

## WRI- Family Activity

A fun local hike that not many people know about is the Chuck-a-Walla Trail, off North Bluff Street, just north of the Snow Canyon Parkway intersection. The trail is part of the Red Cliffs Desert Reserve. There are many beautiful trails that are part of the reserve. The BLM has a nice map I recommend showing the entire reserve, its trailheads, campgrounds, etc.



Figure 1 Chuck-a-Walla Trailhead Location

Along the trail you will encounter four major geological formations: 1) the Triassic Moenave layer, 2) the Jurassic Kayenta layer, 3) the Jurassic Navajo layer, and 4) local Quaternary Basalts. The first three layers are from the Mesozoic Period, which is the era of the dinosaurs. The fourth is quite recent and correlates with the lava rocks that cap many of the hills in the St. George area.

As you first start along the trail you will be in the Navajo formation. This is the same formation that makes the beautiful cliffs of Zion National Park, the Red Cliffs Recreation Area, and Snow Canyon. Near the trail head you will mostly see the chalk and anchors of rock climbers.

However, if you go exploring a little on some of the outcrops and up into the crevasses you will see the lines and patterns of the ancient sand dunes that created these layers.

As you continue along the trail it will descend into the Kayenta formation and to the south you will see the Moenave. Above you here and there and deep into the trail you will see the basalt. On this first hike we just wanted to help the kids become familiar with the trail. We walked along the path and went off exploring in areas where we could see the rock formations more closely.

The Chuck-a-Walla trail is a great trail for learning about St. George's geology and for thinking about the pioneers and how the early landscape looked when the pioneers arrived. This first hike focuses on geology. Future visits to the area will review the flora and fauna of the reserve as well as some pioneer adventures with the kids.

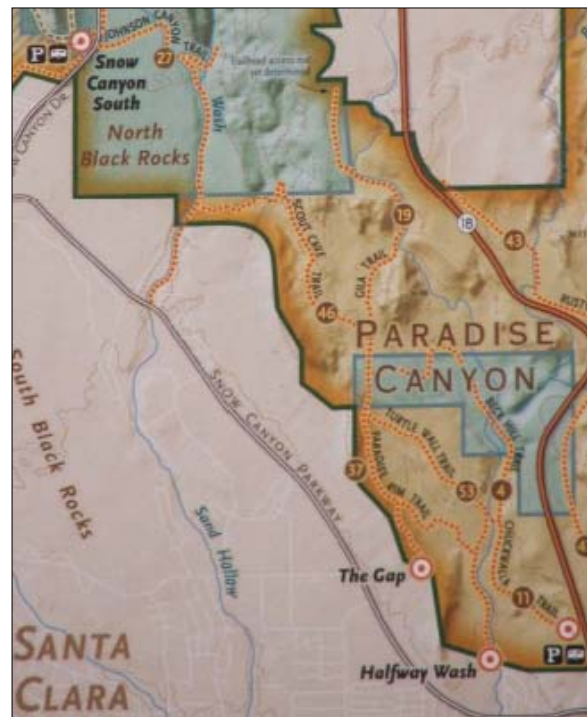


Figure 2 Paradise Canyon Trails

The following is a short description of the layers and their probable history, written by Rebecca.

The Moenave layer (Tmo) was formed during the late Triassic Period, around 225-200 million years ago according to scientists. Based on our research, this would probably correspond to the time between the Flood and the dividing of the continents at the time of Peleg, between about 2344 and 2300 B.C. At that time, Southern Utah was a shallow ocean near the seashore, or a tidal flat. The Moenave layer is made of sediment that was brought by large rivers and deposited on the shallow ocean floor.



**Figure 4 Moenave Layering**



**Figure 5 Moenave Ripple Marks & Dinosaur Tracks**



**Figure 3 Ganges River Delta, Bangladesh**

Since the earth was still quite saturated with water from the Flood, erosion was occurring rapidly, and a lot of sediment was deposited in a short time. The sediment was red because it was so hot that the iron in the sediment oxidized (turned to rust). At that time, the rivers and ocean would have appeared red (as do rivers and ocean in modern Bangladesh) because there was so much red sediment in the water.

The Kayenta layer (Jk) formed during the early Jurassic Period, around 200 –175 million years ago according to scientists. From our research, this would correspond to the time between the dividing of the continents and the Tower of Babel, between about 2300 and 2225 B.C.



**Figure 6 Inland River System of the Ganges, Bangladesh**

Sedimentation had pushed the shoreline north and this area was now a system of meandering rivers which were constantly changing their courses. Within the Kayenta, you can sometimes see the shape of an old river bed which was later abandoned and then filled in with a different type of sediment. The Kayenta appears more diverse than the Moenave because there were many different types of sediment and sizes of sediment brought by the many, many rivers and tributaries that existed here.



**Figure 7 Kayenta Layering**



The Navajo layer (Jn) formed during the late Jurassic Period, around 175-150 million years ago according to scientists. This would also correspond to the time between the dividing of the continents and the Tower of Babel, but closer to the Tower or Babel, or between about 2225 and 2150 B.C. At that time, the St. George area was covered by massive sand dunes. The dividing of the continents is probably the event which set in motion the gradual drying of the climate and uplifting of the land which, over time, led to the formation of sand dunes. The sand dunes turned to rock (were lithified) later when the ocean came back over the area, bringing limestone, which acts as cement.



**Figure 9 Zion National Park Navajo Sandstone**



**Figure 10 Coastal Dunes of Namibia**



**Figure 8 Chuck-a-Walla Trailhead & Navajo Hills**

The Quaternary Basalts (Qb) were formed during the Quaternary Period, around 5.3 million years ago according to scientists. This probably corresponds to the time of the death of Christ. During the great destruction which occurred at that time, lava came out of numerous cinder cones and fissures around the base of Pine Valley Mountain. Since lava just flowed out of the earth and later hardened into rock, it's called flood basalts. When the lava was hot and flowing, it filled in the areas that were valleys at the time. What used to be hills were made of softer rock, so they have eroded away while basalts remained, and now the basalts are high points.



**Figure 11 Quaternary Basalts capping Navajo Sandstone on Chuck-a-Walla Trail**



**Figure 12 Flood Basalts from Pine Valley Mountain extending into Inverted Valleys around St. George as viewed from Webb Hill**