

another; the equilibrium of matter was in a highly fickle and unstable condition. The denser particles of matter tended, by reason of their attractive force, to unite into a central body. At the impact the particles were diverted by the disturbing action of the attractive and repulsive forces; there arose numerous whirls of movement crossing one another. The particles in these whirls or vortices originally moved in all directions, and were constantly coming into conflict with one another, but finally the movements became uniform in direction, and the particles revolved almost in one heavenly plane, and without mutual disturbance in concentric circles round the sun. Within each individual ring the attraction of the particles again came into play, aggregates of the denser particles attracted the lighter particles in the same ring until a planetary body formed, revolving round the sun along its particular path. In this way the whole planetary system, including moons and comets, was thought by Kant to have taken origin in order according to the distance of the path of revolution from the sun; first, the planets next the sun, then those more remote from the sun.

While Kant's mechanical theory of the universe explains the origin of all the bodies in the solar system upon the same fundamental principle, it yields no exact information regarding the constitution and the temperature of the sun and the planets. The nebular theory of Laplace, which was founded quite independently of Kant, goes further in this respect, and has therefore come into closer relationship with geology.

Laplace shows that all the planets in the solar system move round the sun from west to east in almost the same plane, that all moons move in similar direction round their planets, and that the sun rotates, so far as is known, in the same direction round its own axis. In the opinion of the great mathematician, a phenomenon so remarkable cannot be mere chance, but indicates some general cause or combination of causes that has determined all those movements. Clearly, there was a time when the planetary spaces now empty were uniformly filled with matter at a high temperature, representing the substances of the planets and moons in the finest state of rarefaction, and having a rotating movement from west to east. A central body, the sun, massed itself in the midst of this vaporous material.

The finely divided mass behaved like a gigantic atmosphere,