

The English Peak District (as a potential geopark): mining geoheritage and historical geotourism

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ABSTRACT

The Peak District is an upland region in central Britain with a rich mining geoheritage. It was established as the UK's first National Park in 1951. It was the region, due to its widespread loss quarries and mines sites to inappropriate remedial measures, which led to the recognition and promotion of the modern geotourism paradigm. It is the birthplace of British geotourism with the earliest recorded instances of leisure travellers purposefully choosing to visit mines and caves. Metalliferous mining in the region can be traced back to the Bronze Age. Gangue minerals, especially fluorspar and barites, later became significant primary extraction activities and underpinned a small-scale semi-precious stone industry. It is home to the World Heritage inscribed site of the Derwent Mills, significant in the development of early Industrial Revolution textile technology and manufacturing practices. The almost equally significant mining geoheritage has yet to be similarly recognised and, indeed, its survival is still threatened because most tourism and many mining geoheritage stakeholders have a limited understanding of geo-history and the geo-interpretive significance of the individuals and geosites that shaped historical geotourism and geological exploration in the Peak District; their exploits and the legacy of their publications, alongside its superbly exposed and well researched geology and associated mining geoheritage, could underpin a bid for the region's recognition as a geopark. Hence, this introductory paper summarises the key aspects of the region's geology and major mining geoheritage sites, together with the major works and influence of some key individuals that should be included as a very minimum in such a bid.

Key words: geo-history, geo-interpretation, geopark, geotourism, Peak District.

THE PEAK DISTRICT

Introduction

It has been suggested since 2014 that the Peak District in central Britain could be a European Geopark Network member by 2017 with a bid seemingly based upon traditional lines (Benghiat, 2015) – an emphasis on scientific geology, economic benefits and community engagement. This paper explores a possible alternative, geo-historical approach underpinned by mining geoheritage, that better resonates with currently employed industrial heritage management and promotion practices, too little explored in European geological and

geopark circles. The Peak District is an upland area, generally above 300 metres, mainly in the English counties of Derbyshire and Staffordshire (but also parts of Cheshire, Greater Manchester and South Yorkshire), in central Britain. Not all of the area broadly recognised as the Peak District lies within the boundaries of the 1,437 km² of the Peak District National Park, established in 1951 as the UK's first such. It has some 40,000 permanent inhabitants and 16.1 million people live within an hour's drive (or 65 km), and 80% of the UK's population is within a four hour drive, of its boundaries. The Manchester and Stoke conurbations border its western

margin and Sheffield abuts its eastern edge with the Derby and Nottingham conurbation to its south; they (with a combined population of some 3.7 million) contribute to the Peak's estimated 8.5 million annual visitors. To the north the Peak merges with the southern Pennines; to the south it gives way to the Midland Plain.

Despite its name it generally lacks sharp peaks and is characterised by rounded limestone hills and dales (river valleys with cliffs) and gritstone escarpments (the 'edges'); its highest point, at just 636 metres, is the Kinder Scout plateau. The region's depiction in topographic and geological maps has been summarised by Henry and Hose (2015). Metaliferous mining began in pre-Roman times (Barnatt, 1999). Its (geo) tourism began in the late seventeenth century (Hose, 2008). Its scientific geological exploration began in the late eighteenth century. These historical elements, explored within this paper, are underpinned by the region's geology and mineralogy and its exploitation (the mining geoheritage), the latter two are the recognised basis for its potential recognition as a European Geopark (Benghiat, 2015) with information centres, viewpoints, self-guided walks, cycle trails and a Peak District GeoPark Way as five of its 16 projected outcomes especially relevant to this paper.

Peak District Geology

The region's solid geology (see Fig. 1) is mostly of Carboniferous age rocks. A plateau of (Visean age) limestones, the White Peak, is surrounded by outcrops of successively newer strata. Firstly, mainly mudstones, and sandstones of the (Namurian age) Millstone Grit, of the Dark Peak uplands, and then, in more broken form, by the outcrop of the (Westphalian) Coal Measures of the East Pennines, and the Lancashire and Staffordshire Coalfields. Usually on the west, the rocks dip steeply to the west or are highly folded. The dips to the east are gentler. The rocks to the north and south also usually dip away from the

centre. The overall effect is that of a dome-shaped feature, the 'Derbyshire Dome'. The apparently simple structure encouraged early geologists to assume there was a central block of hard ancient rocks (Pre-Cambrian or granite) over which the Carboniferous limestones had been draped as relatively thin beds like on a large coral atoll, and that later rocks were laid down on top. However, deep boreholes and seismic surveys have revealed a complex system of almost east-west faults defining the edges of two or three south-westerly dipping tilted blocks of basement rocks (known as tilt blocks and half grabens).

Peak District Ore Fields

The region is underlain (see Fig. 2) by the southern part of the South Pennine Ore Field (SPOF) and, as at Ecton, the separate Derbyshire Ore Field (DOF). The SPOF's main lead deposits lie on the eastern side of the White Peak in a belt, a few kilometres wide and about 35 kilometres long, between Castleton and Wirksworth. The SPOF consists of hydrothermal vein and stratiform deposits, within the Upper Dinantian limestones, of galena and sphalerite together with barites, calcite and fluorite. The veins occupy ENE-WSW, NW-SE and NE-SW vertical, fault controlled, fractures; mineralisation is due to wall rock and pore fluid interactions at a burial depth of some two kilometres. The SPOF is reckoned to have originally held some 4 million tonnes of galena, 1 million tonnes of sphalerite, 20 million tonnes of fluorite and 20 million tonnes of barites.

Quirk (1993) has provided a summary of the origins of the SPOF; likewise Ford (2004) for the DOF. It is generally agreed that the ore bodies are pipe-like but Ford (2004) concluded that they are large masses of mineralized crush-breccia formed within tightly folded limestones and shales.

Peak District Mining Geoheritage

Metalliferous mining, for lead, zinc and silver ores, in the Peak District dates back to at least Roman times. Copper mining

