

EXPLANATION

<p><b>Quaternary</b></p> <p><b>Upper Quaternary</b></p> <p>ai Alluvium Silt, sand, and gravel in floodplain, stream channel, and alluvial fan deposits.</p> <p>sd Slide deposits Fragmented rockfall debris, including talus from Mesozoic sedimentary rocks and Quaternary basalts.</p> <p>lp Lake and pond deposits Clay, silt, sand, and marl deposited behind slump and slide block dams in Zion Canyon, Hop Valley, and several canyons in the northwest corner of the Park.</p> <p><b>Lower Quaternary</b></p> <p>ca Alluvium Silt, sand, and gravel remnants of floodplain, stream channel and alluvial fan deposits, preserved primarily in Coalpits Wash area and along the Virgin River west of Rockville. In the latter area the cemented gravels correspond to the "Teranuseop Formation" of Gregory, 1950.</p> <p>os Slide deposits Fragmented rockfall debris, including talus from Mesozoic sedimentary rocks, cemented with calcite and forming resistant benches high up on the slopes of lower Zion Canyon and other major canyons in the Park.</p> <p>ls Lake deposits Clay, silt, sand, marl, limestone (and in Coalpits Wash (terra) deposited in low-landed lakes in Coalpits Wash and the canyon of the Right Fork of North Creek and dating respectively approximately 0.5 and 0.26 million years before present. A fossil camel track has been recovered in Coalpits Wash, and palynomorphs in clays from both lakes show the existence nearby of much more mesic conditions than now.</p> <p>vr Volcanic rocks Basalt flows and cinder cones, the former occupying canyons and structural benches and in many cases capping mesas. Cinder cones are associated with normal faults. Important outliers of rhyolite have been identified (Qr) to differentiate them from basalt outliers (Qb). Dated basalts range in age from approximately 0.26 to 1.4 million years before present.</p>	<p><b>Cretaceous</b></p> <p>kd Dakota Formation Sandstone, tan, fine-grained, containing fossil plants and pelecypods, overlying conglomerate, at the top of Stone Ranch Mountain. Approximately 100 feet (30m) exposed in the Park.</p> <p><b>Major disconformity</b></p> <p><b>Jurassic</b></p> <p>jc Carmel Formation Limestone, tan and gray, sandstone and siltstone, banded pink and gray, gypsum and sandstone, fine-grained, constituting four members. Thickness approximately 550 feet (260m) in the mapping area.</p> <p>uj Unconformity</p> <p>tc Temple Cap Formation Sandstone, gray and tan, crossbedded, overlying sandstone, red-brown, faceted, with thin bed red shale. Thickness 0-260 feet (0-80m) in the Park.</p> <p>mi Minor unconformity</p> <p>jn Navajo Sandstone Sandstone, white, gray, yellow, tan, pink, medium to fine-grained, crossbedded increasingly toward top. Maximum thickness attained at West Temple, an estimated 2000 feet (610m).</p> <p>ky Kayenta Formation Mudstone, reddish brown, siltstone, and sandstone representing stream deposition. Dinosaur trackways are relatively common. A tongue of crossbedded Navajo Sandstone occurs about midway in the formation in the southeastern part of the Park. Thickness approximately 600 feet (180m).</p> <p>mo Moenave Formation Sandstone, massive, overlying reddish-brown siltstone and mudstone stream channel and floodplain deposits. Thin gray lake clays are present beneath the upper sandstone. Total thickness approximately 490 feet (150m).</p> <p>uc Unconformity</p> <p>ch Chinle Formation Shale, massive, gray, and white, weathered to clay on exposure, with sandstone and limestone lenses; overlying the Shinarump; a light tan conglomeratic sandstone. Thickness approximately 400 feet (120m).</p> <p><b>Major unconformity</b></p> <p>mo Moenkopi Formation Siltstone and mudstone, red and red-brown, with many gray evaporitic shale beds in the upper part and two limestone members in the lower part. Thickness approaches 1800 feet (550m) in the Park.</p> <p>uc Unconformity</p> <p>ka Kaibab Formation Limestone, yellowish gray, massive, containing chert and marine fossils. Only a few hundred feet of the upper part are exposed within the Park.</p>
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**Geological Features**

Contour  
Dashed where inferred, dotted where concealed.

Normal fault  
Dashed where inferred, dotted where concealed. Ball and bar on downthrown side.

Thrust fault  
Dashed where inferred, dotted where concealed. T on upper plate.

Boundary of klippe  
Dashed where inferred, dotted where concealed. Barbs located on body of klippe.

Anticline  
Dashed where inferred, dotted where concealed.

Monocline  
Dashed where inferred, dotted where concealed. Arrow points in dip direction on the flank of the fold.

**Strike and dip of strata**

Horizontal

Inclined 35 degrees toward north

Vertical

Overturned 55 degrees toward north

**References**

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Geology by Wayne L. Hamilton, assisted in November and December, 1974 by Helmut E. Ehrenspeck.

