Qualitative Analysis for Secondary Schools. By Cyrus W. Irish, A.B. (Harvard), Head master of the Lowell High School, Lowell, Mass. American Book Company.

The preface of this book states that in secondary schools "the first half of a one year's course in chemistry should be devoted to a general introduction to the theory of the science and to a close study of the most common non-metallic radicals. The second half-year should deal with basic radicals and should be combined with the study of Qualitative Analysis." It is to supply a manual for the latter part of such a course that this little book has been written.

The laboratory work begins with a series of experiments, illustrating the classification of the bases into analytical groups. Metals are selected as typical of the various groups, and the action of each group reagent, in turn, upon a solution of a salt of each of these metals is studied. The metals of a group are then taken up in order, preliminary experiments being followed by a few well-chosen questions on the experiments and on the occurrence, preparation, uses, etc., of the element under consideration and its compounds.

The directions for the analysis of a group are followed by a table outlining, by the use of formulæ, the chemical changes which take place in the course of analysis. In the reviewer's opinion the preparation of such a table by the student himself, from the data secured in the preliminary experiments, is much better and is one of the most profitable exercises which can be given him. In this manual the table is followed by 'notes and suggestions' which are altogether too brief. Space might have been gained for the expansion of this part of the book, by the omission of lithium and all but the more common inorganic acids.

As is usual in manuals of qualitative analysis, the section devoted to the acids is unsatisfactory. In the test for an acid, the behavior of other acids under the prevailing conditions is disregarded. The most convenient method of preparing a solution for the detection of the acids, viz, treatment of the substance with sodium carbonate, is not directly mentioned, while there is given in full the preliminary examination of the solid substance, the results of which, in the case of mixed substances, can only be interpreted by the more advanced student.

The methods used for the separation of the bases are for the most part well-chosen. Most teachers would prefer, however, to adopt for high-school students methods for the separation of nickel from cobalt and of copper from cadmium, which do not involve the use of potassium cyanide. The directions for the precipitation of the copper group (p. 36) are faulty in that they favor the incomplete transformation of mercuric compounds into the black sulphide, which will frequently result in a precipitation of mercuric sulphide in the final test for cadmium. On page 42 occurs this misleading paragraph, "Boil stannous chloride with concentrated nitric acid. This converts the stannous chloride into stannic chloride."

The introductory chapter lacks the lucidity of style which should characterize an elementary text-book. The statements, "the specific name of a salt is the name of the basic radical changed to an adjective" (p. 8), and "substances that are in solution can be separated by addition of such a reagent as will form a new substance that is insoluble in the fluid" (p. 12) will surely appeal to the high-school pupil as little as does the following prescription to the chemist, "for Alkali Burns, apply acetic acid diluted with water so that to the taste it is about one-fourth as sour as vinegar. This solution may be safely applied to the eye" (p. 15).

Notwithstanding these faults, the book might produce good results in the hands of an experienced teacher of chemistry. Whether a year's course in chemistry in a secondary school may not be profitably spent in a thorough and extended study of what is usually called general chemistry to the exclusion of anything more than the merest elements of qualitative analysis, is another question.

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The Psychology of Religion. An Empirical Study of the Growth of Religious Consciousness. By Edwin Diller Starbuck, Ph.D., As-

sistant Professor of Education at Leland Stanford Junior University. With a Preface by WILLIAM JAMES. London, Walter Scott. 1899. Pp. xx + 423.

Within the last decade a number of articles have appeared that center about the religious phenomena of adolescence and point the way toward a scientific religious pedagogy. Two of these were by Professor Starbuck (*Am. J. Psy.*, VIII. and IX.), and out of them, by the help of improved methods and of largely increased data, the present volume has grown. Part I. treats of conversion, Part II. of religious growth not involving conversion, and Part III. of the essential unity of the two lines of growth. It is shown that conversion is essentially an adolescent phenomenon, that parallel experiences occur where strong upheavals are absent, and that these experiences in their totality are intimately related to the bodily and mental phenomena connected with puberty. The general outcome is a clear exhibition of the various ways in which the religion of childhood gives way to that of maturity.

The study is purely empirical. In fact, its freedom from all apparent consciousness of dogma is rather remarkable. The data consist of statements of personal experience from more than 400 persons who have replied to question list circulars. The fact that nearly all the respondents are American Protestants and that the research concerns the adolescent period almost exclusively, suggests a question whether the title is not somewhat too broad for the contents of the book. It is only fair to say, however, that the data have been so related to physical and mental laws as to display general rather than merely special tendencies. The manipulation of the returns has been very skilful. In spite of the necessary defects of material derived from what untrained observers tell about their own mental states, the broader features of growth—those upon which general pedagogical practice must be based—are adequately set forth.

The volume is significant of new scientific attitudes and occupations. It means nothing less than that the *modus vivendi* with theology whereby two supposedly distinct fields of study were delimited, has come to an end. Theology moved in this direction when it adopted scientific methods in the study of the Scripture and in the history of religions. And now science also throws off her reserve and, agreeing with Karl Pearson that wherever facts can be observed and compared, there is the realm of science, assumes that 'there is no event in the spiritual life which does not occur in accordance with immutable laws' (Starbuck, p. 3).

