

A Color Test for Differentiating Barbaloin and Isobarbaloin and Identifying Different Varieties of Aloes*

By George L. Keenan and Llewellyn H. Welsh†

Collateral to a microcrystallographic study of barbaloin and isobarbaloin, commercial aloin constituents which are apparently isomeric, tests were made with a number of common microchemical reagents. None of the reagents employed gave significant results with the exception of a 5% aqueous solution of gold chloride. When a drop of this reagent was added to a small amount of isobarbaloin on a microscope slide, a distinct pink to red color was produced. Under the same conditions, barbaloin, prepared as described by Gardner and Joseph (1), gave merely a yellow solution. The red color with isobarbaloin occurred immediately at room temperature, and was intensified by gentle warming.

A number of chemical tests for differentiating varieties of aloes have appeared in the literature, and there have been described several reactions for differentiating isobarbaloin from barbaloin. The reactions which distinguish between the isomers appear to be based, usually, on the susceptibility of isobarbaloin to oxidation by such reagents as sodium nitrite-acetic acid (2) and cupric sulfate-sodium chloride (3). A rather extensive search of available literature failed to reveal any reference to the use of gold chloride solution for the purpose described in this paper, although the Eighth Revision of the United States Pharmacopœia includes an identification test for aloin in which the reagent produces a red coloration with the commercial drug. The test does not appear in the aloin monographs of subsequent revisions. Lenz (4) has observed that solutions of aloes "reducirten alkalische Kupferlösung und Goldlösung" on standing or heating, while Beal and Okey (5) refer to the use by Dragendorff¹

of gold chloride, as well as other reagents, in tests for aloes.

When the test was applied to different varieties of powdered aloes, distinctly different results were obtained for each: Curacao aloes gave an immediate red color, Cape specimens became green on standing and Socotrine samples remained brown. Several different commercial samples of each variety were tested. All specimens of commercial aloin which were tested gave the reddish color associated with isobarbaloin or Curacao aloes. The intensity of color given by Curacao aloes was much greater than that given by isobarbaloin—an indication that substances other than this compound present in the crude drug also produce the color. These substances appear to be concentrated in the aloin-free water-soluble fraction of the drug, since such a fraction, prepared by the method of Wirth, *et al.* (6), gave an intense red color with the reagent. Powdered specimens of senna leaf, cascara and buckthorn bark (*Rhamnus purshiana* and *R. frangula*), and rhubarb root failed to give the color. Tests were negative also with the following compounds: α -hydroxyanthraquinone- β -*d*-glucoside, aloemodin anthrone, α -hydroxyanthraquinone- β -*d*-arabinoside, β -hydroxyanthraquinone- β -*d*-glucoside and syringic acid. The last substance named, as might be expected, strongly reduced the reagent, forming a brown solution and black precipitate.

The test with gold chloride solution is simple in its application and is more convenient than the use of copper sulfate-sodium chloride combinations in aqueous or hydroalcoholic media (Klunge's reagent) (3) for the detection of isobarbaloin.

* Received November 2, 1942, from the U. S. Food and Drug Administration, Federal Security Agency, Washington, D. C.

† The authors wish to thank Dr. John H. Gardner of Washington University, St. Louis, Mo., for specimens of isobarbaloin, aloemodin anthrone and the hydroxyanthraquinone glycosides.

¹ The reference given by Beal and Okey (5) is not completely informative, but apparently refers to "Beiträge zur gerichtlichen Chemie einzelner organische Gifte," by G. Dragendorff, St. Petersburg (1872). This book, however, was found to be almost entirely concerned with alkaloids, and no work devoted to the anthraquinone drugs was detected therein.

SUMMARY

A color test has been described which employs gold chloride solution for identifying different varieties of aloes and for dif-

ferentiating barbaloin and isobarbaloin. The test is simple in application and seems preferable to others which have appeared in the literature.

