

## CHAPTER XXVII

### FROM THE SADDLE MOUNTAINS TO THE PACIFIC OCEAN; *The Basalt Barriers, Topography, Erosion, Character of River, Cultivated Areas, Irrigation, Rainfall, Forests, Columbia River Highway*

I believe that the reader who has carefully followed my course has, at least a fairly accurate knowledge of the character of the Columbia River and the valley through which it flows from Canal Flat to Pasco; but there is still some description necessary to complete the picture to Astoria.

To get a thorough conception of the lower Columbia and its valley, as they appear today, it will be necessary to go back to a point above the Saddle Mountains, which are above Priest Rapids. With a good topographic map in hand it will be seen that the River in order to reach the Pacific Ocean had to find its way through three great barriers which were directly athwart its pathway—these do not include the Coast Range, which to my mind had nothing to do with the problem.

These barriers were at one time dams that backed the water behind them into great lakes with their surfaces many hundred feet above the present river level. The first of these were the Saddle Mountains; the second were where the Horse Heaven Hills on the west meet the hills on the south of the

Walla Walla River; and the third was the Cascade Range.

At the Saddle Mountains the hills adjacent to the River rise practically 1,000 feet above it, and through them a gap a mile wide, with sloping sides, has been made, of which the Columbia occupies but about 800 feet. A natural cleft may have existed here through which the waters of the lake found an outlet; but from the greater elevation of the mountains farther away, and the trend of the slopes, the indications are that a narrow neck and a depression between the summits had formed at this particular location, and being the lowest place, it was here that the pent-up water behind the barrier found a way to escape, the channel being gradually deepened by erosion.

At the Walla Walla River the hills on both sides of the Columbia form walls about 750 feet high, with a further gradual rise beyond that height. This indicates a depression somewhat similar to that at the Saddle Mountains but with a much greater distance across the neck. In this depression erosion has formed a gap from one-half to a mile wide with the River occupying most of the contracted portion. One would naturally expect to find rapids in this closely hemmed-in section, which extends for nine miles, but it is a peculiar feature of the Columbia that there are no obstructions in the channel or dangerous currents until the low shores of the Umatilla Plains are reached many miles below.

At the Cascade Range the lateral pressure that thrust up Mount Adams on the north and Mount

Hood on the south to their present height left between them a sag, or pass. Mount Adams has a height of 12,470 feet, and Mount Hood 11,225 feet. The backbone of the Cascade Range is not on a direct line between these two mountains but several miles to the west at the rapids of the Lower Cascades. Here the normal crest of the Range, if joined across where the break now exists, is about 2,500 feet above sea level, with a rapid increase in elevation, both ways from the River as the distance therefrom increases. There is evidence of deep erosion directly between the two mountain peaks, but the higher barrier to be surmounted must have been at the Lower Cascades, and at that point erosion commenced and did its greatest work. A singular condition exists, however, at the backbone of the Cascade Range, where one would expect, if anywhere, a great, narrow gorge between high, frowning cliffs. On the contrary while the steep, high slopes are near the River on the Oregon side the gap from their base to rising ground in Washington is one and one-third miles wide; another mile is required to attain a height of 500 feet, and it is two miles and one-quarter more before the 2,500 feet elevation is gained at Table Mountain which is supposed to have been the abutment of the Bridge of the Gods. The full distance across from the 2,500 contour on the south to the same contour on the north is four and one-half miles; indicating an immense width and depth of erosion, and the possibility of some other factor such as the splitting asunder of the mountain chain by vertical cleavage across its axis. It is true

that the Columbia is but a quarter-mile wide from the Upper to the Lower Cascades, but this width is between low walls, of but a few feet in height, scoured in the basalt of the River's bed, and the true walls are the mountain sides exterior to the low ones limiting the channel's width.

Above Table Mountain is an area about two miles wide and five miles long rising in a series of terraces to the 500 contour. On these terraces are about thirty small lakes, evidently all that is left of a former great lake.

