

ment of translation in space, it is possible that in some former period the earth may have passed through regions of the universe which communicated heat instead of abstracting it.

We shall first notice the speculations which relate to external sources of heat and cold.

The variability of solar heat, as bearing on geological problems, has been investigated by Sir John Herschel. It is known that the major axis of the earth's orbit is invariable, but that the minor axis is subject to considerable change in a long period of time, though the *limits* of the *variation* of excentricity which this produces in the earth's orbit are unascertained. This excentricity is at present, and has been for ages beyond the reach of history, on the decrease, because the minor axis of the earth's elliptic orbit is continually lengthening. The limit of this elongation is now nearly reached, for the orbit has become nearly circular.

It must be very obvious that the amount of solar heat received on the earth (the major axis of the orbit being constant) diminishes as the minor axis is elongated, and, therefore, the earth's heat derived from the sun has been through all historic time, and is at this moment, *on the decrease*. The quantity of solar heat received on the earth, is, in fact, inversely proportional to the length of the minor axis of the orbit; and were the limits of the variation of this axis calculated (which would be excessively laborious), the extreme change of climate from this cause might be known. Taking, however, the extreme measures of excentricity, which occur in our planetary system (Juno and Pallas for example), as *possible* in the case of the earth, Sir J. Herschel deduces from calculation that the utmost difference of mean solar radiation might amount to about three per cent., a quantity certainly very small, and altogether inadequate, except by a peculiar combination of favourable circumstances, to account for the changes of climates established by geological observations. Until the calculation alluded to be actually made, it