Chapter 37

The Flaxville and Nearby Planation Surface

After the Cypress Hills planation surface was formed, the broad sheet flow phase of the Genesis Flood eroded the vast majority of it leaving behind comparatively small erosional remnants. The next lower planation surface, the Flaxville surface or Alden's bench number one[1] formed shortly thereafter. It is much more extensive than the Cypress Hills surface.

Figure 37.1. The exceptionally flat surface of the Flaxville planation surface near Turner, Montana.

The Flaxville Plateaus

The Flaxville planation surface in north central and northeast Montana (see Figure 14.1) is a belt of wide plateaus 190 miles (300 km) east-west by 50 miles (80 km) north-south, south and southeast of the Cypress Hills. It is also thought to surround the Cypress Hills to the west, north, and east. The plateaus in Montana are only 300 to 600 feet (90 to 180 m) above the adjacent

[1] Alden, W.C. 1932. Physiography and glacial geology of eastern Montana and adjacent areas. *U. S. Geological Survey Professional Paper 174*, Washington, D.C.

plain. They were likely once continuous as indicated by concordant surfaces and the similar quartzite rocks capping the plateaus (see Chapter 14). (Quartzites are also found within the soils of the intervening valleys, indicating the erosion left behind quartzite rocks.) Like the Cypress Hills, the Flaxville surface was probably dissected by late Flood channelized erosion and/or Ice Age rivers.

The elevation of the western edge of the Flaxville plateau surface is 3,200 feet (975 m) msl, approximately 330 feet (100 m) lower than the eastern edge of the Cypress Hills which are 60 miles (100 km) to the north. The eastern end of the Flaxville surface lies at an elevation of 2,625 feet (800 m), resulting in an average west-east slope of only 3.7 ft/mi (0.7 m/km).[2] This slope is about one fourth that of the Cypress Hills. The surfaces of the plateaus are remarkably flat (Figure 37.1). The planation surface is capped by quartzite gravel that varies in thickness from about 3 feet (1 m) to as much as 120 feet (30 m).[3,4,5,6,7] The average thickness is 40 feet (12 m).

The coarse gravel seen on the Flaxville planation surface (Figure 37.2) is *identical* to the gravel capping the Cypress Hills, with the exception of additional igneous rocks and the absence of sandstones from the formations below.[8] Some of the observed exposures of Flaxville gravel appear to have a larger percentage of small pebbles and more common sand interbeds than those in the western and central Cypress Hills.

The nearest source for the quartzite rocks that make up the Flaxville gravel is west of the Rocky Mountain continental divide. It is more than 250 miles (400 km) from the western edge of the Flaxville surface (see Chapter 14). In order for the gravel to have reached the eastern edge of the Flaxville planation surface, it had to have traveled more than 440 miles (700 km). Since the source was west of the continental divide, possibly in central Idaho, the gravel had to have been transported a total of about 600 miles (960 km) over a low slope. If the quartzites in western North Dakota and southwest Manitoba are included, the total distance of quartzite transport likely is as much as 800 miles (1,280 km)!

Flaxville Erosional Remnants Elsewhere

The Flaxville planation surface is Alden's bench number one.[1] He extrapolated the Flaxville surface westward across a gap of about 200 miles (320 km) to several small hills and plateaus east of Glacier National Park (Figure 37.3). One of these small remnants is the gravel-capped Landslide Butte (Figure 37.4a and b). It is famous for its dinosaur bones and eggs.

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[2] Howard, A.D., 1960. Cenozoic history of northeastern Montana and northwestern North Dakota with emphasis on the Pleistocene. *U. S. Geological Survey Professional Paper 326*, Washington, D.C.
[3] Collier, A.J. and W.T. Thom, Jr. 1917. The Flaxville gravel and its relation to other terrace gravels of the northern Great Plains. *U.S. Geological Survey Professional Paper 108*, Washington, D.C.
[4] Jensen, F.S. and H.D. Varnes, 1964. Geology of the Fort Peck area, Garfield, McCone and Valley Counties Montana. *U.S. Geological Survey Professional Paper 414-F*. Washington, D.C.
[5] Cannon, M.R. 1987. Water resources and potential effects of surface coal mining in the area of the Woodson preference right lease application, Montana. *U. S. Geological Survey Water-Resources Investigations Report 87-4027*, Washington, D.C.
[6] Thamke, J.N. 1991. Reconnaissance of ground-water resources of the Fort Peck Indian Reservation, northeastern Montana. *U.S. Geological Survey Water-Resources Investigation Report 91-4032*, Washington, D.C.
[7] Leckie, D.A., 2006. Tertiary fluvial gravels and evolution of the Western Canadian Prairie landscape. *Sedimentary Geology* 190:139–158.
[8] Storer, J.E., 1978. Tertiary sands and gravels in Saskatchewan and Alberta: correlation of mammalian faunas. In, Stelck, C.R. and B.D.E. Chatterton (editors), *Western and Arctic Canadian Biostratigraphy*, Geological Association of Canada Special Paper 18, pp. 595–602.

