

Serpentine, the snaky life-bringing mineral

All life ultimately runs off sunlight, right? Wrong.

Anyone who has spent time in the Klamath mountains will have encountered a characteristic shiny greenish mineral whose glossy luster resembles snake-skin. Although entire mountains and ridges in northern California are made of the stuff, serpentine is actually quite rare elsewhere.



Serpentine from Limestone Ridge in the Trinity Alps

Serpentine forms when certain iron-rich minerals in deep ocean crust react with water in the presence of heat. Ocean crust, which is dense, tends to be destroyed within a couple of hundred million years following its formation, by disappearing ('subducting') under less dense continental crust. For this reason, preserving serpentine on land requires the special geological history that the rocks around us have enjoyed – in this case, the crumpling up ('accretion') of ancient oceanic material onto the edge of the North American continent.

There is more to serpentine than just being left-over ancient deep seafloor, however. The reaction that forms serpentine also releases large amounts of heat and nutrients (hydrogen and methane, in case you're wondering), which together can sustain entire deep-sea ecosystems in the absence of sunlight! The largest such known ecosystem is called the 'Lost City hydrothermal field', whose 200-foot-tall chimneys stand 2,500 feet beneath the waves of the Atlantic Ocean.

Serpentine is also important to scientists, called 'astrobiologists', who look for life outside of our own planet. For example, the formation of serpentine on Mars may well be influencing the present Martian atmosphere. Furthermore, some astrobiologists have speculated that the formation of serpentine may sustain life in far-off worlds like the planet Jupiter's moon Europa, which has a sixty (yes, *sixty*) mile deep ocean. Some exciting things to think about next time you're wandering around our mountains!