Newly discovered microbes could be crucial to understanding origins of life on Earth

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Scientists from the J. Craig Venter Institute (JCVI), along with collaborators from the University of Southern California (USC) and Delft University of Technology, have published results from a three year study outlining the microbial diversity in The Cedars, a high pH, ultra reducing, low salinity systems of springs located in Northern California. The research has been published in the online early edition of the journal *PNAS*.

This unique spring system is an active terrestrial serpentinization site. Serpentinization is a process whereby water reacts with certain types of minerals in the ground to produce other kinds of minerals, as well as hydrogen, methane and highly alkaline fluids. These sites are common in the deep ocean where tectonic plates meet, but are very rare elsewhere.

For three years the JCVI, USC and TU Delft team took multiple samples in three springs at The Cedars and isolated the microbes using sequencing technologies as opposed to culturing them. Each spring was fed by unique groundwater, one by deep groundwater only and the other two by a mixture of deep and shallow groundwater. The team found that the microbial communities remained constant in each spring but that each one had unique microbes which were determined by the type of groundwater by which they were fed.

The microbes in the deep groundwater fed spring were distinct from any other microbial communities found in other terrestrial serpentinizing sites. The most abundant of these microbes are members of the Chloroflexi, Clostridia, andcandidate division OD1, followed by some Euryarchaeota. The microbes found in the mixture of shallow and deep groundwater fed sites appear to be similar to other microbial communities isolated from other terrestrial sites. The most abundant of these microbes were Betaproteobacteria.

The team concludes that because of the pristine yet harsh nature of The Cedars environment, the microbes found there could be crucial to understanding the origins of life on Earth and in understanding the key survival mechanism used by these hearty microbes.

Provided by Delft University of Technology