THE MAIN RANGE

by Neville Stevens and Warwick Willmott

The steep eastern escarpment of the Main Range, stretching from the New South Wales border at Wilsons Peak to north of Cunninghams Gap, acts as a natural barrier between the Moreton Region and the Darling Downs, and forms part of southeast Queensland's mountainous Scenic Rim.

How did these mountains get there in the first place, and why is there such an obvious escarpment? This leaflet provides some of the answers, as well as describing the rocks and landscapes that can be seen.

Origin

The Main Range is composed of numerous, nearly horizontal lava flows, mainly of basalt, which were erupted between 25 and 22 million years ago in the Tertiary period, to gradually build up a complex and elongate volcano. There are also some prominent flows of trachyte in the sequence.

Basalt lavas have a low viscosity, tending to flow large distances, and to form gently sloping "shield" volcanoes rather than classical steep-sided peaks, such as Mount Fuji in Japan (the name "shield" comes from the shape of an upturned warrior's shield).

The Main Range shield volcano formed part of a wider area of volcanic activity which extended northwards past Toowoomba to Kingaroy and beyond. Other major volcanoes of similar age in the region include the Focal Peak Volcano near Mount Barney, and the well known and much larger Tweed Volcano whose remains form the Lamington Plateau and the Border Ranges (see sketch).

The Main Range volcano appears to have been highest southwards from Spicers Gap, partly because of the presence of the trachytes. The maximum total thickness now exposed is about 900 m and it may have been originally as much as 1000 m. It is uncertain how far north it extended; basalts around Toowoomba may have come from separate fissure vents.

The volcano is believed to have originally extended much farther eastward. Whilst the remaining lavas of the Main Range have a gentle slope to the west from the escarpment crest, it is assumed that they originally also sloped down to the east of the escarpment, e.g. to the Kalbar-Boonah district, and to the northeast towards Rosewood, where they have since been removed by erosion. Evidence for this comes from the elevation of the base of some remnant basalts which are left at a fairly low level around Perrys Knob near Rosewood and other places west of Ipswich.

Lavas of the volcano

Although most of the lavas were of basalt, some trachyte and local rhyolite flows were erupted towards the south, where there are also fragmental rocks from explosive eruptions. In other places in the south there are lava flows intermediate between basalt and trachyte. The basalt flows tend to be between 15 m and 25 m thick, whereas the trachytes may be up to 80 m thick.

The basalts are black to dark grey rocks, generally very fine grained, but with some light coloured rectangular crystals of plagioclase feldspar. Several factors have resulted in considerable variation in appearance between individual flows, including the cooling conditions of the lava, the amount of dissolved gases, and the time interval between successive flows.

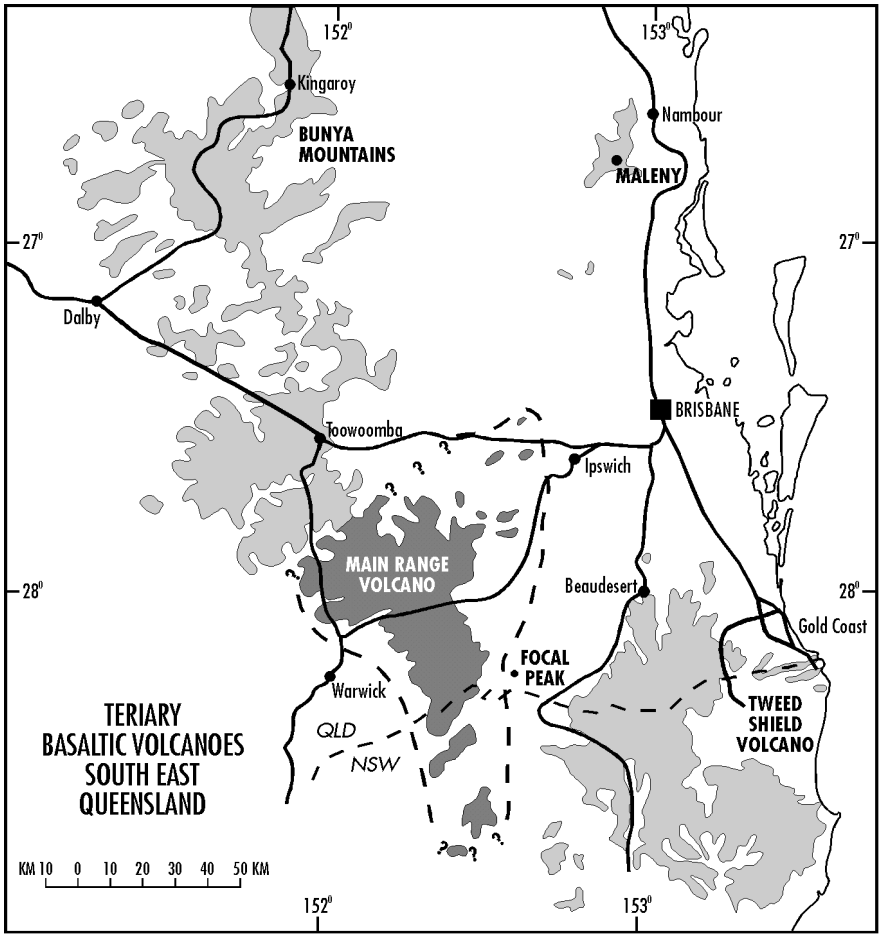
For instance, very gassy lavas often solidify before gases can completely escape, resulting in a rock perforated by small holes (or vesicles). In some cases the holes may be filled with minerals such as zeolites deposited from late fluids and gases. When in-filled, the vesicles are referred to as amygdules.

