

Some Volcanic Terms

relevant to Western District volcanoes

Compiled by Ken Grimes, Hamilton Field Naturalists Club, June 2005.

Aa lava: A relatively stiff type of basalt lava, resulting from the cooling and de-gassing of more fluid lava (*pahoehoe*, q.v.). It forms a fragmented jagged surface. The name derives from a Hawaiian word for pain.

Ash: see *Volcanic ash* and *tephra*.

Basalt: The name of the rock that forms the bulk of the Western District Volcanics. The name refers to the mineral composition rather than to the physical form - *scoria*, *ash*, and *lava* are all composed of basalt.

Base surge: A form of eruption associated with *maar* volcanoes in which hot clouds of *tephra* and gas are ejected horizontally rather than thrown high into the air. The surge can be quite violent and the resultant ash deposits show patterns of wind-formed ripples and small dunes (examples are exposed in the quarries at Tower Hill).

Bomb: see *volcanic bomb*.

Block: An angular fragment of country rock (e.g. limestone) which has been dislodged by the upward rising *magma* and thrown out of a vent and landed in the ash or scoria surrounding the crater. A type of *volcanic bomb* (q.v.).

Composite Volcano: A complex volcano that combines several of the simpler types (see *lava shield*, *scoria cone*, *maar*). Examples in the Western District may have a central scoria cone, or cones, superimposed on either a lava shield or a maar crater. See separate handout on volcano types.

Crater: The basin-shaped hole at the centre of a volcano. In western Victoria this commonly contained a lava lake from which a fountain of lava jetted up for several hundred metres. c.f. *vent*. The terms *vent* and *crater* are sometimes used interchangeably

Crust: (1) the cooled and solidified (but possibly still plastic) surface of a lava flow. Liquid lava may continue to flow in *lava tubes* beneath the crust. (2) The Earth's crust (or *lithosphere*) is the top 7 -70 km and comprises rocks which also occur at the surface. The oceanic crust is thinner than the continental crust. This overlies the *mantle* (q.v.) and most volcanoes are fed from molten pools of *magma* located just above or below the contact between the crust and the mantle.

Fumeroles: Small gas vents on the side of the volcano. The hot gas works its way up through cracks and small pipes through the rock and volcanic sediments - leaving a trail of vari-coloured mineralisation which can be seen as streaks and patches. Multi-coloured fumerole deposits can also build up on the surface.

Hawaiian Eruption: The type of eruption seen in Hawaii, and typical of what happened in the Western District. These are the calmest type of volcanic eruption and involve a lava pool in a crater that feeds extensive basaltic lava flows. The crater commonly has lava fountains up to several 100 metres high that build localised cones of scoria and spatter. See also: *strombolian eruption*, *lava shield*.

Hornito: A small *rootless vent* (q.v.), formed above a lava tube, which ejects intermittent showers of hot lava drops (the name is Italian and refers to a hornets nest). Small cones of spatter may build up around it.

Hot-spot: A pool of molten *magma* in the upper *mantle*. The term is mainly used where a continental crust is drifting across a stationary hot spot, which periodically erupts to form a chain of volcanoes with progressively younger ages. Examples of such chains occur in Queensland and NSW, but there is some debate as to the relevance of this concept to the formation of the Western District volcanoes.

Lapilli: Air-fall material (*tephra*) in the size range of 4 - 32 mm (pea to gravel sizes). If frothy, it is generally called *scoria* in Australia.

Lava: A liquid flow of molten rock on the surface. The basaltic lava from the Western District volcanoes was hot (about 1100 degrees Celsius) and quite fluid and so could travel for long distances. On the sides of some craters we can find local 'lava flows' that were accumulations of spatter so hot that they fused together to form a small flow. The two main types of basalt lava are *pahoehoe* and *aa*.

Lava channel: A channel carrying a river of lava. A broad lava flow tends to solidify in its stagnant parts so that flow is concentrated into fast-flowing channels. Levee banks may be built up on each side by splashing (spatter) or lava overflows.

Lava Shield (or lava volcano): A type of volcano formed as a broad low-angle cone of lava flows fed from a central lava lake. See separate handout on volcanic types.

Lava Tube: A conduit of liquid lava within a partly solidified lava flow. As a flow cools and solidifies the surface crusts over first, but narrow rivers of rapid moving lava may remain visible (*lava channels*). These channels can roof over to form lava tubes. Alternatively, within the body of a flow, beneath the crust, the more stagnant parts cool and solidify first, so the flow of the remaining liquid lava becomes concentrated into a pattern of hidden pipes or tubes. At the end of an eruption, the lava may partly drain from the tubes to leave open lava caves.

