

## **Primitive Rocks: Humphry Davy, Mining and the Sublime Landscapes of Cornwall**

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The newly established Geological Society of London, formed in 1807, set out as a primary purpose its ambition to produce a geological map of Britain. The editors of the first issue of the Society's journal, *Transactions of the Geological Society* (1811), stated their hope that its members will continue to donate mineral specimens which will lay the foundations of such a map ("Preface" viii). A few years later, in 1814, a similar society was formed in Cornwall which then produced its own journal, *Transactions of the Royal Geological Society of Cornwall* (1818), the first issue of which echoed the London version of *Transactions*, though on a smaller scale: "In the construction of a geological map of Cornwall, the Society has made considerable progress, and the Council trust that from the zealous and united exertion of its members, its completion may be confidently anticipated" ("Preface" viii). At this point the president of the London Society, George Bellas Greenough, was about to publish his *Geological Map of England and Wales* (1819), the result of a cooperative collaboration between the society's members who sent in rock specimens from various localities throughout much of Britain.

What such maps clearly highlighted were regional differences in geology, differences which formed a basis for understanding how particular regions were not only comprised of certain kinds of rocks but also exhibited other properties. Of much interest, at least initially, was that some regions contained large quantities of metals and other valuable resources suitable for mining. Thus the first geological map of England ever to be produced, in 1815, was by William Smith, whose work as a land surveyor provided him with the necessary experience in observing the geology of a wide range of areas across England and Wales (see, for example, Porter 95-6). Greenough then drew extensively on Smith's map for his more collaborative *Geological Map*, and London's *Transactions* refer to the practical uses of such a map, but it was Cornwall's version of the journal that most heavily emphasised, from the outset, the purpose of the society and its prospective map as being to serve mining interests: to contribute "to the advancement of the mining resources of the County of Cornwall" as well as "to the progress of geological knowledge" (v). But while rock-mapping had a clear economic function, it was also motivated by a flowering interest in travel and landscape aesthetics, and it is these curiously distinct yet overlapping interests in mining and landscape that this article will consider in combination.

In different ways the interests in both mining and landscapes produced an intensified focus on 'primitive' rocks, such as granite – rocks found mostly in northern and western regions of Britain – largely because these rocks contain some of the most valuable mining materials and underpin some of the most dramatic, sublime landscapes. Focusing on the case of the "primitive" region of Cornwall, this article will explore how members of its Geological Society, including the "Romantic

scientist" Humphry Davy (see: Heringman 6), mapped out geological regions as distinctive in the late eighteenth and early nineteenth centuries – distinctive in terms of both their minerals and landscapes. Davy observed these regional qualities in his poetry and his scientific writing, and contributed to claims of local distinctiveness and expertise which developed in opposition to a growing professionalism centred in London. This article will, in other words, consider how scientific and poetic descriptions of the mineral value and the aesthetic qualities of landscapes support the claims of Cornwall's Geological Society to regional difference and expertise. With their interests in mining as well as landscape aesthetics, Davy and the Cornish geologists provide a different angle from the more usual focus on the aesthetic interests of the canonical Romantic poets, who typically engaged only minimally with industrial concerns.

Through its focus on the case of Cornwall, this article can contribute to the strand of Romantic studies which has continued to develop a critique of the canonical, unified 'centre' of English poets by establishing a devolved plurality of Romanticisms, registering the complexities of national and regional contexts across the British Isles (see, for example, Duff and Jones; Moore). Since the 1980s critics have considered the complexities of Scottish, Irish, and Welsh Romanticisms and have turned attention more recently to "the provincial diversity of English Romantic writing", as Nicholas Roe puts it (4). By turning to the West Country, Roe relocates the roots of English Romanticism, focusing on a region that offers a convincing alternative to the Lake District. Roe's collection, however, has little to say about Cornwall,<sup>1</sup> a county that is of particular interest here as it is part of England but also developed a distinct regional or even national identity (Vernon). By taking Cornwall as its focus, this article will identify how a regionally based version of Romantic science stakes out a specific territorial claim, which is grounded in the aesthetic *and* mineral value of primitive rocks.

### Primitive Rocks and the Sublime

Historians of geology frequently observe that the study of rocks and fossils began to open up a new perspective of earth history in the late eighteenth century. The emerging discipline of geology showed that the history of the earth extended back immeasurably, far beyond the appearance of humankind, and beyond what the bible had accounted for (see, for example, Rupke). It was 'primitive' rocks that were usually considered the oldest, containing no fossils and thus appearing to predate the existence of all living beings. However, literary and historical studies of geology have mostly focused on the role of sedimentary rocks and the fossils found in them, which in providing evidence of the existence of species that over millions of millions of years had become extinct were so crucial to the establishment of theories of evolution (see also: Buckland, "Losing the Plot" 10). Fossils also became important to the process of mapping out rocks in terms of their age, a taxonomic enterprise known as "stratigraphy" which was a core drive of nineteenth-century geology (Secord; Knell 8-12). But in the early decades of the century geologists largely ignored fossils, which is evident in the first few volumes of *Transactions* which placed by far the most emphasis on minerals and rocks. As Simon Knell points out, only one of the eighteen articles in the first volume of London's *Transactions* concerns fossils (9). In the first

volume of Cornwall's issue there are none, while over half of the articles discuss granite, at that time considered the first among the primary rocks since it so often seemed to underlie all other primary rock masses.

