Chapter 62

Underfit Streams

The evolutionary origin of valleys generally assumes the past conditions are similar to the present. But, most rivers around the world flow in valleys that appear to be too large for their rivers (Figure 62.1). These valleys were carved by water, so they can be considered to be ancient channels. The properties of many of these valleys indicate when the banks were full; the flow of water had to have been much greater.[1] A stream that appears too small to have eroded the valley in which it flows[2]is called *underfit*.

Figure 62.1. The small Virgin River flowing in a much larger meandering valley in Zion Canyon, Zion National Park.

[1] Austin, S.A., 1983. Did landscapes evolve? *Acts and Facts Impact No 118*, Institute for Creation Research, Dallas, TX.

[2] Neuendorf, K.K.E., J.P. Mehl, Jr., and J.A. Jackson, 2005. *Glossary of Geology*, Fifth Edition. American Geological Institute, Alexandria, VA, p.696.

Twenty to Fifty Times More Water to Carve the Valleys

George Dury has extensively investigated underfit streams.[3,4,5] He discovered they are common, in both glaciated and non-glacial areas, of the United States, Australia, and Western Europe.[3] The Channeled Scabland of eastern Washington show many examples of underfit streams, including Moses Coulee, Grand Coulee, and most of the other coulees.[6] Of course, we now know that these large, vertical-walled valleys were cut in a matter of days by the massive Lake Missoula flood.[7] Dury discovered within the sediments of the valleys that the valleys represent ancient river channels.[4] He found the bedrock below the sediments is deepest on the outside of valley bends, where water flow would have been the fastest, and shallow toward the inside of the bend, where water flow would have been slow. This is what we would expect from the channel morphology of meandering streams today.

Dury analyzed several variables for estimating the amount of water that once flowed in these valley channels. He primarily focused on the wavelength of valley meanders and the width of the valley compared to those of the current stream or river. The valley meander's wavelength is generally about ten times the valley width.[8] It is valley meander wavelength that is the best criterion for determining the size of past flows that carved the valleys[9]: "Meander wavelength is the most unambiguous measurement of channel properties that can be made."[10] In general, valley meanders and the width of the valley are five to ten times larger than those in the current stream (Figure 62.2).

At one time, Dury concluded the valleys contained up to a hundred times as much water at the bankfull stage as the current rivers when their banks are full.[5] He later became more conservative and revised his figures to twenty to fifty times as much water was necessary to form the valleys.[11,12] Either way, valley meanders provide strong evidence that in the recent past a much greater volume of water once flowed through and carved these valleys.

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[3] Dury, G.H., 1964. Principles of Underfit Streams—General Theory of Meandering Valleys. *U.S. Geological Survey Professional Paper 452-A*, Washington, D.C.

[4] Dury, G.H., 1964. Subsurface exploration and chronology of underfit streams. *U.S. Geological Survey Professional Paper 452-B*, Washington, D.C.

[5] Dury, G.H., 1965. Theoretical Implications of Underfit Streams. *U.S. Geological Survey Professional Paper 452-C*, Washington, D.C.

[6] Twidale, C.R., 2004. River patterns and their meaning. *Earth-Science Reviews* 67:204.

[7] Oard, M.J., 2004. *Frozen in Time: Woolly Mammoths, the Ice Age, and the Biblical Key to Their Secrets.* Master books, Green Forest, AR.

[8] Knighton, D., 1998. *Fluvial Forms and Processes: A New Perspective.* John Wiley & Sons, New York, NY, p. 7

[9] Dury, G.H., 1977. Underfit streams: retrospect, perspect, and prospect. In, Gregory, K.J. (editor), *River Channel Changes*, John Wiley & Sons, New York, NY, pp. 281-293.

[10] Moore, J.M., A.D. Howard, W.E. Dietrich, and P.M. Schenk, 2003. Martian layered fluvial deposits: implications for Noachian climate scenarios. *Geophysical Research Letters* 30(24):3

[11] Dury, G.H., 1976. Discharge prediction, present and former, from channel dimensions. *Journal of Hydrology* 30:219-245.

[12] Dury, G. H., 1986. *The Face of the Earth*, fifth edition, Allen & Unwin, London, U.K.

