

in which human caprice could have intervened. We are not romancing; we argue from cause to effect.

This is the way reasoning leads us:—Following the course of cooling backward, we arrive at a time such that water could not have existed on the earth. All the water of the earth must have been vapor or gas suspended in the atmosphere. At a time when no ocean had existed, no ocean-sediments had been deposited, all those rocks which have resulted from marine sedimentation were yet non-existent. The earth had probably a solid surface of some kind; but to emit heat sufficient to hold all the water of the world in an uncondensed state, the temperature of the surface must have been high—perhaps a glowing temperature.

But even here we are in the midst of a cooling process. Why not? Who can affirm that the world began to exist as a red-hot body? You know that red-hot matter may be made white-hot; and then by increase of heat, may be rendered liquid. We must trace this history back to a *molten* world.

Is there now any ground for refusing to trace the history farther back? This is a *cooling* process. There is no certain beginning for a cooling process except in a temperature so high that the heated matter exists as a mere vapor, or perhaps gas. There is no known remoter *condition* of matter, though we may conceive the temperature indefinitely high. It is, let us say, the remotest *condition* which we seek. Now all terrestrial substances are capable not only of fusion, but of volatilization. Iron and the other metals have been reduced to vapor. So, by reversing conditions, all gases may be liquefied and then consolidated. Carbonic acid, oxygen, nitrogen, chlorine, have been made solid. The form under which matter exists is a circumstance depending on temperature and pressure. There is no inherent improbability that all the matter of the world was once so heated as to exist in the form of vapor, or even of gas. Before our eyes worlds are existing in those states.

We should distinguish between vapor and gas. Gas is dry, like atmospheric air—like steam in the boiler; vapor is com-