sulfocyanate-pyridine complex separate, transfer each mixture to dry separatory funnels. Permit the chloroformic and aqueous layers to separate completely. Drain about 4 cc. of each of the chloroformic fractions into individual colorimetric comparison cups of a Duboscq colorimeter. Compare the green colors as to relative intensity. Take an average of ten readings rapidly.

$$\frac{\text{Reading of standard (mm.)} \times \text{0.5 mg. of Cu}}{\text{Reading of sample (mm.)} \times \text{Volume of sample taken for assay}} = \text{mg. Cu per 1 ml. sample}$$

Discussion.—The method presented above has given consistently accurate results with average deviations of plus 3.7% and minus 2.0% from the theoretical quantities of copper assumed to be present. Aside from experimental and manufacturing errors, the possibility of some exsiccation in the copper salts used in the manufacture of these ampule products may be a contributing factor to such deviations. The following tables are compiled from the assay reports of the different lots of ampules prepared during the year 1939, and are presented to prove the accuracy of the method:

Table I.—Copper Content of Ampule No. 175-A[a]

Lot No.	Copper Content, in mg., per 10 Cc. Ampule
10,875	0.314
10,986	0.309
11,200	0.313
11,260	0.313
11,446	0.307
11,536	0.291
11,666	0.284
11,822	0.294
11,987	0.296
12,038	0.308
12,129	0.298
12,197	0.307
12,345	0.298
Average	0.3025

Table II.—Copper Content of Ampule No. 175[a]

Lot No.	Copper Content, in mg., per 5 Cc. Ampule
10,897	0.147
10,925	0.158
11,003	0.166
11,283	0.155
11,504	0.152
11,599	0.146
11,764	0.145
11,805	0.155
11,985	0.161
12,030	0.154
12,233	0.145
Average	0.153

[a] The theoretical quantity of copper is 0.300 mg. Cu per 10 cc. Ampule Solution.

Table III.—Copper Content of Ampule No. 345[a]

Lot No.	Copper Content, in mg. per 2 Cc. Ampule
11,263	0.420
11,388	0.418
11,558	0.417
11,986	0.410
Average	0.416

Table IV.—Copper Content of Ampule No. 345-B[a]

Lot No.	Copper Content in mg., per 1 Cc. Ampule
10,882	0.198
11,218	0.210
11,583	0.202
Average	0.203

[a] The theoretical quantity of copper is 0.200 mg. Cu per 1 cc. Ampule Solution.

It has been observed in some instances that the shade of green color shown by the copper sulfocyanate-pyridine complex produced by the sample is a trifle more yellow than that shown by the standard copper solution complex. Traces of iron or sulfur alter the shade of green color. However, the intensities can be definitely compared without difficulties. Several attempts to obtain comparable readings by treating the standard copper solution aliquot by the same procedure used in separating and extracting the copper in the ampule sample produced inconsistent and low results.

SUMMARY

1. A suitable method for estimating micro-quantities of copper in ampules of iron, arsenic and copper has been devised, based on a micro-colorimetric method employed in biochemistry for estimating traces of copper in blood and milk (1).

2. The results of thirty-one determinations indicate that the method is sufficiently accurate and reliable to warrant its use in estimating micro-quantities of copper salts in medicinal preparations.

REFERENCE

(1) Hawk and Bergeim, "Practical Physiological Chemistry," 10th Edition (1931), page 468.

Book Reviews

Biological Products, by LOUIS GERSHENFELD, P.D., B.Sc., Ph.M. Publishers, Romaine Pierson, New York. 236 pages, price $4.00.

The author is professor of Bacteriology and Hygiene at the Philadelphia College of Pharmacy and Science. He has prepared the work with a purpose to give information on the preparation, manufacture, uses and other essentials of bacteriology and their practical application; to serve students as a guide for their studies, and for those who carry on laboratory work. It grew out of the need of the author in his field and gives particularly useful information on antitoxins, serums, vaccines for those in the allied public health professions. The book is illus-

trated with plates of a number of pharmaceutical manufacturing establishments to whom the author expresses appreciation. Thirty chapters comprise the Table of Contents. The book is well bound and contains many bibliographic references in the text. A criticism is offered on the typography; parts of the book in the reviewer's opinion, would have been improved in appearance if the type were clearer and some pages would be read with greater ease and assurance. There seems to have been an effort to hold down the number of pages by the use of small type. Bold face small type makes the reading of important matter somewhat difficult for those who are not very familiar with the subject.—E. G. EBERLE.