However much this may look like an 'invasion' of religion by science, it is, in fact, in logical harmony with the theology of divine immanence, which denies the mutual exclusiveness of the natural and the supernatural and finds it worthy of supreme intelligence that nature and mind should proceed by orderly sequence. It is certainly to be hoped that both theologians and men of science will take this view of the matter, and thereby avoid such unfortunate squabbles as accompanied the adoption of the new geology and of the evolution hypothesis. On the side of science all that is required is that law be understood in the sense of uniformity and not in the sense of a controlling necessity.

There are three reasons for expecting that studies like this will be assimilated by religious thinkers with some degree of readiness. The first is that the contest over geology and evolution has taught its lesson. The second is that Starbuck's spirit and attitude show no trace of antagonism to religion or religious beliefs. A third reason is that the book furnishes a preliminary basis for a sound religious pedagogy and contains tools capable of being used for religious propagandism. The 'dead hand' of false method has been upon the practical work of the churches as truly, if not as fully, as upon their theology. Analysis of human nature as it presents itself to observation has scarcely been heard of except in the training of Jesuits, and here it is only a device for attaining certain prescribed ends. The Protestant churches, at least, will find their interest in promoting such studies as that before us. Denominational colleges will find that they have a special call to prosecute them, and in the end we may hope to see shambly Sunday-school methods and hit-or-miss evangelism superseded by a reasonable system of religious training and an evangelism

that has conscious respect for ascertainable facts of human nature.

The effect of the ancient misunderstanding between science and religion could not be slight. In early Greek thought what we now call science was all one with what we now call philosophy and with the intellectual side of religion. The sciences have been completely segregated from other intellectual interests, in fact, scarcely more than a century. No doubt science and religion have both gained by the separation, but it may reasonably be asked whether their going apart, is not, after all, a merely temporary expedient to enable the intellect to regain its unity upon a higher plane.

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BOOKS RECEIVED.

The Cell in Development and Inheritance. Edmund B. Wilson. New York and London, The Macmillan Company, 1900. Pp. xxi + 483.

Lehrbuch der Zoologie. Richard Hertwig. Jena, Gustav Fischer, 1900. Pp. xii + 622. 11 Mark, 50 Pf.

Catalogue of the Fossil Bryozoa in the Department of Geology, British Museum (Natural History), Volume I. *The Cretaceous Bryozoa.* J. W. Gregory. London, The British Museum, 1899. Pp. xiv + 457 and seventeen plates.

Catalogue of the Arctiadæ. Sir George F. Hampson. London, The British Museum, 1900. Pp. xx + 589.

A Monograph of Christmas Island, Physical Features and Geology. Charles W. Andrews. London, The British Museum, 1900. Pp. xiii + 337. A map and twenty-two plates.

Anatomie et physiologie végétales. Er. Belzung. Paris, Alcan, 1900. Pp. iii + 1320.

Micro-organisms and Fermentation. Alfred Jörgensen. Translated by Alex. K. Miller and A. E. Lennholm. London and New York, The Macmillan Company, 1900. Pp. vi + 318.

SCIENTIFIC JOURNALS AND ARTICLES.

The *Journal of the Boston Society of Medical Sciences* for April opens with an abstract of the 'Histology of Acute Pneumonia,' by Joseph H. Pratt, giving a summary of the examination of fifty cases. G. B. Magrath has a preliminary study of 'The Relation of Age, Physique, and Preliminary Training to Class Rank in Pathology,' training not unnaturally seeming to have the most marked bearing on scholarship. F. P. Denny presents a 'Report on the Examination for Diphtheria Bacilli of Cultures from Four Hundred and Seventy-five Individuals,' an important conclusion being that while such bacilli are rarely present in healthy persons, a large number may be infected by healthy individuals who *do* have the bacilli in their throats. J. H. Wright describes 'A Case of Multiple Myeloma,' and Franklin Dexter has some 'Additional Observations on the Morphology of the Digestive Tract of the Cat,' while Wm. Hallock Park gives the results of 'A Few Experiments upon the Effect of Low Temperatures and Freezing on Typhoid Bacilli,' showing that they possess great powers of endurance and that infection may be caused in spring by fecal material thrown out in winter. The final paper, by E. W. Taylor, describes a case of 'Diffuse Degeneration of the Spinal Cord.'

The *Popular Science Monthly*, established in 1872 by Messrs. D. Appleton & Co. and Dr. E. L. Youmans, will hereafter be published by Messrs. McClure, Phillips and Company and edited by Professor J. McKeen Cattell. The table of contents for June is as follows:

Professor Wolcott Gibbs, President of the National Academy of Sciences. (Frontispiece.)

Preventive Inoculation. (1) Dr. W. M. Haffkine.

Professor Ewart's Penycuik Experiments. (Illustrated.)

Colonies and the Mother Country. (1) James Collier.

The Future of the Negro in the United States. Professor N. S. Shaler.

The Physical Geography of the Lands. Professor W. M. Davis.

The New York Botanical Garden. (Illustrated.) Dr. D. T. Mac Dougal.

Gas and Gas Meters. (Illustrated.) Hubert S. Wynkoop.

The Sun's Destination. Professor Harold Jacoby.

A Biographical Sketch of an Infant. Charles Darwin.

Correspondence: Comparative Longevity and Greatness. Professor Joseph Jastrow. School Reform.

Scientific Literature: Chemistry; Zoology; Botany; Anthropology.