

hemisphere as far as the Tropic of Cancer. The result is that all the great equatorial currents of the ocean are impelled into the northern hemisphere, which thus, in consequence of the immense accumulation of warm water, has its temperature raised, so that ice and snow must to a great extent disappear from the arctic regions. In the prevalence of the converse conditions, the arctic zone becomes clad in ice, and the southern has its temperature raised.

At the same time, according to Croll's calculations, the accumulation of ice on either pole would tend, by shifting the earth's centre of gravity, to raise the level of the ocean and submerge the land on the colder hemisphere. Thus a submergence of land would coincide with a cold condition, and emergence with increasing warmth. Facts already referred to, however, show that this has not always been the case, but that in many cases submergence was accompanied with the influx of warm equatorial waters and a raised temperature, this apparently depending on the question of local distribution of land and water; and this in its turn being regulated not always by mere shifting of the centre of gravity, but by foldings occasioned by contraction, by equatorial subsidences resulting from the retardation of the earth's rotation, and by the excess of material abstracted by ice and frost from the arctic regions, and drifted southward along the lines of arctic currents. This drifting 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.\*

While such considerations as those above referred to

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\* 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 southwest.