

Book Reviews

Josiah Willard Gibbs: The History of a Great Mind.

Lynde Phelps Wheeler. New Haven, Conn.: Yale Univ. Press, 1951. 264 pp. \$4.00.

It is not to be expected that the biography of a scientist like Willard Gibbs can convey very much to the general reader, except by indirection, concerning the man's work. More than the 200-odd pages of the present account would be needed to give the non-specialist any grasp of Gibbs' varied achievements in thermodynamics, statistical mechanics, vector analysis, and multiple algebra. Yet Gibbs has become a legendary figure not only to chemists, mathematicians, and physicists who encounter his work, but in some degree to the general public as well, which is learning to recognize him as probably America's outstanding scientific figure of the last century. Professor Wheeler's book is not another attempt, like the chapter of J. G. Crowther or the book of Muriel Rukeyser, to explain Gibbs by some sort of alchemy to persons without scientific background. But it will be a valuable companion volume to the serious works on Gibbs.

For a number of years the devoted students and disciples of Gibbs—men like Charles S. Hastings and E. B. Wilson—have been publishing here and there excellent reminiscences and biographical sketches of their teacher. The author of the present volume was also a pupil of Gibbs. A short time ago he presided over the publication of a small volume of Gibbs' early studies in applied mechanics. He has now made good use of the published biographical materials (of which he gives an extensive bibliography), as well as of valuable unpublished letters and manuscripts. With the aid of this material, he has written a clear and unpretentious book that is the only satisfactory study of the Yale scientist yet published, and that is worthy to take its place beside the Donnan and Haas *Commentary on the Scientific Writings of J. Willard Gibbs*.

The general reader will find portions of this book difficult, but there is something for him also. Wheeler gives a charming picture of the family and boyhood of Gibbs, of his early years at Yale, and of his rise to international eminence. It seems clear that Gibbs was genuinely appreciated in this country earlier than is commonly believed. Even the publication of his epoch-making trilogy of papers, "On the Equilibrium of Heterogeneous Substances," which no member of the Connecticut Academy could fully grasp or appreciate, testifies to the respect in which he was held by his colleagues before he had really demonstrated his powers. "We knew Gibbs and took contributions on faith," the president of the academy is quoted as saying. Clerk-Maxwell's prompt assistance in spreading the reputation and discoveries of Gibbs is documented by the letters of Gibbs' British correspondents. In America appreciation of Gibbs' achievement was early

displayed by his election to the National Academy of Sciences and to the American Academy of Arts and Sciences and by an offer from President Gilman of a position on the faculty of Johns Hopkins.

One of the paradoxes of Gibbs' work has been the large number of fruitful applications of research that must have struck contemporary Americans as abstract and forbidding in the extreme. The climax of the Gibbs story—and I suppose, from some points of view, its fulfillment—is to be found in the vast literature that burgeoned in the decades following his death out of the few pregnant pages devoted to the phase rule. How fitting was this outcome is evident if we realize what Wheeler is the first to emphasize, namely, that Gibbs began his scientific career with interests that were mainly practical. His earliest ventures in science were concerned with improvements in the useful arts: the invention of a hydraulic turbine and of a railway car brake. His earliest paper, read before a meeting of the Connecticut Academy of Arts and Sciences early in 1866, dealt with the problem of units in mechanics. It is published as Appendix II in this excellent biography. Gibbs stood on the threshold of a new American appreciation of abstract science; his personal transition from practical invention to theoretical science of a most fundamental sort is a bench mark in the development of science in this country.

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The Polarographic Method of Analysis. 2nd ed. Otto

H. Müller. Easton, Pa.: Chemical Education Pub., 1951. 209 pp. \$3.50.

In keeping with its intended use as a college textbook, the first chapter presents a review of various types of electroanalytical methods. An excellent feature of the chapter is the analogy the author draws between potentiometric titration curves and polarographic waves. This reviewer is less enthusiastic about the discussion of electrode potentials on pages 10–12 in terms of "electron pressure," and the definition of indicator electrode on page 13 that excludes such common indicator electrodes as the silver electrode and the hydrogen electrode.

The emphasis on simple manual equipment in Chapter II on apparatus adds instructional utility to the text. This chapter also contains a discussion of many measurement details that should be useful to the student. Recording instruments are treated much too cursorily even for an elementary text. The biased remarks on page 52 present a very unfair picture of the capabilities of the most recent recording instruments.

Succeeding chapters discuss the factors governing the limiting current, the equations of waves of various types of reactions, and polarometry (amperometric titrations). These are followed by a chapter on spe-