


LIBRARY

Department of Biodiversity,
Conservation and Attractions

This PDF has been created for digital preservation. It may be used for research but is not suitable for other purposes. It may be superseded by a more current version or just be out-of-date and have no relevance to current situations.

KALBARRI NATIONAL PARK

GEOLOGY



Much of the appeal of Kalbarri National Park lies in the red and white rocks of the river and coastal gorges. These rocks form a single recognisable unit, named the Tumblagooda Sandstone. It has been recognised below the surface in petroleum exploration wells as far north as Exmouth Gulf, but is only seen at the surface between the Murchison River and the Geraldton-Mullewa road. In the river gorges, it is more than 1 km thick. The Tumblagooda Sandstone is a sedimentary rock, deposited as successive layers of sand. These layers form the near-horizontal banding, or bedding, seen in the gorges. What was the landscape like when the Tumblagooda Sandstone formed? Imagine yourself 400 million years in the past....

To your east, there is a mountain range, probably higher than any in Australia today, extending north-south for several hundred kilometres. At the foot of the mountains, there is a broad plain about 100 km wide sloping down to tidal flats several tens of kilometres wide, which in turn grade into a shallow sea. The plain is covered by a maze of interweaving, shifting river courses similar to river patterns in many of the drier parts of Australia today. The fast-flowing rivers carry much sand, and are constantly building out over the tidal flats and into the sea as broad fans tens of kilometres wide. These fans shift sideways with time and eventually die out, only to be replaced by other fans building out in different areas. The boundary between the river plain and the tidal flats is thus very irregular and is constantly changing. There is abundant life in the sea and crab-like animals such as eurypterids and trilobites, are colonizing the tidal flats, but life has not yet evolved on land.

It will be another 380 million years before any trace of the present Murchison River course can be recognised and almost 400 million years before the river and coastal gorges are fully formed.

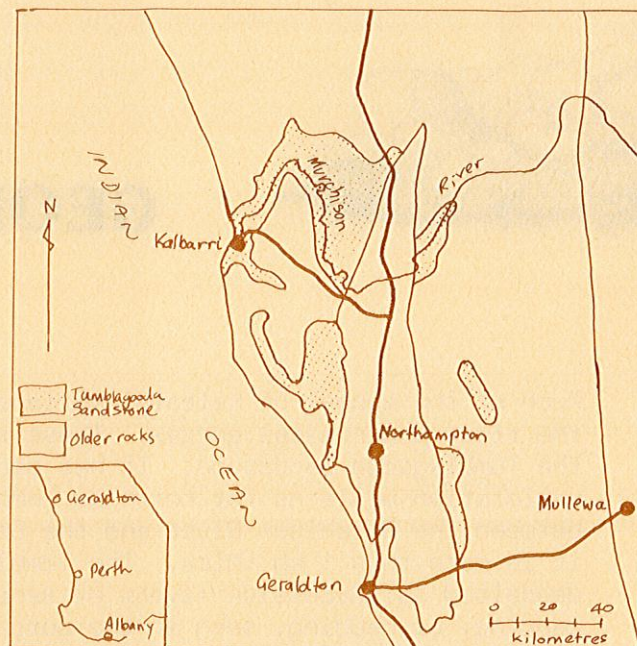
This is what the landscape along the western side of Western Australia looked like between about 400 and 430 million years ago, during the Silurian Period, when the Tumblagooda Sandstone was deposited, forming the river plains and the tidal flats. Relating this landscape to present-day features, the mountain range extended south and north from the position of Mullewa, and the boundary between the river plain and the tidal flats was in the Kalbarri National Park area.

The thinly bedded, red and white banded rocks seen through most of the river gorge and at the foot of Red Bluff were deposited on tidal flats. Rippled surfaces can be seen in many places, such as around Nature's Window. The ripples were formed by waves moving over the tidal flats. Some beds (e.g. on the way down the Z Bend and in



overhangs at The Loop) as if they have been riddled by plant roots, and often have a "can of worms" appearance. These are burrows left by worms sheltering in the sand. Tracks and trails on flat surfaces show where animals crawled across the damp sediment surface.

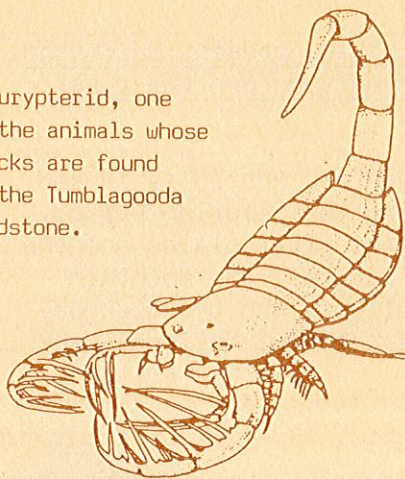
In Rainbow Valley and some other coastal gorges, the sandstone has an "organ-pipe" appearance. The pipes are a specific type of worm burrow called *Skolithos*, which is only found in rocks which were deposited in a beach environment. Remains of the worm which formed *Skolithos*, or actual body parts of other animals, have not been found in the Tumblagooda Sandstone, probably because the environment during Silurian times did not favour their preservation.



The more massive, coarser-grained sandstone seen, for example, at the bottom carpark at Red Bluff and between 10 and 20 m above the base of the Z Bend was deposited by river fans. These fans moved sideways over tidal flats at the Z Bend, and over other river fans at Red Bluff. The difference between the tidal-flat deposits and the river deposits can also be seen at Hawks Head, where thinly layered tidal deposits form the lower part of the gorge, and river deposits form the upper, cliff-forming, more massive part of the gorge.

The red and white striping and blotching of the Tumblagooda Sandstone is caused by staining by iron oxides. It is present at depths of thousands of metres in petroleum exploration wells, and therefore is not a recent, surface feature. The colouring probably took place shortly after the rock was deposited, in an oxidizing (rather than stagnant or swampy) environment. The colouring highlights sedimentary features such as burrows and ripples.

A eurypterid, one of the animals whose tracks are found in the Tumblagooda Sandstone.



PREPARED FOR THE NATIONAL PARKS AUTHORITY
BY MR. ROGER HOCKING OF THE GEOLOGICAL SURVEY
OF WESTERN AUSTRALIA.

ISSUED BY THE DIRECTOR OF NATIONAL PARKS
C.C. SANDERS

NATIONAL PARKS AUTHORITY
HACKETT DRIVE, NEDLANDS 6009
WESTERN AUSTRALIA

