Part III:
Geology and the Emigrant

by Charles W. Martin, Jr.*

Rivers are mentioned in nearly all journals, of course, but usually as landscape features rather than as agents of erosion. Many emigrants described the mud and sand in the Platte River, but few noted that it was material eroded from upstream and destined to be deposited somewhere downstream. James Clyman did at Scotts Bluff when he remarked, "the main Bulk now forming the low grounds have been carried away with the water which opperation is still in active opperation."[27] Riley Root demonstrated an even greater understanding of the erosive power of rivers. He said of the Missouri:

> Yet notwithstanding the amount of soil received from year to year from above, that river carries outward into the ocean more than it receives, and thereby causes a lowering of its bed, though not visible for ages, yet gradually and slowly has it worn away the earth to its present conditions.[28]

Root clearly recognized the ability of rivers to erode their valleys. Still, most emigrants, though able to accurately describe rivers, failed to recognize their geologic importance. As Major Osborne Cross said of the Platte:

> . . . although it is large, it is but a drain for the melting snows from the mountains, and can only be remarkable for possessing more sand bars, less depth of water, and more islands half covered with useless timber than any other stream of its size in the country.[29]

Erosion of weathered rock material is an important landscape forming process, but along many parts of the trails volcanism and mountain building have occurred so recently that they are the dominant factors in landscape formation. However, between Ash Hollow and Scotts Bluff, rapid erosion of the soft sedimentary layers is responsible for the landforms that so many emigrants described. Joseph Stuart accurately observed that:

> The whole country about here appears to have been an extensive plain hundreds of feet above present levels, and as if the soft marl and earthy limestone of which it was composed had been washed away, leaving these remnants to show its former elevation.[30]

William Kelly thought that Chimney Rock

27. Clyman, p. 89.

28. Riley Root, *Journals of Travels from St. Joseph to Oregon* (Oakland, Calif.: Biobooks, 1955), p. 2

29. Maj. Osborne Cross, *Journal in The March of the Mounted Riflemen*, ed. Raymond W. Settle (Glendale, Calif.: Arthur H. Clark, 1940), p. 65.

30. Joseph A. Stuart, *My Roving Life, v. 1 (Auburn, Calif., 1895), p. 34.*

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Deformed sedimentary rocks east of La Prele Creek Wyoming. Tilted sedimentary layers mentioned by many emigrants incline downward to the left and form the sloping surface of the mountains in the background.

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stood in front of the adjoining cliffs, "From the wearing and wasting effects of the watery storms that prevail in those forlorn regions."[31] Near Courthouse Rock, George Gibbs could see "other hills in the course of being isolated from their ranges," and thought "The geological processes at work among those buttes are in fact of the highest interest."[32] Many recognized that erosion was taking place rapidly. At Castle Rock, Dr. Charles Parke said, "Great masses are constantly crumbling and falling to the bottom from the effects of wind and rain."[33] Chimney Rock was of special concern, and among emigrants who commented on it were Charles Gould who said it "is fast crumbling away,"[34] and David Dewolf who thought that "no doubt in a few years [it] will be entirely washed away."[35] Indeed, some wondered why the bluffs still remained. Henry Carleton pondered:

> If they were composed of more enduring substances than that part which has been gnawed off by the tooth of time, and transported away, there would be a cause easily understood why they remain:—but such is not the case.[36]

Of all the features along the trail, perhaps none evoked as many geological descriptions and explanations as Devil's Gate, the strange canyon through the end of a granite ridge. Nearly all of the geological ideas of the time about volcanism, mountain building, erosion, and the origin of valleys are included in emigrants' comments about Devil's Gate. Its location, barely one-half mile from the end of the ridge, troubled some.

31. William Kelly, *Across the Rocky Mountains from New York to California* (London: Sims and McIntyre, 1852), p. 110.

32. George Gibbs, *Journal in the March of the Mounted Riflemen*, ed. Raymond W. Settle (Glendale, Calif.: Arthur H. Clark, 1940), p. 319.

