Chapter 15

Uniformitarian Speculations on Gravel Transport East

Chapter 14 presented evidence that quartzites were transported up to 800 miles (1,280 km) northeast from their source in the western Rocky Mountains. Do the uniformitarian scientists have an answer to how billions of quartzite rocks were transported this far?

One thing I have learned after more than 35 years dealing with origins issues is that evolutionary/uniformitarian scientists always have some kind of answer to their conundrums. They are not hypothesis void. That does not mean that the interpretations are correct, or even make sense. But to those who know little of the science, and those who already believe in evolution and millions of years, it seems to satisfy them. But creation scientists and anyone who desires to know the truth should thoroughly analyze these interpretations. And in the case of long transported quartzites, two very weak hypotheses have been published.[1]

Long Distance River Transport and Relief Inversion Fails

The first hypothesis is one that is commonly brought up whenever mainstream scientists find rounded rocks on plateaus. They credit the transport of these rocks to normal river transport. But in the case of the Cypress Hills, Flaxville Plateaus, and Wood Mountain Plateau, how does the "river rock" end up on the top of the plateaus?

Uniformitarian scientists explain that after millions of years of transport of quartzite from the west, erosion of the High Plains occurred. The ridges around the stream valleys eroded faster than the more resistant, gravel-carpeted stream valleys. The rocks armored the surface of the valley, supposedly protecting the river valley from erosion. So after millions of years the ridges erode lower and lower than the stream valley with its gravel. After a long time, the valley becomes a ridge and the surrounding higher terrain becomes lower terrain. This is a process called relief or topographic inversion.

There is no doubt that relief inversion has occurred in the past. Just the fact that the quartzite rocks are on the highest elevations is enough evidence for uniformitarians to assume *relief inversion*.[2,3] The only question is whether fluvial transport and relief inversion are sufficient to explain the gravel on top of such extensive areas as the Cypress Hills and Flaxville Plateaus. Unfortunately for uniformitarian scientists, there are a myriad of problems with these hypotheses.

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[1] Oard, M.J., J. Hergenrather, and P. Klevberg, 2006. Flood transported quartzites: part 3—failure of uniformitarian interpretations. *Journal of Creation* 20(3): 78–86.

[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] Vonhof, J.A., 1965. The Cypress Hills Formation and Its Reworked Deposits in Southwestern Saskatchewan. In, *Alberta Society of Petroleum Geologists 15th Annual Field Conference Guidebook*, Part I, pp. 142–161.

River Transport Does Not Work

I will first list the problems for river transport. First, it is doubtful rivers can transport gravel so far on the very low slopes of the High Plains, especially when we consider the gravel has spread to north-central North Dakota, southwest Manitoba, and central Saskatchewan, probably from Idaho.[4]

Second, the gravels are not linear in a general east-west or southwest-northeast direction, as if deposited in a river or stream valley that sloped eastward or northeastward, but are large sheet deposits.

Third, there must be many billions if not trillions of rounded rocks on the High Plains. There are too many for such a slow, inefficient mechanism as river transport over millions of years, especially when the quartzites are little weathered and the same roundness and size, no matter what their presumed age.

Fourth, rivers would also have eroded and incorporated abundant plains lithologies, like sandstone. In truth, the majority of the gravel on the High Plains is exotic quartzites from the western Rocky Mountains.

Fifth, river action would not have produced percussion marks on such hard rocks. A very turbulent fast flow is required.

Sixth, how would the quartzites cross the continental divide, since they originated from the western Rocky Mountains?

Figure 15.1. Active landsliding on the north edge of the Cypress Hills. The gravels in the foreground slumped from the edge of the Cypress Hills, seen at the far left.

Problems with Relief Inversion

Relief inversion rarely works, assuming millions of years and that the quartzites were transported by rivers. First, the gravel must fill the valley from side to side to be resistant to erosion and this is unlikely because valleys are often wide and the gravel is mainly in the main stream channels in a valley. There are usually many other types of sediment in the river valley, such as sand, silt, and clay, and these can be eroded rapidly, leaving behind patches of gravel on pedestals.