Lava cooling conditions can also result in a variation in the extent of jointing (fracturing). Some basalts may have very few, while others may be highly fractured, and hence extremely susceptible to weathering. Thick flows cool slowly and commonly develop a regular pattern of cooling fractures called columnar jointing.

The trachytes are mainly light purple-grey with numerous white to pink feldspars throughout, although some dark brown to grey varieties also occur. Such lavas are more viscous (sticky) than basalt and remnants of flow banding commonly can be seen. Again, gas bubbles are common, but these are generally larger than in the basalts. The flows are thicker and with fewer joints (fractures) than the basalts, and this combined with a greater chemical stability, results in a greater resistance to erosion and the formation of cliff lines.

Source of the lavas

Unlike Mount Warning of the Tweed Volcano, there is no well marked centre of eruption for the basalt lavas, and it is likely that in the southern part at least, they came from numerous basalt dykes (dyke swarms) which fed small vents; examples of dykes are exposed around Mount Alford to the east, and along the highway to the east of Cunninghams Gap; others may lie beneath the area at present covered by lavas.



For the trachytes there are several possible sources, such as vents east of the escarpment which have since been removed by erosion. These may be represented by deeper intrusive plugs of trachyte that have remained as resistant peaks in the Fassifern Valley, such as Mount Fraser and Mount Edwards. (Such vents could also have been a source of the basalts before they were plugged by the trachyte).

There is some evidence that the prominent and extensive Steamers Trachyte in the south may have been erupted from the Focal Peak Volcano to the southeast, which is roughly the same age.

Other intrusions east of the escarpment include the rhyolites in the plug of Mount Greville, the sill of Mount French and the ring dyke of Minto Crags. Rhyolite lavas are not seen in the face of the escarpment, and it is

likely that this magma rose to the surface, but being viscous (sticky) did not spread far from the vents, and has since been removed by erosion along with the vents.

Development of the landscape

The eastern part of the shield volcano once spread across the Fassifern Valley, probably as far as Mount Maroon, Boonah and even Ipswich. Other basalts fom this volcano or other vents probably continued northwards across the Lockyer Valley as far as Ravensbourne.

