



Arizona Rocks 45

Text and photos by Ray Grant

Unconformities are gaps in the geologic record; there are no rocks present for some period of geologic time. In most cases uplift and erosion occur before the deposition of new rocks on the eroded surface. There are three major types of unconformities. Nonconformities where the rock on the bottom is igneous or metamorphic rock that has been uplifted and eroded down and sedimentary rocks are deposited on the top. Angular unconformities where a sequence of sedimentary rocks is tilted or folded and later sedimentary rocks are deposited on the eroded surface so there is an angle between the sets of layers. Disconformities are where the sedimentary layers are parallel but there is a time gap between the depositions of the layers. Disconformities are the hardest to recognize and usually fossils are needed to date the parallel layers to determine the time gap between the layers.

Unconformities are found throughout Arizona. The state has a long geologic history with many periods of activity and erosion followed by deposition of sediments. All three types of unconformities can be seen in the Grand Canyon. The amount of time difference across the unconformity varies from location to location. The unconformity between the Precambrian rocks and younger sediments has been called the "Great Unconformity". Clarence Dutton first used the term and J. W. Powell uses that term in his book *The Exploration of the Colorado River and its Canyons*. The time gap at the Great Unconformity can vary but in many places it is over a billion years hence the name great. At some places in the Grand Canyon the Vishnu Schist that is about 1.8 billion years old is overlain by the Tapeats Sandstone that is about 500 million years old, so the time gap is about 1.3 billion years. So any rocks deposited during that 1.3 billion years have been eroded away. Next month the really great unconformity in the Phoenix area.

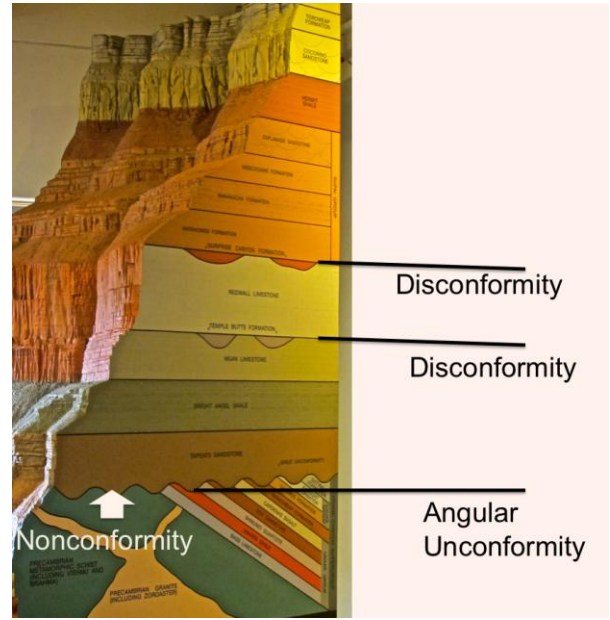
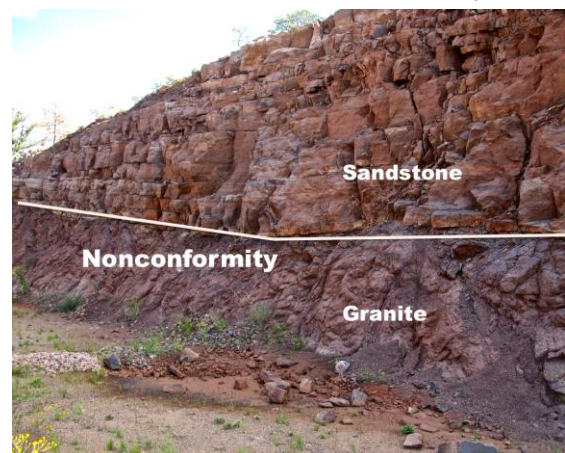


Diagram showing three types of unconformities in the Grand Canyon



Some unconformities in the Grand Canyon



The "Great Unconformity" in a road cut on route 260 north of Payson, the granite is about 1.6 billion years old and the sandstone about 500 million years so the time gap is about 1.1 billion years. During those 1.1 billion years the area was uplifted into mountains and they were eroded down to a relatively flat surface.