"conscious" which evidently is after all used merely as a synonym of "mental." Too little is made of the nature and mode of dissociation and the biology of dissociated complexes, to give the average reader matter for a less misleading reconstruction of what he now stores in the subconscious. With a frank acceptance of biological principles the interesting but probably somewhat bewildering discussion could be greatly simplified. When the reader has successfully divested himself of the over-emphasis of the concept of consciousness—which as we know can hardly be found discussed in modern text-books on psychology—he is again brought up to it on p. 154:

> But again we have even in such most complex and exceptional cases only an alternation in the contents, not an alternation in the consciousness itself.

If consciousness denotes chiefly the mental character of the reaction, why should we go on contrasting "contents" and "consciousness"? If it designates degrees of connections, why deny the alternations? Nothwithstanding these criticisms, the two chapters are a most excellent *pièce de résistance* of the book.

The second part of the book, the field of psychotherapy, its general and special methods, and the mental and bodily symptoms, is better than similar popularizations. To the physician and even more to the layman, the casuistic material brings much encouragement, but probably also a false perspective, although no doubt less so than many other attempts of propaganda. To one familiar with what has been achieved during the last twenty-five years, psychotherapy must appear rather broader than is depicted in the case-records. The book makes it a point to abstain from everything which is exceptional or even unusual; yet, it does not make plain in the cases, how much can be corrected by a simple adjustment of conduct and attitude (without hypnotism or other very specific methods); or why the method employed is necessarily cogent. After all the book claims to sketch the whole field of disturbances in which psychotherapeutic influences might be possible and all the methods available.

There lies a great danger in such an attempt of writing popularly about a matter of action and procedure without a full discussion of the principles and factors to be handled. What should we think of a book on drug-treatment for a general public unless it analyzed the things to be treated and some indications of *why* the matter and choice of method must after all be left to the physician? Münsterberg urges that these matters be left to the physician and he even condemns the running of a "psychological clinic" by a non-medical psychologist. Why then discuss the whole procedure before the wider public?

It might be easy to misinterpret the protestations that the writer would never use hypnotism experimentally (p. 380). They tend to give an idea that there must be something wrong or dangerous or queer in it, after all, even in the hands of a competent M.D. We certainly should not hesitate to try drugs on ourselves or others to study physiological effects and especially their harmlessness. This feature of the third part of the book, and such sentences as "It is never the task of the minister to heal a mind and never the task of a physician to uplift a mind. One moves in the purposive sphere, the other in the causal sphere"—and the continual dogmatic discrimination against psychiatry in which psychotherapy (though not merely hypnotism and tricks) is daily more essential, might well be modified in further editions.

It is a pity that the book is intended to serve for propaganda to so many classes. A book frankly addressed to physicians, and another frankly addressed to the layman would have been safer and more acceptable.

ADOLF MEYER

Anwendung elementarer Mathematik auf biologische Probleme. H. PRZIBRAM. Leipzig, Engelmann. 1908. Pp. vi + 84. (Forming Heft III. of Vorträge und Aufsätze über Entwicklungsmechanik der Organismen.)

The purpose of this book is stated at the outstart by the author to be an attempt to show biologists that a mathematical treatment of biological problems may be in general valid and useful. By such demonstration it is hoped to lessen or eradicate "eine gewisse Scheu" of such methods on the part of workers in this field, which Przibram (in common with others) has observed. Both these aims are certainly commendable, and this book will undoubtedly aid—and in certain quarters perhaps greatly aid—in their realization.

The general plan of the book, which is an outgrowth of a series of lectures given in the University of Vienna, is to present first in an introductory chapter certain general considerations regarding the scope, the limitations, the necessity for and the practical usefulness of mathematical methods in biological investigation. There follows a series of chapters intended to show how the general principles brought out in the introductory chapter apply in the study of specific, concrete, biological problems. In the practical working out of this scheme it results that the introductory chapter, with the title "Möglichkeit mathematischer Biologie," is by long odds the best in the book. The arguments for the possibility, and indeed necessity, of a mathematical biology are stated very clearly, incisively and convincingly. To be sure, such arguments have been as well stated before, but it is encouraging, and augurs well for the wider acceptance of these ideas, that this time they are presented by a biologist *von Fach,* not by a mathematician.

The special chapters (II. to IX. inclusive) deal with a variety of general biological problems from the standpoint noted above. Chapter II. (Raum) discusses the interrelations between cell and nuclear volume and surface. Chapter III. (Zeit und Geschwindigkeit) deals primarily with growth and in particular with rate of growth. Chapter IV. (Energie) has as its chief topic the temperature coefficients of various biological phenomena. Gleichgewicht is the title of Chapter V. and it deals with certain quantitative aspects of regeneration and molting in arthropods. The next chapter has for its title Chance and for its biological topic the distribution (right or left) of asymmetry of the chelæ in certain crustacea. As a supplement to this chapter there is a brief discussion of sex as a "chance" phenomenon. Chapter VII., under the title Kombinationen, deals with the segregation and recombination of characters in Mendelian inheritance. Variation und Selektion are briefly discussed in the next chapter. Chapter IX. deals in an elementary way with psychophysics, particular attention being given to the Weber-Fechner law. A curiously ill-assorted and incomplete bibliography ends the volume. The author states in the preface that the bibliography is not complete. How superfluous this remark is is indicated, for example, by the fact that Pearson's name does not appear at all except as an associate editor of *Biometrika,* and that Weldon is known only by his 1898 British Association address. Whatever one's opinion may be as to the importance of Pearson's work, it certainly is a fact that he has contributed extensively to the subject with which this book has to do. viz., the application of elementary mathematics to biological problems. That Przibram is aware of this fact appears definitely in the text. To cite Pearson's fundamental papers in the bibliography would seem only common justice to the reader.

