have become more rapid, and have tended to make it discoid. From time to time masses became separated at the circumference of this disc under the influence of the increasing centrifugal force. These masses again assumed the form of rotating nebular balls, and either simply condensed as planets, or during condensation also gave off in turn peripheral masses which became satellites or remained, in the case of Saturn, as a connected ring. In another case, the mass which separated at the periphery of the main nebula broke up into a number of nebular fragments, and gave origin to the swarm of small planets between Mars and Jupiter. It has been determined more recently that this process of condensation of loosely composed bodies is still continuing, although in less degree."

A new field of research was opened for astronomy in 1859, when the spectroscope was discovered by Kirchhoff and Bunsen. It was then rendered possible to learn something definite about the materials composing the stars and the sun. By the use of the spectroscope it has been ascertained that all matter has essentially the same constitution throughout the universe, the same substances taking part in the composition of the earth, the sun, the fixed stars, and the planetary nebula.

The mechanical theory of heat, together with the principle of conservation of energy founded by Robert Mayer and by Helmholtz, afforded an exact explanation of the high temperature of self-luminous cosmical bodies, since an enormous supply of heat must be absorbed during the processes of condensation of gases and differentiation of atoms. According to Helmholtz, the supply of heat which the sun has accumulated during its condensation is sufficient, if calculated on the basis of its present expenditure of heat, to have extended over an interval of time in the past equivalent to twenty-two million years. And as the sun is still in process of condensation, it may yet continue for many millions of years to radiate and to impart its animating sunshine to the planets.

Thus, in respect of the unity of matter and the temperature of solar and planetary bodies, the nebular theory of Kant and Laplace was confirmed by spectroscopical research and by the mechanical theory of heat. But it encountered serious difficulty when astronomers discovered that the rotation of the satellites of Uranus and Neptune takes place from east to west,