Context:
Geology, Gabriola Island

Citation:
Doe, Nick, *Steinpilze*—rock mushrooms, *SHALE* 7, pp.32–34, January 2004.



Errors and omissions:

The explanation for salt weathering in this article is a bit dated. If this is your interest, you might find more useful:

http://www.nickdoe.ca/pdfs/Webp51c.pdf

http://www.nickdoe.ca/pdfs/Webp58c.pdf

Reference:

Date posted:
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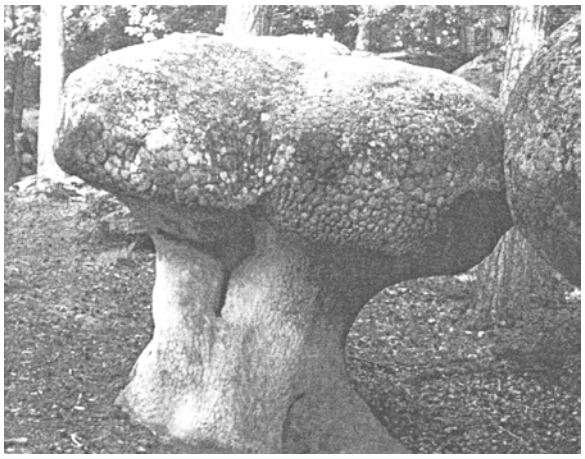
# *Steinpilze*—rock mushrooms

by Nick Doe

"Mushrooms" made of weathered sandstone—*steinpilze* (stone mushrooms) I guess you could call them—are common on the beaches of Gabriola and neighbouring islands. The one shown *right* is between three and four metres high (11 feet). The "stipe" of the mushroom is actively being eroded—*tafone* style—and it will eventually be gone, but the "cap", because of the iron oxide it contains, is very weather-resistant, exactly like the "visor" on the Malaspina Galleries.

West side of Descanso Bay, Gabriola

A seemingly similar formation is found in Europe, but in a non-marine environment. *Le Champignon*, shown *below*, lives in the forest near Fontainebleau, south of Paris, and is about two metres high. The cause of the weathering of *les champignons* is not known, but, according to the investigators, the possibilities include salt drawn up by capillary action from the damp forest underfloor. The cap shows polygonal cracking, a characteristic of quartz-cemented sandstone, which, if it exists at all, is very rare here in the Gulf Islands.



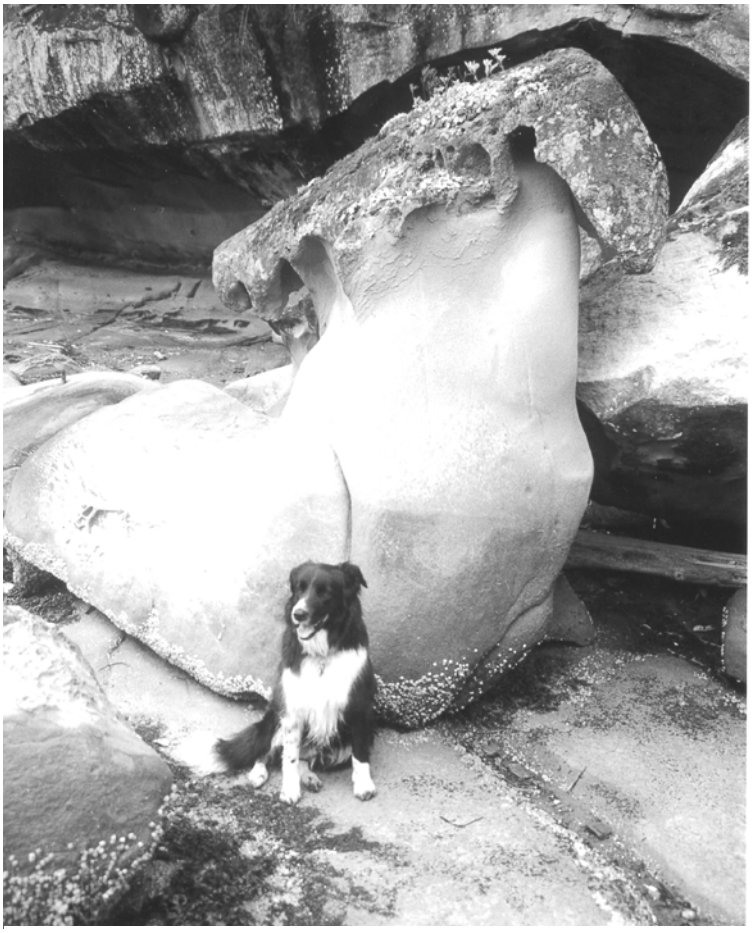
*Le Champignon,* Robinson and Williams, 1994

