Letters to the Editor

The Editor does not hold himself responsible for opinions expressed by his correspondents. He cannot undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. *No notice is taken of anonymous communications.*

NOTES ON POINTS IN SOME OF THIS WEEK'S LETTERS APPEAR ON P. 332.

CORRESPONDENTS ARE INVITED TO ATTACH SIMILAR SUMMARIES TO THEIR COMMUNICATIONS.

Variation of Cosmic Ray Intensity with Sidereal Time

HOURLY records of the intensity of the cosmic radiation have been made at Cape Town since February 1933 in accordance with a scheme organized by Steinke, Hess and others for the study of the *radiation*. The instrument consists of an ionization chamber and electrometer provided with photographic registration. The rise of collector potential is compensated every half-minute by a condenser potentiometer device, and the accuracy of a single hourly observation is 0·1 per cent.

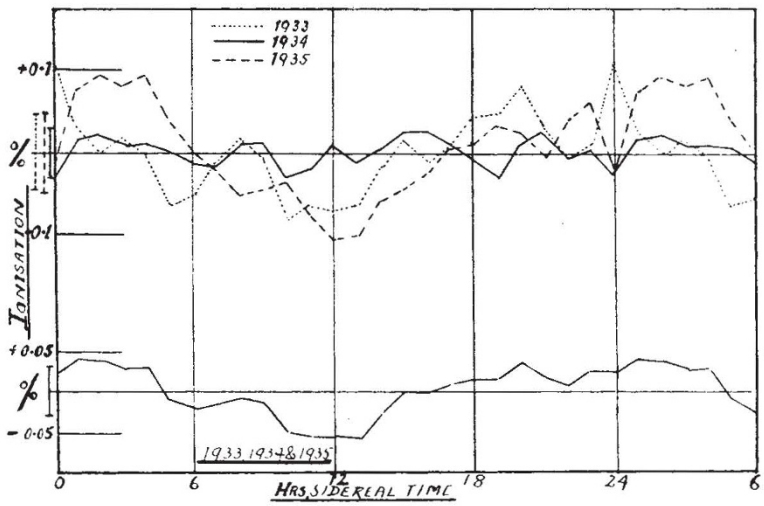

FIG. 1.

We wish to report upon the sidereal time variation during three years of observation, in which for two thirds of each month the chamber was totally enclosed in a shield of lead 10 cm. thick. Each observation has been reduced to a standard pressure of the absorbing atmosphere. Hourly means of intensity have been plotted in the upper set of curves (Fig. 1) for the years 1933, 1934 and 1935, and the combined observations for the three years are shown in the lower curve. The total number of hours of observation is 14,094. Probable errors (root mean square deviations) are indicated by vertical lines on the left-hand side.

It will be seen that the lower curve shows a variation of some 0·04 per cent of the mean, roughly sinusoidal, with maximum at about 24 hr. local sidereal time and minimum at 12 hr. A similar variation is found in the separate curves for 1933 and 1935, but is not definitely indicated in 1934. A variation of this character and phase has been noticed in the observations of Hess and Steinmaurer[1] on the Hafelekar in 1932. Compton and Getting[2] have ascribed it to the effect of the galactic rotation, which if the rays came uniformly from outer space would cause a maximum to be observed in both hemispheres at 21 hr. local sidereal time. They have pointed out the importance of observations in the southern hemisphere, for if the effect observed in the northern hemisphere were due to a seasonal change in the well-known solar diurnal variation, that in the southern hemisphere should show a maximum at 9 hr., being shifted in phase by 12 hr.

Since no such phase shift is observed, we conclude that the very small variation found in both hemispheres is a true sidereal time effect.

B. F. J. SCHONLAND.
B. DELATIZKY.
J. P. GASKELL.

University,
Cape Town.

[1] V. F. Hess und R. Steinmaurer, *Sitzb. Pr. Akad. der W.* (Phys. Math. Klasse), **15**, 15 (1933).
[2] A. H. Compton and V. Getting, *Phys. Rev.*, **47**, 817 (1935).

Measurements of Cosmic Ray Intensity in a Deep Mine

IN a coal mine in the neighbourhood of Budapest, at a depth of 315 m. below the surface, we made measurements of the cosmic ray intensity with triple coincidence apparatus. To obtain still thicker layers of material we measured the intensity at different angles from the vertical, using a very narrow aperture. The results of these experiments show that cosmic rays penetrate through a layer with a thickness of 2,500 m. water-equivalent. For corpuscular rays this will mean that the energy of the particles must surpass 10^{12} e.volt, using the formula of Bethe. The intensity distribution was found to be as follows: 1,700 coincidences per hour on the surface, 0·78 coincidences per hour at an effective depth of 700 m. of water and 0·09 coincidences per hour at 2,500 m. effective depth.

We found, further, that cosmic rays may produce showers even after passing through 700 m. water-equivalent, and that the penetrating power of the shower-particles is of the same magnitude as that usually stated for level measurements.

J. BARNÓTHY.
M. FORRÓ.

Institute for Experimental Physics,
University of Budapest,
Budapest. July 22.