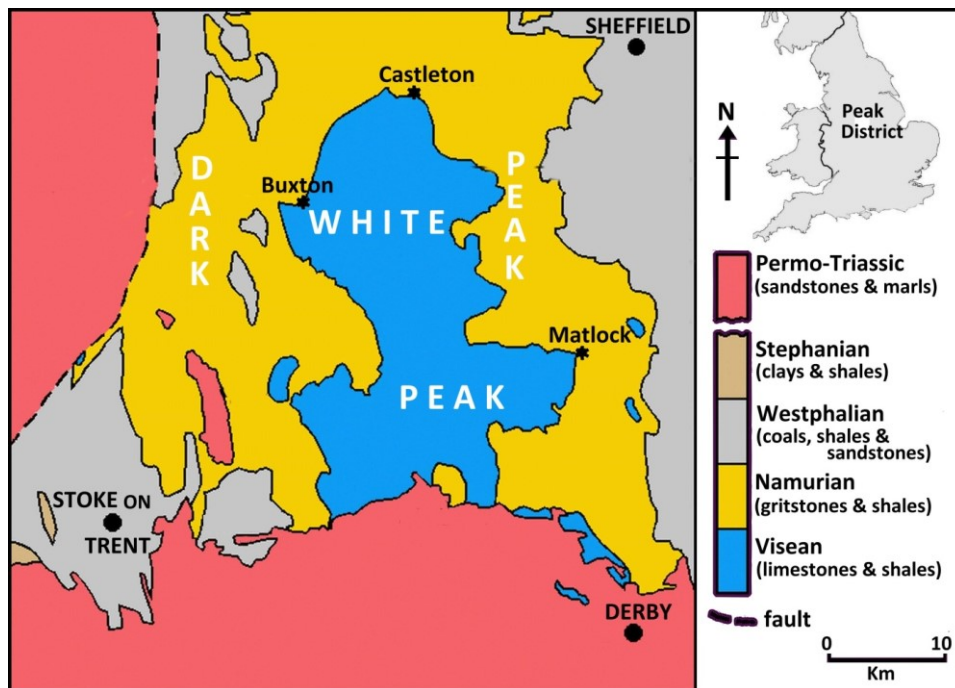


Fig. 1 Map of the Solid Geology of the Peak District

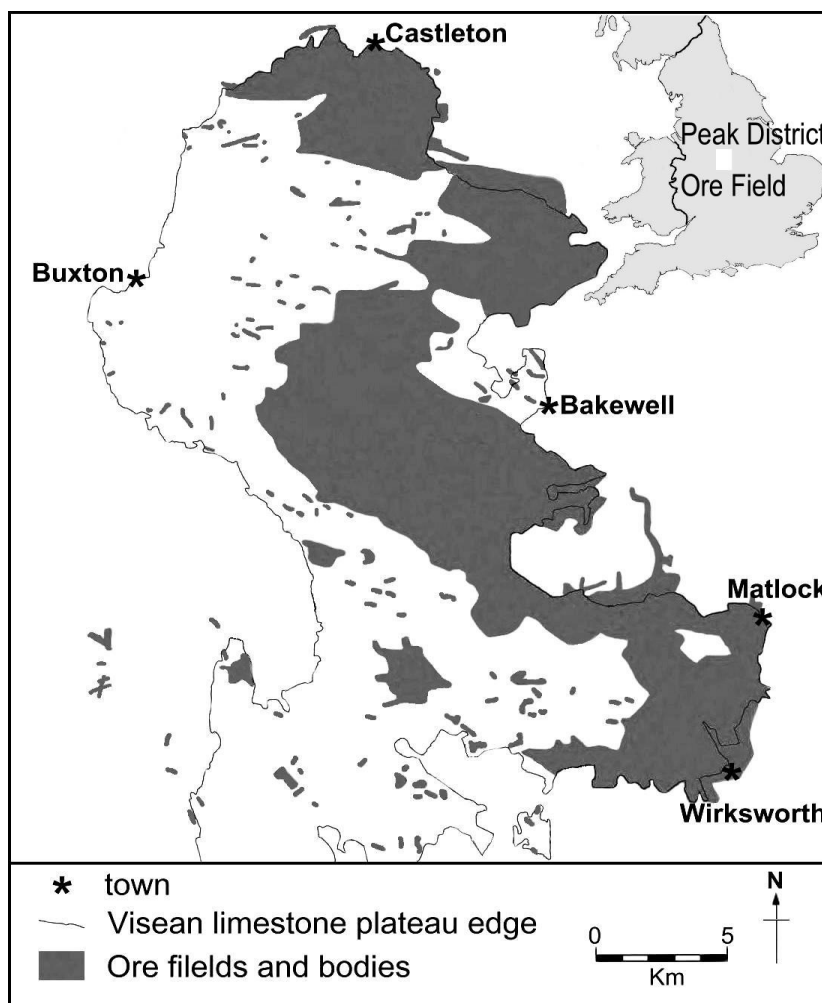


Fig. 2 Map of the Ore Fields of the Peak District

began in the Bronze Age. Iron and manganese have also been extracted. The mines were of three types: shaft and gallery; bell pits; and rakes (open surface workings that followed mineral veins often along fault-lines). Lead mining reached its zenith in the seventeenth and eighteenth centuries, before declining from the mid-nineteenth century; the last major mine closed in 1939; Barnatt et al. (2013) provides an excellent inventory of the remaining major sites. Lead mining was particularly concentrated in the area around Winster and Wirksworth (especially Crich); the most notable surviving mine is the Magpie Mine, worked until 1960, which is one of the UK's finest examples of an eighteenth and nineteenth century lead mine. Now a scheduled Ancient Monument, it is preserved by the Peak District Mines Historical Society. Copper ores were the main focus on the western edge of the Peak where at Ecton and Clayton a major mining complex of mines and spoil heaps, first worked in the sixteenth century, was developed in the eighteenth and nineteenth centuries. Lead was also extracted because it lay above the copper deposit. Its 1 km² site is protected as a SSSI and an Ancient Monument. Its various sites, including a visitor centre, is owned and managed by the The Ecton Mine Educational Trust and the National Trust.

A major fluorite mining centre was at Masson Hill above Matlock, now a derelict part-reclaimed site. Fluorite underpins a small-scale semi-precious stone industry based on the extraction of the world famous Blue John variety. The semi-precious mineral's name is supposedly derived from the French 'Bleu et Jaune' which aptly describes its banding. Today only a few hundred kilograms are mined annually for ornamental and [lapidary](#) use. The [Blue John](#)

[Cavern](#) in Castleton is now just a [show cave](#) but mining still takes place in the nearby [Treak Cliff Cavern](#).

Parts of the limestone plateau of the White Peak are dotted with numerous small mounds (see Fig. 3) and distinctive lines of hillocks; these follow the mineral veins (large veins are 'rakes', small veins are 'scrins') mainly worked for lead in the SPOF. The mounds are usually capped mine-shafts with the entire original mine structures above ground having been demolished. The hillocks are the spoil heaps from underground workings. They are significant because, after several re-working due to changes in smelting technology (enabling successively lower grades of ore to be worked) they contain evidence of significant changes in mining practice. They also often seal in evidence of earlier mining phases along mineral veins; open-cuts were worked first with later spoil from brought up from below burying the earlier workings. Although worked out for ore minerals they have abundant gangue minerals, especially barites and fluorite, within the crushed and broken country rock fragments. The gangue minerals were the main reason for twentieth century mining. A mid-1990s survey of the hillocks, prior to the wholesale removal of many, showed that half had already been lost and another quarter were in a poor state. Just under a quarter (23%) of the surviving hillocks have protected SSSI status, with around a tenth (11%) protected by temporary agri-environment scheme agreements. Despite their mining geoheritage significance they have little or no statutory protection and can be destroyed by landowners (Barnatt, 2000) without any prior notification. The hillocks are associated with features such as an estimated (Willies, 1993) 25,000 mine shafts, open-cuts, engine houses, gin



Fig. 3 Carsington Pastures Lead Mines, near Wirksworth

The obvious feature in the foreground is the mine-shaft capped with concrete railway sleepers; other capped shafts and an ore dressing area can also be seen in the middle distance.

circles, crushing circles and ore washing ‘buddles’ (Ford & Rieuwerts 2000).

PEAK DISTRICT GEOTOURISM AND THE GEOPARK

The history and development of the geotourism paradigm has been explored by Hose (2015) and need not be covered herein. However, it is worth noting that it arose from the late-1980s recognition of the accelerating loss of the UK’s, especially in the Peak District (Hose, 2011), mines and

quarries. Its newest definition (Hose, 2012) as ‘The promotion to visitors of interpreted geosites and their associated artefacts whether *in-situ* or *ex-situ*, to ensure their protection and conservation through sustainable management that promotes their appreciation, enjoyment, education and research by current and future generations’ (Hose, 2012, p. 11) reinforces its original geoconservation rationale. Its initial definition (Hose, 1995) and underpinning rationale were incorporated within the *UNESCO Geoparks Programme Feasibility Study* (Patzak, 2000). Thus, at the outset

geotourism and geoparks were linked approaches to geoconservation involving geo-interpretation. The development and rationale of Europe's geoparks has been documented by Zouros (2013) and need not be elaborated further herein.

The Peak District is a major geotourism area because it has: varied and well exposed (economically important) geology with associated aesthetic and mining geoheritage landscapes; adjacent major urban centres (such as Derby, Manchester and Sheffield) have long resulted in good transport infrastructure providing ready access for local and visiting tourists; and historical geo-literature, maps and sections. It was the UK's first wild upland region explored, from the late-seventeenth century, by leisure travellers. By the seventeenth century's end the Peak District's major attractions were organized and promoted by the 'guidebooks' of Thomas Hobbes (in 1678) and Charles Cotton (in 1681) as seven 'wonders': *'two fonts'* - wells of Tideswell and St Ann; *'two caves'* - Poole's Hole and Peak Cavern; *'one palace'* - Chatsworth House; *'one mount'* - Mam Tor; and *'a pit'* - Eldon Hole pothole. The original 'wonders' are all well described by Ward (1827); that volume also contains much interesting geological information and would have been useful to nineteenth century geotourists visiting the region; for example, on the Cumberland Cavern near Matlock Bath noted '...several parts of this cavern also have a very brilliant appearance; and exhibit different substances that will be inspected by the curious mineralogist with great interest and satisfaction.' (Ward, 1827, p. 59-60). One of the first documented leisure visitors to the wonders was Celia Fiennes, probably England's first geotourist (Hose, 2008). She observed that around Buxton its '...Bowells are full of mines of all kinds off Black and white veined Marbles, and some have mines of Copper, others tinn and Leaden mines, in which is a great deal of silver.' (Fiennes, 1888, p. 82). In so observing she shows how the 'wonders' attracted

travellers to look at other underground sites such as mines.