There was much debate between the theory proposed by Abraham Gottlob Werner that granite was the first of all rocks to form in the primordial sea (pre-dating sea creatures and thus containing no fossils) and the theory proposed by James Hutton which understood it to have an igneous origin, to be formed by the earth's internal heat, for example through volcanic action. According to Hutton's theory, which gained increasing ground in the nineteenth century, granite could erupt or intrude into previously formed sedimentary rocks, and was not therefore in all cases the most primitive formation. But at this stage granite was still widely thought to be the oldest of rocks, and geologists including Davy, as well as poets including Wordsworth and Goethe, used the aesthetics of sublimity in their descriptions of geological formations and landscapes – especially those formed of primitive rocks – which were thus apprehended as vast, potentially infinite and incomprehensibly ancient (see: Goethe, "On Granite").

Marjorie Hope Nicolson discusses how natural philosophers among others developed the concept of "geological time" as indefinite in the seventeenth and eighteenth centuries, which helped to generate the Romantics' interest in mountains in general as sublime, while they were previously considered ugly disfigurements of nature, the result of God's wrath. Poets including Wordsworth were also well-acquainted with contemporary geological theories such as Werner's, building on the sense of primitive rocks in particular as ancient or even eternal, and thus sublime (see: Wyatt 43-44, 48). Wordsworth's travel narratives contain many geological observations. His "An Unpublished Tour" (1811-12), for instance, describes his impressions when looking down into the depth of a chasm in the Lake District, cut through by a brook over ages, and contrasts the fragile slate rocks and earth which are here on the verge of collapse against the sublimity of the "ever-lasting granite" and "basaltic columns" belonging to another scene: "Among sensations of sublimity, there is one class produced by images of durate, [or] impassiveness by the sight of rocks of ever-lasting granite, or basaltic columns, a barrier upon which the furious winds or the devouring sea are without injury resisted" (317). This sense of sublimity is characteristic of Wordsworth's wider treatment of the sublime as involving great temporal durability or even eternity along with great spatial depths or heights. In *The Prelude* the "disappearing line" of a road is perceived as extending into infinite space, or into eternity, across a hilly landscape with its rocky, "bare steep":

a disappearing line  
 Seen daily afar off, on one bare steep  
 Beyond the limits which my feet had trod  
 Was like a guide into eternity,  
 At least to things unknown and without bound. (Book 12, 148-152)<sup>2</sup>

Despite the usual focus on the sublime as a psychological category, we can identify a 'natural sublime' – to refer to sublime objects rather than subjective experiences of the sublime – considering its manifestations in scientific as well as aesthetic contexts.

As Noah Heringman comments, "Outside aesthetic theory, the word 'sublime' is generally used in eighteenth-century Britain to describe physical objects" such as rocks and landforms, a usage that continues in the early nineteenth century (28). Employing this sense of the natural sublime, in his public lectures on geology delivered in 1805, Davy referred to granite as one of the commonest types of "primitive" rock and described its landforms as having special qualities of sublimity both in its spatial "magnitude" and, he implied, in its temporal continuity, its ability to survive, to endure, and to withstand the waves. Like Wordsworth, with whom he exchanged ideas about poetry and science, Davy describes how granite is able to "resist" the waves of the sea. It is found, he goes on to observe, at the "extremity of our land," in the "primitive country" of Cornwall:

No rock is grander in form nor more sublime in structure. Placed at the last extremity of our land, it seems well adapted from its magnitude, solidity, and strength to resist the force of the waves of the Atlantic and to prevent the encroachment of the ocean upon the land. [. . .] Thus in Cornwall, which is most distinctly a primitive country, the granite and micaceous and siliceous schist meet and form the principal rocky basis of the land. (*On Geology* 62)

Maurice Hindle has considered the mutual influence between Wordsworth and Davy with particular attention to *Lyrical Ballads*. Their shared sense of the 'natural sublime', manifest in the temporal and spatial vastness of rocky landscapes, could contribute to this project of demonstrating the exchanges between these writers (see: Wyatt 66-8). The distinctiveness of Davy's work can also be emphasised, however, in the context of Cornwall's geological network. Like the Cornish geologists whose work will shortly be discussed, Davy's lecture mixes scientific with aesthetic observations of the local landscape, swiftly moving on from the sublimity of granite to the technical description of "the granite and micaceous and siliceous schist" which constitutes the basis of the land of Cornwall ("schist" referring to a rock consisting of layers of different minerals). As Hindle observes, it was Davy's dual interests in poetry and science which encouraged Wordsworth to see the imaginative qualities of science, and to compare the poet and scientist as observers of nature (16-29). Davy's interest in landscapes is not only bound up with aesthetic and scientific observations, however, but also, and in contrast to Wordsworth, with their mineral potential, as we will see.

