

Buried river valleys.— Rivers of the Sierra Nevada, in Tuolumne County, California, that had their channels buried beneath lavas in the later Tertiary, afterward, in a comparatively short time, cut new channels through the thick lava stream and the underlying rocks to depths 1500 to 2000 feet below the old channels. (Whitney, 1865, 1879.) They hence are strong evidence of increased precipitation, as held by Whitney, and also, according to LeConte (1879, 1886), of increased elevation in the mountains; and both conditions characterized the Glacial period which was in progress during part or nearly all of the cutting. Like evidence of elevation exists also in the river channels of southern California beyond the limits of the lava-flood, as observed by LeConte (1886), who thence concludes that the elevation extended along the whole length of the Sierras.

The ultimate result of denudation over a continent is, as usually stated, the transfer of the mountains to the sea, bringing all to a nearly level plain. But the facts from Tahiti, explained on page 182, appear to show that the process would, as a general thing, first thin down the mountains to sharp peaks and ridges; and after this, the continuation of the thinning would ultimate in a general level—given time sufficient. The Adirondacks have stood ever since Archæan time, with the height probably never less than 5000 feet; and yet they are to a large extent in the Tahitian stage. But the streams of extensive drainage areas become to a greater or less extent *base-leveled*; and through the continued leveling work along them, with that of the minor tributaries, a wide region may be finally reduced approximately to a plain. Such a plain has been termed by W. M. Davis a *penepine*, from the Latin for *almost* and *plain*; for it may still have ledges of the harder rocks and other irregularities of surface. An elevation of the land, and other causes indicated above, may expose such regions to a new base-leveling.

The fluvial history of a country, it thus appears, may have great complexity, and require a large amount of study and an experienced judgment for its correct elucidation.

SUBTERRANEAN WATERS.

Water descends from the surface by gravity, filling all open subterranean spaces, and also the pores of the solid rocks. Its lower limit is determined by the earth's interior heat; and the lower limit of outward discharge, by a level not much below that of the ocean's surface. At greater depths, consequently, subterranean water may be that of early ages in geological history, and in part the sea water in which the deposits were made, more or less modified in its saline contents and their amount by long contact with the various rocks. Not only the waters of the rains and rivers thus take a downward way through the porous rocks, between their sloping layers and along all crevices, but also those of lakes, which are sources of permanent supply, and pre-eminently those of the ocean.