

phy and symbolic logic by which a new theory of space and time is evolved." The guiding purpose is to clarify the nature of the conception of emergence. The mathematical tool employed is developed from the methods of Boole and particularly from his *Laws of Thought*. The author insists that the methods of Boole belong to "static" thought and he endeavors to show that the Hegelian logic admits of a symbolic treatment which comes into contact with "dynamic" thought. He says (p. 76): "The possibility of carrying the Booleian system beyond the ordinary static or Aristotelian laws of thought has, so far as I am aware, never been previously shown to be possible by algebraic means." In his preface the author says: "I hope that the use of algebraic symbols, without which the reasoning at times is too abstruse for words, will not be regarded as profane in dealing with some of the great and solemn problems under discussion; the language of mathematics being I conceive no less reverent than German, Irish, or Greek; whilst it has the benefit of being universal, pithy, and precise."

R. D. CARMICHAEL

Astronomy. By F. R. Moulton. New York, Macmillan, 1931. xxiii+549 pp. \$3.75.

For many years Moulton's *Introduction to Astronomy* enjoyed well-earned popularity as a college textbook. The present book may be considered as a new edition of the former, but the publishers want to emphasize the fact that it is not a mere revision but an entirely new publication. Comparison of the two books shows that this is not an exaggerated statement.

Textbooks on astronomy have tried to keep in step with the rapid development of the younger branches of the science, and the treatment of the solar system is by no means the dominating subject that it was only thirty years ago.

This tendency is evident in Moulton's *Astronomy*. But the treatment of *Stars and Nebulae*, and of *The Sidereal System* is crowded into a smaller portion of the book than is usual in modern textbooks. However clever the exposition of "stellar" astronomy in these chapters is, in a few instances we see the effects of the attempt to cover too much in a limited number of pages.

An obvious danger is to give insufficient attention to some subjects that may be quite important. A rather striking case of this type is the treatment of the spectroscopic method of parallax determination. We find only brief indirect references to this subject on pp. 406 and 414, and the name "spectroscopic parallax" is not used.

Another consequence is that some subjects are covered in so few words that their characterization has become one-sided or even incorrect. As an example we may consider the statement (p. 445) that the spectral-line displacements of the cepheid variables, "interpreted as Doppler effects of radial velocities, do not vary in harmony with elliptic motion." This may be mathematically correct and the briefest possible way to state it. But would it not be preferable to remark how surprisingly well the Doppler shift can be represented by a fictitious elliptic orbit in the majority of known cases?

The influence of Milne's recent criticisms is apparent in the reference to the theory of the interior of stars. Eddington's mass-luminosity relation is almost reluctantly mentioned, and its importance minimized.

The chapters dealing with the dynamics of the solar system are admirable. The author writes as one who knows the beauty of the mathematical treatment of the subject and who thoroughly appreciates the value of the contributions of the great astronomers of past centuries. Much of this admiration and appreciation is conveyed to the student. The clearness of the presentation is the more remarkable considering the fact that this is a decidedly mathematical subject, and that mathematics is, unfortunately, almost completely banished from college textbooks on astronomy.

It is hardly necessary to add that mathematically and historically the book is very accurate. Among other subjects the discussion of the discovery of Pluto (p. 243) deserves being mentioned for its accuracy.

The author's individuality pervades the whole book. This renders it especially interesting to the reader who has sufficient knowledge of the subject to appreciate variations from the presentation by other writers, even if he cannot always agree with the author's emphasis on certain aspects of the science.

The outward form of the book is very attractive: pleasant type, numerous diagrams and reproductions, and some very good star charts. Printing errors are rare, and usually of the innocent type, like *members* for *numbers* and *Betelgeuse* for *Betelgeuse*.

DIRK BROUWER

De l'Emploi des Droites Isotropes comme Axes de Coordonnées. Nouvelle Géométrie du Triangle. By André Haarbleicher. Paris, Gauthier-Villars et Cie., 1931. vi+76 pp.

This interesting little book serves excellently as an introduction to the analytic geometry of the triangle when the minimum lines through a point are taken as axes of coordinates. The author takes the center of the inscribed circle as origin, develops briefly the necessary formulas, then applies these results to a sequence of problems in the geometry of the triangle, carefully selected to show the value of the method and the types of reasoning employed. The sequence ends with the following problem, which is due to Darboux: Find the locus of a point P such that, among the conics through P and the vertices of a given triangle, there is one to which the normals at these four points concur. Our author remarks "The solution of this problem offers an entirely satisfactory (complet) illustration of the application of isotropic coordinates."

To the student of mathematics, especially if he is preparing to teach in secondary schools, the study of the geometry of the triangle, and allied topics, brings into prominence a number of concepts and methods of interest and permanent value. In this text, he will find an able exposition of a good method of approach to this field from its analytic side. Equally interesting, although the author does not pause even to mention them, are the ideas of projective metric geometry, and of the analytic geometry of the complex plane, to which this method of analysis naturally leads.

American students will doubtless find that the author's frequent introduction of unfamiliar and undefined terms is sometimes troublesome. Otherwise, the text is clear and well written.

C. H. SISAM