stimulating. The first of these, by Professor Blaschke, gives an account of Study's line geometry. Professor Radon contributes the second of these chapters which is devoted to a discussion of the author's mechanical derivation of Levi-Civita's parallel displacement. The third chapter, apparently a joint product of Professors Blaschke and Artin, is devoted to analysis situs. It is of special interest to American readers in that it reproduces Alexander's elegant proof of the deformation theorem of Tietze. Professor Radon contributes also the fourth of these chapters which is devoted to a variety of geometric interpretations in the theory of partial differential equations and the calculus of variations. The last of these chapters furnishes a geometric treatment of the theory of elementary divisors. Each of these chapters is enriched by an adequate bibliography of the subjects under discussion. It is to be hoped that some of our younger devotees will receive inspiration from this work, with a view to bringing geometry back to the front of the stage, from which it has been temporarily crowded by the recent advances in analysis.

J. W. YOUNG

The Evolution of Scientific Thought from Newton to Einstein, by A. d'Abro. New York, Boni and Liveright, 1927. 544 pp.

Explaining scientific theories to people with small knowledge of the technique used by the original developers is the cause of much difficulty in modern thinking. This book is an attempt to present the development of space-time in a manner understandable to a person unfamiliar with the mathematical tools used by the physicists in the new theories.

The author uses the only possible method—that of first acquainting the reader with the foundations of the mathematical and physical problems to be discussed. We find in Chapters I–V and VII an excellent sketch of the non-euclidean geometries particularly from Riemann's point of view. In Chapters VI and VIII–XII the physical questions of time, classical relativity and electromagnetics are dealt with.

We are surprised at the amount of insight it is possible to give without the use of mathematical manipulation. Having wondered how much a student of first year calculus (which is, after all, about as much mathematics as the average layman has in his background, if not more) would make out of such a treatment, we tried Chapter VII on one of our students. This chapter introduces the idea of the curvature of space. To our surprise, the idea was grasped rather well from the author's explanation.

The next section (Chapters XIII–XXII) consists of a most accurate and altogether excellent account of the restricted theory of relativity. One of the most interesting chapters is the one devoted to paradoxes (XXII).

Part three deals with the general theory. As the task is much more difficult here, in view of the extremely complicated mathematics, it is much more to the author's credit that he accomplishes such a fine presentation. The difficulties of discussing tensor equations when your reader has no knowledge of how they are arrived at, seem, at first, insuperable, but the author succeeds in showing the meaning of the law of gravitation and in

discussing the questions of the finiteness of the universe. As the author admits, action and conservation are almost impossible subjects to treat rigorously without mathematics, but even here he does well.

The fourth part of the book is more critical, discussing the methodology of science and the general significance of the relativity theory. Many philosophers will disagree with the indictment of lay philosophers (pp. 374–5) but, being on the scientific side, we feel, as d'Abro does, that the lack of deep insight which comes only from a thorough understanding of the workings of a theory will prevent such people from making many valuable contributions to the underlying principles of it. In other words, the study of this book is not sufficient preparation for a man who wishes to get up a theory of space-time. The author says "The sole rôle that a semi-popular book can hope to perform is to serve as a general introduction." This the book does and does it excellently. It is to be hoped that other branches of modern science may find as capable and accurate popularizers as the relativity theory has found in d'Abro.

In matters of printing the book is excellent and the only error we have detected is in the next to last and last line on page 93, where $1/R_2^2$ should be put in place of $1/R_2$, and $1/R^2$ in place of $1/R$.

T. C. BENTON

Formules Stokiennes. By A. Buhl. (Mémorial des Sciences Mathématiques, Fasc. xvi.) Paris, Gauthier-Villars, 1926. 60 pp.

This tract is concerned with establishing formal connections between the integrands in the generalized Stokes' formulas and the expressions which occur in various differential equations in geometry and physics, notably the electromagnetic and gravitational field equations. In the opinion of the reviewer, these formal connections are too vague and arbitrary to be of great advantage in dealing with the differential equations in question.

T. H. GRONWALL