

The rivers there flow in ravines thousands of feet deep and hundreds of miles long, through vast table-lands of nearly horizontal strata. The Grand Cañon (ravine) of the Colorado River is 300 miles long, and in some places more than 6000 feet in depth. In many instances there are two cañons, the upper being several miles wide, with vast lines of cliff-walls and a broad plain between them, in which runs the second cañon as another deep gorge with the river winding over its bottom. The country is hardly to be crossed except by birds, so profoundly has it been trenched by these numerous gorges. Yet the whole of this excavation has been effected by the erosive action of the streams themselves.<sup>168</sup> Some idea of the vastness of the erosion of these plateaus may be formed from Fig. 123, the Frontispiece to this work, and the illustrations in Book VII.

In the excavation of a ravine, whether by the recession of a waterfall or of a series of rapids, the action of the river is more effective than that of the atmospheric agents. The sides of the ravine consequently retain their vertical character, which, where they coincide with lines of joint, is further preserved by the way in which atmospheric weathering acts along the joints. But where, from the nature of the ground or of the climate, the denuding action of rain, frost, and general weathering is more rapid than that of the river, a wider and opener valley is hollowed out, through which the river flows, carrying away the materials washed into it from the surrounding slopes by rain and brooks.

3. *Reproductive Power.*—Every body of water which,

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<sup>168</sup> For descriptions and figures of this remarkable region, see Ives and Newberry, "Explorations of the Colorado River of the West," 1861; J. W. Powell, "Exploration of the Colorado River of the West and its Tributaries," 1875; Captain Dutton, "Tertiary History of the Grand Cañon of the Colorado"; Monograph II. U. S. Geological Survey, 4to, 1882; and postea, Book VII.