Th B→Th C. Each product has its own rate of change, which is independent of physical and chemical conditions. Radioactive phenomena are explained in terms of the Disintegration Hypothesis, proposed by Rutherford and Soddy. According to this hypothesis, an atom of any sort is a complex system; some atomic systems, those of radioactive elements, are unstable, with the result that a certain proportion of the elements break up or disintegrate per second; accompanied by the expulsion with enormous velocity, of α or β particles or both. The properties of the α particles led Rutherford to suggest that they might be atoms of helium; the experimental confirmation of this prediction by the observation, by Ramsay and Soddy, of the production of helium by the transformation of radium emanation has, more recently, been greatly strengthened by Debierne's demonstration of the production of helium by actinium.

It is shown in the following chapters that the changes in radium, actinium and uranium are to be explained by analogous series of transformations. The slowly changing products of radium are especially interesting; these are almost certainly the active constituents of radiolead, radiotellurium and polonium. In the chapter devoted to the origin and life of radium, it is shown that this element is, without doubt, a transformation product of the element uranium.

The subject matter of the book is well chosen and admirably presented and constitutes one of the most interesting topics in physical science. Coming as it does from a leader in this special field of investigation, the book is authoritative and will naturally take a permanent place in the literature of the subject. Dr. Levin's translation, which follows the original closely, is supplemented by occasional footnotes on the newer developments of the subject. HERBERT N. MCCOY.

THE BACTERIOLOGICAL EXAMINATION OF WATER SUPPLIES. By WILLIAM G. SAVAGE, B. Sc., M. D. (Lond.), D. P. H. and Professor of Pathology, in charge of the Bacteriological Department, University College, London. P. Blakiston's Son & Co., Phila., 1906. Price, $2.50 net.

Water bacteriology, one time an obscure branch of medical bacteriology, later treated more fully in general works on water analysis and water supply engineering, has in the past few years established its just claim to recognition as an independent branch of applied science. This is well illustrated by the appearance of the present work, the third of its kind, devoted wholly to this special branch of bacteriology. The author states in his preface: "Unfortunately, many of the data upon which the bacteriological examination of water is based have not passed beyond the region of controversy, and on not a few questions—some of which are of much importance—each bacteriologist is, at present, a law unto himself." In such cases the endeavor is made to give the best available information and to draw definite conclusions therefrom. In this regard the author

shows familiarity with the best work in this field and by his excellent treatment and logical deductions has done much to clear up the debated points referred to.

The first chapter deals with the influences affecting bacteria in water. The grouping of the bacteria found in waters into (1) normal inhabitants, (2) unobjectionable aliens, and (3) objectionable aliens, is a fortunate conception. The discussion of the effect of light, agitation, temperature, dilution, sedimentation, food supply and microbe products upon the self-purification of streams is thorough and the conclusions drawn are based upon a large amount of experimental work, citations of original sources being given freely. The predominating influence of sedimentation is properly emphasized. The statement (p. 3) that "sewage entering a river will charge the water with vast numbers of its own bacteria alien to a pure water, yet twenty or thirty miles lower down, if no fresh additions have been made between, the water will be free, or practically free, from organisms of sewage origin," is rather a sweeping conclusion upon a vital point in water bacteriology. Although apparently supported by excellent bacteriological investigations, there is strong epidemiological evidence on the other side and the whole matter is at present in an unsettled state. In any case it will be conceded that the *distance* from the point of infection is the least important factor, the *time* of flow and opportunity for *sedimentation* being the vital factors.

In Chapter II, the bacterial content of normal waters, and the subject of standard media are discussed. On p. 23 the table taken from a paper by Gage and Phelps is misinterpreted to show that on Nährstoff agar the number of organisms found in pure ground waters was as great as in sewage. The fault lies perhaps in the original table in which a percentage basis of statement is used. The actual numbers in the two waters are not comparable with each other.

The two chapters following are devoted to the bacteriology of excreta and of soil respectively and contain much valuable material.

Chapter VI takes up *B. coli* and allied forms, including organisms of the hog cholera group, *B. lactis aerogenes* and *B. cloacae*. The various sets of diagnostic characters which have from time to time been proposed for the identification of *B. coli*, including those recommended by the English and the American Standard Methods Committees, are fully discussed. From these the author selects what he considers essential and recommends the following tests as necessary and sufficient for the complete determination of that organism:

A short bacillus with rounded ends, no spores, motile.
Decolorized by Gram's method.
Characteristic growth on gelatin.
Acid production and coagulation in litmus-milk.
Production of indol.

Production of a considerable quantity of acid in litmus-whey.
Production of acid and gas in glucose and lactose media.
No fermentation of starch or saccharose.
A positive neutral red reaction.

The perplexing question of atypical forms is dealt with and the position taken that these are less and less significant as they depart from the normal type, and in quantitive work should be so weighted in the final estimation of the water.

In the chapter on the Eberth group a most excellent summary of our knowledge of the typhoid and dysentery bacilli is given, special attention being devoted to the question of the viability of the typhoid organisms.

The chapter on "Other Intestinal Bacteria" takes up the streptococcus group, *B. enteritidis sporogenes* and the cholera and other vibrios in the same thorough manner.

A chapter on "The Content of Various Waters in Regard to the Presence of *B. coli*, *B. enteritidis sporogenes and streptococci*" is followed by two chapters on "Bacterial Indicators of Pollution" and one on "Interpretation of Results." To the reviewer's mind these chapters are the best part of the book and constitute the most satisfactory discussion of these perplexing questions extant, and will place water bacteriology upon a firmer scientific basis than it has heretofore enjoyed. The conclusions are so thoroughly reasoned out that any attempt to abstract them in a review would be futile. Great reliance is placed upon *B. coli* properly determined, and less upon streptococci and *B. sporogenes*.

Part II, about one-third of the book, is devoted to laboratory methods. It contains among other things a valuable chapter on the typhoid organisms, giving descriptions of the best methods which have been proposed for the detection of this bacillus.

An appendix gives in summary the procedure recommended for the bacteriological examination of a water, and methods of preparing the ordinary standard solutions and media. An extensive bibliography completes the work. It is apparently an oversight that, in the bibliography, which is quite rich in American citation, Prescott and Winslow's "Water Bacteriology" is not mentioned. EARLE B. PHELPS.

SOLUBILITIES OF INORGANIC AND ORGANIC SUBSTANCES. A Handbook of the most reliable quantitative solubility determinations. Recalculated and compiled by ATHERTON SEIDELL. 8 vo. X + 367 pages. D. Van Nostrand Company, New York, 1907. Price $3.00 net.

This handbook of solubilities should find a place in every laboratory and chemical library, for it contains in one volume the solubilities of both organic and inorganic substances, not alone in water, but also in the other common solvents, and, in many cases in salt or other solutions as well. In including organic substances it is a distinct improvement