films of protozoan life which he exhibited at the Zoological Society of London in 1924 and at the British Association meeting at Oxford in 1926; but only his intimate friends will know of the amount of his work and of the patience and ingenuity with which it was achieved. It was work carried out in the spare moments of a busy general practice. He never sought publicity, but hoped eventually to produce an atlas of photographs of as many kinds of protozoa as possible. He was always trying to get better and still better results.

A few of Dr. Hutchinson's photographs have recently been published in "The Science of Life", but there remain a large number of magnificent studies which have been seen by only a few. The writer of this brief notice, who, during a few years at Lowestoft, spent many wonderful evenings in Dr. Hutchinson's laboratory, intends to publish a volume of his photographs and some of the more interesting sections of his films; he believes that they will be of great value to students of animal life, and in addition a source of inspiration to workers in the field of photomicrography.

A. C. H.

WE regret to announce the following deaths:

Dr. F. Arnall, head of the Department of Pure and Applied Chemistry at the Cardiff Technical College, whose interest was mainly in organic chemistry, on Feb. 7, aged thirty-four years.

Sir William Atkinson, I.S.O., formerly Divisional Inspector of Mines, Home Office, a past-president and honorary member of the North Staffordshire Institute of Mining Engineers, on Feb. 15, aged seventy-nine years.

Dr. G. G. Chisholm, formerly reader in geography in the University of Edinburgh and secretary of the Royal Scottish Geographical Society from 1910 until 1925, on Feb. 9, aged seventy-nine years.

Prof. Felix M. Exner, director of the Zentralanstalt für Meteorologie und Geodynamik and professor of terrestrial physics in the University of Vienna, who was an honorary member of the Royal Meteorological Society, on Feb. 7, aged fifty-three years.

Mr. A. A. Campbell Swinton, F.R.S., known for his pioneer work on X-rays and radio communication, on Feb. 19, aged sixty-six years.

News and Views.

THE problem of the structure of cellulose is one which has not only a fascination for the organic chemist but is also of the greatest importance in many industrial processes. The method of X-ray crystal analysis has been applied to supplement the older chemical methods, and the results of this work were set out by Sir William Bragg in a recent discourse at the Royal Institution which we are glad to be able to print as a supplement to this issue of NATURE. X-rays have gone far to confirm modern views of the structure of cellulose and have succeeded in shedding new light on some aspects of the problem. It has been shown, for example, that cellulose contains large numbers of small crystals which tend so to arrange themselves that they have one direction in common. The outward sign of this selective orientation is the fibrous nature of the material. In the direction of length of the fibre it is found that the atomic pattern repeats itself every 10·3 A. The other dimensions of the crystal cell are less certain, but the evidence is consistent with the values of 7·9 A. and 8·35 A. at 84° to each other and perpendicular to the fibre axis. Such a cell contains the substance of four $C_6H_{10}O_5$ groups. Along the fibre direction there are chains of glucose rings (five carbons and one oxygen) linked together by oxygen atoms, the pattern repeating itself identically after every two rings, the length of which is 10·3 A. One such chain starts from each corner and one from the centre of the base of the crystal cell.

THE structure of cellulose suggested by the X-ray examination throws light on its physical and chemical behaviour. The atoms forming the chains of glucose rings along the fibres are very tightly linked together, while the chains are joined sideways by much weaker bonds due to the hydroxyl groups attached to the ring atoms. The cellulose micelle resembles a bundle of sticks, each stick strong in itself but loosely at-