

process would lead to a ratio of maximum ionisation contents, as between summer and winter, which was in very good agreement with the observational material. Appleton leant towards the alternative process of attachment of electrons to uncharged atoms, and Chapman pointed out that if this process were of comparable importance with recombination in *F* region, it would be predominant in *E* region. The evidence seems, however, to be so acutely complicated by the known facts of nocturnal replenishment, that judgment may well be reserved.

It was a disappointing feature of a long discussion that the geophysicists who were not

actively engaged in accumulating and interpreting radiotelegraphic evidence were inarticulate. Many fascinating possibilities awaited discussion: the relation between thunderstorms and magnetic disturbance, solar control and recurrence tendencies, the composition of the atmosphere at ionospheric levels, the possibility of approximate measurement of gas density and temperature from radiotelegraphic evidence on collisional damping, and the radiotelegraphic measurement of ionospheric air velocities for use in studies of terrestrial magnetism. There is room for another, and an early, discussion, with the radiotelegraphists in the back benches.

### Obituary

SIR WALTER MORLEY FLETCHER, K.B.E., M.D., F.R.S.

SIR WALTER FLETCHER died on June 7, with unlooked-for suddenness when he was just approaching his sixtieth birthday, but when his physique and brain were still those of a man in the most vigorous prime.

The first twenty years of Fletcher's active life were all spent in Cambridge, and during that time he completed the work for which in 1915 he was elected to the Royal Society. His thoughts were steadily concentrated on the problem of the respiration of muscle. The laboratory work was interrupted from time to time and his papers appeared intermittently, but each one marked a definite step forward in knowledge. At last, in co-operation with Sir Frederick Gowland Hopkins, he succeeded in unravelling the web of confusion spun by earlier workers and made one main point perfectly clear. Muscular contraction is not related directly and simply to intake of oxygen and expiration of carbon dioxide. It may proceed vigorously in the absence of oxygen and is then attended by the formation of lactic acid, not of carbon dioxide. This lactic acid is not present in resting muscle but appears during contraction and largely vanishes again during the subsequent oxidative changes of recovery. Oxygen enables the muscle to regain activity after exhaustion and to get rid of accumulated lactic acid, some carbon dioxide then appearing during this period of recuperation. But the act of contraction is anaerobic and in itself makes no call on any fresh oxygen supply, oxidation being concerned solely with the processes of recuperation.

These strikingly clear results were presented by Fletcher and Hopkins in the Croonian lecture of 1915 before the Royal Society, and they have not been controverted in any essential detail since. They gave the secure foundations upon which was erected the modern thermodynamic work of Meyerhof and Hill, who carried the analysis further and by measurement of total heat production deduced the formation during muscular contraction of lactic acid from glycogen and the re-synthesis of four-fifths of it back to glycogen during the oxidative processes of recuperation.

Fletcher's impulse must be recognised in this work of A. V. Hill as well as in that of Keith Lucas, who added so greatly to the knowledge of muscular contraction on the electrical side. Both were his juniors at Trinity College, and Fletcher's enthusiasm and clear outlook over the ill-mapped lands of muscular activity captured their interest from other intellectual occupations, just as Michael Foster had done with younger men in the generation before. Keith Lucas left classics to work at physiology. A. V. Hill was definitely persuaded to abandon mathematics and to learn physiology as a field in which his special knowledge might find a novel and delightful application.

The researches of Fletcher with Hopkins hold a classical place among the first exact studies of the internal metabolism of the cells of any tissue, though the lapse of twenty years has given them an air of almost primitive simplicity when contrasted with modern knowledge of the intricate systems of intra-cellular oxidation and chemical change that is emerging from the later work of Hopkins and his school. But though Fletcher's own work in the laboratory always showed perfect execution of the experiment and exact argument to a clear end; and though his thought could envisage far prospects of physiological research with a confident hope that won many younger men to eagerness in sharing the adventure, it never seems that he found full satisfaction in laboratory research. Many other affairs claimed his time and his energies at Cambridge. Trinity College held his affection and received his services fully as much as Michael Foster's School of Physiology, which he often proudly traced to its source in the action of Trinity College in making Foster prælector of that subject. His unquenchable interest in every vivid side of life, his keen intellect, his artistic sense, and the athletic ability that was simply natural for a man of his big well-balanced frame, all these from undergraduate days had given him friendships and attractions outside the ambit of physiology and none of these was he willing to suppress. President of the Pitt Club for fifteen years and a don of a

