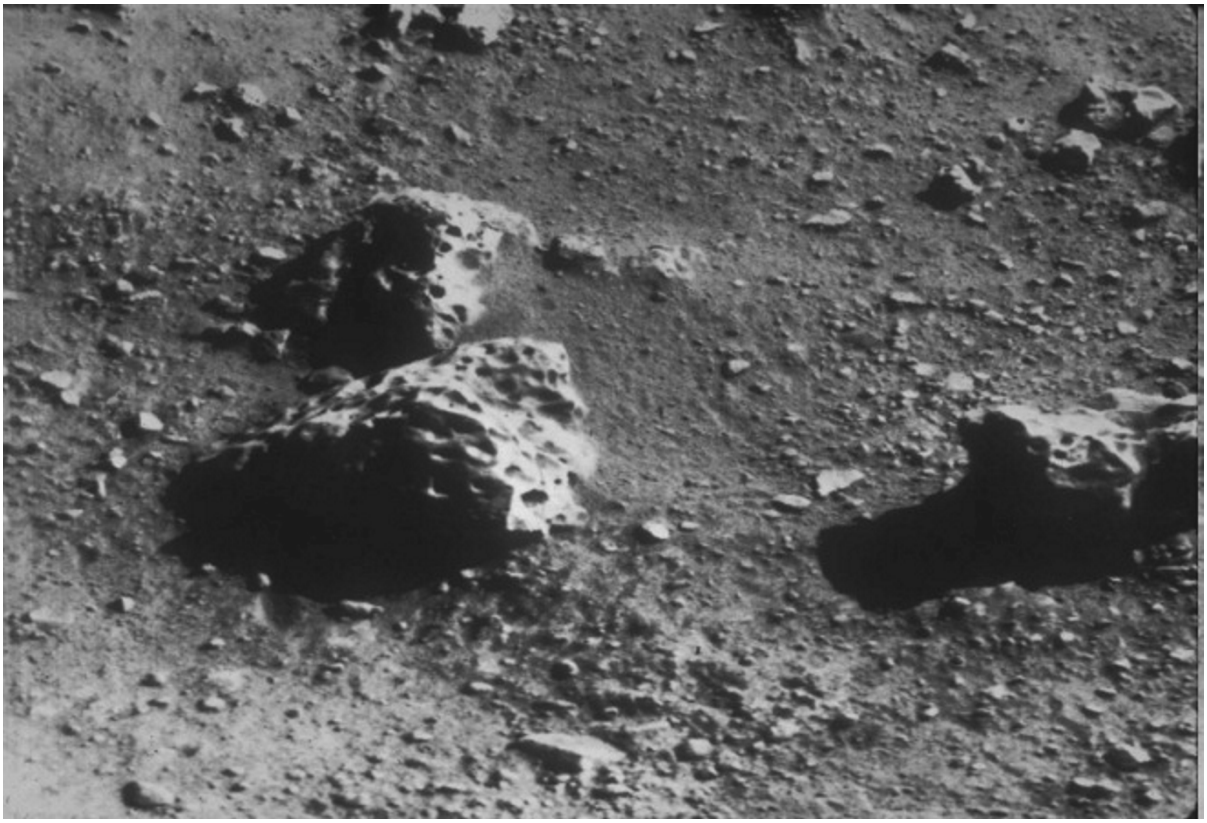

This photo was taken on Mars by the Viking Lander probes launched in 1975. It was provided by George Mustoe who received them in the early 1980s from Jim Garvin who at that time was in the Planetary Sciences Graduate Program at Brown University, Rhode Island, where he was trying to figure out if these Martian textures are honeycomb weathering.

Honeycombs on Mars?

Gabriolans and visitors to Gabriola and the other Gulf Islands are very familiar with arrays of small holes in the sandstone bedrock. You see them on the beaches practically everywhere. These holes and curious erosion patterns (honeycombs), sometimes known as *tafoni*, are created by salt weathering, [1] [2] the "salt" involved being mostly sodium chloride.

Although this type of honeycombing is most common in sandstone, it does occur in siltstone, and I have seen examples in New Mexico in poorly-welded volcanic tuff (*rhyollite*) where the salt is calcium carbonate (*calcite*), and in Australia in weathered *granitic pegmatite*, but, except where dissolution of the rock is involved, as in the cavernous weathering of limestone, the causes, I suspect, are the same.

[1] *What makes holes in sandstone*, *SHALE* 9, pp.12–40, August 2004.

[2] *The geometry of honeycomb weathering of sandstone*, *SHALE* 26, pp.31–60, November 2011.

Honeycomb weathering in siltstone on Gabriola (*pencil for scale*).

I am grateful for the following two emails from geologists at Western Washington University who also provided me with evidence that tafoni can form in igneous rock:

> …I have also seen photos taken in Antarctica of salt weathering in basaltic rocks… [Dave Tucker]

and:

> …I've seen tafoni on Miocene plateau *basalt* at Starvation Rock, State Park, in central Idaho, and I have a few photos of coastal honeycomb weathering in basalts on the Kitsap Peninsula along the eastern side of the Olympic Peninsula in Washington. There is wonderful honeycomb weathering in coastal *basalt* in Hawaii. I think *basalt* can be suspectible, because some flows are fairly porous because of microvesicles. I've learned the hard way making thin sections that *basalt* and *andesite* can soak up a lot of epoxy during the curing process because of their porosity. [George Mustoe]

And let's not forget, *tafoni* is a Coriscan word, and refers to weathering features in rocks there that are not sandstone.

US Geological Survey picture of possible honeycomb weathering on Mars (*partial view*).

There's little doubt in my mind that the weathering seen on Mars is honeycomb weathering—notice how they face the sun as all good honeycombing does. Sulphate-rich grains of *kieserite* have been found in fluvial deposits on Mars, and magnesium sulphate is a very effective eroder of sandstone.[3]

These honeycombs must be billions of years old—which I suppose must mean that if ancient Martians created petroglyphs, they will still be there too. ◊

[3] *Salt-weathering of upper Nanaimo Group sandstone*, *SHALE* 23, pp.35–56, March 2010.