

Kangaroo Valley Rocks

for the

Pioneer Museum Park

Contents

1. Rock types in Kangaroo Valley
2. Glossary
3. Kangaroo Valley landform and geology cross section
4. Kangaroo Valley geology map

January 2006

John Rowntree 2006
Authors: Glen Barn and Rachel Nanson



THE BRUSH TAILED ROCK WALLABY

Rock types in Kangaroo Valley

Kangaroo Valley hasn't always been the valley we see today. Over the last 450 million years it has been situated in a deep ocean, on a limestone reef, on the flanks of explosive volcanoes, in a shallow seaway and part of a huge peat swamp. Geologically speaking, the valley as we see it today has only existed for a very short time it has been carved out of very old sediments by river erosion.

The oldest rocks in Kangaroo Valley are situated in the river gorges downstream of the Kangaroo Valley township. These rocks are Mid Palaeozoic in age (450-300 million years old) and belong to the Lachlan Fold Belt. They include deep ocean sedimentary rock, volcanic rocks, limestones and granites.

Sitting above these older deposits are Permian southern Sydney Basin sediments, the oldest of which are mainly conglomerates comprised of eroded Lachlan Fold Belt mountains, which were deposited by ancient river systems. The rock units that are found in the Permian southern Sydney Basin above these conglomerates include the following five major units, in order of decreasing age.

1. The Wandrawandian Siltstone (WS) is quite thick in the south west gorges and valleys. It is a fine-grained grey siltstone and was deposited in a shallow sea with volcanoes offshore. Wandrawandian is the original name for the township of Wandandian. Outcrops are rare as it erodes easily.
2. The Nowra Sandstone (NS) can be seen beneath Hampton Bridge and in the cliffs on the Shoalhaven River, Nowra. This rock is made of quartz and contains Brachiopod fossils which indicate that it was deposited in a shallow marine environment. The Nowra Sandstone forms many steep cliffs.
3. The Berry Formation (BS) consists mainly of siltstone. Outcrops are rare, very weathered and when fresh, are dark grey in colour. The Berry Formation was deposited in a shallow sea and rock fragments and dropstones within the Formation are volcanic in origin. This means offshore volcanoes were erupting lava and eroding at the same time as Berry, Formation was being deposited.
4. The Broughton Formation (BF) consists of a number of lava flows and volcanically derived sandstones. The lava flows belong to the Gerringong Volcanics and were erupted from island volcanoes into a shallow sea. These volcanoes were situated along a present day coastline, extending north to Wollongong. One of the largest eruptions produced the Cambewarra Latite, a dark coloured volcanic lava which forms steep cliffs around the Kangaroo Valley and on Woodhill, Berry and Cambewarra Mountains. The sandstone within the Broughton Formation is usually green-brown to purple, indicating its volcanic origin. It is also very rich, fertile soils and lush rainforest in the Kangaroo Valley, Berry, Kiama and Jamberoo areas.
5. Above the Broughton Formation are the famous Illawarra Coal Measures (ICM), These were deposited in huge peat swamps extending from Kangaroo Valley to Bulli, Newcastle and the Hunter Valley to the north and Lithgow to the west (which all have coal mines today). They are even beneath Sydney. The coal seams are too thin in Kangaroo Valley to mine economically, although some early coal miners tried their luck in Brogers Creek, without success. The coal seams rarely outcrop and are usually covered with soil. Remember that 20m of peat compresses over millions of years to produce only 1 m of coal! There are also layers of lava and volcanic ash deposits in the coal.

Lying above the Permian southern Sydney Basin sediments are three major Triassic units:

1. The Narrabeen Group (NG) consists of silty clay sediments (shale) deposited by ancient river systems. This unit is very thin in Kangaroo valley, but gets thicker towards the north.
2. The Hawkesbury Sandstone (HS) lies above the Narrabeen Formation and forms the massive sandstone cliffs around the rim of the Valley. It is made mostly of quartz and was formed in river systems flowing from ancient mountains to the south and south east. Many waterfalls, such as Fitzroy, Belmore and Carrington falls, have cut back into this sandstone. Recent rock falls and avalanches expose fresh surfaces and large boulders are often at the base of the cliffs.
3. The Wianamatta Formation (WF) (Mittagong Formation) represents the final stages of the huge river system that deposited the Hawkesbury Sandstone. Siltstones and shales are the main rock type in this unit which are located on the highland plains to the north west.

Jurassic granite intrusions such as Mt Gibraltar were formed as South Eastern Australia started to split apart, forming the Tasman Sea. This allowed granite intrusions to rise into the crustal rocks from deep within the earth's mantle. Most of these rocks never actually made it to the surface and so cooled slowly, forming large crystals. Erosion has removed the surrounding sediments and exposed them.

