Blind Pilbara beetles

Above The blind beetle (*Magnanillus serenitatis*), which is only known from the Serenity mining area, Pilbara.

Photo – Dr Giulia Perina/Subterranean Ecology Pty Ltd

If you've ever wandered about the Pilbara, your eye will be drawn to the stunning, rugged scenery and the distinctive vegetation comprising spinifex, Acacias and the odd ghost gum. Animals are harder to spot, especially during the day, when all sensible creatures apart from birds are usually sheltering from the extreme heat, particularly in the hotter months.

You're more likely to see animals at night when they are out searching for food.

You might be surprised to learn that there's a teeming underground community of animals living beneath your feet as you stride through the landscape. Spiders, beetles, scorpions, amphipods, sprickets (schizomids) and isopods, to name just a few. And these aren't sitting just below the soil surface. They live in small open spaces that occur deep within the Pilbara rocks. The voids are not big enough to be called caves, and they lack obvious openings to the surface. They have formed over millions of years as the rock itself has slowly dissolved from water running through it. These little homes join to form networks, much like a miniature interconnected village that provides habitat and a safe haven for underground species that can't tolerate the baking Pilbara sun.

Most of these underground species evolved from ancestors that lived on the Pilbara surface when the land was wetter and the landscape was vegetated with rainforest. As the surface became progressively drier during the Miocene Period (ca. 23–5 million years ago) many forest inhabitants became extinct, unable to deal with the new climatic conditions. Others became arid-adapted, presumably by changing their lifestyles and physiology. And yet others found solace in the cracks and voids below ground. They slowly developed traits that enabled them to survive in a lightless, humid ecosystem, such as long legs, or lost features that were no longer needed, such as eyes and pigmentation.

A recent publication by Dr Pier Mauro Giachino (Italy), Dr Stefan Eberhard (Subterranean Ecology Pty Ltd) and Dr Giulia Perina (Western Australian Museum) in the scientific journal *ZooKeys* has described six new genera and 18 new species of subterranean carabid beetles from the Pilbara. This research builds on earlier research by the late Dr Martin Baehr (Germany) who described 16 new subterranean carabid species from the region.

These underground beetles look like their surface cousins but they lack eyes. Like other carabids, the larvae and adults are predators, feeding on other subterranean organisms that they come across.

The vast diversity of the beetles and other troglobites in the Pilbara is thought to be the result of different incursions into the subterranean voids, followed by diversification as different parts of the landscape eroded away and became separated from each other. This formed 'island' habitats—often in the form of mesas—that the beetles were unable to move between. And just like island organisms that are incapable of dispersal, the lack of gene flow inexorably led to speciation and morphological changes in the beetles. Hence the large number of newly named species in the scientific study. Millions of years of underground isolation has produced remarkable diversity, not just in beetles, but in many other subterranean animals currently being studied by taxonomists.

Most of the new beetle species have been collected once only, suggesting that they are rather rare and that each possesses very small natural distributions. This poses a problem for developers who are obliged to consider each of these species when applying to mine or otherwise alter the landscape. If beetle species exist only at a single site, care must be taken to avoid destroying the entire population and hence the entire species.

Next time you visit the Pilbara, spare a thought for these ancient remnants of those long-lost days when rainforests blanketed most of WA. They've survived the past five million years eking out a living in these tiny voids, slowly adapting to a permanent life underground. Let's hope they survive the next five million years.