Davy's "Extract from an Unfinished Poem on Mount's Bay" provides a commentary on his dual interest in granite rocks as both scientist and poet. Again here Davy firstly describes the rocks as stable, as strong, surviving over vast stretches of time. He describes the "granite feet" of the Mount, "whose base / Beat by the storm of ages, stands unmoved / Amidst the wreck of things, the change of time" (7, 10-12). He then moves on to the granite cliffs of Land's End (here referred to as "Bolerium"), with their spatial vastness or "awful height", and how they are sought out by the scientific seeker of "great laws" or by the poetic soul who is sensitive to the beautiful and sublime:

Thy awful height Bolerium is not loved  
 By busy Man, and no one wanders there  
 Save He who follows Nature: He who seeks  
 Amidst thy craigs and storm-beat rocks to find  
 The marks of changes teaching the great laws  
 That raised the globe from Chaos. Or He whose soul  
 Is warm with fire poetic, He who feels  
 When Nature smiles in beauty, or sublime  
 Rises in majesty [. . .]. (44-52)

As Jan Golinski has observed, Davy modelled himself publicly as a scientific hero with much in common with the poetic genius, with his ability to sense the sublime and to give passionate displays in his lectures, "apparently giving way to transports of rhetorical intensity as he dilated on the beauties of the divine design or the sublimity of natural forces" ("The Literature" 547). Sharon Ruston has developed this idea of a more "egotistical sublime" in her discussion of how Davy considered scientific activity as itself sublime in its discovery of the "great laws". Contemplating God's works, the perceiving scientist is able to understand the universal laws, transcending his sensory experience and becoming superior to nature as part of an elite group in sympathy with the sublime (132-174).

The "great laws" are universal, but their manifestations are grounded in specific places. The laws that "raised the globe from chaos" can only be worked out by attending to local manifestations, in this case in Mount's Bay. The domain of geology, in other words, is primarily in the field rather than the supposedly neutral, rational, universal space of the laboratory, and its findings based on observation rather than experimentation. As Roy Porter has pointed out, local histories and county surveys were a great contributing factor to geology, and it was only from detailed local observations that more general theories could be built, or indeed questioned and new theories developed. Porter provides the example of William Borlase who, in his *Natural History of Cornwall*, upheld the conventional religious view of the Creation and flood, but whose "familiarity with the devastations of tides and weather on the Cornish coast-line," along with his "expertise in Cornish mining" and the complexities of veins, lodes and faults, led him almost despite himself to an awareness of denudation and of the operation of other events subsequent to the catastrophic flood (113).

Individual observations of the details of local rocks and strata made by provincial members of the London Geological Society from all over Britain also contributed to that more general, centralised system of knowledge provided by Greenough's geological map. The focusing of attention on specific localities was just as likely, however, to involve observations about their distinctiveness, about their particular characteristics, and even claims as to the "specialness" of individual places. Hence contributors to Cornwall's *Transactions* observed that the region's landscapes are especially sublime, and beautiful, and repeatedly proposed that it is especially rich in minerals – perhaps containing more mineral veins than anywhere else in the world. Davy, too, of course had already suggested in his geological lectures and poetry that the "primitive country" of Cornwall in general, and also specific places within it

(Mount's Bay, Land's End), are especially sublime. For Davy, the rocks of Cornwall are not only of interest to the poet and scientist, however; they are also important to the "practical miner."

### Minerals and Maps

In his article published in the first issue of the local *Transactions*, Davy refers to the county's superior mineral wealth, both in terms of economic value and its contribution to scientific theory:

Cornwall may be regarded *kat'eksochin* [*par excellence*] as the *Country of Veins*. It is in veins that the most useful as well as the most valuable minerals generally exist; that the pure specimens are found which serve to determine the mineralogical species, and that the appearances seem most interesting in their connexion with geological theory. Thus veins, which now may be considered in the light of the most valuable cabinets of nature, were once her most active laboratories; and they are equally important to the practical miner, and to the mineralogical philosopher. (38-9)

Davy's metaphorical language here helps to further emphasise the exceptional worth of Cornwall's geology. Echoing his earlier reference to how veins contain the "most valuable minerals," Davy then compares veins to "the most valuable cabinets" and to the "most active laboratories," underlining how their value to science is as rich as they are to mining interests. The image of veins both as cabinets and laboratories points to their capacity to make things apparent or evident, while the former in particular suggests that veins may also contribute to landscape aesthetics: cabinets are not only for storing but for visible, even showy display of their valuable contents.

Davy's notebooks similarly emphasise the unique qualities of Cornwall, including its scenic display of veins and rocks, where he drafts his Introduction for *Sketches of the Geology and Mineralogy of Cornwall* (unpublished). The first indication of his idea for such a project is in an early notebook where he notes a series of chapter titles under the heading "Sketch of a book to be entitled observations in Cornwall". His interest in landscapes as well as in minerals is apparent in the first two chapter titles, "Scenery" and "Mineralogical outline", while the rest of the titles go on to point to other aspects of Cornwall's distinctiveness, such as the "Manners of the people" (37). Later versions of the book are more focused on geology, and his fullest draft is his "Introduction to the Geology of Cornwall" in a notebook written in 1806. It is here, in the opening paragraph, that Davy refers to Cornwall's unique geological qualities, not least in its display of its rocks, this time alluding to the county's especially long-standing mining industry, and using the metaphorical image of the county's naked body:

It is wholly impossible to give a complete and accurate geological and mineralogical history of any considerable district. Cornwall offers some objects which can however, scarcely be attained elsewhere. Mines have been opened in it from the earliest times, and an immense number are still worked. The materials of the interior have been largely spread upon the

surface, and not a few excavations are still open to the light of day. Its hilly aspect likewise favours the research of the geologist; for as nature has been unkind as to clothing the face of the country, the bare rocks, the bones, and, as it were, the sinews of the earth, are more perfectly disclosed. The sea likewise has intersected upon a great scale the strata of the country, and the Atlantic has displayed, in a series of bold, majestic, and diversified cliffs, the general arrangements of the rocks of the district. (295-6)

