

fore, Mr. Darwin's hypothesis be accepted, we must conclude either that it does not necessarily involve such violent superficial operations as he supposes, or that even the oldest sedimentary formations do not date back to a time when the influence of increased rotation could make itself evident in sedimentation, that is to say, on Mr. Darwin's hypothesis, the most ancient fossiliferous rocks cannot be as much as 57,000,000 years old.

§ 8. **Climate in its Geological Relations.**—In subsequent parts of this work data will be given from which we learn that the climates of the earth have formerly been considerably different from those which at present prevail. A consideration of the history of the solar system would of itself suggest the inference that, on the whole, the climates of early geological periods must have been warmer. The sun's heat was greater, probably the amount of it received by the earth was likewise greater, while there would be for some time a sensible influence of the planet's own internal heat upon the general temperature of the whole globe.³⁶ Although arguments based upon the probable climatal necessities of extinct species and genera of plants and animals

data, pushed his conclusions to such an extreme as to call in the agency of tides more than 600 feet high in early geological times. In repudiating this application of his results, Mr. Darwin (*Nature*, xxv. p. 213) employs the argument I have here used from the absence of any evidence of such tidal action in the geological formations, and from the indication, on the contrary, of tranquil deposit.

³⁶ Lord Kelvin (Sir William Thomson) believes that the hypothesis that terrestrial temperature was formerly higher by reason of a hotter sun "is rendered almost infinitely probable by independent physical evidence and mathematical calculation." (*Trans. Geol. Soc. Glasgow*, v. p. 238.) Prof. Tait, however, has suggested, that the former greater heat of the sun may have raised such vast clouds of absorbing vapor round that luminary as to prevent the effective amount of radiation of heat to the earth's surface from being greater than at present; while on the other hand, a similar supposition may be made with reference to the greater amount of vapor which increased solar radiation would raise to be condensed in the earth's atmosphere. "*Recent Advances in Physical Science*," 1876, p. 174.