

Knowing the magnetic declination and the dip at any place, we can completely define the direction at that place along which the earth's magnetism acts. This direction would be that assumed by a magnetic needle so suspended that it would be free to move in every possible direction, not alone in the horizontal plane like the compass needle, nor alone in the vertical plane like the dip needle. We shall have occasion later on to investigate how this direction of the earth's magnetic force varies with the lapse of time.

THE DIURNAL VARIATION OF THE EARTH'S MAGNETISM.

In the year 1722 another remarkable fact came to light, namely, that the magnetic declination is subject to an appreciable *diurnal variation*. The discovery was made by Graham, a London instrument maker. It has been found since that not only the declination, but also the inclination and the force are subject to this diurnal variation. The precise cause of the diurnal variation has not as yet been satisfactorily demonstrated. That the Sun plays an important part is unquestionable, but the *modus operandi* is not yet known.

THE INTENSITY OF THE EARTH'S MAGNETIC FORCE.

There remains one element more to be referred to before we have observed the earth's magnetism in its totality, namely, the *strength* or *intensity* of the attractive pull exerted on the magnetic needle by the earth as a magnet.

Let us suspend by a fine silk fibre a compass needle and enclose the same within an air-tight enclosure, so that there will be no air currents acting on the needle to disturb any position of rest it may assume. Let us now draw it aside from its position of rest with the aid of a bit of magnetized steel and then remove the latter. The needle, the moment it is free from the influence of the second magnet, endeavors to return to its original position, and thereby it performs a series of vibrations back and forth, the amplitudes of which continually decrease until finally the needle has come to rest in the position first occupied. At any given place it will be found that a definite number of complete swings or oscillations will be performed in a given interval of