other. This latter discovery was made by M. Ampère; and the extraordinary rapidity and sagacity with which he caught the suggestion of such forces, from the electro-magnetic experiments of M. Oersted, (of which we shall speak in the next chapter,) well entitle him to be considered as a great and independent discoverer. As he truly says,[1] "it by no means followed, that because a conducting wire exerted a force on a magnet, two conducting wires must exert a force on each other; for two pieces of soft iron, both of which affect a magnet, do not affect each other." But immediately on the promulgation of Oersted's experiments, in 1820, Ampère leapt forwards to a general theory of the facts, of which theory the mutual attraction and repulsion of conducting voltaic wires was a fundamental supposition. The supposition was immediately verified by direct trial; and the laws of this attraction and repulsion were soon determined, with great experimental ingenuity, and a very remarkable command of the resources of analysis. But the experimental and analytical investigation of the mutual action of voltaic or electrical currents, was so mixed up with the examination of the laws of electro-magnetism, which had given occasion to the investigation, that we must not treat the two provinces of research as separate. The mention in this place, premature as it might appear, of the labors of Ampère, arises inevitably from his being the author of a beautiful and comprehensive generalization, which not only included the phenomena exhibited by the new combinations of Oersted, but also disclosed forces which existed in arrangements already familiar, although they had never been detected till the theory pointed out how they were to be looked for.

CHAPTER IV.

Discovery of Electro-magnetic Action.—Oersted.

THE impulse which the discovery of galvanism, in 1791, and that of the voltaic pile, in 1800, had given to the study of electricity as a mechanical science, had nearly died away in 1820. It was in that year that M. Oersted, of Copenhagen, announced that the conducting

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[1] *Théorie des Phénom. Electrodynamiques*, p. 113.