



Review

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Source: *The Mathematical Gazette*, Vol. 5, No. 84 (Mar., 1910), p. 208

Published by: [Mathematical Association](#)

Stable URL: <http://www.jstor.org/stable/3603147>

Accessed: 08-02-2016 08:24 UTC

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REVIEWS.

Methodologisches und Philosophisches zur Elementar-Mathematik, von G. MANNOURY, Priv.-Doz. f.d. logischen Grundlagen der Mathematik an der Universität zu Amsterdam. Pp. viii, 279. (Haarlem, P. Visser Azn., 1909.)

One of the most important facts that have been discovered in recent years is the fact that the basis of pure mathematics is logic, and logic alone. This does not, of course, mean that what is popularly called 'intuition' plays no part in mathematical discovery; there are certainly interesting psychological problems raised by the consideration of methods of mathematical discovery, but the proposition that the ultimate premises of mathematics are all of a general logical nature has been proved to be the case as rigidly as it can well be by modern mathematicians. This is particularly interesting to mathematicians, since for centuries philosophers have vainly tried to prove or disprove this; and now only mathematicians, like M. Poincaré, who deliberately refuse to study symbolic logic, and who only follow the work of others in it with polemical intentions, still hold a position something like Kant's.

Herr Mannoury's book is an outcome of yearly courses of lectures he has given to teachers of mathematics since 1906; space, time, number and mathematical method are discussed in it; and the controversial literature of the last ten years on Kantianism in mathematics, which has appeared in *Revue de Métaphysique et de Morale*, is especially noticed.

The book has two parts, devoted to the foundations of arithmetic and of geometry respectively. Strangely enough, an account of mathematical logic (pp. 129-154) is reserved for the second part, and a psychological discussion—on which I feel incompetent to form any judgment beyond feeling that it is irrelevant—precedes a logical discussion, beginning on p. 39 with finiteness and infiniteness treated in the orthodox mathematical way. On p. 49, note, Herr Mannoury has the curious remark that Mr. Russell's (1903) contradiction is a merely verbal one.

The author lavishes praise on Peano's logic; but we do not find that he has mentioned what is the most important character of Peano's calculus,—that, unlike Aristotelian logic, it deals with implications between propositional *functions* (containing variables), which are the elements of all mathematical reasoning.

An important work mentioned (p. 75) is that of C. S. Peirce (1881) on the principle of induction. This is often overlooked.

On pp. 109 sqq. Dirichlet is often misprinted for Dedekind.

The book seems to me to be well worth consulting, but to be very incomplete as regards the information that is necessary for fruitful discussion of the questions with which it is concerned.

PHILIP E. B. JOURDAIN.

An Introduction to the Study of Integral Equations. M. BÔCHER. (Cambridge Tracts in Mathematics and Mathematical Physics, No. 10.)

Prof. Bôcher's tract is rather different in character from any of its predecessors in the Cambridge Series. Most of these have dealt with subjects selected from "classical" theories, with the general outlines of which every mathematician is familiar. The general theory of Integral Equations, on the other hand, is a product of the last ten years; it is still possible to be a mathematician of the highest reputation and to know next to nothing about it.

It has hitherto been very difficult for anyone who has not kept pace with the development of the theory from the beginning to make good his deficiencies afterwards. The subject is intrinsically difficult, and has been approached from different points of view, which have at first sight but little in common. The literature is scattered, and new contributions appear almost every month. It has been a severe handicap to anyone who wished to "get up" the subject that there has been no connected account of those parts of the theory which may be regarded as tolerably complete. At the same time, so much still remains confessedly incomplete that a treatise on the subject would probably be superseded almost as soon as it was written, and it is not surprising that no one has been willing to write one. The publication of a "Tract" is an ideal compromise, and Prof. Bôcher's should be one of the most valuable of the series.