

come many of the difficulties I encountered while growing the crystals, and gave me much stimulating advice. I am grateful to the Rockefeller Foundation for the grant which makes this research possible.

¹ Bernal, J. D., Fankuchen, I., and Perutz, M. F., *NATURE*, **141**, 523 (1938).

² Bragg, W. L., and West, J., *Phil. Mag.*, **10**, 823 (1930).

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⁴ Neurath, H., *J. Amer. Chem. Soc.*, **61**, 1841 (1939).

OBITUARIES

Prof. Jean B. Perrin, For. Mem. R.S.

It was with great regret that I saw the announcement of the death in New York on April 17 of Prof. Jean Perrin. He had many friends in England who will feel that we have lost a staunch ally, for it will be remembered that during the War of 1914-18 he was of the greatest assistance to every one engaged in scientific work for the Government departments. He was himself scientific adviser to the French Government, and was keenly interested not only in what was being done in Paris but also in the work done in England, especially the development of tanks. He disliked the Germans very much, and during the whole of the period 1914-18 and shortly before this War broke out the spirit that animated him was "Il faut écraser les Boches". It was some consolation to know that he and his son had got out of Occupied France and gone to the United States.

Early in his scientific career, more than forty years ago, Perrin was elected professor of physical chemistry at the Sorbonne, and since then he has made many original investigations in atomic physics, for which he will always be remembered, as they are included in all modern treatises on these subjects.

Perrin's earliest experiments were designed to determine the nature of cathode rays and the conductivity of gases produced by the action of Röntgen rays and radioactive substances. At that time Varley and Crookes maintained that the cathode rays were material particles charged with negative electricity, which were repelled from the cathode and acquired large velocities under the action of the electric force. But the early experiments which were made to detect the charge were inconclusive, and other physicists maintained that the rays were a form of undulatory motion of the ether. The problem of determining the nature of the rays was settled by Perrin, by experiments with apparatus which showed conclusively that the rays were charged negatively.

But the work for which Perrin is best known is his experimental investigation of the Brownian motion. This investigation was designed with the object of determining the energy of agitation of molecules, from which it is possible to deduce the number of molecules in a cubic centimetre of a gas. There were several indirect methods of estimating that number but the results varied within wide limits. Perrin in his method of determining the number relied on a general theory of motion of particles, which implied that the mean energy of agitation of small particles suspended in a liquid was the same as that of a molecule of a gas. He succeeded by very remarkable original methods in determining the energy of agitation of the particles and thus deduced the number of molecules in a cubic centimetre of a gas.

Perrin's work "Les Atomes" is one of the most popular scientific publications. It deals with the discoveries made in molecular physics during the

very active period after the discovery of Röntgen rays and radioactive substances. Before the 1936 edition came out, 30,000 copies had been sold. He also wrote a very interesting book in 1935 entitled "Grains de matière et de lumière", where he gave a most vivid account of modern theories of radiation, and discussed several problems which agitate the minds of physicists.

Perrin never seemed to change; he was just as lively and original in his conversation a few years ago as he was when he was first appointed to be professor at the Sorbonne. He took the greatest interest in young people engaged in research, and had a party for them once a week in his laboratory where discussions took place on all sorts of subjects. What was most pleasant about these meetings was the boyish interest Perrin took in experiments, for he always placed more confidence in experimental investigations than in mathematical theories.

When on one occasion another professor, after trying to persuade him to accept a theory he had propounded, said "At least you must admit there is something in it", Perrin replied: "My dear —, it would be difficult to propound a theory that was entirely false."

He will be greatly missed by all French men of science, and also by his friends in England, for nothing added so much to the pleasure of a visit to Paris as a meeting with Perrin.

J. S. TOWNSEND.

Dr. T. B. Macaulay

THOMAS BASSETT MACAULAY, whose generous benefactions made possible the foundation of the Macaulay Institute for Soil Research at Aberdeen, died in Canada on April 3.

Mr. Macaulay who was born at Hamilton, Ontario, on June 6, 1860, was descended from the same family as Macaulay the historian, the Macaulays of Uig in the Island of Lewis. His grandfather migrated to Aberdeenshire and his father, Robertson Macaulay, was born at Fraserburgh in that county, but went to Canada as a young man and later became president of the Sun Life Assurance Company of Canada.

Dr. T. B. Macaulay entered the service of that Company in 1877, and held the posts of actuary, secretary, director and managing director, finally succeeding his father as president. He played a great part in expanding the Company from a very small concern to one of the most important corporations of its kind in the world. He was a fellow of the Institute of Actuaries of Great Britain and a charter member of the Actuarial Society of America of which he was twice president. A leading figure in his profession, he received the honorary degree of LL.D. from the Universities of McGill, Edinburgh and Aberdeen.

Dr. Macaulay's interests outside insurance were widespread and ranged from the development of trade between Canada and the West Indies to medical research and agriculture. During the War of 1914-18 he was Canadian chairman of the National Committee on Food Resources. He had the experimenting instinct highly developed. On his own farms at Hudson Heights near Montreal he built up one of the finest Friesian herds in North America, and for many years carried out experiments on the development of strains of maize and soya beans with the view of obtaining early varieties of good quality suitable for Canadian conditions. The work was not delegated to others