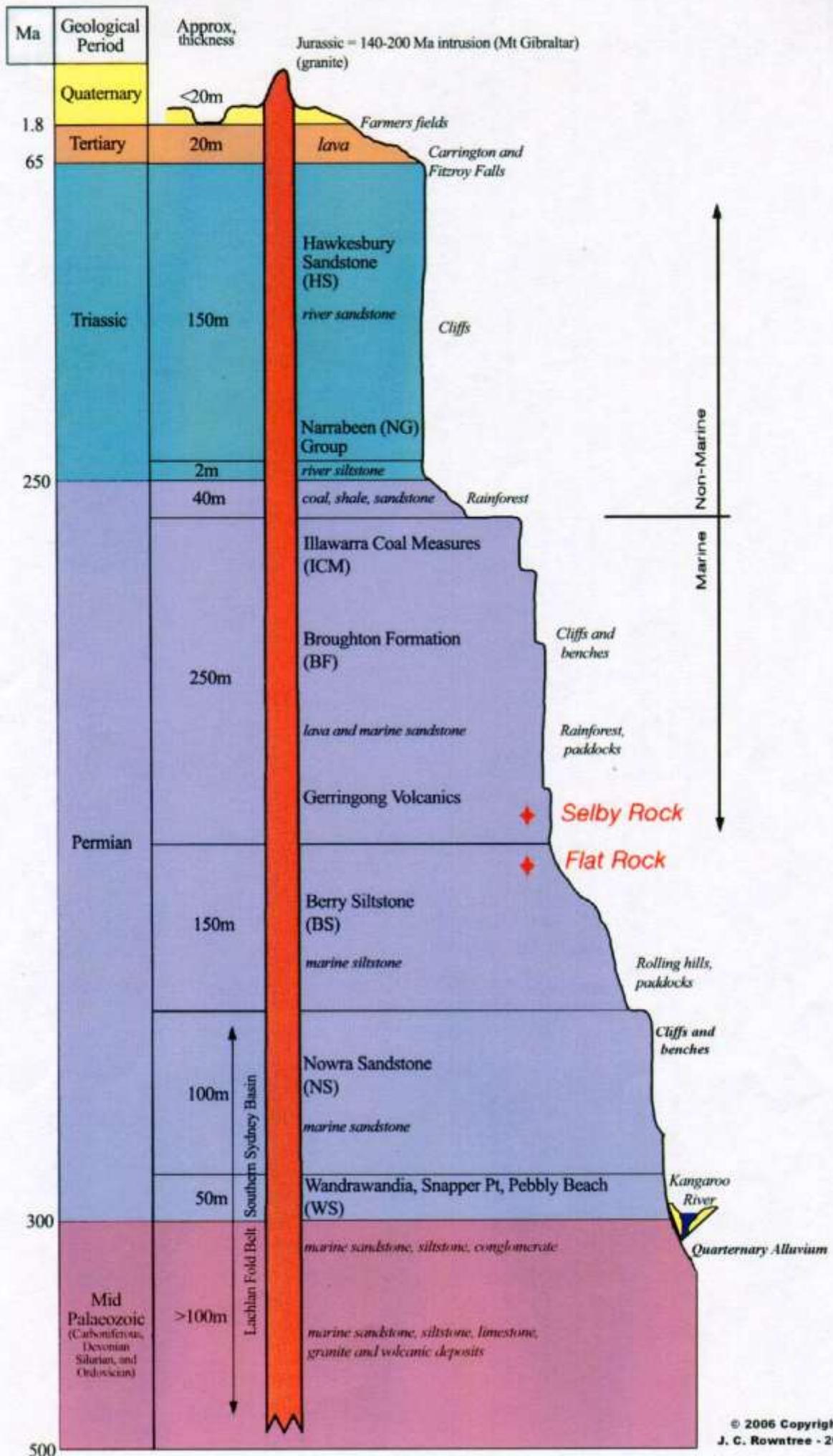
Tertiary Basalts, such as the Robertson Basalt, were deposited during a period when the east coast of Australia experienced widespread volcanism. There are many dark coloured, fine grained volcanic rocks called basalts, extending right along the east coast. The rich fertile soils around Robertson and Moss Vale are derived from these lavas.

Finally, the youngest deposits in Kangaroo Valley are the Quaternary alluvial river sediments. The Kangaroo River and its tributaries have eroded down through the older rock units described above and are still depositing this material on the valley floor. Waterfalls around the valley are evidence of this erosion, although it's happening slowly, at a rate of about 2.5km every million years!

Glossary

<i>Alluvial</i>	sand, silt and clay deposited by a creek or river (forming soil)
<i>Basalt</i>	dark coloured lava that is erupted onto the earth's surface
<i>Brachiopod</i>	Brachiopods are marine animals that usually have two shells hinged together, one larger than the other
<i>Conglomerate</i>	a rock made up of mixed sand, pebbles and cobbles
<i>Dropstone</i>	a rock which has floated out to deeper water on or in ice, then dropped when the ice has melted
<i>Fossils</i>	ancient remains of plants or animals that have been covered up with sediment and preserved
<i>Granite intrusion</i>	a rock that was formed by magma trying to get to the earth's surface. It often has large crystals from cooling slowly.
<i>Limestone</i>	a sedimentary rock mainly composed of calcium carbonate (eg shells)
<i>Ma</i>	millions of years ago
<i>Marine</i>	found in the sea or ocean
<i>Outcrop</i>	rocks that can be seen at the earth's surface (eg rivers, cliffs and road cuttings)
<i>Peat</i>	dead plant material formed in a waterlogged bog or swamp
<i>Sandstone</i>	a sedimentary rock composed of sand-sized grains
<i>Sedimentary rock</i>	a rock formed from grains (sediments) settled out of water, ice or air
<i>Siltstone</i>	a sedimentary rock mainly composed of silt-sized grains
<i>Shale</i>	a sedimentary rock composed of very fine grains (finer than silt)
<i>Unconformity</i>	a break in the rock record, often where erosion has taken place before more sediments have been deposited.

Kangaroo Valley landform and geology cross section



Kangaroo Valley Geology

