

# *The Ground* on which we Walk

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*YD Bar-Ness* takes us on a geological tour of  
Australia's granite landscape

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*Granite domes and boulders rise above the recently-burnt landscape of the Western Australian south coast. All photos by YD Bar-Ness*

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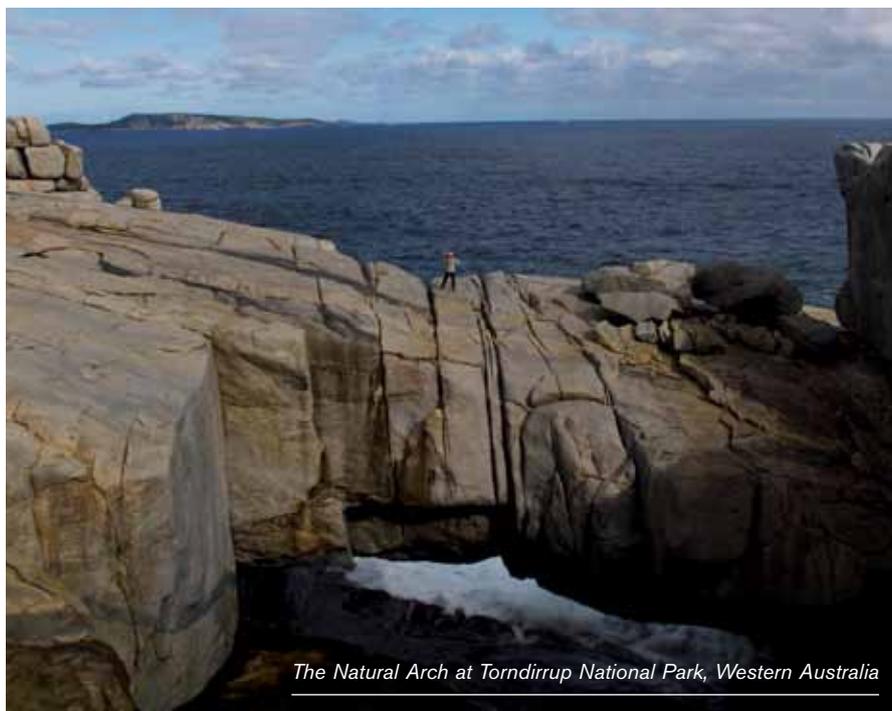
**W**hat makes Australia? What forms the mass of the continent? From the widest of perspectives – geological – the landscape is made of one material: Granite.

Let's walk across this ancient landscape and look for its characteristic domes and slabs. We'll contrast it to the younger, fire-born volcanic rocks, and to the slowly grown sandstones and limestone. We'll visit some of the most famous and memorable granite terrains, including Freycinet Peninsula in Tasmania, the Bunya Mountains in Queensland, and the extensive Darling Scarp of the southwest corner of the continent. We can think about how this most ancient of rocks crumbles, cracks, and flakes into the shapes on which we walk, and make the conceptual link between the ancient Earth and the direction of our footsteps. We'll think about the way in which this rock conserves and hides wildness, in the crevices and slabs of these massive domes.

### **The Stuff of Continents**

Granite is one of the major materials of the outermost layer of the Earth, and is mostly composed of silicon dioxide, or quartz. If basalts are the heavy, dark rocks of the ocean floor, then granites are the lighter, brighter rocks of the continents. Both of these materials are molten in the Earth's interior and the continents literally float upon the heavier basaltic rock. They occasionally bump into each other to form supercontinents such as Gondwana, of which Australia was once part. We only see the oceanic material on dry land in places such as highland Tasmania, or western Victoria, where tectonic activity has thrust it up to the landscape.

Generally, if you are on land, there is granite somewhere below you. It is often obscured by younger formations; sandstone and limestone are materials laid down when the landscape was underwater, and soil and sediments were deposited in more recent times on dry land. Where this basal continental granite is exposed, as a vast, flat, thin-soiled landscape, it is known as a continental shield. The vast lands of the Canadian North, southern Africa, eastern South America, and southwestern Australia are continental shields.



