**Great Basin National Park 2**

1. Looking west across the southern Snake Range you can see the basic structure tilting layers to the south such that the oldest rocks are to the north. That the grain (strike) of this structure is perpendicular to that of the Basin and Range suggests that it is related some earlier orogeny.
2. The basic structure is complicated by the intrusion of several Mesozoic and Early Cenozoic plutons. These generally lay below the detachment surfaces. Heat from such igneous intrusions helped metamorphose the Paleozoic quartz sandstones into quartzite. Quartzite’s resistance to erosion combined with the pluton-thickened crust here, …
3. … both contribute to Wheeler Peak’s status as the second highest peak in Nevada.
4. That altitude puts Wheeler Peak and a significant portion of Great Basin National Park above the tree line, where glaciers have formed on shaded northerly slopes.
5. The glacier at the base of Wheeler Peak contains an exceptionally large amount of rock debris along with the ice, qualifying it as a rare “rock glacier”.
6. Rock is added to the glacier from the extensive talus deposits here, which are formed by rock debris falling and accumulating at the base of the frost wedged slopes. The Thumb is a good example of the extremely angular topography that results from frost wedging.
7. Notice the rather circular basin surrounding the rock glacier, called a cirque. Cirques form the action of glacial ice frozen to the rocks of the surrounding valley, which are plucked away when the glacier moves. Since rock protrusions into the cirque are more susceptible to plucking than smooth surfaces, they tend to be removed and the basin becomes ever more circular and bowl-like.
8. If the glacier melts, then a circular lake will fill the cirque called a tarn. There are several tarns in the park including Lake Teresa,…
9. … and Lake Stella. Tarns usually form in cirques, but they can form anywhere along glacial troughs where plucking removes soft or fractured rocks.
10. At slightly lower elevations ice melts to provide just enough water to support Bristlecone pines.
11. Few other plants can survive under these harsh conditions, …
12. … but the Bristlecone pines, by virtue of their long life spans, can take advantage of long term variations in climate which eventually become favorable to growth.
13. Although certain cloning plants are older, Bristlecone Pines are the oldest *single* plants on earth. This one is 3500 years old.
14. But this one, dubbed “Prometheus”, was over 5000 years old when it was cut down in 1964 for dendrochronology studies. It was the oldest living single organism ever dated, and now it’s dead. Criticism over how permission to cut down the tree was granted contributed to the establishment of Great Basin National Park in 1986. So if you’re sad about the loss of the old tree, it might help to know that its sacrifice helped protect the rest of the grove and its rings have added greatly to our understanding of Holocene climatology.
15. Melt water eventually makes its way to lower elevations, …
16. … where it soaks into the loose gravel of low-lying valley sediments. The water table becomes especially high at the confluence of groundwater sources and that’s essentially where Lehman Caves are. One of the park’s most popular attractions, Lehman Caves are situated on an outcrop of Paleozoic limestone mostly surrounded loose gravel. Groundwater from the gravels permeated into fractures within the limestone, eventually dissolving it to form the caves.
17. Notice how nearly level the caves are in profile.
18. That’s because Lehman Caves formed at or very near the water table, probably during glacial ages when the climate was wetter and the water table was higher.
19. Limestone dissolves in the presence of acidic water, which usually results from the reaction of rain water with atmospheric CO2 to form H2CO3 (carbonic acid). Surface water that soaks into the ground is relatively acidic, but it does not dissolve much limestone above the water table because it only remains in contact with the rock for a short time. The water in the saturated zone below the water table moves slower than water percolating down, so it is in contact with the rock long enough such that significant solution can take place. Since the reaction of carbonic acid with limestone neutralizes the acid, the optimal conditions for dissolving limestone occur at and just below the water table where fresh carbonic acid is added.
20. Reduced precipitation following the ice ages lowered the water table, drained the caverns and exposed them to the conditions in which speleothems (cave decorations) could form.
21. The decoration process works like this: Limestone dissolved in the acidic water above the   
    cave, re-precipitates when the water’s acidity is reduced upon entering the air–filled cavern where CO2 can escape from the dripping water. Because acidity is most greatly reduced on the surface of a drop where the CO2 escapes, limestone precipitates on the edges of the drop, not the center. This results in hollow speleothems called “Soda Straws”.
22. Soda straws and other icicle-like speleothems on the ceiling of caverns are called stalactites whereas those on the cavern’s floor are stalagmites.
23. Columns are formed when the two join.
24. Lehman Caves is a fairly typical limestone cavern, except that it contains several roughly circular speleothems known as shields. These are apparently very rare in other caverns. I could find no explanation for why they are common here.