Davy's descriptive language here echoes his poem "Mount's Bay" in its personification of the country and in its language used to evoke the sublime. In the poem, the Mount, like the cliffs here, is "majestic" and bodily, although clothed: it has "granite feet", as we have seen, and also a "brow [. . .] crown'd with castles" and "rocky sides [. . .] clad with dusky ivy" (8-10). Land's End also has a "frowning brow", and "sublime / Rises in majesty" (35, 51-52). This paragraph from Davy's unpublished "Introduction to the Geology of Cornwall", then, distinguishes Cornwall in terms of its long mining history, its amenability to scientific observation and to the observer of the natural sublime. Mining has contributed to the exposure of Cornwall's rocks and minerals, as has the sparsity of vegetation and the action of the sea upon the sublime cliffs. Cornwall is distinguished in these qualities from other areas of Britain and Ireland: "Under such favourable circumstances, Cornwall presents a wonderful geological and mineral aspect; it is not like the cliffs of the south of England, composed of layers of limestone, sandstone, or chalk, or like North Wales and the south of Ireland" (295).

In Davy's emphasis on Cornwall's special value to mining as well as to science, he echoes the preface to the first issue of the local *Transactions*, in which his only published essay in geology appears (as above). The preface introduces the importance of the Society in terms of the richness of Cornwall's minerals which can benefit both the economy and scientific knowledge (in a rather enormously long opening sentence):

The establishment of a scientific Society for cultivating and diffusing a knowledge of Mineralogy and Geology, in a district so inexhaustibly rich in all the varied treasures of the mineral kingdom, and so singularly adapted, both from its natural structure and artificial excavations, for the examination of subterranean phenomena, must be hailed as an event of high importance, as well to the progress of geological knowledge, as to the advancement of the mining resources of the County of Cornwall; for the benefits which such an Institution is capable of importing to our local interests, by defining and multiplying the objects of economical industry, are not less numerous and substantial than those which it will necessarily confer upon Science, by collecting, arranging, and generalising instructive facts. (v)

Historians have debated the extent to which geology was an economic, industrial enterprise or a gentlemanly leisure activity, most often observing that the members of the London Society tended to have a more gentlemanly interest in geology as a leisure

activity. Mining interests, however, underpinned an increasing number of provincial scientific societies in England, such as Cornwall's.<sup>3</sup> Cornwall's Society was the first to be set up outside of London at least partly due to the rapid expansion of the copper and tin industries in the early decades of the nineteenth century (see: Payton 183-6). As well as asserting the economic along with the scientific importance of their own Society and county, the local geologists put up some degree of resistance to the centralised professionalism of the London Society, resistance which could explain Davy's careful, respectful framing of his own expertise in terms of the assertions of the Cornish Society. Davy was from their inception a member of both Societies, but his own interest in economic, industrial geology aligned him more closely with the concerns of Cornwall's Society. He had come into conflict with Greenough, partly due to the latter's 'gentlemanly' opposition to the application of science to mining, and had resigned from the London Society in 1809 (see: Weindling 259-60; Rudwick, "The Foundation of the Geological Society of London").

The establishment within Cornwall of its own Geological Society may be considered, at least in part, to have been an attempt to resist encroachment from outside the territory. The turn in the history of science toward studying particular social situations for scientific research has helped to unearth numerous controversies between the proponents of rival approaches and theories, and the field of geology seems to have been especially riddled with controversy. Simon Knell, for example, discusses the conflicts and rivalries which developed between participants within the London-based Geological Survey who sought to map out regions such as Cornwall (225-252), but there also seems to have been a more general discord between the London Society and other, provincial Societies, including Cornwall's, with its own competing map.<sup>4</sup> As several geographers have observed, maps are often used as a means of maintaining or establishing power over or ownership of particular territories. Stephen Daniels considers how they operate as instruments for the consolidation and expansion of central government, for instance, aiding "the internal colonisation of the nation-state as well as the incorporation of its overseas territories" (114; see also Naylor 59ff). Wales did not establish its own geological institutions and could therefore be represented as "territory to be conquered" by the London-based geologist and imperialist Roderick Murchison (Knell xiii; see also Secord, "King of Siluria"). Cornwall's Geological Society may thus be considered an attempt to resist such 'colonisation', and even to have been itself a kind of protonationalist formation.

A founding member of Cornwall's Society, John Hawkins, expressed a sense of regional or even national pride in Cornwall. In the second volume of the *Transactions*, published in 1822, he observed that the German state of Saxony took the lead in the science of geology largely because of its mineral resources, and that Cornwall is even better situated to become a "country" of geological importance. It exhibits its mineral deposits "in a still more striking point of view," for instance, "while the facilities for observation are, upon the whole, much greater than they can be in any inland country" (3-4). (Hawkins is presumably referring here to how the coastline surrounding most of Cornwall allows more rocks and strata formations to be visible to the naked eye than in a landlocked region like Saxony.) Hawkins's use of the word "country" here is interesting, as its meaning seems to slip between its different senses: between its earliest meaning (as Latin *contrata*) of 'a tract of land spread out before an observer'



and its later meaning of 'native land' (from the thirteenth century onwards). In its general use as native land, 'country' includes the people who live in it, and became comparable to, and even interchangeable with 'nation', as Raymond Williams indicates. 'Nation' referred originally to a racial group and later to a politically organised grouping, and although it began to be used in a clearly political sense from the sixteenth century onwards, 'country' remained more common in referring to the political unit of people until the eighteenth century (71, 178). What is striking about the frequent use of the word by geologists in the early nineteenth century – as where Davy refers to Cornwall as the "*Country of Veins*" in the quotation above – is how it slips from the sense of a tract of land to a more political suggestion that Cornwall is a nation in its own right, distinct from England; a nation among nations. Hawkins goes on to propose that Cornwall's claims "to be ranked among the primitive countries of the globe, as far as our patriotic feelings are concerned, will be readily admitted" (4).

