Chapter 16

Quartzite Gravel of Southwest Montana and Adjacent Idaho

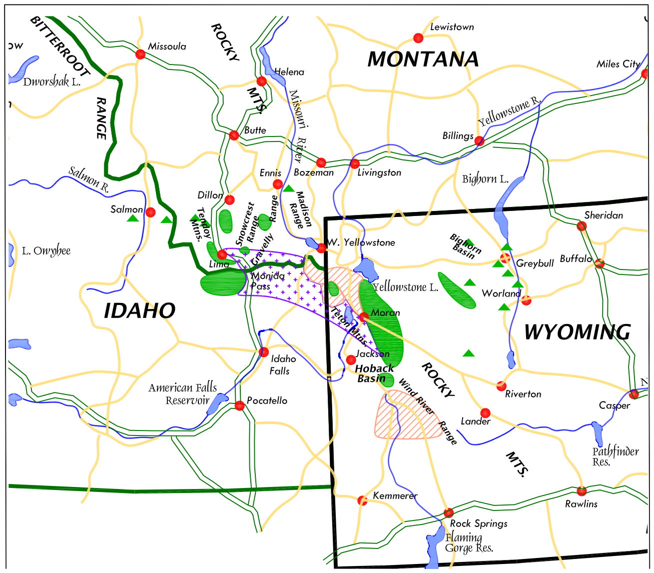

Figure 16.1. Quartzite gravel locations in southwest Montana, northwest Wyoming, and adjacent Idaho. The triangles are small areas while the large green areas are large areas of quartzite gravel, cobbles, and boulders. The slanting red lines signify the quartzite is mixed with glacial debris. The purple crosses represent a thin, patch distribution.

Quartzite gravel has also been transported to southwest Montana, adjacent Idaho, and northwest Montana.[1] Figure 16.1 shows the locations of these gravels, which are sometimes found in unusual tectonic situations. Quartzite gravel is found on top of mountains and piled up thousands of feet thick into what was once a gigantic crack or trough in the earth. This chapter will discuss the quartzite gravel deposits discovered at numerous locations within southwest Montana and south in adjacent Idaho. Chapter 17 will discuss the gravels transported farther southeastward into northwest Wyoming.

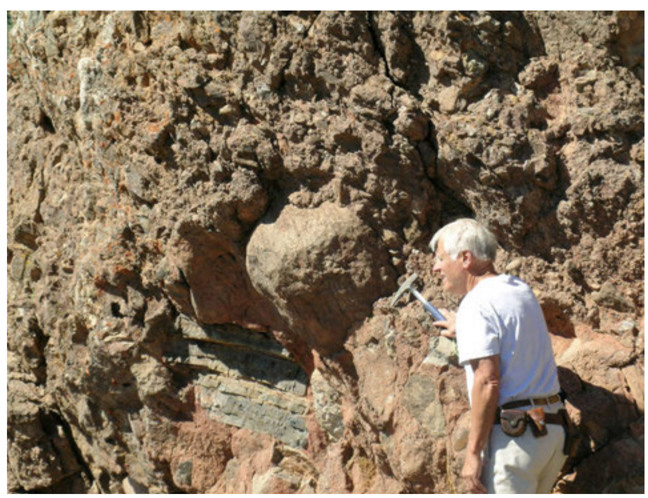

Figure 16.2. Close-up of the Red Butte Conglomerate showing both rounded and angular rocks. Creation geologist, Brent Carter, from Boise, Idaho, for scale.

[1] Oard, M.J., J. Hergenrather, and P. Klevberg, 2005. Flood transported quartzites—east of the Rocky Mountains. *Journal of Creation* 19(3):76–90.

Figure 16.3. Two distinct types of gravels and conglomerate about 9 miles (15 km) east of Lima, southwest Montana. The Red Butte limestone conglomerate forms the side of the mountain, while the mounds in the foreground are quartzite gravel filling up the valley.

Two Distinct Types of Gravels

There are two distinct types of gravel in southwest Montana and adjacent Idaho. One type is composed mostly of limestone, and the second type is predominantly well-rounded quartzite rocks similar to Cyp lax.[2,3,4,5] The limestone gravel is practically all cemented together with the individual rocks, either rounded, forming a conglomerate or angular, forming a breccia. Sometimes both rounded and angular rocks occur together (Figure 16.2).
It is generally called the Red Butte Conglomerate and will be discussed further in Appendix 11.

Well-rounded quartzites are practically always uncemented. It is strange that the quartzite and limestone gravels are *not* mixed (Figure 16.3), except rarely.[6] These gravels have been given a variety of names, which are discussed in the in-depth section at the end of the chapter. We are mainly interested in the quartzites that travelled long distances since they provide more information on the mechanism of transport and other events that happened during the Flood, which will be discussed in Chapters 22 and 23.

