

A Weardale Mineralogical Mystery

*Jesse Fisher
380 Pennsylvania Ave.
San Francisco, CA 94107
Jef520@comcast.net*

Mining for lead and other mineral commodities has taken place in and around the Weardale region of Northern England for many centuries. These mines have also been the source of many superb specimens of fluorite and other minerals - known by local miners as “Bonnie Bits” – which have been collected as curiosities for almost as long (see Fisher, 2004, and King, 1982). Coincident with the height of mining in Weardale during the 18th and 19th centuries, was a popularity in Britain (and during the latter part of this period, the United States) for collecting “objects of natural history”, including mineral specimens, among those with the financial ability to do so (for an example, see Cooper, 2005). This led to a thriving secondary market in specimens, which was primarily based outside of Weardale itself, in the town of Alston.

Weardale is, even today, located in one of the more remote parts of the country, and

before the establishment of extensive rail, and later road networks, travel to the mines by the average individual would have been quite difficult and time consuming. As a result, most collectors and curators of the time relied completely on the dealer intermediaries for their specimens and accompanying information. The Alston-based dealers were undoubtedly anxious to protect their sources, and the miners who supplied them were undoubtedly equally anxious to hide their lucrative, but possibly job-threatening sideline from mine management. As a result, the location information given with specimens was usually vague, if not downright incorrect. It has only been during the twentieth century that motivated collectors such as Sir Arthur Russell began to actively visit mines in search of specimens for their collections. This, along with the increased popularity of field collecting one’s own specimens

Figure 1.

A specimen of green Weardale fluorite, which likely dates from the early 19th Century. Like many old green fluorite specimens from the region, this one has faded because of exposure to sunlight.



(facilitated, no doubt, by improved transportation infrastructure) has resulted in more attention being paid by collectors to the accurate provenance of specimens they acquire.

So what has become of all the specimen material that must have emerged during the height of lead mining in the region during the eighteenth and nineteenth centuries? Suites of magnificent, if poorly located, Weardale fluorites are common among collections both public and private assembled during the 19th and early 20th centuries. Unfortunately, mineral collecting, as with many other human pastimes, is subject to the vicissitudes of fashion, and many older collections have suffered from varying degrees of neglect once the original collector has passed on. Owing to the once prolific output of the Weardale mines, decent specimens can still occasionally be found in the mineral marketplace through “recycling” of older collections. The provenance of these older specimens, vague to begin with, is often further clouded when specimens become separated from labels or collection catalogues during dispersal.

An early reference to the occurrence of mineral specimens in the North Pennines was made by Westgarth Forster in the second edition of his book "*A treatise on a section of the strata commencing near Newcastle upon Tyne, and concluding on the west side of the Mountain of Cross Fell*", published in 1821. This was the earliest published work to document the geology of the Weardale region in a modern scientific context, and Forster's correlation of the regional stratigraphy is still, for the most part, accepted today. In a section where he describes the minerals found in the local lead mines (p. 216), he states:

"All the extensive mines in Weardale, in the county of Durham, and Allenheads and Coalcleugh, in the county of Northumberland, have calcareous and fluor spars for the matrix; and it is from mines in Weardale, that the beautiful green fluor has been procured lately in such quantities."

Unfortunately, he does not say which mine it was that produced the quantities of beautiful green fluor. For many years, the Heights



Figure 2.

A specimen of twinned green fluorite crystals on sandstone-like matrix, 7 cm across. Specimen was labeled as “Heights Mine” but matrix composition argues otherwise.

Figure 3.

A close-up of the above specimen showing modifications to the edge of the cube and internal purple color bands, typical of fluorite from this find.



mine was the source of much of the green fluorite found in the region. The Heights mine, however, can not be the source of the find Forster refers to, as it was not in production until around 1850 – some 30 years after the date of his writing.

Modern mineral collectors and dealers commonly assume that any specimen of green fluorite from the North Pennines for which the location is uncertain is from the Heights mine, owing to its prolific output over the years. As with many assumptions, however, this may not always be a safe one to make. Occasionally, twinned green fluorites that are obviously from the North Pennines, but having some peculiar characteristics, can be found in old collections. These characteristics suggest yet another source.

