mathematics of the country by his editing of several texts; this new volume should share in the wide recognition of worth accorded the series.

R. G. D. RICHARDSON.

The Calculus. By E. W. DAVIS and W. C. BRENKE. Edited by E. R. HEDRICK. New York, The Macmillan Company, 1913. xx+383+63 pp.

"THIS book attempts to preserve the essential features of the calculus, to give the student a thorough training in mathematical reasoning, to create in him a sure mathematical imagination, and to meet fairly the reasonable demand for enlivening and enriching the subject through applications at the expense of purely formal work that contains no essential principle."

This is the closing sentence of the preface. It sets forth four things that the authors attempted to do in writing the book. Probably every author of a calculus consciously attempts the first two. An examination of the current texts however reveals but little evidence that the last two have received adequate attention, although there is a clearly defined tendency towards a fuller recognition of their importance. While the formal type of calculus is pretty definitely standardized, there is no generally recognized norm for one of the type here under review. Accordingly a book of this kind is more difficult to write, and also more difficult to teach, than one of the former kind.

It is obvious to any one at all familiar with teachers of college mathematics that the genus is made up of two clearly defined species; namely, those who reverence the symbol and those whose main interest is in the thing symbolized. This book is obviously and confessedly not for the former. It makes its appeal to those who want our students of calculus to realize that the subject is not primarily a formal one, but that it is vitally connected with physical phenomena and represents an important and significant intellectual achievement of the race. For example, instead of devoting a large amount of space to a discussion of the artifices for integration, the authors have presented integration as a process of reversal of rates. They have done this admirably and have brought home to the student with clearness and force what the process is and why it is important for him to study it. And that is the

one thing needful. It helps to create in him a sure mathematical imagination—a far more important thing than to make him an expert manipulator of forms. It is impossible to do both in the time given to the subject.

There are many other features of the book that are excellent for the same reason. Prominent among these the presentation of Taylor's theorem may be mentioned. This presentation is unusual and has the great and rare merit of making the student see an important use for the theorem. The excellence of the treatment of relative rate of increase and the compound interest law is equally conspicuous. The treatment of simple and damped harmonic motion, the frequent and happy use of parametric equations, and the simple examples in least squares also merit special mention. There is a brief but adequate treatment of simple differential equations.

The book is not free from faults, although many of these are of a mechanical nature and are not inherent in the text. For example, the page is too condensed; a number of important principles and formulas appear in inconspicuous places and are not properly emphasized; it is difficult to use the book for reference. But not all of the shortcomings are of this nature. There are a number of inaccuracies. Some of the exercises are unsuitable. The treatment of infinite series is inadequate.

To sum up, it seems to the reviewer that the authors have been reasonably successful in their effort to enliven and enrich the subject and to present it in such a way as to help create in the student a sure mathematical imagination. He has used the book in his classes since its first appearance and imagines that his students get from it a clearer notion of the essential features of the calculus than they get from any other text he has used. Many of its faults can be overcome by the teacher, whereas its excellent features cannot so successfully be grafted by him upon a text of the formal type. In the reviewer's opinion it is the best elementary calculus now available for use in American colleges. A judicious combination of the good points of this book, the Osgood, and the Franklin, McNutt and Charles would make an ideal text.

WILLIAM BENJAMIN FITE.