

similar to those of the Sixth Cataract, about forty miles north of Khartum, where the volcanic rocks are certainly older than the Nubian Sandstone. In the northern parts of Dongola basalt intrusions occur in the Nubian Sandstone, and there is a hot spring at Akasha, about eighty miles south-west of Halfa. Turning to more distant regions, one of the solitary landmarks on the White Nile is Jebel Ahmed Aga, in latitude 11° N., consisting of the remains of a volcanic cone formed of basaltic scoria and evidently of comparatively recent age. Towards the east there are the plateau basalts of Abyssinia, with outliers extending into the Sudan. Along the Langeb Valley, north of Kassala, there is an interesting suite of acid and intermediate volcanic rocks, but we are still in doubt about their age. Similar rhyolites certainly occur farther north among the Red Sea hills. The western parts of Kordofan have been traversed geologically without revealing the existence of volcanic rocks on the continuation of the line referred to by Mr. Campbell Smith. Farther west Darfur appears to be full of recent volcanic rocks, principally of scoriaceous types.

The N.E.-S.W. features seen by Dr. Chalmers Mitchell may have been to some extent due to erosion by sand driven from the N.N.E. by the prevalent wind. The direction of strike among the metamorphic rocks is another factor to be borne in mind. It is not constant over these large areas, but it is very often N.E.-S.W., and would then account for some of the features seen from the air. In these circumstances caution appears desirable in basing wide structural theories on rather scanty data.

G. W. GRABHAM.

Box 178, Khartum, March 25.

The FitzGerald-Lorentz Contraction Theory.

IN the discussion on relativity at the Royal Society on February 5 (*NATURE*, February 12), Mr. Jeans stated that the FitzGerald-Lorentz contraction theory presented grave difficulties in the case of a wheel rotating about a fixed axle, so that the circumference would contract while the radius would not. Surely these difficulties are not so grave as would appear at first sight? Let us adopt the point of view of the old-fashioned non-relativist to whom space is rigid and Euclidean, even though his measuring instruments may change and so introduce errors in his measurements. A scale is not a rigid invariable unit of length. Its length, even if its orientation is unchanged, depends on its temperature and the tensile or compression stresses to which it is subjected. If we change its temperature, keeping the stresses constant, its length (as measured by a standard scale at fixed temperature) varies. But we may by suitable means prevent the variation of length, in which case the change of temperature will cause a change of stress. Similarly, on the FitzGerald-Lorentz theory, turning the scale to a different orientation relative to the supposed æther stream causes a change in the electric forces to which the cohesion of the molecules is ultimately due, so that if the temperature and the external stresses remain constant, the length changes. In this case, however, we cannot detect the change directly, as it would be necessary to turn our standard scale also, and it, too, would change. If for any reason the change of length is prevented, the FitzGerald-Lorentz effect causes a change of stress.

Now in the case of the rotating wheel the ratio of the circumference to the radius must remain constant, so that any tendency of one to change its dimensions will affect the other, with the result that both

circumferential and radial stresses will be set up, and any changes of length caused must be compatible with the constancy of π . These stresses would in any actual case be almost vanishingly small compared with those due to centrifugal force, so that the only effect of the FitzGerald-Lorentz contraction would be to alter the latter stresses to an utterly negligible extent.

HORACE H. POOLE.

Physical Laboratory, Trinity College,
Dublin, March 19.

Moseley Memorial.

THE fund founded in the University of Manchester for the provision of a memorial to the late H. G. J. Moseley (killed in action at Gallipoli, 1915), and originally proposed as a private memorial from Moseley's personal friends and fellow-workers in Manchester, has now been extended in order to give other scientific bodies, both in England and abroad, an opportunity of participating. This extension has been made at the request of a number of scientific men interested in Moseley's work, but not personally connected with him, and it is in order to reach this wider public that you are asked to publish this letter.

The scheme of memorial proposed is (1) the provision of a memorial tablet in the physical laboratory and (2) the foundation of a Moseley prize or medal for physics in the University of Manchester.

The fund is administered by a committee consisting of Sir Henry A. Miers (chairman), Profs. W. L. Bragg and H. B. Dixon, Sir E. Rutherford, and Dr. E. J. Evans.

Subscriptions, which should be made payable to the "Moseley Memorial Fund," and crossed "Williams Deacon's Bank, Ltd.," may be sent to either of the hon. secretaries, Mr. C. G. Darwin, Christ's College, Cambridge, or Dr. H. Robinson, Physical Laboratory, University of Manchester.

About 170*l.* has already been received, comprising donations from Great Britain, Canada, the United States, and France (including contributions from the Société Française de Physique and the Société de Chimie-Physique).

It is desired to close the fund in July of this year.

HENRY A. MIERS,

Chairman.

C. G. DARWIN,

H. ROBINSON,

Hon. Secretaries.

The Aurora of March 22-23.

I HAD a fine view of this superb display at Workington between midnight and 1 o'clock a.m., in a clear and bright starlit sky. The whole sky was filled with the light except a small area in the south-east. I could detect no colour except creamy-white, the general intensity being, to my mind, at times equal to full moonlight. Curtains of light surrounded a point just east of the zenith, which seemed to mark the "hub" of the display. The bright star (α) in Canes Venatici almost exactly marked this point, and filmy sheets of light seemed to dash upwards from the south-west and north-east horizons and merge together at this star. The only display I have ever seen to equal this was on 1907 February 14 at Motherwell, in the previous sun-spot maximum period. It was the fact that I could see the great sun-spot train on March 22 without telescopic aid that made me expect and look out for the aurora that night.

W. B. HOUSMAN.

Seaton Cottage, Workington, April 9.