



## Arizona Rocks 55

Text and photos by Ray Grant

Last month I wrote about the Navajo Volcanic Field and the volcanic necks and dikes in the landscape of the Four Corners area. The rocks found at these volcanoes are very unusual and have names most of us have never heard; minette, monchiquite, limburgite, and trachybasalt (see the attached map to see where these different rocks are found). I looked these rocks up since I had no idea what they are, and you can do the same if you really want to know what they are. The one rock in the area most of us have heard about is kimberlite because that is the rock that is mined for diamonds throughout the world.

Unfortunately, no diamonds have been found in Arizona and the conclusion of several studies is that these rocks are not the same as those with the diamonds. The unusual natures of these igneous rocks have led to many studies about their origin. The result is that they are from selective melting of parts of the mantle from depths as deep as 100 miles. Reaction with the crustal rocks as these magmas moved to the surface may also have caused some of the chemical variations.

The area has been of interest since the 1800s because of the pyrope garnets found with these volcanic rocks and the chance of finding diamonds. George F. Kunz in *Gems and Precious Stones of North American*, 1890, describes the garnets from the region. "Garnets have been observed associated with grains of peridot, a chrome pyroxene, and a hyaline chalcedony. They are found on ant hills and near the excavations made by

scorpions. They are collected by soldiers and Indians, and sold to the Indian traders, who send them to the large cities in lots of from an ounce upward." A reference from the 1960s states: "garnet and olivine crystals were found in abundance on the surfaces of ant hills." Because of the deep red color these garnets have also been called Arizona rubies.



Pyrope garnet from the Navajo Volcanic Field



Peridot (olivine)

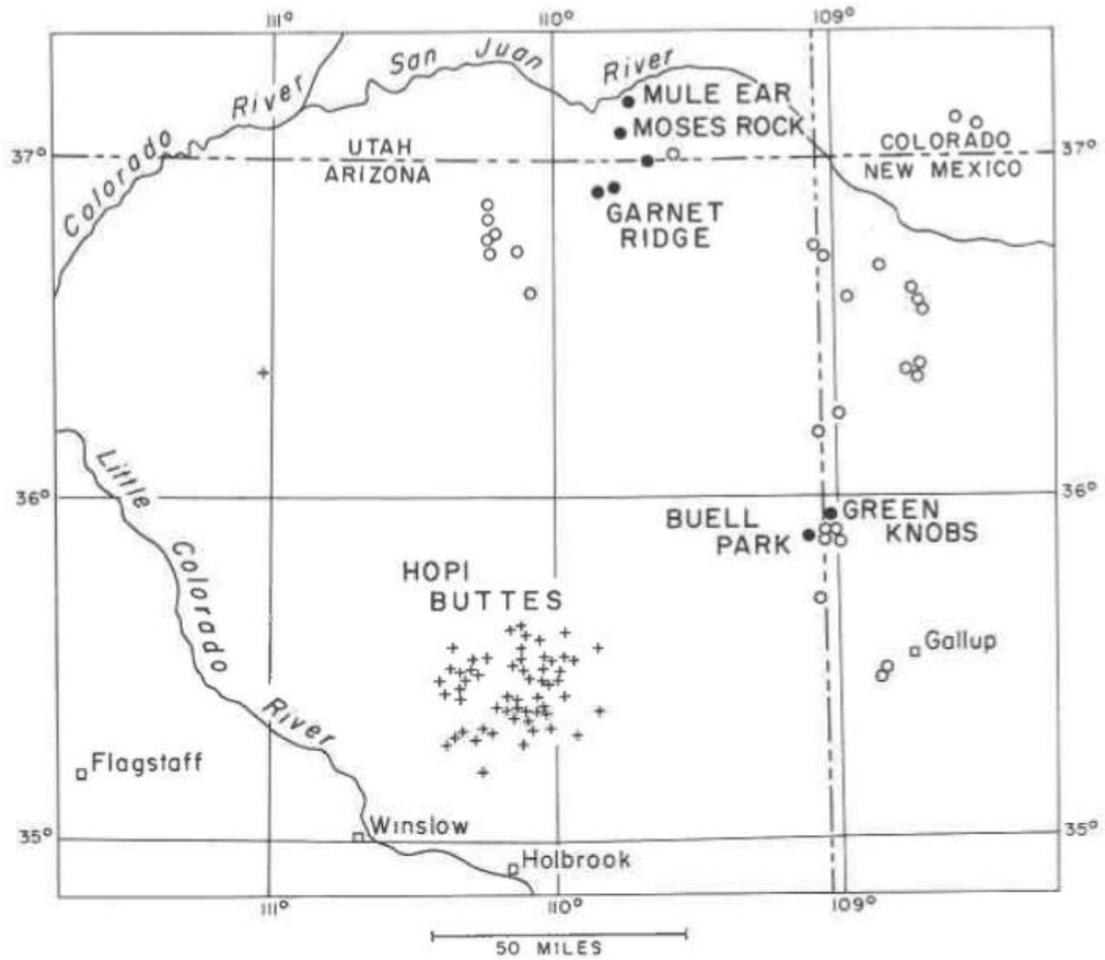


FIG. 1. Map of northeastern Arizona and adjacent parts of New Mexico, Utah, and Colorado showing distribution of kimberlite (black circles); minette and trachybasalt (open circles); monchiquite and limburgite (crosses). Mainly after Shoemaker (1956) and Shoemaker, Roach, and Byers (1962).