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## Minerals and mineralogy

The strict scientific 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.

Rocks are composed of different minerals in varying proportions. Minerals may therefore be viewed as the essential components of rocks. Mineralogy is the study of minerals. Outside the science of mineralogy, the term mineral is widely used to describe any natural product won from the earth. Thus, although sandstone, coal, 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 section is concerned with mineral species as defined above.

### Minerals in County Durham and their wider importance

Approximately 130 valid mineral species are reliably reported in the scientific literature from County Durham. Many of these are known mainly, or solely, as components of rocks within the county. However, many are found within the mineral veins or related deposits within the Northern Pennine Orefield.

In common with most parts of Great Britain, no comprehensive topographical inventory of the minerals and their occurrence exists for County Durham.

The veins and associated deposits of the Northern Pennine Orefield have long been a source of beautifully crystallised examples of many of the more common of their constituent minerals.

Perhaps best known of these is fluorite. The area has yielded some of the finest examples of this species known anywhere in the world. Striking examples are to be found in most of the world's major museum collections, and are described and figured in many mineralogical publications. Most spectacular are the brightly coloured crystals which have been recovered from mines, most notably in Weardale. Boltsburn Mine at Rookhope is probably one of the world's most famous localities for beautifully crystallised examples of fluorite, though Blackdene, Cambokeels and Frazer's Hush fluor spar mines also became important sources of striking crystals in the second half of the 20th century.

Most common were purple crystals in a variety of hues, though yellow, colourless and green crystals were also found. Particularly fine examples of deep bottle-green fluorite are well known from the abandoned underground workings of Heights Mine, formerly exposed during limestone quarrying at Heights Quarry, and now mostly quarried away. Similar specimens occur, in some abundance, in a small vein in Eastgate Quarry. Commercial mining for fine fluorite specimens, mostly of a rich deep green or purplish green colour, continues today at Rogerley Mine, near Frosterley.

The widespread abundance of barium carbonate minerals is a feature which makes the Northern Pennines unique in the world, though the reasons for their comparative abundance here has yet to be determined. Most abundant is the barium carbonate, witherite, which is a major constituent of many of the veins in the outer zones of the field. There is strong evidence that this mineral was first recognised as a species within the Northern Pennines, almost certainly from specimens originating in the Alston Moor area. Elsewhere in the world witherite is an extremely uncommon mineral. In the Northern Pennines it is present in such abundance that it was for many years worked commercially as a raw material for the chemical industry. Within County Durham substantial deposits of witherite occur in veins of the Northern Pennine suite of deposits hosted within the Coal Measures rocks of the coalfield. For many years witherite was mined from such deposits, especially at South Moor. Also present in the Northern Pennine veins, locally in some abundance and in places closely associated with witherite, are the even rarer double carbonates of barium and calcium alstonite and barytocalcite. A few specimens of alstonite were recovered from the baryte/ witherite vein at New Brancepeth Colliery. Fine examples of witherite were obtained from both the South Moor and New Brancepeth workings. Unusually fine, large crystals of the uncommon nickel mineral ullmannite were also found at New Brancepeth.

Other minerals, found in particularly fine specimens, or in unusual or interesting assemblages, within the county include apophyllite and pyrrhotite crystals from Cambokeels Mine, Weardale; cerussite from Stanhopeburn and Redburn Mines,

Weardale; niccolite from Lady's Rake Mine, Teesdale; and leadhillite from Closehouse Mine, Lunedale.

An unusual suite of iron sulphate minerals, including ferricopiapite, sideronatrite and jarosite, has recently been identified in colliery spoil on parts of the Durham coast at Hawthorn and elsewhere.

## Threats

Fine examples of several species, notably fluorite, have long attracted collectors and good examples are increasingly scarce, even at localities formerly well known for them. However, many of the area's most common minerals remain abundant at numerous localities.

The progressive depletion of important sites by continued uncontrolled collecting is addressed below (page 168).

Backfilling, or reclamation, of abandoned quarries may destroy important exposures of mineralisation.

## Conservation

SSSIs or Durham County geological sites with important fossils are listed under Mineral veins and flats.

Museums with significant holdings of County Durham minerals are listed under Geological Archives.

## Selected references

British Geological Survey, 1992, 1996; Dunham, 1990; Dunham and Wilson, 1985; English Nature, 2003; Fairbairn, 2003; Hacker, 2003; Wallace, 1861; Young, 1997, 2001, 2003.

## Photographs

(Photo 71) Crystals of purple fluorite from Boltsburn Mine, Rookhope. Natural History Museum, London.

(Photo 72) Polished slice of the unusual niccolite (copper coloured), magnetite (black) ore from Lady's Rake Mine, Teesdale. B Young, BGS, ©NERC, 2004.

## [Full references](#)



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*(Photo 72) Polished slice of the unusual niccolite (copper coloured), magnetite (black) ore from Lady's Rake Mine, Teesdale. B Young, BGS, ©NERC, 2004.*