A century after Fiennes, John Byng (1743-1813) journeyed, during the summers of 1781 to 1794, on horseback throughout England and Wales. His recorded travels, unpublished in his lifetime and only re-discovered in the twentieth century have been in print ever since, display his training as a retired Army officer and his antiquarian interests; whilst mainly about domestic and social matters they include descriptions of the countryside, including geological observations, through which he journeyed, such as 'All the country is scooped by lead mines and their levels; betwixt Winster and Elton are the great lead mines of Portway.' (Byng, 1966, p. 186). And 'Macclesfield looks well in approach: and one knows a place to be enriching and increasing when it is surrounded by brick-kilns: the copper works have done this and disseminate their coin far and wide.' (Byng, 1996, p. 174). Like Fiennes he believed that there was just as much of interest in Britain as in France and Italy, particularly because England and Wales contained so much that was picturesque. He equally admired contemporary industrial technology, including Richard Arkwright's (1732-1792) Cromford Mill and Josiah Wedgwood's (1730-1795) Etruria potteries. On the Derbyshire mills he wrote 'These cotton mills, seven storeys high and fill'd with inhabitants, remind me of a first-rate man of war and, when they are lighted up on a dark night, look most luminously beautiful.' (Byng, 1966, p. 188) making him an ideal links person between the potential geopark and the Derwent Valley Mills World Heritage Site

In the 1720s Daniel Defoe (1660-1731) typically characterized the moorland around Chatsworth as a 'houlng wilderness' and that Peak Cavern, near Castleton, was disappointing for tourists '...with a just curiosity...when they go to see it, they generally go away, acknowledging that they have seen nothing suitable to their great expectation, or to the fame of the place.'

(Defoe nd, vol.1, 168). Half a century later, in 1771, Arthur Young (1741-1820), a writer on agricultural improvement, travelled through Dove Dale and recorded (in *The Farmer's Tour through the East of England...*) in complete contrast that it was '...bounded in a very romantic manner by hills, rocks and hanging woods; which are extremely various; and the hills in particular of a very bold and striking character. They are spread on all sides in vast sweeps, inexpressably magnificent...' (in Trench, 1990, p. 158). It was also noted in the early nineteenth century that 'The caverns of the Peak and the lead mines, afford something strange and new. Altogether we can warmly commend a trip through Derbyshire, as one affording great variety of hill and dale, wood and stream, barren moors, and rich cultivation, fine parks and mansions, and beautiful hamlets, cottages, and roadside gardens...' (Sydney, 1851, p. 221) and 'The environs of Buxton afford ample room for rides, drives, picnics, and geological and botanical explorations.' (Sydney, 1851, p. 224).

The first formal account of the region's geology appeared towards the end of the eighteenth century, John Walcott's (?-1813) *An inquiry into the original state and formation of the Earth* of 1778 which went into two further (1786 and 1792) editions. Its fossils were described in William Martin's (1767-1810) *Petrificata Derbiensia; or figures and descriptions of petrifications collected in Derbyshire* (1809). John Farey's (1728-1798) *General View of the agriculture and minerals of Derbyshire* (1811) and White Watson's (1760-1835) *A delineation of the Strata of Derbyshire...* (1811) (which are cross sections) and *A section of the strata in the vicinity of Matlock Bath...* (1813) were major descriptive works of the regions geology; the latter was a groundbreaking approach (see Fig.4) to representing subterranean geology. However, there is no evidence that the works of Farey and Martin had a wide readership amongst the

early travellers to the region; likewise for Watson's works although travellers visited his Bakewell museum-shop in some numbers. Walford's *The Scientific Tourist* of 1818 included both an account of the counties of the Peak District and general geological information, including advice on how to describe geological features.

Today, the original 'wonders' are still major geotourism attractions along with mines and industrial history sites (Harris 1971), together with geosites (see Horton & Gutteridge, 2003; Rodgers, 1977; Wolverton Cope; 1999) in and around Bakewell, Buxton, Castleton (see Ford, 1996) and Matlock; these are mainly old mine sites of which a mere handful have any remaining structures above ground. The region has been acknowledged (Hose, 2008) as the birthplace of geotourism, particularly because of the visits of Celia Fiennes to some of its geosites. Indeed, from the late-seventeenth century, travellers to the region visited them because they were comparatively readily accessible from its adjacent and then industrialising towns; they would often break their leisure journeys to visit its textile mills (the world's first such buildings), potteries smelting works and other manufacturing attractions - much as today's tourists visit its industrial history sites chief of which is The Derwent Valley Mills World Heritage Site.

The Derwent Valley Mills World Heritage Site (Derbyshire County Council, 2014) which lies south of, and abuts, the Park received its inscription in 2001. It delineates and promotes a cultural landscape where the factory system was born in the eighteenth century. It has historic mill complexes and the watercourses that powered them, together with the settlements developed for the mill workers, the canals, railways and other structures; these are grouped within a distinctive landscape setting which has changed little over two centuries. The Derwent Valley also houses at Matlock Bath the Peak District Lead Mining

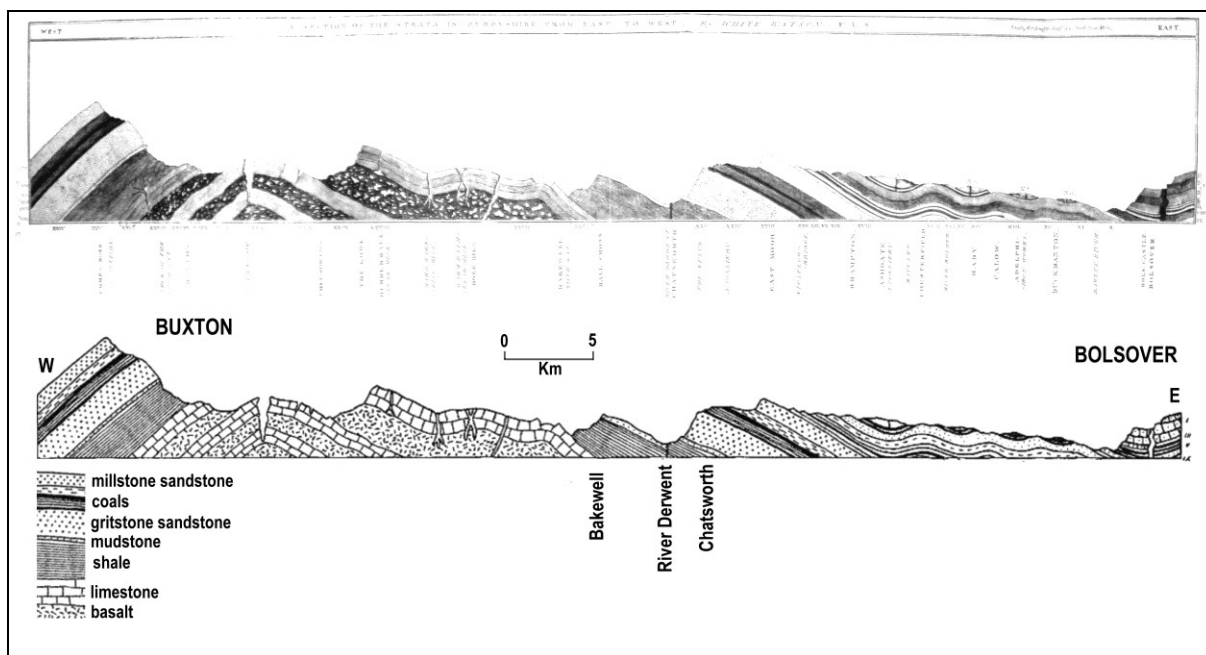


Fig. 4 White Watson's (1813) Cross Section of the Derbyshire Dome
The top section is as it appears in Watson, W. the 1813 volume "A Delineation of the Strata of Derbyshire forming the surface from Bolsover in the East to Buxton in the West designed from a Tablet, Composed of the Specimens of Each Stratum above the Line, With an Explanatory Account of the same, together with A Description of the Fossils found in these Strata; and also Of the Nature and Quality of the respective soils". The bottom section is a modern version employing conventional litho-stratigraphic symbols.