Figure 16.4. Quartzite boulders from the Johnson Creek Valley, northwest Tendoy Mountains, southwest Montana deposited in water-laid volcanic ash.

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[2] Wilson, M.D., 1967. *The Stratigraphy and Origin of the Beaverhead Group in the Lima Area, Southwestern Montana*, Northwestern University PhD dissertation.

[3] Ryder, R.T., 1968. *The Beaverhead Formation: A Late Cretaceous-Paleocene Syntectonic Deposit in Southwestern Montana and East-Central Idaho*, Pennsylvania State University PhD dissertation.

[4] Ryder, R.T. and R. Scholten, 1973. Syntectonic conglomerates in Southwestern Montana: their nature, origin, and tectonic significance. *GSA Bulletin* 84:773–796.

[5] Ryder, R.T. and R. Scholten, 1986. Syntectonic conglomerates in Southwestern Montana: their nature, origin and tectonic significance (with an update); in: Peterson, J.A. (editor), *American Association of Petroleum Geologists Memoir* 41, Tulsa, OK, pp. 131–157.

[6] Mann, J.A., 1950. *Geology of Part of the Gravelly Range, Montana*, Princeton University PhD dissertation.

Valley Locations of Quartzite Gravels

Quartzite gravels are usually found in valleys, such as the small valley northeast of Ennis, Montana,[7] Johnson Creek Valley in the Tendoy Mountains of extreme southwest Montana (Figure 16.4), and in the Lima Valley, east of the town of Lima (Figure 16.5). Valley quartzites are commonly found within volcanic ash deposits called tuffs (Figure 16.4). Quartzite cobbles and boulders carpet the bottom of the valley from Lima north to Clark Canyon Dam, the wide Centennial Valley east of Lima, and the valley between Clark Canyon Dam and Salmon Idaho just west of the continental divide at Lemhi Pass (see Figure 18.2).[8] The quartzites become larger and less round as we go toward Salmon, Idaho, suggesting a source west of Salmon.

Figure 16.5. Quartzite boulders from near locality in Figure 16.3. Granddaughter, Madison Wolfe, for scale when she was three years old.

Since I live in southwest Montana, I accidentally made some new discoveries. One was at the highest point in the southwest Gallatin Valley on a dissected, quartzite-capped planation surface (Figure 16.6). It is about 1,000 feet (300 m) above the Madison River, indicating much channelized erosion after the deposition of the quartzite gravel (see Chapter 69). There was a lower planation surface that was also capped by quartzite rocks, some with abundant percussion marks (Figure 16.7), once again demonstrating the violence and energy of transport. I have also found quartzites with percussion marks in the Gallatin and Madison Rivers that must have been reworked from quartzite deposits in the area. Modern streams and rivers rarely make percussion marks.

Figure 16.6. A quartzite capped, dissected planation surface in the southwest Gallatin Valley of southwest Montana.

I have also found quartzites farther east. While hunting, I found quartzite boulders up to about two feet (70 cm) in diameter in a huge gravel terrace south of Boulder, Montana. Farther east, there are quartzites just northwest of Glendive, Montana, in southeast Montana. Klevberg has also found them on a high terrace south of Billings. So, it appears quartzites were carried east for hundreds of miles after leaving the mountains and valleys of southwest Montana.

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[7] Shelden, A.W., 1960. Cenozoic faults and related geomorphic features in the Madison Valley, Montana; in, Campau, D.E. and H.W. Anisgard (editors), *Eleventh Annual Field Conference*, Billings Geological Society, Billings, MT, p. 179.

[8] Janecke, S.U., C.J. VanDenburg, J.J. Blankenau, and J.W. M'Gonigle, J.W., 2000. Long-distance longitudinal transport of gravel across the Cordilleran thrust belt of Montana and Idaho. *Geology* 28:439–442.

Figure 16.7. A quartzite with abundant percussion marks from a lower planation surface in the southwest Gallatin Valley of southwest Montana.

Figure 16.8. Matrix-supported quartzite gravel on top of the Gravelly Mountains, southwest Montana. Boulder in center about 2 feet (0.6 m) long.

