and of applying nitrogenous fertilizers to raise the protein content of crops of high-energy content.

In Britain there is the problem of making efficient rations for the livestock with feeding-stuffs of diverse and fluctuating origin and kind. The nation is dependent on the technological capacity of manufacturers abroad; for example, half the national supply of protein concentrates was imported in 1953 and 1954. In 1955 there was a large increase in supplies, mainly of imported oilseed meals. So far, continued Dr. Duckworth, little research on the nutritive value and still less on local processing methods has been published from most sources of these feeding-stuffs. Processing has generally a profound effect on the nutritive value of protein concentrates and, if inadequately controlled, yields highly variable products. Only on fish, herring, soya-bean and cotton-seed meals has extensive research been done, and then almost entirely from the point of view of suiting the products to non-ruminant needs. A recent trend has been to process oil-seed meals for high solubility of protein. Such materials are contra-indicated for ruminants under preferred British feeding systems. Attention is now being given to developing rapid laboratory tests of protein quality. If success is attained, an appropriate amendment of the Fertilizer and Feeding Stuffs Act would give protection against low-value protein concentrates of domestic or imported origin, and thus lead to more efficient compounding of rations.

Many members and visitors took part in the discussion which followed.

SCIENCE HOUSE, PAKISTAN

THE visitor to Pakistan cannot fail to be impressed by the rapid scientific development which is taking place there. The science departments in the older universities are expanding; new universities have been created in Sind, Karachi, Peshawar and Rajshahi; the Central and three Regional Laboratories of the Pakistan Council of Scientific and Industrial Research have been established, and important research institutions, such as the Cotton Research Institute, the Jute Research Laboratory, the Pakistan Standards Laboratory and others, have come into being during the past three years. The new buildings, many of which have been completed, are very impressive. The sites are spacious and convenient, and the buildings, of pleasing design, have been planned with imagination and foresight. There is ample accommodation for many years to come, and expansion will not be hampered by considerations of space. These institutions have been provided by the State, and are a reflexion of the importance attached by the Government to the part which science must play in the development of the country.

The Pakistan Association for the Advancement of Science was founded in 1947, and has been very active, having started the publication of Pakistan's first scientific journals—the *Pakistan Journal of Science* and the *Pakistan Journal of Scientific Research*—and organized the annual All-Pakistan Science Conferences.

A new development of great importance has just been launched. The foundation stone of the Ismail Aiwan-i-Science (Science House), Lahore, was laid on January 27, 1956, jointly by Mr. Nasser Ahmad Shaikh, and the representatives of science associations from Australia, China, India, Pakistan, the U.S.S.R., the United Kingdom and the United States.

Science House will be the integrating centre for science in Pakistan. It will contain a large science library and a bibliographic, translation and documentation centre equipped for microfilming and duplication. There will be an auditorium to seat a thousand persons. There will be accommodation for a Human Relations Research Centre, which will be concerned chiefly with social science research. Science House will also contain office accommodation for the various scientific societies, together with seminar and committee rooms, and a press and publications section for the various scientific societies and organizations. There will be residential accommodation for visiting scientists, club rooms and a cafeteria.

The building is situated in the new modern residential centre of Lahore, adjacent to the new Regional Laboratories of the Council of Scientific and Industrial Research, and close to a number of important educational institutions and the proposed new site for the University of the Panjab.

This magnificent project was conceived by Dr. Bashir Ahmad and his colleagues, and has been made possible through the generosity of Mr. Nasser Ahmad Shaikh, a leading industrialist in Pakistan, who has provided the funds for building Science House.

The new building will be completed early in 1957, and the next annual meeting of the Pakistan Association for the Advancement of Science will be held in it.

GEORGE ALLEN

OBITUARIES

Dr. Walter Sydney Adams, For.Mem.R.S.

WALTER SYDNEY ADAMS, the son of a missionary, was born in Antioch in northern Syria on December 20, 1876. He was educated at Dartmouth College and the Universities of Chicago and Munich, and was appointed an assistant at the Yerkes Observatory under Hale in 1901. In 1904 he was one of the small staff which went with Hale to Mount Wilson to start the new Observatory in California. As assistant astronomer, as assistant director, as acting director during Hale's illness, and from 1923 onwards as director, he devoted his life to the Observatory until his retirement in 1946. As a research associate of the Carnegie Institution of Washington and of the California Institute of Technology, he continued working on astrophysical problems, his last paper on the shell star α Orionis appearing in the March issue of the *Astrophysical Journal* this year. He died on May 11, 1956.

Adams's earliest publications were on line-of-sight velocities of stars, on spectroscopic binary orbits, on stars of variable velocity and on details of spectro-

graphs and allied instruments in use in the Observatory. He showed an early interest in the spectra of novæ, in the characteristics of sunspot spectra and in the comparison of centre and limb spectra in the Sun. His measurement of solar rotation at different levels in the solar atmosphere showed that the higher strata rotate faster and with a smaller equatorial acceleration than the lower strata. His next major contribution to astrophysics, the one for which the Gold Medal of the Royal Astronomical Society was in large part awarded in 1917, was the spectroscopic determination of stellar parallaxes. The first paper with Kohlschütter on the criteria provided by varying relative strengths of spectral lines for determination of absolute magnitudes of stars appeared in 1914. Afterwards Adams extended the work to cover a much wider range of spectral types and he published spectroscopic parallaxes of thousands of stars. His work led to a direct probing of the galaxy to far greater distances than had hitherto been possible except by statistical methods.

