of photons and electrons, the energy regions in which it holds and does not hold. To follow the presentation along this line would lead us into a technical discussion.

The great contribution of the past three years in the realm of cosmic rays has been the discovery of the mesotron (meson, barytron, heavy electron). Of course we are shown the historic and unique photograph made by Neddermeyer and Anderson of the cloud track of a dying mesotron. But the very important photograph obtained by Street and Stevenson is not shown. In this photograph there are two tracks, one undoubtedly made by a proton, the other by the unknown particle. The curvature and ionization for each track are measured. A simple computation makes the mass of the unknown particle about 130 times that of an electron. Various observers have found ratios ranging from 100 to 800. Is there only one mesotron? What was it before it started on its brief (one millionth of a second) career of plunging with vast energy (200,000,000,000 electron volts?) through great thicknesses of matter? What does it become when it vanishes in thin air? This kind of question must in part be answered before we can hope to solve the riddle of the how, why and when of the origin of the primary cosmic rays.

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NON-UNIFORM GASES

The Mathematical Theory of Non-Uniform Gases. By S. CHAPMAN and T. G. COWLING. pp. xxiii + 404. Cambridge: University Press. New York: The Macmillan Company. $7.50.

THE scope of kinetic theory is defined by the authors as follows: "It is the province of a detailed kinetic theory to study the problems of non-equilibrium states, and such investigations occupy the greater part of this book. The probability methods of the kinetic theory are also, however, in the earlier chapters (3 and 4) applied to determine the equilibrium states; the results thus obtained are merely special cases of much more general results of statistical mechanics." The scope of this book is, however, further restricted to gases of medium density. Low densities, where collisions with the walls of the containing vessel are important, are not treated. An account of Enskog's work on dense gases is given in Chapter 16. In this work Enskog considered the collisions of smooth rigid elastic spherical molecules of finite size. Thus the space-filling property of molecules was taken into account, but not multiple collisions. These have not yet been considered in kinetic theory except by Wiener.[1] The scope is also limited to the mathematical theory. Thus the thermal diffusion coefficient is calculated and shown to be small, but experimental arrangements which multiply the effect of thermal diffusion so as to produce very good isotope separations are not discussed.

Within its scope the book is excellent. The fundamental equations of the subject were given by Maxwell and Boltzmann (1866 and 1872). They were first solved for the general case by Chapman and Enskog in 1916 and 1917 in papers often referred to but not often read. Chapman is senior author of this book, and the method used is that of Enskog, which is presented both clearly and rigorously for the first time. The distribution function is expanded in a convergent series, Sonine Polynomials forming an interesting part of the expansions. General formulae are thus obtained for the viscosity, thermal conduction, and diffusion coefficients. Special molecular models are considered. They are mostly spherically symmetrical force fields. When introduced in the general formulae they yield numerical results which are compared with experiments. Suitable choices of the fields are shown to give excellent agreement. The more direct atomic ray measurements of the force fields are not mentioned.

Ionized gases are considered in the last chapter, the effect of crossed electric and magnetic fields being studied quite thoroughly. Crossed concentration gradient and electric field, such as occurs when electrons are drawn through a slit into a gas, is, however, not treated.

The book is addressed to the theoretical physicist, as may be gathered from the 329 symbols listed at the beginning. To one interested in kinetic theory it should be essential.

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SOCIETIES AND MEETINGS

THE NORTH CAROLINA ACADEMY OF SCIENCE

THE thirty-ninth annual meeting of the North Carolina Academy of Science was held at Davidson College on May 3 and 4, 1940. Some two hundred members registered. About seventy papers were presented.

The executive committee reported one hundred new members elected since September; the University of North Carolina at Chapel Hill as the next meeting place; appropriation of funds to provide additional lantern slides for high-school loans; the treasurer's report (including delinquencies) to be submitted to the auditing committee before July 1st and published in the *Proceedings*.

The academy adopted the recommendations of the high-school science committee for its continued activity with high-school teachers, including the organization

[1] *Am. Jour. Math.*, 60: 897, 1938.