

together various views of psychology that may be gained from a university standpoint: The enlargement of the portion of university appropriation devoted to this science; the broadening interest and increasing specialization within the department of psychology itself; the advanced position attained in the university faculties; and the growing favor among students and among scientific investigators. In the history of this institutional development the psychologists themselves deserve much credit. They have continually justified the confidence placed in them by intensifying their instruction and by increasing the merit of their literary and research contributions, until to-day these rank with the best of any nation.

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#### SCIENTIFIC BOOKS.

*Gems and Gem Minerals.* By Dr. OLIVER CUMMINGS FARRINGTON, Curator of Geology, Field Columbian Museum, Chicago, Ill. Chicago, A. W. Mumford. 1903. Imperial 8vo. Pp. xii + 229, with plates in color and black and white.

This work is a popular and comprehensive book on the subject of precious stones, treating of their finding, cutting, history and chemical composition. It is intended to supply a long-felt want for an inexpensive popular treatise adapted alike to the mineralogist, the jeweler and the general reader; and the work is one full both of illustrations and information. The nature of the leading gems, their occurrence, their mining, their color, luster, hardness and specific gravity; their optical properties, their crystalline form, their cutting, and the various superstitions connected with them, are treated in successive chapters in the order named. The minor gems follow in their natural sequence, a chapter or part of a page being devoted to each of the principal species and varieties. The volume is printed on good paper, and in large clear type. The illustrations are of two kinds, in colors and in black

and white, the latter giving maps of gem regions, methods of mining and the various forms of natural and cut stones, most of the maps being made by half-tone processes and many of them very exact. The special feature of the work, however, is found in the numerous plates produced by the three-color process, and in most cases direct from the objects themselves. The application of this method makes possible a vivid presentation of most of the varieties of precious and semiprecious stones, almost exactly true to nature, a result which of course could not be attained by any black-and-white process.

Some of the plates prepared for this book have already appeared in that excellent and instructive popular publication, 'Birds in Nature,' issued by the same publisher, whose reprints of birds and other natural objects have been adopted by many educational institutions for use in teaching, in so much that more than 100,000 plates have been ordered by a single school committee. Others of the plates are reproduced from the great work, 'Edelsteinkunde,' by Dr. Max Bauer, who was one of the first to utilize the three-color method with success.

Dr. Farrington has had peculiar advantages in preparing such a work, from his position in charge of a great reference collection. This is based on the Tiffany collection of gems gathered for the Columbian Exposition at Chicago in 1893, and subsequently purchased for the Field Columbian Museum, where it is now installed in Higinbotham Hall. It is the best book published up to the present time as regards text, illustration and exact facts for a low price and useful to every mineralogist or collector of gems.

The color work in the gem plates compares remarkably well with the three-color work of Ives, who has attained excellent results, more particularly, however, with porcelains, enamels, pottery, etc., and is somewhat in the line of the plate illustrating North American gems issued by the U. S. Department of Mining Statistics in its report for 1899.

The Heliotype Company, of Boston, Mass., also, have printed (unpublished) a most re-

markable color reproduction of a slab of Mexican onyx, which for realism and beauty is as yet unrivaled.

It is not, of course, within the province of an inexpensive work like this to furnish such splendid plates as those illustrating the Heber R. Bishop book on jade—notably the lithographic work of the art objects by Prang, and of the archeological objects by Forbes, of Boston; or the etchings of the French artists, which were colored by being rubbed in with the hand, on the etched plates, that is, the color and the tintings were applied to an etching plate, giving both an artistic as well as a realistic and charming effect; or some of the Chinese wood-cuts, made by the artists in their own homes, from native specimens, and printed on the thinnest paper, which was then mounted. Dr. Farrington's volume contains thirteen plates, while Bauer's great book has twenty in color; but 'Gems and Gem Minerals' contains about one sixth the text of Bauer's book, and sells at one fifth the price.

To digress for a moment from the review, a few words upon color illustration may not be amiss. Illustrations for works upon science and art have become possible, both in kind and in cost, within recent years, by the wonderful advances in photographic reproduction, to a degree that is indeed remarkable. Plates that are almost perfectly true to nature can now be furnished in black and white at one tenth the cost of producing them twenty years ago; and color illustrations are now within the reach of students of entomology, ornithology, and, indeed, almost all branches of zoology and botany, to an extent formerly impossible. The realistic effect of such illustrations is often admirable; and these processes can be used in a multitude of cases where either lithographic or hand-colored work would be out of the question on account of its far greater cost. These expensive processes remain for luxurious and elaborate works, in which cost is not considered; but the half-tone and three-color methods have an immense and most valuable field in educational and popular uses. The question whether a book is to be a commercial

success, when sold at from two to ten dollars a copy, or is to be privately printed in a limited edition, for distribution as a gift by a wealthy man or a large institution, regardless of cost, for the purpose of describing a great collection, naturally involves an immense difference in the character of the make-up.

