

## MARTHA ANNIE WHITELEY (1866-1956): CHEMIST AND EDITOR

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Few women chemists whose careers began before 1900 made important contributions to major technical works still to be found in reference sections of science libraries. But Martha Annie Whiteley, coeditor and then editor-in-chief of the eleven-volume fourth edition of *Thorpe's Dictionary of Applied Chemistry* (1937-1954) is an exception.

The original three-volume edition of this work was produced under the editorship of British chemist Sir Edward Thorpe (1845-1925) over the period 1890-1893. During the next four decades it was greatly expanded, a five-volume second edition being brought out by Thorpe in 1916-1919 and two more volumes being added by Foster Morley in 1927-1930 after Thorpe's death. However, within a few years, because of the rapid growth of the field, a complete revision was being



Martha Annie Whiteley, c. 1907, courtesy of the Archives of Imperial College of Science, Technology and Medicine

planned. Supplementary volumes were issued in 1934 and 1935 as a stop-gap measure and the first volume of the revised fourth edition appeared in 1937. The revision was expected to take nine years, a projection which prompted a *Nature* reviewer of volume 1 to remark that the first volumes would be out-of-date before the last came out (1). In fact seventeen years were to pass and World War II to intervene before the work was completed with the publication in 1954 of volume 11; a combined index followed in 1956. Coeditors were Sir Jocelyn Field Thorpe (not a relative of Thomas Edward) and Martha Annie Whiteley, who was already very familiar with the material, having helped extensively in the preparation

of earlier editions. With Sir Jocelyn Thorpe's death in 1940 about the time of publication of volume 4 of the fourth edition, Martha Whiteley, although then seventy-four and somewhat handicapped physically, became editor-in-chief, with help from an assistant editor, A. J. E. Welch. She also had the backing of a distinguished editorial board; the latter consisted of I. M. Heilbron, Professor of Organic Chemistry at Imperial College London, and H. J. Emeléus, Reader in Inorganic Chemistry, at Imperial College, Sir Alexander Todd, Professor of Chemistry at Manchester University, and H. W. Melville, Professor of Chemistry at Aberdeen University. Throughout World War II Whiteley's work was done at Cambridge, where she was given accommodation and library facilities. In 1944 she returned to London and prepared the last four volumes, working from Imperial College and her South Kensington flat, her house having been destroyed by bombing.

This last edition of a chemical encyclopedia on which major effort was put forth over more than sixty years covered almost every topic relating to chemistry. Although it can still be used as a comprehensive source for much basic information, it is of considerable interest now from another point of view as well, namely, the broad historical perspective it can give of the field up to the late 1940s. Many entries are in fact careful, detailed reviews by leaders in the field of progress in particular areas and topics up to that time; the essays on stereochemistry (W. H. Mills) and on tautomerism (J. W. Baker) are two of many such articles of particular note. Also striking is the long essay on synthetic drugs by three chemists from Imperial Chemical Industries, Manchester (S. Ellington, W. R. Boon, and H. C.

Carrington), which sets out in precise detail the relatively limited collection of medicinal compounds available fifty years ago, when, for example, the sulfa drugs were still the major systemic antibacterial agents. Short discussions afford summaries of work on newly discovered isotopes, such as tritium, and recently isolated compounds such as streptomycin, while longer essays cover standard, classical topics such as the theory, construction, and performance capabilities of the chemical balance, including the successive changes and improvements from the instruments of the early nineteenth cen-



Group photograph, c. 1912 - Imperial College of Science and Technology, London, women students and staff - M. A. Whiteley seated third from left

tury to the London-manufactured Oertling micro-assay balance much used by the 1930's.

This huge, ambitious work, in its several editions, is associated primarily with the Thorpes, Sir Edward and Sir Jocelyn. However, Martha Whiteley's efforts as both contributor and editor over almost four decades were remarkable, especially her work on the fourth edition, the labor of her retirement years. She has good claim to a note in the history of the field.

Among the most outstanding women chemists of her time and a notable figure in British academic life, she was one of the first women to hold a full staff position in the chemistry department of a coeducational university in Britain. She was also one of the first to hold a teaching position at Imperial College, where she did

much to gain the acceptance of women students and foster their work in chemistry at both undergraduate and graduate levels (2).

Born in Hammersmith, London, November 11, 1866, the second daughter of William Sedgwick Whiteley and his wife Mary (Bargh), she attended Kensington High School and the Royal Holloway College for Women (London), graduating with a B.Sc. in 1890. She then taught for eleven years, first at Wimbledon High School and after that at St. Gabriel's Training College (London); but by 1898 she was also continuing her studies, having begun work at the Royal College of Science (later part of Imperial College) under the guidance of Professor Sir William Tilden. She received a London D.Sc. in 1902, presenting a dissertation on the preparation and properties of amides and oximes, and the following year was invited by Tilden to join the Royal College of Science teaching staff. Promoted to demonstrator in 1908, she became lecturer in 1914, at age forty-eight, and for fourteen years, from 1920 until she retired in 1934, held the post of assistant professor (a senior academic post at Imperial College, later designated as reader).

Her early research, published in the period up to about 1909, continued her dissertation studies on the amide and oxime derivatives of dicarboxylic acids and related cyclic ureides, including derivatives of caffeine and barbituric acid. She focused particularly on the problem of tautomerism in oximes, an area receiving considerable attention at the time, and a special interest of Sir Jocelyn Thorpe. Although Whiteley was Thorpe's junior colleague at Imperial College and his collaborator in many projects, it is clear from her writings that she had her own research program. Her work on amides and oximes continued after World War I, she and her students and collaborators (including two women, Edith Usherwood and Dorothy Yapp) publishing at least three full papers during the 1920's (3).

