

tonishment, on the woody banks of the Orinoco, in the sports of the natives, that the excitement of electricity by friction was known to these savage races, who occupy the very lowest place in the scale of humanity. Children may be seen to rub the dry, flat, and shining seeds or husks of a trailing plant (probably a *Negretia*) until they are able to attract threads of cotton and pieces of bamboo cane. That which thus delights the naked copper-colored Indian is calculated to awaken in our minds a deep and earnest impression. What a chasm divides the electric pastime of these savages from the discovery of a metallic conductor discharging its electric shocks, or a pile composed of many chemically-decomposing substances, or a light-engendering magnetic apparatus! In such a chasm lie buried thousands of years that compose the history of the intellectual development of mankind!

The incessant change or oscillatory motion which we discover in all magnetic phenomena, whether in those of the inclination, declination, and intensity of these forces, according to the hours of the day and the night, and the seasons and the course of the whole year, leads us to conjecture the existence of very various and partial systems of electric currents on the surface of the Earth. Are these currents, as in Seebeck's experiments, thermo-magnetic, and excited directly from unequal distribution of heat? or should we not rather regard them as induced by the position of the Sun and by solar heat?* Have the rotation of the planets, and the different degrees of velocity which the individual zones acquire, according to their respective distances from the equator, any influence on the distribution of magnetism? Must we seek the seat of these currents, that is to say, of the disturbed electricity, in the atmosphere, in the regions of planetary space, or in the polarity of the Sun and Moon? Galileo, in his celebrated *Dialogo*, was inclined to ascribe the parallel direction of the axis of the Earth to a magnetic point of attraction seated in universal space.

If we represent to ourselves the interior of the Earth as fused and undergoing an enormous pressure, and at a degree of temperature the amount of which we are unable to assign,

* "The phenomena of periodical variations depend manifestly on the action of solar heat, operating probably through the medium of thermo-electric currents induced on the Earth's surface. Beyond this rude guess, however, nothing is as yet known of their physical cause. It is even still a matter of speculation whether the solar influence be a principal or only a subordinate cause in the phenomena of terrestrial magnetism." (*Observations to be made in the Antarctic Expedition, 1840*, p. 35.)