

to the magnetic meridian, and passing through the same point of the needle whatever be its position." This was the more important, because it was necessary, in the first place, to allow for the effect of the terrestrial force, before the mutual action of the magnets could be extricated from the phenomena.⁶ Coulomb then proceeded to correct the theory of magnetism.

Coulomb's reform of the Æpinian theory, in the case of magnetism, as in that of electricity, substituted two fluids (an *austral* and a *boreal* fluid,) for the single fluid; and in this way removed the necessity under which Æpinus found himself, of supposing all the particles of iron and steel and other magnetic bodies to have a peculiar repulsion for each other, exactly equal to their attraction for the magnetic fluid. But in the case of magnetism, another modification was necessary. It was impossible to suppose here, as in the electrical phenomena, that one of the fluids was accumulated on one extremity of a body, and the other fluid on the other extremity; for though this might appear, at first sight, to be the case in a magnetic needle, it was found that when the needle was cut into two halves, the half in which the austral fluid had seemed to predominate, acquired immediately a boreal pole opposite to its austral pole, and a similar effect followed in the other half. The same is true, into however many parts the magnetic body be cut. The way in which Coulomb modified the theory so as to reconcile it with such facts, is simple and satisfactory. He supposes⁶ the magnetic body to be made up of "molecules or integral parts," or, as they were afterwards called by M. Poisson, "magnetic elements." In each of these elements, (which are extremely minute,) the fluids can be separated, so that each element has an austral and a boreal pole; but the austral pole of an element which is adjacent to the boreal pole of the next, neutralizes, or nearly neutralizes, its effect; so that the sensible magnetism appears only towards the extremities of the body, as it would do if the fluids could permeate the body freely. We shall have exactly the same result, as to sensible magnetic force, on the one supposition and on the other, as Coulomb showed.⁷

The theory, thus freed from manifest incongruities, was to be reduced to calculation, and compared with experiment; this was done in Coulomb's Seventh Memoir.⁸ The difficulties of calculation in this, as in the electric problem, could not be entirely surmounted by the analysis of Coulomb; but by various artifices, he obtained theoretically the rela-

⁶ p. 603. ⁷ *Mem. A. P.* 1789, p. 488. ⁸ *Mem. A. P.* p. 492. ⁹ *A. P.* 1789.