distinction which any undergraduate could recognise, for he had sprinted in the 'hurdles' against Oxford, a good shot on the grouse moor, able to stalk his own stag in a deer forest, a keen player of the Royal game of tennis, an antiquarian who could satisfy the present Provost of Eton by his company in many a holiday study of the churches of France, and intellectual friend of G. M. Trevelyan, Regius professor of modern history, on matters that lay altogether outside the scope of science—his future at Cambridge seemed incapable of contraction to the intense aim of scientific research alone. The tutorship was about to expire, and some college might then have found in him a notable master and the University have gained by the exercise of his great administrative powers what the physiological laboratory would progressively have lost. Suddenly his whole career was changed. The scene shifted to London, and in the next twenty years Fletcher found the work to which he willingly and whole-heartedly devoted all that lay in him to give.

The present abundance in England of opportunities for scientific work in medicine is no older than the beginning of this century. Even in 1902 Lord Balfour had felt driven to ask "Why do we, the richest country in the world, lag behind Germany, France, Switzerland, Italy? Are we too poor, or are we too stupid to equip our universities and our medical schools with all the costly armoury which research must have in these modern days?" The gift by Lord Iveagh of £250,000 for the completion and endowment of a building, the Lister Institute, was the first great step forward; and in 1909 it was followed by Sir Otto Beit's gift of a like sum to provide fellowships for younger men who wished to embark on the voyage of research. The stream rapidly swelled to a great river. Someone in power in government had at last realised that the tiny grants for research through the Local Government Board were a poor measure of the nation's interest in what should be done to advance knowledge of the means for safeguarding health. A Research Fund yielding £55,000 a year was created under the National Insurance Act and the Medical Research Committee was formed in 1913 to administer its disposal. The new Committee had Lord Moulton as chairman, and its members from the outset were chosen for their scientific standing and not as representatives of any body or institution. In all official dealings it was aided by the support of Sir Robert Morant, who was even then looking forward to the creation of a Ministry of Health, so that the body might be educated to its best as well as the mind. Morant was a man possessed by ardent ideals, but he was also a most competent administrator whose experience in practical education before he became a Civil Servant had taught him that many things could be better done without the restriction of 'red tape'; and his wise sympathy with Lord Moulton's views saved the Committee from being bound by official swaddling clothes in its infancy. The Committee bought a building,

the empty hospital at Mount Vernon, Hampstead, to serve as a national institute for a proposed research staff, and then in July 1914 appointed W. M. Fletcher as its administrative secretary.

Fletcher's life at Cambridge had been passed on levels that appeared to be remotely high above all concern for the welfare of the ordinary people, and he had so little knowledge of the movements by which the Research Committee was established that his name was a late choice and the appointment was criticised, but only for a moment. He came to the task, in itself inspiring to him when he saw this great fund for scientific work and knew the freedom that the Committee had secured for its action; and he met Morant. Between these two men, alike in big physique, in strong personality, and in culture, friendship at once arose, and Morant's ideals found not an echo but a counterpart in what had ever been innate in Fletcher. All his spiritual depths were uplifted by the vision of service for others in so wide a field. Scientific research became more than a beautiful use of the intellect in approaching the truths of Nature, for he now realised the need by England of its direct application to all the problems of ill-health. Henceforward he too became a great public servant and sank his own conspicuous abilities for research in guiding and helping countless other men.

The War broke out a month after Fletcher's official appointment as secretary, and the resources of the Medical Research Committee were largely diverted from civilian to army needs. The Director of the Army Medical Services had no such fund or organisation for research at his own disposal, and he gave ready facilities in all areas of the War both for civilians and for his own officers to use these resources of a Government organisation which could act with a hitherto unknown flexibility and speed. The Committee could rarely meet and most of the work, both initiative and executive, fell on Fletcher who, with the economy characteristic of a man trained to work in laboratories, had begun in small quarters and with a tiny office staff. He overworked recklessly, and in the winter of 1916 nearly died from an attack of pneumonia which left behind it a fibrosed area of lung where at last flared up the sudden infection that took away his life. But when the War ended, the Medical Research Committee and Sir Walter Fletcher had established beyond all doubt the great value of the services they could render to the country.