The Essentials of Physiology and Pharmacodynamics, by GEORGE BACHMANN, M.S., M.D., Professor of Physiology in the School of Medicine of Emory University; sometime Demonstrator of Physiology in the Jefferson Medical College, Philadelphia, and A. RICHARD BLISS, Jr., Ph.D., M.D., LL.D., Professor of Pharmacology and Dean of Pharmacy in Howard College of Birmingham, Ala., member of the Committee of Revision of the U. S. Pharmacopœia. Third Edition. Publishers, The Blakiston Co., Philadelphia. Price, $4.50. Published, January 2, 1940. The edition has been thoroughly revised.

Use has been granted in this volume by the respective Revision Committees of U. S. Pharmacopœia and National Formulary, also the British Pharmacopœia, and New and Nonofficial Remedies, for comment—no responsibility is accepted by the respective committees, for inaccuracies or errors in percentage strengths. The authors have placed the titles of individual drugs and preparations at the end of the groups; the aim is to present the material for study by students of pharmacy, including the essential facts of anatomy. The principles of pharmacodynamics are explained and the relation of materia medica with notes on pharmacology, hygiene and public health. The book contains 506 pages, 196 illustrations. Typography and binding are good. The revisers state that they have considered especially those topics in which more important advances have been made, as the vaccines, electro cardiogram, the pharmacodynamics of the cell, the vitamins, the barbiturates, newer antiseptics, newer anesthetics, the endocrines, allergens. The Table of Contents shows 42 chapters; the authors are known to teachers of pharmacy, they have prepared the revision for use in pharmacy schools, and libraries of pharmacy and other professional institutions, and for individuals.—E. G. EBERLE.

A Textbook of Materia Medica, Pharmacology and Therapeutics, by HAROLD N. WRIGHT, M.S., Ph.D., Assistant in Pharmacology, University of Minnesota; and MILDRED MONTAG, R.N., M.A., Instructor in Nursing Arts, St. Luke's Hospital, New York City, illustrated. Published by W. B. Saunders Co., Philadelphia and London, 560 pages. Price $2.75.

The authors state that the subject matter for the study of drugs is commonly divided into Materia Medica, Pharmacology, Therapeutics and Toxicology. They have drawn upon their teaching experience for drugs used in the presentation of the text, and for the explanation of the use of weights and measures in the calculation of doses and in making preparations. The book gives information on toxicology, antiseptics, oxygen therapy, new preparations, endocrines, vitamins and on sulfanilamide and sulfapyradine. The standards under the Food and Drugs Act are briefly described. The biographies and illustrations are well selected. For some description, articles could have been selected from the PROCEEDINGS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION. More National Formulary preparations could have been used. Under Narcotics, marihuana could have been employed for illustrating the possibilities of addiction and the responsibilities of those who handle narcotics. Marihuana is not used in prescription practice. The authors, wherever they had opportunity, give brief and clear illustrations. This applies to solutions and other forms of Materia Medica wherein calculations are required, prescription dosage and parts when additions or reductions are to be made on order of the physician. The authors have prepared a useful work, they have different views on some questions, as an example, the use of the designation of "dram" is a subject of discussion at different times. "Dram" is not frequently used and is not essential to medical and pharmaceutical practice, but possibly more should have been said in connection with the subject.—E. G. EBERLE.

The Second Supplement to the Pharmacopœia of the United States of America, Eleventh Decennial Revision (U. S. P. XI—1939 Supplement.) *1939*. Distributed by the Mack Printing Company, Easton, Pennsylvania, 178 pages. Price, $1.50.

The Second Supplement to U. S. P. XI became official on January 1, 1940, and all monographs and general tests published in this Second Supplement superseded the corresponding U. S. P. XI Standards and First Supplement on that date with exceptions for the revised minimum standards for vitamin A under *Oleum Morrhuæ* and under *Oleum Morhuæ Non-Destearinatum*, and also for the new monograph for Chorda Chirurgicalis—these will become official July 1, 1940. The new articles under English title are: Ascorbic Acid, Mandelic Acid, Nicotinic Acid, Tribasic Calcium Phosphate, Surgical Gut, Cyclopropane, Tribasic Magnesium Phosphate, Methylrosaniline Chloride, Soluble Pentobarbital, Sulfanilamide, Thiamine Hydrochloride, Natural Vitamin A in Oil, Natural Vitamin A and D in Oil. Changes in official Latin titles are: Ergosterol Activatum in Oleo, Petrolatum Liquidum, Petrolatum Liquidum Leve, Serum Antipneumococcicum. Changes in official English titles are: Antipneumococcic Serum, Liquid Petrolatum, Light Liquid Petrolatum, Activated Ergosterol in Oil. All page