

It appears clear, however, from what we know of the tertiary fossils of Europe—and I believe the same will hold true in North America—that many species of testacea and some mammalia, which existed prior to the glacial epoch, survived that era. As European examples among the warm-blooded quadrupeds, the *Elephas primigenius* and *Rhinoceros tichorinus* may be mentioned. As to the shells, whether freshwater, terrestrial, or marine, they need not be enumerated here, as allusion will be made to them in the sequel, when the pliocene tertiary fossils of Suffolk are described. The fact is important, as refuting the hypothesis that the cold of the glacial period was so intense and universal as to annihilate all living creatures throughout the globe.

That the cold was greater for a time than it is now in certain parts of Siberia, Europe, and North America, will not be disputed; but, before we can infer the universality of a colder climate, we must ascertain what was the condition of other parts of the northern, and of the whole southern, hemisphere at the time when the Scandinavian, British, and Alpine erratics were transported into their present position. It must not be forgotten that a great deposit of drift and erratic blocks is now in full progress of formation in the southern hemisphere, in a zone corresponding in latitude to the Baltic, and to Northern Italy, Switzerland, France, and England. Should the uneven bed of the southern ocean be hereafter converted by upheaval into land, the hills and valleys will be strewn over with transported fragments, some derived from the antarctic continent, others from islands covered with glaciers, like South Georgia, which must now be centres of the dispersion of drift, although situated in a latitude, agreeing with that of the Cumberland mountains in England.

Not only are these operations going on between the 45th and 60th parallels of latitude south of the line, while the corresponding zone of Europe is free from ice; but, what is still more worthy of remark, we find in the southern hemisphere itself, only 900 miles distant from South Georgia, where the perpetual snow reaches to the sea-beach, lands covered with forests, as in Terra del Fuego. There is here no difference of latitude to account for the luxuriance of vegetation in one spot, and the absolute want of it in the other; but among other refrigerating causes in South Georgia may be enumerated the countless icebergs which float from the antarctic zone, and which chill, as they melt, the waters of the ocean, and the surrounding air, which they fill with dense fogs.

I have endeavored in the "Principles of Geology," chapters 7 and 8, to point out the intimate connection of climate and the physical geography of the globe, and the dependence of the mean annual temperature, not only on the height of the dry land, but on its distribution in high or low latitudes at particular epochs. If, for example, at certain periods of the past, the antarctic land was less elevated and less extensive than now, while that at the north pole was higher and more continuous, the conditions of the northern and southern hemispheres might have been the reverse of what we now witness in regard to climate, although the