Appendix 11

The Limestone Conglomerate of Southwest Montana

Limestone conglomerates of Southwest Montana are derived from the local "Paleozoic" formations of southwest Montana and adjacent Idaho. They are red because the limestone conglomerate often contains iron oxide in the matrix. The processes that eroded and deposited this conglomerate mostly happened before the exotic quartzites from the west were transported into the area. At the top of the Gravelly Range, limestone conglomerate underlies quartzite gravel. I noticed the limestone conglomerate east of Lima formed the sides of the mountains, while quartzite lined or filled the bottom of the valley (see Figure 16.3). The quartzites are usually large with percussion marks.

The limestone conglomerate is of interest because it sometimes forms entire mountains. Sphinx Mountain (3,442 m ASL) on top of the Madison Range (Figure A11.1) is composed of more than 3,300 feet (1,000 m) of mostly limestone conglomerate.[1,2] The limestone conglomerate on the northeast side of the Sphinx has crossbeds up to 330 feet (100 m) tall,[3] indicating rapid, catastrophic deposition. Paleocurrent directions are

Figure A11.1. Sphinx Mountain in the central Madison Range, southwest Montana, is an isolated erosional remnant composed of 3,330 feet (1,000 m) of limestone conglomerate.

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[1] DeCelles, P.G. et al., 1987. Laramide thrust-generated alluvial-fan sedimentation, Sphinx conglomerate, Southwestern Montana, *American Association of Petroleum Geologists Bulletin* 71:135–155.

2 Coffin, H.G., 2009. Two mystery mountains. *Creation Research Society Quarterly* 45(4):293–297.

[3] Beck, F.M., 1960. Geology of the Sphinx Mountain area, Madison and Gallatin Counties, Montana; in, Campau, D.E. and H.W. Anisgard, (editors), *West Yellowstone-Earthquake area, Billings Geological Society 11th Annual Field Conference Guidebook*, Billings, MT, pp. 129–134.

generally toward the northeast, indicating the material was transported *across the present deep Madison Valley to the west* before that valley formed.

Other mountains of limestone conglomerate are the Red Conglomerate Peaks and Knob Mountain, along the Montana-Idaho border south of Lima, Montana (Figures A11.2).[4] One of the highest peaks in the Snowcrest Range, northeast of Lima, is Antone

Figure A11.2. The Red Conglomerate Peaks on the southwest Montana/Idaho border, also composed of thick limestone conglomerate.

Peak, which consists of over 5,250 feet (1,600 m) of limestone conglomerate.[5] Mann describes a limestone conglomerate that occurs in widely scattered outcrops on the crest of the Gravelly Range.[6,7] The limestone clasts range up to 3 feet (1 m) in diameter and vary from rounded to subangular. Similar conglomerates outcrop in the Centennial region southwest of the Gravelly Range where they are up to 3,300 feet (1,000 m) thick.[8]

These conglomeratic mountains and the isolated locations of limestone conglomerate at lower elevations likely represent erosional remnants of a vast blanket of limestone conglomerate from sources nearby, since the mountains are of the same type of rock. This blanket must have been over 5,000 feet (1,500 m) thick in places and covered much of

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[4] Dyman, T.S., J.C. Haley, and W.J. Perry, Jr, 1995. Conglomerate facies and contact relationships of the Upper Cretaceous upper part of the Frontier Formation and lower part of the Beaverhead Group, Lima Peaks area, Southwest Montana and Southeast Idaho, *U.S. Geological Survey Bulletin* 2131, U.S. Government Printing Office, Washington, D.C., p. A8.

[5] Lane, B.B., B. Hupp, and B.H. Waltall, 1967. First day geological road log: West Yellowstone to Lima Reservoir; in, Henderson, L.B. (editor), *Montana Geological Society Guidebook*: 18th Annual Field Conference August 9–12, 1967—Centennial Basin of Southwest Montana, Montana Geological Society, Billings, MT, p. v.

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

[7] 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.

[8] Mann, Ref. 7, p. 35.

southwest Montana. It is likely that the blanket of limestone rocks came from the west and southwest, probably as the granitic Idaho batholith rose up and shed the sedimentary rocks that once covered the area. The deposition of a thick sheet of limestone conglomerate with the transport of clasts up to 19 feet (6 m) long, followed by erosion of much of this conglomerate during tectonic uplift and sinking, strongly indicates catastrophic action. I place it during the late Flood differential vertical tectonics as described in Part II.