per cent, respectively, or an over-all yield of 89 per cent. The 432 mg. of radio-2-acetone thus obtained were diluted with 1.20 gram of ordinary acetone as a carrier and condensed with sulfuric acid essentially according to the procedure in *Organic syntheses* (Collective Vol. I. New York: Wiley, 1941. P. 341), adapted to small quantities. The 296 mg. of distillate were diluted with 865 mg. of ordinary mesitylene as a carrier, purified by preparation and recrystallization of the monosulfonic acid (melting point, 74–75° C.), which was then decomposed with HCl, and steam-distilled. The distillate was finally distilled in a high vacuum over sodium. The product weighed 672 mg. and had a n D/20° = 1.4976, as against a recorded value of 1.4967.

The radioactivity was measured in a thin-window, scale-of-64 Geiger counter. The values obtained, corrected for absorption and geometry, were: for radio-1-acetic acid, $270 \cdot 10^6$ disintegrations per minute and per gram carbon; for radiomesitylene, $6.3 \cdot 10^6$ disintegrations per minute and per gram carbon. The radioactivity of the mesitylene indicates a 10-per cent yield, based on acetone.

Part of the mesitylene was converted into *1,3,5-trimethyl-radio-1-cyclohexane* by catalytic hydrogenation (by W. Fowkes) under pressure in a microbomb.

A. V. Grosse and S. Weinhouse
Houdry Laboratories
Houdry Process Corporation of Pennsylvania
Marcus Hook, Pennsylvania

Book Reviews

The electron microscope: an introduction to its fundamental principles and applications. **(2nd ed.) E. F. Burton and W. H. Kohl. New York: Reinhold, 1946. Pp. 325. (Illustrated.) $4.00.**

Prior to the late 1930's the development of the electron microscope was confined to Germany and Belgium, and as a consequence we find that the early books treating this instrument are written in German. The University of Toronto was the first institution on this continent to attempt to duplicate and improve upon the work of the European physicists, and the guiding force behind this successful effort at Toronto is the senior author of the present volume, Prof. Burton. With the exception of certain treatises on electron optics, the first book in English devoted to electron microscopy was the first edition of *The electron microscope,* published in 1942.

In the intervening four years there have appeared in this country two other books on electron optics and microscopy: *Seeing the invisible,* by Gessner G. Hawley, and *Electron optics and the electron microscope,* by Zworykin, Morton, Ramberg, Hillier, and Vance, all of the RCA staff. The former volume is so elementary as to be of interest only to the generally curious and uncritical reader, while the latter is very thorough and mathematically rigorous. The second edition of Burton and Kohl's *The electron microscope* is nicely balanced between these two extremes and should be of use and interest to those whose work is connected with electron microscopy but whose training in mathematics and physics is not advanced. There are many persons working either directly or indirectly with the microscope, or contemplating the use of the instrument, who would like to know enough about it to comprehend its possibilities and limitations but who do not care to become experts in the theory, construction, and operation of such a highly specialized instrument. It is to these persons, as well as to those of training sufficient to afford them a genuinely intelligent curiosity about the electron microscope, that the book is directed.

For the most part the book rearranges and enlarges upon the material contained in the first edition. Electron microscopy has advanced rapidly in America since 1942, and the authors have expanded certain chapters and have written new ones in a conscientious effort to keep up with current research. The chapters on electrostatic lenses and microscopes have been reduced in length, and those on magnetic microscopes have been extended to reflect the relative success in this country of the magnetic type of instrument.

The contents of the book can be reviewed under four major divisions. In the first the principles of geometric and physical optics are developed with particular reference to the compound light microscope and to the meanings of magnifying power and resolving power. In the second division the wave nature of the electron is introduced and discussed, and the fundamentals of electron optics are elaborated. The geometry of the focusing action of electrostatic and magnetic lenses is derived from elementary notions, with constant reference to analogies with the light microscope. The third general division is given to an explanation of the construction and operation of the complete electron microscope, the University of Toronto microscope of 1944 being used as an example. Here the authors may be accused of myopia, since all instruments in use on this continent, with the exception of three, are those made by RCA. A detailed description of the commercially available microscope would have been more generally useful to the readers. In the last section of the book one finds an excellent résumé of the research work which has been done with the aid of the electron microscope. This discussion is ample for a book of this size, and it has been critically written and profusely illustrated with about 50 half-tone plates. As an appendix to the book there is reprinted the bibliography of electron microscopy by Marton and Sass, brought up to date to the end of 1944.

Aside from a few fundamental formulas, one finds no mathematics in the book. Instead, the authors have attempted to explain the ways of electrons with words and well-designed drawings. It is perhaps not generally recognized by physicists, hardened to the frequent use of equations, that the easy way for authors lies in the use of equations and symbols. Burton and Kohl will be thanked by the nonmathematical reader for their very real effort to explain physical phenomena in words and pictures instead of symbols.

