

grounds on which Copernicus adopted his theory; as the craving for these qualities was the feeling which led him to seek for a new theory. It is manifest that in this, as in other cases of discovery, a clear and steady possession of abstract Ideas, and an aptitude in comprehending real Facts under these general conceptions, must have been leading characters in the discoverer's mind. He must have had a good geometrical head, and great astronomical knowledge. He must have seen, with peculiar distinctness, the consequences which flowed from his suppositions as to the relations of space and time,—the apparent motions which resulted from the assumed real ones; and he must also have known well all the irregularities of the apparent motions for which he had to account. We find indications of these qualities in his expressions. A steady and calm contemplation of the theory is what he asks for, as the main requisite to its reception. If you suppose the earth to revolve and the heaven to be at rest, you will find, he says, "*si serio animadvertas,*" if you think steadily, that the apparent diurnal motion will follow. And after alleging his reasons for his system, he says,¹ "We are, therefore, not ashamed to confess, that the whole of the space within the orbit of the moon, along with the centre of the earth, moves round the sun in a year among the other planets; the magnitude of the world being so great, that the distance of the earth from the sun has no apparent magnitude when compared with the sphere of the fixed stars." "All which things, though they be difficult and almost inconceivable, and against the opinion of the majority, yet, in the sequel, by God's favor, we will make clearer than the sun, at least to those who are not ignorant of mathematics."

It will easily be understood, that since the ancient geocentric hypothesis ascribed to the planets those motions which were apparent only, and which really arose from the motion of the earth round the sun in the new hypothesis, the latter scheme must much simplify the planetary theory. Kepler² enumerates eleven motions of the Ptolemaic system, which are at once exterminated and rendered unnecessary by the new system. Still, as the real motions, both of the earth and the planets, are unequable, it was requisite to have some mode of representing their inequalities; and, accordingly, the ancient theory of eccentrics and epicycles was retained, so far as was requisite for this purpose. The planets revolved round the sun by means of a Deferent, and a

¹ Nicolai Copernici Torinensis *de Revolutionibus Orbium Caelestium Libri VI.* Norimbergæ, M.D.XLIII. p. 9.

² *Myst. Cosm.* cap. 1.