

had scored a ravine which split the land. The streams were inaccessible and dwarfed, and their availability for human uses seriously impaired. There must be a general repair of the surface before it would meet the demands of a being of such enterprise and resources as man was destined to be.

The end so necessary was accomplished without departure from the fundamental method of all the previous history of the continents. Uplift and subsidence accomplished the glacial renovation which now approached. We have already studied many indications of glacier action. We have concluded (Talk III, which should now be reviewed) from the inductive evidence, that a continental glacier has some time, brooded over the land, and we have made some observations on actual glaciers (Talk IV). We will now attempt to sketch the glaciation of a continent, from a historical point of view.

The mild climate of the middle and later Tertiary time which had prevailed as far north as Disco, on the coast of Greenland, and Melville and Bennett Islands in the Arctic Ocean, had already been succeeded by a colder one. The cause of the change remains an unsolved problem. The later invasion of severe cold, throughout the northern temperate zone, is generally ascribed to northern elevation; but there is much reason to suppose it the result of certain astronomical changes, and to hold, also, that this was but one of a succession of glacial visitations. Whatever the cause, the reality of the glacier period can not be questioned. The area of perpetual snow had extended its limits from the arctic zone into northern America. In the middle latitudes, an unwonted chill was already experienced in the atmosphere. Successive winters grew more and more severe, and the snow lingered always later in the spring. There were deep ravines where it survived the summer. With continued depression of mean temperature, the winter snows still further delayed their departure. The forest was changed. One by one, the species suited to a milder climate perished; and frost began to brown foliage in a zone which had witnessed a state of perpetual verdure. Year by