

*Sect. 5.—Discovery of the Laws of Double Stars.—The two Herschels.*

No truth, then, can be more certainly established, than that the law of gravitation prevails to the very boundaries of the solar system. But does it hold good further? Do the fixed stars also obey this universal sway? The idea, the question, is an obvious one—but where are we to find the means of submitting it to the test of observation?

If the Stars were each insulated from the rest, as our Sun appears to be from them, we should have been quite unable to answer this inquiry. But among the stars, there are some which are called *Double Stars*, and which consist of two stars, so near to each other that the telescope alone can separate them. The elder Herschel diligently observed and measured the relative positions of the two stars in such pairs; and as has so often happened in astronomical history, pursuing one object he fell in with another. Supposing such pairs to be really unconnected, he wished to learn, from their phenomena, something respecting the annual parallax of the earth's orbit. But in the course of twenty years' observations he made the discovery (in 1803) that some of these couples were turning round each other with various angular velocities. These revolutions were for the most part so slow that he was obliged to leave their complete determination as an inheritance to the next generation. His son was not careless of the bequest, and after having added an enormous mass of observations to those of his father, he applied himself to determine the laws of these revolutions. A problem so obvious and so tempting was attacked also by others, as Savary and Encke, in 1830 and 1832, with the resources of analysis. But a problem in which the data are so minute and inevitably imperfect, required the mathematician to employ much judgment, as well as skill in using and combining these data; and Sir John Herschel, by employing positions only of the line joining the pair of stars (which can be observed with comparative exactness), to the exclusion of their distances (which cannot be measured with much correctness), and by inventing a method which depended upon the whole body of observations, and not upon selected ones only, for the determination of the motion, has made his investigations by far the most satisfactory of those which have appeared. The result is, that it has been rendered very probable, that in several of the double stars the two stars describe ellipses about each other; and therefore that here also, at an immeas-