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## Minerals & mineralogy

The precise definition of a mineral is “A substance having a definite chemical composition and atomic structure and formed by the inorganic processes of nature”. Individual minerals are generally referred to as species. The study of minerals is called Mineralogy. Rocks are composed of different minerals in varying proportions. Minerals may therefore be viewed as the essential components of rocks.

Outside the science of mineralogy, the term mineral is widely used to describe any natural product won from the earth. Thus, although sandstone, coal, oil, iron ore, and sand and gravel, are all commonly referred to as mineral products, they do not fulfil the strict definition of a mineral. This document is concerned with mineral species *sensu stricto*, as defined above.

### Minerals in the AONB

Approximately 130 valid mineral species are reliably reported in the scientific literature from the North Pennines. Whereas many of these are found within the mineral veins and flats, others are known mainly, or solely, as components of rocks within the area.

The North Pennines includes the type localities for four mineral species: witherite; barytocalcite; alstonite and brianyoungite.

The mineral deposits of the North Pennines have long been a source of beautifully crystallised examples of several of their constituent minerals. Perhaps best known of these is fluorite, spectacular brightly coloured examples of which have been recovered from many mines, most notably in Weardale, Alston Moor, East Allendale, and parts of the North Pennine escarpment.

The area has yielded some of the finest known examples of this species. Striking specimens are to be found in countless museum collections and many are described and figured in numerous mineralogical publications.

The widespread abundance of barium carbonate minerals in the area's mineral deposits is a feature which makes the North Pennines unique in the world. Most abundant is the barium carbonate, witherite, which is a major constituent of many of the veins in the outer zones of the field. Elsewhere in the world this is an extremely uncommon mineral. Here in the North Pennines it is present in such abundance that it was for many years worked commercially as a raw material for the chemical industry. Also present, locally in some abundance and in places closely associated with witherite, are the even rarer double carbonates of barium and calcium, barytocalcite and alstonite. Both are extremely rare outside of the North Pennines. The reasons for this remarkable concentration of these minerals has yet to be determined. Superb specimens of these minerals from the North Pennines figure conspicuously in the world's mineralogical museums and collections.

### Wider importance

The North Pennines has long been an internationally famous source of fine examples of numerous mineral species. Of particular significance are the magnificent specimens of fluorite, witherite, barytocalcite and alstonite. The area hosts the world type localities for the latter three species of barium carbonate minerals as well as the comparatively recently recognised zinc sulphate carbonate hydrate species brianyoungite.

### Conservation issues

Fine examples of several species, notably fluorite and the barium carbonate minerals, have long attracted collectors and good examples are increasingly scarce, even at localities formerly well known for them.

The collecting of minerals is an essential part of mineralogical science and has contributed, and continues to contribute, much to the understanding of mineralogy. However, uncontrolled collecting has, over the years, resulted in damage to several important mineral localities within the AONB. If such collecting is to be allowed to continue, suitable safeguards need to be devised to ensure that the benefits to be derived from responsible and informed collecting are not outweighed by the depletion and damage to the finite mineralogical resources. Collectors of minerals need to be encouraged, or perhaps required, to record and report the results of their collecting with the wider Earth science community and to deposit representative specimens with museums with major Earth science collections.

Trace fossils found at Scordale, probably formed small molluscs or worms around 320 million years ago. © Brian Young

## Selected references

Bevins et al in press; Dunham, 1990; Dunham and Wilson, 1985; English Nature, 2003; Fairbairn, 2003; Symes and Young, 2008; Young, 1997, 2003

## Figures

(Figure 58) Barytocalcite crystals, Clargill Mine, Alston © BGS, NERC.

(Figure 59) Fluorite crystals, Weardale. [Rob Lavinsky, iRocks.com – CC-BY-SA-3.0, CC BY-SA 3.0](#), via Wikimedia Commons

## [Full references](#)



*Barytocalcite crystals, Clargill Mine, Alston © BGS, NERC.*



*Fluorite crystals, Weardale.*

(Figure 59) Fluorite crystals, Weardale. [Rob Lavinsky, iRocks.com – CC-BY-SA-3.0, CC BY-SA 3.0](#), via Wikimedia Commons.