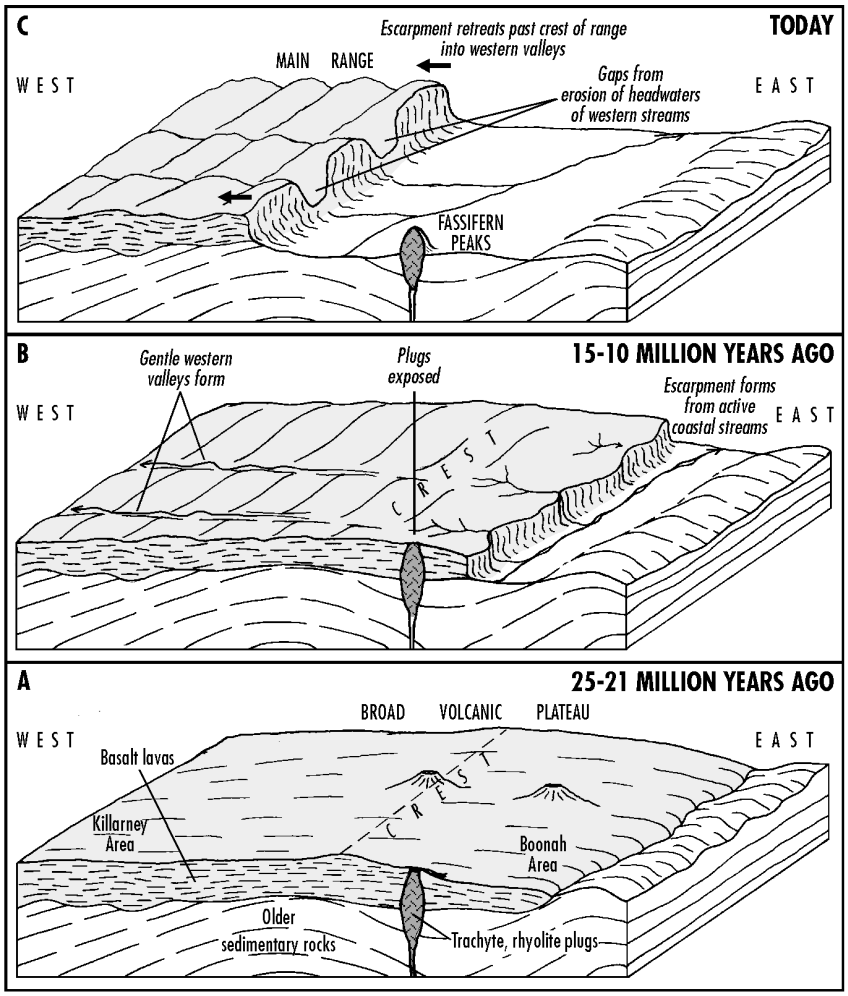
The relatively steep gradients and greater erosive power of the streams that developed eastwards from the volcano crest to the coast led to more rapid erosion on the east than on the west, where there was a lesser fall to the inland rivers. Consequently the prolonged erosion over 20 million years has removed mainly the eastern side of the volcano, exposing soft shale and sandstone of the underlying Walloon Coal Measures and Marburg Formation sandstones (as well as the intrusive plugs and dykes).
On this eastern side a north-trending escarpment has been produced, from the headwater retreat of the steep coastal streams. This has been favoured by close spacing of parallel streams, vertical jointing and horizontal layering in the basalts, and undercutting by the more easily eroded shales and sandstones beneath. The escarpment has gradually retreated westward past the centre crest of the volcano, as virtually all the lavas now remaining are sloping to the west. North of Cunninghams Gap the escarpment turns westward and forms an amphitheatre around the headwaters of the sizeable Lockyer Creek, with Toowoomba on its rim. However, the Mistake Range and Little Liverpool Range continue the northward trend of the Main Range into the Lockyer Valley.

The western side of the range is characterised by flat-topped ridges, the summits of which approximate the original surface of the volcano, separated by west-trending valleys which have gradually deepened from streams that began on the western flank 20 million years ago. The headwaters of many have been removed as the escarpment has retreated westwards, leaving the prominent 'gaps'of the range (such as Cunninghams Gap and Spicers Gap).

The trachyte lavas are more resistant to erosion than the basalts, and where they occur on the western side of the range they form cliff-fringed valleys such as Emu Creek (with the striking pinnacles of The Steamers), and Condamine Gorge.

The escarpment is part of the Great Escarpment of eastern Australia, which extends from Cape York Peninsula to the Victoria - NSW border. Usually the Great Escarpment is well to the east of the Main Divide, but here the two coincide. It is here too that the Great Escarpment is highest and most spectacular; this is because the Main Range lavas are of relatively recent accumulation on the sedimentary shales and sandstone beneath.

The term Main Divide is preferred to Great Dividing Range, as the latter is not a range (a chain of mountains) over most of its length- in many places the country, although elevated, is flat.



Development of Main Range escarpment

Looking at the rocks and landscapes

Carneys Creek-The Head-Queen Marys Falls-Killarney road.

This scenic minor road up the southern end of the escarpment (rough gravel in places) is one of the best routes to see the rocks and remnant land forms of the Main Range volcano. From Boonah take the road to Rathdowney for 9 km, turn right onto the Carneys Creek road, and right again on to The Head road at the second crossing of Teviot Brook, a few km south of Croftby. Measure distances from here.

The foothills of the range here are formed on shale and sandstone of the Walloon Coal Measures (weathered and poorly exposed), but there are numerous intrusive dykes and sills, mainly of trachyte. At 4.1 km a trachyte or andesite sill outcrops on both sides of the road, and at 4.7 km the road passes through cliffs of coarse trachyte (microsyenite) of another sill. At 7.3 km at the base of the climb the major cliffs of The Verandah and Kinnanes Falls are obvious ahead; these are formed on a thick sill of trachyte.

