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What Made the Soil Rich.

John Muir

Geology of the County.

THIS county has never had a scientific geological survey and our information is rather restricted except for the mountain ranges and mining regions. The general topography and geological features indicate that this great valley has been the bed of a vast inland sea, whose tranquil waters for ages have received the wash and wear of the surrounding mountains, until at the lowest depression deposits of diluvium thousands of feet deep have been made, which have been superimposed by the present soil during the subsidence of the waters. The foothills also bear traces of having been water-worn by some mighty stream, and are covered by gravel, decomposed lava, and the humus of ages. From their bases the land gently descends, and does not lose its volcanic soil until reaching the general level of the plain. No great convulsion of nature has ever upheaved the valley from the peaceful condition the gradual subsidence of waters left it in, but it lies placid and serene as a sleeping child awaiting some event to waken it into life and action.

WHAT MADE THE RICH SOIL.

To the action of glaciers we owe the richness of the soils of the valley. The soil is made up of the rocks pulverized and carried down by the glaciers, and mingled with the lavas ground from the Sierras by other glaciers.

John Muir says of the Sierras: "They are everywhere marked and adorned with characteristic sculptures of the ancient glaciers that swept over this entire region like one vast ice-wind, and the polished surfaces produced by the ponderous flood are still so perfectly preserved that in many places the sunlight reflected from them is about as trying to the eyes as sheets of snow.

"God's glacial-mills grind slowly, but they have been kept in motion long enough to grind sufficient soil for any Alpine crop, though most of the grist has been carried to the lowlands, leaving the high regions lean and bare; while the post-glacial agents of erosion have not yet furnished sufficient available food for more than a few tufts of the hardiest plants, chiefly carices and criogonæ.

GLACIERS OF THE SIERRAS.

"At a distance of less than three thousand feet below the summit of Mount Ritter you may find tributaries of the San Joaquin and Owen's rivers, bursting forth from the eternal ice and snow of the glaciers that load its flanks; while a little to the north of here are found the highest affluents of the Tuolumne and Merced. Thus, the fountains of four of the principal rivers of California are within a radius of four or five miles.

"Could we have been here to observe during the glacial period, we should have overlooked a wrinkled ocean of ice continuous as that now covering the landscapes of North Greenland; filling every valley and cañon, flowing deep above every ridge, with only the tops of the fountain peaks rising darkly above the rock-encumbered waves like islets in a stormy sea—these clustered islets the only hints of the glorious landscapes now smiling in the sun. Now, in the deep, brooding silence all seems motionless, as if the work of creation were done.

"But in the midst of this outer steadfastness we know there is incessant motion. Ever and anon, avalanches are falling from yonder peaks. These cliff-bound glaciers, seemingly wedged and immovable, are flowing like water and grinding the rocks beneath them. The lakes are lapping their granite shores and wearing them away, and every one of these rills and young rivers is fretting the air into music, and carrying the mountains to the plains. Here are the roots of all the life of the valleys, and here more simply than elsewhere is the eternal flux of nature manifested. Ice changing to water, lakes to meadows, and mountains to plains. And while we thus contemplate nature's methods of landscape creation, and, reading the records she has carved on the rocks, reconstruct, however imperfectly, the landscapes of the past, we also learn that as these we now behold have succeeded those of the pre-glacial age, so they in turn are withering and vanishing to be succeeded by others yet unborn.

"Early one bright morning in the middle of Indian summer, while the glacier meadows where still crisp with frost crystals, I set out from the foot of Mount Tyndall, on my way down to Yo Semite valley. I had spent the past summer, and many preceding ones, exploring the glaciers that lie on the head-waters of the San Joaquin, Tuolumne, Merced, and Owen's rivers; measuring and studying their movements, trends, crevasses, moraines, etc., and the part they had played during the period of their greater extension in the creation and development of the landscapes of this Alpine wonderland."

PERIOD OF FIRE AND HEAT.

High up in the Sierra, granite or syenite mountains rise to an altitude of a little more than 8,000 feet above the sea level, leaving gorges between of fearful depth, the walls of which are often of ragged and bare rock. Sometimes the declivities of the mountains, and the valleys present extensive beds of detritus that may have been deposited when the mighty glaciers of the Sierra were melted—abundant evidence of glacial action being frequent at that altitude. The detrital deposits are of sedimentary lava, pebbles and boulders of the material of the primitive rocks, and sand. In some cases large beds of sand appear, and sometimes deposits of angular gravel, which have the look of ancient moraines.