To find occasional NASA researchers, international geologists, and a resident prostrate dwarf, go to Barberton, Mpumalanga. It’s also the setting of Bryce Courtenay’s novel *The Power of One*. Barberton’s scenic beauties have attracted visitors for decades, but it also has scientific interest if you know what to look for.

Barberton and the Makhonjwa Mountains (also known as the Barberton Mountain Land) that enfold it are inextricably interconnected. Small, as mountain ranges go, the Makhonjwas are deeply folded and peaked, a dramatic landscape with more than just visual impact. The region’s rocks offer the best-preserved example of the Earth’s ancient oceanic and continental crust, which formed between 3.6 and 3 billion years ago. Its remains have a distinctive green colour, and include some of the earliest forms of life on the planet (preserved as microfossils believed to be cyanobacteria). Here’s where researchers study Earth’s ancient crust, and there was no better place for NASA scientists to visit, to get to know the relics of the opening phases of life so as to recognize the same if they ever appeared in rocks retrieved from Mars.

**Mineral wealth**

The rocks around present-day Barberton attracted all sorts of people long before aeronautics and space travel came on the scene. The Ngwenya iron-ore mine on the Swaziland side of the border is thought to be the oldest mine in the world, with radiocarbon dating indications that red oxides and shiny haematite for early use as cosmetics were mined there between 41 000 and 36 000 bc. You’ll often hear the phrase ‘the oldest’ around the Makhonjwas as, dating from about 3.5 billion years ago, they are the world’s oldest least-transformed rocks – they’re not older than rocks found elsewhere (such as in Australia, for instance, or Greenland) nor is this where life began, despite local advertisements calling this the “Cradle of Life”. They hold the best-preserved records of the earliest life forms, rather than proof that life began here.

Yet the claim ‘oldest gold’ might well be true, since it comes from the oldest best-preserved rocks. The gold-mineralizing fluids are younger than the rocks, and their age of mineralization is around 3.1 billion years. (The gold-bearing rocks on the Witwatersrand are around 2.8 billion years old.)

Gold was the great attraction about a century and a half ago. The little mining camp around Rimers Creek, where the Barbers (Graham, plus cousins Fred and Harry) struck it rich in 1884, became for a while the centre of activity in the then Transvaal. This was the economic hub, the destination and departure point for transport wagons and coaches. The country’s first stock exchange was established here in 1886 and, in its heyday, Barberton had two of them. Today just a floodlit facade of the second one remains. Yet Sheba Mine (which produced the greatest tonnage of gold after Edwin Bray’s 1885 discovery of the reef, resulting in Bray’s Golden Quarry) is still worked and is the world’s oldest operating gold mine.

But free gold was mined out rapidly, and what’s left is refractory. Laced and threaded through the ancient Archaean Greenstone Belt1, the remnant gold is associated with pyrite and arsenopyrite and is retained in their crystal structure. The ore cannot be ground fine enough to extract the noble metal. The only way to get to it is to dissolve the rock.

A process of biological extraction uses bacteria to oxidize sulphides to sulphates, and the iron from ferrous ions to ferric ions, and the compounds are made soluble, exposing the occluded gold (that is, the incorporated gold) for normal processing. This combination of biological and physical chemical processes has extended the life of the mines by increasing the yield substantially. African Pioneer Mining’s Agnes Mine uses a bioxidation heap process called Geocoat®, and Barberton Mine’s Fairview Mine uses the Biox® process developed by Gencor. Apart from Ghana (which applies them on a massive scale), Barberton is the only place in Africa where these processes are currently in use, making it a place of

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1. The Archaean Eon is the period of Earth’s history extending from its formation, about 4.600 million years ago, to 2.500 million years ago.

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Rocks, mines, & daisies

Read Earth’s history in the rocks of Barberton, revisit the gold rush, and enjoy the home of the internationally fashionable Barberton daisy, advises Sandy Ferrar.
interest for visiting biolohymdendallurgists.

**Plant life**
The slopes that wrap Barberton in mineral-rich folds are covered by equally rich and varied plant life. Geology has a major influence on plant distribution and was used to refine the boundaries of centres of plant endemism.