ROBLEY C. WILLIAMS
Physics Department, University of Michigan

Advancing fronts in chemistry. **Vol. II: *Chemotherapy.* Wendell H. Powers. (Ed.) New York: Reinhold, 1946. Pp. 156. (Illustrated.) $3.25.**

This volume is a collection of lectures delivered in 1945 as a symposium at Wayne University. The scope is indicated by the chapter titles. Chapter I, by W. H. Feldman, covers "Chemotherapy in Experimental Tuberculosis." One is impressed by the relative paucity of significant results attained in this field, and as a result the chapter deals principally with work with the sulfones, largely by the chapter's author and co-workers.

Chapter II, by F. H. Blicke, covers "Antispasmodics." One may question the presence of this chapter in a work on chemotherapy, but the presentation is an interesting example of how the chemists have juggled leads, in this case principally tropic acid and tropine, to evolve synthetics with more desirable properties than those of the natural compounds first known to have antispasmodic effect.

Chapter III, by E. H. Northey, deals with the sulfa drugs and includes an adequate consideration of the ideas of competition between prevailing drugs and a related "essential metabolite" for a place in the economy of the bacterial invader. Other theories of the mechanism of the action of the sulfa drugs are also considered.

"The Antimalarial Problem," by H. S. Mosher, is the subject matter of Chapter IV. In addition to chemicals used for treatment and prophylaxis, methods of control by sanitary means and chemical extermination of the insect carriers are considered. Brief mention is given the notion that the antimalarial drugs may act as the sulfonamides may act, *i.e.* by competition with some metabolite essential to the growth of the malarial parasite.

C. K. Banks contributes a chapter on "Organometallic Compounds as Chemotherapeutic Agents." With relatively brief space available for each metal, a satisfactory outline is given of the uses of the compounds of arsenic, antimony, mercury, bismuth, gold, and silver in the treatment of infections.

The last chapter, by W. H. Wright, on "Past and Present Needs in Chemotherapy of Parasitic Diseases" is the most detailed chapter, as well as the longest (42 pp.). In fullness it more nearly approaches a monograph than does any other chapter. There is necessarily some overlapping of subject matter with the preceding chapter.

The absence of a chapter on antibiotics is a glaring hiatus. This subject was covered in the symposium in a lecture by H. E. Carter, but the editor explains in the Preface that the author was unable to prepare the lecture for inclusion in the book.

As is probably inevitable in a symposium, there is some variation in the degree of excellence of presentation among the different chapters. However, in all cases there is a satisfactory pharmacological color, in that the relation of chemical considerations and biological problem is always borne in mind and made clear.

While the book is in no sense a monument of reference, it will be a very useful starting point for chemical students wishing to become acquainted with the present status of chemotherapy. The full references at the end of each chapter will be ample keys for those wishing to explore the subject in full detail.

EDWIN C. WHITE
713 Lake Drive, Baltimore, Maryland

Photometric atlas of stellar spectra. **W. A. Hiltner and R. C. Williams. Ann Arbor, Mich.: Univ. Michigan Press, 1946. Books I–IX. (Illustrated.) $7.50.**

The University of Michigan possesses a microphotometer, constructed by Williams and Hiltner, which has the property of recording spectra on a direct intensity scale (for description see *Publ. Observ. Univ. Mich.*, 1940, 8, 45).

The first major batch of results is before us in the *Photometric atlas of stellar spectra*, published in the form of nine separate booklets, held together in a sturdy folder. Marvelous tracings of the spectra of α Bootis, α Cygui, β Orionis, α Lyrae, α Canis Majoris, α Canis Minoris, α Persei, and α Orionis fill Books II to IX, and Book I contains general information concerning the use of the *Atlas*. The stellar spectra were photographed with the Coudé spectrograph of the 82-inch reflector at the McDonald Observatory of the University of Texas while the star image was driven very slowly along the 0.05-mm.-wide slit of the spectrograph. The length of the slit was at the most 3.0 mm., and the maximum length of the analyzing slit of the microphotometer was 2.5 mm.

The tracings in the *Atlas*, reduced to one half the originals, show a magnification of 21.6 with respect to the spectrograms, and the dispersion ranges from 12 (mm./A.U.) in the violet to 2.5 in the red. The intensity scale, reproduced with each tracing, permits reading to 1 per cent (corresponding to about 0.5 mm.), and this represents, as the authors point out, the real accuracy of the intensities. It is, perhaps, somewhat unexpected that the wave lengths are indicated only at the ends of the tracings; a wave-length scale would have been convenient to many students in this field.

To say that spectroscopists will welcome the *Atlas* is doubtless an understatement, since it is the first time that stellar spectra have been made available on a scale hitherto possible only for the sun.

JAN SCHILT
Department of Astronomy, Columbia University