

All about Speleothems

Caves are unique – because of the dark, because of the quiet, but perhaps most of all because of the strange crystal formations with which caves are decorated. These decorations are called SPELEOTHEMS.

How are speleothems formed?

Speleothems are crystal deposits which form on the ceiling, walls and floor of caves. As rainwater seeps through the soil it absorbs carbon dioxide (CO_2) given off by plant roots, soil animals and decaying matter. This carbon dioxide makes the water acidic and able to dissolve limestone (calcium carbonate).

The acidic water dissolves some of the limestone as it finds its way through tiny cracks in the rock. When the water reaches the cave, it loses carbon dioxide to the cave air. The water is now less acidic and unable to hold the same amount of limestone. Tiny crystals of calcium carbonate are deposited, slowly decorating the caves with speleothems.



Speleothems formed by dripping water

Stalactites begin as a single drop of water hanging on the cave ceiling. Before the drop falls to the floor carbon dioxide is lost to the cave air, and a tiny amount of calcium carbonate (limestone) is deposited as a crystal. The easiest place for this to happen is where the surface of the droplet touches the rock; this gives the tiny crystals a surface on which to grow. Gradually an edge is built up which channels the drops further down. A straw stalactite, like a hollow crystal tube, is formed. Eventually the straw may become blocked and water forced over the outside of the tube depositing crystals. The straw becomes a stalactite.

When the drop lands on the cave floor the process continues – carbon dioxide is given off and more crystal is deposited as a stalagmite. Occasionally a stalagmite and a stalactite will grow together to form a column or a pillar.

Speleothems formed by evaporating water

In some dry cave passages where water seepage is very slow, water may evaporate depositing calcium carbonate and causing speleothems of beautiful and unusual shapes. Helictites are delicate, almost translucent structures, which begin the same way as straw stalactites, with a small hollow tube. In this case there is not enough water to form drips so the water simply evaporates, leaving any other dissolved minerals such as iron impurities, on the growing tip as well as calcium carbonate. The growing crystals are distorted so the helictite forms fantastic twists and curls.

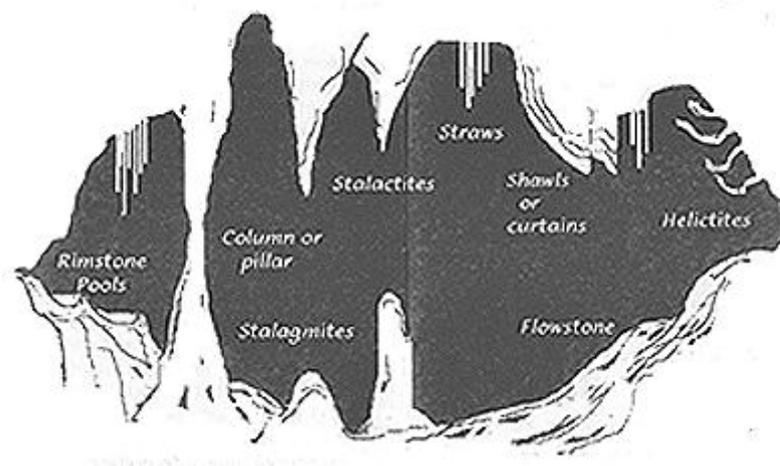
Speleothems and cave walls in drier passages are often coated with cave coral, a hard coral-like crystal growth thought to be caused by thin films of seepage water evaporating into the cave air. The crystal crust gives the wall a rounded appearance.

Speleothems formed by flowing water

Shawls are formed when water traces and retraces a path down the cave wall leaving crystal behind. Eventually this creates thin, translucent curtains or draperies. Flowstone is formed when crystals are deposited by water flowing in sheets down the cave walls. The surfaces of flowstone are not always smooth – sometimes they are covered with tiny rimstone pools rather like semi-circular terraces on a steep mountainside. These may range in size from a centimetre or so across to metres across. They occur because small irregularities in the surface disturb the water flowing over it, setting up ripples. Where the water is most disturbed more carbon dioxide will pass to the cave air and calcium carbonate crystals will build up into tiny dams.

Speleothems formed in water

Crystals may grow in still pools or slow flowing water. The crystals may grow in intricately branched patterns completely covering all the underwater surfaces.



Some commonly asked questions about speleothems

How fast do speleothems grow?

The growth rate of speleothems depends on how fast the water seeps into the cave and how much CO₂ is in the cave air. Speleothems do not grow at a constant rate. Climate changes over time affect the pattern of water seepage into the cave, which in turn affects the growth rate of the speleothems.

Rates of growth vary tremendously between speleothems, between caves and between different areas of the world. Within one cave a rapidly growing stalactite may be found next to one which grows slowly. One study of speleothem growth showed a range from 0.007mm/yr to 40.09mm/yr.

What is the human impact on speleothems?

When land is cleared above a cave, less water is retained in the soil and therefore less water seeps into the cave. Existing speleothems may dry out or stop growing altogether.

Speleothems may be broken or discoloured if touched. As recently as the 1960's, speleothems were being removed from caves and sold to tourists.