REFERENCES

- (1) Gardner, J. H., and Joseph, L., *JOUR. A. PH. A.*, 26 (1937), 794.
- (2) Ware, A. H., *Analyst*, 50 (1925), 384; *Pharm. J.*, 124 (1930), 596.
- (3) Lèger, M. E., *Ann. chim.*, [9] 6 (1916), 341.
- (4) Lenz, W., *Z. anal. Chem.*, 21 (1882), 228.
- (5) Beal, G. D., and Okey, R., *J. Am. Chem. Soc.*, 39 (1917) 716.
- (6) Wirth, E. H., Maher, F. T., and Lindblade, V., *Bull. Natl. Formulary Committee*, 8 (1939), 54.

Book Reviews

An Introduction to Materia Medica and Pharmacology, by HUGH ALISTER MCGUIGAN, Ph.D., M.D., and ELSIE E. KRUG, B.S., R.N. The C. V. Mosby Company, St. Louis, 1942. X + 779 pp., 83 figs., 14 x 22 cm. Price, \$3.50.

A Textbook of Materia Medica, Pharmacology and Therapeutics, by HAROLD N. WRIGHT, M.S., Ph.D., and MILDRED MONTAG, R.N., M.A. W. B. Saunders Company, Philadelphia, 1942. 2nd Edition xvi + 647 pp., 93 figs., 13 x 19.5 cm. Price \$3.00.

As sources of pharmacological information for pharmacists, both of these texts suffer from a paucity of detail concerning drug action. Because these volumes are intended for use as texts in Schools of Nursing, they present the material from the viewpoint of hospital routine and it is this feature that makes both books helpful to practitioners of Institutional Pharmacy. It is advantageous for any pharmacist to be conversant with hospital therapeutic practices and many pharmacists will wish to equip their professional libraries with these excellent compendia.

The McGuigan-Krug text represents the classical interpretation of pharmacology in a substantial manner and is essentially factual. There are times, however, when one wonders if the student of limited background in physiology is capable of interpreting the sketchy pharmacological reasoning. The discussion of the mode of action of atropine is a case in point. To one already familiar with the subject, the summary of proofs for the site of action of this drug is appreciated for its conciseness, but to the novice, the fact that under the influence of atropine, the eye is placed in autonomic imbalance in favor of the sympathetic system is not forcefully stated.

The documentation could have been materially improved by the addition of more primary source material, especially of the review type. The typography of the text is excellent and the use of tinted paper of the finest quality should be appreciated by the reader.

The fresh outlook of the Wright-Montag text is

an achievement. Many teachers of pharmacology will wish to see this text for its exemplary pedagogy which more than compensates for its lack of detail. The authors see clearly the needs of the student of drug action as far as nursing is concerned and they have written with a consistent consciousness of that need. It is unfortunate that more elementary texts do not get away from the encyclopedic approach.

The many photographic illustrations are well conceived and splendidly executed. The schematic material expresses a viewpoint different from that ordinarily seen and all illustrative material is functional in character, tying in well with the text. The fact that the illustrative material is original contributes to the harmony between text and figure and is a welcome relief from the hackneyed illustrations that have been accompanying pharmacology texts for decades.

Teachers of pharmacy and pharmaceutical arithmetic can learn some excellent teaching methods in these fields from this text. The treatment of common fractions is well developed; and, although many will decry the childish presentation, a realist appreciates the necessity of clarifying a grade-school subject which is none too well understood by many college students.

This textbook is well documented with current literature and the typography is of the finest quality.—M. W. GREEN.

First Aid, Surgical and Medical, by WARREN H. COLE, M.D., F.A.C.S., and CHARLES B. PUESTOW, B.S., M.S., M.D., Ph.D., F.A.C.S. D. Appleton Century Company, Inc., New York, 1942. xxiii + 351 pp., 92 figs., 14 x 22 cm. Price \$3.00.

As a result of the war, colleges of pharmacy have recently laid increased stress upon the teaching of first aid and many teachers will be interested in new books in this field. The text by Cole and Puestow, although designed primarily for medical use, is quite adaptable to the needs of the pharmacy curriculum.

As one should expect, the greater portion of this text is given over to discussions of war casualties, but nevertheless considerable attention is paid to