Among the first successful attempts to apply colored illustration to this department of natural objects, were the plates in the volumes by Sowerby, on British and exotic minerals, published in the early part of the last century. In other branches, especially in ornithology, entomology and botany, hundreds of volumes have been illustrated in color, often with great accuracy and beauty, in a manner rarely employed in mineralogy or geology. This difference may be due in some degree to the fact that birds, insects and flowers have greater interest than minerals for the general public; but it is also largely caused by the difficulty of reproducing successfully the peculiarities of crystalline form, especially when grouped, and the varying effects resulting from differences in luster and transparency. Among the first to avail themselves of the new processes, in a popular point of view, were Messrs. Funk & Wagnalls in the gem and other colored plates in their *Standard Dictionary*. The bird and similar color illustrations of Mr. Mumford have already been noted, and their extensive adoption in schools, etc., throughout the country. One of the latest and best examples of fine color work is in the monumental treatise on Indian baskets, by Dr. Otis T. Mason, recently published by the Smithsonian Institution. All these, however, notwithstanding their beauty and fidelity, and their great general value, can not be compared with such splendid illustrations as those of the North Carolina Geological Survey, which is now publishing a volume upon 'Gems and Precious Stones,' to contain four colored plates, by Taber Prang Art Company, or the Bishop jade catalogue, already referred to, or the great forthcoming work describing the Morgan collection of porcelains, which will consist of an edition limited to 250 copies, and will be of regal elegance in every way;

or the new description of the Morgan gems, which is to present the finest combination of realistic accuracy and artistic beauty yet attained.

GEORGE F. KUNZ.

*Laboratory Exercises in Physical Chemistry.*

By FREDERICK H. GETMAN, Ph.D. New York, John Wiley & Sons. 1904. Pp. 241.

Laboratory manuals in physics and in chemistry separately have been put upon the market during the last twenty years in sufficient number to satisfy all reasonable demands on the part of the general public. But during this interval a field that overlaps both of these has become differentiated, the start being made by Ostwald, whose work has been taken up and enlarged by a considerable number of ardent workers. Many of the laboratory operations involved are not provided for in the current manuals in English. Ostwald's 'Physiko-Chemische Messungen' and Traube's 'Physikalisch-Chemische Methode' cover the ground well in German, but, as is so often the case in German books, the amount of detail involved in the effort to be exhaustive, and the large number of references to researches not easily found in most American college libraries, deprive them of much of their value for American beginners.

Dr. Getman's admirable little book has been prepared with constant recognition of the American demand for directness and economy. His own experience during the last few years in Johns Hopkins University, where physical chemistry was the subject in which his doctor's thesis was prepared, has been linked on to several years of previous experience in the teaching of chemistry. His effort has been to select only such methods for presentation as he has found to be typical and worthy of preference. He has very decidedly the teacher's instinct, exhibiting much aptitude in the art of arrangement and of clear expression. Although the book is not yet two months out of press, it has been already adopted in a number of university laboratories. It certainly meets well the needs of the beginner in physical chemistry and is worthy of special commendation as a handbook.

The range covered may be briefly indicated.

In the introductory chapters the author discusses the theory and use of the balance; volume and density; viscosity and surface tension; and the determination of solubility. Thermometry and calorimetry are then considered, and a chapter on optical measurements is introduced. This is followed by several chapters on electrical measurement of conductivity, electromotive force, current and the dielectric constant. The last chapter is on chemical kinetics as illustrated in reactions of the first order, like the inversion of cane sugar, and of the second order, like certain cases of saponification.

The book closes with a well-selected series of tables and an index.

W. LE CONTE STEVENS.

DISCUSSION AND CORRESPONDENCE.

THE USE OF ROMAN NUMERALS.

ROMAN numerals are frequently used to designate the volume of a serial in bibliographic references. Instead of writing Vol. 88, or merely 88 after the name of the serial, we go to the trouble to write LXXXVIII. Why? Simply because we have seen others do it, and have unreflectively imitated them. When we are forced to defend our usage we find that there are few reasons for the use of the Roman system, whereas there are many reasons for the use of the Arabic system. Those who are intelligently in favor of the Roman numerals in bibliographic work argue that the use of them enables us to avoid the abbreviation for volume, while at the same time we thus distinguish sharply between volume and part, or volume and page. They, furthermore, urge that it is well for us to conform to the usage of publishers. But these arguments should be considered in the light of the following facts.

Although no one would deny that it takes much longer to write and read the Roman numerals than the Arabic, and that we are far more likely to make mistakes in dealing with the former system, few of us realize how great the difference in the ease and accuracy with which we use the two systems really is. In order that my arguments for the use of Arabic instead of Roman numerals, not alone