The situation that was faced by the Columbia River through the Coast Range is not analagous to what it overcame at the three barriers above. Below the Sandy River erosion played little part in making a channel. Some great earth convulsion must have split asunder the hills from Tongue Point to the Pacific Ocean and the section westward of the Cascade Range became a great estuary of the sea, which has been filled in to its present condition of marsh and bottom land by detritus brought down and deposited by the Sandy, Willamette, and smaller rivers, and the Columbia itself; the Columbia only maintaining sufficient width and depth of channel to fulfil its mission of delivering up to the sea the accumulated water gathered along its course.

There is little doubt that the Columbia existed as a river long prior to the great lava flow that covered the surface of the country with a blanket of basalt, and which was of such a comparatively recent date that its occurrence has been handed down among the Indian tribes as one of their legends.

This being so makes it certain that the Columbia cut out the channel it now follows antecedent to the lava flow; and it must also have continued to exist as a river (although possibly in a superheated condition) during the time of volcanic activity, with much of the liquefied rock finding a way down the channel, partly filling it, as is pronounceably noticeable in many places, especially at Celilo Falls and the Grand Dalles; a conclusion confirmed by the fact that much of the waterway is a defined trench in the hard, igneous formation. Exposure of the material underlying the basalt, it is said, can be seen in some localities. I noticed sandstone just above Vancouver, at St. Helens, and Mount Coffin, and probably overlooked it in other places. It is claimed that sea-coral has been found at the Lower Cascades—a point the tides now reach—giving proof that an arm of the estuary at one time extended that far inland.

The deductions made in regard to the depth of erosion at the three barriers described are based on elevations as they now exist. If the River's channel was excavated antecedent to the lava flow, then, the thickness of the basalt blanket at the respective places represents a diminution of the depth of erosion by the amount of that material piled upon the original surface. Consequently, erosion by the flowing waters of the Columbia has not been as great as it seems; and the wearing-away of the basalt at the high elevations must have been due to weathering or other agencies than the River alone.

At Pasco the distance across the Columbia to the Kennewick shore is about a half mile, but below



there to the Upper Cascades the width is very variable—often a mile or more, where there are islands. Above the White Bluffs islands are of infrequent occurrence, but from there they are numerous all the way to Tongue Point, varying in character from little, rocky islets to great blocks of basalt, large, level areas well above high water, marshy slough and lake-filled expanses, and low tide-flats. The contraction of the River through the backbone of the Cascade Range to a quarter-mile has already been noted, but from a point about a mile below the town of Bonneville, Oregon, which is at the Lower Cascades, there is a continual, but irregular, increase in width to Cathlamet Bay, just above Tongue Point, where the distance from the Oregon to the Washington shore is ten miles. At Astoria this contracts to seven miles, and at the Narrows, just below Astoria, to five miles, expanding again to seven miles where the River and Ocean meet, broken, however, by a considerable island at the mouth of Baker's Bay, which is on the Washington side just behind Cape Disappointment.

As we travel down the surface of the River below Pasco we note the character of the land on either side. Until the hills at the Walla Walla River are approached, the shores are low and flat, being somewhat higher on the right, where they are the extension of the Kennewick district, and are gradually pinched off to a point by the encroaching Horse Heaven Hills. On the left is a great level plain—the Plains of the Columbia—extending eastward and enclosed by the Snake River and the Blue Moun-

tains. This is a great wheat-growing section, of which the City of Walla Walla, about thirty miles east of the Columbia River, and having a population of 16,000, is the capital.

Entering the hills at the mouth of the Walla Walla we notice that their comparatively level summits have been planted to grain, of which the yellow stubble is all that now remains; and that what low, flat ground there is at the base of the hills is too small in area for grain culture. Leaving the hills, we reach the Umatilla Plains, another grain section with an occasional small orchard. Below that the land rises into low, cultivated plateaus, and then becomes gradually ascending, broken, rounded foothills which merge into the rugged, forested slopes of the Cascade Mountains, which, culminating near Bonneville, then descend and terminate at the Sandy River. The low, alluvial valley then follows, and finally the tree-clad and generally gentler slopes of the Coast Range are penetrated and the ocean reached.