Like much Weardale fluorite, these crystals are invariably twinned and show well developed growth lines, or "vicinal faces" on the cube. They also show unusually rounded edges to the cube. The color, while green, is often faded as can happen to green Weardale fluorite over time. These fluorites also appear to have one or more thin, purple layers just below the cube face, which become more visible in specimens where the green has faded. What suggests that these specimens are not from the Heights Mine, or

any of the other recognized localities for green fluorite in Weardale is the unusual nature of the matrix on these specimens. When present, the matrix appears granular or porous, often friable, and iron-stained. Microscopic examination reveals the presence of numerous angular quartz grains, suggesting that the fluorite in question originated either from a sandstone unit rather than the usual limestone, or that the limestone matrix has undergone a degree of metasomatic alteration not normally seen from the Heights mine. Perhaps these are the remnants of the find Forster was referring to.

Though mining records from the early 19th century are rather spotty at best, there is evidence from both Dunham (1990) and Fairburn (1996) that the lead mines in Middlehope Burn, just north of the village of Westgate were quite active around the time that Forster was writing. One of these, the Middlehope Shield Mine, was accessed by an adit known as White's Level, which was driven below the Great Limestone in a major sandstone unit called the Quarry Hazle. This level eventually intersected the Great Limestone, and in the process encountered several major ore-bearing veins, including one that may be a westward extension of the Heights West Cross Vein. Dunham (1990) cites production figures for the period 1818 to

1864, and Fairburn (1996) states that records suggest the mine was active prior to 1809. The time period and geological setting draw a connection between Forster's reference and the old fluorite specimens on sandy matrix.

A final piece in the puzzle is found in a publication from the early 19th century. In the "Annals of Philosophy", vol. XIV, published in 1819 is a short paper by Edward Daniel Clarke, (then Professor of Mineralogy at Cambridge University) entitled "*Account of a newly discovered variety of green fluor spar, of uncommon beauty, with remarkable properties of colour and phosphorescence.*" In this paper, he describes a large find of "perfectly transparent, intense emerald green" fluorite that occurred at the Middlehope Shield mine, near Westgate, in the autumn of 1818. He goes on to give a description of the specimens that matches quite well those in question, including the crystal twinning, beveled edges, surface "laminae", and buff-colored, often friable matrix.

A corroboration of this may be found in the Arthur Russell collection, housed in the Natural History Museum, London. In the collection, mixed in with specimens from the Heights mine, are several green fluorites with

a sandstone-like matrix. One of these specimens, collection number 1524, was acquired by Russell from a 19th Century collection and is recorded in his ledger as being from White's Level. Unfortunately, White's Level was never reopened in the 20th century during the region-wide resurgence of mining for fluorspar, so there are no modern descriptions of the mine and its mineral deposits. The level is long collapsed, and the area encompassing much of Middlehope Burn is now a protected archeological site, so it is unlikely that anyone will get there again any time soon to have a look.

Acknowledgments

I would like to thank Lindsay Greenbank for originally bringing the "matrix problem" to my attention, Mark Wrigley for assistance tracking down specimens, Alan Hart and Mike Rumsey of the Natural History Museum, London, for allowing access to the Russell collection, and finally David Green of the University of Manchester for providing a copy of Clarke's publication. Reviews of the manuscript during preparation were kindly provided by John White and Michael Cooper.



Figure 4.

*The portal of
White's Level,
Middlehope
Burn, summer
of 2003.*

Figure 5.

*Another specimen of
green North Pennines
fluorite on a friable
sandy matrix,
possibly from White's
Level. This one has
retained its color.
Specimen is 10 cm
across.*



References

- Clarke, E. D., 1819. *Account of a newly discovered variety of green fluor spar*. In: Thompson, T., ed, *Annals of Philosophy*, v. XIV, Baldwin, Cradock and Joy, London, 34-36.
- Cooper, M. P., 2005. The Devonshire Mineral Collection at Chatsworth House: An 18th century survivor and its restoration. *Mineralogical Record* 36:239-272.
- Dunham, K. C., 1990. *Geology of the Northern Pennine orefield*, v. I, 2nd Ed. British Geological Survey, London.
- Fairbairn, R. A. 1996. *Weardale mines*. British Mining No. 56, The Northern Mining Research Society, Keighley, U.K.
- Fisher, J., 2004. Fluorite from the North Pennines Orefield, England, *Rocks & Minerals* 79(6):378-398.
- Forster, W. 1821. *A treatise on a section of the strata commencing near Newcastle upon Tyne, and concluding on the west side of the Mountain of Cross Fell*, 2nd ed., Geological Press, Alston, 422 p.
- King, R. J. 1982. The Boltsburn mine, Weardale, County Durham, England. *Mineralogical Record* 13:5-18.