Museum opened in 1976, where visitors can access the fluorspar Temple Mine on a guided tour. The Derwent Valley is also home to the National Stone Centre (Thomas & Prentice, 1994) established in 1990 within six limestone quarries; it has a geotrail and a visitor centre concerned with the extraction and uses of stone. The World Heritage Site provides a model for how parts of a Peak District Geopark might be managed (see Derbyshire County Council, 2014), especially for sustainable (geo) tourism.

SUPPORTING THE GEO-HISTORICAL APPROACH: SOME KEY PERSONS

Geo-history and its materials

The writings and researches of seventeenth to nineteenth century individuals recorded their observations and the reading of which encouraged others in the past to visit the Peak District.

This geo-historical material is an ideal basis for geo-interpretive materials;

geohistory, 'The study, evaluation and application of a systematic narrative of geological discoveries, events, personages and institutions' (Hose, 2012), has a published model (Hose, 2010; 2015) indicating its practical outcomes and contextualising geotourism research.

Almost a century ago it was noted that 'The curiosity shown by the tourists in the agricultural and industrial development of those parts of the country they visited seems to have been in a degree general. The number of books which may be described as topography, although their compilers often call them geography, or a tour, is fairly large, and they were reprinted in a more or less amended, expanded, and up-to-date form at frequent intervals.' (Fussell & Goodman, 1929, p. 86). Such works, as shown herein, can still and should be consulted today when developing mining geoheritage geotourism because they provide useful background information, often on sites with little or no present-day surface expression; they can also provide information on the social conditions of the miners. Examining a few selected

individuals, some of whose words have already been quoted herein, is sufficient to indicate the nature of the contributions and the potential of their writings for Peak mining geoheritage geo-interpretation. Indeed, 'The object of the, so to say, lay tourist was to see the country: he wanted views and what he was pleased to call 'the picturesque'. Consequently we find that many of these diarists and letter-writers visited the same parts of the country, while other parts, not less interesting to us, were comparatively neglected. The favourite places were almost the same then as they are to-day with the more ubiquitous motorist.' (Fussell & Goodman, 1929, p. 85). The lives and works of a few individuals – such as those reported herein – with Peak District connections are worth noting, even in summary, because these, together with their recorded observations, have much to offer the mining geoheritage geo-interpretation copy writer. These individuals include poets (Cotton and Hobbes), travellers (Fiennes) and geologists (Farey, Mawe, Watson, and Whitehurst) of whom the following vignettes illustrate their geo-interpretive potential for the proposed geopark.

Thomas Hobbes (1588-1769)

Thomas Hobbes was a graduate of Oxford University. In 1610 he travelled to France and Italy on a Grand Tour. In 1613 he was employed as tutor, at Chatsworth House, to William Cavendish. His pupil became the 2nd Earl in 1626. For the next two decades, with Hobbes as the official travelling companion and Secretary, they travelled together. When the 2nd Earl died Hobbes then escorted a Nottinghamshire landowner's son on a 1629-1630 Grand Tour. On his return to England he was employed, as a tutor to the young 3rd Earl. From October 1634 to October 1636 he toured Europe, with the 3rd Earl, and met the leading continental mathematicians. In Paris, he exchanged natural science views with Descartes, via his secretary Marin. He met Galileo and was inspired by the idea

that motion was the underlying universal force. He subsequently planned and part published an ambitious three-part project explaining Nature, Man, and citizenship based around this idea of motion. Significantly for geotourism, sometime around 1627 he presented a Latin poem, *De mirabilibus Pecci. Carmen*, of some 500 verses to William Cavendish, 2nd Earl of Devonshire, describing a trip through the Peak; it praises (in verse 79) its 'Seven Wonders'. The poem was printed around 1636, reprinted in 1666, 1675 and – with an English translation – in 1678. It inspired Charles Cotton's *The Wonders of the Peake* of 1681. However, because there is no published modern edition or translation, few people today has read Hobb's volume, although it is the first attempt to produce a travel guidebook in England.

Charles Cotton (1630-1687)

Charles Cotton's father was friends with many contemporary writers of his day including Ben Jonson, John Donne, John Selden, Sir Henry Wotton, and Izaak Walton. As a young man he travelled in France and a probably also in Italy on the Grand Tour. He had no paid profession and seemingly spent his entire life on various inadequately funded literary pursuits. About 1670 he composed the semi-autobiographical poem *A Voyage to Ireland in Burlesque* about his captain's commission forcing him, with a near shipwreck, to Ireland and regrettably having to relinquish his passion for angling – he contributed an account on fly-fishing to the 5th edition of the world's most famous angling book, Izaak Walton's *The Complete Angler*. He was a skilled horticulturalist and published in 1675 *The Planter's Manual, being instructions for the raising, planting, and cultivating all sorts of Fruit-Trees, whether stone-fruits or pepin-fruits, with their natures and seasons*. He published in 1681 the descriptive poem, *The Wonders of the Peak*. An unauthorised collection of his poems was posthumously published in 1689. *The Genuine Works of Charles*

Cotton (which included *Scarronides*, *Lucian Burlesqued*, *The Wonders of the Peak*, and *The Planter's Manual*) was published in 1715 and by 1771 had gone to a further five editions. During his life and right up to the Romantic poets of the nineteenth century his poems were highly regarded; *Ode to Winter* was a favourite poem of William Wordsworth who did much to popularise Romantic travel.

Celia Fiennes (1662-1741)

Celia Fiennes was an elite traveller in the last two decades of the seventeenth century who undertook and kept a journal of her several long distance horseback journeys in England, between 1684 and about 1703, partly to regain and improve her health. At that time the idea of travel for its own sake, except perhaps for spiritual and physical health reasons, was still somewhat novel. She was keen on domestic tourism and her interest in the products and manufactures of the places she visited anticipated the later genre of 'economic tourism' that became formalised with Daniel Defoe's professional and survey-like *A Tour through the Whole Island of Great Britain* (1724–26). Fiennes recorded that at Chesterfield she '...Came by ye Coale mines where they were digging. They make their mines at ye Entrance Lie a Well and so till they Come to ye Coale then they dig all the Gorund about where there is Coale and set pillars to support it, and so bring it to ye well where by a basket Like a hand barrow by Cords they pull it up – so they Let down and up the miners with a chord.' (Fiennes, 1888, p. 77). On Ashbourne's copper she noted that

John Whitehurst (1713-1788)

John Whitehurst served an apprenticeship as a clockmaker with his father. He was fascinated by the Peak's natural wonders. He explored, sometimes accompanied by the likes of Josiah Wedgwood and Erasmus Darwin, the northern part with its caverns and mines and gradually developed a keen interest in geology. He began to formulate theories on the origin and

'They digg down their mines like a well for one man to be let down wth a rope and pulley, and so when they find oar they keep digging under ground to follow the oar wch lies amongst the stone yt lookes like our fine stones. In yt mine I saw there was 3 or 4 at work and all let down thro' ye well; they digg sometymes a great way before they come to oar. There is also a sort of stuff they dig out mixt wth ye oar and all about the hills they call sparr, it looks like crystal or white sugar candy, its pretty hard; ye doctors use it in medicine for the collick...' (Fiennes, 1888, p. 82-83). She also recorded aspects of mine construction and the health of its miners who '...wall round the wells to ye mines to secure their mold'ring in upon them, they generally look very pale and yellow that work underground, they are fforc'd to keep lights wth them and sometymes are forced to use gunpowder to break ye stones, and yt is sometymes hazardous to the people and destroys them at ye work.' (Fiennes, 1888, p. 83). She worked up the notes scribbled on her various journeys into a travel memoir in 1702 but this was never intended for publication, only family reading. It was passed down through the family before being fully transcribed for publication by a descendant, The Honourable Mrs Emily Griffiths, and Robert Southey published unacknowledged extracts of it in 1812. The first complete edition, *Through England on a Side Saddle in the Time of William and Mary*, only appeared in 1888. A scholarly edition, *The Journeys of Celia Fiennes*, was produced by Christopher Morris in 1947 and has since been constantly in print.

structure of the Earth. He met with Benjamin Franklin in 1758 and 1759 with whom he discussed his theories, finally crystallised in *An Inquiry into the Original State and Formation of the Earth* of 1778; it has a considerable section on Derbyshire's strata and is one of the earliest such accounts. Although his theories on the Earth were flawed, his accounts of Derbyshire's structure and geology are remarkably accurate. He was the first to

recognise that the 'toadstone' of the lead miners was of volcanic origin. His remarks and observations were the basis for further work by later geologists such as John Farey and White Watson.