*The Natural Arch at Torndirrup National Park, Western Australia*

Granite uplands are lifted by the slow rise of underground bubbles of rock, known as batholiths. The most popular analogy is to visualise these bubbles moving upwards through the molten earth like the blobs in a lava lamp. They slowly push their way up onto the surface, and stand above the surrounding land as domes. You can see only the uppermost section of these massive, round bubbles: the domes are just the crowns of the batholith. In other mountain ranges, such as the Sierra Nevada of California, the uplift of an entire section of continental crust juts the granite high into the sky. Over time, these mountain ranges can also erode and form granite domes.

### **The Domes**

Isolated granite domes are known as inselbergs, after the German for 'island mountains'. They can rise out of the landscape, alone or as ridges, and are often too steep for the accumulation of the forests, soils and sediments that could hide it from sight. Each of these inselbergs has experienced fantastic lengths of time and unimaginable extremes of the elements, all of which have left their mark. The domes that we can visit today have been radically altered over their vast ages.

While it is impossible to know exactly what form any particular piece of granite took when it was first exposed to the air, we can imagine that they were simple shapes, resembling ovals or spheres. Over time, however, these domes are worn down, cracked, gouged, carved, and submerged. The rocks of Western Australia's Darling Scarp are two and half billion years old, more than half the age of the planet. In

this timeframe, they have been subjected to inconceivable energies. To the careful observer, this history can be read in the shape of the rocks.

The most obvious dynamic in the formation of a granite inselberg is the exfoliation of slabs. As the titanic forces that lifted the batholith find their mechanical release, and as the rock heats and cools over time, curved slabs flake off. You could imagine these slabs to be like the outermost peel of an onion skin. These slabs may slide, or fall off the side of the dome, leaving it slightly steeper, and slightly smaller. For a certain period of time, they will stay in place, forming a foothold and a shelter that serves as habitat for plants and animals. These slabs can accumulate as boulders beneath the dome, or may stand in the same spot to be worn away by the elements.

Running water gouges the rock. At the upper portions of the dome, these will be shallow channels, but on the lower slopes, they may be sizeable ravines. If there is a depression on the summit of the dome, there may be a small pool. Wind blows over the rocks, carrying water droplets and grains of sand, and sculpts the rock into beautiful curves, such as those at Remarkable Rocks on Kangaroo Island, South Australia.

When the Earth is cold, glacial ice may form on the rocks. Some of the most spectacular terrain in the world is made of glacially carved granites – the glacially carved Fiordlands of New Zealand, for example, or the mountain cliffs of Yosemite. In low-lying Australia, glacial terrain is rare, found only in the highest mountains of the Alps, or in the Central Plateau of Tasmania.



*At the Hazard Mountains, at Tasmania's Freycinet National Park*

### Coastal Scenery

When the Earth is warm, the oceans rise and reclaim the dry land. The granite rocks that we see on the seashore are today on the dividing line, but over timescales of millions of years, they can submerge and recede. The salt water can further modify the structure of the granite. When the inselbergs are steep, and the ocean waves are strong, the coastline may contain fine, sandy beaches beneath rugged cliffs. You can discover this sort of terrain at the Torndirrup National Park, near Albany, Western Australia, or at Freycinet National Park, on the east coast of Tasmania.

Rachel Jaeschke, ranger at Freycinet National Park, mentions that many visitors to the park don't realise that the famously picturesque white sands of Wineglass Bay are at the foot of such sheer rocky scenery.

'But when they see the mountains, and how spectacular they are, there's an element of surprise,' she says. 'They don't expect these beautiful granite mountains to come out of the ocean like they do.'

However, all things on Earth, no matter how massive, return to the ocean. Throughout the park, the nature of each cliff and mountain helps to determine the character and feel of each of the beaches. 'People really enjoy visiting the different beaches because of the sand is so different, depending on where they go,' she continues. The sparkling sands are made of this mountain granite, ground down through coastal processes and wave action, creating beautiful white sand.

