FOSSIL REMAINS

Fossils have not been found in these rocks, though microscopic remains of simple organisms have been discovered in similar deposits elsewhere in the Pilbara. Concentric rings seen on the surface of some beds, such as Red Gorge, were once thought to be fossil jellyfish. Disappointingly, they have since been shown to be flattened remains of inorganic nodules.

THE PRESENT LANDSCAPE

Although the Hamersley Range has been in existence for hundreds of millions of years, most of the landscape features we see today were formed in comparatively recent times, that is, during tens of millions of years. This period of erosion began when a sharp drop in sea level caused the rivers to downcut rapidly to a new base level.

The process was enhanced by the onset of a more arid climate which depleted the protective vegetation cover on the valley sides.

Former valley floor sediment, known as pisolite, now stands high above the level of the present day river bed at several localities, for example, Circular Pool and Dales Gorge. It consists of cemented iron-rich gravel and was formed before the recent phase of active downcutting began. Relict slope deposits, consisting largely of cemented fragments of banded iron formation, also date from this time.

By providing lines of weakness (and resistance) to erosion, the underlying rocks have greatly influenced the form of the landscape. Many creeks have exploited joints and other fractures cutting across the rocks. These water courses

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are characteristically straight and often parallel to neighbouring valleys, for example, lower Wittenoom Gorge and Bee Gorge. Angular creek junctions occur in areas where two or more directions of jointing are present. Soft, easily eroded shale and dolomite, occurring beneath the main iron formation layers, has enabled the creeks to cut back rapidly into the Range. Spectacular gorges and waterfalls are the result. Plunge pools occurring at the foot of many of the falls, such as Circular Pool and Joffre Falls, are a valuable source of permanent water in the park.

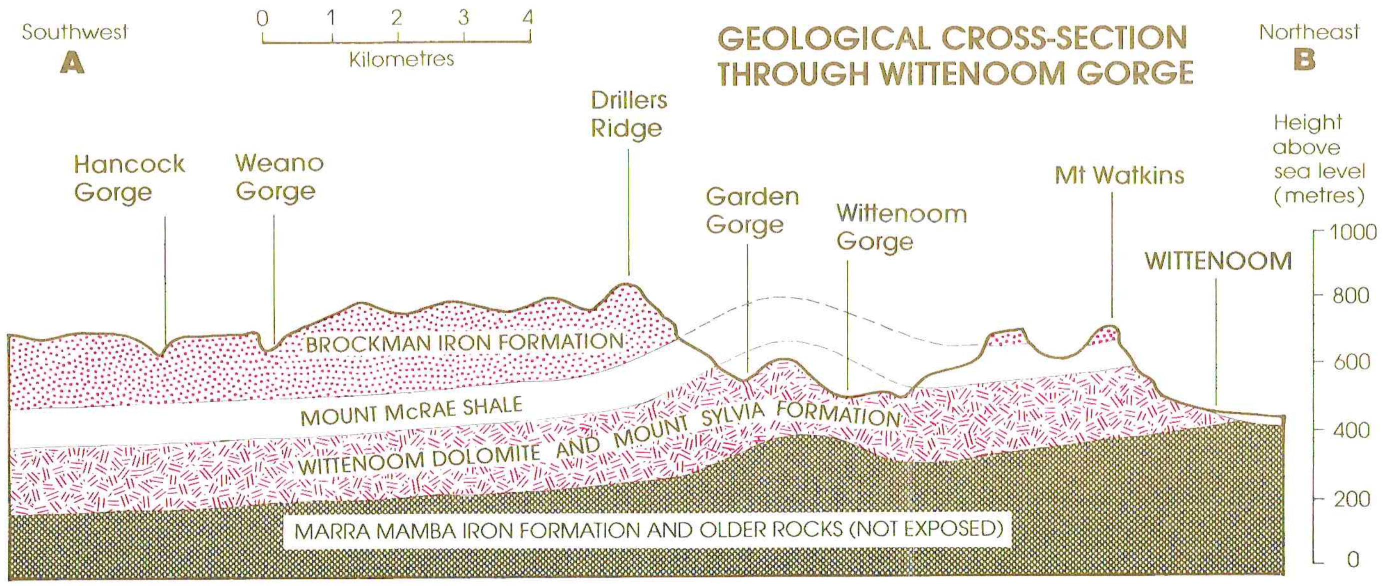
The characteristic slope-and-step appearance of many valley sides also results from the alternation of weak and resistant rock types. Shale and dolomite generally form the gentler slopes, while iron formation outcrops are marked by notches and steep cliffs.

