

to a knowledge of the true nature of heat, and its relations to ponderable matter.

Magnetism and Electricity.

(363.) These two subjects, which had long maintained a distinct existence, and been studied as separate branches of science, are at length effectually blended. This is, perhaps, the most satisfactory result which the experimental sciences have ever yet attained. All the phenomena of magnetic polarity, attraction, and repulsion, have at length been resolved into one general fact, that two currents of electricity, moving in the same direction repel, and in contrary directions attract, each other. The phenomena of the communication of magnetism and what is called its induced state, alone remain unaccounted for; but the interesting theory which has been developed by M. Ampere, under the name of Electro-dynamics, holds out a hope that this difficulty will also in its turn give way, and the whole subject be at length completely merged, as far as the consideration of the acting causes goes, in the more general one of electricity. This, however, does not prevent magnetism from maintaining its separate importance as a department of physical inquiry, having its own peculiar laws and relations of the highest practical interest, which are capable of being studied quite apart from all consideration of its electrical origin. And not only so, but to study them with advantage, we must proceed as if that origin were totally unknown, and, at least up to a certain point, and that a considerably advanced one, conduct our inquiries into the subject on the same inductive principles as if this branch of physics were absolutely independent of all others.

(364.) Iron, and its oxides and alloys, were for a long time the only substances considered susceptible of magnetism. The loadstone was even one of the examples produced by Bacon of that class of physical instances to which he applies the term "*Instantiæ monodicæ*"—