Maar: A type of volcano produced by strong steam-driven explosions to form a broad but shallow crater (commonly with a water-table lake). See separate handout on volcano types.

Magma: The name for molten rock while it is still within the Earth's *crust* or *mantle*. It may solidify there to form igneous masses such as granite or gabbro, or it may force its way up to the surface where it erupts and flows across the surface as *lava*. Magma contains dissolved gas which may escape on reaching the surface to drive explosive eruptions.

Mantle: The zone of the Earth's core that underlies the *crust* (q.v.) and extends down to depths of about 2,900 km. The mantle is solid, but the upper mantle (the top 400 km) is "plastic" and can flow very slowly, carrying the overlying crust to generate continental drift. Many volcanoes are fed from pools of *magma* (q.v.) in the upper crust.

Pahoehoe: A fluid form of basalt lava that flows freely to form surfaces that are smooth or wrinkled (ropy lava). This is the most common type found in the Western District Volcanics. As pahoehoe cools and loses gas it becomes stiffer and changes to jagged *aa lava* (q.v.)

Parasitic Cone: A secondary eruption point that forms on the side of a volcano when the main vent becomes clogged. May be difficult to distinguish from *rootless vents* (q.v.).

Rootless vent: A small eruption point fed from a hole in the roof of a lava tube. It may feed surface lava flows, form small *hornitos* (q.v.), or build up a scoria cone (which may be difficult to distinguish from a *parasitic cone*, q.v.).

Scoria: Loose pebble to cobble sized angular fragments of frothy lava. A high lava fountain throws drops of lava up into the air. As they fall they froth and cool so that by the time they land they have solidified and so form a loose deposit in a steep-sided cone around the fountain. The varying colours are due to different degrees of oxidation of the material before it cooled. See also *spatter*. A much-sought material for road-surfacing, and so most of our volcanoes are scarred by quarries.

Scoria Cone: A type of volcano formed by lava fountains or mild explosions that build a steep-sided cone of *scoria*. See separate handout on volcano types.

Spatter: A welded *scoria* formed of molten frothy lumps that were still soft when they landed and so stuck together as twisted and flattened 'cow-pats'. In places you might see small solidified trickles of liquid lava that oozed out of the mass.

Stony rises: A local term for the irregular hummocky and stony ground formed on the younger lava flows. A distinctive modern feature is the lines of dry-stone walls.

Strombolian Eruption: Named from a volcano in Sicily, this is a slightly more explosive eruption than the *Hawaiian* type (q.v.). It involves rhythmic explosions that throw out scoria and bombs. May be accompanied by lava flows.

Tephra: A general term for all air-fall materials associated with volcanic explosions - includes *bombs, lapilli, scoria* and *ash*.

Tuff: A consolidated rock formed from *volcanic ash* (q.v.) or *lapilli*.

Tumulus: (plural *tumuli*) A steep-sided mound of lava the size of a shed or house with cracked sides and top. Formed by the localised heaving up of a lava *crust*. The name derives from the ancient burial mounds of Europe.

Vent: The central hole where the molten rock (*magma*) reaches the surface - rising from 20 km or more below. The explosive release of pressure (both fluid and gas) enlarges the vent to form a *crater* (q.v.). The vent is usually blocked by rubble or solidified lava at the end of the eruption, but may occasionally stay open as a shaft at the bottom of a crater.

Vesicles: gas bubbles preserved in solidified lava (basalt rock).

Volcanic ash: smaller-sized (< 4mm) solid material thrown out of a crater. A type of *tephra*. This is a major component of the material thrown out of the more explosive volcanoes, such as Tower Hill. When consolidated it may be called *tuff*.

Volcanic Cone: A steep-sided volcanic hill, generally formed from *tephra* (q.v.). See also *scoria cone*.

Volcanic bombs: large fragments (greater than 32 mm) of solidified lava or country rock (e.g. limestone) that have been thrown high by explosive eruptions and landed at some distance from the vent - usually found embedded in a scoria or ash deposit. Some bombs have twisted or winged forms that show that they were ejected as liquid but were shaped and solidified as they flew through the air. Angular fragments of country rock may be called *blocks* to distinguish them from the more rounded or twisted lava forms.

Volcano: A natural structure, usually a conical hill and/or *crater*, formed by eruption of molten material (*magma*) rising from deep within the earth.