### Study by Walking

One of the best ways to learn something is

to experience it, up close, and to explore it from all angles. Geology, for the bushwalker, becomes an intensely personal and immediate consideration. Like the builder creates the interior space for the decorators, and like the theatre carpenter sets the stage for the actor, so does the landscape formation underlie and determine our movement on the wild tracks. Let's think of the granite from different positions on the dome, starting with the uplands:

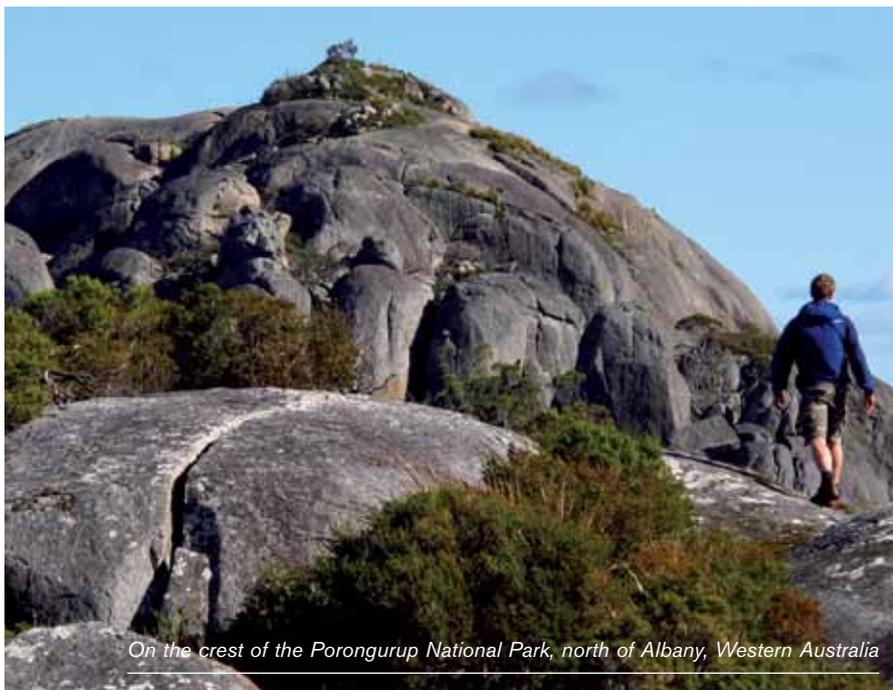
Large granite domes form steep sided and solid uplands, and these topographical islands are a refuge and habitat for many elements of biodiversity. For example, the Bunya Mountains have a cooler climate than the subtropical lowlands surrounding them, and can provide a home for the bunya pine forest. On the highest domes of the Darling Scarp, the sun-baked slabs hide a habitat for lichens, herbs, and reptiles that could not compete with the eucalyptus forests surrounding them.

Where the ravages of time have attacked the smooth slabs of the summit, creating crevices, crannies, and nooks, life gains a foothold. Green plants and carpets of moss grow in these protected places, and provide the basis of life for the other organisms. Raptors circle overhead, their wings catching the rising thermal air from the sun-baked rock.

The rock itself can also be a lesson about our past biogeographic connections. The shield known to geologists as the Yilgarn Craton is the basic material of which the Darling Scarp of southwest Western Australia is made. More than 100 million years ago, this corner of the continent was the meeting point with Antarctica and India. Travellers in



*A trekker walks below the massive coastal boulders of Elephant Rocks, on the Western Australian south coast*



*On the crest of the Porongurup National Park, north of Albany, Western Australia*

these regions can see similarly ancient and eroded granite rocks. In India, the famous climbing boulders of Hampi and the tall granite mountains of Karnataka and Andhra are fundamentally the same rock as that of the hills just behind Perth.

#### **On the Slabs**

It is here on the steep sides that we must cling carefully to the rock, and learn to appreciate the rubber soles of our shoes. Granite slopes are the terrain in which we must trust, with confidence, the friction of our footwear. Here, the sharp treads and texture of the walking boot serve us less well than the flat and malleable rubber of the climbing shoe.

The steep sides of the inselberg are relatively easy to ascend, moderately difficult to traverse, and quite arduous to descend. We will, like the plants and animals that seek to find a place to live, seek a foothold in the slightest crack, water channel, or depression in the rock. These intricacies of the rock surface may allow us a positive grip for our hands, but when we cling to these textures, it is easy to lose the confidence of our feet.