The land has been constantly somewhat higher on the north than on the south since the State of Oregon is entered, and while the low plateaus cease about at the town of Arlington, Oregon, they have already changed into hills about twelve miles farther upstream on the Washington side. From these points the shores of the Columbia become frequently rough and broken, often high and precipitous, all the way to Sandy River. The structure of the hills is exposed almost everywhere, and we notice that they rise in terraces, somewhat inclined to the horizontal, and that the number of these terraces is almost in-

variably three. Many of the spurs of the hills reach the River in a succession of narrow, rocky points, necessitating short tunnels on the railways paralleling the stream. At one place on the North Bank Road I counted five tunnels in a half mile. The ridges frequently terminate in steep, frowning cliffs many hundreds of feet high, which either rise directly from the water's edge or are back short distances from the shore. In most instances the railways have found ample ground for their roadbeds below these cliffs, but frequently tunneling had to be resorted to.

In spite of the rugged nature of the country between Arlington and the Sandy River there is much tillable land. There are many nooks in the mountains and occasional places on the shores where farming is done, and the many tributary rivers have their own fertile valleys where crops are raised and dairying is carried on. Below the Sandy River conditions are more favorable than they are above, both for the raising and disposal of farm products.

From Snake River to The Dalles City is known as the semi-arid district. The average total annual precipitation at the mouth of Snake River is 9 inches, which increases to 15 inches at The Dalles City. For other crops than grain this rainfall is supplemented by irrigation with water from available sources in the hills. West of The Dalles City the increase in rainfall is rapid. At Hood River it is 36 inches, between the two mountain ranges 40 inches, and in the vicinity of Astoria from 75 to 100 inches.

The frequent current-operated ferries and private



pumping plants which add so much to the appearance and life of the Columbia below the Boundary are no longer seen below Pasco. The River had become too wide for the satisfactory operation of boats from a stretched-across cable, and power-propelled boats are the only kind practicable, and are in use at some of the towns. I counted seven of these, of which the last was at Kalama. The only pumping plants utilizing the River's water are municipal ones in the semi-arid section. After the Cascade Range is entered an abundance of water, for all purposes, is furnished by mountain streams.

The Columbia River Highway has been briefly referred to. The Oregonians claim it to be "America's Greatest Highway," and is certainly an object of admiration, and also of scenic interest, especially as viewed from the surface of the Columbia, whose shore it skirts on the south, from Umatilla to Rooster Rock and also as Astoria is approached. One sees it climbing an ascent on one side of a ridge and descending on the other, clinging to the face of cliffs hundreds of feet above their base, winding its way in loops to the crest of hills, passing through virgin forests, boring its way with tunnels, crossing the rivers and ravines on great masonry bridges and viaducts, and guarded from the danger of dashing off its sides by substantial parapet walls of concrete.

The following description is taken almost entirely from *The Roadrunner*, a magazine published by the Standard Oil Company:

"The Columbia River Highway is 340 miles long, extending from Astoria to Pendleton, Oregon. It con-



—Photo. by Frenchie

MITCHELL POINT TUNNEL

sists of 200 miles of asphaltic concrete paving from Astoria to The Dalles, and 140 miles of gravel and crushed rock surfacing from The Dalles to Pendleton. The construction of some of the paved parts of the highway was probably the most difficult highway construction ever undertaken in the United States. For many miles it was necessary to construct the roadbed upon the rugged, nearly vertical walls of the Columbia River Gorge, necessitating that the road be carved out of solid rock. In many places rock bluffs overhang the finished highway, and at six places tunneling was done through rock points which could not otherwise be passed. At Mitchell Point the tunnel is in the form of an arcade with four openings, or windows, overlooking the Columbia River. For almost its entire length the highway presents a series of bridges, rock walls, overhanging bluffs, and tunnels. It has a width of 24 feet, and has no curve with a radius shorter than one hundred feet, or gradient steeper than five per cent. It intersects with the Pacific Coast Highway at Portland."

Little can be said about the minerals of the country contiguous to the lower Columbia River. About the only rock one sees is basalt, and that carries no ores of any kind; and there are no auriferous gravels. I was unable to learn of any productive mines either on the Washington or Oregon side, but was informed that copper and lead had been found near Umatilla, and that there is iron ore in the Cascade Range in Multnomah County, and near St. Helens. Indications of mineral oil are very pronounced near Astoria and when I was there a well was being drilled but was not yet on production.