33. Dr. Charles R. Parke, "Journal of a Trip Across the Plains," June 9, 1849, ms., Huntington Library, San Marino, Calif.

34. Charles Gould, Diary in *The Boston-Newton Company Venture*, compiled by Jessie Gould Hannon, (Lincoln, Nebr.: University of Nebraska Press, 1969), p. 121.

35. David Dewolf, "Diary of the Overland Trail and Letters of Captain David Dewolf," *Transactions Illinois State Historical Society* (1925), p. 195.

36. Carleton, p. 234.

Devil's Gate, Wyoming, a geological curiosity described in many emigrant diaries.

A. J. McCall stated:

> It is difficult to account for the river having forced its passage through rocks at this point when a few rods south is an open level plain over which the road passes.[37]

Franklin Starr described Devil's Gate as "where the river runs through the hill instead of going a little way arun."[38] Dr. Charles Parke, though bothered by the location, offered an explanation:

> Here agin the traveler is at his wits end Why and when this break through Solid grainte rock 400 feet high and 100 wide when the water could easily have gone round the point of mountain only a few hundred yards distance— Possibly one day it did. While there was fire below, but when the fire went out the crust cooled So rappidly, this Mountain rib contracted & cracked in twain allowing the stream a shorter cut to the valley below.[39]

Volcanic activity was a common explanation for Devil's Gate. Charles Gray said, "Some volcanic irruption no doubt caused it,"[40] and Alonzo Delano wrote, "It was evidently done by volcanic force."[41] Dan Gelwicks was a little less certain:

> The Sweetwater runs to a point and is apparent[ly] blocked up by the high range of mountains which hems it in on both sides but by some volcanic eruption or unexplained cause, it cuts its way through the solid rock that hems it in, and rolls on in placid serenity.[42]

A. J. McCall said, "It rather seemed to me that the hill had been rent by an earthquake."[43] Isaac Wistar agreed, "it is simply an earthquake split or cleft, carrying about the same width from top to bottom, suggesting no idea of its having been gradually cut out by water."[44]

But others preferred water, one way or

37. A. J. McCall, "The Great California Trail in 1849, Wayside Notes of an Argonaut," reprinted from the *Steuben Courier*, Bath, N. Y. (1882), p. 45.

38. Franklin Starr, Diary, June 21, 1849, ms., Illinois State Historical Library, Springfield, Ill.

39. Parke, p. 41.

40. *Off at Sunrise, The Overland Journal of Charles Glass Gray*, ed. Thomas D. Clark (San Marino, Calif.: Huntington Library, 1976), p. 44.

41. Delano, p. 40.

42. Gelwicks, p. 37.

43. McCall, p. 45.

44. *Autobiography of Isaac James Wistar* (Philadelphia: The Wistar Institute of Anatomy and Biology, 1937), p. 90.

Eroded horizontal sedimentary rock layers and buttes left as erosion remnants near Scotts Bluff, Nebraska.

another, as the cause. Edwin Hillyer thought water had "split the mountains apart."[45] Prince Athern, Origin Thomson, and Joseph Hackney all said the river has "forced its way through"[46] the rock, perhaps following Joseph Ware's guidebook which states that Devil's Gate is a "fissure through which the Sweet Water forces its way."[47] Loren Hastings and Elisha Perkins both wrote that somehow the water has "cut" a passage through the granite.[48] Finally there are those who simply did not know how Devil's Gate formed, or were able to enjoy it without worrying about the origin. W. S. McBride said simply that it had "evidently been split asunder,"[49] while Alexander Ramsay thought it was made by "some convulsion of nature."[50] John Banks apparently did not care about the origin, but he was, nonetheless, impressed: "It is grand, it is sublime . . . He must be brainless that can see this unmoved."[51] Alden Brooks said, "I was never so struck with astonishment." For him, water, rocks, and trees "made the scene look 'splendifferous.'" Brooks was so moved that he "took a sketch from the upper end—went swimming in the gate while naked I went up to the top 400 ft. crawled down to the brink & looked down men looked like a walking 'Buffalo chip' for I could only see the hat."[52]

Emigrants observed, described, and explained not just Devil's Gate, but many other features along the way. Their geological interpretations varied widely, but many were based on contemporary geological ideas. They were aware of volcanism and interested by things they thought it might explain, including hot springs, canyons, and deformed rocks as well as volcanoes and lava flows. Few had much understanding of the enormity of geologic time or the impact of processes that operated slowly over great

45. Edwin Hillyer, "From Waupun to Sacramento in 1849," ed. John O. Holzhueter, *Wisconsin Magazine of History*, v. 49, n. 3, 1966, p. 235.