Quartzite Gravel on top of the Gravelly Mountains

There are also several outcrops of well-rounded quartzite cobbles and boulders on the top of the Gravelly Range. The range rises above 10,000 feet (3,000 m) msl in southwest Montana.[6,9] The quartzites there are well rounded and up to about 2 feet (0.6 m) in diameter (Figures 16.8 and 16.9). The deposit has a lot of finer-grained rocks surrounding the big rocks and a few of the larger rocks are scratched. More interestingly, the gravel occasionally lies on a bedrock surface that has been scratched with chattermarks: small, curved cracks commonly found in nested arrangements (Figure 16.10). Because this quartzite gravel demonstrated two out of three major diagnostic features for an "ancient" ice age (an ice age considered many tens of millions to over 2 billion years old), it was considered an ancient ice age deposit and was dated at about 50 million years old according to the uniformitarian paradigm.[10] Unfortunately, they also believe in a very warm climate at the time and so were forced to abandon their initial conclusion. It is interesting to contemplate how large, well-rounded quartzite boulders ended up on *top* of the Gravelly Mountains.

Figure 16.9. Well-rounded quartzite boulder about 2 feet (0.6 m) in diameter with numerous percussion marks from on top of the Gravelly Mountains, southwest Montana.

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9 Mann, J.A., 1954. Geology of part of the Gravelly Range Montana, *Yellowstone-Bighorn Research Project Contribution* 190, Yellowstone-Bighorn Research Association, Red Lodge, MT, pp. 34–36.

10 Oard, M.J., 1997. *Ancient Ice Ages or Gigantic Submarine Landslides?* Creation Research Society Books, Chino Valley, AZ.

Figure 16.10. Non-glacial striated pavement with chattermarks (left center) from the Gravelly Mountains, southwest Montana.

Figure 16.11. Quartzite boulder on top of the Divide quartzite.

Thick Quartzites in Deep Paleovalleys

Both limestone and quartzite rocks can be quite large and gather in very thick accumulations. Boulders up to 20 feet (6 m) long are found in McKnight Canyon northwest of Lima[11] and southeast of Lima near the continental divide.[12] Conglomerate in McKnight Canyon is around 9,500 feet (2,900 m) thick.[13]

But, the thickest pile of quartzite cobbles and boulders is barely into Idaho south of Lima, Montana. It is called the Divide quartzite and is estimated to be up to 15,000 feet thick (4,570 m) thick.[14] I am not sure how the uniformitarian scientists calculated this thickness, but it is probably by seismic methods. I drove up on a gravel road to the top of the accumulated quartzites from just west of Interstate 15 near Spencer, Idaho. I climbed over 1,000 vertical feet (300 m) over rounded quartzite gravel to the top where large quartzite boulders lie loose on the ground (Figure 16.11). A few of the quartzite rocks in the Divide quartzite are almost three feet (1 m) long with percussion marks and pressure solution marks. Pressure solution marks are different from percussion marks. They are small circular cavities caused from the pressure of one rock against another during deep burial. The rock recrystallizes at the point of contact. Quartzite rocks with pressure solution marks look like they have the measles but with white spots. (see Figure 13.2). How can we explain how billions of quartzite cobbles and boulders filled a gigantic crack that is about 30 miles long and 10 miles wide? See Chapter 22 for the answer.

The Proliferation of Names (in-depth section)

All the gravels and conglomerates in southwest Montana and adjacent Idaho have been given local names, such as the Beaverhead Conglomerate, Frontier Formation, Black Butte Gravel, Divide Quartzite Conglomerate, Lima Conglomerate, Red Butte

[11] Lowell, W.R. and M.R. Klepper, 1953, Beaverhead Formation, a Laramide deposit in Beaverhead County, Montana, GSA *Bulletin* 64:236–244.

[12] Wilson, M.D., 1970. Upper Cretaceous-Paleocene synorogenic conglomerates of Southwestern Montana. *American Association of Petroleum Geologists Bulletin* 54, p. 1,857.

[13] Ryder and Scholton, Ref. 4, p. 779.

[14] Ryder and Scholton, Ref. 4, p. 781.

Conglomerate, and Kidd Quartzite, but have been generally lumped into the Beaverhead Formation.[11] The Beaverhead Formation was raised to group status in 1985,[15] which means that it is composed of two or more formations. It represents what is called syn-tectonic conglomerate because the limestone gravels piled up *during* mountain uplift and erosion, and the far-travelled quartzite cobble and boulders arrived soon after from central Idaho, the closest source to the west and northwest. The Red Butte conglomerate, which is the main limestone unit, includes some quartzite. The limestone conglomerate is of much interest in regard to erosion and tectonics in southwest Montana before the quartzites spread into the area, so will be discussed further in Appendix 11.

[15] Nichols, D.J., W.J. Perry, Jr, and J.C. Haley, 1985. Reinterpretation of the palynology and age of Laramide syntectonic deposits, southwestern Montana, and revision of the Beaverhead Group. *Geology* 13:149–153.