tional energy. It is therefore necessary to assume that the core was substantially complete at an early stage in the Earth's history and that its subsequent growth has been slight.]*

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* Note added in proof.

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DR. STACEY's suggested mechanism is a specific one by which convective overturn can be brought about by the chemical separation which must occur if the Earth has been formed by accretion and the iron core has grown gradually in radius. It seems doubtful, however, to me that the rate of release of gravitational energy by chemical separation can be as great as that released by the decay of radioactive elements, although in any event it appears that the form of convection should not depend on the cause of the density differences which give rise to convective instability.

However, Dr. Stacey's mechanism of chemical segregation makes the specific proposal that there is a silicon-rich layer 200 km thick at the bottom of the mantle which is as much as 0·3 g/cm^3 less dense than the material above it. It can be shown that for any reasonable value of viscosity such a layer would be highly unstable. This can perhaps best be seen from calculations made by me[1] which show that for a viscosity as high as 10^{21} poise convection velocities of 1 m/sec are to be expected with a temperature difference between the up-going and down-going streams of as little as 1/3°, which of course means density differences between the up-going and down-going streams of one part in ten thousand.

Further, I think there is now evidence that there may be a thin layer of solid iron at the base of the mantle of variable thickness not exceeding about 10 km. It has long been known that the geomagnetic secular variation and the non-dipole field are systematically small over a large area of the Earth roughly co-extensive with the Pacific[2].

A convective mantle essentially means one with very nearly uniform physical properties and it is hard to suppose that the turbulence in the Earth's core which gives rise to the secular variation of the Earth's magnetic field can for long be systematically different in its properties below one area of the Earth, especially as the core is slowly rotating relative to the mantle. The cause has long been a puzzle to geomagneticians.

New interest in the problem has been raised by palæomagnetic observations on recent lavas from Hawaii by Doell and Cox[3], who find that the low secular variation in the Pacific seems to have been a property of the Earth over the past few tens of thousands of years. In a full account of this topic elsewhere, I am suggesting that the cause is electromagnetic screening by a layer of iron which has collected at the base of the mantle by separation from the descending convection currents, but which has not freed itself completely from lighter silicates and may, in fact, be similar to the Palliasite meteorites. As this is a thin layer it is reasonable to suppose that its distribution may be highly irregular, although any one distribution would be expected to persist for the order of a million years.

While this does not exclude the specific mechanism of chemical separation suggested by Dr. Stacey it seems more likely to me that it results from convection currents of a fairly regular kind existing throughout the whole of the mantle.

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METEOROLOGY

Meteorological Conditions Dependence of Radon Concentration in the Air above the Atlantic Ocean

CONCENTRATION of radon in the air above the Atlantic Ocean at the *K* ('kilo') point was measured during May 28–June 28, 1962, and now we are attempting to relate the values of natural radioactivity to meteorological conditions.

In previous papers[1,2], an apparatus for measuring the natural radioactivity of the air was described. We have examined the meteorological conditions by referring to the daily weather information of the Meteorologie Nationale, and the local data obtained at the *K* point, especially the wind direction (front-crossings).

We have systematically examined the way followed by the air, at ground-level, getting the *K* point. We have also investigated whether the *K* point was concerned with cold descending air, although such a phenomenon is not very likely to happen in June, and, finally, we have connected the concentration of radon and of its descendants to the origin of the air masses, for the air reaching the *K* point. As a first approximation, taking into account the mean speed of movement of the air masses, it may be assumed that the air takes one day to move from Brittany and Ireland, and half-a-day from the Cantabric coast.

The following results were obtained:

(1) If the air comes from the north-west of France or from Great Britain, its radon concentration is always between 10 and 27 pc./m^3; the mean speed wind blowing from east to north-east which has brought this air during the observed period was generally weak ($\leqslant 10$ m/sec), mostly when leaving the coast, but a stronger wind could give higher values. We noticed, during the morning of June 1, a decrease in radon activity, and we are inclined to impute this to a descending draught of descending cold air, poorer in radon.

(2) When the air comes from the north of Spain, its radon concentration is greater than 27 pc./m^3. The maximum activity obtained was 40 pc./m^3. The arrival of this air at the *K* point is always conditioned by an isobaric constriction prevailing for 12 h at least above the north-western side of the Iberian Peninsula, and on the neighbouring oceanic zone. This constriction is bound sometimes to a centre of depression located above western Spain or Portugal. If, in this centre, the minimum pressure comes down enough (1,005 millibars) the air supply feeding the *K* point will be deviated towards the south before it reaches that point. Such a phenomenon occurred, for example, on June 27.

(3) During the recording time, there was no crossing of warm fronts, but there were four crossings of cold fronts with one quasi-stationary front: we observed in three of these five cases that maximum radioactivity was always very low (< 6 pc./m^3) when the front was running. Then the cold air located behind the front comes from the northern to the north-western direction, but it seems risky to take into account its previous behaviour. As we noticed before, there was only one cold front subsidence, and the