

as these in geological and modern times is an important but much-neglected subject in geology.*

3. BENCHES.—On the banks of many rivers of the western slope of the Rocky Mountains are found curious terrace “benches,” not unlike in general appearance to the famous “parallel Roads of Glen Roy,” but (without stirring up such debateable ground) altogether different in character. These benches are always found to the east of the Cascade Mountains, and are well seen at Lilloet, on Fraser River, in British Columbia. Lord Milton and Dr. Cheadle figure them in their ‘North-West Passage by Land,’ as seen at this point. These benches are generally flat and of a good soil, though, as everywhere else to the east of the Cascades, very dry. From what I have already said in reference to the formation of Cañons, I need scarcely enter into any long explanation of their origin, as it is at once self-evident, if the explanation I have given of the formation of the clefts just named is correct. In a word—these benches were formed when the Fraser (or other river) was a lake, only emptied by some little streams (or a stream), now and then gathering strength, and as barrier after barrier was broken down, these benches mark the successive stages of the lowering of the lake’s margin, until it finally sunk into the channel of the river. I have supposed these breaks to have occurred at intervals, as some portion of the wall of the gorge gave way. This level may have continued for years, it may be centuries, when another break happened, and so on; the height of the “bench” marking the character of the gap made each time. These breaks may have been (indeed no doubt were) assisted by the volcanic disturbances, which at a comparatively late period, seem to have riven all the country in that region, and volcanoes in the mountains through which these rivers flow were doubtless the active agents of these disruptions.

The same “benches” can be seen more or less distinctly wherever the physical contour of the country is the same, or where a river is barred from reaching the sea, under similar conditions to what the Fraser bears to the Cascade range. That these benches were not connected with glacier action is shown (among other proofs) by the rich character of the soil, and the total absence of *morainès*, or other marks of glacier action.

* The late Professor Edward Hitchcock, of Amherst, U. S. America, has published a memoir “On the Erosions of the Earth’s Surface, especially by Rivers,” in ‘The Smithsonian Contributions to Knowledge,’ vol. ix.; but this treatise I am unable, in the place where this paper is written, to refer to,—a matter which I the more regret as I am convinced, from a familiar acquaintance with many of the venerable author’s other researches, that it must contain many strikingly original observations.