46. Prince A. Athern, "Logbook, 1849," *Pacific Historian*, II (May, 1958), 6-7; (August, 1958), 9-12; (November, 1958), 13-16; Origin Thomson, *Crossing the Plains* (Greensburg, Indiana, 1896), p. 55; Joseph Hackney, Journal in Elizabeth Page, *Wagons West* (New York: Farrar and Rinehart, 1930), p. 153.

47. Joseph E. Ware, *The Emigrants' Guide to California* (Princeton: Princeton University Press, 1932), pp. 23-24.

48. Loren Hastings, "Diary, 1847," *Transactions*, Oregon Pioneer Association (1926), p. 17; Elisha Douglas Perkins, *Gold Rush Diary*, ed. Thomas D. Clark (Lexington, Ky.: University of Kentucky Press, 1967), p. 67.

49. McBride, p. 63.

50. Alexander Ramsay, "Gold Rush Diary of 1849," ed. Merrill J. Mattes, *Pacific Historical Review*, XVIII (November, 1949), 449.

51. Banks, June 29, 1849.

52. Alden F. Brooks, "Grand Trip Across the Plains 1859," July 4, 5, 1859, ms. Newberry Library, Chicago.

lengths of time. Many of their explanations contained elements of the sudden or catastrophic, such as earthquakes, a "natural convulsion," an eruption, or a deluge. Naturally, some were more observant or more perceptive than others; some more bound to conventional ideas, others more imaginative.

But it is difficult to categorize the emigrants simply as products of their time, for the well-exposed and dramatic geological phenomena of the West allowed even the most traditional among them to make perceptive and insightful observations. Thus although Samuel Parker accepted contemporary religious views when he wrote: "The courses, which are formed for the rivers, as forcefully prove the creating and directing hand of God, as the design manifested in the organic part of creation; . . . "He also identified up to twenty separate layers of lava in the Columbia Plateau and astutely observed that, "the internal fires have had long intervals of repose, and then have again sent forth their volcanic substances."[53] Riley Root apparently accepted the contemporary notion that the course of rivers was determined by rifts or fissures when he stated:

> If it be admitted that rivers are formed by the expansive force of gasses acting beneath the earth's crust, it may be supposed that a fissure by similar means may be formed parallel and near to an ocean, . . .[54]

Yet he was also perceptive enough to recognize the great erosive ability of rivers over long periods of time, and noted that the Missouri River had lowered its bed. For every George Gibbs who searched for diluvial scratches, or John Banks who described the hills near Scotts Bluff as, "torn by the rushing flood,"[55] there was a Joseph Middletons who understood the slow and gradual process of rock weathering and erosion.

Most emigrants tried to fit their geological observations into established theories. We do the same today, and when something cannot be explained by those established theories, we either have to modify them or develop new ones. That is how science advances. Wakeman Bryarly wrote of the Soda Springs valley: "Here is a grand field for the geologist, minerologist, naturalist, & any other kind of 'ist' that you can conceive."[56] The same can be said for most of the West, and those emigrants who observed its features added to the body of geological knowledge. Those who used their observations to test the old ideas, and by so doing revised those ideas, advanced the science of geology.

53. Rev. Samuel Parker, *Journal of an Exploring Tour Beyond the Rocky Mountains*, 3rd ed. (Ithaca, N. Y.: Mark, Andrus and Woodruff, 1842), p. 96, 329.

54. Root, p. 45.

55. Banks, p. 19.

56. Geiger and Bryarly, p. 145.

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