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THE IBERIAN PYRITE Belt in southwestern Spain looks like a movie set for an alien world. Rusty lakes punctuate the iron-rich landscape. The Rio Tinto, named for its vibrant red coloration, seems to glow against the dull rocks. But dig a little deeper, and things get even weirder.

In a surprise to scientists, cyanobacteria have been found thriving nearly 2,000 feet below the strange landscape, where sunlight, water, and nutrients are scarce. Researchers previously thought these microbes could survive only while basking in the sun's rays, although they are otherwise a versatile bunch; researchers have found them alive nearly everywhere on Earth.

“You go to the desert, you have cyanobacteria; you go to the sea, you find cyanobacteria. You go to the International Space Station, and they can get [the microbes] up and get them down, and they survive,” says Fernando Puente-Sánchez, a postdoctoral researcher at the National Center for Biotechnology in Spain.

“The last habitat we hadn't seen before was the subsurface.”

Cyanobacteria hold an important role in Earth's history: They were responsible for pumping oxygen into the atmosphere, paving the way for life to swim, slither, hop, gallop and fly around the planet. That's why the new study, published today in *Proceedings of the National Academy of Sciences*, is pushing scientists rethink what can survive deep below our feet—and perhaps even the types of critters we should look for in our search for life on Mars and beyond. (Find out about an underground lake possibly found on Mars.)

Exploring the Deep

Puente-Sánchez, who completed the research as a graduate student at the Centro de Astrobiología (CSIC-INTA) in Spain, wasn't initially looking for cyanobacteria in the rock cores taken from the pyrite belt. Instead, the team expected to find similar bacteria as what are seen on the surface, including the types of microbes that oxidize iron and sulfur.

Control samples helped the team determine that the microbes did not come from contamination due to the drilling fluid nor from processing in the lab. And the cyanobacteria were not found in random locations, as you might expect if the samples had been doused in contaminated liquid. Instead, they were congregating along the fractures in the rock, eking out an existence in the tiny pockets of air. (Learn more about extreme microbes found in the driest part of the Atacama desert.)

by Maya Wei-Haas