On the climb up the range sandstone is still evident in a small cutting at 8.8 km. Above this, basalt soil becomes common, but this may be hillside debris from above. The first basalt outcrops are seen at 10.2 km above a small patch of rain forest. At 11.1 km the crest of the range is reached at Teviot Falls Lookout; the falls are next to a massive cliff fall/landslide which shows that retreat of the eastern escarpment is still occurring.

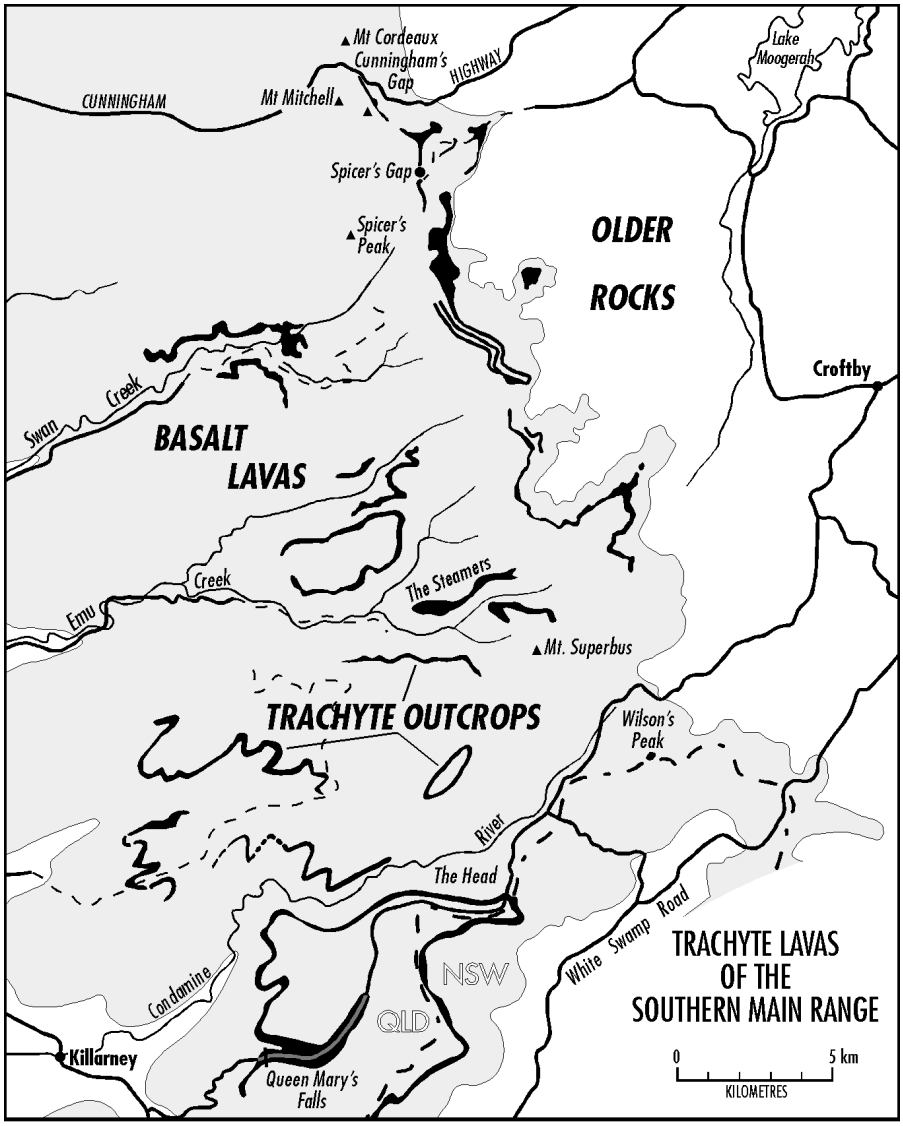
From here the road enters the valley of the Condamine River, one of the westerly flowing streams that have carved valleys on the western side of the volcano. The eastern headwaters of the river have been removed by westward retreat of the escarpment, leaving a gap between Mount Superbus to the north and Wilsons Peak to the south. Wilsons Peak is capped by a cliff line of resistant trachyte lava, a small remnant of flows farther to the west.

At 17.8 km, at the 4WD turn-off to The Head locality, cliffs of Condamine Gorge can be seen down the valley. These are of a thick trachyte flow, which being resistant to erosion has delayed broadening of the valley as the river has cut downwards. Continue on the Killarney road which climbs over a break in this cliff line.

