stinging occurs, and the invariable similarity of the attacks.

CHAS. E. VON GELDERN, M.D.
SACRAMENTO, CALIF.

SCIENTIFIC BOOKS

Three Centuries of Chemistry, Phases in the Growth of a Science. By IRVINE MASSON, D.Sc., F.I.C., professor of chemistry and head of the department of pure science, The University of Durham. The Macmillan Company, New York, 1926, 191 pages, 1 plate.

OF the recent histories of chemistry which have come to the reviewer's notice, the present work is one of the most stimulating and inspiring. The volume is not a complete history, even for the three centuries which it is supposed to cover, the author having "chosen to portray the genesis and evolution of ideas rather than to rehearse every discovery that gains a place in our chemical text-books." Very little information, for example, is given concerning the rise and development of organic chemistry, these phases of the subject being regarded by the author as of too specialized a character for the non-technical reader. Professor Masson's book, therefore, should not be read as a mine of information, but rather for its suggestiveness and the inspiration which it arouses to pursue further the history of a great department of science.

In Part I, upon "The Rise of Scientific Thought," the author after a brief introduction discusses the work of Sir Francis Bacon and its influence in establishing the Philosophical or Invisible College of London about the beginning of 1645. From this club of scientists there afterwards emerged the Royal Society which Professor Masson regards as the *fons et origo* of a considerable part of subsequent scientific developments. He mentions in this connection the stimulating influence of Boyle and others of the Royal Society upon their fellow member, John Winthrop, Jr., the founder of chemistry in the English Colonies of North America. The letters written to the Royal Society by Winthrop, Leonard Hoar, William Avery and others are of particular interest to American readers, for they show that the efforts of the society "to season the youth of New England with its experimental philosophy" had begun to bear fruit.

In Part II upon "The Genesis of Modern Chemistry" the influence of Boyle "the father of chemistry" is traced. This section of the book is most delightful reading, for fine scholarship is intermingled with warm human interests. It is the most accurate and appreciative evaluation of the work of Boyle that has yet been published and deserves to be read again and again.

In Part III upon "The Search for the Elements" five interesting chapters are devoted to the work of Mayow, Hales, Hooke and other English chemists upon combustion, to the growth of the phlogiston hypothesis under Stahl, to the development of the use of the balance under Black, to the investigation of gases by Cavendish and Priestley, and to the final overthrow of the conceptions of the four elements and of phlogiston by Lavoisier. In this section Professor Masson gives well-balanced accounts of the work of these chemists with brief references to their influences and personalities. In commenting upon the inheritance of scientific knowledge, on page 96, he traces Mayow's experiment of burning a candle in a jar inverted over water back to Sir Francis Bacon. He might have followed this path of transmission to a much earlier date, for the experiment is recorded in a Latin translation (*De Ingeniis Spiritualibus*) of the "Pneumatica" of Philo of Byzantium who lived in the second century B. C.

In Part IV upon "The Search for the Structural Units," the final section of his book, Professor Masson traces the development of the ideas of the molecule, atom and ion. This is the least satisfactory part of an otherwise most successful volume, for the treatment is one which appeals neither to the chemist nor to the non-technical reader. The effort to crowd the chemical developments of the past 125 years into a small compass of forty pages is an impossible task under almost any plan of curtailment. Part IV of "Three Centuries of Chemistry" is in consequence a fragment with little of the humanistic atmosphere which gives so much of quality and charm to the earlier pages. The postscript upon Professional Chemistry, which Professor Masson has added to his book, is an essay that will appeal more to teachers of chemistry than to the general reader.

"Three Centuries of Chemistry" leaves the reader with the unsatisfied feeling of a person who has had his appetite whetted for more. One wishes that Professor Masson might have included many more of the personal sketches which he has drawn so vividly in the case of Bacon, Black, Cavendish, Hartlib, Hooke, Mayow, Petty, Priestley, Wallis, Wilkins and Wren. These pen pictures are almost epigrammatic in brevity, yet they convey clean-cut impressions, so that the reader is in no doubt as to the character and personality of the men described. Hooke, for example, is portrayed as "a hollow-cheeked, sallow, wry-bodied little man; a 'fretful porpentine,' far too ready to stick a quill into any one whom he suspected of impinging on his own discoveries; very jealous for his own credit, in that uncomfortably assertive way sometimes seen in an unprepossessing person with a good brain." The reader not only sees the man but actually knows him.