The next step was one of great administrative importance. In 1919 the Ministry of Health was constituted, with Sir Robert Morant as its first Permanent Secretary. That Department seemed appropriate for control of a research fund derived from contributions made under the National Insurance scheme. But both Morant and Fletcher were keenly alive to the need for keeping an organisation for work by men of science free from the chances of political influence by changing

Ministers of Health, and free too from any stiffening rigidity in its methods that might follow the introduction into its machinery of many men with Civil Service training. Moreover, the Minister of Health was responsible only for England and Wales, whereas Fletcher had learned from War experience that there was need for medical research not only in Great Britain but also throughout the Empire.

A better device had already been found in 1915 when the organisation for scientific and industrial research was placed directly under a committee of the King's Privy Council. This model was accepted, and a new Charter in 1920 placed the Medical Research Council, as it was now styled, directly under a committee of the Privy Council which included the Minister of Health and ultimately the ministers responsible for health in the Empire as well as in Great Britain. The financial grant-in-aid was drawn direct from Parliament and raised at once to £125,000 a year. As a safeguard of scientific independence was a provision in which Fletcher took peculiar satisfaction, namely, that no scientific member of the Medical Research Council should be appointed by the Lord President except after consultation with the president of the Royal Society.

In the very month before the new Council was formally created, Sir Robert Morant died from the strain of excessive work, at the relatively early age of fifty-seven. Fletcher wrote of his loss in phrases of deepest sorrow—"his departure is taken for misery, and his going to be utter destruction"—but Morant's work was too well based to crumble away or fall when he had left it, and the foundations of the Medical Research Council were re-laid so wisely in 1920 that it too will not be shattered, only shaken, by Fletcher's recent death.

From 1920 onwards, the Council could plan more securely for its work, and the increased financial grant enabled Fletcher to obtain fuller assistance in the routine of office work, though his administrative expenses under this heading were always kept low. The time thus freed was used to good purpose. As secretary of the Council, he was officially a member of many Government committees, and it was his steady aim to convince such bodies of the value of the help they might receive from the scientific experts who were accessible either through his Council or the Royal Society. But now his own personal guidance was being more and more sought by those who were responsible for schemes of education or funds devoted to medical research, and his influence in this direction steadily assumed a high importance. Through his advice the Dunn Trustees gave £200,000 to the University of Cambridge to build and endow Sir Frederick Gowland Hopkins's School of Biochemistry, and £100,000 afterwards to Oxford for a Department of Pathology. These benefactions were then quoted when the Rockefeller Foundation in its turn was persuaded to give a Department of Biochemistry to Oxford, and to Cambridge £130,000 for its School of Pathology. The Rockefeller Foundation put full trust in

Fletcher's judgment, and his advocacy was a determining factor in many of the other great gifts which it has made with such generosity for the advancement of medical work in Great Britain. Among these gifts he was especially eager for the success of the London School of Hygiene and Tropical Medicine, since through it he hoped that the Council might gain closer co-operation with medical work in the Empire abroad. In the same sense he welcomed an invitation in 1928 to visit India as chairman of a Government Committee for the Organisation of Medical Research. The confidence which he then won among the Indians themselves was quickly proved by a gift of £250,000 for medical research in memory of Lady Tata, and he was appointed chairman of the European Committee advising the trustees in Bombay upon the scientific work itself.

It is unnecessary to review the actual advances of medical knowledge which the Medical Research Council has in recent years helped to promote. These have been admirably summarised in the annual reports of the Council, to which later students will assuredly be indebted for a valuable historical account of the yearly progress, both that made and that contemplated, in different branches of medical research in Great Britain. Moreover, as Fletcher himself emphasised in these reviews, much of the work was often not directly planned by the Council but merely supported in its total distribution of £80,000 a year to almost every university and centre of active work in Great Britain.

Fletcher's position was that of permanent secretary to a Council the scientific members of which were changing yearly, and it often fell to Fletcher to initiate—and always to him to maintain—lines of policy, especially in matters of administration, which might require long years for their fulfilment. He had thus seen medical research with its national laboratory take its rightful place under the Privy Council side by side with the organisation for scientific research in chemical and physical questions affecting the manufacturing industries. He was finally satisfied that science had obtained its due recognition by Government when to these two committees of the Privy Council a third was added in 1931, the Agricultural Research Council for scientific inquiry into the uses of plant and animal life. Then, so far as science could add to human happiness or welfare, the nation had given to it an organisation which could effectively—and that word had become one of Fletcher's most frequently used adjectives—bring to practical aid of affairs all the special knowledge that might aid the industries, the health and the nourishment of man.

