the period of ionium could at once be found. For example, if the period were 100,000 years, there should be 12·5 grams of pure ionium per ton of uranium. Auer von Welsbach, in a masterly chemical separation of the rare-earth fraction from 30 tons of Joachimsthal pitchblende, separated a preparation, which he described as thorium oxide, containing ionium, the activity of which was measured by Meyer and von Schweidler. To obtain a maximum estimate for the period of ionium, I assumed that Welsbach's preparation was in reality pure ionium oxide (which it certainly was not, as it gave the thorium emanation), and so I obtained the period of a million years as the upper possible limit. In proportion as the percentage of ionium oxide present is less than 100 per cent., this period must be reduced.[2] Thus we have fixed the period of ionium as between 10^{-5} and 10^{-6} years, if ionium is the only intervening long-lived member.

Quite recently a method has been devised for calculating the period of ionium from the range of its α-particles, which is based upon an empirical mathematical relation holding between this range and the periods of the substances giving α-rays in the case of the other members of the series.[3] The most recent estimate by this method is about 200,000 years, which may be accepted provisionally as the most probable at the present time. If this is correct, there should be 25 grams of ionium per ton of uranium in minerals. A variety of evidence thus leads to the conclusion that to detect the growth of radium from uranium either still larger quantities of uranium or still longer time is necessary. Even after ten years, that is, at the end of 1916, if the period of ionium is as estimated, the uranium in No. III. preparation should only have produced 12×10^{-12} grams of radium, which is rather less than half the amount that will then have been formed by the ionium initially present. Nos. I. and II. preparations are very much less favourable. But it is interesting to consider No. IV. preparation, which, though only 2·6 years old, has more than seven times as much uranium as No. III. From the present slope of the curve it appears to have little more than one-half as much ionium, relatively to the uranium, as No. III., whereas the relative initial quantity of radium is about twice as great as in No. III. After eight years, that is in 1917, the quantity of radium produced from the uranium should be about equal to that which will have by then been produced from the ionium present. A distinct upward slope should be detectable in the growth curve some time before this. But this is the best, if the estimate of the period of ionium assumed is correct, that the present set of experiments can offer to the solution of the problem. With the experience already gained, especially in dealing with large quantities of uranium and in the methods of measurements of the minutest quantities of radium, there should be no difficulty in obtaining and dealing with sufficient uranium, say 20 kilograms, of the requisite degree of purity as regards ionium and radium, to determine directly in a few years the period of ionium from the growth curve provided it is not greater than 200,000 years.

A favourable opportunity is being awaited to initiate this large-scale experiment. It requires a small room to itself in a permanent institution uncontaminated with radium, and some guarantee that once installed the preparations will remain undisturbed for a reasonable term of years, and that the measurements will be continued in a comparable manner should the period of life of the original investigator prove insufficient. It is not enough to set aside a quantity of uranium for our successors to see if any radium has grown in it. It is essential that the exact form of the growth curve should be known before the problem in question can be fully answered. There *may* be more than one long-lived intermediate product between uranium and radium. However, such indirect information as has been acquired as to the life period of ionium indicates that it alone is sufficient to account for the present results as regards the absence of growth of radium from uranium.

[2] Soddy, *Le Radium*, 1910, vii., 297.
[3] Geiger and Nuttall, *Phil. Mag.*, 1911, xxiii., 613; 1912, xxiii., 439.

THE CROCKER LAND EXPEDITION

REFERENCE was made in NATURE of February 22 (p. 560) to the expedition organised by the American Museum of Natural History and the American Geographical Society to reach and map Crocker Land, in the north polar seas north-west of Grant Land, and to make all the scientific studies *en route* and in other parts of the Arctic regions that circumstances may permit.

The expedition will leave Sydney, N.S., by special steamer about July 20, 1912, and it is proposed to land on the south side of Bache Peninsula (Flagler Bay), lat. 70° 10′ N., and establish winter quarters. The ship will then be sent home. About the middle of September, sledging supplies to Cape Thomas Hubbard will be begun, and the work will be carried on throughout the winter during the moonlight periods. Cape Thomas Hubbard will be left with the return of dawn in February, 1913, and the expedition will push across the ice to Crocker Land. Crocker Land will be left about May 1, and a return will be made to Cape Thomas Hubbard. Scientific work will be carried on in Grant Land and along the return route to winter quarters on Flagler Bay, where the expedition expects to arrive in July, 1913. In the spring and summer of 1914 there will be an expedition from Whale Sound (Inglefield Gulf) directly eastward to the summit of the ice-cap of Greenland, at the widest part of that island. The return to New York will be in the autumn of 1914 by special ship.

The leaders of the expedition will be Mr. George Borup, assistant curator of geology in the American Museum of Natural History, and Mr. Donald B. MacMillan, both of whom are well known by their work done under Admiral Peary in his last polar expedition.

It is estimated that not less than fifty thousand dollars (10,000*l.*) should be provided for the absolute needs of the expedition, in order to enable it to accomplish the results that have been outlined above. On the proviso that sufficient funds are contributed from outside sources, the American Museum of Natural History has agreed to appropriate in the course of the expedition six thousand dollars in money, and has taken over its organisation and management. The American Geographical Society has made an appropriation of six thousand dollars toward the expedition, and Yale University an appropriation of one thousand dollars, while other subscriptions have been promised.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

GLASGOW.—The degree of Doctor of Science was conferred upon the following on April 22:—Leonard Findlay: *Thesis*, "The Etiology and Condition of the Blood in Spontaneous and Experimental Rickets, with additional papers." David Robertson: *Thesis*, "The Mathematical Design of Transformers; Electrical Meters on Variable Loads; and other original