



# Searching for the Goldilocks Solution

An insatiable curiosity and thirst for knowledge have placed Erica Suosaari at the forefront of research into the humble beginnings of life as we know it.

If you'd gone searching for current-day geologist Erica Suosaari in the early 2000's, you wouldn't have found her in a science lab. More likely, you'd have found her on the Alaskan seas working as a crab fisherman, or in Las Vegas, shooting as a commercial photographer.

"I was raised to try anything, ask questions and think for myself," says Erica.

Fast forward to 2018, and it's clear that Erica's curiosity and independent thinking have served her well.

A Bush Heritage Science Fellow and Smithsonian Institute Research Associate, Erica is at the forefront of research into stromatolites; living examples of the oldest preserved life on Earth. Her work aims to uncover the precise conditions that allowed stromatolites to thrive up to 3.7 billion years ago, and in doing so, to provide a window into early Earth.

So, what exactly are stromatolites?

"The bacteria that form stromatolites were among the earliest photosynthesisers; they kicked off the process that saw oxygen levels in Earth's atmosphere rise [from less than 1% to more than 20%] to the point where evolution of higher life became possible, eventually leading to us – humans," says Erica.

There is no better place to study these relics of early life than at Hamelin Pool, which sits within the Shark Bay World Heritage Area and adjacent to Bush Heritage's Hamelin Station Reserve, in Western Australia.

The pool's extreme environment – characterised by high salinity, seasonal variations in water levels and dramatic temperature fluctuations – limits competition and predation, thereby mimicking the kind of setting stromatolites thrived in billions of years ago. Of the few stromatolite assemblages left on Earth, Hamelin Pool is by far the biggest and most diverse.

"The sheer number of stromatolites at Hamelin is just mind-blowing, and then you see all sorts of shapes and sizes as you move around the pool," says Erica.



↑ Dr Erica Suosaari walking among stromatolites at Hamelin Pool, WA. Photo by Annette Ruzicka

“One snorkel and you know you want to be there for the rest of your life... Scientifically, Hamelin has my heart.”

While these grey, rock-like mounds might not make the most thrilling first appearances, five minutes with Erica will have you as excited about them as she is.

“People are surprised when I tell them we wouldn’t exist without the photosynthesis that these microbial mats are responsible for. They shaped the atmosphere over billions of years of Earth’s history. And understanding the past is the key to the future,” she says.

Erica is so fascinated by stromatolites that to study them, she splits her time between three corners of the world: Hamelin Pool; Washington D.C, where the Smithsonian is based; and the Atacama Desert in Chile, where another small, living stromatolite assemblage exists.

While the international travel is gruelling, Erica can’t resist the chance to work on two different stromatolite assemblages. She’s hoping that comparing them will help her to answer one of her biggest questions.

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“If there’s one thing I would like to discover in my career, it would be to understand the ‘Goldilocks Solution’, where you figure out what ‘just right’ looks like for stromatolites. What conditions do they need to thrive? And what does that mean for our quest for life on other planets?”

There are plenty who might share Erica’s interest in such answers.

“If Elon Musk wants to find a way to make Mars habitable,” jokes Erica, “he really needs to pay Hamelin a visit!” ●