John Farey (1728-1798)

John Farey was a pupil at Robert Pulman's Academy in Halifax where he received special instruction in mathematics and philosophy (including natural science), drawing and surveying. In 1792 he was appointed Land Steward to the 5th Duke of Bedford's Woburn Estates. For ten years he pursued his duties, especially overseeing land and agricultural improvements. He honed his skills in land surveying, the evaluation of soils and underlying rocks, and land drainage. He heard of William Smith (1769–1839) and his skills in land surveying and especially drainage in 1800. During Smith's visits to drain parts of the Woburn Estate they met and Smith outlined his principles of stratigraphy to him in 1801. Through his Estate work Farey knew Sir Joseph Banks, President of the Royal Society, and he reported enthusiastically to him in early 1802 of Smith's geological insights. Farey was unjustly blamed for the Estate's mismanagement and dismissed whereupon, after failing as a farmer, he moved to London establishing himself as land surveyor, graduating to mineral surveyor (a term he coined) in 1808. Like Smith he hired out his services to landowners who required appraisals of their estates and assessments of any possible

White Watson (1760-1835)

White Watson was a Bakewell man, spending most of his life there, and seldom travelled more than 40 kilometres away. He was a sculptor, marble-worker and mineral dealer. A pioneer of Derbyshire and Peak District stratigraphy, he published sections (1788 and 1811) with some assistance from John Farey and inlaid marble tablet 'sections of strata' (inlaid into slabs of Ashford Black Marble) with samples of the actual rock types so that they were

minerals worth the cost of extraction. He travelled extensively throughout Britain but the number and location of the estates he surveyed are unknown.

John Mawe (1766-1829)

John Mawe (see Torrens, 1992) was born and schooled in Derby. He worked as merchant seaman until he married, in 1794, the daughter of Richard Brown (1736-1813), a mineral dealer and marble worker. Mawe then worked for his father-in-law. By late 1794 he was managing the London shop near Covent Garden. A year later the business was trading as 'Brown, Son and Mawe, Petrification Warehouse'. His interest in mineralogy seemingly stemmed from his seafaring days, his travels provided ample opportunity to collect minerals and seashells. He travelled extensively in Britain collecting minerals to sell in the shop and making geological observations. For some years he lived in [Castleton](#), where there is a memorial to him in the parish church. In 1802, he published *The Mineralogy of Derbyshire*. During 1804 he set off on a long voyage to South America, and between 1807 and 1810 extensively travelled in the interior of Brazil. On his return the mineral business flourished so well that he opened 'Royal' museums in London, Cheltenham, Castleton and [Matlock Bath](#); the 'Royal' epithet related to patronage by the Spanish, not the British, royal family which had commissioned him furnish them with Derbyshire minerals and fossils for their collections.

decorative as well as informative; amongst, but not, the first reasonably accurate geological sections as recognised today to appear in England. He had a combined shop and 'museum' in Bakewell from which he sold minerals to wealthy travellers, such as Josiah Wedgwood and Sir Joseph Banks, on Peak tours. He assembled cabinets of minerals for collectors and was patronised by Georgiana (1757-1806), Duchess of Devonshire; a regular visitor to Chatsworth, he arranged and catalogued her collections and gave geology lessons to her son (later

the 6th Duke). He learned about subterranean geology by talking to miners and observed in the field, becoming an expert geologist and botanist, supported by a fine library – the latter suggesting he was making a good living despite common assertions that he had precarious finances.

GEO-INTERPRETATION AND THE GEOPARK

Geo-interpretation, ‘The art or science of determining and then communicating the meaning or significance of a geological phenomenon, event, or location.’ (Hose, 2012), is founded upon environmental education approaches from the USA’s National Parks adopted in the UK from the 1960s; Aldridge (1975) provides a summary of such UK countryside interpretative practice. Comprehensive guides to USA practice, such as by Ham (1992) and Knudson et al. (1999), and numerous on-site geo-interpretation schemes, whether acknowledged or not, incorporate Freeman Tilden’s (1883-1980) mid-1950s suggestions. He defined interpretation, with regards to the USA’s National Parks Service, as ‘An educational activity which aims to reveal meanings and relationships through the use of original objects, by firsthand experience, and by illustrative media, rather than simply to communicate factual information.’ (Tilden, 1977, p. 8); he argued that interpretation must be underpinned by research about the locations on which it is focussed (Tilden, 1977, p. 5) and should evoke an emotive response rather than merely imparting information. It has been suggested within the European Geopark Network, at the 2013 Arouca meeting, that Tilden’s principles need to be reasserted (Brilha, 2011); further, ‘Any presentation of geological heritage that does not somehow relate to something in the personal experience of the visitor will be sterile.’ (Brilha, 2011, p. 10). A key interpretation element from USA interpretative practice seemingly lacking

from many geoparks is ‘The human element [which] should always be part of your topic... Natural history topics may be fascinating in themselves but people relate best with other people... You can incorporate people into your writing by talking about historical figures associated with your subject.’ (Heintzman, 1988, p. 2). The Peak District’s association with some early geotourism and scientific geology individuals lends itself to this geohistorical approach in developing a geopark proposal.

Some existing Peak District Geo-Interpretation

Several Peak District geosites have been interpreted over the past 20 or so years with each reflecting the prevalent interpretive style and practice of their time. One of these, Brown End (limestone) Quarry, has had two distinct phases of interpretation. Both the original (Cossey et al., 1994) and new interpretive (Staffordshire Wildlife Trust, 2004) panels tell a geological story with no human interest whatsoever (Hose, 1997, p. 2958); likewise, the panels at the Ecton Copper Mine (see Fig.5). Although innovative in its consideration of stone usage, the National Stone Centre’s (Thomas & Prentice, 1994) interpretive provision generally lacks human focus; it has been critiqued by Hose (1994, 1999). The Buxton Museum and Art Gallery, housed since 1928 in part of the former Peak Hydropathic Hotel built in 1880, has the permanent exhibition ‘Wonders of the Peak’ which explores the region’s history from ‘Big Bang’ times to the present-day; it also has the Prof. William Boyd Dawkins (1837-1929) recreated Victorian study and displays on him and John Wilfred Jackson (1880-1978) – both local geologists. Overall, there is very little on-site geo-interpretive, whilst there is comparatively much general countryside and wildlife interpretive, provision in the Peak District; consequently most visitors are unaware of the nature, longevity and significance of the mining geoheritage literally beneath their feet and just occasionally in front of them.

