

more irregularly diffused measure eight lunar diameters. According to William Herschel's earlier estimate, made in 1811, these nebulous spots cover at least $\frac{1}{270}$ th part of the whole visible firmament. As seen through colossal telescopes, the contemplation of these nebulous masses leads us into regions from whence a ray of light, according to an assumption not wholly improbable, requires millions of years to reach our earth, to distances for whose measurement the dimensions (the distances of Sirius, or the calculated distances of the binary stars in Cygnus and the Centaur) of our nearest stratum of fixed stars scarcely suffice. If these nebulous spots be elliptical or spherical sidereal groups, their very conglomeration calls to mind the idea of a mysterious play of gravitative forces by which they are governed. If they be vapory masses, having one or more nebulous nuclei, the various degrees of their condensation suggest the possibility of a process of gradual star-formation from inglobate matter. No other cosmical structure—no other subject of this branch of astronomy more contemplative than measuring—is, in like degree, adapted to excite the imagination, not merely as a symbolic image of the infinitude of space, but because the investigation of the different conditions of *existing things*, and of their presumed connection of sequences, promises to afford us an insight into the laws of *genetic development*.*

The historical development of our knowledge of nebulous bodies teaches us that here, as in the progress of almost every other branch of physical science, the same opposite opinions, which still have numerous adherents, were maintained long since, although on weaker grounds. Since the general use of the telescope, we find that Galileo, Dominique Cassini, and the acute John Michell regarded all nebulæ as remote clusters of stars; while Halley, Derham, Lacaille, Kant, and Lambert maintained the existence of starless nebulous masses. Kepler (like Tycho Brahe before the invention of the telescope) was a zealous adherent of the theory of star-formation from cosmical vapor—from condensed conglobate celestial nebulous matter. He believed "*cæli materiam tenuissimam* (the vapor which shines with a mild stellar light in the Milky Way) *in unum globum condensatam, stellam effingere*," and grounded his opinion, not on the process of condensation operating in defined roundish nebulous spots (for these were unknown to him), but on the sudden appearance of new stars on the margin of the galaxy.

* *Cosmos*, vol. i., p. 84.