

a voltaic circuit on the magnetic needle, and Seebeck's discovery of the influence of heat in inducing electric currents, that any well-founded theory of magnetic action and phenomena resulting from it has been formed. But we shall hereafter have occasion to refer to the origin of terrestrial magnetism; the diurnal variation in the direction is the present object of attention. If the unequal distribution of heat through metallic, and, in all probability, other bodies, can cause the development of electric currents, then the earth, containing metallic, as well as other substances, and subject to a constant variation of temperature, in consequence of the diurnal and annual revolution, must be in an unequal electric condition, and conduct through its mineral crust electric currents of varying intensity and character. The superficial crust of the earth can, in fact, only be considered as a vast thermo-electrical apparatus, and to its influence we may trace the diurnal variation of the needle. Mr. Christie, speaking of a course of experiments he made on this subject, says, "from these I drew the conclusion, that one part of the earth, with the atmosphere, being more heated than the other, two magnetic poles, or rather electric currents, producing effects referrible to such poles, would be formed on each side of the equator, poles of different names being opposed to each other on the contrary side of the equator; and that different points in the earth's equator becoming successively those of greatest heat, these poles would be carried round the axis of the earth, and would necessarily cause a deviation in the horizontal needle. On comparing experimentally the effects that would result from the revolution of such poles with the diurnal deviation at London, as observed by Canton and Beaufoy, also with those observed by Lieut. Hood, at Fort Enterprise, and finally by the late Captain Foster, at Port Bowen, I found a close agreement in all cases, in the general character of the phenomena, and that the times of the maxima east and west did not differ greatly in the several cases. The double oscillation of the needle clearly resulted from this view of the subject. Some of the experiments to which I have referred showed, that when heat was applied to a globe, the electric currents excited were such, that, on the contrary sides of the equator, the deviations of the end of the needle of the same name as the latitude, were at the same time always in the same direction, either both towards east or