Figure 37.2. An iron-stained quartzite cobble with percussion marks on the Flaxville Planation surface near Turner, Montana.

Alden also correlated the Flaxville planation surface north and south to many other benches and plateaus on the High Plains across a wide area of Montana and northern Wyoming. The Flaxville planation surface is claimed to have originally extended northwest into central Alberta.[9] The Hand and Wintering Hills, about 1,000 feet (300 m) above the plains east of Drumheller, Alberta, are capped by 25 feet (8 m) of quartzite cobbles and boulders that correlate with the Flaxville surface[10] (see Figure 14.7). Plateaus or hills west and northwest of Calgary, Alberta, Canada, also form a gravel-veneered planation surface that can be correlated with the Flaxville surface.[11,12]

So, like the higher Cypress Hills planation surface, the Flaxville planation surface at one time covered a large area of the High Plains. It also was extensively eroded and left behind the present

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[9] Kupsch, W.O. and J.A. Vonhof, 1967. Selective cementation in Tertiary sands and gravels, Saskatchewan. *Canadian Journal of Earth Sciences* 4:769–775.

[10] Williams, M.Y. and W.S. Dyer, 1930. Geology of southern Alberta and southwestern Saskatchewan. *Geological Survey of Canada Memoir 163*, Canada Department of Mines, Ottawa.

[11] Russell, L.S., 1950. The Tertiary gravels of Saskatchewan. *Transactions of the Royal Society of Canada* 44 (Series III):51–59.

[12] Warren, P.S., 1939. The Flaxville plain in Alberta. *Transactions of the Royal Canadian Institute* 22 (Part 2):341–349.

day erosional remnants.

Figure 37.3. Gravel-capped Two Medicine Ridge planation surface just east of southern Glacier National Park (view north). Part of the same planation surface can be seen in the distance.

Figure 37.4a. Landslide Butte, 1 mile (1.6 km) south of the Port of Del Bonita, north central Montana (view southeast). Landslide Butte is a remnant of the Flaxville surface, as seen from the next lowest planation surface, Alden's number 2 bench.

Figure 37.4b. Gravel cap on top of Landslide Butte, north central Montana.

Figure 37.5. The surface of the Wood Mountain plateau.

The Wood Mountain Plateau

The Cypress Hills and Flaxville Plateaus are the two highest planation surfaces described in Alden's classification.[1] However, the Wood Mountain Plateau of southern Saskatchewan (Figure 37.5) is a quartzite-capped planation surface that is intermediate in altitude and lies between the Cypress Hills and Flaxville Plateaus. The Wood Mountain Plateau is approximately 105 miles (170 km) east-southeast of the Cypress Hills and north of the Flaxville plateaus in northeast Montana (see Figure 14.1 for locations). The uniformitarian dating by fossils of this plateau is problematic, but it is considered older than the Flaxville gravels.[8,11,13,14,15] Storer stated:

[13] Sternberg, C.M. 1930. Miocene gravels in southern Saskatchewan. *Transactions of the Royal Society of Canada* 24 (Series III):29–30.
[14] Russell, L.S. and R.T.D. Wickenden, 1933. An Upper Eocene Vertebrate Fauna from Saskatchewan. *Transactions of the Royal Society of Canada* 27 (Series III):53–65.

“Separation of the Flaxville and Wood Mountain Formations remains a vexing problem.”[16] Most of the Wood Mountain planation surface is capped by a thin veneer of quartzite gravel, but at least one *in situ* outcrop occurs on top of the Wood Mountain Plateau (see Figure 14.8).

Paleocurrent directions in the Wood Mountain gravel indicate a flow from the southwest or the south southwest.[7] This eliminates the Cypress Hills gravel to the west northwest as its source. Some researchers have speculated, and I agree, that the Wood Mountain gravel originated in central Idaho.

