and Golgi material, are not always entirely successful, but in the present state of confusion of those particular subjects that is hardly to be wondered at.

The difficulty is at least as great in dealing with cytology in its bearing on genetics. In some aspects, as in the chromosomal variations of structure and number and of hybridity, the book is concerned with aspects which for the present are generally accepted. In presenting them to the student, Sharp is at his best. But in the basic mechanisms that underlie chromosomal behavior, the difficulties of elementary presentation become almost insurmountable. To be sure, by soft-pedaling and ignoring the dubious parts of the evidence, these sections could be written so as to give a logical and well-rounded account. Many geneticists conceive of the cytological background in this way, and several books on genetics and cytology have so treated it. Generally, Sharp, too, sketches his preliminary outlines in this fashion, but he is too good a cytologist to let his case rest on such a treatment and thus often follows it up with the doubts and faults that lurk behind the beautiful story. The chapter on chromosomes is an illustration of this and though to a working cytologist it seems like an excellent, brief survey, one wonders what an elementary student's attitude may be about the number of chromonemata, coiling, heteropycnosis and salivary chromosomes, when he gets through with it. It is for this reason that it is to be regretted that Sharp did not expand the conclusions which terminate about half of the chapters, for it is there that his skill in outlining basic concepts is especially evident.

The criticism sometimes made of Sharp's earlier book that zoological cytology does not meet with as adequate consideration as botanical cytology, will likely be made here also. In a way, the illustrations reflect this unequal distribution, for there are 115 figures of botanical against 54 figures of purely zoological subjects. But aside from the fact that Sharp is himself primarily a botanist and quite naturally more at home in his side of the field, it might be pointed out that especially in the cytogenetics of the last ten years the animal cytologist has definitely fallen behind his botanical colleague in furnishing the evidence that is advancing our knowledge. However, this does not altogether explain the somewhat uneven judgment employed in listing reference works to animal cytology. Thus the chapter on animal reproduction, perhaps the weakest in the book, is supported by twelve references. Of these, six are on protozoa, and though this group has admittedly been somewhat neglected by both zoologists and botanists, that seems a little disproportionate. Of the remaining six references, Hegner's 1914 book certainly does not meet the demands of 1943, and Agar's and Doncaster's treatises, both published twenty-three years ago, can hardly be expected to give an adequate survey of the modern status of the subject.

As already indicated, many aspects of cytology are at present in that state of flux which betokens progress. This renders it almost impossible to reduce it to simple outlines and by the same token makes it very difficult to present it justly to a student with only an elementary background. If the attempt is nevertheless to be made, Sharp's book will prove of great help.

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QUANTITATIVE ANALYSIS

Elementary Quantitative Analysis. By CARL J. ENGELDER. Third edition. viii + 283 pp. 15 × 23 cm. New York: John Wiley and Sons, Inc. 1943. $2.75.

THIS book is designed for a short course in quantitative analysis. It is divided into four sections: "Fundamental Principles of Quantitative Analysis"; "Volumetric Analysis"; "Gravimetric Analysis"; and "Systematic Quantitative Analysis."

The section on fundamental principles introduces the student to the subject and includes discussions of the scope and theoretical basis of quantitative analysis, preparation of sample, mathematical operations, errors and precision, reagents and the analytical balance. This entire series of discussions occupies less than twenty-six pages.

The section on volumetric analysis includes a chapter on theory, apparatus, technique and calculations, and chapters on neutralization methods, redox methods and volumetric precipitation methods. Both the normality and the titer methods of expressing solution strength are discussed with emphasis on the latter method. The chapter on neutralization methods includes the preparation of standard acid and alkali, using sodium carbonate as the primary standard; the determination of sodium carbonate in soda ash, the strength of potassium acid phthalate solution and the strength of oxalic acid solution; and the theory of hydrolysis, indicators and differential titrations. No mention is made of the removal of carbonate from standard alkali. The redox chapter includes experiments with permanganate, iodine, dichromate and ceric sulfate. The precipitation methods include the determination of chloride, silver thiocyanate and cyanide. Throughout the section, the author encourages the use of two burettes with a resultant jockeying back and forth in finding end points.

