the American Phytopathological Society, the American Society of Plant Physiologists, the Ecological Society of America, the American Society of Plant Taxonomists, the Genetics Society of America, the Mycological Society of America and numerous other organizations. For example, the American Phytopathological Society has a membership of 1,128; the American Society of Plant Physiologists, 623; the American Society of Plant Taxonomists, 514; and the Mycological Society of America, 384.

TABLE 1

| Sub-science | "Interests" of men | "Interests" of women | Total | Per cent. of women |
|---|---|---|---|---|
| Systematic botany | 199 | 34 | 233 | 15 per cent. |
| Morphology | 165 | 54 | 219 | 25 " " |
| Cytology | 124 | 32 | 156 | 21 " " |
| Mycology | 107 | 22 | 129 | 17 " " |
| Anatomy | 79 | 26 | 105 | 25 " " |
| Algology | 30 | 9 | 39 | 23 " " |
| Paleobotany | 31 | 4 | 35 | 12 " " |
| Bryology | 17 | 7 | 24 | 29 " " |
| Phylogeny | 8 | 0 | 8 | 0 " " |
| Total of morphological sub-sciences | 760 | 188 | 948 | 20 " " |
| Physiology | 349 | 57 | 406 | 14 " " |
| Pathology | 143 | 9 | 152 | 6 " " |
| Ecology | 122 | 17 | 139 | 12 " " |
| Genetics | 100 | 20 | 120 | 17 " " |
| Plant Geography | 32 | 1 | 33 | 3 " " |
| Economic Botany | 29 | 2 | 31 | 6 " " |
| Grand Total | 1,535 | 294 | 1,829 | |

Table 1 does not include some of the minor subdivisions listed in the Year Book, such as kryobiology, atmometry and micrurgy. One botanist gives as her interests—"pathology; morphology; peanuts."

The five universities with the largest numbers of members are Cornell with 37, California (Berkeley) with 35, Harvard with 33, Wisconsin with 25 and Illinois with 22. Thirty-five members are listed from the U. S. Department of Agriculture in Washington.

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# SCIENTIFIC BOOKS

## PHYSICAL CHEMISTRY

*Physical Chemistry, A Brief Course.* By LOUIS J. BIRCHER, Ph.D., professor of physical chemistry, Vanderbilt University. xvi + 429 pp. Prentice-Hall Chemistry Series, Wendell M. Latimer, Ph.D., editor. New York. 1940.

THE preface states:

> The value of specific training in theoretical or physical chemistry is being recognized not only for students who are majoring in chemistry and chemical engineering, but also for those who are preparing for medicine, biology, geology, agriculture, and other branches of engineering. . . . In an effort to meet the needs of students who can profit by a brief course in physical chemistry taken in the intermediate college years, certain materials which seem particularly useful have been selected from the larger field of theoretical chemistry. . . . This material and certain other topics that are included should serve as a background for advanced work in chemistry or for those other sciences in which chemistry plays an important part.

"Each part of the book stresses a phase of the problems of solubility and reactivity." Part I (pp. 3–108) deals with the role played by atomic and molecular structure; Part II (pp. 109–220), transitions from state to state and fugacity as a controlling factor in chemical reactivity; Part III (221–358), physicochemical change, reaction velocities and the methods of measuring reactivity; Part IV (359–420), directions for 12 laboratory experiments.

Simple proportion and the natural logarithm constitute the mathematics necessary for understanding the equations in this book. Most of the subject matter is to be found to-day in the better type of college texts on inorganic, qualitative and quantitative analysis. The merit of the book consists in the organization of this material in one volume for those students of agriculture, biology and medicine who do not have the preparation for a standard course in physical chemistry for which a knowledge of elementary calculus is prerequisite. For this group of students the book can be recommended as a readable and appropriate text.

However, if the book is addressed to students of chemistry, chemical and other branches of engineering, it should be pointed out that the American Chemical Society's committee has recently taken the position that they do not recognize a course in physical chemistry which does not require the use of the calculus as meeting their requirements for accrediting a school.

The use of fugacities is properly emphasized as "more exact measures of reactivity," but it is questionable if fugacity merits the space assigned when more immediately practicable concepts for the students addressed are necessarily dismissed with elementary statements and problems.

The distinction between reactivity and rate of reaction is not clear. This is evident from the highly plausible, but nevertheless incorrect statement (p. 226): *"The number of collisions between the molecules involved in a chemical reaction is proportional to the product of the active masses (activities), a,* or often, less accurately, the partial pressures or concentrations of the several reacting substances. (Italics mine.)