Contributors to Cornwall's *Transactions* thus emphasised the importance of their own Society in terms of the county's distinctive, uniquely rich minerals with their benefits to the economy and to science, while they also asserted the importance of their being local, of being familiar with the aesthetics of its geological landscapes, unlike visiting geologists whose ignorance disqualified them from anything more than superficial knowledge. The fourth volume of Cornwall's *Transactions* opens with a pull-out of the promised geological map of Cornwall (1832), and contains an article by the map's creator and secretary of the Society, Henry Boase, in which he reiterates the uniquely primary nature of the region. Cornwall, he writes, affords "more ample opportunities for studying the nature of primary rocks, than any other portion of the globe" (167). He goes on to describe the aesthetic qualities of the scenery, including the "fantastic forms" of heaps of granite blocks, and the "very grand" cliffs of a cove (171, 177). Boase also describes his labours in producing the map, which only a local man could carry out. He spent two years, he explains, walking over 1200 miles, "sparing neither personal toil nor expense, in endeavouring to gain a more perfect knowledge of the geology of Cornwall, than could be obtained by strangers, however well qualified for the task, in their hasty and partial excursions" (167).

John Hawkins, in the opening article of this same volume, similarly asserts that "native geologists" are the best researchers because they can easily revisit and revise their labours. Hawkins's article is framed by the narrator taking up the role of a guide to the interested "traveller," thereby setting up his position as local expert. Like Boase, and as was typical for both local and visiting geologists, the article zooms in firstly on the "great chain of granite hills, which runs through the peninsula," then moving on to their relation to the strata of clay-slate surrounding them, an understanding of which "Cornish Geologists [. . .] alone possess the means of accomplishing" (1-5). This assertion of local knowledge is made in the face of new kinds of incursions, by visitors for whom both landscape and geology have become subjects of genuine interest.

As Roy Porter, among others, observes, travel literature was very popular in the late eighteenth and nineteenth centuries, reflecting the surge of interest in topography, along with "geographical works, local natural history, antiquarian studies, guide-books, maps, scenic prints, landscape painting" (102). Porter goes on to point out that influential travel writers displayed much proficiency in discussion of rock

formations and landscape. Much as travel writers could become geological experts, then, it seems geologists blend their observations with an understanding of the expectations of travel narrative (see also: O'Connor 228-230). Like Boase, Hawkins thus comments on the aesthetics of topography, acknowledging the dreariness of the landscape around Goonhilly, for example, while claiming that the "traveller, however, if he be a geologist," will nevertheless feel interested in it (15). He goes on to observe a part of the cliffs near Landewednack "where the serpentine is so beautifully marbled with red veins, and interspersed with crystals of diallage" (18).

Like other travel writers, Davy similarly describes the colours and beauty of rocks, while building up another, 'deeper' scientific layer of interest. With regards to the serpentine district described by Hawkins for example, Davy's unpublished "Introduction to the Geology of Cornwall" includes a description of the diverse colours of serpentine before explaining that it is a complex rock,

constituted by many parts: resplendent hornblende, mica, talc, and felspar, are its principal constituents [. . .] the green colour is generally caused by the steatites, the red by the red resplendent hornblende, and the brilliant specks are the talc and mica. [. . .] At Coverac, the resplendent hornblende and felspar occur as separate elements, of from one half to two, three, and four square inches in surface, and nothing can exceed the beauty of the combination. (298)

Davy continues to emphasise the colours and exceptional beauty of these rocks, including "The cliffs at Kinnance" which "exhibit all the varieties of serpentine, and all its most beautiful colours." As the editor of these notebooks, John Davy, comments, the granite and serpentine rocks of Cornwall were "particularly attractive" to his brother: "the granite in its grand forms, and the serpentine in its forms of beauty" (299). While beauty is associated with diverse colours, the sublimity of granite is associated in part with grandness. In contrast to the serpentine cliffs, Humphry Davy describes granite blocks near Land's End: "The masses are grand, their colours uniform, and their uniformity increases the effect upon the eye; and the arrangements of this kind have a peculiar wildness and sublimity" (297).

In his essay for *Transactions*, presumably drawing on the earlier notebook, Davy similarly explains how the colours of the serpentine district are caused by particular elements, and goes on to propose that the "Cornish serpentine" could be mined for architecture or sculpture. Where Davy, like Hawkins, previously described the beauty of the colourful serpentine landscape, here he describes the potential beauty of the mined rocks: "I am convinced, that by making proper excavations, many parts of the serpentine district would afford large and beautiful blocks of great fineness and beauty of colour" (46). The economic value of certain rocks, then, is closely tied up with the aesthetic appeal of the landscape – in this case with its beauty rather than its sublimity – being enhanced by the colours often documented in travel narratives.

