rather stout stuff for sophomores, and the mathematical background of the latter must be extensive to avoid putting an extra heavy burden on the teacher of the book. The use of the dot and cross products of vectors also raises some problems for the instructor. But in general it may be said that the basic physical explanation is well done and illustrated by a great variety of carefully made diagrams and worked out problems.

It is always easy to find something to criticize. The reviewer would have liked to see a more thorough introduction of the wave concept: it is brought into the text too casually for students who have not already had a good preliminary treatment of the mechanics of deformable media. Justice is not done to the fundamental character of the *ideas* which Bohr introduced into atomic physics, and the all too common mistake of confusing the Bohr *theory* with the Bohr *model* of the hydrogen atom is unfortunately perpetuated. Nevertheless the discussion of wave mechanics is appealing.

In most colleges the book will doubtless find its greatest use in junior and senior courses. Many of the problems are tough enough to try the mettle of the average graduate student of physics. If the book really succeeds in providing a new direction for undergraduate instruction in physics, as may well be the case, physicists in general will owe the author a debt of gratitude for his pains.

The Principles of Mechanics. By Heinrich Hertz. Edited by P. Lenard. Translated by D. E. Jones. J. T. Waley. 274 pp. Dover Publications, Inc., New York. 1956. Clothbound $3.50; paperbound $1.75. *Reviewed by P. Morrison, Cornell University.*

Ernst Mach's *Science of Mechanics* is familiar to the American physicist and his students as an analytical and persuasive account of the foundations of mechanics, and as an example to illustrate the positivist theory of knowledge which flows out of the Mach analysis. Here is a book of related date, kind, and intent, much less well known. No doubt it is a difficult book to read; its axiomatic formulation and its compact and mathematical form—definition, proposition, corollary—guarantee that. But the much easier prose introduction partly eases that complaint. It ought to be as widely known, if not as widely studied, as Mach's work.

Hertz's geometrization of dynamics, replacing all forces by geometrical constraints, if need be connecting visible and invisible particles, and reducing the laws of motion to the minimization of curvature of path, is cold and clear. Even more interesting for modern readers is his foundation of dynamics on the definition of mass, the concept taken by the Mach school to flow out of the third law. Hertz believed, as we do today, both in atoms and in fields, and he doubted the universality of the third law of Newton. Hertz therefore took mass as prior, and defined it in the way which seems most attractive, as a simple count of the fundamental particles within a body. In the nonrelativistic limit, at least, this seems to me deeper than any purely

dynamical beginning. Mass *is* in the atomic sense the Newtonian quantity of matter.

The volume contains an appreciation of Hertz by his master, Helmholtz. Hertz was the Fermi of his time: brilliant experimenter, fertile theorist, dead of cancer at only 37. A short introductory essay prepared for this edition by Professor R. S. Cohen of Wesleyan is a meaty and provocative piece, setting the Hertz view into the context of the theory of knowledge, and into its place in the history of ideas. It deserves wide reading, even apart from Hertz's mechanical ideas.

Let the reader be warned that Hertz used p for the coordinate and q for its canonical momentum!

L'Origine des Planètes: Essai de Cosmogonie. By Alexandre Dauvillier. 221 pp. U. of France Press, Paris, France, 1956. Paperbound 800 fr. *Reviewed by S. A. Korff, New York University.*

In his book *L'Origine des Planètes,* the French physicist and astronomer Dauvillier faithfully carries out the promise of the title. He discusses at length all the various theories, and gives an excellent critique of each. The book would make excellent supplementary reading in a course in astronomy. He shows how each of the theories, popular in its turn, eventually has come to be discarded since each one fails in some important respect.

The author starts by reviewing what is known about the planets; their sizes, masses, and distances, and what may be inferred about their atmospheres from spectral studies. He includes comets and asteroids. Next, he starts systematically on the theories of origin, and first sets forth the accretion theory, then the Laplacian theory, the tidal wave calculations of Kant and later of Jeans, and of Russell and Lyttleton; the collision theory, and the twin-planet picture. He discusses the retrograde cases, and the rings of Saturn.

The book is excellently written, well documented, and is a good and a scholarly account of this difficult problem. This reviewer found it stimulating and thought-provoking. It is especially recommended to anyone who would like an intelligent, critical appraisal and résumé of all the various theories. It would be especially good if the enthusiasts for one or another of the hypotheses were to consider seriously whether his pet model meets the objection cited, for there appear to be serious difficulties for each one which some persons happily ignore.

Electron-Emission; Gas Discharges I. Vol. 21 of Handbuch der Physik. Edited by S. Flügge. 683 pp. Springer-Verlag, Berlin, Germany, 1956. DM 132.00 (if part of series DM 105.60). *Reviewed by L. Marton, National Bureau of Standards.*

There are enough volumes of the new *Encyclopedia of Physics* on hand now to show that on the whole this is a very successful undertaking. It is remarkable both from the point of view of its size and the quality of the individual volumes. The present volume is no exception and it is a pleasure to report on its contents.