assumed to be good conductors of electricity, while the interspaces between them are taken to be insulating. According to this assumption the dielectric polarisation must depend on the size and distance apart of the molecules, and therefore on the same elements which regulate the molecular free path" (p. 327).

§ 123, on molecular forces, makes near the end a more detailed reference to the work of E. Wiedemann on luminous vapors. "He compared the light radiated by sodium vapor with that coming from a platinum wire made to glow by the passage of an electric current; from the resistance of the wire and the strength of the current he could determine the luminous energy in heat units, and compare it with the total heat-energy contained in the vapor. He found that the energy needed for the illumination is vanishingly small in comparison with the total energy. An atom, therefore, must be a structure in which pendulous movements can be produced by very small forces."

§ 124 is an enthusiastic statement of the general features and possibilities of the vortex atom theory. It is probable that Meyer has never seen the letter written by Lord Kelvin to the late Professor Holman, which ends thus: "We may expect that the time will come when we shall understand the nature of an atom. With great regret I abandon the idea that a mere configuration of motion suffices."

This brings us to the mathematical appendices, which extend through 112 pages. The new matter in these is, for the most part, closely connected with the changes already noted in the earlier portions of the book. In several cases the changes in numerical values of important constants are based on the computations of Conrau.

The translation is well done, though an occasional awkward phrase may show that the translator's ear for English is slightly and temporarily dulled by attention to the original. Thus, on p. 264, 'much too little for there to be found in it,' on p. 270 'has concluded the law,' and on p. 250 'relation' * * * 'which' * * * 'did not succeed in disclosing itself with full clearness.'

Edwin H. Hall.

Cambridge, Mass.

The Digestibility of American Feeding Stuffs. By Whitman H. Jordan and Frank H. Hall. U. S. Department of Agricultural, Office of Experiment Station, Bulletin No. 77. Pp. 100.

Since farm animals, like man, live not upon what they eat but upon what they digest and assimilate, data on the digestibility of the various feeding stuffs are essential for judging of their relative feeding value and for calculating rations for animals under different conditions. Experiments on this subject have formed quite a feature of the work of a number of the agricultural experiment stations of this country, and these experiments have accumulated until at present they furnish a comprehensive series of digestion coefficients. The Bulletin brings together the results of these digestion experiments up to the end of 1898, and summarizes them in convenient form for use. Of the 378 experiments compiled, many of which were made with a number of animals, 59 were with green fodders (grasses and corn), 34 with silage (largely of corn), 143 with dried fodders (hay, corn fodder, etc.), 8 with roots and tubers, 24 with grains and seeds, 62 with by-products (brans, gluten feeds or meal, oil meals, etc.), 1 with milk, and 47 with mixed rations. The digestion coefficients are first arranged according to the stations at which the experiments were made. They are then grouped by classes of feeding stuffs and by the kind of animal (cow, steer, sheep, pig or horse) used in making the experiment. The latter classification gives both the individual experiments and the averages for the different classes of material. It is therefore the one which will be most generally used in practice. In the light of the data presented, the effects of various factors on digestibility are considered at some length. Under this heading are included the influence of the kind and condition of the animal used, the stage of growth of the crops, the effect of drying and curing, ensiling, grinding, cooking and moistening of the feed, etc. In many cases the need of more extended data is evident before deductions can be safely drawn.

The general methods of conducting digestion experiments are described and discussed, together with the limitations of the present

methods, and the application of digestion coefficients in practice.

The compilation represents a large amount of painstaking work and study on the part of its authors, but it was well worth the undertaking and will prove a valuable summary. It will make it possible to use American digestion coefficients quite generally, in place of the European ones which were for many years the main reliance. The compilation will also serve a useful purpose in showing the lines in which additional digestion experiments are needed to supplement the data already obtained, and in calling attention to feeding stuffs which have not been sufficiently studied as to their digestibility. E. W. ALLEN.

SOCIETIES AND ACADEMIES.

NEW YORK ACADEMY OF SCIENCES.

SECTION OF ASTRONOMY, PHYSICS AND CHEMISTRY.

A MEETING of the Section was held on Monday evening May 7th. Mr. Bergen Davis read a paper describing some new experiments in stationary sound waves. The experiments were in three groups, those with a sound wave anemometer, those with the use of empty gelatine medicine capsules instead of cork-dust to show the Kundt figures, and those concerning the longitudinal motion of a cylinder closed at one end across the stream lines in a stationary sound wave.

The stationary sound wave was that produced in a stopped organ pipe, provided with a glass panel for observation, when it was sounding its first overtone. A thin rubber diaphragm near the central node prevented air currents due to the blowing of the pipe. The cups of the miniature anemometer were made by dividing No. 2 gelatine capsules longitudinally so as to form half cylinders and mounting them on card-board arms. The anemometer rotated with ten revolutions per second in the loop of the wave and came nearly to rest in the node. The rate of revolution at various positions along the wave varied approximately according to a sine curve. The maximum amplitude of the wave as calculated from the above rate was .57 cm.

The Kundt's figure experiment was performed by emptying a box of No. 5 gelatine capsules into the middle of the loop. They arranged themselves in rows across the pipe. Each capsule attracted its neighbor at the ends and repelled it at the sides. The experiment is quite striking.

The motion of a cylinder perpendicularly to the stream lines was obtained by using a capsule from which the cap had been removed. Such a capsule moved in the direction of the closed end with considerable force. This was also shown by making a small mill with a capsule at the end of each of four card-board arms. The rates of revolution in various parts of the wave made, when plotted, nearly a sine curve. The force acting normally to the closed ends of the cylinders was measured with a torsion balance. The square roots of the torsion deflections gave, when plotted, an approximate sine curve. The experiment was performed in air, illuminating gas, carbon dioxide and hydrogen. The torsion deflections were directly proportional to the densities of the gases. Professor William Hallock first suggested the cause of this effect, showing that it was due to the principle of Bernouilli, that a gas in motion is less dense than the same gas at rest. The vibrating air has considerable velocity while the air within the cylinders is nearly at rest. The force is due to the difference of density on the two sides of the closed end of the cylinder. The author used this principle to determine the amplitude of vibration. Professor R. S. Woodward assisted him in applying the proper hydrodynamical principles, and he calculated that the change in density was such as to give a pressure of 21 dynes per square centimeter, while the amplitude was .33 centimeters. This agrees closely with the value obtained with the sound wave anemometer.

Professor Hallock also exhibited some color photographs and some sound wave photographs taken by Professor R. W. Wood, of the University of Wisconsin. WILLIAM S. DAY,
Secretary of Section.

SECTION OF ANTHROPOLOGY AND PSYCHOLOGY.

A REGULAR meeting of the Section was held on May 28th. The first paper, by G. B. Ger-