

(chloroform solution) with (-)trimethylcolchicinic acid, was produced. In view of the reported racemization and resolution of (-)trimethylcolchicinic acid,¹⁰ and the reconversion of the latter to colchicine,¹ the above operations represent the total synthesis of the natural product.¹¹

(11) Complete analytical and spectral data on all isolated intermediates will be presented in a full publication.

Acknowledgment.—We are indebted to the Wisconsin Alumni Research Foundation and the National Institutes of Health for financial support.

UNIVERSITY OF WISCONSIN
DEPARTMENT OF CHEMISTRY
MADISON, WISCONSIN

EUGENE E. VAN TAMELEN
THOMAS A. SPENCER, JR.
DUFF S. ALLEN, JR.
ROY L. ORVIS

RECEIVED NOVEMBER 5, 1959

BOOK REVIEWS

Punched Cards: Their Applications to Science and Industry. Second Edition. Edited by ROBERT S. CASEY, W. A. Sheaffer Pen Co., Fort Madison, Iowa, JAMES W. PERRY, Center for Documentation and Communication Research, Western Reserve University, Cleveland, Ohio, MADELINE M. BERRY, National Science Foundation, Washington, D. C., and ALLEN KENT, Center for Documentation and Communication Research, Western Reserve University, Cleveland, Ohio. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1958. x + 697 pp. 16.5 × 23.5 cm. Price, \$15.00.

If you are a salaried employee of a large organization, a stockholder, a payer of bills and taxes, a subscriber to magazines, and a borrower from public libraries, you may have begun to suspect that the economic structure of the United States is sheltered in a house of punched cards. As a scientist, you may also have utilized computing machinery, much of which requires input data in the form of punched cards. Except for a chapter on library routines and occasional remarks elsewhere, however, this book has nothing to say about these comparatively well-known applications. And it does have something to say about tools that can and perhaps should be used *instead* of punched cards. In fact, the book could be entitled "Binary-Code and Other Storage and Retrieval Systems for Scientific Information."

On the other hand, it could be called "First Approaches to The Dream" of many scientists and science-fiction writers, in which the dreamer picks up his phone, dials ENCYCLOPEDIA, asks the machine "What are the common uses of lutecium sulfate?" and gets an immediate answer. Neither of these suggested titles is a good one, and the best compromise is to let well enough alone. The book deals with "Punched Cards: Their Applications [other than accounting and computing] to Science and Industry."

It starts off with an elementary exposition of the use of simple punched cards. The second section adds descriptions of scores of ways in which punched cards, or tape, or film, have been and are being used for storage, retrieval, and sometimes correlation of scientific information. Chemistry is well represented. Indeed, it almost dominates. This may be because chemists are quick on the draw, or because chemical information retrieval by other methods is cumbersome, or because chemists are unusual in believing that information *can* be retrieved. Or it may be fortuitous. The knotty problem of linear notations for chemical formulas is included in the third section of the book, which expands on the first section's treatment of "Fundamental Considerations in Coding and Systems Design." The importance of such considerations cannot be overstressed. Although the book does not say so, the reviewer ventures to guess that punched-card systems which continue to be useful are outnumbered by those that were inadequately designed and have sunk into desuetude.

A speculative fourth section is followed by an extension of the bibliography of 276 references in the first edition. References in the new edition are numbered from 277 to 677. As for other changes from the first edition (published seven years earlier) 25 of the 30 chapters are extensively revised or entirely new.

The book was written by 32 authors, many of whom present not only their own views but those of other workers (includ-

ing mine). The presentation is therefore, inevitably, somewhat incoherent. This flaw is more than compensated by the fair and comprehensive over-all effect. The wealth of detail considered ranges from methods of punching cards for manual sorting to the use of magnetic cores for rapid memory. James W. Perry (page 392) points out that "Punched cards and electronic machines enable us to surmount the limitations of three-dimensional space. These newer tools are essentially multiple dimensional in character by virtue of their ability to search out and to select information on the basis of new combinations of characteristics, that is to say, combinations not formulated or established at the time the information is analyzed. Thanks to their multi-dimensional character of operation, the newer tools, as exemplified by punched cards, enable us to center our attention on *selecting* and *retrieving* information for use. We are thereby released from the limitations of systems which function by deciding *where* we are going to put documents within a fixed array of one type or another."

