

3. Geological formation of the Grampians

Links to Section 1

This resource sheet can be used for Earth Science studies, as pre-visit information, and to help students investigate influences on the natural communities within the park.

Use a contour map to locate the four main ranges in Grampians National Park. Vicmap Outdoor Leisure Maps for Northern and Southern Grampians are suitable.

For more information on landforms such as cuestas, sills and dykes, see 4. Geology and landforms of Grampians National Park.

The Grampians Ranges are a series of north-south oriented ranges rising abruptly from the surrounding plains. The four main ranges are Victoria Range, Serra Range, Mount William Range and Mount Difficult Range.

The distinctive **cuesta** landform of the Grampians, consists of abrupt escarpments on the eastern side of the ridges and more gentle dip slopes to the west. This landform is the result of complex geological processes beginning in the Palaeozoic era (600 - 300 million years ago – see next page).

As explained in more detail below, a huge inland sea once covered this area. The sediments making up the Grampians were deposited under this freshwater sea about 400 million years ago and are thousands of metres deep. They consist of layers of

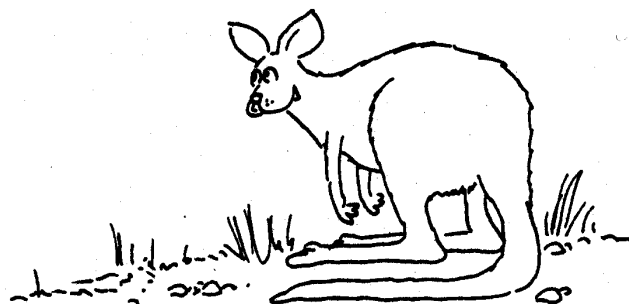
massive sandstones, siltstones and mudstones which were **folded** and **tilted** during the Middle Devonian period (around 370 million years ago), with later smaller earth movements causing further warping. The Wartook Syncline and the major fault line which runs to the east of Mount William, resulted from these earth movements.

Erosion of softer sediments and along fault lines has created valleys such as Dairy Creek and Devils Gap in the Wonderland Range.

Granitic magma intruded into the Grampians sediment around 395 million years ago. The molten magma upwelling from the earth's interior slowly cooled to form **granite**. Molten granite intruded into cracks in the sandstones to form **dykes** and **sills** in the Wonderland Ranges, Mount William and Mount Difficult (Gar). Many walking tracks on escarpments are on weathered sills. Greatly weathered intrusions also form low hills between the Victoria and Serra Ranges.

Scree slopes have developed below escarpments. Outwash from the ranges has formed the **alluvial plains** found in Victoria Valley and the Wannon Valley, and as elongated strips along some valley floors.

Type localities for the different rock units in the Grampians have recently been described. Since these type locations are important reference sites against which other rocks can be compared, they have a high priority for preservation for scientific purposes.



Influenced by the sea

The sea has also had an influence on the Grampians. About 14 million years ago the mountains of the Grampians, the Black Range and the Dundas Range were probably part of a promontory that jutted south into the sea, while nearby Mount Arapiles may have been an island. Gentle earth movements led to alternate invasions and retreats of the sea into the Otway and Murray Basins. About 10 million years ago the sea finally retreated to near its present position more than 150 kilometres south of the Grampians.

The isolation caused by being almost completely surrounded by sea in its geological past has been an important factor in the development of a distinctive Grampians flora and in the presence of normally coastal plants and animals (e.g. Southern Emu-wren, Heath Rat, and the plants, Blue Howittia and a form of Coast Banksia now called Rock Banksia).

For more information and diagrams

The Grampians – a noble range.
Jane Calder. Victorian National Parks Association. 1987.

Geological evolution of the Grampians

The formation of the Grampians can be identified with the three main divisions of geological time.

PALAEOZOIC ERA 600 - 300 million years ago (time of ancient life).

