

These broadly marked "benches" ought not to be confounded with some terraces found on various rivers, such as the Columbia, &c., to the west of the Cascades. These terraces are probably connected with glacier action when the mouth of that river was hollowed for more than a hundred miles of a great and uniform depth. The channel of the Golden Gate (San Francisco) has a maximum depth of nearly 50 fathoms, being greatest immediately in the line of the axis of the chain, through which it is cut, while the bar without, and the bay within, are silted up to within less than 10 fathoms of the surface. The straits of Carquines, near the mouth of the Sacramento, have a maximum depth of 18 fathoms, and in the line of the range which bounds them an average depth of 14. Dr. Newberry* thinks that these phenomena are due to glacier action of a similar character to that which hollowed out the fjords; and on the whole there seems some reason to accept his theory, with reservations. In passing down the Columbia from the Dalles (Lat. $45^{\circ} 35' 55''$ N., Long. $120^{\circ} 55'$ W.) to the Cascades, a curious feature is seen, which though scarcely strictly coming under any of the headings of this paper, is yet interesting, as helping to explain some of the phenomena of bench and cañon. Under the water can be seen, standing upright and firmly rooted in the soil, the remains of a forest of *Abies Douglasii* (Lindl.). General Fremont noticed this in his voyage down the river, and attributed it to a landslip. This explanation may be easily proved to be erroneous, and must, I think, though generally received without investigation, give way to a totally different one. The vicinity of the Cascade exhibits marks of recent volcanic action and disturbance of the traps. The Indians even say that, at one time, the river used to flow under an archway, but that during an eruption of Mount Adams this bridge was thrown down, forming an island in the centre, and helping to give rise to the "Cascades." The effect of this would be to form a dam in the water, raising its waters above the scene of disturbance, and submerging the forest which grew down to its margin. The very recent date of this submergence is shown by the sound character of the wood. The "bench" is also well figured in the plate of the Cañon of Pucsee-que Creek (Oregon) in volume vi. p. 85 of the 'Pacific Railroad Surveys.'†

4. PRAIRIES.—The central portion of the American continent, as indeed of Asia and Africa (witness the great "Steppes" and the "Sahara") is almost treeless, and with a correspondingly

* 'Pacific Railroad Surveys,' vol. vi. p. 43.

† On this subject, see also Hector, in the 'Quarterly Journal of the Geological Society,' 1863, p. 399.