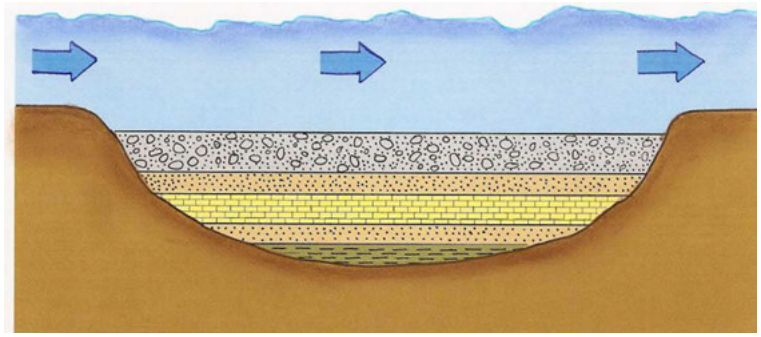
Second, once the relief is a little inverted (supposedly), the edges of the gravel-capped stream bed would start landsliding into the lower area, eventually obliterating the ancient stream bed. The edge of the Cypress Hills is actively eroding today because of landsliding (Figure 15.1). So, if there were millions of years of relief inversion, a high plateau

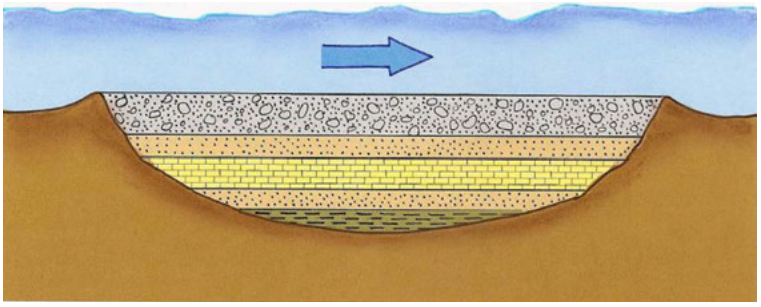
[4] Klevberg, P. and M.J. Oard, 1998. Paleohydrology of the Cypress Hills Formation and Flaxville gravel; in, Walsh, R.E. (editor), *Proceedings of the Fourth International Conference on Creationism*, technical symposium sessions, Creation Science Fellowship, Pittsburgh, PA, pp. 361–378.

like the Cypress Hills should have been destroyed by landsliding a long time ago.

However, it would be relatively simple for the Flood to result in relief inversion. The scenario would be similar to the uniformitarian one, but instead of slow erosion over millions of years that would have also eroded the bottom of the river valley, erosion would be rapid in those areas not armored by quartzite rocks. Figure 15.2 shows how this would work for a gravel capped plateau.

Braidplain/Tectonic Boost Idea—a Desperate Hypothesis





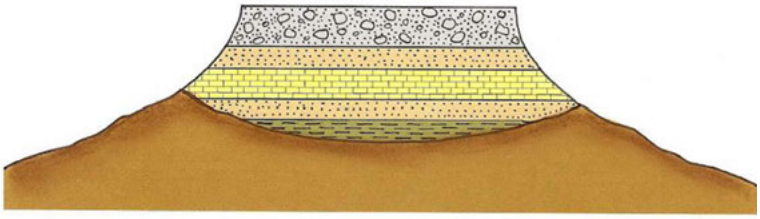


Figure 15.2a-c Schematic of relief inversion for the formation of a plateau during the Flood (drawn by Mrs. Melanie Richard). Sediments rapidly deposited in a trough with erosion of the sides of the trough, leaving the sediments with a resistant top layer at higher elevation after the Flood.

The inadequacy of river transport was recognized by Leckie and Cheel, who proposed the second major hypothesis, the braidplain/tectonic boost idea.[5] According to this hypothesis, multiple, very wide, braided streams flowed out of the Rocky Mountains and spread a large, continuous sheet of gravel up to 95 miles (150 km) out onto the High Plains forming what is called a "braidplain."[6] A typical braided stream is shown in Figure 2.4. This braidplain extends so far east that it covered the area where the Sweetgrass Hills and Bears Paw Mountains would eventually uplift. Then, they suggest the tectonic uplift of the Sweetgrass Hills and Bears Paw Mountains provided an "eastward tectonic boost" to spread the gravel clear to the Cypress Hills. The "boost" was partially provided by rivers or streams in confining valleys flowing northeast. Subsequent erosion over about 30 million years produced isolated gravel-capped erosional remnants at four general levels on the High Plains through the process of relief inversion.

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[5] Leckie, D.A. and R.J. Cheel, 1989. The Cypress Hills Formation (upper Eocene to Miocene): a semi-arid braidplain deposit resulting from intrusive uplift. *Canadian Journal of Earth Sciences* 26:1,919.

[6] Leckie and Cheel, Ref. 5 pp. 1,918–1,931.