The section on gravimetric analysis gives procedures for chloride, iron, sulfate, calcium, magnesium and phosphate. The theory of gravimetric precipita-

tion and purification of precipitates is almost totally neglected.

The section on systematic analysis includes general information which should be useful for reference purposes.

There are a number of aids for the student and the instructor: question and problem sets following each chapter; a plan of the course; and an appendix containing sample report forms, a division on the literature of analytical chemistry, a division on reagents and supplies, density tables, gravimetric factors and a table of five-place logarithms.

The experiments are well chosen and conveniently arranged, if a bit old-fashioned, but the book suffers from an attempt to cover too much ground in too short a space with a resultant dearth of specific information. However, the material included could serve as good basis for a course in quantitative analysis if properly expanded in the accompanying lectures.

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THE CHEMICAL FORMULARY

The Chemical Formulary. Vol. VI. By H. BENNETT, editor-in-chief. xx + 636 pp. Brooklyn, N. Y.: Chemical Publishing Company, Inc. 1943. $6.00.

THIS is the sixth volume of the series, and as in previous volumes the editor-in-chief has had the assistance of an editorial board of about fifty specialists in industrial and educational organizations. A footnote to the preface states that all the formulae in volumes I to VI are different except for a few typical cases used in the introduction to illustrate directions and advice for new users of the volumes.

The fields covered in the present volume include Adhesives, Beverages, Emulsions, Inks, Paints and Varnishes, Paper, Pyrotechnics and Explosives, Rubber, Plastics, Detergents, Textiles, etc. A timely section is included on special formulae of military interest.

Another section which may be of value to many users is devoted to substitutes for scarce or priority materials. A perusal of this section would seem to indicate that many of the suggested substitutes would be far from universally adaptable but might be useful for certain specific applications.

A directory of sources of chemicals and supplies is included. This will prove of value to users of the volume, since many of the substances mentioned in formulae throughout the book are trade-marked or copyrighted "trade names" and could not be secured on the open market either by reason of their compound nature or secret composition. The editor feels justified in including such substances, since without them many ideas and processes offered in formulae of specialty producers would have been automatically eliminated.

Tables of weights and measures, a list of foreign sources of chemicals and an index of some 2,400 entries complete the present volume. Previous volumes have been widely reviewed in technical and trade publications such as *American Dyestuffs Reporter, Electrochemical Society Bulletin, Modern Plastics, Rubber Age,* etc., and have received most generous and favorable comment. The present volume is a worthy addition to the series and will doubtless find wide acceptance among chemists and technologists throughout the industry.

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SPECIAL ARTICLES

INFLUENCE OF ADRENAL CORTICAL SECRETION ON BLOOD ELEMENTS[1]

THE marked decrease of lymphoid tissue produced by augmented adrenal cortical secretion[2] has led to an examination of the changes in blood elements resulting from adrenal cortical stimulation. The availability of purified pituitary adrenotropic hormone,[3] the normal physiological regulator of adrenal cortical activity, makes possible the study of fundamental phenomena resulting from adrenal cortical secretion. The establishment of these data should be of significance in the elucidation of changes following stimulation of the adrenal cortex by a variety of agents.

It is the purpose of this communication to indicate the striking alterations in blood elements which result in normal, approximately fifty-day old, mice of both sexes (CBA strain, Strong) within a few hours following a single subcutaneous injection of pituitary adrenotropic hormone (1.0 mg in 0.5 ml solution). Blood analyses have been conducted at intervals after hormone injection, using groups of mice at each time interval, rather than successive determinations on the same animals. The blood picture observed is characterized by the following: (a) decrease in total leucocyte count, (b) decrease in absolute number of lymphocytes, and (c) increase in absolute number of

[1] This investigation has been aided by grants from the International Cancer Research Foundation, the Fluid Research Fund, Yale University School of Medicine and the Committee on Therapeutic Research, Council on Pharmacy and Chemistry, American Medical Association.

[2] T. F. Dougherty and A. White, *Proc. Soc. Exp. Biol. Med.*, 53: 132, 1943.

[3] G. Sayers, A. White and C. N. H. Long, *Proc. Soc. Exp. Biol. Med.*, 52: 199, 1943.