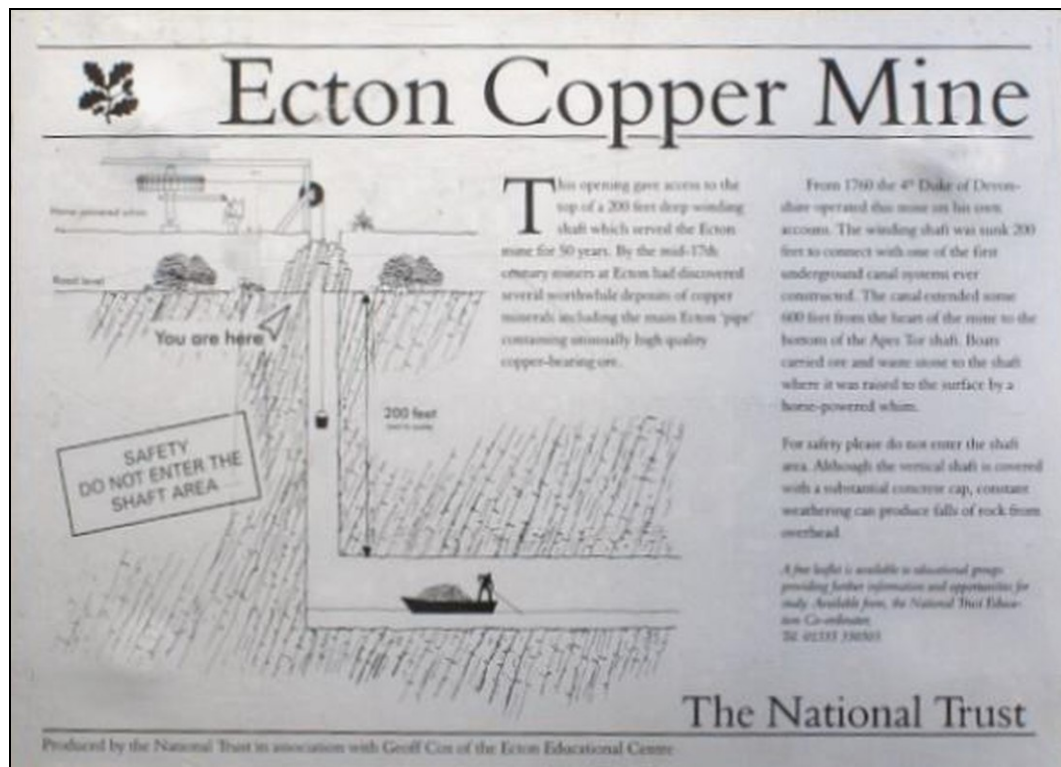


Fig. 5 Ecton Copper Mine Information Panel

Information panel providing an explanation of how the mine-shaft was used.

Hence, there is an urgent need to develop communicatively competent geo-interpretation for the Peak District, almost as a pre-cursor to the geopark, in order to generate public support for such a venture.

Suggested Geopark Interpretive Provision

In supporting and promoting a European Geopark Network candidacy for the Peak District employing a geo-historical approach the suggestion is that geo-interpretive materials should be developed for deployment along the major existing (Derwent Valley, High Peak, Monsal, Tissington) Trails, the Manifold Track and the South Pennine Bridleway with linking routes where needed; geo-historical information and signage materials should be made available to their managing organizations. Arguably the High Peak and Tissington Trails (see Fig. 6) are the most accessible, popular and fairly well routed in the White Peak to show good aspects of its mining geoh heritage; the mines near Ashbourne early attracted the attention of Celia Fiennes amongst the early

geotourists. For outdoor on-site usage it is suggested that small (but measuring at least 15x15 cm) colour-printed ceramic tiles, such as those employed in Spain's Aliaga Geopark, either singly or in combination to create small plaques be employed. This is because of their ability to reproduce photo-images, durability, relatively low cost, graffiti resistance and limited maintenance apart from cleaning; unlike metal panels they are unlikely to be stolen and unlike fibreglass panels will not be damaged by portable barbecues! The small ceramic tiles are also considerably less visually intrusive than the usual A0 and larger panels generally employed for outdoor on-site interpretive provision, further they lend themselves to unobtrusive affixing to walls and historic buildings. The tiles could, for example, be affixed to either the actual buildings or those occupying the site (of say the Mawe Royal Museum at Matlock Bank - see Fig.7), or at a viewpoint where the work of someone such as White Watson (see Fig.8) can be appreciated. Further, there should be made available print-on-demand pdf versions of the tiles, together

with leaflets and information sheets, placed on-line for off-site access; the designs on the individual tiles could also be printed on drinks mats. These essentially printed media could later be used as a basis for developing smart-phone on-site usage applications. All the geo-interpretive media must have a common ‘brand identity’, such as the PEAK District GEOPARK, which has some resonance with the current National Park branding but is sufficiently distinct so as to avoid confusion and to promote the geopark’s recognition.

CONCLUSIONS

Generally geopark candidacy and later management and promotional approaches are founded on practitioner and economic led (supply-side) approaches, rather than addressing the actual needs and, especially human, interests of geotourists (consumer-side led), with a limited understanding of the relevance of the history, development and philosophy of landscape tourism. The individuals and their works noted in this paper could provide the basis for a number

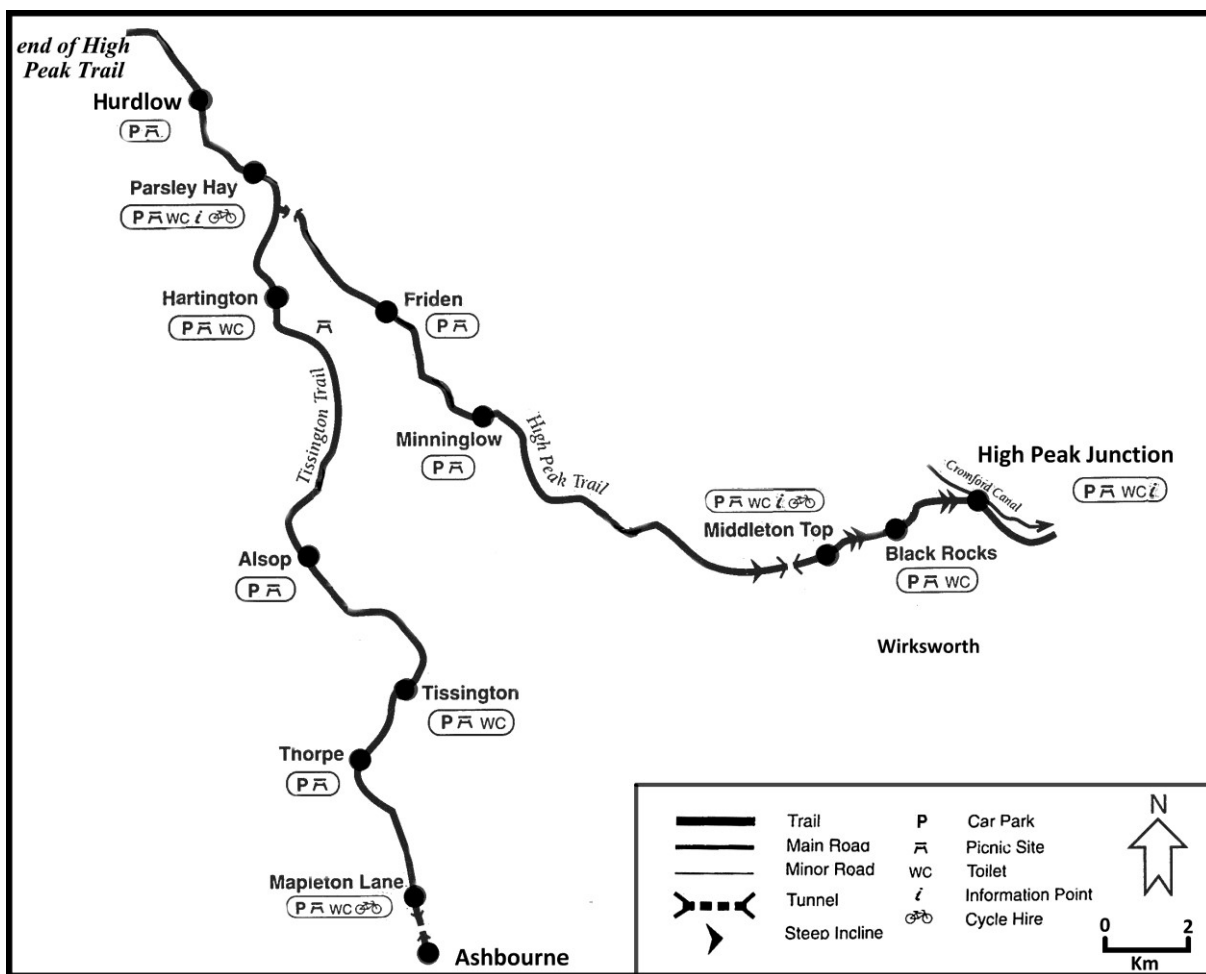


Fig. 6 Map of the Part of the High Peak and Tissington Trails

The Tissington Trail runs for 21 km, along the route of the 1899 Buxton to Ashbourne railway that was closed in the 1960s, from Ashbourne to Parsley Hay where it joins up with the High Peak Trail; this runs for 28 km from High Peak Junction near Wirksworth to Dowlow near Buxton. The High Peak Trail follows the route of the Cromford and High Peak Railway constructed in 1825-1830 which also finally closed in the 1960s. The local rocks are well displayed in the various cuttings and tunnels along the two Trails from which various mining geoheritage sites can be seen. Both Trails are open to pedestrians, cyclists and horseback riders.