Finally, in the closing two paragraphs of his article, Hawkins reiterates his point about local expertise, and asserts a sense of ownership, of possession of "*our* Cornish granite, of *our* slate, or of *our* serpentine formations" (my italics):

I cannot refrain from the observation, that while travellers glance superficially over every object, and too often from this cause, form very incorrect judgements, the indulgence which they are entitled to, cannot well be extended to native observers; from whom we have a right to expect correctness; and above all, an attention to the minutest circumstances of the case before them.

It is by this mode of proceeding that the labours of our society may be made most eminently conducive to the progress of geognosy; and the monographies of our Cornish granite, of our slate, or of our serpentine formations, if they were so treated, might constitute a work of such original merit, that its authority would be appealed to, in all controverted points, as decisive. (20)

The assertion of local expertise could have been an attempt to counteract growing claims to expert professionalism such as those made by some members of the Geological Society of London and, a little later, the director of the Geological Survey, Henry de La Beche. The Geological Survey was established in 1835 as a government funded project to examine and map Britain in detail, which was in many ways a continuation of Greenough's earlier project with its aim to produce a geological map of Britain, except that de La Beche wanted paid employees to carry out the work in provincial surveys rather than to leave this work in the "amateur" hands of local men (see: Secord, "The Geological Survey"). In contrast Davy seems very attuned to the sensitivities and claims of local geologists. Despite his fame, or because of it, he frames his entire article for the first issue of Cornwall's *Transactions* as a letter to the local Boase (who later contributed the geological map), downplaying his own expertise in the face of the Society's members who have much more opportunity to study the county:

I shall in this letter comply with the request that you did me the honour to make, of offering a few hints regarding the geology of Cornwall. I can hardly venture to hope that they will be worth the attention of the Society: most of the members have had much better opportunities than have occurred to me, of examining our interesting county; and I dare say that many of the observations which I shall make, will have been anticipated by others. (38)

In this first paragraph Davy echoes an earlier private letter to Boase (dated August 27 1815), in which he accepts Boase's invitation to contribute to this first issue of *Transactions*. Davy also refers to his notebooks in this letter, notebooks which draw attention to the distinctiveness of Cornwall – here referred to as "my native country" – in terms of its value to mining, to science, and to the appreciator of sublime landscapes, as we have seen:

It would give me great satisfaction if I could communicate any thing to the Geological Society of Cornwall respecting the mineralogy of my native

country at all worthy of their notice; but though some years ago I paid much attention to the subject yet I dare not trust to memory & my notes are in London -- It is likely also that the few observations I have made are on objects that have occupied the attention of some of your body & that what I should state has been already stated -- I will however during the next fortnight commit to paper a few hints & queries: if they have anticipated have the goodness not to communicate them; at all events I am desirous of shewing my zeal in the cause.

Davy was born and grew up in Cornwall, in Penzance, a town in Mount's Bay where the Geological Society of Cornwall was set up, and he retained a long-standing attachment to the county, despite becoming a figure with an international reputation, and being closely involved with national organisations such as the Royal Institution. In his privileging of local knowledge over national and institutional knowledge, we see another side to Davy to how he is usually understood, for example by Golinski as an "establishment" figure whose public success depended on turning away from his provincial background and associating himself with the metropolitan centre. Davy seems in this case to have instead allied himself with and used his professional reputation to support the provincial society in its opposition to the far better known London Society, rather than ruthlessly exploiting the public fame he gained largely through his association with the Royal Institution and its lectures solely for his own ends, as he was at times perceived to do (*Public Science*).

Alan Kent goes so far as to claim that Davy's poetry illustrates a Cornishman's assertion of "identity" with the earth, when in an untitled poem of 1795 Davy describes his tearful view of his "forefathers' graves": "deep in the earth / In darkness and silence the organs of life / To their primitive atoms return" (qtd. in Holmes 19). Such a characterisation of Davy is typical of Cornish nationalist readings of such material, which associate national identity with ancestry or even race and with the timelessness of the land itself. But in his letter-article published in Cornwall's *Transactions*, Davy seems to speak as a now-urban dweller whose expertise in the locality has diminished, as well as a knowledgeable "Cornishman" whose observations of Mount's Bay can point the way for further investigation by members of the local Society as opposed to the "foreign naturalist" employed by the London Society:

The place where the granite joins the schist in St. Michael's Mount, is remarkable for the number of crystallized substances it contains; oxide of tin, wolfram, phosphate and fluuate of lime, quartz, mica, felspar, topaz, are all known to occur in the same veins; and the particular investigation and history of the nature of crystallized bodies occurring in this beautiful and remarkable spot, appears well worthy of the attention of the Geological Society, established so immediately in its neighbourhood.

An opinion has been expressed by a foreign naturalist, who was extensively employed in geological researches some time ago by the Geological Society of London, that the granite veins of Cornwall are mere protuberances of primary granite in which mica schist has formed. This

opinion does not merit discussion, and could only have been formed in consequence of very superficial examination. (41)

Like Boase, Hawkins and other contributors to Cornwall's *Transactions*, Davy refers to the "superficial" nature of a visitor's observations. This "foreign naturalist" from the London Society is set against the local Society which is "established so immediately in its [the place of a "remarkable" quantity of minerals] neighbourhood." And here, once again, are geological observations of minerals mixed with an aesthetic appreciation of the "beautiful and remarkable spot".