The "feet" of Gabriola mushrooms are usually aligned to the highest level of the spring tides, exactly like the floor of the Malaspina Galleries, so it's not waves that cause the erosion. On the contrary, it is the tide washing away corrosive salt that keeps the feet from eroding. If this didn't happen, the mushrooms would become top-heavy and would topple over.

Capillary action drawing salty moisture upward might contribute to the formation of Gabriola's mushrooms, but eleven feet seems an awfully long way for the water to be "wicked" up. Also not supporting this idea is the fact that the most severe weathering is often right at the top of the mushroom under the cap, where the "gills" are, not at the bottom.

Mushrooms are commonly separate from the rock they're standing on, either because of erosion along a fracture; a layer of mudrock underneath the foot; or because they're made from boulders.

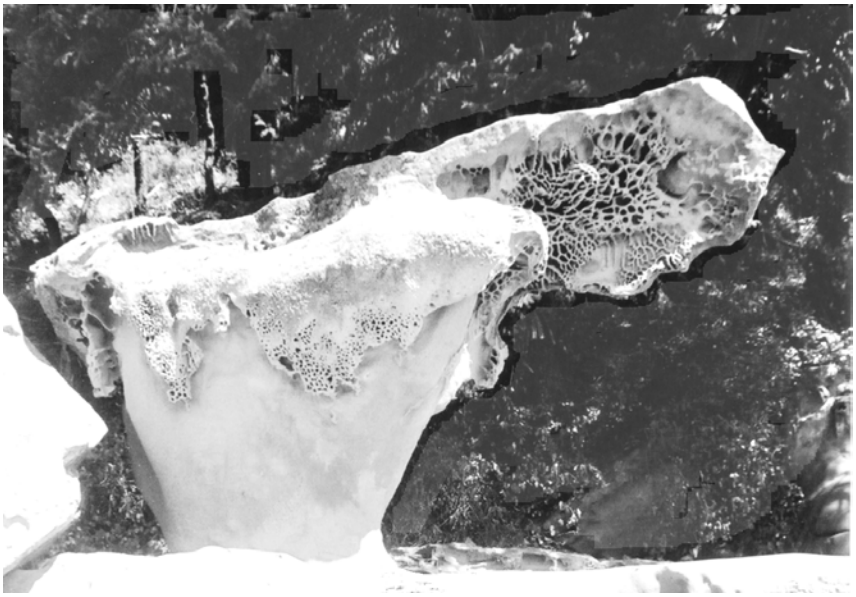
As to how they form, I think that our mushrooms are galleries "in-the-round"—versions of *tafoni*—which makes them different from the French ones…perhaps.



Waiting for the ferry. Descanso Bay, Gabriola

They grow near the high-tide mark because that's where they catch the most salt from sea spray.