ASBESTOS MINING

Blue asbestos (or crocidolite) was first discovered in the Hamersley Range in 1908. However, it was not until the late 1930's that serious attempts were made to extract the mineral. It generally occurs in thin veins within the iron formation, in seams parallel to the layering in the host rock. Attempts to mine asbestos were hampered by the limited size of the veins and their flat-lying attitude. Numerous small-scale operations took place on the valley sides, and involved the removal of small amounts of overburden above the seams. Underground mining took place at three locations: the Colonial and Wittenoom mines in Wittenoom Gorge, and the Yampire Mine in Yampire Gorge. The last of these operations closed in 1966.

The semi-precious stone, tiger-eye, does not occur within the park. It forms during the weathering of asbestos, when the fibres are replaced by silica.

BY ALAN THORNE ▲ GEOLOGICAL SURVEY OF WESTERN AUSTRALIA



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GEOLOGY OF THE GORGES

GEOLOGY OF THE GORGES

HAMERSLEY RANGE NATIONAL PARK

The rugged beauty of the Hamersley Range National Park results from a unique combination of geology, climate and natural vegetation. Of these, geology has probably had the greatest influence in shaping the landscape.

GEOLOGICAL HISTORY

Rocks exposed in and around the gorges originated as fine-grained sediment which accumulated on the sea-floor 2500 million years ago. At this time conditions on earth were quite different to the present day. The atmosphere contained much less oxygen, and the only forms of life were simple bacteria and algae. Many of these sediments laid down in the oceans were unusually rich in iron and silica.

Over many millions of years the iron-rich deposits were transformed by the pressure of further sediments laid down over them. Water, which had been trapped within, was driven out of the sediments, and they gradually turned into tough, well-bedded rock.

Later, horizontal compression caused the rocks to buckle and develop numerous vertical cracks (joints), before being lifted to the surface to form dry land. Erosion over millions of years finally sculptured the rocks into the present day landscape.

Similar iron-rich rocks occur in other countries such as South Africa, the U.S.A. and Brazil, but they are nowhere better exposed than in the Hamersley Range National Park.

THE ROCK LAYERS

Three types of rock are especially common in the area of the gorges:

BANDED IRON FORMATION –
a hard, brown-weathering rock composed of thin bands of iron oxide and fine-grained quartz. It is often weakly magnetic; test some if you have a compass or small magnet.

DOLOMITE –
a grey or pale brown rock similar to limestone. Broken surfaces have a sugary appearance and, unlike iron formation, this rock can be easily scratched with a knife.

SHALE –
a very soft purple or pink rock, often faintly banded in fresh exposures.

These deposits are stacked on top of one another, rather like layers on a cake. The thick dolomite in the cliff face overlooking the town of Wittenoom is known as the Wittenoom Dolomite. Other rock layers, consisting of many tens or even hundreds of metres of strata, overlie the Wittenoom Dolomite. These are the Mount Sylvia Formation (contains shale and banded iron formation), Mount McRae Shale and Brockman Iron Formation. Their distribution is shown on the map and cross-section overleaf.

GEOLOGICAL STRUCTURE

Generally, throughout the northern part of the park, the rock layers tilt gently to the south. In the central part of Wittenoom Gorge, however, the beds buckle upwards to form a broad arch known as the Garden Gorge Anticline. Just north of this feature the rocks dip gently to the north.