of themed geotrails, the details of their lives and their writings providing the essential human interest element in the associated geo-interpretive media; the latter should be more than the usual leaflets and panels commonly associated with geo-interpretation (Hose, 2000), which quite frankly too often fails to inspire any interest by visitors, but should embrace the possibilities to reach wider and younger

audiences by exploiting the opportunities provided by the UK's widespread smart-phone and tablet personal computer ownership. The region has a long tourism, and even longer mining history, whose literary record and *in-situ* remains offer much potential to support the legitimacy of a bid for the Peak District to become a European Geopark.

<p><i>John Mawe (1764-1829)</i></p> <p>John Mawe was born in Derby. As a teenager he went to sea for 15 years – by 1790 he was captain of the sailing ship <i>Trent</i> which often sailed to St. Petersburg.</p> <p>In 1793 he was apprenticed to a Derby mason, Richard Brown, and married his daughter, Sarah, in 1794.</p> <p>By 1797 they had a marble and mineral shop in London's Covent Garden which he managed.</p> <p>Around 1800 he toured England and Scotland visiting mines to collect minerals for the King of Spain.</p> <p>In 1800 he opened the Royal Museums spar shop in Matlock Bath</p> <p>He travelled in the 1800s to exotic places such as Brazil to collect minerals to sell.</p>	 <p><i>Gold and Diamonds in rock brought back from Brazil by John Mawe in the 1800s</i></p>
	

Fig. 7 Possible John Mawe (1764-1829) Interpretive Plaque

The images show Mawe's Royal Museums, opened in 1800 and a rock specimen, encrusted with native gold and diamonds, he brought from Brazil. The simple bullet point text draws attention to some keys aspects of his personal and professional life. Note that this plaque is composed of our abutted tiles.

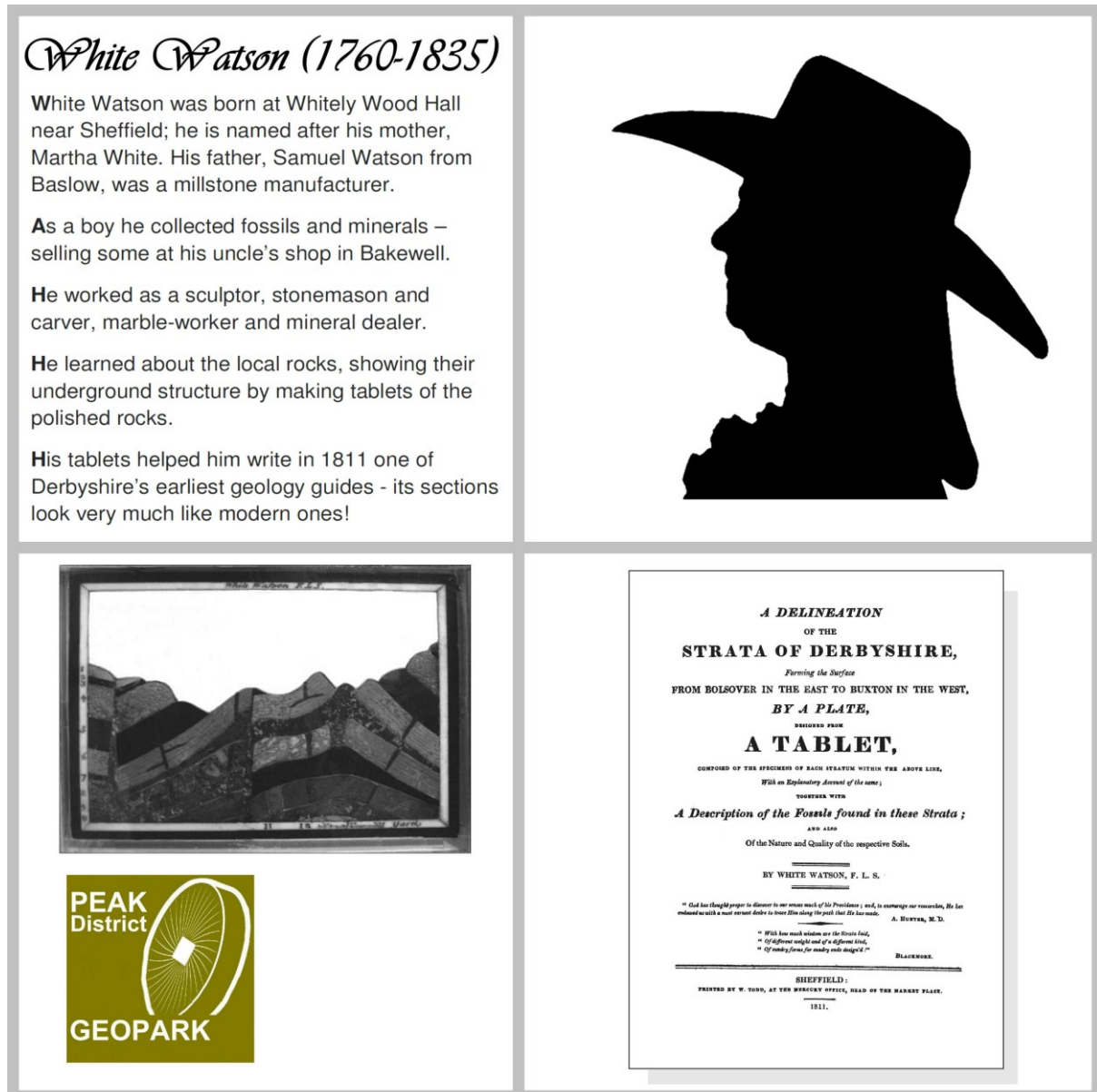


Fig. 8 Possible White Watson Interpretive Plaque
The images show one of Watson's tablets made from real polished stones, the title page of his major book on Derbyshire geology, and silhouette of him in later life. Note that this plaque is composed of our abutted tiles.

REFERENCES

Aldridge, D. (1975) *Guide to Countryside Interpretation, Part one: Principles of Countryside Interpretation and Interpretive Planning*. HMSO (for Countryside Commission for Scotland and Countryside Commission), London.

Barnatt, J. (1999) 'Prehistoric and Roman mining in the Peak District: present knowledge and future research'. *Mining History* **14** (2), 19–30.

Barnatt, J. (2000) *Lead Rakes in the Peak District: Hillock today, gone tomorrow?* PDNPA (unpublished report for English Heritage).

Barnatt, J., Huston, K., Mallon, D., Newman, R.,

Penny, R. and Shaw, R. (2013) The Lead Legacy: An Updated Inventory of Important Metal and Gangue Mining Sites in the Peak District. *Mining History: The Bulletin of the Peak District Mines Historical Society* **18** (6), 1-112.

Benghiat, A. (2015) *Interim Prospectus for a Peak District GeoPark Feasibility Study*, East Midlands Geological Society, Nottingham.

