

white ashes of the Dalles, but usually contains angular fragments of the underlying basalt. The presence of these white ash outliers, as well as the basaltic ones noticed in the Spokane and Chemikane valleys, furnish, as well, a measure of the enormous amount of denudation to which this country has been subjected in recent times. The basalt is of comparatively modern date, as it overlies Miocene Tertiary strata at Walla Walla and it is evident that the valleys of the Spokane and Chemikane had been excavated before its eruption, as the outliers are found at the lower levels as well as high up on the hillsides. The presence of marine infusoria in the white bluffs, necessitates a great amount of subsidence for their deposition—at least 2,500 feet at the Dalles—and it is probably during re-elevation that they have been removed from the Spokane plateau and that the terraced gravels of the higher valleys have been arranged in their present forms. After the removal of the ashes, the denudation of the basalt has probably been effected by the streams, as it is easily decayed away owing to its columnar structure. Very fine examples of these valleys of erosion are seen on the Yakima and Untenun (?). The latter, a small brook only about ten feet wide, is bounded by vertical walls about 500 feet high. Many old river courses are also found on this rock. The most important is the well-known Grande Conlée or old channel of the Columbia, which is fifty miles long, eleven wide at the north end, and bounded by nearly vertical cliffs 800 to 1,000 feet in height.

Erosion.

Courses of
rivers.

There is one curious feature in the eastern tributaries of the Columbia which is deserving of special notice. The Colville Mill River, the Pend D'Oreille and the Kootanie all flow in a generally northerly direction for the latter part of their courses, and force their passages into the Columbia over great obstacles;—thus the Colville Mill Stream has a fall of seventy feet over rocks about two miles above its mouth, the Pend D'Oreille presents a succession of step-like falls and rapids for about five miles above its mouth, and the Kootanie is not navigable at its northern end from similar obstacles. The watersheds between these streams, on the other hand, are almost imperceptible, not being marked by transverse rock-ridges or any salient feature in the north and south valleys. It may, therefore, be urged with a fair show of probability, that at some former period the two former rivers, and perhaps, also the latter, discharged their waters through the Spokane Valley, which, from its great size, far exceeding that of the Columbia at Colville, appears to have performed a more important office in the drainage of the country in former times than it does at present.

Mr. Gibbs, of the United States Commission, has suggested the probability of a similar change of drainage having taken place in the