general principles being given. The helicoidal motion of a set of moving axes is discussed and then it is shown that the most general motion of a rigid body can be described as a helicoidal motion. The helicoidal movement gives the velocities but not the accelerations. This is pointed out, but it might have been useful to account for this difference by pointing out the distinction between vectors and vector quantities.

Chapter III deals with the relative motions of different systems of axes and the composition of relative motions, and after developing the general principles makes various applications, including treatments of the methods of Poinsot and Roberval. The discussions here are principally for the two dimensional case, but in Chapter IV the application to sets of moving coordinate axes in space is made.

The remaining chapters deal with more detailed study of the motions of rigid bodies. Chapter V is devoted to plane motion. The theory of the instantaneous centre is developed, and also the method of describing continuous plane motion by the rolling of one curve on another. The formulas of Euler and of Euler-Savory are obtained, and the graphical construction of Savory for relating instantaneous centres is given. Several applications are made, including a discussion of various types of epicycloids.

In Chapter VI the motion of a rigid body with one point fixed is considered. This is done by studying the motion of a sphere, with centre at the fixed point and radius arbitrary, relative to a fixed sphere having the same centre and radius. This permits of the description of the motion by means of curves on these spheres rolling on each other, just as in the case of plane motion.

The final chapter deals with the general motion of a rigid body. Use is made of the line complexes formed by the normals to the trajectory of a point and by the tangents to a trajectory, and motion is described by the rolling of one surface on another.

All told, the author has given a very thorough and well organized development of his subject. The notation used is simple and consistent. Vector and coordinate modes of expression are intermingled, and the free and natural choices that have been made render the discussion easy to follow.

There are slight inconsistencies in two or three of the Figures but these are not serious, and the number of typographical errors noted was small.

J. W. CAMPBELL

Statistical Mechanics. By R. H. Fowler. Cambridge, University Press; New York, The Macmillan Company, 1936. Second Edition. 864 pp.

The publication of a new enlarged edition of Fowler's treatise on statistical mechanics brings forcibly to the reader's attention the rapidity with which work in this field has progressed since 1929. There is a wealth of new material presented both from the theoretical and experimental side and the order of presentation has been changed by introducing the quantum mechanical point of view from the outset and omitting all reference to the older Bohr theory.

The mathematical methods utilized in the first edition remain essentially unchanged, and as these have been reviewed so ably in this journal by M. H. Stone (vol. 39 (1933), p. 850) it is hardly necessary to comment further on

these points. It will be disappointing to many, as it is to the reviewer, that Fowler has not included a critical discussion of the fundamental postulates of statistical mechanics, especially since the whole subject is approached from a quantum mechanical viewpoint. To be sure, an exposition of the work of von Neumann in this connection would be "somewhat lengthy and would form a portion necessarily out of tune with the rest of this monograph," but the more elementary treatments instigated by Jordan and Pauli would seem to be well worthy of inclusion.

The book itself is a veritable mine of information, the theoretical treatment and the discussion of experimental data being well mixed throughout the work. The author has also ventured somewhat outside the field of statistical mechanics to present the theory of those non-equilibrium flow problems in which many of the results of equilibrium theory can be applied as a good approximation.

In view of the tremendous scope of the book it seems appropriate to outline the contents. After an introductory chapter stating the fundamental assumptions of the theory, the next three chapters are concerned with the equilibria of perfect gases, crystals, and any general system obeying classical laws. Chapter V discusses problems of dissociation and evaporation and Chapter VI treats the connections between statistical mechanics and thermodynamics in detail, merging into the material of the next chapter which presents the Nernst heat theorem and chemical constants. The three following chapters extend the theory of imperfect gases, equations of state, and a survey of intermolecular forces as derived from imperfect gas equations and allied crystal data. Chapter XI covers the field of thermionics and the simpler aspects of conduction of electricity and allied effects in metals, and this is followed by a chapter on magnetic and dielectric properties of matter in bulk, including ferromagnetism. Chapter XIII attempts to develop the theory of liquids. The next three chapters contain the theory as applied to the high temperatures inside and outside the stars, whereas the next three contain detailed studies of the laws to which the mechanisms of interactions must conform in order to preserve the equilibrium laws. The next chapter is devoted to fluctuation phenomena, and the final chapter summarizes some recent work, principally along the lines of cooperative phenomena.

The book has been produced in the superlative style of the University Press and stands as an invaluable contribution to the literature on statistical mechanics.

N. H. FRANK

Généralités sur les Probabilités. Variables Aléatoires. By M. Fréchet. Paris Gauthier Villars, 1937. xvi+308 pp.

This book belongs to the series bearing the general title *Traité du calcul des probabilités et de ses applications*, edited by E. Borel. It is the first book of Fascicule III of Tome I of this series. Tome I is entitled: *Les principes de la théorie des probabilités*, Fascicule III: *Recherches théoriques modernes sur la théorie des probabilités*. This Fascicule III is divided into two books. The first book, which we have here under consideration, is mainly devoted to the