

RADIO-THORIUM.

DURING the past week accounts have appeared in the daily papers of a discovery emanating from America of "a new rival to radium" called radio-thor; and as in name and in the circumstance that the body is spoken of as a cheap substitute for radium the body bears obvious resemblance to radio-thorium, well known as one of the most interesting and promising members of the radio-active hierarchy at the present time, it may be of interest to compare the two bodies.

It is obvious that the resemblance begins and ends with the two points referred to. Radio-thor, we read, was discovered by Dr. Bailey, of Hahnemann Medical College, Chicago, in pitchblende from Colorado. It is stated in the recent report with which the public has been favoured, that the new body possesses all the curative properties of radium and none of its baneful after-effects, that the supply is apparently unlimited, and that it is within the reach of persons of moderate means. When placed in contact with the negative pole of a magnet it becomes luminous (!); it colours common glass like Bohemian glass; and is of immense value financially. Dr. Bailey, adds the account, claims to have discovered a positive remedy for locomotor ataxy, cancer, and other maladies that have long baffled the medical profession. The prolongation of life and the cure of all ills by its aid are also referred to airily by a colleague.

It is a relief to turn from this monotonously familiar exploitation of knowledge to the radio-thorium of science, the intensely radio-active product of thorium, giving α rays, first separated from the new Ceylon mineral thorianite, which consists mainly of thorium oxide, by Otto Hahn while working in Sir W. Ramsay's laboratory. Its period of half-change was determined to be two years by G. A. Blanc, who independently separated the substance from the sediments of the hot springs of Baden-Baden. The subsequent developments formed as fascinating a chapter of progress as any in radio-activity. The first product of thorium to be separated and recognised was the thorium X, of period four days, which Rutherford and Soddy found was left in solution when thorium is precipitated by ammonia. We know now it is the product of radio-thorium, which in this separation, as always, remains with the thorium. So closely allied are they in chemical nature that even to-day no process is known of separating them. Yet both thorium and radio-thorium are known alone because though the one is the product of the other, it is not the direct product.

There is an intermediate body, "meso-thorium," produced from thorium, and producing radio-thorium. Its period is not yet accurately known, but is estimated at seven years. It gives β rays only. Boltwood showed that in the ammonia separation referred to the meso-thorium goes with the thorium X, and leaves the radio-thorium with the thorium. In the course of a few years the radio-thorium all changes, leaving thorium alone, while the meso-thorium grows new radio-thorium, readily separable as before. In all probability all the radio-thorium yet prepared is not ready-made radio-thorium separated from thorium, as the investigators first thought, but re-formed radio-thorium produced during the separation from the easily separable meso-thorium.

As the result of these researches it was suggested by Rutherford that meso-thorium and its spontaneously appearing family of products—radio-thorium, thorium X, &c.—might serve as a cheap and effective substitute for radium for many purposes. In the Welsbach gas-mantle industry thorium salts are manufactured by the ton. The readily separable meso-thorium plays no

part in the commercial application of thorium, and could be removed without injury to the product and with no appreciable waste of the substance during the manufacturing process. At first it would only give β rays, but in the course of a few years α radiation would make its appearance as radio-thorium and its products were formed. The substance would then comprise practically the whole of the radio-activity of as large amounts of thorium in as small amounts of matter as desired. For most purposes such a body would be as valuable as radium. The activity, it is true, would not be permanent, like radium essentially is, but it would last a good many years—long enough to be very useful—and its cheapness and the practically unlimited supply of it would compensate for this lack of permanence. It is to be hoped that the thorium manufacturers of Germany and America are following up this suggestion.

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THE POOR LAW COMMISSION REPORT.

IT might be thought that this document would hardly furnish matter for consideration in a scientific journal, but those who have given the closest attention to subjects of poverty and public assistance are getting to be more and more convinced that it is to scientific study and the application of scientific principles, in other words, to the cultivation of a scientific spirit, that we have to look for the best remedies of the various evils of social life, and that it is by the want of that spirit that those evils have grown up.

The report in question will probably rank in future as an economic State paper of as great importance as that of 1832, upon which the reform of the Poor Law in 1834 was based. That report bore fruit for many years in a gradual reduction of the number of paupers and the volume of pauperism. Recently a reaction has taken place, and the number of paupers and the volume of pauperism have increased. The conclusion is irresistible that considerations other than scientific ones have been allowed to have undue weight.

The present report defines the principles upon which the poor law reform (incorrectly printed as "report" at pp. iv, 53, 80) of 1834 proceeded, as follows:—

(1) That relief should not be offered to able-bodied persons and their families otherwise than in a well-regulated workhouse.

(2) That the lot of the able-bodied should be made less eligible than that of the independent labourer outside.

With these principles there can be no quarrel, and to their having been carried into effect with more or less fidelity during the greater number of the years that followed must be attributed the decline in pauperism to which we have adverted. It is to the gradual weakening of these principles in later years that the reaction towards an increase in pauperism is due. The causes of this reaction and the remedy for it constitute the real problem which was submitted by the King in 1905 to the Commission which has just made its report after a patient investigation occupying more than three years.

One source of the failure of the present system has undoubtedly been the inefficiency of the local authorities charged with its administration. The boards of guardians are elected by popular vote, but that election attracts little popular interest. In London somewhat more than a quarter of the electorate trouble themselves to vote for a guardian, while nearly three times as many will vote for a member of Parliament. The result is that men are sometimes returned on those boards who are ignorant of the laws they are selected to administer, and who have other reasons for seeking