You’ll see proteas, of which a few are very rare. The smallest and rarest of the endemic proteas is a dwarf prostrate shrub *(Protea rostrata* subsp. *Hamiltonii)*, with white flowers surrounded by delicate greenish-white bracts. It’s found only in a small area in Nelshoogte above Barberton, in leached-out soil, surrounded by glowering walls of pine. Threatening these little plants more than the steady march of pine boles are local bushbuck – the delicate dwarf protea is far less vulnerable since a fence was erected around the Dr Hamilton Protea Reserve.

The prettiest rare protea is the Barberton Protea (*Protea curvata*), found on a few hills of serpentine rock, just north of the town. Standing about four metres high, the tree’s curved grey-green leaves and dark red bracts frame the thick mass of velvety, rose-pink flowers. Plants growing on serpentine rock are particularly interesting, since the rock is rich in metals such as nickel and chromium, which make the soil toxic. Some endemics to serpentine, such as *Berkheya coddii*, a daisy-like perennial herb with spiny-tipped or bristly leaves, are able to absorb the toxic metals from the soil. This provides a double interest, in that they could be used in rehabilitating mine dumps, and there’s a suggestion of phytomining possibilities, where leaves might be harvested to extract the metals.

Another aspect to Barberton Mountainlands’ botanical interest is that the deeply folded klipps and gorges are self-protecting in their ruggedness, creating mini-environments protected from fire, harsh winds, people, and livestock. In one of these, the Ugutugulu Gorge, previously unrecorded plants have recently been discovered that are also found in the Nyika Plateau in Malawi and the Clarinda Forest of eastern Zimbabwe, for instance. Unrelated to the Barberton Centre of Endemism, these plants clearly indicate tidal reversal captured in Moodies pillow lava near Msauli Mine on the eastern boundary of Songemvelo Nature Reserve. Viscous lava extruded into seawater, which chilled the surface of each pillow-shaped mass.

**Further information**

Contact the following for information.

- **Barberton Mountainlands Geological Society** have pamphlets on the Barberton Geological Heritage, the Bulembu Road Geotrail, the Fortuna Tunnel Trail, and Geology of the Kaapsehoop Trail. Contact: Chris Rippon (Chair), who says “Being a working geologist in Barberton is about as good as being a volcanologist in Hawaii!” at e-mail: chris@bmines.co.za or tel: (013) 712 8500 during working hours.
- **Gerbera Society**: Secretary Stephné Macaulay at e-mail: sefert@netactive.co.za
- **Lowveld Branch of the Botanical Society** (Nelspruit): Chair, Guy Bagnall, at 083 455 4565
- **Plant Specialist Group** (Lydenburg): John Burrows, tel/fax (013) 235 3851 or e-mail: botart@mweb.co.za
- **Barberton Bird Club**: John Bunning at e-mail: ljbird@soft.co.za
- **Barberton Community Tourism**: Astrid Christianson at e-mail: astrid@barberton.co.za or tel. (013) 712 2880 during working hours.


**Better-known is the fact that Barberton is the type locality of the Barberton daisy (the *Gerbera*, developed from *Gerbera jamesonii*), one of South Africa’s most internationally fashionable exports. Its spindly, petalled, long-stemmed, orange-red flower has been incorporated into the new Mupumalanga crest. Robert Jameson from Durban, who had a passion for indigenous plants, noticed it during the gold rush of the 1880s. He took samples to the curator of the Durban Botanical Garden, who cultivated them and sent specimens to London’s Kew Gardens. Botanists at the Cambridge Botanic Gardens developed hybrids and, within a couple of decades, the daisies were eagerly sought after by growers in the Netherlands, North America, and Australia.**

Despite the area’s unique riches, there are few organized or maintained trails or excursions, so special arrangements have to be made to visit the variety of rocks and botanical specialities. Barberton’s history is more easily accessible, with museums, guided walks through the town itself or down an early mine, and experiences of the basic technology of panning for gold. An organized quad-bike trail takes day-triers along the old wagon route to Sheba Mine, visits Bray’s Golden Quarry and the derelict boom town of Eureka, and offers sweeping views of Barberton Mountainlands swathed in abundant flora.

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2. The Barberton Centre of Plant Endemism is an area of 3 988.4 km² and has a total species/taxa count of 2 210.