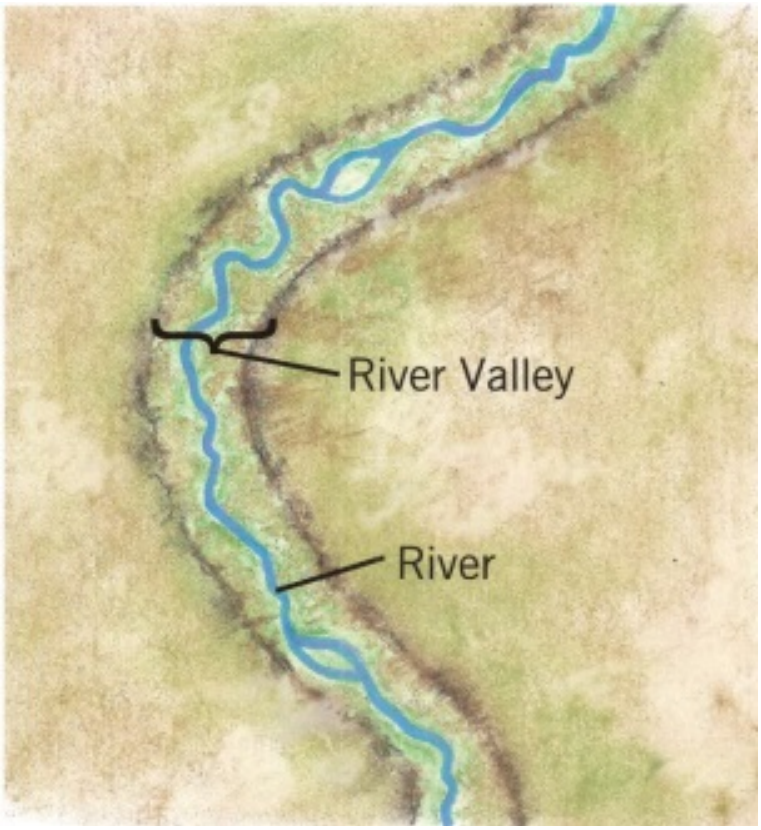

Figure 62.2. .Schematic of valley meanders ten times the size of the river meanders (drawn by Mrs. Melanie Richard).

Controversy over the Amount of Water

Not everybody agrees with Dury, possibly because of the radical implications to the uniformitarian principle. Tinkler disagreed with Dury after studying streams in south-central Texas.[13] Brakenridge disagreed after studying the Duck River, Tennessee.[14] Dury has analyzed all the criticisms of his work and has refuted every one of them.[9]

Twidale generally accepts Dury's conclusions based on valley meanders.[15] In an earlier paper, Twidale affirmed some of the incredible discharges in deserts discovered by Dury, although Twidale attributes the runoff values to climate change [16,17]:

> Although various factors influence meander geometry (gradient, channel roughness, bank stability), some meandering rivers display a geometry incompatible with present discharges. The wide distribution of misfit [underfit] streams points to climatic change as its causation … Application of the formulae [Dury's equations] to paleoriver conditions in desert lands, however, suggests discharges that are in some instances incredible.[18]

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[13] Tinkler, K.J., 1971. Active valley meanders in south-central Texas and their wider implications. *GSA Bulletin* 82:1,783-1,800.
[14] Brakenridge, G.R., 1985. Rate estimates for lateral bedrock erosion based on radiocarbon ages, Duck River, Tennessee. *Geology* 13:111-114.
[15] Twidale, Ref. 6, pp. 202-207.
[16] Twidale, C.R., 2003. Canons revisited and reviewed: Lester King's views of landscape evolution considered 50 years later. *GSA Bulletin* 115:1,155-1,172.
[17] Twidale, C.R., 2004. River patterns and their meaning. *Earth-Science Reviews* 67:159-218.
[18] Twidale, Ref. 16, p. 1,159.

Since underfit streams are continent-wide, Dury concluded that a climatic explanation has to also be continental.[19] But, there remains the problem of accounting for such a huge amount of precipitation and run-off over such a large area. Because underfit streams are common, Dury excluded the possibility of river capture as an explanation (see Chapter 82). River capture reduces flow of the upper reaches of a captured stream, increasing flow downstream of the capture point. The problem with this "solution" is that the event would be local and not continental.[3] Furthermore, this mechanism could increase the flow maybe by two or three times, while valley meanders indicate flows twenty to fifty times present streams. Dury also rejected higher flows based on the overspilling of lakes adjacent to ice sheets and meltwater discharge. So, the mechanism for the formation of valley meanders remains a mystery for uniformitarian scientists.

Ice Age Runoff and/or Channelized Flood Erosion?

Whereas Twidale and others are forced to postulate some kind of unspecified climate change, underfit streams would fit in nicely during the channelized runoff that took place very late in the Genesis Flood or with the greater discharges of the post-Flood Ice Age or both. Carving of some valley meanders is reasonable during the Ice Age because of the much greater precipitation and the catastrophic melting of the ice sheets[20,21,22] [23] that would affect regions of continents. However, it seems the valleys must have come first to direct the water, so they were probably large *before* glaciation. Moreover, in most areas Ice Age precipitation did not produce enough water. Of course, burst ice dams could produce large valleys, such as what happened when glacial Lake Missoula broke. [24] Underfit streams in non-glaciated areas are even more sensational, especially the ones in semi-arid regions, and point even more so that most large valleys across the Earth probably were carved during late Flood runoff.

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[19] Dury, Ref. 3, p. 29.
[20] Oard, M.J., 2004. *Frozen In Time: The Woolly Mammoth, the Ice Age, and the Bible*, Master Books, Green Forest, AR, pp. 95-106.
[21] Oard, M.J., 1990. *An Ice Age Caused by the Genesis Flood*, Institute for Creation Research, Dallas, TX.
[22] Oard, M.J., 1993. Comments on the breached dam theory for the formation of the Grand Canyon. *Creation Research Society Quarterly* 30:39-46.
[23] Twidale, Ref. 17, p. 203.
[24] Oard, M.J., 2004. *The Missoula Flood Controversy and the Genesis Flood*, Creation Research Society Monograph No. 13, Chino Valley, AZ.