collective capacity while on the whole reducing his individual independence, therefore science is dangerous, and that unless we take steps to counteract these tendencies we may perish by science instead of living by it.

In one sense this is all but commonplace—everything is what we make it, and all implements are only good or bad as we use them well or ill. But Mr. Russell doubtless intends his book to be more than commonplace; and if so, he should have made more of it, and not left so much out of the picture. He has left medicine almost wholly out of the picture, both curative and preventive—and that is a big omission. But, bigger omission than that, he has left the scientific spirit out of the picture. The scientific spirit, we take it, is that which finds out what is true, and attempts to act on what it has found out—rational imagination and imaginative reason. However much governments or individuals may attempt merely to utilise the practical results of science, they cannot have those results without men of science, and they cannot have men of science without the scientific spirit. As the men of science grow more numerous, the scientific spirit will spread, and as it spreads, it will make more and more difficult a foolish use of the practical applications of science. Hitherto, though science has transformed social and industrial conditions, there has been no corresponding change in the relationship of labour to management, or in the provision of administrators adapted by scientific knowledge to deal with problems of the new era.

Mr. Russell dislikes present-day Western civilisation: but he is impatient. If ever there was a time of rapid transition, it is now. Does he forget that our modern science as an organised body of knowledge is scarcely three centuries old ? Or does he forget what a short time is three centuries, even in the life of a rapidly evolving species like man ? Frankly, it is a rather disappointing little book, from one of whom we expect so much.

Mathematical Philosophy.

Mathematical Philosophy, a Study of Fate and Freedom : Lectures for Educated Laymen. By Prof. Cassius J. Keyser. Pp. xv + 466. (New York : E. P. Dutton and Co., 1923.)　4.70 dollars.

MOST of us make use of mathematical ideas and processes to some extent, and many of us have wondered from time to time what these ideas and processes really were. What is the meaning of function, transformation, invariance, limit, infinity ? What are the relations of algebra and geometry ? Has geometry anything to do with space ? What is the meaning of a geometry of n dimensions ? What are irrational numbers ? These and many more questions naturally occur on reflection. The mathematicians themselves are seldom able to give much help to the outsider. None of the questions of this type are easy to answer, and some of them the mathematicians themselves could not answer until recently. Indeed, inquiry into the fundamental principles of mathematics is of very modern growth ; the older school of mathematicians were content to find that the methods they use worked all right without finding out the reason why.

Prof. Keyser sets out to answer such questions, and explains to those who are not mathematicians what mathematical reasoning is and what it is about. He has succeeded admirably. He is lucid and interesting. His illustrations are always to the point, and his digressions (which are many) are always entertaining and provocative of thought. If any reader complains that the author whets the appetite rather than satisfies it, he has his reply ready : " I trust we are not so stupid as to be able to answer all the questions we are able to ask."

A more serious criticism that might be made is that among the questions Prof. Keyser discusses, he gives rather scant attention to the very fundamental problems of the nature and relations of the various types of numbers, and his treatment of infinity consists mainly of digressions, though they are interesting ones. Of course, he might reply to this that any one who wishes information on these matters can get it from Russell's " Introduction to Mathematical Philosophy," to which he refers.

In the last three lectures the author leaves his more strictly mathematical topics. In one, perhaps the best in the book, he discusses the psychology of mathematics. He points out how, from the time of Pythagoras almost to the present day, the bad psychology of mathematicians has frequently hindered mathematical discovery. It has taken a long time to persuade them that things can be reasoned about even when they cannot be imagined. The last two lectures, interesting and highly controversial, deal with the nature of mankind, civilisation, and progress. These topics are not quite so remote from mathematical philosophy as might be thought at first sight.

The work is emphatically a book to be read by all who wish to learn what the science of mathematics is about. Even if the study, as Prof. Keyser says, " is not so entertaining as a movie or so easy as the life of maggots in a cheese," he has made it sufficiently easy and entertaining for any reasonable person, without sacrificing lucidity and accuracy.

A. D. R.