

magnetism would be confined to the surface of bodies; but he had found that, in a long needle, the magnetic fluid might be supposed to be concentrated very near the extremities, just as it is in a long electric body. The theoretical confirmation of this rule among the other consequences of the theory,—that the sensible magnetism would be collected at the surface,—was one of the results of Poisson's analysis. For it appeared that if the sum of the electric elements of the body was equal to the whole body, there would be no difference between the action of a solid sphere and very thin shell.

We may, then, consider the Coulombian theory to be fully established and verified, as a representation of the laws of magnetical phenomena. We may add, as a remarkable and valuable example of an ulterior step in the course of sciences, the application of the laws of the distribution of magnetism to the purposes of navigation. It had been found that the mass of iron which exists in a ship produces a deviation in the direction of the compass-needle, which was termed "local attraction," and which rendered the compass an erroneous guide. Mr. Barlow proposed to correct this by a plate of iron placed near the compass; the plate being of comparatively small mass, but, in consequence of its expanded form, and its proximity to the needle, of equivalent effect to the disturbing cause.

[2nd Ed.] [This proposed arrangement was not successful, because as the ship turns into different positions, it may be considered as revolving round a vertical axis; and as this does not coincide with the magnetic axis, the relative magnetic position of the disturbing parts of the ship, and of the correcting plate, will be altered, so that they will not continue to counteract each other. In high magnetic latitudes the correcting plate was used with success.

But when iron ships became common, a correction of the effect of the iron upon the ship's compass in the general case became necessary. Mr. Airy devised the means of making this correction. By placing a magnet and a mass of iron in certain positions relative to the compass, the effect of the rest of the iron in the ship is completely counteracted in all positions.¹²]

But we have still to trace the progress of the theory of terrestrial magnetism.

Theory of Terrestrial Magnetism.—Gilbert had begun a plausible course of speculation on this point. "We must reject," he says,¹³ "in

¹² See *Phil. Trans.* 1836.

¹³ *Lib. iv. c. 1. De Variations.*