K_2O content of seventeen eclogites cited by Rosenbusch is 0·70 per cent., and of eleven cited by Mlle. Brière (*Bull. Soc. Française de Min.*, 43, 1920) it is 0·37 per cent. They are, in fact, at once the poorest in the heat-producing elements and the densest rocks known.

There would, also, exist a lack of homogeneity respecting the distribution of the non-radioactive elements. Some parts would be richer in silica, alumina, etc.; others in metallic oxides, etc.; such parts would for ever seek to ascend or to descend. Or, in times of thermal loss, certain well-known factors concerned in magmatic differentiation would operate in the same directions.

The final results should be precisely what we find; a highly siliceous and aluminous surface layer rich in radioactive elements and—what seismic evidence reveals—in the depths, rocks of maximum density and, as we now find, of minimum radioactivity. Should these inevitable final conditions be disturbed by the circulation attending a great revolution, they would gradually be re-established during the long later period of thermal loss. We perceive, in short, that heterogeneity in the circumstances is not stable, but must result in radioactive and gravitational stratification. Reversing our line of argument, we might justify our assumption of initial heterogeneity in recognition of the revealed surface structure of the earth.

If these views are correct, it would appear that radioactivity mainly has been responsible for the stratification of the earth's outer materials. It has determined the origin of the radioactively rich and gravitationally light continental layer, of the isostatic layer of intermediate radioactivity and density, and of that more deep-seated layer which only at long intervals takes part in the great events of surface history: the major revolutions ("The Halley Lecture," 1924, pp. 31 *et seq.*, and A. Holmes, *Geol. Mag.*, July 1926). In short, it would appear to have fashioned those structural conditions which have been responsible for geological history and for the development of life upon the globe.

Further evidence of stratification in the earth's great basaltic layer is revealed in the petrology of the oceanic islands. The island basalt—which we must regard as representing the same lava as composes the ocean floor or prevails immediately beneath it—is richer in all the radioactive elements, and at the same time lower in density, than are the plateau basalts. These island lavas reveal, in fact, the final differentiation of the substratum where it attains the surface of the globe; a differentiation referable to physical causes similar to those we have referred to above.

As bearing on all our views of earth-history we would point out that the low radioactivity of eclogite directly affects estimates of geological time based upon the period required to bring about a major revolution. The length of previous estimates will require to be doubled.

J. JOLY.
J. H. J. POOLE.

Trinity College, Dublin.

Experiments on highly penetrating Radiation from the Earth.

MEASUREMENTS of penetrating radiation of the earth executed at Piatigorsk (in the Caucasus) by means of a portable electrometer covered with lead 1 cm. thick have shown that, though the same apparatus was used, the intensity fluctuated according to the stations of observation where the measurements were made. The fluctuations of intensity were especially marked in places rich in radium, where differences of so much as 100 per cent. were observed between stations separated by a few metres only.

Measurements made at the same observing stations during a period of three years have shown the intensity to be constant and independent of meteorological conditions, and of fluctuations of emanations contained in the atmosphere, within the limits of sensibility of the apparatus.

Measurements of the prevalence of radioactive elements in the upper layers of the soil have shown its constancy, which indicates that the fluctuations were caused by deeper strata only.

The application of four hoods fitting one into the other, each 2 cm. thick and covering the apparatus from above and laterally, and likewise of four flat lead screens covering it from beneath, has shown the influence of the hoods to be very slight, while that of the screens was quite important, indicating that the electrometer was acted upon chiefly from below.

The thickness of lead protecting the apparatus from above, laterally, and from below, having been varied from 0 to 8 cm., the computation of coefficients of absorption was rendered possible. It appeared that the coefficients of absorption by screens varied from 0·45 to 0·06 for 1 cm. Values approaching the lower limit were frequently encountered at different stations. In most cases the value of the coefficient of absorption diminished with an increase of thickness of the lead screens; that is to say, a complex of radiations was being dealt with, some of them possessing a much greater radiating capacity than the γ-rays of radium C. The radiations are directed from below, and their source lies apparently in radio-elements diffused in upper strata of the soil.

The full report of this work will be published in the *Bulletin of the Institute of Practical Geophysics*, Leningrad.

L. N. BOGOIAVLENSKY.
A. A. LOMAKIN.

Central Chamber of
Weights and Measures,
19 Mejdunarodni Prospect,
Leningrad.

Spectrographic Observations of the Second Green Line of the Auroral Spectrum.

I THINK that all those who have worked on the spectrum of the aurora will congratulate Prof. Vegard on the notable success he has achieved in photographing so distinctly the line or band about λ5238 as recorded in his letter in NATURE of Mar. 5, p. 349. The technical difficulties which he had to overcome were formidable.

The present letter is not written in an unsympathetic spirit, but it seems worth while to point out that an interpretation alternative to that of Prof. Vegard is possible. He identifies the band with one which he has observed in the phosphorescent spectrum of frozen nitrogen. But there is a band in about the same position in the negative band spectrum of gaseous nitrogen. Ångström and Thalen (quoted by Kayser in "Spectroscopie") gave the wave-length as λ5227·5. The stronger bands of the same series come out with great intensity on Prof. Vegard's photograph as on other photographs of the auroral spectrum: so that it is probable, indeed nearly certain, that a long enough exposure would bring out this band.

If, as would appear from Prof. Vegard's letter, precise wave-length comparisons are not feasible, the criterion of intensity distribution remains. I hope Prof. Vegard may think it worth while to photograph this negative nitrogen band with the same instrument, for direct comparison with the auroral spectrum. It is not unlikely that this would help a decision.

RAYLEIGH.

Terling Place, Chelmsford,
Mar. 23.