Figure 37.6. The rolling eastern Fairfield Bench, northeast of Great Falls, Montana. It was this erosion surface that inspired William Morris Davis to deduce his “cycle of erosion” or “geographical cycle.”

It is interesting that the quartzite gravel on the Cypress Hills, Wood Mountain, and Flaxville Plateaus is identical, yet it is fossil dated at widely different Cenozoic ages (see Appendix 8). Moreover, the Cypress Hills gravel had always been dated as 45 million years old (early to mid Cenozoic), while the Wood Mountain Plateau gravel was dated as 15 million years old (mid to late Cenozoic). So, there was a problem with the date of the Cypress Hills Formation—until a fossil horse was discovered on top of the Cypress Hills that *just happened to match* the 15 million year age of the Wood Mountain Plateau.[8,15] Such manipulations, I believe, are only the

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[15] Storer, J.E. 1975. Tertiary mammals of Saskatchewan Part III: the Miocene fauna. *Life Sciences Contributions Royal Ontario Museum Number 103*, Toronto, Canada.
[16] Storer, Ref. 8, p. 599.

tip of the iceberg in fossil dating (see Appendix 8), and one of many reasons I am convinced uniformitarian dating is an exercise in circular reasoning.

The Flaxville/Wood Mountain Driftless Area

Strangely, the Wood Mountain Plateau and the eastern Flaxville Plateaus were *never* glaciated. There are no signs of moraines and other glacial features in the area (see Appendix 7). However, Klevberg and I found crystalline glacial erratics on top of the Wood Mountain Plateau with no other signs of glaciation anywhere in the vicinity. The only way to reconcile this observation is to assume that during glacial melting, huge lakes and rivers formed at the edge of the ice sheet. One lake must have overtopped the low Wood Mountain Plateau, where icebergs carrying erratics grounded.

In general, the glaciation of northern Montana, southern Alberta, and southern Saskatchewan is a problem for the uniformitarian paradigm because these plateaus are only several hundred feet above the surrounding terrain, which indicates the ice sheet was very thin in this area.

Figure 37.7a. Bench number 3 just south of Fairfield Bench, west of Great Falls, Montana.

Figure 37.7b. Close up of the gravel cap at edge of bench number 3 (Peter Klevberg provides scale).

Alden's Benches Number 2 and 3

The next planation surface below the Flaxville level is the Missouri Plateau planation surface of Howard[2] or Alden's bench number two.[1] It lies about 300 to 600 feet (90-180 m) lower than the Flaxville planation surface outcropping in scattered locations across the High Plains.

One outcrop is a remarkably flat bench in the unglaciated Milk River Hills near Del Bonita close to the Canadian border, north of Cut Bank, Montana (see Figures 14.11 and 12). Similar to the other benches and plateaus of the area, it is capped by rocks that sourced from the west, but there is no high-grade quartzite on it. The rocks on the planation surface outcrop in the mountains *east* of the continental divide, unlike the gravel cap on the Cypress Hills and Flaxville plateaus that came from west of the divide.

The Fairfield Bench is another example of bench number 2 and is found northwest to northeast of Great Falls, Montana (see Figure A9.1). It extends 60 miles (100 km) east-west. The eastern Fairfield Bench is the planation surface that motivated William Morris Davis to postulate the classical "cycle of erosion," discussed in Chapter 50. This part of the Fairfield Bench is covered with glacial debris and is a rolling surface (Figure 37.6).

