OBITUARIES

Sir Arthur Harden, F.R.S.

BIOCHEMISTS the world over will have heard with sincere regret of the death of Arthur Harden on June 17 in his seventy-fifth year. By his late colleagues at the Lister Institute and by a host of old pupils from many lands who learnt at his feet or at one time collaborated with him, his loss will be particularly felt, for Harden who, on his retirement in 1930, had completed thirty-three years of service as head of the Biochemical Department, was in himself an institution and a veritable tower of strength in the Lister community.

A pupil of Roscoe and a lecturer in chemistry at Owens College for nine years, Harden came in 1897 to London to take charge of the Chemical and Water Laboratory of the Lister Institute, then the British Institute of Preventive Medicine with its laboratories in Great Russell Street, in succession to Mr. Joseph Lunt, who had received the appointment of assistant in physics to the Astronomer-Royal at the Cape. The Institute was then young, financially very insecure, and struggling to justify its existence to a somewhat impatient generation unused as yet to the trained professional prepared to play his appropriate part in concerted attacks on basic problems of preventive medicine. Soon, however, the position was to change for the better, for in May 1898 the Institute was able to remove to the new buildings in Chelsea Gardens and in December of the same year, the Council of the Institute was happy to accept the munificent donation by the late Lord Iveagh to the Institute's funds.

Harden's training and research experience in chemistry at Manchester and at Erlangen had been, up to the time of his joining the Institute, on strictly orthodox and classical lines, and it was on this sound foundation that he was soon to build the high reputation he later enjoyed as a pioneer of biochemistry in Great Britain.

On his arrival in October 1897, Harden found the then director, Dr. Allan Macfadyen, actively engaged in the study of the fermentative activities of the *coli* group of organisms, and at Macfadyen's suggestion he embarked on an investigation of the breakdown products of glucose. One of Harden's earliest publications on this subject appeared in 1899 in a volume not now readily accessible (*Trans. Jenner Institute Prev. Med.*, Second Series, Macmillan and Co.) but it was a subject to which he often reverted in later years. His great knowledge and practical experience of bacterial enzymes and bacterial metabolism generally enabled him to survey this whole field in masterly fashion for the "System of Bacteriology" (1930).

Certain circumstances of the time, however, drew Harden inevitably to the problem of the chemistry of the yeast cell, which formed the chief preoccupation of his working life for some thirty years. In

1897 Buchner had demonstrated the fermentation of sugar by the pressed yeast juice, while the interest taken by certain members of the Council of the Lister Institute in industrial fermentation processes had led in 1899 to the establishment of a Hansen laboratory under the direction of Dr. G. Harris Morris. This laboratory was, a year later, merged in the general chemical laboratory directed by Harden. Further, the efforts of Macfadyen and Rowland to secure the juices of pathogenic bacteria by grinding at the temperature of liquid air, an elaborate plant being available for this purpose, represented at least cognate inquiries to those on which Harden and his first collaborators, Sydney Rowland and W. J. Young, embarked with yeast juice as the object of test.

Here is not the place to follow in detail the story of the discoveries made by Harden and his collaborators in the course of their many years study of the chemical processes involved in the fermentation of sugar by yeast juice. That study is truly classic, and its issues have not only illuminated our knowledge of the chemical processes within the yeast cell but have also provided clues to the chemical dynamics underlying such seemingly remote processes as muscular activity and ossification of bone. For his work on alcoholic fermentation Harden was in 1929 awarded the Nobel prize in chemistry, shared with von Euler.

The yeast cell has been a gold mine to many kinds of diggers, and not least to those immersed in vitamin studies. It is not surprising, therefore, that Harden towards the end of the War of 1914-18 entered the nutritional field for a time, and with his colleague Zilva contributed a series of valuable papers on the antiscorbutic and antineuritic vitamins and their occurrence in various foods and drinks, not excluding beer.

Harden's outside links and interests were numerous, but perhaps his services as editor-in-chief of the *Biochemical Journal* for twenty-five years from 1913 until 1938 deserve special mention; for the influence he was able to exert in this capacity on the development of biochemistry in Great Britain has been incalculable.

Many honours came to him; an honorary LL.D. from Manchester and from Liverpool, an honorary D.Sc. from Athens, the Davy Medal of the Royal Society awarded him in 1935 and the honour of knighthood in 1936. Until some nine months ago, Harden continued to visit the Institute every day from his home in Bourne End and his interest in all the activities of the Institute never flagged. At his death he had been for nine years a valued member of the governing body of the Institute. A widower for twelve years, Sir Arthur leaves no family. To his sisters we would extend our sincere sympathy.

J. C. G. LEDINGHAM.