

ZEOLITES AND ASSOCIATED MINERALS FROM  
RED ROCK CANYON, CALIFORNIA

Red Rock Canyon, one of the scenic canyons of the Mojave Desert, 120 miles from Los Angeles, is carved across a tilted fault block, known as the El Paso Mountains. Exposed in the canyon are a basement complex of granitic rocks and associated old metasedimentary types intruded by plutonic sequences, all of which are overlain unconformably by a sequence of bedded rocks, composed of water-laid tuffs and ash beds, and intercalated basaltic lavas. This sequence is colored pink, green, and white in varying intensities, which, in contrast to the black basalts makes a spectacular panorama when viewed at the correct time of day. The geologic setting of the canyon has been briefly discussed by several writers.<sup>9</sup>

The minerals of interest are found in the cavities of the basaltic flows, which are sometimes uniformly vesicular and amygdaloidal. The amygdules are usually geodal, with interesting small, but perfect, crystals in each cavity. Commonly several minerals are found, including analcite, natrolite, calcite, the quartz family minerals—quartz, chalcedony, jasper—and occasionally opal. In other parts of the same region, opal is unusually abundant, and has been prospected commercially.

Analcite occurs in perfect, white to transparent, trapezohedrons, often completely encrusting vesicular cavities in the basalt. Analcite crystals vary from microscopic size up to .5 cm. in diameter. Projecting into the amygdules, resting on the analcite, are prisms of natrolite, in radiating bundles of transparent crystals. The crystals are usually .5–1.0 cm. in length, and diverge radially into individual prisms capped by a simple pyramid. Other specimens show crystals of calcite filling the balance of the amygdule; at other times chalcedony completes the filling. More commonly, however, natrolite is the last mineral to form in the cavities. Some vesicles are completely filled with red, yellow, or greenish jasper, or, on occasion, with opal. Quartz geodes are usually preceded by chalcedony linings and followed by natrolite or calcite.

The general paragenetic sequence is clear, but exceptions to each case were noted. Chalcedonic solutions were permeating the basalts throughout the period of formation of the entire sequence, because chalcedony forms the initial linings and final fillings for some vesicles. Analcite followed the chalcedony, as coatings of analcite trapezohedrons on chalcedony are common. Natrolite or calcite came next, the sequence indeterminate. However, natrolite and analcite must have partially overlapped because a few sharp natrolite crystals have analcite crystals perched on the natrolite terminations. This condition is rare, however. Where jasper and opal fill vesicles, no other minerals have been found.

<sup>9</sup> Baker, C. L., *op. cit.* (1912); Miller, William J., Red Rock Canyon, California: *Jour. Geog.*, 25, 330–336 (1926).