Science and the State.

IN reference to the recent memorandum signed by thirty-six eminent men of science on the neglect of science in our national organisation, it may be of some interest to your readers to be reminded of the paragraph on a similar topic written by Thomson in his "History of Chemistry," which appeared in 1831, or more than three-quarters of a century ago :—

"What Minister in Great Britain ever attempted to cherish the sciences, or to reward those who cultivate them with success? If we except Mr. Montague, who procured the place of master of the Mint for Sir Isaac Newton, I know of no one. While in every other nation in Europe science is directly promoted, and considerable sums are appropriated for its cultivation and for the support of a certain number of individuals who have shown themselves capable of extending its boundaries, not a single farthing has been devoted to any such purpose in Great Britain. Science has been left entirely to itself; and whatever has been done by way of promoting it has been performed by the unaided exertions of private individuals."

The above statement is not literally true of the present day; but the same spirit of indifference still exists.

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Altitudes of Auroræ.

IN NATURE of August 7, 1913 (vol. xci., p. 584), a short account was given of my auroral expedition of 1913. I think, therefore, that the accompanying preliminary result of the determination of altitude (Fig. 1) will interest your readers. More details will soon be published in the *Comptes rendus* of the Paris Academy of Sciences, in the *Astrophysical Journal*, and especially in *Terrestrial Magnetism and Atmospheric Electricity*, where a series of reports are in the press.

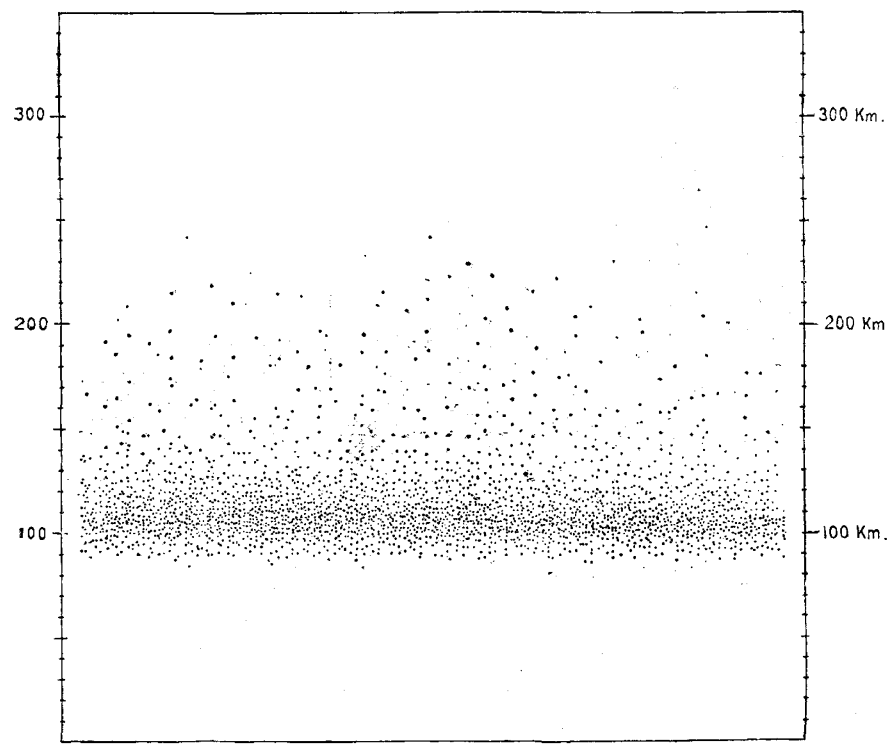
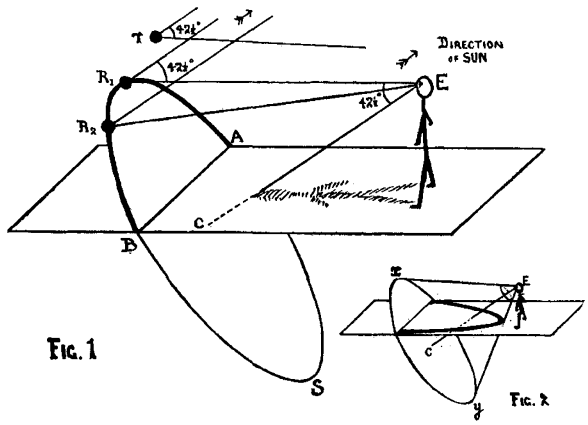


FIG. 1.—The altitude of aurora borealis seen from Bossekop during the spring of 1913. Each calculated altitude is marked by a dot and the several hundred simultaneous photographs of aurora from the stations—Bossekop and Store Korsnes—(mutual distance 27½ kilometres) gave about 2500 determinations of height, which are seen above.

Kristiania, February 15. CARL STÖRMER.

Ground Rainbows.

MY observations of ground rainbows are here described in the hope of learning whether the phenomenon is well known. I can find no reference to it, and no information as to how the gossamer, which causes the rainbow, and seems to be a kind of spider-web, comes to be spread over so large an area.



The ground rainbow observed occurred about 11.0 a.m. on October 14, 1915. A cricket field of about two acres was covered with a thick layer of gossamer which the early morning mist had loaded with millions of glittering beads of water. As one walked over the ground a rainbow of about the brilliancy of a good secondary bow moved over the grass—stretching from one's feet in the direction away from the sun in a sweeping curve with two arms. The explanation is obvious on the ordinary theory of primary rainbows.

Those rays will enter the eye which fall on the drops in the direction of the thick circle, $A R_1 R_2 B S A$ (Fig. 1). But the raindrops were all on the ground, and so what the eye saw was the underneath part, A S B, of the rainbow circle—that is, the rays which lie on the under surface of the cone, $E x y$ (Fig. 2). The rainbow is therefore the trace of the cone, $E x y$, on the ground plane. It follows at once that the form of this trace will depend on the angle of elevation of the sun; when the sun is in the zenith the curve is a circle when the angle of elevation is between 90° and 42° it is an ellipse, when 42° a parabola, and when below 42° a hyperbola. Some of my pupils measured the elevation, by finding the height and length of