### **Industrial Landscapes**

Earlier observers had of course described the geological distinctiveness and particular qualities of "peripheral" regions such as Cornwall (for example Richard Carew in his *Survey of Cornwall* first published in 1603, and William Borlase in his *Natural History of Cornwall* first published in 1758), but by the middle of the nineteenth century such observers were no longer isolated exceptions. Davy's writings and the establishment of The Geological Society of Cornwall in 1814 are just examples of a much more general, burgeoning interest in the rocks of such regions. The preoccupation with rocks arose at least in part from growing interests in the aesthetics of rocky landscapes, along with the mining industry. Many geographers and historians and literary critics have observed that from the eighteenth century onwards mountainous landscapes were invested with a new kind of value, especially those of the Alps, but also increasingly those of Britain's mountainous periphery, such as the Peak and Lake Districts, Wales and Scotland (see, for example, Nicolson; Darby). Landscapes previously seen as forbidding and hostile were romanticised and described in terms of the aesthetics of the sublime and picturesque, becoming attractive tourist destinations and the subjects of much travel writing, poetry and painting in the Romantic period, and while many studies have considered how landscape aesthetics tend to exclude concern with material, economic conditions, this opposition can also be challenged.

Stephen Copley considers how a new kind of aesthetics of the picturesque emerged in the Romantic period, an aesthetics that tended to exclude signs of economic activity from the landscape, but that nevertheless at times accepted limited traces of industry. One of the best-known writers on picturesque travel was of course William Gilpin, whose work occasionally accommodates traces of industry such as "the black-lead mine" in the Lake District in contrast to his brief account of the Cornish tin mines on his Western tour which typify "the limits of normal Picturesque concern with the conditions of economic production" (57). Gilpin's visit to Cornwall is cut short because he finds the landscapes "coarse" and "uninteresting" despite recognising the geological qualities of the area. He notes that there is much of interest for the antiquarian and fossilist including stone monuments, metals, and fossils, and that despite the "wildness" of the "dreary landscape" these lands are "the richest in the country." Few crops are grown but Gilpin goes on to note that "it is very immaterial what the surface produces: the harvest lies beneath. In this neighbourhood [the moors between Bodmin and Liskeard] some of the richest of the Cornish mines are found" (192-6). But he soon leaves all this behind: "We had not, however, the curiosity to

enter any of these mines. Our business was only on the surface" (197). For Gilpin, the local views are not at all picturesque and thus not of interest to the traveller. It is presumably against such a perspective, then, that the local geologist John Hawkins criticises those travellers who "glance superficially over every object, and too often from this cause, form very incorrect judgements" (30). Despite the dreariness, the "dull uniformity" of the landscape, Hawkins claims that the traveller can find much of geological interest and goes on to emphasise striking views and beautiful colours, as this article has shown.

The local geologists considered so far describe the rocks of Cornwall as having functional, economic use as well as aesthetic appeal, while these two aspects of rocks were often separated from one another. Travellers seeking aesthetic qualities of landscape were likely to overlook industrial features such as mineral wealth and mines. Wordsworth's work, for instance, is of course far more likely to describe landscapes seemingly untouched by modernity than to acknowledge the presence of industrial activity. "Lines written a few miles above Tintern Abbey" famously depicts a picturesque scene in which the "wreathes of smoke" rising up from the charcoal-furnaces on the banks of the River Wye are imagined to derive, instead, from "some hermit's cave, where by his fire / The hermit sits alone" (18-23). Wordsworth's "An Unpublished Tour" is one among few exceptions in his work to depict an industrial location, Tiberthwaite slate quarry, but the production of slate is opposed to anything picturesque (slate is also contrasted to the sublime scene of granite rocks at sea, as we saw earlier):

Things are not to be valued merely in reference to picturesque beauty, especially in this mountainous & romantic [? region], else one might be permitted to regret that this delicate art [splitting slate into thin plates] should ever have been invented; for by means of it, trim & [? spruce] roof[? s] upon the surface of which no seed can find a [? rest or haven] will in time be substituted for those moss-grown and fern-clad coverings which, as we have already noticed, harmoniously unite the Cottages & outhouses with the rocks & trees among which they are placed, & represent Nature to the fancy as having an interest in adorning the Habitations of her Children. (317)

Wordsworth went on to collaborate with the geologist, Adam Sedgwick, a member of the Geological Society of London, who contributed a section on geology to his *A Complete Guide to the Lakes* (1842). Both Wordsworth and Sedgwick here occasionally mention slate quarries, but Wordsworth is far more focused on the aesthetics of the scenery, on the "grandeur and sublimity" of mountains, for example (5), while Sedgwick's contribution concentrates mainly on providing scientific explanations for the formation of such scenery. Sedgwick does defend an interest in mining – Whitehaven's coal-field is of interest due to its machinery and related topics which are "of no vulgar interest" – but, much like Gilpin, he quickly closes: "inviting as the subject is, I must here leave it" (22). A little later Sedgwick moves on to an area of slate rocks, briefly describing the "fine roofing slates" and "noble quarries" of the area, but these quarries cannot compete with the aesthetics of the natural formations

of slate rocks which "weather into fine picturesque forms, of which there are many beautiful examples between Broughton and the foot of Coniston water" (33-4).

