

closely in position with the unknown bright lines in the nebular spectrum. We seem to be, with all the recent developments in radio-activity and the ultimate constitution of matter, on the eve of most important discoveries and generalizations not only in astronomy but in its sister sciences, physics and chemistry. Notwithstanding the diversity of composition indicated, it is believed that all these bodies contain the same elements, our terrestrial substances, and that only the spectra of the elements appear which are most easily produced by the particular forms of energy in action. It is not probable that the luminosity is produced by heat, for the enormously extended and attenuated matter of the nebulae must be at a very low temperature; it is rather a sort of luminescence, perhaps due to electrical action or to some form of radio-activity.

We have in the nebulae, according to the practically universal belief of scientific men, the primal form of matter, the material from which suns and worlds are made. From this world stuff, if I may use the term, we can trace the evolution, following simple and well known laws, to suns and stars in all their stages, to planets, comets and all the heavenly host. Further than this also, though this is the province more particularly of your science, following also other simple and well known laws, the gradual development of life on planets such as ours from the lower to the higher forms can equally well be traced.

In the tracing of this evolution in the heavens, it must not be for a moment supposed that it can be followed in any one star, any more than that the changes in living organisms can be detected in one generation. Stellar development is so inconceivably slow that it is very doubtful whether any change could be detected in a million years. But we have in the sky so rich a field for observation, such a great number of stars in all stages of their development, that by the aid of the spectroscope and by data obtained in numerous other ways it is possible to arrange in orderly sequence the process of evolution. If we suppose ourselves in an oak forest, though we could not expect to see the growth of any one oak from the acorn and seedling through small and large to a fully developed tree, and then through the process of decay to a crumbling log, yet we would have no difficulty, owing to the examples in all stages of growth around us, in correctly tracing and arranging the development.

Let us begin then with our nebula, whether gaseous or of finely divided particles does not matter, as, by the theory of the chemical unity of the cosmos, there are all the terrestrial elements present or perhaps, to be more precise, at least matter out of which all terrestrial elements may appear. It is practically certain that this matter is extremely attenuated or