Throughout the war, the chemistry staff at Imperial College put their efforts into urgently needed government work. With the cutting off of Britain's pre-1914 supply of German-manufactured chemicals, crash programs had to be started to try to make good the deficit. Whiteley collaborated with Thorpe on the synthesis of drugs badly needed for military hospitals, especially phenacetin, novocaine and b-eucaine, until then imported. She also worked with Thorpe, a member of the government's Trench Warfare Committee, on the production of lachrymatory and vesicant gases for military use.

In 1925 she and Thorpe brought out their *Students' Manual of Organic Chemical Analysis: Qualitative and*

*Quantitative*, a work which had its origins in the accumulated experience of twenty years' teaching in the organic chemistry laboratories of Imperial College; Whiteley had directed the advanced course throughout much of this period. The 241-page work, a comprehensive and up-to-date compilation of methods used for estimating the more common types of organic materials with full experimental procedures included, was a much welcomed addition to the then meager literature on organic analysis. In addition to presenting clear, practical information, it traced the historical development of some of the most important areas of the subject. Thus the section on the quantitative estimation of carbon and hydrogen included a description of the apparatus devised by Lavoisier 140 years earlier, which, though it failed to give satisfactory results, established as early as 1784 the basic method of burning the organic sample and collecting and weighing the combustion products (4).

One further area in which Martha Whiteley's influence was considerable was in the long campaign to bring women into fellowship in the London Chemical Society (5). She and her friend and fellow chemist Ida Smedley MacLean (1877-1944), a research worker at the Lister Institute of Preventive Medicine, were patient leaders in this effort over almost two decades; and in 1920, when women were finally admitted, Whiteley was one of the first to be formally accepted. The first woman elected to the society's council, she served from 1928 to 1931.

Although several British women from about Whiteley's time were productive research workers, most of them made their contributions as assistants to male chemists. A few developed their own research programs and achieved notable success in newer, nontraditional branches of the field, Ida Smedley MacLean's work in biochemistry being especially outstanding (6). Whiteley, however, was probably the only one who found a place as an independent worker in an established area of chemistry and remained active in research, teaching, and technical writing throughout a long career at a major educational institution—a notable achievement for a woman chemist of her generation.

Her services to chemistry in general and Imperial College in particular were formally recognized in 1945 when she was made an honorary fellow of the college. An able teacher, she was remembered by students and younger colleagues as a source of inspiration and a dependable guide. She died on May 24, 1956, in her ninetyeth year, not long after she had seen the *Dictionary* revision through to its completion.

## REFERENCES AND NOTES

1. H. E. W., "A Chemical Encyclopedia," *Nature*, **1937**, *140*, 1076-1077.
2. A. A. Eldridge, "Martha Annie Whiteley. 1866-1956," *Proc. Chem. Soc. London*, June, 1957, 182-183; *London Times*, May 26, 1956, p. 10; information from Anne Barrett, Archivist, Imperial College of Science, Technology, and Medicine, London.
3. Martha Whiteley's papers include the following: "The Oxime of Mesoxamide and some Allied Compounds," *J. Chem. Soc.*, **1900**, *77*, Pt. 2, 1040-1046; "The Action of Barium Hydroxide on Dimethylvioluric Acid," *ibid.*, **1903**, *83*, 18-23; "The Oxime of Mesoxamide and Some Allied Compounds. Part II. Di-substituted Derivatives," *ibid.*, **1903**, *83*, 24-45; "Studies in the Barbituric Acid Series. I. 1:3-Diphenylbarbituric Acid and Some Coloured Derivatives," *J. Chem. Soc. Trans.*, **1907**, *91*, 1330-1350; (with Edith H. Usherwood) "Oxime of Mesoxamide (Isonitrosomalonyamide) and Some Allied Compounds. Ring Formation in the Tetrasubstituted Series," *ibid.*, **1923**, *123*, 1069-1089; (with Arthur Plowman) "Oxime of Mesoxamide (Isonitrosomalonyamide) and Some Allied Compounds. Structural and Stereoisomerism in the Methyl Ethers of the *p*-Tolyl Derivative," *ibid.*, **1924**, *125*, 587-604; (with Dorothy Yapp) "Reaction of Diazonium Salts and Malonyldiurethan," *J. Chem. Soc.*, **1927**, *130*, 521-528.
4. See A. T. Schwartz, "Instruments of the Revolution: Lavoisier's Apparatus," *Bull. Hist. Chem.*, **1989**, *5*, 31-34.
5. J. Mason, "A Forty Years' War," *Chem. Br.*, **1991**, *27*, 233-238.
6. See M. R. S. Creese, "British Women of the Nineteenth and Early Twentieth Centuries who Contributed to Research in the Chemical Sciences," *Br. J. Hist. Sci.*, **1991**, *24*, 275-305.

## ABOUT THE AUTHOR

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The *OUTSTANDING PAPER AWARD* for 1997 goes to Dr. David E. Lewis for his publication "Aleksandr Mikhailovich Zaitsev (1841-1910), Markovnikov's Conservative Contemporary," which appeared in Number 17/18 of the *Bulletin*.

The 1996 Dexter Award address by Dr. Keith J. Laidler was presented in video format at the San Francisco ACS Meeting in April, 1997. Copies of the video may be purchased by sending \$15 (check made out to HIST) to Dr. Vera Mainz, Secretary-Treasurer (her address may be found on the inside cover).