

cold, heavy, lifeless, and lightless body behind.¹ The action of attractive power would sometimes reveal the existence of cold bodies, with specific gravity much in excess of our earth, as in the case of the satellite of Sirius, and the spectroscope would reveal clusters of stars or nebulae in the various stages of development, such as the nebular hypothesis suggested as making up the genetic process of our planetary system. Much uncertainty and much conjecture must of course exist in these chapters of science, which those who are in full possession of the accumulated and yet very imperfect facts may venture to elaborate in a more or less plausible or fanciful manner. Such attempts to write the history of the universe have been made in an original fashion by M. Faye in France² and Sir Norman Lockyer³ in this country. They have tried

51.
Genesis of
the cosmos
—Faye and
Lockyer.

¹ See Helmholtz, 'Vorträge und Reden,' vol. ii., 3rd ed., p. 88, &c.

² 'Sur l'Origine du Monde,' 2nd ed., Paris, 1885. The author, finding the celebrated cosmogonic hypothesis of Laplace in "full contradiction" with the actual state of science, takes up an original theory of Descartes, that of vortices, in order to characterise not the actual, but the initial, stage of the solar system (see Preface): "Autrefois, je veux dire il y a une vingtaine d'années, on avait les coudées franches pour imaginer un système cosmogonique: il suffisait de l'accommoder aux notions contemporaines d'Astronomie solaire et de mécanique céleste. Il n'en est plus de même aujourd'hui, car la thermodynamique assigne à notre Soleil une provision limitée de chaleur, l'Analyse spectrale nous révèle la constitution intime des astres les plus éloignés, et la palé-

ontologie nous fait remonter à des époques où il n'y avait, sur notre globe, ni saisons, ni climats."

³ Whereas M. Faye has ingeniously modified the original and older nebular hypothesis so as to account for the anomalies in the movement of some of the members of our planetary system, which were unknown or unexplained in Laplace's time, and has tried to account for the phenomena of loss and supply of heat which thermodynamical theory and palaeontological records reveal, Sir Norman Lockyer has during more than thirty years been occupied with the elaboration of a special theory which tries to harmonise the revelations of the spectroscope as to the chemical constitution of the sun and other stars with the more recent developments of the atomic theory as suggested by chemical and electrical phenomena observed in our labora-