

antigen-antibody relationships which run counter to all our accumulated knowledge of serology. As pointed out by Dr. W. E. Gye (National Institute), however, there appeared to be some experimental evidence derived from his work on transmissible fowl tumours that the induction of a tumour by means of a cell-free filtrate is brought about by the co-operative action of two elements, one arising intrinsically and the other (most probably the virus) extrinsically.

Dr. G. H. Eagles (Lister Institute), who has recently reported success in the cultivation of the virus of vaccinia on artificial media free from cells (centrifuged kidney extracts), pointed out that if criticism was directed to these experiments on the ground that the centrifugalisation was incomplete, the very notable multiplication of the virus would have to be accounted for by the presence of such a minimal amount of intact cell substance as could scarcely play any decisive rôle in facilitating growth.

Important evidence was given bearing on the well-founded assumption that, below the smallest visible bacteria, another range of living entities begins, going down, so far as we can judge, to degrees of smallness which, at the moment perhaps, it is difficult to conceive as capable of association with an independent life process.

Prof. Ledingham (Lister Institute) discussed the evidence in support of the belief that the large inclusion bodies met with in the epithelial cells in fowlpox are made up of elementary bodies (Borrel bodies) about 0.2μ diam., and that these latter are the actual infective agents. He stated that he had recently been able, by a special process of extrac-

tion, to secure pure suspensions of the elementary bodies (Paschen bodies and Borrel bodies) present in the lesions of vaccinia and fowlpox respectively. These suspensions were found to be agglutinated by the sera of animals (rabbits and fowls) in the course of infection with, and after recovery from, vaccinia and fowlpox. This new evidence supported the view that the elementary bodies were of etiological importance.

Mr. J. E. Barnard and Dr. W. J. Elford (National Institute) discussed their recent work on the microscopy of the elementary bodies present in the lesions of ectromelia, the recently discovered disease of mice which, like fowlpox, is associated with the presence of characteristic large inclusion bodies in the epithelial cells of the infected mouse skin. They showed that, as in fowlpox, the inclusion body in this disease is similarly made up of elementary bodies which are also to be found in great numbers in infected organs such as the liver.

The diameter of the elementary body (about 0.15μ), as determined by microscopical methods, agreed closely with that determined from differential filtration methods in which collodion membranes of varying porosity were used. The diameter of the foot and mouth virus particle, on the other hand, when determined by similar filtration methods, in conjunction with biological tests of the filtrates, appeared to be of the order of $25-30 \mu\mu$, and thus only some three times larger than the diameter of a haemoglobin molecule.

The discussion as a whole brought to a focus a number of the more important lines on which virus research is at present concentrating, and the outlook for the future was distinctly optimistic.

Obituary.

DR. GUSTAVE LE BON.

THE death of Dr. Gustave Le Bon, at the age of ninety-two years, removes one of the most brilliant and versatile of French savants. Ethnology, sociology, psychology, history, philosophy, and experimental science occupied his attention in turn, and often simultaneously.

Le Bon began his professional career as medical officer of a military ambulance in 1870. His early publications refer to experimental work in physics and chemistry, including a study of the alkaloids of tobacco smoke (1880). An adventurous nature led Le Bon to take part in many explorations and scientific missions, which supplied him with material for several ethnographical and sociological studies, such as "La Civilisation des Arabes" (1884), "Les Civilisations de l'Inde" (1887), "Les Premières Civilisations de l'Orient" (1889). Le Bon came to the conclusion that races differ from one another in the proportion of higher types of individuals that they contain, and that the difference between the sexes becomes greater in the more advanced civilisations.

The writings by which Le Bon was best known are his psychological works. The "Psychology of Crowds", "Psychology of Education", "Psycho-

logy of Socialism", etc., have been very widely read, and have exerted a wide influence on contemporary thought. Le Bon was also known for his pioneer work in connexion with the relation between matter and energy. In 1897, in a communication to the Paris Academy of Sciences, Le Bon declared that all bodies under the influence of light emit radiation capable of rendering the air a conductor of electricity. He pointed out that this radiation was probably related to the cathode rays and to the newly discovered Becquerel radiation from uranium. His opinion that "matter is only a stable form of energy" was considered at the time highly unorthodox and met with vehement opposition. These speculations were brought together in his "L'Évolution de la Matière" (1905) and "L'Évolution des Forces" (1907), the latter of which was translated into English.

Le Bon counted among his friends some of the most distinguished French savants, including Henri Poincaré, Painlevé, and Ribot, and had perhaps more admirers outside France than in his own country. He was born in 1841 at Nogent-le-Rotrou, and died at Marnes-la-Coquette of bronchopneumonia, after a short illness. As director of the Library of the Philosophy of Science, he remained active in scientific matters until the end.