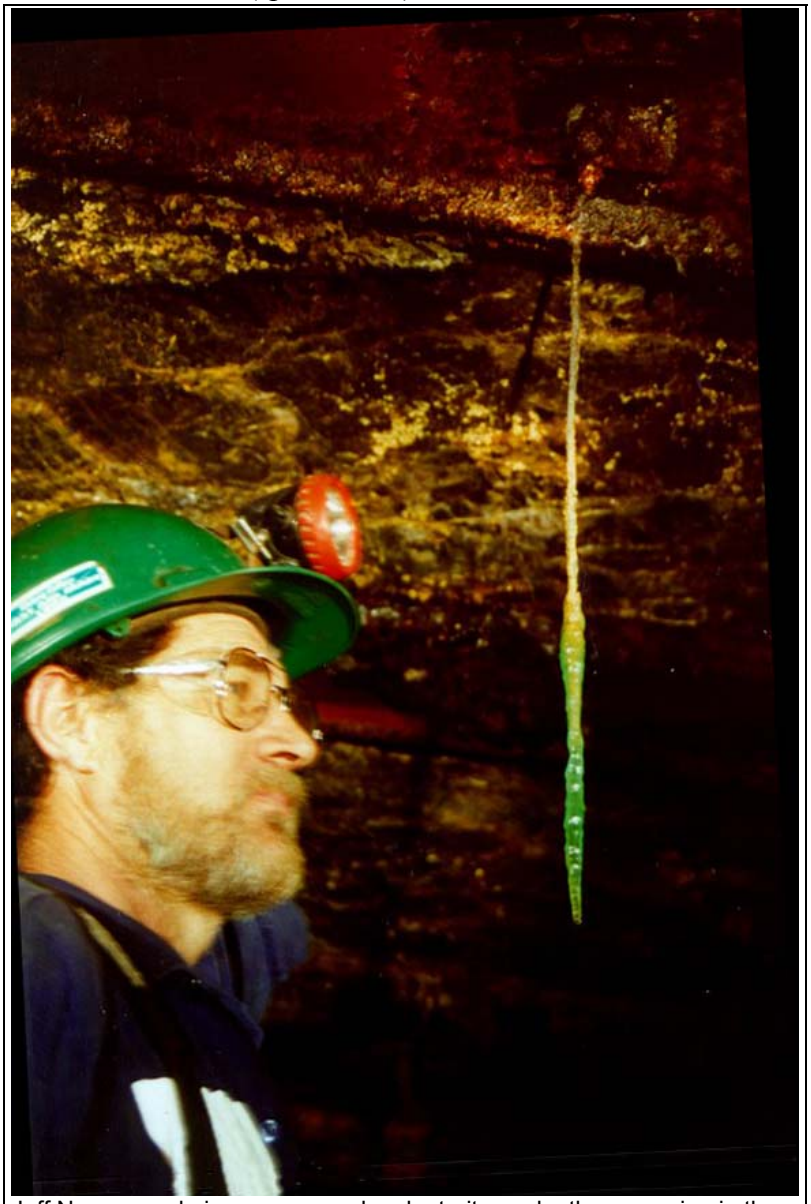
A Colliery Speleothem

By Garry K. Smith© (Secretary - Newcastle & Hunter Valley Speleological Society).

Published in "Underground Photographer": Summer 1998, Issue 10, Pages 6-7

This photograph shows a stalactite of Melanterite growing in old workings of the Ellalong colliery in NSW, Australia. The coal was extracted from this part of the mine about 18 years ago and this formation (speleothem) and about 15 others have been growing ever since. The brilliant glassy green of this formation is not apparent in the monochrome reproduction (there is also a colour version on the back cover of the magazine), but this is the first time I had seen a formation of this type.



Jeff Newman admires an unusual melanterite speleothem growing in the old workings of Ellalong colliery, NSW, Australia.
Photo taken using light-painting with a miners cap lamp, due to explosion risk in a mine. © Garry K. Smith

I was told about these formations by a mine Deputy (Jeff Newman) a short time before the mine was due to close 8th May 1998, so an inspection trip was hastily organised on the day before the closure. Due to mine regulations, no naked flames or unapproved electrical devices are allowed in the mine because of the possibility of sparks causing an explosion. This included battery watches, flash guns and cameras with batteries.

Also banned were aluminium products, such as aluminium tripods. The trip was organised in such haste that I was unable to track down an approved camera and flash to record this unusual find. Any approved electrical equipment used in the mine (including flash guns) are specially insulated to prevent sparks.

There was only one option left. That was to take batteries out of my old Minolta SLR camera and use it on manual cable release, drag out the old steel tripod and to try painting the scene with the beam of a miner's head lamp issued by the pit. These miners lamps use Quartz Halogen globes which give a yellow to orange appearance to exposures on most films.

Since I don't normally do this type of photography, I did not have appropriate colour balancing filters to fit to my camera lens, so it was a case of pot luck with exposure time and colour.

After covering several kilometres underground, we reached the rarely visited section of old workings. Here the methane gas levels were up to 7% near the ceiling of the tunnels (5% is regarded as highly explosive).

The sight of these brilliant green translucent speleothems (stalactites and stalagmites) was indescribable as they were more beautiful than anything I had seen before. In retrospect it may have been because these were so different to the calcite speleothems I am accustomed to seeing in caves. Anyway these green speleothems were amazing.

The attached photo was taken using Kodak Gold, 200 ASA, 35 mm print film with an aperture setting of f3.5 and a manual exposure of 5 seconds. Two miner's lights were used to paint the scene and miner Jeff Newman stood still with his hand resting on a roof strap to reduce movement during the exposure. Another light shone at the speleothem from below to highlight its translucent appearance. The film was especially printed at the developers to reduce some of the yellow cast, bringing the shot back toward true colour. This was achieved as the formation colour in the final print, matches that of the sample taken to the surface.

As suspected the speleothems are highly soluble in water and will be destroyed when the mine is flooded, now that operations have ceased. A small sample has been analysed as Melanterite ($FeSO_4.7H_2O$) which is Iron Sulphate Hydrate. Thankfully, rubber gloves were used to collect the sample, because the Melanterite becomes extremely acidic (sulphuric acid) when dissolved in water. This could have resulted in burnt skin on the hands.

Overall the visit to the mine was an experience of a lifetime, for which I am extremely thankful to Jeff Newman the mine deputy. Thankyou also to fellow cavers, Brian England (geologist) and Ken Turner (Chemist) for the analysis and their willing assistance in taking the photos.

A Melanterite stalagmite (speleothem) which was taken to the surface and photographed next to a miners flame safety lamp (170mm high) for scale. Photo illuminated by electronic flash unit. Photo Garry K. Smith ©