

TREAK CLIFF CAVERN, CASTLETON

NOTES FOR TEACHERS

The answers required for the work-sheets are shown in bold type, where possible. Helpful information is included in these notes.

The village of Castleton, often referred to as "The Gem of the Peaks" is world famous for Peveril Castle, for its Caves and for the rare Blue John Stone. The Treak Cliff area is the only place in the world, up to now, where this rare mineral is found.

Treak Cliff Cavern contains several veins of Blue John stone, together with stalactites, stalagmites and various kinds of beautiful cave formations, and to see them all in their natural surroundings a visit to this Cavern is a must for everyone, from child to geologist.

The way into this underground wonderland is through an old mine tunnel, originally dug about **1750**, that leads into a cave system full of fascinating minerals, fossils and cave formations. The temperature in the Cavern remains constant all year at about 11 degrees Celsius. Warm clothing is therefore recommended, but special clothing is not necessary.

Treak Cliff Cavern was Castleton's first Blue John mine, and Blue John was already being taken out of what was then known as Miller's Mine before 1750. **Blue John** is a semi-precious mineral currently thought to be calcium fluoride (fluorspar) having inclusions of hydrocarbons (oil) within its crystal lattice. The crystals of Blue John themselves are **cubic**, but the crystals of calcite often associated with the Blue John are called **Dog Tooth** or Nail Head, depending on their particular shape. Research into the Blue John enigma continues.

The largest piece of **Blue John** ever found is **The Pillar**, which weighs about **16 tonnes** and can be seen in the **Witch's Cave**. This rare mineral has been used for making ornaments and jewellery for nearly **250** years. The Blue John bowl on display inside a light fitting was made in 1935: when made its value was about £15; it is now valued at about **£2500**.

The surrounding rock is carboniferous limestone, formed from material deposited about **330** million years ago on what was then the sea-bed. The **Fossils** that can be seen in the roof and walls of the Cavern's chambers are the remains of plants and creatures that lived in this **sea** long ago. The limestone was created from their shells and limey secretions.

The tour continues with the descent into **Aladdin's Cave**, discovered in **1926** by miners looking for Blue John. This is the first chamber of a completely different cave system, called the "New Series". The "Old Series" of caves already visited, although more extensive than the "New Series", has only three chambers that are open to the public whereas the "New Series" has four chambers that can be visited. These are **Aladdin's Cave**, the **Fairyland Grotto**, the **Dream Cave** and the **Dome of St Paul's**.

Throughout these chambers can be seen all kinds of beautiful cave formations. There are **stalactites** that form downwards and **stalagmites** that form upwards. On a large boulder in Aladdin's Cave is a group of stalagmites, known as **the Seven Dwarfs**. The walls of this chamber are covered with multi-coloured **flowstone**, and many other unusual cave formations can be seen.

All these formations are made by drops of **water**. Rain-water is a dilute acid and as it percolates down through the **limestone** in the hillside it dissolves some of the rock. It then travels into the Cavern where the mineral-rich fluid deposits some of its mineral content on the roof, walls and floor before continuing its journey to the valley below. This water-deposited mineral is a form of calcium carbonate known as calcite and is highly crystalline.

When the Fairyland Grotto is reached the guide switches off all the lights and the chamber is plunged into total darkness; when the lights are switched on tiny lights come on first and "Fairyland" can be seen. As more lights come on it is possible to see the full extent of the Fairyland Grotto, above which is the lovely cascade of flowstone called the frozen waterfall. Stalactites and stalagmites often occur in pairs that meet and join to form a column or pillar. In the Dream Cave a pair has nearly met, with only 4cm to go, but because stalactites in the Cavern only "grow" on average about 2.5cm every 1600 years it will still take 1000 years for the pair to meet, in about the year 3000 A.D.!!!

Twisted, bent or peculiarly-shaped formations are called helactites and are thought to be caused by irregularities in the crystallisation process causing non-conformities in the crystals. A little imagination is needed to see some of the "shapes" pointed out by the guide. The most popular are: the Stork, the Sheep's Head, the Tortoise, the Hand and the Elephant. The tour of the Cavern ends in the Dome of St Paul's, about 50 metres below the surface.

Extensive exploration has failed to find a way out of the Cavern from here because the way ahead is blocked by a huge boulder that weighs about 420 tonnes.

A return must be made to the Witch's Cave and then along the exit tunnel to the surface.

Caverns like Treak Cliff Cavern were created many thousands of years ago by powerful underground rivers that dissolved and scoured away the limestone rock. The large quantity of water needed for this was supplied by melting ice during a great ice age. This melt-water ceased to flow over one hundred thousand years ago according to radio-carbon dating of the stalactite formations, which shows them to be about one hundred thousand years old!

The surrounding limestone rock was dated in a similar manner as about 330 million years old, whilst the Blue John in the "Old Series" was dated by a much more complicated process as having been formed about 240 million years ago.

The Treak Cliff Cavern cave system is a Site of Special Scientific Interest (SSSI), on which geological and scientific research continues to be carried out.

The guide is happy to talk about the caves and to answer any questions.