

moving cosmical bodies and fixed. See *Cosmos*, vol. iii., p. 115.)

The number of the principal planets has been exactly doubled since the first volume of *Cosmos* appeared,\* so excessively rapid is the succession of discoveries, the extension and perfection of the topography of the planetary system.

2. *Classification of the Planets in two Groups.*—If the region of *small planets situated in the solar system between the orbits of Mars and Jupiter*, but, on the whole, nearer to the former, is considered as a separating zone—as it were, an intermediate group—then, as has already been remarked, those planets which are nearest to the sun, the interior (Mercury, Venus, the Earth, and Mars), present several resemblances among each other, and contrasts with the *exterior* planets (Jupiter, Saturn, Uranus, and Neptune), or those which are more remote from the sun, beyond this separating zone. Of these three groups, the intermediate one occupies a space scarcely equal to half the distance of the orbit of Mars from that of Jupiter. Of the space between the two great principal planets, Mars and Jupiter, that part which is nearest to Mars is, as far as has hitherto been observed, the most closely filled; for if, in the zone which the asteroids occupy, the two outermost, Flora and Hygeia, are examined, it will be found that Jupiter is more than three times further from Hygeia than Flora is from Mars. The most distinctive features of this intermediate group of planets are the great inclination and eccentricity of their interlacing orbits, and the extreme smallness of the planets. The inclination of the orbits toward the ecliptic increases in that of Juno to  $13^{\circ} 3'$ , in that of Hebe even to  $14^{\circ} 47'$ , of Egeria to  $16^{\circ} 33'$ , of Pallas even to  $34^{\circ} 37'$ ; while in the same intermediate group it falls as low, in the orbit of Astrea, as  $5^{\circ} 19'$ , in that of Parthenope to  $4^{\circ} 37'$ , and that of Hygeia to  $3^{\circ} 47'$ . The whole of the orbits of the small planets having inclinations smaller than  $7^{\circ}$  are, to go from the large to the small, those of Flora, Metis, Iris, Astrea, Parthenope, and Hygeia. Nevertheless, none of these orbits attain such a small degree of inclination as those of Venus, Saturn, Mars, Neptune, Jupiter, and Uranus. The eccentricities partly exceed even that of Mercury (0.206); for Juno, Pallas, Iris, and Victoria have 0.255, 0.239, 0.232, and 0.218, while Ceres (0.076), Egeria (0.086), and Vesta (0.089) have orbits less eccentric than Mars (0.093), without,

\* *Cosmos*, vol. i., p. 92. Compare also Encke, in *Schumacher's Astron. Nachr.*, vol. xxvi., 1848, No 622, p. 347.