At the Moss Gardens-White Swamp Lookout car park at 20.8 km, dark grey basalt with zeolite (chabazite) in gas bubbles occurs in a cutting a few metres below the car park. About 50 m up the road, massive, light purple-grey trachyte with feldspar crystals and flow banding, overlies the basalt; this is the trachyte of the major cliff line. The lower part of the flow has cooled quickly to a natural dark-coloured glass. At Carrs Lookout at 23.9 km, the vista to the north over the western side of Mount Suberbus shows the ridge crests sloping gradually to the west; these approximate the original surface of the western flank of the volcano.

Queen Marys Fall National Park is reached at 32.1 km. Here Spring Creek, while eroding down through the pile of lavas, has encountered the thick resistant trachyte flow between softer basalts. A trachyte cliff line with a retreating waterfall has developed, with the valley broadening only slowly downstream. The retreat is continuing, as the large blocks at the bottom of the falls were not evident in photos taken late last century. The nature of the trachyte can be seen in fresh broken faces in cuttings beside the circuit track which descends through breaks in the cliff line; it is mid-grey with numerous crystals of feldspar. In the face of the falls a horizontal flow banding resulting from flow patterns can be discerned from the lookout, as well as numerous large gas bubbles.

Continuing towards Killarney the road is on the trachyte flow; but at the beginning of the western descent of the mountain, above a small quarry on the left, it appears to thin out and terminate. At this point it is lying on a deposit of trachyte boulders of a volcanic breccia. In the quarry this breccia is overlain by two basalt flows; the lower one has a well marked red oxidised top. Below here the road descends through a series



of basalts in various states of weathering, with red tops visible in places. Zeolite is common in gas bubbles. Daggs Falls are over two thicker, less fractured, resistant basalt flows; columns resulting from regular contraction on cooling of the lava can be seen around the base. At the base of the descent pale coloured rocks in the cuttings indicate the underlying Walloon Coal Measures have again been reached.

The Steamers and Emu Creek valley.

The most striking feature west of the Divide is the line of peaks and flat-topped pinnacles at the headwaters of Emu Creek known as The Steamers. They are remnants of a thick horizontal trachyte flow interbedded between basalts, isolated by erosion. Vertical fractures are a factor in the erosion and the separation of the pinnacles. Cliffs on either side of the valley and around the western side of Mount Superbus are formed by the same flow. The Emu Creek road may require high clearance or 4WD vehicles.

Other nearby western valleys, such as Emu Creek North Branch and Swan Creek are also fringed by cliff lines of trachyte. There is some rhyolite at Hell Hole Creek.

Cunninghams Gap

Approaching from the east, the cliffs of The Ramparts on the right are the best example of the landform of the eastern escarpment. The high vertical face of Mount Mitchell ahead clearly shows the numerous layers of basalt flows. Just before the actual gap a prominent cliff line on the left is formed on a trachyte flow with some tuff and breccia; this continues around the contour to the south to form Mount Matheson.

At Cunninghams Gap, the National Park tracks to Mount Mitchell (1182m) and Mount Cordeaux (1021m), Bare Rock and Gap Creek Falls all pass over basalt, with outcrops in places. Towards the top at about 975 m elevation they pass over a zone of weathered basalt with white zeolite minerals (mainly chabazite) in the steam holes. Especially on the Mount Cordeaux track, some red weathered (soil) layers between basalts are passed over - these indicate long periods (at least thousands of years) between flows. Other features on this track are small lava caves which were original cavities left by draining out of lava beneath a solid crust, and a vertical cutting, apparently quarried out by miners for unknown reasons.

Spicers Gap

On the road just below the crest of the gap, the Spicers Gap Trachyte crops out, showing vertical columns. Governors Chair is made of this rock, as is the summit of Mount Matheson, seen on the Matheson trail. Other trachyte layers are passed over on the road up from the east, mostly marked by a change in slope from steep to level steps.

Goomburra valley - Sylvesters Lookout - Mount Castle - Mistake Range

A road to the Goomburra forestry camping area continues farther up a ridge almost to the crest of the range where there are tracks to two lookouts. The first is to Sylvesters Lookout on the edge of the escarpment; the second is at the end of the road and leads to a view over Mount Castle on the Little Liverpool Range. This, together with Kangaroo Mountain to the north are formed by a major trachyte flow.

Further reading

Ewart, A. & Grenfell, A., 1985: Cainozoic volcanic centres in southeastern Queensland. Papers of the Department of Geology, University of Queensland **11** (3).

Stevens, N.C., 1965: The volcanic rocks of the southern part of the Main Range, SE Queensland. Proceedings of the Royal Society of Queensland **77**, 37-52

1st edition September 1996