

cannot be ignored. Bentham's work, vast in quantity, was fragmentary and limited in scope; but his method of critical thinking, as set out, for example, in the closing words of the "Fragment", was sound, and with "The Federalist" in mind one may read with interest its application in the "Principles" to the ideas of the Declaration of Independence. "With men, who are unanimous and hearty about *measures*", Bentham wrote, "nothing is so weak but may pass in the character of a *reason*." The remark, and the method, have lost none of their validity during the period of nearly two centuries since these words were set down.

MAURICE BRUCE

BERKELEY: FATHER OF PLANT PATHOLOGY

Phytopathological Classics, No. 8

Observations, Botanical and Physiological, on the Potato Murrain. By M. J. Berkeley; together with Selections from Berkeley's "Vegetable Pathology" made by the Plant Pathology Committee of the British Mycological Society. Pp. 108. (East Lansing, Mich.: American Phytopathological Society, 1948.) 1.50 dollars.

MODERN farmers and gardeners are now well acquainted with the possibilities of control of plant disease. Should a new trouble be found, it is usually only a matter of time before a palliative or remedy is discovered. It is, therefore, somewhat difficult for us to realize the state of passive acceptance of crop 'blights' which prevailed a century ago. We can, however, give a far greater measure of appreciation than could be accorded by his contemporaries to the Rev. Miles Joseph Berkeley. He, more than any other, established on a sure foundation the conception of plant disease caused by parasitic fungi.

It is true that fungi had been found growing on plants to their detriment before Berkeley's classic paper on the 'potato murrain' appeared. There was, however, no clear indication whether they were the primary cause, or a secondary effect, of the diseased condition. Berkeley's full powers were called forth by his celebrated literary controversy with Dr. John Lindley, who stated the purely physiological view that the 'murrain' was due to disturbed water relations resulting from unusual climatic conditions. It is impossible not to feel reverence for the scholarship and erudition of Berkeley's paper. Now that it is reprinted in this classic form, it can provide background for teacher and student, and still give inspiration to the more specialized mycologist.

The selections from "Vegetable Pathology" made by the Plant Pathology Committee of the British Mycological Society provoke rather a different note of humility. The completeness of Berkeley's conception of disease as abnormal functioning of plants finds, as yet, no corresponding completeness in modern studies. We are, alas, only too well acquainted with 'Congelatio, freezing' and 'Sphrigosis, rankness', but know all too little about them. Should anyone ask us the cause of 'Exostosis, hard excrescences consisting of sound tissue', we can only say we know they occur, and shake our heads about the cause. It is not that we have been idle, for studies on virus, on mineral deficiencies and on some non-parasitic maladies have explained many of Berkeley's classified diseases. The science of genetics has elucidated still more. The real shortcoming is that whereas Berkeley

directed the attention of mankind to damage caused by parasitic fungi, and showed that it was amenable to control—he it was who suggested the use of sulphur and lime to Mr. Tucker—the science of plant pathology languished until twenty years ago. It then began to gather momentum, is now beginning to command the respect of practical growers, and should look forward to a brighter future.

JOHN GRAINGER

FROM RADIUM TO THE ATOMIC BOMB

Atomic Energy

By Dr. R. R. Nimmo. (Frontiers of Science Series.) Pp. 201. (London: Pilot Press, Ltd., 1947.) 9s. 6d.

THE 'Frontiers of Science' series, of which this is the first number, is stated to be "intended for the growing non-specialist public which wants to keep abreast of recent scientific developments and so keep pace with a changing world". Atomic energy is undoubtedly one such important scientific development, and the general editor of the series, Dr. A. C. B. Lovell, has chosen well in asking Dr. Nimmo to write an account of the progress made in nuclear physics from the discovery of radioactivity in 1896 to the release of the first atomic bomb in 1945. Dr. Nimmo was, during the Second World War, a member of the British team engaged on the atomic bomb project in the United States, and has since been working at the University of Birmingham on the construction of particle accelerators, so that he writes on his subject with considerable authority and knowledge. It is true that Dr. Nimmo divulges no secrets, nor gives any information that is not contained in the official Smyth Report; but he does not hesitate to read between the lines and to set down in detail all reasonable deductions that an expert in this field can make from the official information.

To those with a moderate knowledge of chemistry and physics the first half of the book can be recommended as an excellent introduction to modern atomic structure and as an account of modern experimental techniques. The second half of the book deals with nuclear fission, chain reactions, uranium piles, plutonium, the atomic bomb and atomic energy plants, and will be read with interest by all who have not access to, nor the time nor ability to wade through, the mass of uncorrelated information which has been published during the last few years.

The last chapter of the book, on atomic energy and the future, is naturally speculative, but the problems to be faced and overcome are clearly stated, and the difficulties in the way of rapid development of nuclear physics, such as considerations of military security and the delay in the declassification of fundamental data, are specifically mentioned. The author's attitude is well summed-up in the concluding sentence of the book, "The future is full of hope and promise, but only if we see to it that never again are these new powers used for killing and destruction".

The reviewer has two faults to find with this otherwise excellent book. One is that, though reference is made to the health hazards in atomic energy work, little or no reference is made to the great benefits of the use of radioactive tracers in medicine, agriculture and industry. The other is the unusual arrangement of type and size of page, which, with its long close lines, is very fatiguing to the reader.

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