in size from thin dikelets with thicknesses of 2 cm to 5 cm to irregular pods a few meters across. Locally abundant quartz veins also cut the quartz monzonite.

The Ladron quartz monzonite is coarse grained, exhibits a rather uniform texture, and is composed of approximately equal amounts of K-feldspar, sodic plagioclase, and quartz. It differs most strikingly from the Capitoite granite in containing biotite and muscovite and in lacking fission. Accessory minerals are apatite, magnetite, and epidote. K-feldspars exhibit typical girdle twinning of microcline and usually possess twin textures.

STRUCTURE

The structure of the Precambrian rocks in the Ladron Mountains varies from simple to complex. The quartzite sequence appears to represent the eastern limb of a north to northeast-trending anticline. The western limb is not exposed. Although foliation is generally parallel to bedding, small-scale (a few centimeters to a few meters) isoclinal and monoclinal folds occur in some areas. In the northern part of the range, the granite plutons have generally disrupted the metamorphic sequence which occurs as a large roof pendant between (and within) the Capitoite granite and the Ladron quartz monzonite, and as inclusions in these bodies. Complex development of folded migmatics occurs along the northeastern border of the Ladron quartz monzonite in Colton del Atahualpa vicinity.

Faults of both Precambrian and Cenozoic age occur in the range. The most complex development of Precambrian faults, which appear to be chiefly high-angle normal faults, occurs about 2 km (1.2 miles) south of Ladron Peak in the quartzite sequence. The major Cenozoic faults are the Ladron Fault on the west, the Cerro Colorado fault on the southeast, and Jette Fault on the northeast. The first two are high-angle normal faults, while the Jette Fault is a low-angle normal fault dipping to the east. The Precambrian rocks adjacent to the Jette fault are highly sheared and folded, and in places mineralized.

Two major joint systems are best developed in the Ladron quartz monzonite. One system strikes approximately north and dips 75° - 85° E, the other strikes northwest and has a vertical dip. A minor subhorizontal joint system also occurs in this area and, together with the two major systems, is responsible for the knobby weathering habit of the Ladron quartz monzonite.

METAMORPHISM

Metamorphic mineral assemblages in the Precambrian rocks of the Ladron Mountains are summarized as follows:

- Monzonite-quartz-chlorite-sodic plagioclase-biotite
- Monzonite-quartz
- Monzonite-quartz-chlorite
- Monzonite-quartz-chlorite-chloritoid-biotite-garnet
- Blue-green hornblende-sodic plagioclase-quartz-biotite epidote

These assemblages indicate the transitional greenschist-amphibolite facies of regional metamorphism. This low-grade metamorphism was not sufficiently intense to completely destroy primary textures and structures in the metasedimentary and meta-igneous rocks. Foliation ranges from poorly (or not at all) developed in some of the quartzites and volcanic rocks to well-developed in the phyllites and schists. Cataclastic foliation and related structures are present in the upper part of the quartzite sequence and in the southern and eastern parts of the Capitoite granite.

The effects of contact metamorphism around the granite plutons are minimal. Contact metamorphic mineral assemblages were not recognized. Such evidence together with the overall sparsity of slates and phyllites in the granite rocks suggests the parent magma were relatively dry when emplaced.

MINERAL DEPOSITS

Minor occurrences of arsenic and molybdenum with associated quartz, calcite, and limonite occur throughout fault zones and within some of the amphibolites, phyllites, and metavolcanic rocks. Neither of these copper minerals, however, appear to have economic potential. Galena, fluorite, and amethyst quartz occur at the Juan Torres prospect about 3 km (1.8 miles) northwest of Cerro Colorado. Fault gouge is also mineralized with molybdenum along the Ladron fault north of this prospect. Barite veins, some of which have been mined, occur in the altered facies of the Capitoite granite in the northwest part of the range. Black (1964) reports small deposits of specular hematite in veins and replacing quartz in the Ladron quartz monzonite. The only deposit of economic importance in the Ladron Mountains was the oxidized uranium deposit at the Jette mine. This deposit, located about 2 km (1.2 miles) northeast of the Browns [Lazy C, Bar J] Ranch, occurs in fault breccia along the Jette fault. It is associated with limonite, arsenite, malachite, barite, and quartz, all of which partially replace the fault breccia. West of the mineralization in the Ladron Mountains appears to be of Cenozoic age.

GEOLLOGIC HISTORY

The oldest event recorded in the Precambrian section of the Ladron Mountains is the accumulation of elastic sandstones rich in quartz and feldspars. The detrital feldspars in these rocks appear to reflect both a tectonically active source area of granite or granitic composition and rapid erosion and burial. Amphibolite in the section, which becomes progressively more abundant in the amphibolite-phyllite unit, reflects the onset of basic magmatism. The abundance of phyllites in the upper portion of the quartzite sequence records more distant, although not necessarily more tectonically stable, source areas. Then follows a rather abrupt onset of siliceous volcanism and corresponding decline in basic volcanism. Next, the area is buried, metamorphosed, folded about northeasterly-trending fold axes, and intruded by the Capitoite granite. This pluton appears to represent a syntectonic body emplaced at relatively shallow levels. During its emplacement, the quartzite and metavolcanic sequences are deformed and partially granitized. The final event in the Precambrian is the shallow intrusion of the Ladron quartz monzonite.

Like other Precambrian rocks in New Mexico, the Precambrian rocks in the Ladron Mountains are rather unusual in terms of plate-tectonic rock associations. The association of immature, elastic sediments with bimodal igneous rocks in which siliceous and mafic elements greatly dominate is not widely recognized in the Phanerozoic. The absence of andesites, basaltic andesites, and dacites seems to eliminate a convergent plate-boundary model; the absence of ophiolites does not favor a divergent plate-boundary setting. The early stages of development in the Ladron Mountains characterized by vertical uplift and basaltic volcanism may record the evolution of an incipient continental rift system. However, the dominance of siliceous volcanism and plagioclase does not characterize Phanerozoic rift systems. Such voluminous siliceous magmatic activity may have reflected partial melting of the lower crust in response, perhaps, to an ascending mantle plume. A lower crustal source for siliceous igneous rocks in other Precambrian terrains in central New Mexico is favored by trace-element studies. 

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