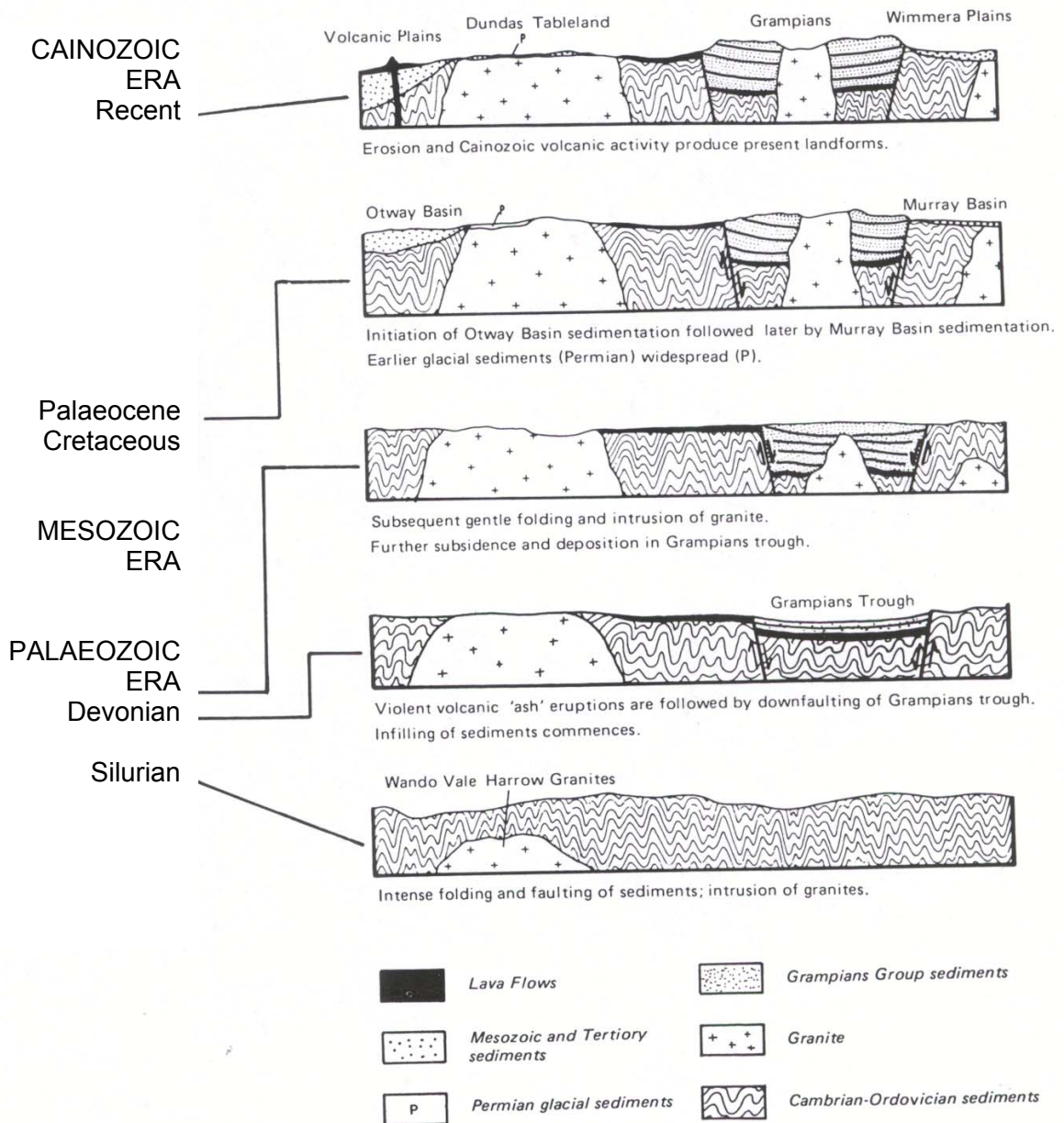
At the end of the Palaeozoic Era the Australian continent began to drift northwards and split from Africa and Antarctica. The resulting instability caused a deep inland basin to form in the Grampians region. Over millions of years this lake gradually filled with over a thousand metres of sandy material, eventually forming layers of hard and soft sedimentary rock.

MESOZOIC ERA 300 - 70 million years ago (the age of the dinosaurs).

During the Mesozoic Era, Australia experienced considerable earthquake activity and faulting as the continent finally split from Antarctica. Major faulting in the Grampians region caused the rock layers to tilt to the west. Continual erosion over millions of years by streams has cut deep valleys between the more resistant rock layers.

CAINOZOIC ERA 70 million years ago to present (time of recent life).

Erosion during the Cainozoic Era has formed the typical 'cuesta' landform of the Grampians ranges.



Simplified geological evolution of the Grampians

(After L.C.C. S.W. Study Area District 2)