

C₆ or those at C₄ and C₅. A decision between these alternatives seems possible on the following reasoning. Glucose oxidase (from *Aspergillus niger*) catalyses the oxidation of *d*-glucose to gluconic acid, and at a much lower rate (1/4) it also oxidizes *d*-mannose¹⁷. Since in this case the hydroxyl at C₁ is one of the attachment groups, it may be concluded that a change in the configuration at a carbon atom adjacent to that carrying a contacting group greatly affects the velocity of the enzymatic reaction. Further examples supporting this conclusion can be easily presented. The hexokinase reaction with *d*-mannose as substrate proceeding only at about one third of the rate of its reaction with *d*-glucose¹⁸, the addenda to C₂ appear to be vicinal to one of the contacting groups. Hence, the —OH groups of the substrate interacting with the receiving groups of hexokinase most probably are those at C₂ and C₆.

It would thus appear that the specificity of enzymes acting on hexosides resides in some atomic groupings arranged at the surface of the enzyme protein in a pattern able to attract the hexose residue by the glycosidic oxygen and one or more hydroxyl groups in *cis*-position to this oxygen. In addition to this bonding, attraction must be assumed for one or more groups of the aglycon part of the glycoside. Thus, the substrate molecule as a whole is appropriately orientated and fixed. The activity of glycosidases is restricted to a single type of the aldo-pyranose ring, because any change in the configuration at a ring carbon atom may remove from its proper spatial position a contacting —OH group, or produce a steric hindrance by replacing a hydrogen atom with the more voluminous hydroxyl group, or result in such a redistribution of electron charge as to eliminate the possibility of bonding between the respective groups of enzyme and substrate. There are, however, enzymes acting on hexoses, for example, hexokinase, which are less sensitive to configurational changes in the substrate. The quantitative effect on the enzyme-substrate relationship of a change in configuration at an asymmetric centre depends mainly on the spatial relation of the latter to the contacting groups. A rearrangement of the hydrogen and hydroxyl group at a carbon atom adjacent to an attachment group of the substrate invariably affects seriously the rate of the enzymatic reaction. When, however, the same configurational change takes place at a carbon atom more distant from the contacting groups, the effect on the enzyme-substrate relationship is much less marked.

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OBITUARIES

Prof. C. A. Kofoid

LESS than two months after the death of H. S. Jennings (see *Nature*, June 21, p. 834), America has lost another—and almost the last—of her elder workers on the Protozoa. Prof. C. A. Kofoid died—also in California—after a heart attack on May 30 at the age of eighty-one.

Charles Atwood Kofoid was born at Granville (Illinois) on October 11, 1865, and took his first degree (A.B.) at Oberlin College in 1890. He then moved to Harvard, where he graduated A.M. (1892) and Ph.D. (1894). After a short period of teaching at Michigan (1894–95), he was appointed superintendent of the Illinois Biological Experiment Station, where he remained for five years. Finally, he gravitated to the centre of his chief scientific activities—the University of California, where he became assistant professor of zoology in 1900, and professor and director of the department in 1910. He remained at this post for more than a quarter of a century, when he retired (1936) as professor emeritus.

Kofoid was a zoologist of wide interests, but devoted his great energies particularly to marine zoology, protozoology, and parasitology. He was always attracted by planktonic organisms, and while at Illinois published papers on the phytoflagellates of the Illinois River. Later, at California, he took a leading part in establishing the Marine Biological Station (now the Scripps Institution of Oceanography) at San Diego, and produced a notable series of memoirs on the dinoflagellates of that region. These were followed by exhaustive systematic monographs on the Unarmoured Dinoflagellata (with O. Swezy, 1921), the Dinophysoidae (with T. Skogsberg, 1928), the Tintinnidae (with A. S. Campbell, 1929), and the Heterodiniidae (with A. M. Adamson, 1933). Earlier, he published a detailed survey of all "The Biological Stations of Europe" (1910). In the field of applied zoology, with which he was always concerned, he played an active part on various committees for studying the damage done by the shipworm (the mollusc *Teredo*: reports published in 1924 and 1927), and also that caused on land by termites (final report published in 1934); and with his pupils he paid much attention to the wonderful flagellate Protozoa living in these remarkable insects.

Towards the end of the First World War Kofoid was appointed major in the U.S. Sanitary Corps, and threw himself with enthusiasm into the study of human intestinal Protozoa. A long series of papers by himself and his collaborators was the result. But unfortunately he approached this intricate and tricky subject without sufficient previous experience, and consequently most of his 'discoveries' and all his 'new' genera and species are now known to be misinterpretations. To the end of his life, however, he refused to give them up. In his later years he also became interested in the history of biology, and during the last decade wrote many reviews for *Ibis*. He left a large library, which is housed in the University of California at Berkeley.

Kofoid will be specially remembered for his fundamental share in developing the Zoology Department of the University of California to its present distinguished status, and for his editorial work in connexion with the "University of California Publications in Zoology". These contain many important papers—including many by himself and his pupils—

which are familiar to all zoologists. His own publications are too numerous to mention in more detail, but together they constitute an integral part of the output of protozoological research in the United States during the last fifty years.