Among much other work of his mention must be made of his analysis of high-dispersion spectra and the calibration of Rowland's scale of intensities; in novæ he noted the simple 1 : 2 : 3 relations between the velocity displacements of successive outbursts: high-dispersion spectra enabled him to detect as many as five clouds of interstellar gas in the same direction in space moving with different line-of-sight velocities. Adams also both detected the white dwarf nature of the companion to Sirius and afterwards the relativity displacement to the red of the lines in its spectrum—a displacement of +19 km./sec. as compared with Eddington's predicted value of +20 km./sec. at λ4500.

Adams was president of the Astronomical Society of the Pacific and later of the Astronomical Society of America. He was vice-president of the International Astronomical Union during 1935–49, keeping the Union alive during the Second World War. He was the senior associate of the Royal Astronomical Society, a foreign member of the Royal Society and a corresponding member of many other national academies. He was awarded the Draper Medal and the Bruce Medal in America, the Prix Janssen and the Janssen Medal in France as well as the Gold Medal of the Royal Astronomical Society. In his death the astronomical world has lost a much loved and widely revered leader. F. J. M. Stratton

Mr. P. W. Wood

It would seem strange to anyone in Cambridge to speak of Philip Worsley Wood in any other way than as "P. W.". His passing is a great loss to Cambridge and especially to Emmanuel College, as was that of his namesake Alex. a few years ago. Born in April 1880, he matriculated and entered Emmanuel in 1899.

To one who was his exact contemporary, the passing of "P. W." comes as a reminder that the ranks of those who took the Mathematical Tripos Part I in the days when there was an order of merit are becoming very thin. In 1902 he was Third Wrangler, bracketed with H. A. Webb. In 1903 he was placed in Class I, Division 2 in Part II of the Tripos, and in the next year was awarded a Smith's Prize.

"P. W." had in a high degree that facility in the solution of ingenious problems which counted for so much in the Tripos of that day. But it was not the kind of outlook for which the times were asking. With the passing of the old Tripos, mathematical fashion was for connected theory, ever widening in scope and in new points of view. Thus Wood became one of that band of teachers who held the fort for that wide range of students for whom mathematical research lay beyond their reach. As such he was an outstanding member of his College and of the Faculty. To his pupils he was devoted, meticulous and challenging. Though he retired at the age of sixty-five under the age limit, he went on teaching for the love of it until the day when he was overtaken by the illness which led to his death ten days later.

Being what he was, his original work was limited. The best known was his Cambridge Tract on "The Twisted Cubic". Not so well known was a series of papers in the London Mathematical Society *Proceedings* on algebraic invariants.

His activities turned early to College administration. A Fellow of Emmanuel for fifty-one years, he served for thirty-five years as lecturer in mathematics, for twenty-six years as librarian and for seventeen years as senior tutor, besides acting for some periods as vice-master. In University affairs he was not so prominent, though he was a junior proctor in 1917–18 and was for many years a much-valued member of the Local Examinations Syndicate.

As a man, "P. W." cannot be put into any class. He was just himself—kind and appreciative but caustic and terse in conversation, diligent in all that he undertook, working hard for little reward. Having no ambition but to serve well, he lived to serve.

Some would say that his hobbies were lawn-tennis and gardening. But truly his College was his hobby and his absorbing pursuit. His home and garden were places of renewal in the companionship of his wife, his two sons and his daughter. Is it possible that he shared with them, as he did with me, in the year 1944, the discovery that that number is just $3^5 \times 2^3$? Ebenezer Cunningham

Dr. M. A. Whiteley, O.B.E.

Martha Annie Whiteley was born on November 11, 1866, and received her early scientific training at Royal Holloway College, London, where she graduated in 1890. During the following twelve years she held appointments as science mistress at Wimbledon High School, lecturer in science at St. Gabriel's College, Camberwell, and lecturer in physical chemistry at Royal Holloway College. During the last few years of this period, from 1898, she also carried out part-time research at the Royal College of Science, and in 1902 she obtained the D.Sc. degree of the University of London (her examiners at the oral examination being Ramsay and Frankland), and in 1903 the diploma of associateship of the Royal College of Science. In the following year Tilden appointed her to be a teaching scholar on the staff of the Royal College of Science, and she was promoted assistant in 1905, demonstrator in 1908 (by which time the College had become part of the newly constituted Imperial College of Science and Technology), lecturer in 1914, and assistant professor of organic chemistry in 1920.

Her first paper, in 1900, on "The Oxime of Mesoxamide", set the pattern of her research activities on derivatives of malonic acid and barbituric acid. During the First World War, her specialized knowledge in this field enabled her to play an important part in the development of methods for the synthesis