The discussions in these special chapters are in every case suggestive. They are, however, neither exhaustive nor thorough. But since they were obviously not intended to be they perhaps can not fairly be criticized on this ground. The greatest weakness of these chapters, to the reviewer's way of thinking, is that the standpoint is too exclusively abstract and too little concrete and *quantitative.* Biology needs definite, quantitative data bearing on its problems, much more than it does theoretical abstractions, even though these be mathematical in form. Of course it is not to be expected that measurements or statistics will be presented in a general work of this character; but it is reasonable to ask that the general

standpoint of the work give no excuse for even the most careless reader to carry away the notion that a deft manipulation of equations will *per se* ever solve a biological problem. On the whole the book is an interesting and suggestive introduction to the general subject of "mathematical biology."

RAYMOND PEARL

Archiv für Zellforschung. Herausgegeben von Dr. RICHARD GOLDSCHMIDT, München. Leipzig, Verlag von Wilhelm Engelmann.

Cytology has grown so rapidly within the last decade that it is already one of the important subdivisions of biology and the journals devoted to morphology and physiology are no longer able to provide for the publication of the constantly increasing output of research in this field. Furthermore in the study of the cell, which is the ultimate independent unit of all organic structure and function, the subdivisions of biology into botany and zoology, morphology and physiology, have less value than in the study of less general structures and functions; in the study of the cell all biological sciences come to a focus, the cytologist is not, or at least should not be, exclusively a zoologist, a botanist, a morphologist or a physiologist, but all of these combined. The scattering of cytological literature through the journals of all of these special sciences makes it much less accessible to the student of the cell and tends to emphasize distinctions which are here worse than useless. Finally the problems of cytology are of such general and fundamental interest that they well deserve and should well support special publications in this field.

Almost twenty-five years ago the late Professor Carnoy established the journal *La Cellule,* which has ever since continued to be published in beautiful and sumptious form; from the first, however, it was devoted very largely to the work of Carnoy and his pupils and its *raison d'etre* was the propagation of the views of a particular school. Of late there has been very urgent and increasing need of a general journal devoted exclusively to cytology and representing no particular school or propaganda. Such a journal is the *Archiv für Zellforschung,* edited by Dr. Richard Goldschmidt, of Munich, and published by W. Engelmann, of Leipzig. The first number of this journal appeared in February, 1908, and the first volume, consisting of four numbers, was completed in July of the same year; a second volume has appeared since then. Each volume consists of about 600 pages and 20 lithographic double-plates, with numerous text figures. The *Archiv* receives and publishes contributions in the German, French, English and Italian languages, supplies authors with 40 separata gratis, and pays an honorarium of 40 Marks per signature of sixteen pages for contributions of not more than four signatures. In paper, typography and illustrations the new journal shows the usual German excellence, while the character of the contributions is of a very high order, as is indicated by the following lists of contents of the first volume: Richard Hertwig, "Ueber neue Probleme der Zellenlehre"; G. Tischler, "Zellstudien an sterilen Bastardpflanzen"; A. und K. E. Schreiner, "Zur Spermienbildung der Myxinoiden"; Richard Goldschmidt, "Ueber das Verhalten des Chromatins bei der Eireifung und Befruchtung des *Dicrocœlium lanceatum;* Methodi Popoff, Experimentelle Zellstudien"; M. G. Sykes, "Nuclear Division in *Funkia";* J. Duesenberg, "Les divisions des Spermatocytes chez le Rat"; Kristine Bonnevie, "Chromosomenstudien"; M. G. Sykes, "Note on the Number of the Somatic Chromosomes in *Funkia";* Honoré Lams, "Les divisions des Spermatocytes chez la Fourmi (*Camponotus herculaneus*)"; Alfred Kühn, "Die Entwicklung der Keimzellen in der parthenogenetischen Generationen der Cladoceren *Daphnia pulex";* Vladislav Ruzicka, "Zur Kentnis der Natur und Bedeutung des Plastins"; R. Fick, "Zur Konjugation der Chromosomen"; Friedr. Meves, "Es gibt keine parallele Konjugation der Chromosomen!" R. Goldschmidt, "Ist eine parallele Chromosomenkonjugation bewiesen?"

The second volume is equally meritorious, and the abundance of such excellent contribu-