

have been since corrected and improved by various persons. The most recent are those of Mr. Yates in 1817, and of M. Hansteen. The dip, as well as the variation, was found to be different in different places. M. Humboldt, in the course of his travels, collected many such observations. And both the observations of variation and of dip seemed to indicate that the earth, as to its effect on the magnetic needle, may, approximately at least, be considered as a magnet, the poles of which are not far removed from the earth's poles of rotation. Thus we have a *magnetic equator*, in which the needle has no dip, and which does not deviate far from the earth's equator; although, from the best observations, it appears to be by no means a regular circle. And the phenomena, both of the dip and of the variation, in high northern latitudes, appear to indicate the existence of a pole below the surface of the earth to the north of Hudson's Bay. In his second remarkable expedition into those regions, Captain Ross is supposed to have reached the place of this pole; the dipping-needle there pointing vertically downwards, and the variation-compass turning towards this point in the adjacent regions. We shall hereafter have to consider the more complete and connected views which have been taken of terrestrial magnetism.

In 1633, Gellibrand discovered that the variation is not constant, as Gilbert imagined, but that at London it had diminished from eleven degrees east in 1580, to four degrees in 1633. Since that time the variation has become more and more westerly; it is now about twenty-five degrees west, and the needle is supposed to have begun to travel eastward again.

The next important fact which appeared with respect to terrestrial magnetism was, that the position of the needle is subject to a small *diurnal* variation: this was discovered in 1722, by Graham, a philosophical instrument-maker, of London. The daily variation was established by one thousand observations of Graham, and confirmed by four thousand more made by Canton, and is now considered to be out of dispute. It appeared also, by Canton's researches, that the diurnal variation undergoes an annual inequality, being nearly a quarter of a degree in June and July, and only half that quantity in December and January.

Having thus noticed the principal facts which belong to terrestrial magnetism, we must return to the consideration of those phenomena which gradually led to a consistent magnetic theory. Gilbert observed that both smelted iron and hammered iron have the magnetic virtue,