

Weathering Photos & Diagrams

PHOTOS

Exfoliation / Pressure Release



Sometimes rocks weather by peeling off in sheets rather than eroding grain by grain. Exfoliation is scientific Latin for that process. It can happen in paper-thin layers on individual boulders, or it can take place in thick slabs as it does here, in Yosemite Valley, California.

The great white granite domes and cliffs of the High Sierra, like Half Dome, owe their appearance to this type of exfoliation. These rocks were emplaced as molten bodies, or plutons, deep underground, raising the Sierra Nevada range. Erosion then unroofed the plutonic rocks and took away the pressure of the overlying rock. As a result, the solid rock acquired fine cracks through pressure-release jointing. The combined work of gravity, weathering, plant roots, and the expansion of freezing water opened up the joints further and loosened these slabs.

(<http://geology.about.com/library/bl/images/blxfoliation.htm>)

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Jointing



Rocks are brittle, so they crack, but they crack very carefully. When this body of gneiss was deep underground during the folding and uplift of the southern Sierra Nevada, the stresses made it fracture. The cracks are called joints. You can see that they come in three different sets. The first set is parallel to the surface of this rock exposure, so that it looks like layers. The second set runs up the photo and the third runs diagonally from upper left to lower right. The stream in the picture has plucked out the resulting joint blocks to form its rugged streambed.

Joints are like faults, except that there is no movement along them. Joint patterns can be mapped to yield insights into the stresses that have affected the region during its geologic history. Sometimes jointing can occur as a body of rock is uncovered by erosion. As the overlying weight is removed, internal stresses may create jointing that result in the erosional process of exfoliation. That is common elsewhere in the Sierra, and perhaps it's an element at this locality too.

(<http://geology.about.com/library/bl/images/bljointing.htm>)

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Frost Shattering



Blocks are boulders being born. Solid rocks, like this granitic outcrop on Mount San Jacinto in southern California, fracture into blocks under a set of conditions lumped under the name physical weathering. The most important of these conditions is temperature, which fluctuates above and below freezing almost every day. Water in cracks will expand as it freezes at night, forcing cracks wider, then trickle further into the expanded crack during the day. To a lesser extent, the cycling of temperature also affects the various minerals in the rock, causing the grains to loosen. Another factor that guides the direction of cracking is internal stresses in the rock, which cause jointing and exfoliation. Between these forces, the work of tree roots and earthquakes, mountains are steadily dismantled into blocks that tumble down the slopes.

As blocks work their way loose and form steep deposits of talus, their edges begin to wear down and they officially become boulders. When erosion wears them down smaller than 256 millimeters across, they become classified as cobbles.

(<http://geology.about.com/library/bl/images/blblocks.htm>)

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Spheroidal Weathering



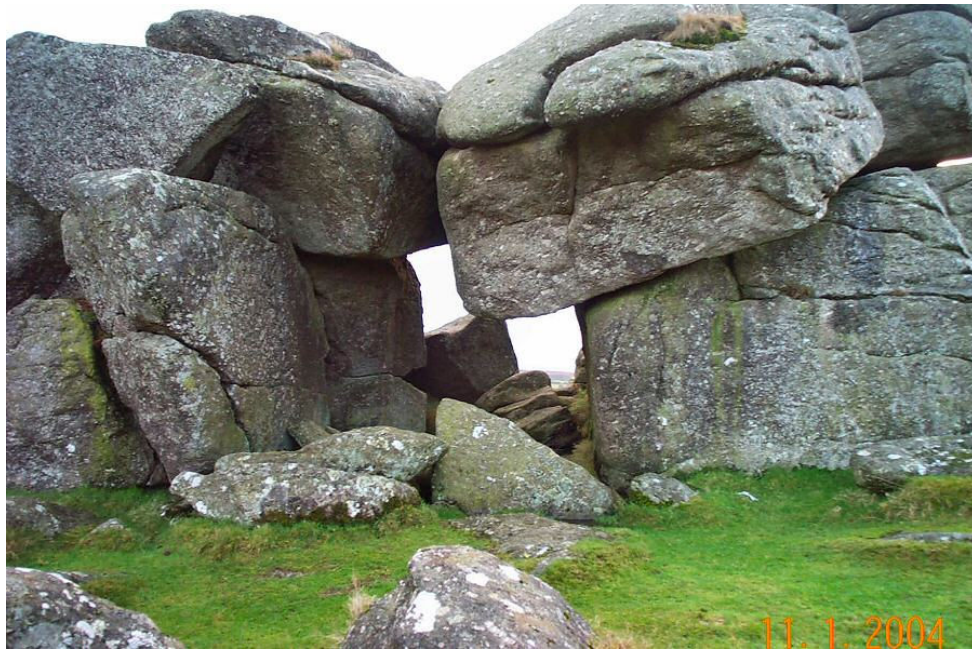
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(<http://uregina.ca/~sauchyn/geog323/279.jpg>)

