Searles Lake, in the Mojave Desert, California, isn't exactly a beautiful body of water. It's mostly salt-crusted ooze. The ooze smells like a combination of rotten eggs, decayed fish, and old cheese. It has a pH of 9.8—about the same as bleach. To top things off, Searles Lake contains extreme levels of deadly arsenic.

Incredibly, there's one organism that loves living in the poisonous ooze of Searles Lake. The organism, a bacterium called SLAS-1, is an "extremophile."

Extreme Lifestyles

Extremophiles are bacteria that live in very extreme environments. Some thrive on sulfur. Some hang out in super hot spots like thermal springs. Other extremophiles prefer mine waste so acidic it would liquefy your skin.

Searles Lake is extreme because of its salinity and high concentration of chemical elements. Natural chemicals begin to concentrate when rain washes soil and rock downhill. In desert valleys like Salt Lake, Utah, or Searles Lake, the hot sun quickly evaporates the water. The chemicals are left behind. Over thousands of years, the chemicals become extremely concentrated.

Just the intense salt concentration makes Searles Lake an extreme environment. It's 10 times saltier than ocean water. Even brine shrimp that manage to live in Salt Lake, Utah, can't take Searles Lake.

But arsenic is the real killer. Searles Lake contains levels of arsenic 29,000 times higher than drinking water.

Breathing Arsenic

Biochemist Ronald Oremland, from the United States Geological Survey, specializes in studying extremophiles. Just for grins, Oremland collected a sample of the super salty, toxic ooze from Searles Lake. Between the salt, the pH, and the arsenic, he wasn't expecting to find much. "I assumed the stuff would be dead as a post," he said.

Then, squirming around under his microscope, Oremland found a wiggly one-celled bacterium, happily sucking in arsenic. He named it SLAS-1.

How does SLAS-1 survive? The ooze doesn't have any oxygen for breathing. But it is packed with a form of arsenic called Arsenic V. SLAS-1 takes in arsenic V and reduces it to arsenic III. The chemical reduction gives it energy. "SLAS-1 uses arsenic the way we use oxygen for breathing," explained Oremland.

On To Mars?

SLAS-1 is not the first arsenic-loving bacterium to be discovered. But it's the most extreme, because it thrives on such high levels of arsenic.

Could any other environment be as homey for SLAS-1? One remote possibility is Mars. Ron Oremland explained that Mars is a little like Searles Lake. “There’s evidence that there was water there, and that the water evaporated like it does at Searles Lake,” he said.

Biochemists often wonder what type of life could survive on Mars. SLAS-1 has certainly gotten their attention. After all, if an extremophile can handle Searles Lake, living on Mars might be a cinch.