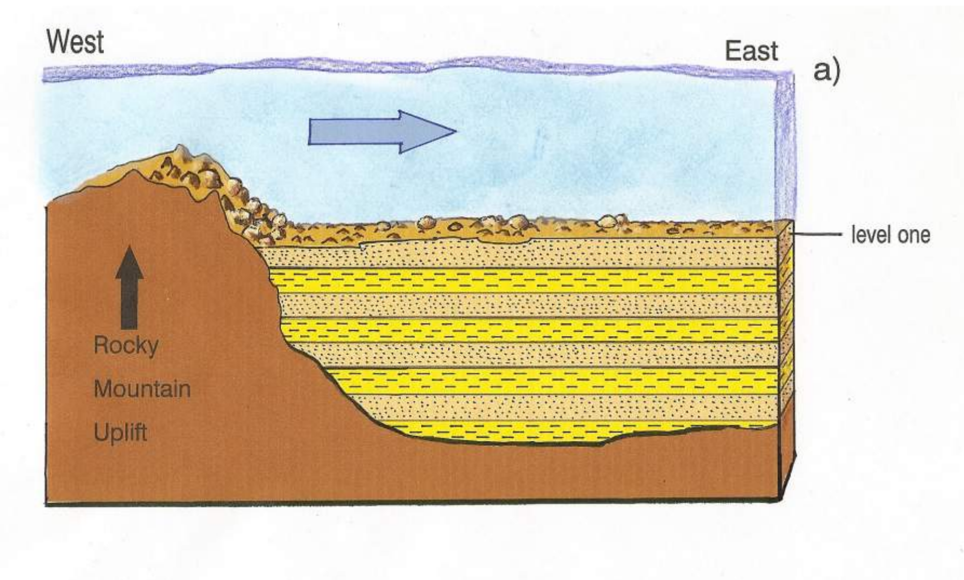
The lowest bench is Alden's bench number three on the High Plains of Montana.[1] It is isolated and usually not far above the rivers and streams. For instance, bench number three is found just south of the Fairfield Bench in the valley of the Sun River (Figure 37.7a and b). It was on this bench that Klevberg calculated flood current speeds had to be greater than 34 mph (54 kph) to transport the gravel.[17]

The lower planation surfaces were formed in the same way as the upper planation surfaces. After the formation of the Flaxville planation surface, renewed erosion stripped much of this surface away. Then, bench number two developed, which was later eroded with the subsequent development of the lowest bench number three. Finally, the river and stream valleys were carved by more channelized erosion at the end of the Flood. The catastrophic melting of glaciers after the Flood would have widened some of the valleys and created other valleys or channels.

Planation Surfaces Carved during the Retreating Stage of the Flood

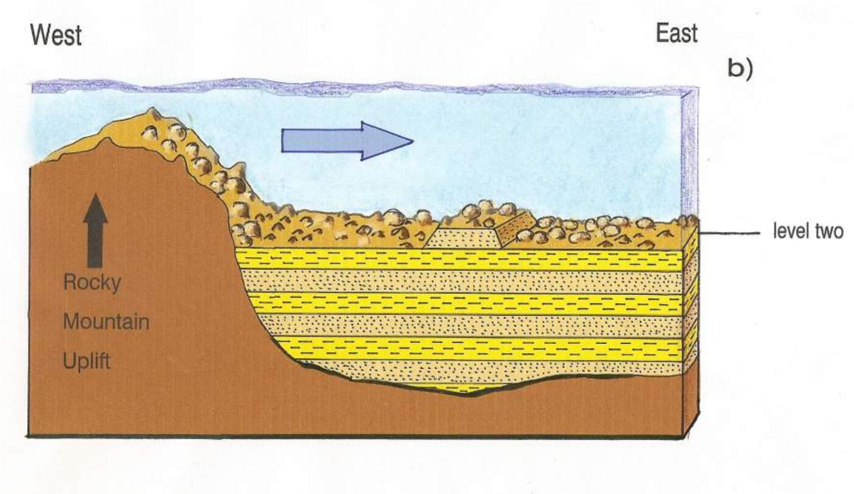
The generally four gravel-capped benches (planation surfaces) on the High Plains are a problem for the uniformitarian paradigm. If erosion were slow, taking millions of years, the debris would lie all around and especially east and southeast of the High Plains of Montana and southern Canada. There are Cenozoic formations to the east and southeast but they are mainly volcanic[18] and small compared to the erosion of the High Plains. The erosional debris had to have been swept off of the continent. This is consistent with the Retreating Stage of the Flood, which will be amplified in Chapter 57.

The benches represent powerful evidence for the Retreating Stage of the Flood which was primarily an erosional event. The several planation surfaces likely represent periods of increasing and decreasing current velocity. Increasing velocity would cut the surface, decreasing would lay a portion of the rounded rocks that were being swept along the bottom. It is impossible to know whether these current pulses were attributed to pulses from the uplifting of the Rocky Mountains to the west or were simply due to increases and decreases in current velocity caused by reasons other than tectonics. Figure 37.8 summarizes the formation of the four planation surfaces and the river valleys during Flood runoff.



[17] Klevberg, P., 1998. The Big Sky Paving gravel deposit, Cascade County, Montana. *Creation Research Society Quarterly* 34:225–235.