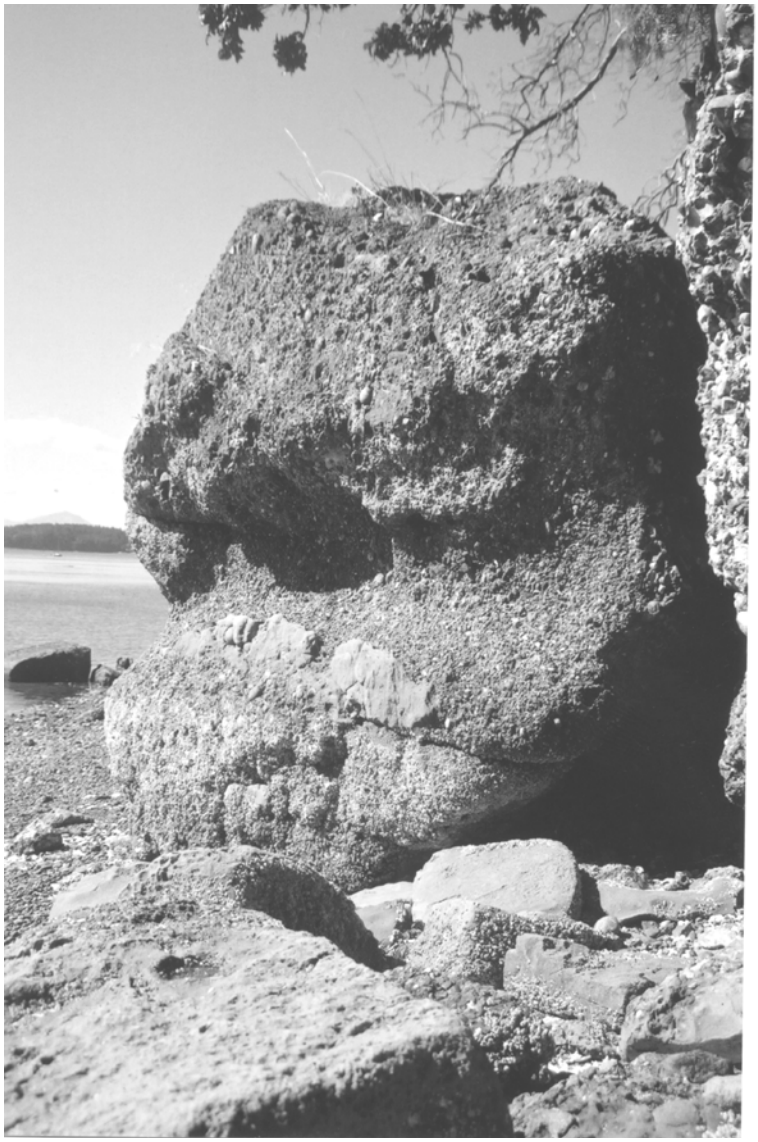
The "melted cheese" look of the caps is a deception. The case-hardened sandstone of the cap hasn't warped; it has just preserved the original outline of the rock, just as it has at the Malaspina Galleries.



Hey! look under here. These things even have boletoidal spore tubes!
Thompson Point, Gabriola

Case-hardened sandstone is sandstone that has had its original clay cement replaced by iron oxide, which in turn is the result of weathering by the rain of the dark, iron-rich minerals in the sand like *biotite* and *hornblende.*

The light-greyish area on the stipe immediately below the cap in the photograph at the top of the previous page consists of flakes of clay that have been washed out of the sandstone by evaporating salt-laden moisture from within the rock. The evidence for this is that salt encrustation appears on the *inside* of the flakes, not on the *outside*. The loss of this clay loosens the grains of sand and so weathers the rock and gives it a fresh, "clean" look, which is, you'll note, free of the barnacles that would be there if it were the work of the sea. You can see the same accumulation of clay in the roofs of galleries. Clay is a by-product of weathering of feldpars and several other minerals in the sandstone.



A mushroom made of conglomerate. Although not as pretty as the sandstone ones, it has all the features—case-hardened cap, weathered stipe, relatively uneroded foot up to the high-tide mark, and a "best" side facing the sun. There's even a hint of spore tubes in the shadows beneath the cap.

Spring Beach, Gabriola

Sea salt is an essential part of the process. It's the crystallization of the salt as the water from within the rock evaporates on the stipe that breaks the clay bonds between the grains of sand. Once the clay has been broken down, it can easily be washed away, leaving behind loose grains of sand that slowly drop away. Probably the salt gets into the inside of the rock by a combination of wicking at high tide, absorption of sea spray during winter storms, and seepage of salty rainwater through small fractures in the cap.

## Reference

D.A. Robinson & R.B.G. Williams, *Sandstone Weathering and Landforms in Britain and Europe*, in *Rock Weathering and Landform Evolution*, pp.371–391, John Wiley & Sons, 1994. ◊