ing must in all geological times have greatly exceeded, as it certainly does at present, the denudation caused by atmospheric action at the equator, and must have tended to increase the disposition to equatorial collapse occasioned by retardation of rotation.[1]

While such considerations as those above referred to tend to reduce the practical importance of Mr. Croll's theory, on the other hand they tend to remove one of the greatest objections against it—namely, that founded on the necessity of supposing that glacial periods recur with astronomical regularity in geological time. They cannot do so if dependent on other causes inherent in the earth itself, and producing important movements of its crust.

Sir Robert Ball has in a recent work very ingeniously improved this theory by showing that Croll was mistaken in assigning equal amounts of heat to the earth, as a whole, in the periods of greater and less eccentricity. This would tend to augment the effect of astronomical revolutions as causes of difference of temperature; but has no bearing on the more serious geological objections to the theory in question.

A fatal objection, however, to Croll's theory, the force of which has been greatly increased by recent discoveries, is that the astronomical causes which he adduces would place the close of the last Glacial period at least 80,000 years ago, whereas it is now certainly known from geological facts that the close of the last Glacial period cannot be older than about an eighth or a tenth of that time. This difficulty seems to have caused the greater number of geologists, specially acquainted with the later geological periods, to regard this theory as quite inapplicable to the facts.

[1] Croll, in "Climate and Time," and in a note read before the British Association in 1876, takes an opposite view; but this is clearly contrary to the facts of sedimentation, which show a steady movement of *débris* toward the south and south-west.