

in 'Climate and Time' it is shown that, but for the Gulf Stream and other currents, London would have a mean annual temperature  $40^{\circ}$  lower than at present.

"But there is still another cause which must be noticed—a strong undercurrent of air *from* the north implies an equally strong upper current *to* the north. Now if the effect of the undercurrent would be to impel the warm water at the equator to the south, the effect of the upper current would be to carry the aqueous vapor formed at the equator to the north; the upper current, on reaching the snow and ice of temperate regions, would deposit its moisture in the form of snow; so that it is probable that, notwithstanding the great cold of the glacial epoch, the quantity of snow falling in the northern regions would be enormous. This would be particularly the case during summer, when the earth would be in the perihelion and the heat at the equator great. The equator would be the furnace where evaporation would take place, and the snow and ice of temperate regions would act as a condenser.

"The foregoing considerations, as well as many others which might be stated, lead to the conclusion that, in order to raise the mean temperature of the globe, *water* should be placed along the equator, and not *land*, as was contended by Sir Charles Lyell and others. For if land be placed at the equator, the possibility of conveying the sun's heat from the equatorial regions by means of ocean currents is prevented." <sup>45</sup>

The astronomical theory in explanation of former great differences of terrestrial climate has recently been illustrated and enforced by Sir Robert Ball, who, while strengthening the general arguments in its favor, especially insists upon the existence of an important law in the distribution of solar heat on the earth's surface, which he thinks has been hitherto overlooked. He remarks that the original state-

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<sup>45</sup> That climate, however, may be considerably affected by changes, such as are known to have taken place in the distribution of land and sea, must be frankly conceded. This has been recently cogently argued by Mr. Wallace in his "Island Life," 1880. Mr. Croll's views, summarized above, have been adversely criticised by Prof. Newcombe, for whose papers and Dr. Croll's replies see Amer. Journ. Science, 1876, 1883, 1884, and the work by the latter writer, "Discussions on Climate and Cosmology," already referred to.