

The origin of the Cave.

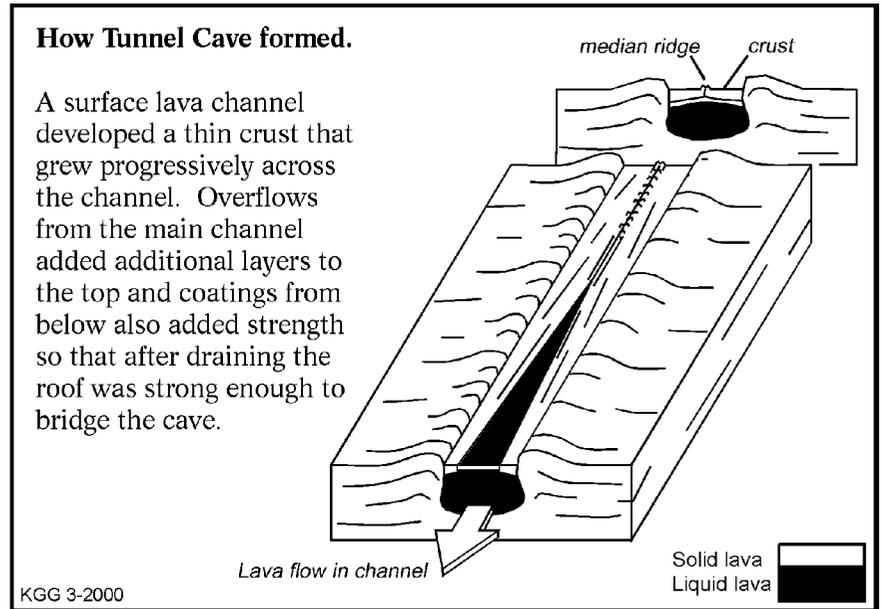
Tunnel Cave is a "lava tube" formed, towards the end of the eruption of Mount Eccles, by the drainage of lava from an underground conduit. During the eruption the crater would have been a lake of molten lava which overflowed through a gap in the crater wall and ran away to the west and south along channels (or "canals") similar to river channels. Tunnel Cave is in the side of the main canal. Initially it would have been an open channel diverging from the main one, but the surface of the lava flowing in the channel cooled and solidified to form a crust. Additional lava overflows from the main canal buried this crust with a stack of thin layers, now seen in the cliff above the entrance. Molten lava continued to flow in a tunnel left beneath the crust and, at the end of the eruption, that liquid partly drained away to leave the cave we now see. The original large entrance probably collapsed shortly afterwards. The present entrance is a small hole accidentally left at the top of the large mound of collapsed rubble.

The cave environment

Wait in the initial chamber until your eyes get used to the dark. Note the temperature: caves generally have a stable temperature beyond the entrance area, which approximates that of the surrounding rock - somewhere near the average annual temperature of the region. The humidity in the cave is also higher than on the surface. Thus, cave environments are characterised by darkness, dampness and a stable temperature with little air movement.

As your eyes adapt you will notice a greenish tinge to the rocks. A range of small plants are managing to survive on the limited light that comes through the entrance. These include small ferns, mosses, liverworts and algae. You will see that there is a marked change in colour from green on the sides facing the entrance to black on the shaded side. As well as the green areas, you will see patches of pale grey powdery material, rather like a sprinkling of flour. This is formed of actinomycetes, microscopic organisms that resemble both fungi and bacteria. They do not need light, so can be found throughout the cave. These are responsible for the 'earthy' smell of a cave; give them a sniff.

One would expect bats in a cave of this shape and size, but they are seldom seen now. The constant flow of visitors disturbs their sleep, and



so they have taken to using other, more peaceful, caves. Bats are a major source of food in caves - they feed outside, but return to roost in the cave where their droppings provide food for a wide range of fungi, insects and other small animals. The departure of the bats and the trampling of the floor sediments by human visitors over the last 100 years means that we see little animal life here now.

Features of the cave.

The arched roof and flat floor, resembling a railway tunnel, are typical of lava tubes. The original cross-section would have been elliptical; The flat floor is the surface of the final stream of molten lava which solidified as it moved through the cave. Much of the roof has a jagged appearance that suggests that fragments have fallen away. The rubble pile at the entrance formed in this way, but where is the rest of the fallen material? The lava floor must still have been liquid when most of it fell. For the first part of the cave the lava floor is covered with a thin layer of hard mud, washed in from the entrance and compacted by human traffic. If you have a bright light you may see colour variations on the walls - white, cream, and shades of brown and orange. These are mostly mineral coatings that have formed by weathering of the basalt rock.

Along the wall to your left is a low bench; a 'tide-mark' left from times when the lava surface was slightly higher. Where the lava touched the wall it cooled and formed a semi-solid lining that can be anything from a few centimetres to a foot or more thick. When the level dropped, the solidified lining remained to form a bench.

During much of the eruption the tube would have been completely filled with flowing lava. Towards the end, as the levels dropped, soft lava coatings a few inches thick were left on the walls and roof. The surface may have an irregular lumpy form, or have dribbles and drips, and horizontal or vertical grooves and ridges. The horizontal lines are probably 'tide-marks', but the origin of the vertical marks is less certain - possibly fragments of soft lining slid down the wall to leave grooves and ridges. In a few places one can see striated scrape marks left by fragments of crust that were floating on the surface of the lava river.

In places you see small flaps of lining a few decimetres across that have broken free and sagged down - some of these appear to have burst like bubbles because of gas pressure built up behind them. Towards the end of the cave (just beyond the low-roofed section) look at the right hand roof at eye height. A small cavity has formed behind a span of lining that broke free and sagged into the empty cave while still soft. Within the cavity an older lining has also cracked and sagged slightly.

The original wall features are often hidden by a younger growth of knobby to prickly 'cave coral'. This is not alive, but a mineral growth (mainly calcite) which has precipitated from coatings of water on the cave surface. The water picked up the mineral material from the weathered rock as it seeped down from the surface.

At the far end of the cave the roof drops and finally meets the floor - which is the surface of the undrained part of the underground lava flow that solidified in place and now blocks the rest of the original tube. We can guess that the tube, filled with liquid lava, would once have continued for quite a distance beyond this. Note the wrinkles of 'ropy lava' on the floor here. These are small pressure ridges formed by the movement of a lava that had a fairly thick consistency, similar to porridge. Comparable ridges may once have occurred in the floor of the main passage, but have been hidden under the mud.

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TUNNEL CAVE MOUNT ECCLES



Compiled by Ken Grimes for the Friends of Eccles and Napier.

Tunnel Cave is easily found - the entrance is right beside the Crater Rim Walking Track, at the north-west end of the main crater.

Note that although you can view the first part of the cave by natural light from the entrance, you should bring torches (with decent batteries!) if you want to see the dark areas beyond.

