

marks: "I tell and advise you that I believe the best thing to do is to turn to the natural gold and silver that is extracted from ores rather than that of alchemy, which I believe not only does not exist but also, in truth, has never been seen by anyone, although many claim to have seen it." Similarly without arguing the matter he dismisses those who proclaimed the possibility of artificially creating human, or animal, or vegetable life by simply stating: "I cannot forbear saying that I do not believe them."

The present scholarly work of Drs. Smith and Gnudi will be all the more appreciated by both student and book collector for the reproduction of the title page of the first 1540 edition (interesting for its marginal engravings of apparatus) and for the eighty-four  $2 \times 4$  inch reproductions of the original wood cuts of equipment and processes. In Appendix A are eight additional reproductions of drawings from Agricola and other authors to illustrate several of Biringuccio's descriptions. Appendix B gives an explanation of the weights and measures used by Biringuccio. Appendix C contains a list of the editions of the *Pirotechnia*. Appendix D is a bibliography of important metallurgical works with mention of English translations when such are known. An index of ten pages is also provided.

The typographic work of this edition, by Carl Purington Rollins at the printing office of the Yale University Press, is of the highest quality. As for the edition itself the reviewer can only repeat what Harvey S. Mudd, of the Seeley W. Mudd Memorial Fund Committee, has stated in his Foreword.

Biringuccio's work is a classic and in its translation Dr. Smith and Dr. Gnudi have brought to bear the high degree of scholarship that it deserves. Dr. Gnudi made the translation at Dr. Smith's request and it was then refined "in the fire" of his scientific knowledge of the subject. The result is a book which the Institute is proud to place before its members and which the Memorial Fund Committee considers it a privilege to publish.

The book is one which should be read, and if possible owned, by all metallurgists and chemical technologists as well as by all students of the history of metallurgical arts.

C. A. BROWNE

## CHEMISTRY

*Introductory Chemistry for the Laboratory.* By ALFRED BENJAMIN GARRETT, LAURENCE QUILL and FRANK HENRY VERHOEK. 239 pp. Ginn and Company. 1942. \$1.60.

THIS manual contains 61 exercises, each of which will require two to four hours for performance and answering questions. The exercises are grouped into 14 units of related experiments, such as the gases of

the air (Unit No. 1), acids (No. 3), the chlorine family (No. 6), compounds of sulfur, nitrogen, carbon (Nos. 9, 10, 11). An excellent unit is No. 12, raw materials for the inorganic chemical industries, which includes formation of useful compounds from natural carbonates, chlorides, sulfates, silicates and phosphates. Unit No. 13, metallurgy and reactions of some common metals, contains a few such interesting projects but consists mostly of test-tube reactions of metal salt solutions. Unit No. 14 consists of interesting applications of chemical principles—to water hardness, blueprinting, alloys, colloids, milk, butter, vinegar, baking powder, etc.

There is a wide choice of topics and ample opportunity for rearrangement for use with any text. There are a few quantitative experiments; this reviewer would prefer more. Appendixes I, II and III deal with fundamental techniques, weighing and elementary glass working, and since they are used immediately might well have been made into preliminary experiments. Most of the test-tube reactions are carried out on a semi-micro scale. An incongruity appears in the description of the "brown ring" test (p. 113) where five drops of nitrate and ferrous solutions are mixed in a small test-tube and five drops of concentrated sulfuric acid added; the accompanying diagram shows the acid being poured from a large wide-mouthed bottle.

The book is paper-bound, with the sheets perforated and punched for reassembling with rings. Each sheet has a blank for the student's name, and blanks are provided for answers to all questions. The printing is good, and there are few errors.

*Semimicro Laboratory Exercises in General Chemistry.* By J. AUSTIN BURROWS, PAUL ARTHUR and OTTO M. SMITH. xiii + 328 pp. The Macmillan Company. 1942. \$2.50.

THIS laboratory manual is exceptionally well written, and the care, experience and interest of the authors in the student's progress are evident throughout. It introduces real semi-micro procedures from the start, with adequate directions, but does not hesitate to use small-scale macro-methods when this seems advisable. The saving in materials and time should be considerable, and the advantage of collecting 12 ml vials of dangerous or obnoxious gases instead of larger amounts is obvious. The experiments are thoroughly workable and most students should be stimulated by the careful but not at all difficult technique required.

The reviewer can do no better than to quote from the preface: "Balance has been maintained between descriptive experiments, quantitative experiments, experiments illustrating . . . laws and principles, and experiments illustrating applications of chemistry."

"The seventy-two exercises offer a wide variety of experiments from which the teacher . . . may choose a suitable number of almost any desired type." "Practical applications . . . are brought out here and there . . . to reveal to the student that chemistry is related to his personal existence." "More and more responsibility is thrown upon the student as he progresses from the earlier experiments to the later ones."

