equator, the north pole of the earth having the greatest effect, the needle is attracted downwards, towards the north pole; hence, exactly over the magnetic pole, the needle would be vertical. Similar phenomena happen in the southern hemisphere; but here the south pole predominates, and, of course, depresses the corresponding pole of the needle; while, at the magnetic equator, from the equal action of both poles, the needle will assume an exactly horizontal position. It may be remarked, that neither the magnetic poles, nor the magnetic equator, coincide exactly with the poles and equator of the earth; and that this non-coincidence is owing to, or rather constitutes, what is termed the *variation* of the needle; which is not only different in different parts of the world; but appears to be liable to periodical differences in the same place, at present not well understood. Such are the principal phenomena of the magnetic needle, as demonstrative of the earth's magnetic operation; we shall attempt to illustrate these phenomena a little further.

We have mentioned, that the earth may be considered as acting like a great magnet. Now, we have formerly shown, that when a magnetic needle is in its natural position of north and south, there exist electrical currents in planes at right angles to the needle, descending on its east side, passing under it from east to west,