

the present planets; but by analogy with the many nebulae which have become known in the last fifty years, it is now thought more probable that the planets originated in special points of condensation of the nebula. Comparisons of the spectra of the comets and nebulae with those of meteors led Sir Norman Lockyer to the view that these bodies were made up of swarms of meteors whose temperature was raised by impact among themselves; and he contended that the solar system had its origin in such a swarm. Prof. George H. Darwin showed that such a swarm would probably act practically like a mass of gas and that the solar system under this hypothesis would develop in exactly the same way as under the hypothesis of a gaseous origin, a high temperature being caused by the impact of the meteors analogous to that produced by the contraction of the gas. This modification of the nebular hypothesis does not require any material change in the history of the solar system. As contraction and condensation proceeded, the ancestors of the planets became hotter and hotter, and finally reached a stage like that of our present sun; as they became still denser, their power of condensation diminished, and their comparatively small masses have allowed them to cool sufficiently to become solid, though the immense sun still retains enough heat to keep it in a gaseous or liquid state. In the case of the earth, as it continued to cool it is probable that the solid rock first formed at the surface, but on account of its greater density, sank through the underlying liquid, and gradually built up a solid foundation from the center to the surface. The very small conductivity of rock for heat has only allowed a very thin shell of the earth near the surface to cool appreciably below the temperature at which it first solidified. This view has been largely strengthened by the calculations of Lord Kelvin, who, assuming that heat had not been developed within the earth since its solidification in sufficient quantities materially to alter the temperature gradient near the surface, showed that the well-known increase of temperature underground could only be accounted for on the supposition that the earth was at one time hot enough to be liquid. Within a few years Prof. T. C. Chamberlain has advanced the suggestion that the earth was built up by the accumulation of meteors which fell at such a slow rate that the heat of impact was dissipated *pari passu*, and that the internal heat of the earth is due to the compression of the earth under the weight of its own parts. Still more recently Prof. E. Rutherford has suggested that the internal heat is produced by the radio-active substances distributed throughout the earth, and the Hon. R. J. Strutt has shown that it is only necessary for these substances to be distributed to a depth of 45 miles with the density they have at the surface to account for the observed heat. The last two