

On the Penetrating Radiation at the Surface of the Earth.

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I.—INTRODUCTION.

During the last few years a number of investigators have made a study of the penetrating radiation which is known to be present at the surface of the earth with a view to locating its source or origin. The presence of radioactive substances in the soil and of radioactive emanations in the atmosphere suggest both the earth and the atmosphere as sources for part at least of this radiation. It is possible, too, for such a penetrating radiation as that present at the earth to have its origin in the sun or other celestial bodies.

It is known, besides, that the amount of radioactive emanation present in the atmosphere at any time is largely dependent upon the barometric changes which have taken place for a short time previously, and upon the precipitation which has occurred in the locality concerned. If then the penetrating radiation comes largely from the atmosphere it would follow from the above considerations that frequent though perhaps irregular changes should occur in the intensity of the radiation at any particular locality.

If the sun, however, contributed the major portion of the penetrating radiation we should then expect to find regular daily variations in its intensity. On the other hand, if the greater part of the penetrating radiation has its origin in radioactive substances in the soil and rocks, we should expect to find but little, if any, variation in its intensity throughout the day or even from day to day in any particular region.

One of the first to note a diurnal change in the ionisation of air contained in closed metallic cylinders was J. J. Borgmann.¹ His experiments were carried out in the neighbourhood of St. Petersburg. Among other results he found that the ionisation of the air in cylinders of copper, aluminium, brass, iron, zinc, tin, or lead, increased for some days after being enclosed, and finally reached a limit. This limit he found to vary from day to day and even during a single day. The minimum of ionisation noted by him was most frequently observed about three o'clock p.m.

¹ Science Abstracts, 1905, No. 1580.