The book is provided with a good index of persons and subjects. The frontispiece is an interesting old astronomical plate, with figures of Copernicus, Galileo and Kepler, reproduced from the fifth edition of John Wilkins's "Discourse Concerning a New World and Another Planet." The volume is printed on heavy paper, almost like cardboard—a little too inflexible for convenient turning of the pages. It is cordially recommended not only to all chemists but to every student of the history of science.

C. A. BROWNE

Die Vitamine, Kritische Uebersicht der Lehre von den Ergänzungsstoffen. VON RAGNER BERG, leiter des physiologisch-chemischen Laboratoriums auf Weisser Hirsch. (Germany.) Zweite, umgearbeitete Auflage. S. Hirzel, Leipzig, 1927. pp. 714, with subject index, author index and a bibliography of 3,500 titles.

THIS monograph is an able and useful treatise on *nutrition,* with special reference to the vitamines. It is much more than a manual on the vitamines. For example, we have comprehensive and critical chapters on the biological value of the different proteins, on mineral metabolism, on diet as related to growth, on nutritional edema and on pellagra, in addition to shorter sections on sprue, on "Mehlnährschaden" and on "Milchnährschaden." In the chapter on beri-beri and the various forms of polyneuritis the author gives a full and fair account of the data and views of the Japanese investigators who claim that human beriberi is a different, or at least a more complicated, disease than the acute polyneuritis induced in animals by vitamine B free diets. The work of Evans, Sure and others on the so-called fertility vitamine (E) is reviewed in the chapter on "Growth," but Berg does not recognize this work as having demonstrated a new vitamine.

The final chapter includes an extensive table showing the distribution of the vitamines in foods. Here the author deviates from the usage in English nutrition literature in designating the antiarchitic vitamine as "E." In English and American nutrition literature this vitamine is usually given the letter "D," while "E" is being applied to the fertility vitamine of Evans and Sure. This is an unfortunate confusion.

The author is critical, catholic and fair in the treatment of the extensive literature. In the preface he extends special thanks to American investigators for sending him reprints and monographs in the vitamine field. The monograph ranks with the best on the subject.

A. J. CARLSON

UNIVERSITY OF CHICAGO

SPECIAL ARTICLES

A PRELIMINARY REPORT ON THE STUDY OF THE EMISSION SPECTRA AND SURFACE TENSION ALTERATIONS IN EXPERIMENTAL ANIMAL TUMORS[1]

IN the Emery Laboratory of Experimental Radiology and Roentgenology an earnest effort has been made to study, from the physical and physical-chemical point of view, the initial alterations undergone when a cell is transformed from a state of normality to one of malignancy, and the resulting physical-chemical and biological changes accompanying such manifestations. A portion of the work, that already completed, has proved fruitful and has been reported on numerous occasions by one of the writers and shall not be included in this preliminary announcement which deals entirely with our studies of spectrum analysis and surface tensions.

Knowing the physical nature and modus operandi of the various spontaneous and induced radiations at our disposal, we feel that the true action of radium and roentgen therapy must be accurately studied and controlled to bring about a scientific treatment of the most dreaded disease which the medical and allied professions are called upon to combat.

To the present time, the portion of our researches reported in this communication have been confined almost entirely to the behavior of normal and cancerous tissues which have not been subjected to any form of ray therapy. This is necessary before we are able to study any effect resulting from treatment by radiation.

These investigations have offered results which are of extreme scientific interest and importance.

First, we shall consider the method and scope of our researches in the field of spectroscopy.

All animals used were killed by decapitation to eliminate the possibility of a tissue change due to the prolonged administration of ether anesthesia.

In order that all types of normal tissue occurring in the body might be studied, the heart, peritoneum, lungs, liver and brain from one or more rats were removed, weighed, ignited in a platinum crucible and thoroughly ashed in the flame of a blast lamp. When sufficiently cooled, the sample was again weighed, and the percentage of ash calculated, the ash then being reduced to a homogeneous powder in a chemically clean agate mortar.

In order that each of the organs previously men-

[1] From the Emery Laboratory of Experimental Radiology and Roentgenology, Hahnemann Medical College and Hospital, Philadelphia.