

directly, with the physical constitution of the Sun, and with the periodical greater or less prevalence of spots on its surface,—the maxima of the amount of fluctuation corresponding with the maxima of the spots, and these again with those of the exhibitions of the Aurora Borealis, which thus appears also to be subject to the same law of periodicity. The discovery made by General Sabine of a decennial period in all those magnetic influences at the surface of the globe, which, by their dependence on the hours of solar time, led him to recognize the Sun as their primary cause—operating, however, in some other manner than by its heat—was explained by reference to the observations of Arago on the diurnal variation of the declination, which were purposely selected by the lecturer, as giving independent evidence on the subject, having been made before the establishment of the British Magnetic Observatories, and because that philosopher was evidently unaware of the existence of the periodicity they demonstrate, in common with the later and different observations in which the decennial period was first recognized by Sabine. A general view was then taken of the phenomena of the Solar Spots, and of the analogy between them and the revolving storms of our own atmosphere, first inferred by Sir John Herschel, and since remarkably confirmed, it was stated, by the observations of the Rev. R. Dawes, on the rotation of the spots about their own centres, and those of Mr. Carrington, on the currents in which they appear to drift across the Sun; and the discovery of a decennial period in their amount and frequency by Schwabe of Dessau, in the observations which he has carried on for the third part of a century, was described by reference to tables comparing the periods of the maxima and the minima of the spots with those of the magnetic fluctuations as made known by Sabine, which were thus shown to be, when complete, corresponding periods of ten years. The enormous activity in certain regions of the Sun, indicated by the magnitude of the spots, and the rapidity of their motions and changes, it was suggested, was adequate to any conceivable exertion of force upon the Earth. In proceeding to the third subject of this law of periodicity, the Polar Lights, after a brief description of their characteristic phenomena, Mr. Brayley stated that, in his opinion, the only suggestion of their cause hitherto enunciated, in the nature of a *vera causa*, had been made by Professor Faraday, and had been amply verified by facts subsequently observed,—a statement now made for the first time. In the Bakerian Lecture, read before the Royal Society in 1832, relating his discovery of terrestrial magneto-electric induction, Mr. Faraday showed that effects similar to those he had obtained by instrumental means, but infinitely greater in force, might be produced by the action of the globe, as a magnet, upon its own mass, in consequence of its diurnal rotation; and, in the sequel, he asked whether the Aurora Borealis and Australis might not be the discharge of electricity thus urged towards the poles, and endeavouring to return, above the earth, to the equatorial regions; citing, as in accordance with an affirmative reply, the effect of an aurora upon the magnetic needle recorded by Mr. R. W. Fox. He did not pursue the subject; but the hypothesis has been abundantly verified, with respect to the production of terrestrial currents of electricity, in the manner inferred, by the earth's rotation, and the other natural motions of conductors cutting the magnetic curves, by facts which the electric telegraph, land and submarine, has disclosed, and some of which were recited; while all the