at most of the meetings, and presided at the State banquet, at which he gave an excellent résumé of the present position of forestry in Sweden and the enormous importance of the forests to the country, half of the exports of which consisted of forest produce in one form or another. The Crown Prince showed that he had a first-hand knowledge of the question; the best summary of his speech being the remark: "If you properly manage your forests they will be preserved for all time."

The chairman of the College Board, as also of the Forestry Association, was that remarkable man Admiral Arvid Lindman, recently appointed Prime Minister of the country. The Admiral spoke several times and laid especial stress on the great importance of the work the State Forestry College was accomplishing, and that it now held an unquestioned position in the country; and nowhere less unquestioned than amongst the great commercial industrial element dependent upon the forest for the raw product of their industries, as the indispensable centre at which forestry education in all its aspects was conducted, and that its functions were yearly becoming more valuable to the country.

The celebrations were attended by important delegations from universities and forestry colleges from most of the European centres, namely, Germany, Great Britain (from the Universities of Oxford, Cambridge, and Edinburgh), France, Austria, Belgium, Czechoslovakia, Yugoslavia, Poland, Soviet Russia, Finland, Norway, Latvia, etc., with two representatives from universities of the United States.

Radioactive Changes and Thermionics.[1]

H. J. BRADDICK AND H. M. CAVE.—The rate of emission of alpha particles from radium. A knowledge of the rate of disintegration of radium as measured by the number, Z, of α-particle disintegrations taking place in unit mass of radium in unit time is of considerable importance in the interpretation of radioactive changes, and in particular of the energy relations involved. Recently published values for this quantity Z range from $3{\cdot}40 \times 10^{10}$ to $3{\cdot}72 \times 10^{10}$. The heat evolution of radium and its products as determined experimentally is in agreement with that calculated from the number and energy of the α-rays, recoil atoms, β- and γ-rays if a value is assumed for Z of about $3{\cdot}7 \times 10^{10}$.

The authors have made a determination of the number Z by measuring the total charge carried by a known fraction of the α-rays from a source of radium active deposit, assuming that the normal α-particle carries twice the electronic charge, taken as $4{\cdot}77 \times 10^{-10}$ e.s.u. The experiment was carried out in a highly evacuated chamber placed in a strong magnetic field which served practically to eliminate β-ray and δ-ray effects. The α-ray current was measured by the Townsend compensation method, and the activity of the source was determined continuously throughout an experiment by γ-ray methods. Possible sources of error were investigated.

The value obtained is $3{\cdot}68 \times 10^{10}$ and leads to a value for the heating effect in good agreement with that observed in recent experiments. It seems that there is no necessity to assume the existence of an unrecognised heat-producing mechanism in the disintegration.

P. WHITE AND G. MILLINGTON.—The velocity distribution of β-particles after passing through thin foils. The source of β-particles was radium-B and -C on a narrow platinum wire, and their velocities were measured by the usual photographic method with semi-circular focusing. The source was covered by a thin screen of mica pierced with two or three small holes, the straggled and the unstraggled lines being obtained on the same plate. The relative number of particles falling on each part of the plates was determined from the density curves by using the known density-calibration curve for the plates. The frequency curves so obtained were corrected for the finite width of the unstraggled lines, and the abscissæ expressed as $\delta(H\rho)$. The curves for $H\rho$ 1410 to 1938 for thicknesses of mica 2 to 6 mgm. per sq. cm. are expressed in terms of a fundamental straggling curve. It is found that many more particles lose large amounts of energy than theory predicts. The relation between the most probable loss of velocity and the thickness of foil shows a small systematic divergence from Bohr's theory which is beyond the limits of experimental error, and the same is found for the relation between initial velocity and the most probable loss of velocity. The assumptions underlying Bohr's theory are discussed in relation to these divergences and the possible advances to be made on the theoretical side.

N. A. DE BRUYNE.—The action of strong electric fields on the current from a thermionic cathode. An account is given of an investigation into the rise of the saturation current from a thermionic cathode from a hot tungsten filament as the applied field is increased. Schottky's relation holds good for fields up to one million volts per centimetre; it is concluded that the electrons pulled out by fields of this magnitude have a Maxwellian velocity distribution.

In the case of one of the three filaments used there was an apparent departure from the Schottky relation; the only reasonable explanation of the anomaly is that at high field strengths produced adventitiously by the presence of irregularities on the cathode surface the Schottky relation no longer holds good; it is therefore concluded that the electrons pulled out by strong fields do not have a Maxwellian velocity distribution. From the results a value of the electronic charge is deduced.

J. C. MCLENNAN AND G. GREENWOOD.—The decomposition of ammonia by high speed electrons. In these experiments, carried out with a Collidge cathode ray tube, the pressure range studied was 0·5-4·0 mm. On bombarding ammonia at pressures within this range an equilibrium between hydrogen, nitrogen, and ammonia was established. By the use of rays of constant velocity the percentage decomposition decreased with increasing gas pressure. When the initial pressure of the gas was kept constant and the velocity of the rays varied, the percentage decomposition was found to be a linear function of the voltage applied to the cathode ray tube. No decomposition was found to occur below 82,000 volts, apparently because no rays with less speed penetrated the window. The presence of an excess of nitrogen increased the quantity of ammonia decomposed, while the presence of excess hydrogen lessened it.

Analysis of the results obtained showed that each electron having a definite velocity depending on the constant applied voltage was responsible for the decomposition of a definite quantity of ammonia molecules regardless of the pressure of the gas. With electrons of different speeds the amount of ammonia decomposed per electron increased with the speed. When the ammonia contained nitrogen in excess, the primary decomposition of the ammonia was not affected by the presence of the nitrogen. With hydrogen in excess, however, the speed of the initial decomposition of the ammonia was decreased.

[1] Abstracts of papers read before the Royal Society on Nov. 1.