At the end of a career, the work done becomes the enduring record of a man, and other memory rarely lives longer than the recollection of his friends. But the simple calendar of achievements misses the deeper question, that of the personality which inspired and was the work with both its faults and virtues. Fletcher's driving motive came

first through his intellect that knew the discipline of science, and then from the spirit of human sympathy that gave him an almost apostolic ardour in convincing men that this instrument of scientific thought must for the sake of man's welfare be brought to fuller use in medicine. The achievement of this aim was made possible by the rare gifts of Nature that were so happily combined in him.

Fletcher's mind was quick, critical and retentive. He grasped intuitively both the details and the wider relationships of the many problems continually placed before him; and while he would lend sympathetic attention to every man with a piece of work to put forward, he made extraordinarily few mistakes in his judgment of men and their problems. His astonishing personal knowledge of almost all the research workers receiving support in any way from the Council was utterly unlike that of an official administrator dealing only with written reports, for he sought to meet them as comrades in the field of scientific work who should discuss with him their problems and meet his ever helpful criticism.

To this mastery of the intellectual side of his work were added other qualities which made it easy for Fletcher to win goodwill at first acquaintance, while they determined the firm affection of those who had the happy fortune to know him more intimately. No friend ever had occasion to doubt the sincerity and staunch loyalty of his character; but even without proof of that constancy, it was difficult for a new acquaintance to resist the impression made by his frank manner, his splendid physique and the sense that he gave of tireless strength and energy. His spirits remained unconquerably young, and the boyish half-smile—and perhaps some kindly jest—with which he could suddenly relieve the tedium of a dull discussion, will ever remain in the memory of his friends. These were many, and of enemies he had none among those who took what he never denied to anyone, the opportunity to know

him well. Cynicism, that closed defence of the doubting mind, he never used. Rather were his thoughts so freely brought to light that men were apt to misjudge as egotism what was little more than a too frank outpouring of the self-confidence that lies within all men of action. Perhaps in the same category was a habit of giving unsought advice, *more magistri*, to others on the way in which they should manage their affairs. If mistakes in this fashion arose, he was willing, even eager, to listen to criticism; and to be aware of a misunderstanding on such personal grounds was so painful to him that he could not rest until it was banished.

These two foibles were minor elements of weakness in Fletcher's character, and he was quick to apologise for faults into which they might lead him. But on matters where he felt that principles were at stake, he was ever an unyielding and a most formidable fighter. "Walter is a most charming fellow but do be careful of rousing Morley." Then he would make no concessions, and with outspoken courage he would pierce to the heart of arguments that he could show to be based on unthinking custom, however widely honoured or clothed with men's respect. On such issues he was utterly regardless of consequences to himself, caring only that the cause of scientific research, and of the Council in so far as it was identified with that, should not suffer setback. He knew the past struggles through which medical science in England had lately come from smallness to high repute among the nations of the world, and he knew what his share in that work had been. In moments of deeper emotion Fletcher would sometimes use the emphasis of old religious phrases. As his own end came so quickly near he might well have repeated to himself the words of Mr. Valiant-for-truth when he was going down to the river side: "I do not repent me of all the trouble I have been at to arrive where I am. My sword I give to him that shall succeed me in my pilgrimage, and my courage and skill to him that can get it." T. R. E.

## News and Views

### New Buildings of the University of London

THE University of London was honoured on June 26, when His Majesty the King, who was accompanied by the Queen, laid the foundation stone of the new buildings which are to be erected on the Bloomsbury site. Their Majesties were accompanied by Lord Irwin, president of the Board of Education, and were received by the Earl of Athlone, Chancellor of the University, and the Mayor of Holborn. The chancellors and vice-chancellors of the principal universities of Great Britain and Ireland, and representatives of Dominion and foreign universities and learned bodies formed part of the notable company which witnessed the ceremony. In the opening address, the Earl of Athlone referred briefly to the history of the University, pointing out that although

the University now has more than 12,000 internal students and a similar number of external students, it has never had a home of its own. The University is, he said, "standing upon the threshold of the great inheritance she has built up for herself, a heritage which means nothing less than that she shall become not only the University of London in name but in deed and in reality London's University." The King replied, before laying the foundation stone, congratulating the University on the approach of the centenary of its existence and on the prospect of possessing a group of buildings as headquarters for its far-reaching work and influence. He continued: "I count it of good omen that in these difficult times we have the opportunity of showing an unshaken faith in the inestimable benefits of knowledge and