There are a number of problems with Leckie and Cheel's hypothesis, some of which are the same as the problems with long distance river transport and relief inversion discussed above. Any mechanism for the deposition of the Cypress Hills Formation, Wood Mountain Plateau gravel, and Flaxville gravel must be able to account for: 1) the laterally extensive, surficial planation surfaces at generally four elevations of the High Plains, 2) the laterally extensive sheets of gravel that mantle the planation surfaces, and 3) the transport of exotic quartzites many hundreds of miles from their nearest source over slopes of less than 0.1 degree from *west* of the continental divide. Leckie and Cheel presume the quartzites were transported from central Idaho.

Such a "Braidplain" Should Have Incorporated Abundant High Plains Rocks

The quartzite gravels show no evidence of being deposited in channels or as alluvium transported east of the Rocky Mountains. Transport by "palaeorivers" issuing out of the Rocky Mountains would have eroded and incorporated a mixture (probably a majority) of local types of rocks, such as hard sandstone, but we observe that 90% or more of the gravel on the Cypress Hills is quartzite. Klevberg considered many possible transport mechanisms other than by water from the Rocky Mountain Front far onto the High Plains, which are briefly discussed in Appendix 10.[4] These transport mechanisms do not work.

Uplifting Mountains Cannot Provide a Boost

I will assume for the sake of argument that the first phase of this uniformitarian mechanism happened: that high-grade quartzites had to travel about 100 miles (160 km) east of the divide from outcrops well west of the divide. Then the Sweetgrass Hills uplifted, raising the quartzite rocks upward, and transporting them much farther east by either water transport or landsliding. However, the Sweetgrass Hills, 60 to 95 miles (100 to 150 km) from the Rocky Mountain front are only small crystalline rock intrusions, called stocks.[7] They only cover a small area (Figures 15.3 and 15.4), so how can they "boost" billions of quartzites east? In other words, it is hard to imagine uplifting these *isolated* hills, which range up to about 6,400 feet (2,100 m) msl and up to 3,300 feet (1,000 m) above the plains, and spreading huge amounts of quartzites another 95 miles

Figure 15.3. West Butte of Sweetgrass Hills, north-central Montana.

[7] Lopez, D.A., 1995. *Geology of the Sweet Grass Hills North-Central Montana*, Montana Bureau of Mines and Geology Memoir 68, Butte, MT.

Figure 15.4. Haystack Butte (left) and Middle Butte (right) of the Sweetgrass Hills, north-central Montana (view west).

(150 km) northeast and form a 100 feet (30 m) thick gravel deposit on the Cypress Hills planation surface. Then there is the problem of the Leckie and Cheel hypothesis accounting for quartzites that are even farther out onto the High Plains. The Swift Current, Wood Mountain, and Flaxville Plateaus, are about 100 or more miles farther east of the Cypress Hills. The quartzite gravels of North Dakota, central Saskatchewan, and southwest Manitoba are even farther away from their source.

The Bears Paw Mountains are about 125 miles (200 km) northeast from the Rocky Mountain front. This is farther than Leckie and Cheel's initial braidplain of 95 miles (150 km). It is possible the quartzite gravel in the Bears Paw Mountains could have originated from quartzite outcrops in the Little Belt and Big Belt Mountains that are to the south and south-southwest. They are closer than the Rocky Mountains, but the volume of quartzite in these mountains is limited and paleocurrent directions in the quartzite on the Cypress Hills indicate more of a west-southwest to southwest source. If the Bears Paw Mountains uplifted and boosted the quartzites toward the northeast, you would expect to find many more quartzites in the mountains and just to the northeast of the mountain range. There are some small deposits of quartzite gravel in the Bears Paw Mountains, but hardly any around the mountains.

The Quartzite Source in the Eastern Rocky Mountains Is Low Grade

Another problem is that the quartzites that outcrop in the eastern Rocky Mountains, especially south of Glacier National Park, are of lower grade (less metamorphosed) than the Cypflax gravel (see in-depth section at the end of Chapter 14). This lower grade quartzite (see Figure 13.11 for an example) is generally what forms the non-Cypflax gravels south of the Cypflax exposures. The Cypflax gravel originated well west of the continental divide! It stretches the imagination to think billions upon billions of quartzites were transported by river action and formed a generally uniform cover east of the Rocky Mountains. If the continental divide were farther west at the time, that would still place the distance of transport forming the braidplain much farther than Leckie and Cheel imagined. The source of the quartzites in itself eliminates Leckie and Cheel's hypothesis.

Summary

Considering the many problems of the braidplain/tectonic boost hypothesis, it seems to be highly speculative. Leckie and Cheel even admit this in saying that sedimentation of the Cypress Hills Formation is poorly understood.[8] So, there really is no viable uniformitarian hypothesis that accounts for the billions of well-rounded quartzites that carpet the four planation surfaces of the High Plains.

[8] Leckie and Cheel, Ref. 5, p. 1,918.