

at that period was unavoidable, do him no discredit when compared with the doctrines of his successors a century and a half afterwards. But such speculations belong to a succeeding part of this history.

In treating of these Sciences, I will speak of Electricity in the first place; although it is thus separated by the interposition of Magnetism from the succeeding subjects (Galvanism, &c.) with which its alliance seems, at first sight, the closest, and although some general notions of the laws of magnets were obtained at an earlier period than a knowledge of the corresponding relations of electric phenomena: for the theory of electric attraction and repulsion is somewhat more simple than of magnetic; was, in fact, the first obtained; and was of use in suggesting and confirming the generalization of magnetic laws.

CHAPTER I.

DISCOVERY OF LAWS OF ELECTRIC PHENOMENA.

WE have already seen what was the state of this branch of knowledge at the beginning of the seventeenth century, and the advances made by Gilbert. We must now notice the additions which it subsequently received, and especially those which led to the discovery of general laws, and the establishment of the theory; events of this kind being those of which we have more peculiarly to trace the conditions and causes. Among the facts which we have thus especially to attend to, are the electric attractions of small bodies by amber and other substances when rubbed. Boyle, who repeated and extended the experiments of Gilbert, does not appear to have arrived at any new general notions; but Otto Guericke of Magdeburg, about the same time, made a very material step, by discovering that there was an electric force of repulsion as well as of attraction. He found that when a globe of sulphur had attracted a feather, it afterwards repelled it, till the feather had been in contact with some other body. This, when verified under a due generality of circumstances, forms a capital fact in our present subject. Hawkesbee, who wrote in 1709 (*Physico-Mechanical Experiments*), also observed various of the effects of attraction and repulsion upon threads hanging loosely. But the person who appears to have first fully seized the general law of these facts, is