

that magnetic bodies in the form of bars or needles, if free to move, arrange themselves in the *axial* line joining the poles; diamagnetic bodies under the same circumstances arrange themselves in an *equatorial* position, perpendicular to the axial line. And this tendency he conceives to be the result of one more general; that whereas magnetic bodies are attracted to the poles of a magnet, diamagnetic bodies are repelled from the poles. The list of diamagnetic bodies includes all kinds of substances; not only metals, as antimony, bismuth, gold, silver, lead, tin, zinc, but many crystals, glass, phosphorus, sulphur, sugar, gum, wood, ivory; and even flesh and fruit.

It appears that M. le Bailli had shown, in 1829, that both bismuth and antimony and bismuth repelled the magnetic needle; and as Dr. Faraday remarks, it is astonishing that such an experiment should have remained so long without further results. M. Becquerel in 1827 observed, and quoted Coulomb as having also observed, that a needle of wood under certain conditions pointed across the magnetic curves; and also stated that he had found a needle of wood place itself parallel to the wires of a galvanometer. This he referred to a magnetism transverse to the length. But he does not refer the phenomena to elementary repulsive action, nor show that they are common to an immense class of bodies, nor distinguish this diamagnetic from the magnetic class, as Faraday has taught us to do.

I do not dwell upon the peculiar phenomena of copper which, in the same series of researches, are traced by Dr. Faraday to the combined effect of its diamagnetic character, and the electric currents excited in it by the electro-magnet; nor to the optical phenomena manifested by certain transparent diamagnetic substances under electric action; as already stated in Book ix.^o]

CHAPTER VIII.

DISCOVERY OF THE LAWS OF MAGNETO-ELECTRIC INDUCTION.—FARADAY.

IT was clearly established by Ampère, as we have seen, that magnetic action is a peculiar form of electromotive actions, and that, in

^o See the *Twentieth Series of Experimental Researches in Electricity*, read to the Royal Society, Dec. 18, 1845.