analysis, his group obtained much fundamental information about the synthesis and internal concentration of alkaloids in cells.

Shortly before his move to London, James' group had been amongst the first in the world to isolate active mitochondria from plants and study their oxidative and phosphorylative capacities. The group had also begun to use the new techniques becoming available for the examination of the ultrastructure of cell organelles for James had the vision to see the potential of structural studies in understanding intracellular metabolic processes. At Imperial College he set up a Unit of Analytical Cytology where electron microscopists and biochemists worked together to isolate, purify and characterise subcellular plant organelles. New electron microscopical techniques were developed to monitor the purity and integrity of the isolated organelles used in a continuation of the studies of mitochondria to localise cellular respiratory activities. Later plant nuclei, ribosomes and chloroplasts were examined and the group were the first to publish methods for the isolation of structurally intact chloroplasts and also plastoglobuli and grana from them.

In addition to introducing the study and teaching of analytical cytology of plant cells, James also initiated and fostered the development of new sections of the department at Imperial College to study plant taxonomy, palaeobotany and nitrogen fixation. He guided and encouraged those who shared his enthusiasm for all aspects of plant biology and by example and positive criticism showed the high standard of scientific expertise required to gain a true insight into plant function.

In addition to publishing numerous papers reporting his own research findings, for many years James was a co-editor of *New Phytologist* and a member of the editorial panel of *Endeavour*. His uncluttered literary style also contributed to his skill as a good writer of school and university texts and semi-popular articles and books. All his publications were characterised by the high standard of the beautifully presented and appropriate illustrations. For almost 50 years his now classical text *Introduction to Plant Physiology* (first edition 1931, seventh edition 1972) has been the introduction for successive generations of schoolchildren and undergraduates to this field. In the preface to the fourth edition he looks forward to the time when the reader of his book will take part in finding some of the answers to unsolved physiological problems: indeed there have been

many whose initial interest was aroused by his text and who have gone on to make their own contributions as professional plant physiologists. His *Introduction to Plant Biology* is still used as 'the bible' for school and university courses. His amusing book *Background to Gardening* became a best-seller. After his retirement he published *Cell Respiration* (1971) which gives a comprehensive account of the respiration of the whole range of living cells.

James' distinguished contributions as a scientist were made despite recurrent ill-health throughout his life. All who knew W. O. James and his wife recognise the magnificent supportive role she played throughout his career. His many former colleagues now working in all parts of the world have cause to be grateful to W. O. James for his scholarly example.

R. M. Leech

Francis Aylward

PROFESSOR FRANCIS AYLWARD who was Professor of Food Science in the University of Reading from 1968 to 1976 died on 28 September 1978, aged 67. A memorial service for him was held in Westminster Cathedral on Thursday, 7 December.

After graduating at Liverpool University with first class honours in chemistry, he remained at Liverpool studying lipid chemistry under Hilditch (whose school was of international repute) and obtained his PhD. His subsequent contribution to lipid chemistry and biochemistry was recognised by the award of a DSc in 1958.

Francis began his scientific career by holding research fellowships at the Hannah Dairy Research Institute and Johns Hopkins University. The war years were spent with ICI Ltd. In 1947 he was appointed Head of the Department of Chemistry and Food Technology at the Borough Polytechnic. It was at this time that it began to be recognised, largely as a result of food research carried out in USA and UK, that a substantial and systematic body of knowledge had accumulated, and the time had arrived for food technology to be taught as a discipline particularly to provide the food industry (which was rapidly expanding and moving from a craft based to a scientifically oriented industry) with its scientific manpower. The Borough Polytechnic was one such teaching institution that recognised this need, and under Francis's able and progressive leadership the food technology element of his department grew and flourished.

Though still retaining his interest in lipids he began to take a greater interest in the role of food technology in relation to nutrition and food supplies.

This led naturally to his appointment in 1960 to serve for two years as FAO Adviser on Food and Nutrition to the Government of Ghana, and for the period 1961-62 as Head of the newly created Department of Biochemistry, Nutrition and Food Science at the University of Ghana. From that time he developed a major interest in nutrition in relation to national and international food problems. From Ghana he moved to Poland and during 1962-65 he was Director of the Polish Food and Nutrition Project supported by the UN special fund.

In 1965 he returned to Britain as Director of the Fruit and Vegetable Preservation Research Association, Chipping Campden. Then in 1968, following the retirement of Professor Crossley as Professor of Dairying and the decision of Reading University to broaden the interests of the department to cover food science, Francis was appointed its first professor. In many ways this was an apt and fortunate appointment. Francis believed that institutes of higher education have a duty to assist developing countries, and this view agreed well with the tradition of Reading's Faculty of Agriculture. He obtained a substantial grant from the Leverhulme Foundation which permitted him to support two Senior Fellows and with their help he built up a large postgraduate school of food science—the largest in Europe—drawing most of its students from developing countries.

While at Reading he continued to act as consultant on behalf of organisations of the UN. This work was complementary to his service as Chairman of the University's Overseas Service Committee. Within the UK he was an active member of the Food Group of the Society of Chemical Industry. He was a member of the Food Additives and Contaminants Committee of the Ministry of Agriculture, Fisheries and Food. After retiring from his University post he continued to put great effort into helping with nutrition programmes overseas. He was appointed a member of the UN Advisory Group on Nutrition and was engaged in co-operating with UNEDO in regional services of food industries in the developing countries.

They heavy demands his career made on his time were not allowed to prevent him from playing an active role in the Roman Catholic Church, and recognition was given in 1951 when he was appointed a Knight of St Gergory.

With the untimely death of Francis Aylward, we in food science and technology have lost not only a highly respected colleague, but a friend of great warmth and personal kindness.

E. Rolfe