

NASA Astrobiology Early Career Collaboration Award

Follow-up Report

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Project Title: A Step Back in Time – Ancient Hot Springs and the Search for Life on Mars

Collaborator: Dr. Martin Van Kranendonk, UNSW, Australian Center for Astrobiology

During Summer 2018 I travel to the Pilbara Craton in Western Australia in search of the earliest known evidence of life on land. Here I met up with Dr. Martin Van Kranendonk, director of the Australian Center for Astrobiology and expert on the Pilbara geology. Over the next two weeks, we traveled to many previously established sites of interest containing stromatolitic textures and evidence of past terrestrial hot spring activity, as well as new sites of interest which provided further evidence supporting the terrestrial hot spring hypothesis. Over the course of these two weeks, I collected samples of ~3.5Ga microbial textures in order to analyze such samples for their biosignature preservation potential. I also was able to spend some time mapping the Pilbara in order to understand the greater regional geologic context of the samples I collected.

After this field work, Dr. Van Kranendonk and I returned to Sydney, where I met with Dr. Malcolm Walter at the University of New South Wales. Dr. Walter allowed me to search through the sample archive of the Australian Center for Astrobiology, where I collected younger samples from the mid-Paleozoic from terrestrial hydrothermal deposits. With these samples, I am able to perform a comparison study between modern, older, and ancient hydrothermal deposits in order to characterize what happens to potential biosignatures in these environments throughout geologic time.

These samples are currently being prepped for analyses and should yield highly informative data of interest to the origin of life and astrobiology communities. Specifically, the environments studied during the course of this field work are proposed as analogues to certain environments on Mars, including impact-induced hydrothermal environments which may exist on the crater rim of Jezero Crater, the future sampling site for the Mars 2020 mission.

I wish to extend my heartfelt thanks to the NASA Astrobiology Institute for supporting me in my research endeavors and for making this field work and collaborative experience possible.



Potential ~3.5 billion-year-old stromatolites found in an outcrop located in the Pilbara Craton.



Conical Stromatolites also found within the Pilbara Craton.



Hiking through the Pilbara in search of ancient microbial fossils.



The beautiful Pilbara at dusk.