

matter to have been infinitely dispersed, and assumes that all the heat ever existing in the contracting mass arose from the process of contraction. Of course, if the sun's matter—in other words, the matter of our primitive nebula—did *not* extend an infinite distance, the time for contraction would be shortened. He says a temperature permitting the existence of water on the earth would have been reached ten million years ago.

Professor Newcomb calculates further, that the sun in its process of cooling will reach a darkened or planetary state in twelve million years. So the whole life-time of the sun from infinitely expanded fire-mist to final darkness, spans only thirty million years.

Sir William Thomson has calculated the time required for the earth to cool from incipient incrustation to its present state. He thinks it would not exceed eighty million years. Rev. O. Fisher, in making the same calculation deduces thirty-three million years. These estimates do not cover precisely the same stage of cooling as either of Newcomb's, but the numbers appear to be relatively higher.

Another way of getting at the length of any particular period of the world—for instance, the time elapsed since the close of the Tertiary—is first to compute the relative duration of the different ages on the basis of thickness of formations, and then divide some assumed total age in the same proportion as the relative ages. To make this plainer: A formation two hundred feet thick has probably consumed more time than a formation one hundred feet thick. We do not know whether the rate of accumulation was the same for the two formations, but we must assume it the same, if the materials are the same; if however, one is of limestone and the other of fragmental materials (sand, pebbles, clay) we may assume the rate of accumulation five times as great for the latter as for the limestone. Thus the formation one hundred feet thick, of limestone would be equivalent in time to 500 feet of sandstone. Now, we have carefully studied the thickness of all the formations, making due allowance for all the limestones. We