The description of materials and solutions required

is complete and adequate. Each experiment has a set of "Preparatory Questions" for preliminary study, the "Procedure" with notes calling for observations to be written down and used as a guide in filling in blanks in the "Interpretation" pages, which are to be torn out and handed in. The whole book is paper-covered, with spiral binder, and all sheets are perforated and punched for reassembly with rings. The format is good, and there are few if any errors.

CECIL V. KING

## SPECIAL ARTICLES

### STUDIES ON THE ISOLATION OF THE FACTOR RESPONSIBLE FOR TISSUE INJURY IN INFLAMMATION<sup>1, 2</sup>

CAREFUL analysis of the various manifestations of inflammation reveals an essentially stereo-patterned reaction, irrespective of the causative irritant. The latter as well as the anatomical location of the lesion may influence the ultimate appearance of the inflamed area; but close scrutiny reveals the presence of a basic pattern.<sup>3, 4, 5</sup> This is characterized first by an increased fluid passage primarily referable to the liberation of leukotaxine. This substance as shown in earlier studies increases capillary permeability.<sup>3</sup> The alteration in the structure of the capillary endothelium allows the free passage of plasma proteins, including fibrinogen. The latter in the presence of injured tissue is precipitated as a fibrinous network.<sup>3</sup> The tributary lymphatics being evidently more delicate in structure than the capillaries are damaged at a relatively early stage, becoming thus occluded with fibrinous thrombi. The presence of coagulated plasma at the site of inflammation in addition to the occlusion of the tributary lymphatics induce, a lymphatic blockade which thus "walls-off" the inflammatory irritant. In this way inflammation as shown in a number of earlier studies plays an important rôle in immunity as a regulator of bacterial invasiveness.<sup>6</sup> Subsequently, polymorphonuclear leukocytes appear on the scene. Chemotaxis of these phagocytic cells is brought about by the liberation of leukotaxine.<sup>3</sup> Thus this substance is responsible for two of the basic sequences in the development of the inflammatory reaction, namely, increased capillary permeability and migration of

polymorphonuclear leukocytes. The usual cytological sequence of polymorphonuclear leukocytes followed eventually by macrophages is conditioned by the local pH at the site of inflammation.<sup>7</sup> The developing local acidosis is in turn referable to a disturbance in the local intermediary carbohydrate metabolism.<sup>8</sup> The rise in number of circulating leukocytes is due to the liberation of a pseudo-globulin in the exudate. It has been termed the *leukocytosis-promoting factor*.<sup>9</sup> The interplay of the foregoing sequences ultimately disposes of the irritant and allows unhampered regeneration or repair.

In the last analysis the inflammatory reaction is a manifestation of severe cellular injury. Neither leukotaxine nor the leukocytosis-promoting factor induce the characteristic injury of inflammation. Besides the function ascribed above to these two substances, there is as a result of their presence in normal tissue scarcely any detectable cellular injury. An attempt has therefore been made now to identify the factor responsible for injury *per se*. Studies have been undertaken on the pleural exudates of dogs obtained as a result of turpentine injection. The results have been further substantiated by additional studies on exudative material obtained from man. In brief, it has been found that either dialysis of the exudate or its fractionation with usually one-third saturation of ammonium sulfate yields, after removal of the  $\text{SO}_4^{=}$  by dialysis, a potent euglobulin fraction which rapidly induces severe tissue damage in rabbits and to some extent in dogs. The induced inflammatory reaction is characterized after a few hours not only by marked leukocytic infiltration but also by massive thrombosis both of lymphatics and to some extent of the small blood vessels. There is also present a fibrinous network in the tissue distended with edema. The presence of the elements inducing lymphatic blockade, which in themselves serve as a gauge of the degree of local injury, is fully substan-

<sup>1</sup> From the Department of Pathology, Harvard University Medical School, Boston, Massachusetts.

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<sup>3</sup> Valy Menkin, "Dynamics of Inflammation," Macmillan Company, New York, 1940.

<sup>4</sup> *Idem*, "Medico-Surgical Tributes to Harold Brunn," University of California Press, 1942, p. 275.

<sup>5</sup> *Idem*, *Physiol. Rev.*, 18: 366, 1938.

<sup>6</sup> *Idem*, *Am. Jour. Med. Sci.*, 190: 583, 1935.

<sup>7</sup> *Idem*, *Am. Jour. Path.*, 10: 193, 1934.

<sup>8</sup> Valy Menkin and C. R. Warner, *Am. Jour. Path.*, 13: 25, 1937.

<sup>9</sup> Valy Menkin, *Arch. Path.*, 30: 363, 1940.