



## Arizona Rocks 24

Text and photos by Ray Grant

We are starting the third group of rocks, the metamorphic rocks. Metamorphic rocks are those that have changed from any pre-existing igneous or sedimentary rock by an increase in temperature and/or pressure to form a new type of rock. The increase in temperature and pressure is usually associated with burial in the earth's crust.

As with the other rock types (igneous and sedimentary) texture and mineralogy will be used to classify metamorphic rocks. There are two major classes of metamorphic rocks, foliated and massive. The foliated rocks have flat or needle shaped minerals that grow parallel to each other in response to the pressure during their formation. A massive texture develops in rocks that have irregular shaped randomly oriented minerals that do not line up.

Also, for metamorphic rocks, there are two things we would like to know, first what was the original rock and second what the temperature and pressure were that caused the metamorphism. The mineralogy and chemistry of the rock will be used to answer these questions.

Two, billion years ago there was no Arizona, there was only ocean here. From 1.8 to 1.7 billion years ago series of igneous and sedimentary rocks were added to North America to form Arizona. These early rocks have all been metamorphosed and form the basement rocks of Arizona. Over most of the state these older rocks are covered with younger rocks, but there are areas scattered around where the younger rocks are all eroded away. As you travel around the state, when you see rocks that are standing vertically you are most likely looking at metamorphic rocks.

Next month we will begin the classification and names of metamorphic rocks.



Vertical metamorphic rocks at Piestewa Peak Phoenix



Vertical metamorphic rocks in the inner gorge of the Grand Canyon



Vertical metamorphic rocks in San Tan Valley