A warning note is added by E. J. Crane and Charles L. Bernier (page 513). "There are many more or less specific purposes in the field of scientific information for which machines can provide effective help. Our purpose in emphasizing limitations is to suggest the wisdom of substituting an element of precautionary realism for some of the enthusiasm which is leading to higher claims for literature mechanization than present attainment has provided."

This is where matters stand now. What, I wonder, will the third edition be like?

RESEARCH LABORATORIES
KODAK PARK
ROCHESTER 4, NEW YORK

EDWARD M. CRANE

The Chemistry of Heterocyclic Compounds. Volume XII. Six-Membered Heterocyclic Nitrogen Compounds with Three Condensed Rings. By C. F. H. ALLEN, Eastman Kodak Co., Rochester, N. Y., Arnold Weissberger, Consulting Editor. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1958. xxii + 624 pp. 16 × 23.5 cm. Price, \$26.00. Subscription price, \$24.00.

This volume is the twelfth of a series of monographs whose object is to provide a detailed survey of heterocyclic chemistry. Volume 12 presents the chemistry of nitrogen heterocycles which possess three fused six-membered rings, *i.e.*, azaanthracenes, azaphenanthrenes and *peri*-azabenzonaphthalenes. Acridines, phenazines and alloxazines have been excluded since they are to be treated separately. The literature covered is complete only to 1952, though some of the cited references are as recent as 1957.

The authors are obviously aware of the disconcerting task faced by the reader who must decipher the complex numbering and nomenclature associated with many heterocyclic systems. Accordingly, the carefully selected subject matter has been very liberally supplemented with structural formulas and equations. The tables which follow the discussion of each ring system have been arranged according to functional groups, and are easy to consult. The "a" system of nomenclature is employed for the general headings,

in which "aza" is used to denote the replacement of a -CH member of a benzene ring by a nitrogen atom. The "Chemical Abstracts" and "Ring Index" systems of nomenclature are also given.

A helpful, though somewhat superficial, introductory chapter serves to acquaint the reader with some of the more important cyclization procedures and mechanisms which form the basis of many of the subsequently described syntheses. Inevitably, a few minor errors have crept into the work which undoubtedly will be corrected in subsequent editions. For example, on p. 136 hydrogen cyanide (rather than cyanogen) is said to react with *o*-phenylenediamine to give 2,3-diaminoquinoxaline. A chapter describing some of the general ultraviolet absorption properties of heterocyclic systems is especially welcome, in view of the scarcity of such collected information. The chapter would perhaps have been more illuminating if the discussion had been illustrated with tables giving data for some specific compounds. On page 560 it is stated that the additional absorption ($\eta \rightarrow \pi$) band in polyaza compounds is shifted progressively to longer wave lengths with every increase in the number of annular nitrogen atoms. This is not strictly true, since pyridazine, with its two adjacent ring nitrogens, exhibits a larger red shift than *sym*-triazine with its alternating nitrogens.

In summary, this is a well-presented, readable volume which, like its predecessors, will be a fine asset to workers in this field.

CENTRAL RESEARCH DEPARTMENT
EXPERIMENTAL STATION
E. I. DU PONT DE NEMOURS AND CO.
WILMINGTON, DELAWARE

R. A. CARBONI

The Chemistry of Drugs. Third Edition, Entirely Revised and Enlarged. By NORMAN EVERS, Ph.D., F.R.I.C., formerly Director of Research to Allen and Hanburys Ltd., and DENNIS CALDWELL, B.Sc., F.R.I.C., Development Chemist to Allen and Hanburys Ltd. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1959. 415 pp. 16 × 23.5 cm. Price, \$12.25.

This is the third edition of Evers' "The Chemistry of Drugs" and according to the authors this new version has been completely revised and rewritten. The book is divided into two major sections: The first deals with synthetic compounds which are grouped according to their biological action and the second covers naturally occurring drugs. Most of the latter section is devoted to alkaloids, although such topics as purgatives and antibiotics are also discussed. Chapters on hormones and vitamins are included although, strictly speaking, these substances are not drugs.

The authors' rigid adherence to the arrangement of material often led to difficulties. In the chapter on synthetic antimalarials the usual compounds such as pamaquine, pentaquine, chloroquine and mepacrine are covered. However, quinine and its congeners are described in the section on cinchona alkaloids. Similarly, atropine and scopolamine, prototypical compounds, which form the basis for most of the antispasmodic work, are not discussed in the chapter devoted to this subject because they happen to be solanaceous alkaloids. There are several other instances of this schismatic treatment and the opportunity to point out structural similarity between natural and synthetic drugs is missed. It is unfortunate that the authors did not use a unified approach by classifying all drugs according to their therapeutic similarities.