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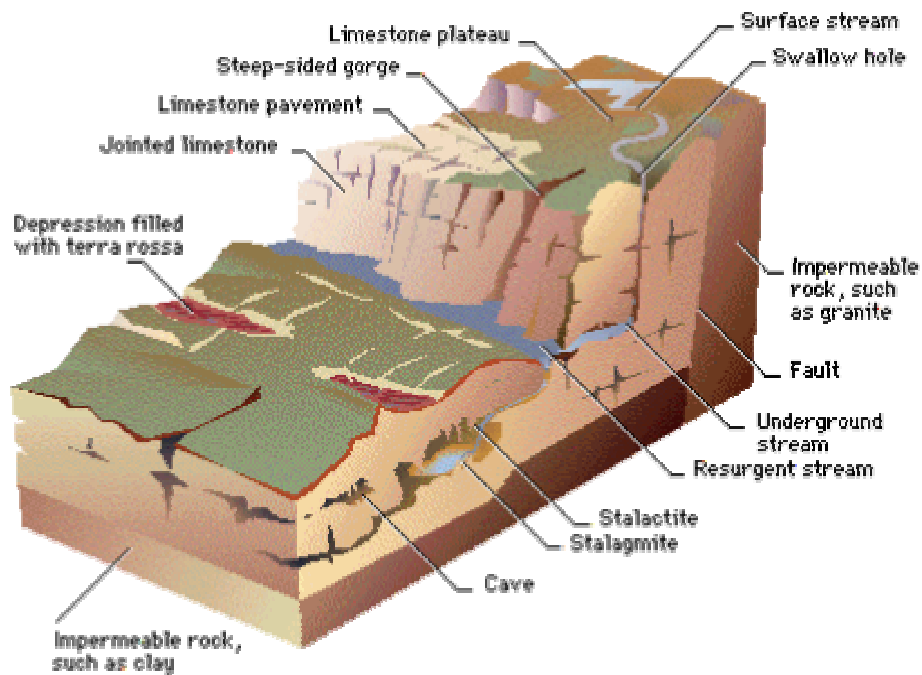
Granite Tor



(<http://www.richkni.co.uk/dartmoor/pix/miscell/bonehill.jpg>)

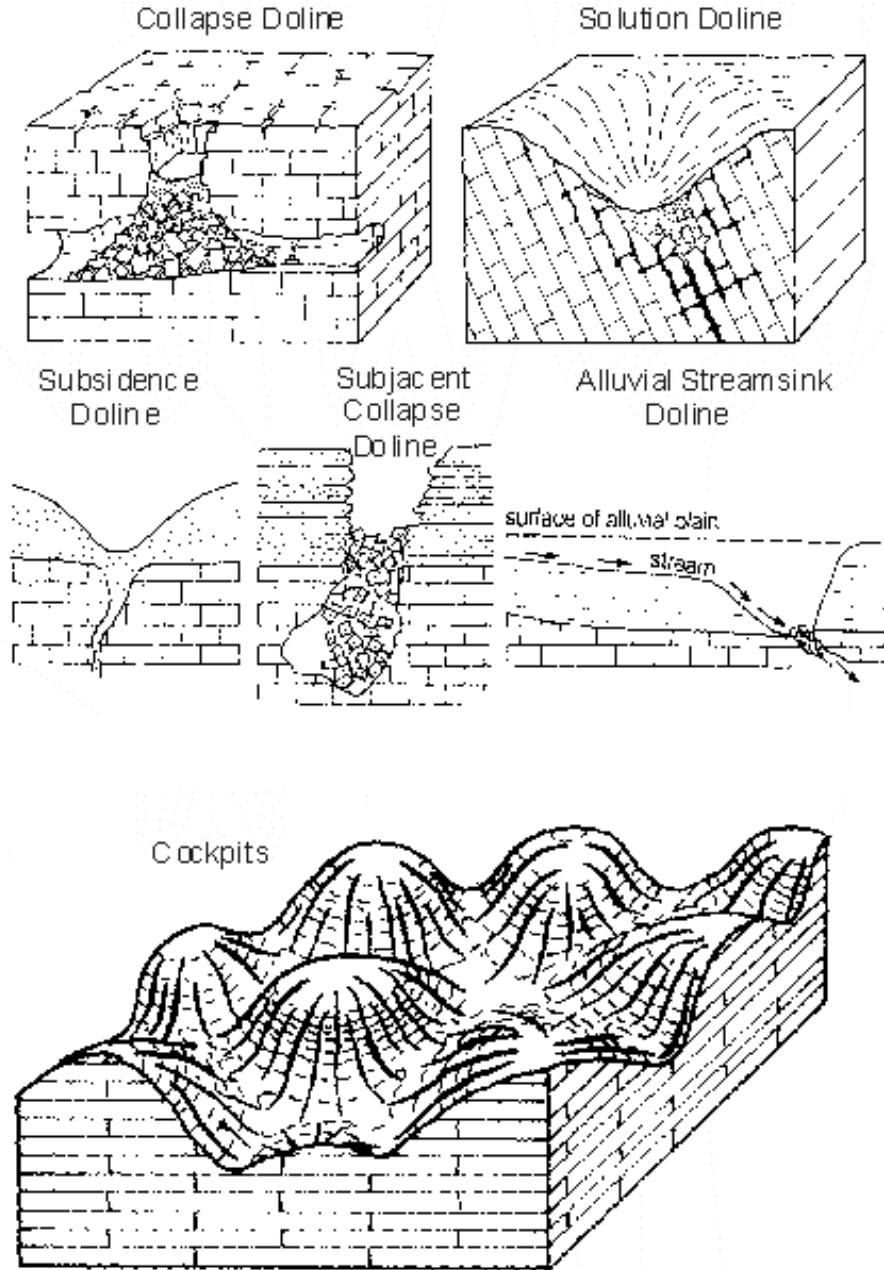
DIAGRAMS

Limestone



(<http://www.ruralnet.org.uk/~epic/fod/images/limestr.gif>)

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(<http://www.kgs.ku.edu/PRS/publication/OFR2001-55/gif/p2-001.gif>)