CLIFFORD DOBELL

Prof. A. W. Stewart

EMERITUS PROF. ALFRED WALTER STEWART died at his residence in Belfast on June 30, after many years of indifferent health borne with stoical courage.

The youngest son of the late Prof. William Stewart, Dean of Faculties in the University of Glasgow, he was educated at the University of Glasgow, the University of Marburg and University College, London, and had held in turn the lectureship in organic chemistry at Belfast and the lectureship in physical chemistry and radioactivity at Glasgow. In 1919 he succeeded the late Prof. Letts as professor of chemistry at Belfast. During his tenure of office in Queen's University, Stewart did much to create the school from which many of his students went to occupy important positions in industrial and academic life at home and abroad. He was a man of great learning, gifted with a fertile imagination, and laboured continually to provide a sound and fundamental training in all branches of modern chemistry. He was ever ready to give counsel to those who sought his advice, and was deeply interested in the welfare of his students.

Stewart had a special interest, born from his close association with Ramsay and Collie, in the application of physical chemistry to the elucidation of the structure and properties of organic compounds, and his work upon Tesla-luminescence spectra was especially noteworthy. He and his co-workers developed a new field of spectroscopy by employing a fresh method of excitation to reveal series of spectra each of which is characteristic of the compound which emits it, and so added a new constitutional property to those previously known.

His love of investigation and his interest in the teaching of chemistry are revealed in his many writings, notably the volumes in his series of "Recent Advances in Physical, Inorganic and Organic Chemistry", which have reached many editions. He had pleasure in recalling that he had directed attention to the elements which had identical atomic weights but which differed in chemical properties and to which he gave the name 'isobars'. Since his retirement in 1944 from the chair of chemistry in the Queen's University of Belfast, which he had occupied for twenty-five years, he had devoted himself to his literary work with increased pleasure and devotion.

To have been one of Stewart's intimate friends is a privilege and a cherished memory; of a shy and retiring disposition, he avoided all forms of ostentation, and only those who had his confidence can appreciate the kindly nature, the tender affection and the stimulating effect of an evening spent with him by his fireside. Stewart's work—both as a man of science and an author—was characterized by meticulous care and thoroughness. His interests were catholic and his learning wide. British science is poorer by his loss, and another link has been severed with the pioneers of the early years of this century.

During his years of ill-health, borne with great fortitude, he had the constant companionship of his wife and only daughter, to whom sympathy is extended in their loss. D. N. McARTHUR

Prof. G. E. M. Jauncey

DR. GEORGE ERIC MACDONNELL JAUNCEY, professor of physics at Washington University, St. Louis, Missouri, died on May 19 at his home in St. Louis. He was born in South Australia in 1888, and educated at the University of Adelaide; later he did graduate work under Sir William Bragg at the University of Leeds. He held instructorships in physics at Toronto, Lehigh, Missouri, and Iowa State College. In 1920 he joined the department of physics at Washington University and became professor of physics in 1930, a position which he held at the time of his death.

During the twenty years following his appointment, Jauncey carried out research on many phases of X-ray scattering, the results of which are to be found in numerous communications in the *Physical Review* and other journals. He was also deeply interested in students and the problems of teaching physics at all levels. Out of his interest in teaching undergraduates at an intermediate level resulted his widely used book "Modern Physics", which has passed through three editions.

A severe illness in 1940 resulted in a permanent impairment in his health, which made it impossible for him to continue experimental work. He then turned his attention to the history of physics. The papers which he had published were to have been followed by others in this field had he lived to work out his programme.

A. L. HUGHES

Prof. G. Matthai

WE regret to announce the death at Cambridge on June 25 of Prof. George Matthai, formerly of the Indian Educational Service and emeritus professor of zoology in the University of the Punjab at Lahore. Dr. Matthai succeeded the late Lieut.-Colonel J. Stephenson as professor of zoology at Lahore in 1919. Under Stephenson the Lahore School of Zoology had been raised to a high degree of efficiency and was *facile princeps* among the Indian Schools; Prof. Matthai worked hard to maintain this proud position, though of late years Lahore has been challenged and has had to yield pride of place to Lucknow. Prof. Matthai would under normal conditions have retired in 1942, but as a war measure his term of office was extended until 1945.

Prof. Matthai was a recognized authority on corals, and as Mackinnon Student he had worked on the coral reefs of the West Indies: he also studied the corals and reefs of the Indian and Ceylon regions. He revised the classification of the *Astræidæ* and published several valuable monographs, the most important of which was the British Museum Catalogue of this family (1928). Negotiations were in progress to enable him to undertake the preparation of a similar monograph on the Fungiid Corals. His death is a great loss to systematic and taxonomic zoology.

R. B. SEYMOUR SEWELL

WE regret to announce the following deaths:

Prof. Noah Morris, regius professor of *materia medica* and therapeutics in the University of Glasgow since 1937.

Dr. Wilfred H. Osgood, emeritus curator of zoology in the Field Museum of Natural History, and a corresponding member of the Zoological Society of London, aged seventy-one.

Dr. John Parkinson, well known for his work in economic geology in many parts of the British Empire and elsewhere, on July 19, aged seventy-five.