The method of presentation usually consists of giving the name and formula of a drug, a method or methods of synthesis and concluding with a description of some physical properties such as the melting point and solubility. In the first section each chapter begins with a brief definition of the activity in the heading. Thus tranquilizers are defined as drugs that induce a mental state free from agitation and anxiety. Even if one accepts this definition it is still difficult to see how methylpentynol, a sedative, mephenesin, a spinal cord depressant, and methyl phenidate, a mild stimulant, fall into the same class as the true ataractic drugs chlorpromazine and reserpine. The latter, of course, is not discussed here because it is a product of natural origin.

It would have been better if the authors devoted more space to the mode of action of drugs and to a critical discussion of the merits and demerits of those that are in cur-

rent use. In the chapter on synthetic tuberculostats more attention is devoted to the therapeutically obsolete thiosemicarbazones than to isoniazid which is the present drug of choice.

British names are used in preference to American ones, but this causes no more than a minor inconvenience. The appendices which list official (B.P. and U.S.P.), proprietary and chemical names of the drugs are extremely helpful. The errors in the book are few and easily recognizable.

The authors have compiled a volume wherein the synthesis of fairly common drugs can be found readily. If this was their goal then they have succeeded. I believe that most individuals will find that it is too modest an achievement to warrant purchasing the book.

STERLING-WINTHROP RESEARCH INSTITUTE
RENSSELAER, NEW YORK

S. ARCHER

The Physico-chemical Constants of Binary Systems in Concentrated Solutions. Volume I. Two Organic Compounds (without Hydroxyl Derivatives). By JEAN TIMMERMANS, Hon. Professor, Université Libre, Brussels, Belgium. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1959. xiii + 1259 pp. 18.5 × 24.5 cm. Price, \$29.00.

This compilation of numerical data on "binary systems in concentrated solutions" is planned to appear in four volumes, arranged as follows: I, two organic, non-hydroxyl compounds; II, two organic compounds, at least one a hydroxyl derivative; III, one or both components a "metallic compound" (including salts); and IV "all other systems." The only class not to be included is the alloys. The present volume, I, is divided into seven parts, according to whether or not one or both components contain halogens, oxygen, nitrogen, oxygen and nitrogen, etc., in general "according to the degree of physico-chemical similitude of the components." The arrangement followed in each part is clearly explained and is easy to use.

The material for each system is presented in clearly constructed tables, covering first heterogeneous equilibria (vapor pressure, compositions of coexisting phases, freezing points), then properties of phases (density, viscosity, optical, electrical), and finally thermal constants (heats of mixing, etc.). The format is good, two columns to a page, with plenty of space and dividing lines. The legibility is excellent; there is no crowding, the numbers are not too small, and there is no microscopic print.

The book will thus make easily available an immense mass of data of a certain type. For what particular "field" or for what particular group of workers such a collection will be particularly valuable it is difficult to say, for "binary systems at high concentrations" is hardly a "field." This is perhaps not a serious question, for at twenty-nine dollars a volume we may expect that in general only libraries and large laboratories will be purchasing the work. When thus available, however, the book, in its spread and variety, will undoubtedly prove useful even if any one person will probably use only a small part of it.

Volume I, the only one presently available, is not complete in itself. The literature references are cited by author's name and year, and the required information is to appear in Volume IV for the whole series. Volume I, moreover, has no index. While the binary systems involving aniline, for example, can be found easily as long as aniline is the "first component," all those in which it is the "second component" cannot easily be searched out without the final index. Moreover, in the majority of cases each system is identified only according to the "common names" of its components, and it is promised that a Table, to appear in Volume IV, will follow the classification of *Chemical Abstracts*, together with synonyms.

These are only temporary drawbacks in the use of the present volume. In the meantime, however, some difficulty arises from the use of equivocal names such as nitronaphthalene, diethylbenzene, amyl naphthyl ketone, tetracyanoheptane, dichlorobenzophenone, etc. It is not clear how the final index will help this situation, which is an uncertainty in the tables themselves.

The preface implies that the literature has been covered through 1957. The discovery of omissions, if there are any, will have to wait upon the use of the book, as in all compilations. In the present case, however, uncertainties about