Critics have demonstrated the significance of friendships and acquaintances between poets and geologists of the period, particularly between Wordsworth and Coleridge, Sedgwick and Greenough, and Davy (see, for example, Fulford). Even more than Sedgwick, Greenough's interests in geology were Romantic in so far as they were focused on landscape aesthetics – influenced in part by Gilpin (Wyatt, "George Bellas Greenough") – as well as scientific observations. It is only the latter, Davy, who emphasised, at the outset of his contribution to the Cornwall Society's *Transactions*, the importance of mineral veins ("they are equally important to the practical miner, and to the mineralogical philosopher") in combination with the aesthetic qualities of rocky landscapes. In this respect, Davy seems to side with the priorities of the Cornwall Society. Whereas the London Geological Society's interests in mining were limited – aligning its members more closely with the poets – societies based in Cornwall (and North East England) tended to have greater interests in mineral resources. Davy's interest in mining in the context of geology accords with his interest in science more generally for its utility and application, as manifest for example in his well-known invention of the "safety lamp" for use in coal mines. Davy refers to his hopes for such an invention – to prevent "great loss of life" – in his letter to Henry Boase, in which he also agrees to contribute to the first issue of Cornwall's *Transactions* (August 27, 1815).

The links between geological and literary forms of writing and activity are well-documented, geology being a popular emerging discipline of the time that was highly compatible with the Romantic attraction to nature, mountaineering and the sublime (see, for example, O'Connor). Romantic concepts such as the sublime thus circulate through scientific as well as poetic writing, as we have seen in the work of Davy. Cornwall provides a locale for thinking further about the ongoing relations between geological and literary interests in the first half of the nineteenth century, as Davy and other members of its Geological Society used the county's minerals as well as its landscape aesthetics to contribute to territorial claims concerning its uniqueness and importance. Davy's poetry puts forward a sense of Cornwall's distinctiveness by describing its exceptionally sublime granite landscapes, while his essays do most to bring together his interests in mining and landscape aesthetics. For Davy, Cornwall's geological landscape is of value not only to the miner and to the scientific observer but also has sublime and beautiful qualities. Hawkins and Boase similarly incorporate the conventions of travel narratives in the descriptions of landscapes contained in their geological writing, as they map out a territory over which they claim ownership. Davy and the Cornish geologists, in other words, develop a version of Romantic aesthetics in order to make claims about the value of Cornwall as a geological territory, a version that incorporates rocks in terms of their economic value as well as their landscape properties. Minerals and mining can themselves have aesthetic qualities, and landscapes can have mineral value, as we have seen: mineralogical veins are like "valuable cabinets of nature"; mining displays rocky scenery much as the sea exposes the sublime cliffs; the colourful serpentine district would yield "beautiful blocks" with "beauty of colour"; and St Michael's Mount, with its rich mineral veins, has a "beautiful and remarkable spot." Whereas Gilpin and Wordsworth engage only

minimally with the industrial, the mineral potential of the landscape as an industrial resource, for Davy, contributes to its aesthetic qualities, and it is only the Cornish geologists, located in the immediate "neighbourhood," who can understand the rocks of that landscape.



## **Acknowledgements**

This article derives from a project funded by the AHRC (Mysticism, Myth, and 'Celtic' Nationalism at the University of Exeter's Cornwall Campus). Thank you to Dafydd Moore and Tim Fulford for very generous comments. Thanks also to Mary Lindsey, Jane Harrison and Wahida Amin for their great help in finding what I needed in the Royal Institution archives, and to the reviewer who directed me there and in other helpful directions.

## **Notes**

1. Those few chapters which discuss Cornwall at any length do so in the context of Devon and other counties further to the north and east (see especially Parker's chapter, 15-36).

2. This is from the 1805 edition of "The Prelude". For more on the complexities of the concept of the sublime in Wordsworth's work, which critics have of course discussed at great length, see Wyatt. Wyatt makes further and more detailed connections between geology and Wordsworth's sublime, and includes discussion of its element of duration or "eternity", along with the importance of decay and change. See especially chapter 7 (150-168).

3. For wider context, Porter considers how geology was informed both by economic and landscape interests (96-103 & 133-6). Morrell argues that geological societies engaged with practical mining only to a very limited extent (231-256). Weindling focuses more on an economically oriented mineral history as a motivating factor for the London Geological Society, although the hopes of many founding members were not fully realised. He notes that Greenough was opposed to the application of geology to mining, in contrast to another founding member, Davy, and to more provincial societies such as Cornwall's (248-271).

4. Such conflicts were present from the beginning of the geological mapping enterprises, starting with the provincial mineral surveyor William Smith and the Geological Survey run by the London-based gentlemanly Greenough. Smith's supporters considered that the Geological Society did not give the provincial effort due credit, as Rupke notes (115-117). Winchester gives a full account of Smith's enterprise with its attendant difficulties and conflicts with Greenough and his circle. For discussions of further conflicts in mapping and geology more generally, especially between Roderick Murchison and his colleagues/competitors, see for example Secord, *Controversy in Victorian Geology*; Rudwick, *The Great Devonian Controversy*; Oldroyd. Cadbury considers how opposition developed between provincial geologists, especially Gideon Algernon Mantell, and the Geological Society of London, whose members were at times prejudiced against amateur provincials, especially Richard Owen. For further discussion of tensions between the metropolitan Society and provincial men in the second half of the nineteenth century, focusing on the specific case of Thomas Hardy and the geologist and collector Gideon Mantell, see: Buckland "Thomas Hardy".

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