CHAPTER VII.

FARTHER EXAMINATION OF THE QUESTION AS TO THE ASSUMED DISCORDANCE OF THE ANCIENT AND MODERN CAUSES OF CHANGE.

On the causes of vicissitudes in climate — Remarks on the present diffusion of heat over the globe — On the dependence of the mean temperature on the relative position of land and sea — Isothermal Lines — Currents from equatorial regions — Drifting of icebergs — Different temperature of Northern and Southern hemispheres — Combination of causes which might produce the extreme cold of which the earth's surface is susceptible — Conditions necessary for the production of the extreme of heat, and its probable effects on organic life.

*Causes of vicissitudes in climate.** — As the proofs enumerated in the last chapter indicate that the earth's surface has experienced great changes of climate since the deposition of the older sedimentary strata, we have next to inquire how such vicissitudes can be reconciled with the existing order of nature. The cosmogonist has availed himself of this, as of every obscure problem in geology, to confirm his views concerning a period when the planet was in a nascent or half-formed state, or when the laws of the animate and inanimate world differed essentially from those now established; and he has in this, as in many other cases, succeeded so far, as to divert attention from that class of facts, which if fully understood, might probably lead to an explanation of the phenomena. At first it was imagined that the earth's axis had been for ages perpendicular to the plane of the ecliptic, so that there was a perpetual equinox, and uniformity of seasons throughout the year; — that the planet enjoyed this "paradisiacal" state until the era of the great flood; but in that catastrophe, whether by the shock of a comet, or some other convulsion, it lost its equal poise, and hence the obliquity of its axis, and with that the varied seasons of the temperate zone, and the long nights and days of the polar circles.

When the progress of astronomical science had exploded this theory, it was assumed, that the earth at its creation was in a state of fluidity, and red hot, and that ever since that era it had been cooling down, contracting its dimensions, and acquiring a solid crust, — an hypothesis hardly less arbitrary, yet more calculated for lasting popularity; because, by referring the mind directly to the beginning of things, it

* The theory proposed in this and the following chapters, to account for former fluctuations of climate at successive geological periods, agrees in every essential particular, and has indeed been reprinted almost verbatim from that published by me twenty years ago in the first edition of my Principles, 1830. Its originality was recognised by Sir John F. W. Herschel in his Discourse on Natural Philosophy, published in 1830. In preceding works the gradual diminution of the earth's central heat was almost the only cause assigned for the acknowledged diminution of the superficial temperature of our planet. I am not aware that any formidable objections have yet been made to my views respecting the predominant influence of changes in physical geography in bringing about all former fluctuations in climate, both local and general. The remarks of an ingenious German critic on this subject will be fully replied to in the next chapter: see p. 125.