Bray, W. (1783) *Tour through some of the Midland Counties, into Derbyshire and Yorkshire by William Bray, F. A. S.* Performed in 1777 paraphrased in Mavor, W. (1798–1800) *The British Tourists; or Traveller's Pocket Companion, through England, Wales, Scotland, and Ireland. Comprehending the Most*

- Celebrated Tours in the British Islands, Volume 2* (6 volumes). B. White, London.
- Brilha, J.** (2011) What is Geotourism. *ProGEO News* 4, 9-10.
- Byng, J.** (1966) *Rides Round Britain* [Adamson, D. (ed)]. The Folio Society, London.
- Cossey, P.J., Buckman, J.O and Steward, D.I.** (1994) The geology and conservation of Brown End Quarry, Waterhouses, Staffordshire. *Proceedings of the Geologists' Association* 106 (1), 11-25.
- Derbyshire County Council** (2014) *The Derwent Valley The Valley that changed the World: Derwent Valley Mills World Heritage Site Management Plan 2014-2019*. Derbyshire County Council, Matlock.
- Fiennes, C.** (1888) *Through England on a Side Saddle: In the Time of William and Mary: being the Diary of Celia Fiennes*. Field & Tuer, London.
- Ford, T.D.** (1996) *Geologists' Association Guide No.56: The Castleton Area, Derbyshire*. Geologists' Association, London.
- Ford, T.D.** (2004) Ecton Copper Deposits, Staffordshire. *Mercian Geologist* 16 (10), 62-64.
- Ford, T. D. and Rieuwerts, J.H.** (2000) *Lead Mining in the Peak District*. Peak District Mines Historical Society, Matlock Bath.
- Fussell, G.E. and Goodman, C.** (1929) *Travel and Topography in Eighteenth Century England: A Bibliography of Sources for Economic History*. *Library* s4-X (1) 84-103.
- Ham, S.H.** (1992) *Environmental Interpretation: A Practical Guide for People with Big Ideas and Small Budgets*. North American Press, Golden Co.
- Harris, H.** (1971) *Industrial Archaeology of the Peak District* (1992 reprint). Ashbourne Editions, Ashbourne.
- Heintzman, J.** (1988) *Making the Right Connections: A Guide for Nature Writers*. UW-SP Foundation Press, Stevens Point.
- Henry, C.J. and Hose, T.A.** (2015) The contribution of Maps in the Nineteenth Century to Appreciating Physical Landscape; examples from Derbyshire's Peak District. In: Hose, T.A. (ed) *Appreciating Physical Landscapes: Three Hundred Years of Geotourism, Special Publication No.417*. Geological Society of London, London.
- Horton, A. and Gutteridge, P.** (2003) *Geologists' Association Guide No.63: The Geology of the East Midlands*. Geologists' Association, London.
- Hose, T.A.** (1994) Telling the story of stone – assessing the client base. In: O'Halloran, D., Green C., Harley, M., Stanley, M. and Knill, S. (eds) *Geological and Landscape Conservation*. Geological Society, London. 451-457.
- Hose, T.A.** (1995) Selling the Story of Britain's Stone. *Environmental Interpretation* 10 (2), 16-17.
- Hose, T.A.** (1997) Geotourism - Selling the earth to Europe. In: Marinos, P.G., Koukis, G C, Tsiammas, G.C. & Sournass, G.C. (eds) *Engineering Geology and the Environment*. A.A. Balkema, Rotterdam. 2955-2960.
- Hose, T.A.** (1999) Selling geology to the public. *Earth Heritage* 11, 10-12.
- Hose, T.A.** (2000) European geotourism - geological interpretation and geoconservation promotion for tourists. In: Barretino, D., Wimbledon, W.P. and Gallego, E. (eds) *Geological heritage: its conservation and management*. Instituto Tecnológico Geominero de España, Madrid. 127-146.
- Hose, T.A.** (2008) Towards a history of Geotourism: definitions, antecedents and the future. In: Burek, C.V. & Prosser, C.D. *The History of Geoconservation*. Geological Society of London, London. 37-60.
- Hose, T.A.** (2010) The significance of aesthetic landscape appreciation to modern geotourism provision. In: Newsome, D. & Dowling, R.K. (eds) *Geotourism: the tourism of geology and landscapes*. Goodfellow, Oxford, 13-25.
- Hose, T.A.** (2011) The English Origins of Geotourism (as a Vehicle for Geoconservation) and their Relevance to Current Studies. *Acta geographica Slovenica* 51 (2), 343-360.
- Hose, T.A.** (2012) 3G's for modern geotourism. *Geoheritage* 4 (1-2), 7-24.
- Hose, T.A.** (2015) Three Centuries (1670-1970) of Appreciating Physical Landscapes. In: Hose, T.A. (ed) *Appreciating Physical Landscapes: Three Hundred Years of Geotourism, Special Publication No.417*. Geological Society of London, London.
- Knudson, D.M., Cable, T.T. and Beck, L.** (1999) *Interpretation of Cultural and Natural Resources*. Venture Publishing, State College PA.
- Patzak, M.** (2000) *UNESCO Geoparks Programme Feasibility Study*. UNESCO, Paris.
- Quirk, D.G.** (1993) Origin of the Peak District Orefield. *Bulletin of the Peak District Mines Historical Society*, 12, 4-15.
- Rodgers, P.R.** (1977) *Derbyshire Geology*. Dalesman Books, Clapham.
- Sidney, S.** (1851) *Rides on Railways leading to the Lake and Mountain Districts of Cumberland, North Wales, and the Dales of Derbyshire; with a glance at Oxford, Birmingham, Liverpool, Manchester and other manufacturing towns*. London, William S. Orr & Co.
- Staffordshire Wildlife Trust** (2004) *Discovering Brown End Quarry* [leaflet]. Staffordshire Wildlife Trust, Wolseley Bridge.
- Thomas, I.A. and Prentice, J.E.** (1994) A consensus approach: industry and geosciences in the National Stone Centre, UK. In: O'Halloran,

- D., Green C., Harley, M., Stanley, M. & Knill, S. (eds) *Geological and Landscape Conservation*. Geological Society, London. 423-427.
- Tilden, F.** (1977) *Interpreting Our Heritage* (3rd edn.). University of North Carolina Press, Chapel Hill.
- Torrens, H.** (1992) The Early Life and Geological Work of John Mawe (1766-1828) and a Note on His Travels in Brazil. *Mining History: The Bulletin of the Peak District Mines Historical Society* **11** (6), 267-271.
- Towner, J.** (1996) *An Historical Geography of Recreation and Tourism in the Western World 1540-1940*. Wiley, London.
- Walford, T.** (1818) *The Scientific Tourist Through England, Wales and Scotland by which the traveller is directed to the principal objects of antiquity, art, science, and the picturesque including the minerals, fossils, rare plants, and other subjects of natural history arranged by counties to which is added an introduction to the study of antiquities and the elements, and the elements of statistics, geology, mineralogy, and botany* [in two volumes]. J. Booth, London.
- Ward, R.** (1827) *A Guide to the Peak of Derbyshire, contains a concise account of Buxton, Matlock, and Castleton and other remarkable places and objects chiefly in the northerly parts of that very interesting county*. William Ward, Birmingham. [available as a 1977 reprint, E.J. Morten, Didsbury].
- Watson, W.** (1811) *A Delineation of the Strata of Derbyshire forming the surface from Bolsover in the East to Buxton in the West designed from a Tablet, Composed of the Specimens of Each Stratum above the Line, With an Explanatory Account of the same, together with A Description of the Fossils found in these Strata; and also Of the Nature and Quality of the respective soils*. W. Todd, Sheffield.
- Watson, W.** (1813) *A Delineation of the Strata of Derbyshire forming the surface from Bolsover in the East to Buxton in the West designed from a Tablet, Composed of the Specimens of Each Stratum above the Line, With an Explanatory Account of the same, together with A Description of the Fossils found in these Strata; and also Of the Nature and Quality of the respective soils*. W. Todd, Sheffield.
- Willies, L.** (1993) *Underground Metal Mines (Excluding Iron): Step 1 Report*. Cranstone Consultancy (unpublished report for English Heritage).
- Wolverton Cope, F.** (1999) *Geologists' Association Guide No.26: The Peak District*. Geologists' Association, London.
- Zouros, N.** (2013) European Geoparks: new challenges and innovative tools towards Earth heritage management and sustainable local development. In: Aloia, A., Calcaterra, D., Cuomo, A., De Vita, A. & Guida, D. (eds) *Proceedings of the 12th European Geoparks Conference*, National Park of Cilento, Vallo di Diano and Alburni Geopark. v-ix.