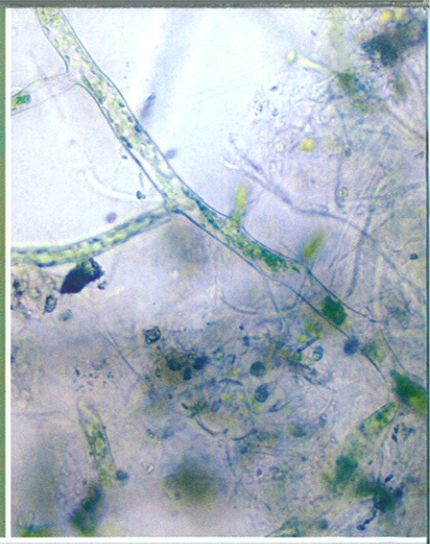
LIVING FOSSILS AT LAKE THETIS

BY CATHERINE JACK



New visitor infrastructure at Lake Thetis near Cervantes enhances the experience for visitors who come here to see stromatolites—examples of the earliest forms of life on Earth.

In the beachside landscape of Nambung National Park, it is easy to feel that you have been transported back in time amid the flowing sand dunes and the surreal limestone structures that emerge from the dunes. However, the Pinnacles are not the only natural wonder to intrigue your senses.

On the outskirts of the park, just over a kilometre from the centre of the Cervantes town site, lies a saline lake home to a threatened ecological community of rare living fossils called stromatolites. Examples of the first forms of life on Earth, stromatolites are rock-like structures formed by layers of cynobacteria on their surface which deposit calcium, cementing sediment into the bulbous structures.

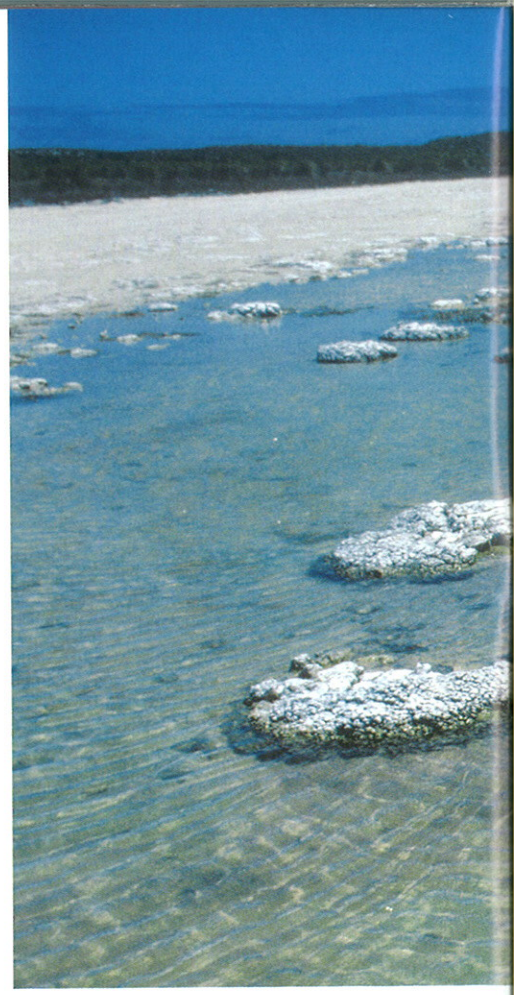
For a long time these living fossils were thought to have only existed in ancient times, until they were discovered in isolated, highly saline ecosystems such as Lake Thetis. Other examples of stromatolites in Western Australia can be found at Hamelin Pool in Shark Bay and Lake Clifton, south of Perth. The earliest examples of these rocky-looking structures are found in the Pilbara in Western Australia and are dated to 3,370 million years old.

Windows to the past

The University of NSW has found stromatolites to be a great model for studying the origins and evolution of life on our planet, and perhaps other planets too. Stromatolite studies at the university have looked at some of the fundamental questions of how life evolved—what is the mechanism that leads to life, how and when did life arise on Earth and did it happen elsewhere in the solar system or universe?

The university's studies of stromatolite communities at Shark Bay revealed that stromatolites have remarkable biodiversity values, with more than 100 species of bacteria in each form. This unexpected diversity suggests that Earth was teeming with life when the first stromatolites were forming 3.5 billion years ago, which in turn suggests that evolution must have been occurring for tens of millions of years before this—a finding that is making scientists re-think figures on when life first occurred on Earth.

Due to their makeup of cyanobacteria, stromatolites played a more significant role in changing the Earth than any other organism. These photosynthetic bacteria converted carbon dioxide into oxygen on a massive scale, changing the composition of the atmosphere and causing an oxygen catastrophe that would have killed off many of the organisms alive at the time, for which oxygen was poisonous. While poisonous to many organisms, the oxygen enabled animals to survive, which in turn provided food for our early ancestors.



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Main New visitor infrastructure protects the stromatolites at Lake Thetis.
Photo – Ann Storrie
Inset Cyanobacteria.
Photo – Clay Bryce/Lochman Transparencies

Left Interpretive signage explains the natural environment.
Photo – Ann Storrie

Above Stromatolites at Lake Thetis.
Photo – Jiri Lochman

Lake life

Stomatolites have a growth rate of about one to three centimetres per 100 years, making the size of the Lake Thetis examples all the more intriguing. It is estimated that Lake Thetis was isolated from the sea about 4,800 years ago when sea levels dropped and coastal dunes formed around the lake. The stromatolites growing in the lake are estimated to be about 3,500 years old. Fed by rainfall and ground water input, Lake Thetis has no connecting rivers or creeks and is almost one-and-a-half times saltier than sea water. However, while the water is alkaline and nutrient poor, it supports a range of life in an ideal environment for bottom-dwelling microbial communities. The lake contains some small fish, amphipods and a few crustacean species adapted to living in highly saline environments.

There are other bacterial communities living at Lake Thetis, including 'blister' (crenulate) mats of cyanobacteria found growing on the margins of the lake in the flood zone and a pink-purple coloured substance with cottage cheese consistency known as a flocculent mat. These bacterial communities, especially those found on the surrounding flood plain, are sensitive and easily disturbed.

Exploring the lake

The Lake Thetis stromatolites are considered to be some of the best examples of their kind in the world and, for many years, have attracted high numbers of local and international visitors, along with geologists and other academics. However, over time disturbance from visitors driving up to the water's edge to take a stroll around the stromatolites began to degrade the shoreline and surrounding area.

In 2007, a change in tenure officially included the lake into Nambung National Park. As the visitors to the area increased, damage to the stromatolites became the catalyst for a massive restoration project completed by the Department of Environment and Conservation, in conjunction with the Northern Agricultural Catchments Council and the Federal Government.

The three-year Coastal Assessment and Restoration project, of which the Lake Thetis project was the main milestone, was completed in 2009. The restoration of Lake Thetis features a new car park taking vehicles away from the lake shore, a low boardwalk that enables visitors to get up close to the stromatolites without disturbing the fragile environment, a 1.5-kilometre interpretive walk trail which winds through the various vegetation types and towards some of the best examples of stromatolites, and a lookout with views over the serene lake and surrounding coastal environment.

The ancient forms are most easily visible during the drier months when the water level is at its lowest with the best examples found at the south-western edge of the shoreline. If you are feeling energetic and want to explore more of the region, a longer beach and bush walk trail is available. The walk stretches between Thirsty Point and Hansen Bay with a detour into Lake Thetis. Visit during wildflower season and you will be blessed with a stunning display of colour on your journey.

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