

shows its influence on the course of the needle over large portions of continents, and, as Arago first discovered, far from the spot where the evolution of light was visible. It is not improbable that, as heavily-charged threatening clouds, owing to frequent transitions of the atmospheric electricity to an opposite condition, are not always discharged, accompanied by lightning, so likewise magnetic storms may occasion far-extending disturbances in the horary course of the needle, without there being any positive necessity that the equilibrium of the distribution should be restored by explosion, or by the passage of luminous effusions from one of the poles to the equator, or from pole to pole.

In collecting all the individual features of the phenomenon in one general picture, we must not omit to describe the origin and course of a perfectly developed Aurora Borealis. Low down in the distant horizon, about the part of the heavens which is intersected by the magnetic meridian, the sky which was previously clear is at once overcast. A dense wall or bank of cloud seems to rise gradually higher and higher, until it attains an elevation of 8 or 10 degrees. The color of the dark segment passes into brown or violet; and stars are visible through the cloudy stratum, as when a dense smoke darkens the sky. A broad, brightly-luminous arch, first white, then yellow, encircles the dark segment; but as the brilliant arch appears subsequently to the smoky gray segment, we can not agree with Argelander in ascribing the latter to the effect of mere contrast with the bright luminous margin.* The highest point of the arch of light is, according to accurate observations made on this subject,† not generally in the magnetic meridian itself, but from 5° to 18° toward the direction of the magnetic declination of the place.‡ In northern latitudes,

* Argelander, in the important observations on the northern light embodied in the *Vorträgen gehalten in der physikalisch-ökonomischen Gessellschaft zu Königsberg*, bd. i., 1834, s. 257-264.

† For an account of the results of the observations of Lottin, Bravais, and Siljerström, who spent a winter at Bosekop, on the coast of Lapland (70° N. lat.), and in 210 nights saw the northern lights 160 times, see the *Comptes Rendus de l'Acad. des Sciences*, t. x., p. 289, and Martins's *Météorologie*, 1843, p. 453. See, also, Argelander, in the *Vorträgen geh. in der Königsberg Gessellschaft*, bd. i., s. 259.

‡ [Professor Challis, of Cambridge, states that in the Aurora of October 24th, 1847, the streamers all converged toward a single point of the heavens, situated in or very near a vertical circle passing through the magnetic pole. Around this point a corona was formed, the rays of which diverged in all directions from the center, leaving a space free from light: its azimuth was $18^{\circ} 41'$ from south to east, and its altitude $69^{\circ} 54'$. See Professor Challis, in the *Athenæum*, Oct. 31, 1847.]—T