There is a particular phrase used in the rock climbing guidebooks – ‘run out’. This means that the climber must friction up a long distance of smooth slab before finding a feature where a rope can be secured. This may be easy, yet the risks are real. When you find yourself on a massive slab of granite, keep confidence in your rubber-soled shoes.

#### **At the Base**

The water collects at the base of the hill, and it is here that the soil creeps up to the granite itself. There are the smashed remains

of slabs that exfoliated from the dome above, and we can explore the incidental caves and shelters beneath these slabs.

As we walk around the edge of the granite, the unique nature of each dome will be apparent. We may, at the base of a steep mountain in Victoria’s Wilson’s Promontory, look up to see that it is too sheer to ascend easily; or at the edge of a flat granite dome along Western Australia’s Bibbulmun Track, discover that we can walk clear across it with ease and comfort.

Some granite mountains bases touch the ocean, and must be visited by boat. Daniel Moss, a kayak guide on Tasmania’s east coast, describes the attraction of the coastal granite landscape. He describes how visitors ‘become fixated upon [the] famous pink granite. Whether it’s paddling into a secret granite cove, watching the evening’s sunset glow over its various pillars and ledges, or just admiring the stunning area beneath the magical Hazards mountain range’.

#### **Walking the Granite**

Granite is ubiquitous in this southern island continent, although you may have to do a bit of investigation to find it beneath the forests, soil, sedimentary rocks, and cities of Australia. Here is a short list of famously scenic and accessible places to explore granite scenery.

**The Darling Scarp:** The Darling Scarp is a mountain range 1000 kilometres long, uplifted by a geological fault, on the southwest coast of Australia. It rises above the Swan Coastal Plain to the domed summit of Mt Cooke, 582 metres high, and in this granite landscape can be found the jarrah forest, a critical element of the South West biodiversity hotspot.

**Wilson’s Promontory National Park:** In east Victoria, Wilson’s Prom sticks out into Bass Strait and is the point on the Australian mainland farthest south. An immensely popular destination with Melburnians, it is geologically similar to Flinders Island and the northwest Tasmanian coast.

**Bunya Mountains:** The Bunya Mountains, northwest of Brisbane, are the last sizable refuge of the *Araucaria bidwillii*, or the bunya pine. This tree has survived, almost unchanged, for at least two hundred million years, and thrives in the cooler temperatures of this granite mountain range.

**Mt Kosciuszko:** Australia’s highest peaks are made of granite. If you travel on the plateau at the summit of Kosciuszko National Park, you can see glacially carved terrain and mountains of ice-shattered and storm-weathered rocks.

**The Dampier Archipelago:** In the northwest of Australia, a collection of steep-sided granite islands rise from the tropical waters. This continental rock provides an important habitat for marine biodiversity.

**Torndirrup National Park:** Near Albany, Western Australia’s major south coast city, a long ridge of granite hills (Torndirrup) strikes out into the ocean and creates a spectacular harbour. Here, beaches lie hidden beneath steep domes, and Antarctic waves smash into the rocks, forming such natural curiosities as the Arch and the Blowhole.

**Porongurup National Park:** To the north of Albany, the granite domes of the Porongurups rise in sheer slabs; from their summits one can see the sharp peaks of the Stirling Ranges. This mountain range contains the easternmost tall eucalyptus forests in the state.

**Girraween National Park and the Granite Belt:** The Darling Downs of Queensland is an uplifted region of rock domes with high botanical conservation value. The mountains of the Girraween National Park contain the second largest single monolith in Australia, after Uluru.

**Cape Le Grande National Park:** At Esperance, on the south coast of Western Australia, coastal granite can be seen in steep domes above the Great Australian Bight. One of these mountains, Frenchman’s Peak, is crowned by a massive arch, said to resemble the hat of a fashionable Frenchman.

**Freycinet National Park:** Over on the east coast of Tasmania, the orange Hazard Mountains of Freycinet National Park provide some of the most vertical of Australia’s granite scenery. A quick scramble up the slabs of Mount Amos will provide the walker with a view down to Wineglass Bay, an iconic and picturesque beach of white sand and wild forest. [W](#)