[18] Terry, D.O., H.E. LaGarry, and R.M. Hunt, Jr., 1998. *Depositional Environments, Lithostratigraphy, and Biostratigraphy of the White River and Arikaree Groups (Late Eocene to Early Miocene, North America),* GSA special Paper 325, Boulder, CO.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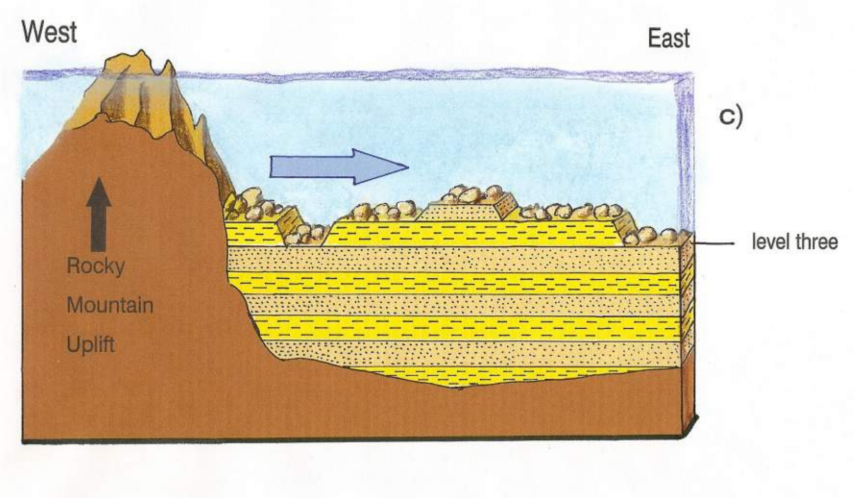
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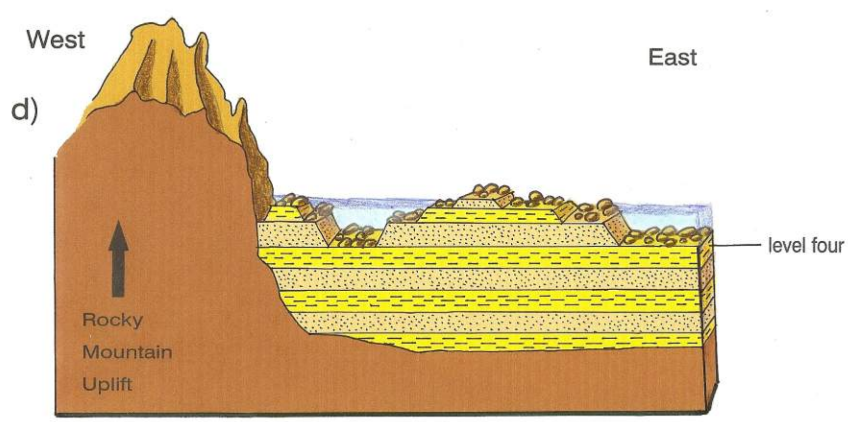
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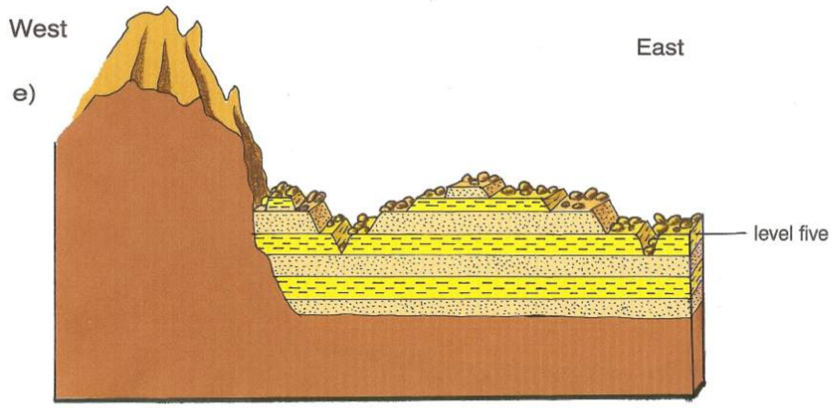

Figure 37.8. Series of illustrations showing the development by Floodwater erosion of four cobble- and boulder-capped planation surfaces at four levels east of the Rocky Mountains during the Retreating Stage of the Flood. Level five corresponds to the current river and stream valleys.