On pages 226–227, this "generalized" treatment leads to equations for the velocity of a reaction as proportional to the product of activities! Later in the

chapter on reaction velocity (p. 343), these equations are referred to, but become, without explanation, the products of concentrations. Nothing is said about the critical complex or the importance of activities and their coefficients at a point where they are of the greatest importance. It has been repeatedly emphasized in the American literature for the past fifteen years that if the italicized statement and the equations (p. 226–227) were correct, there could be only negative salt catalysis and never positive salt catalysis in contradiction to well established experimental evidence.

The author is to be commended for introducing the concept of osmotic coefficient. This innovation, for an elementary book, will save the student from unlearning later erroneous statements about ionic dissociations.

Unfortunately, however, after all the preparation on fugacity, activity of the electrode (p. 273) and of the ions, (p. 268), one learns (p. 274), that "hydrogen ion concentration is the most exact measure of the 'acidity' of a solution." The student is given no inkling that pH really involves the activity and not the concentration of hydrogen ion.

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## KINETIC THEORY OF GASES

*An Introduction to the Kinetic Theory of Gases.* By SIR JAMES JEANS, O.M., F.R.S. 311 pp. New York: The Macmillan Company; Cambridge University Press. 1940. $3.50.

THIS book lies somewhere between a treatise such as represented by the author's "The Dynamical Theory of Gases" and a text-book for advanced students. It is, in fact, the author's intention to supply a book which will provide such knowledge of the kinetic theory as is required by the average serious student of physics and physical chemistry, and at the same time give the mathematical student the equipment he should have before undertaking the study of specialist monographs.

The book differs from the author's larger work above cited in that the subject is covered in a more elementary manner, with less mathematical rigidity and with greater attention to the physical and descriptive aspects. The various concepts are illuminated, moreover, to an extent unusual in a book of this kind, by the inclusion of accounts of experimental investigations.

The book covers a wide field, and it is inevitable that there should be a considerable range of difficulty in the various parts. It is probable that the student who has already an acquaintance with the subject will get more benefit from the work than will a beginner; and to the semi-advanced student the book will constitute a valuable reference to which he may turn to refresh his memory when the practical need occurs for drawing upon various parts of the subject.

The work is rich in references both on the experimental and theoretical sides. It contains much useful numerical material and a helpful appendix, containing certain special standard theorems and also tables convenient for numerical calculations associated with the subject.

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# SPECIAL ARTICLES

## ISOLATION OF THE VIRUSES OF WESTERN EQUINE AND ST. LOUIS ENCEPHALITIS FROM *CULEX TARSALIS* MOSQUITOES[1]

IN North America three types of epidemic virus encephalitis are recognized. Two of these, the eastern and western types of equine encephalomyelitis, are believed to be mosquito-borne. Mosquito transmission has been repeatedly demonstrated in the laboratory (summarized by Davis[2]), but until now the virus has never been isolated from mosquitoes collected in epidemic areas. With respect to the St. Louis encephalitis virus opinions of observers have differed as to the mode of transmission. Lumsden[3] concluded that it was probably transmitted by Culex mosquitoes. Mitamura and associates[4] have reported successful transmission of this virus in the laboratory by *Culex pipiens*.

In the Yakima Valley, Washington, evidence was obtained by Hammon[5] and Hammon and Howitt[6] during the summer of 1940 indicating the probable presence in man and horses of both the western equine

[1] Part of a Cooperative Survey of Encephalitis in the Yakima Valley by the University of California, the State College of Washington, the Washington State Health Department, the Yakima City-County Health Department and the U. S. Department of Agriculture, Bureau of Entomology and Plant Quarantine. Aided by a grant from the Natural Foundation for Infantile Paralysis, Inc.

[2] W. A. Davis, *Amer. Jour. Hygiene,* 32: 45, 1940.

[3] L. L. Lumsden, Unpublished official report, 1933.

[4] T. Mitamura, S. Yamada, H. Hazato, K. Mori, T. Hosoi, M. Kitaoka, S. Watanabe, K. Okubo and S. Tenjin, *Tr. Jap. Path. Soc.,* 27: 573, 1937.

[5] W. McD. Hammon, *Jour. Am. Med. Assn.,* 117: 161, 1941.

[6] W. McD. Hammon and B. F. Howitt, To be published.