An early-19th century geological map of the Peak District by John Farey

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Abstract: The incomplete geological map of the Peak District, compiled in 1808, is recorded and reproduced in part for the first time, together with a discussion of the background to its production and re-discovery.

John Farey senior was a pioneer of geology, and especially in Derbyshire, as shown by his massive three-volume *General View of the Agriculture and Minerals of Derbyshire* (1811-1817). This survey of Derbyshire, which uniquely included minerals, had been instituted by Sir John Sinclair, President of the Board of Agriculture, on the recommendation of Sir Joseph Banks, President of the Royal Society. Sinclair had commissioned Farey by a letter dated 14 August 1807 (copy in Sutro Library, California, Ag. 3:43), in which Sinclair had already agreed to Farey's wish, to give

in addition to the usual particulars discussed in the Agricultural Reports hitherto published, to enter more fully into all questions connected with the surface and soil of the District, than has hitherto been attempted.... [Sinclair having previously received a letter from Banks] who seems much impressed with the idea that a corrected Report of Derbyshire, drawn up by you, will be a valuable addition to the surveys now going forward.

Sinclair then agreed to initially pay Farey £300, and to allow the period for its delivery to be extended to May [1808]. On the copy of this letter which Sinclair had sent to Banks, that same day, Banks noted "not a syllable in my letter has a Reference to the increased price offered to Mr. Farey. I think he will deserve it if he is able to give a distinct account of the Stratification of Derbyshire, but whether he is or not remains to be known" (Sutro Lib. Ag. 3:44). How well Farey succeeded in assuaging Banks' doubts, at least in this Derbyshire *Agricultural Report*, is now a matter of record, but sadly Farey was to fail with his other geological projects in Derbyshire.

His project for the Board of Agriculture

Farey was able to commence his Derbyshire field work for the Board in September 1807, which continued until December 1809 (*Derbyshire*, 2, p. viii). But, because of delays at the Board of Agriculture and its then publisher Sir Richard Phillips (1767-1840) who had been declared bankrupt in October 1810 (*Morning Chronicle*, 29 October 1810), volume one (which contained most of the geology and mineralogy) could not be issued until June 1811 (*English Chronicle,* 23 June 1811). A biography of John Farey, and a list of some 250 of his publications was published in the 1989 reprint edition of this volume 1 (Ford & Torrens, 1989) and which was also included in the compendium volume on the *Practice of British Geology* (Torrens, 2004, 1-44).

Farey's *General View of 1811* includes only a single carefully coloured outline sketch map (*Derbyshire,* 1, opp. p. 97) to illustrate the county's geology, using nine different colours. But Farey is known to have planned from the very beginning a detailed "Mineral History and large Map", at a scale of 1 inch to 1 mile, to which he often refers. This was to have comprised his major work on the "Mineral History of Derbyshire, and its Environs, with a map of it, 1 inch to 1 mile". But, of this project, Farey had later to write, in 1817, how "the probable period of publishing my intended large Map and Mineral History... was now more distant" (*Derbyshire,* 3, p. 207).

Any modern equivalent project would certainly contain a large scale geological map in explanation, but with his Derbyshire project, Farey was very much acting as a "guinea pig", since his *Agricultural Report* for Derbyshire was the only one to contain full details of any county's geology (unlike all the other such *Reports*). The first author was first helped, from 1981, with locating Farey holdings at the Sutro Library in San Francisco, by a great great grandson of John Farey, Art Farey (1905-1992) then of nearby Oakland. But it only became possible to study the extraordinary detail, and colouring, of Farey's Derbyshire maps when the same author could explore the Sutro Library in person, in 1992 and again in 1996.

Adolph Sutro and his library

The Sutro Library, in San Francisco (in the J. Paul Leonard Library, on the State University campus) has long held a major collection of the papers of Joseph Banks, one of Farey's most significant patrons. Adolph Sutro (1830-1898) had made his fortune from gold, and other Californian mining, and soon became a major book, and manuscripts collector (Davidson 2003). He had been able to buy much of the Sir Joseph Banks archive when it was stupidly "scattered to the winds", at a series of London auction sales between 1880 and 1886, by later members of the Banks family (Carter, 1987). But soon, much of Sutro's wonderful collection of books, held in a warehouse on Battery Street, San Francisco, was destroyed in the fires, which followed the San Francisco earthquake in 1906. But Sutro's manuscript collections, in the separate Montgomery Block, including these Banks papers, in which were a number of Farey manuscripts, miraculously survived.

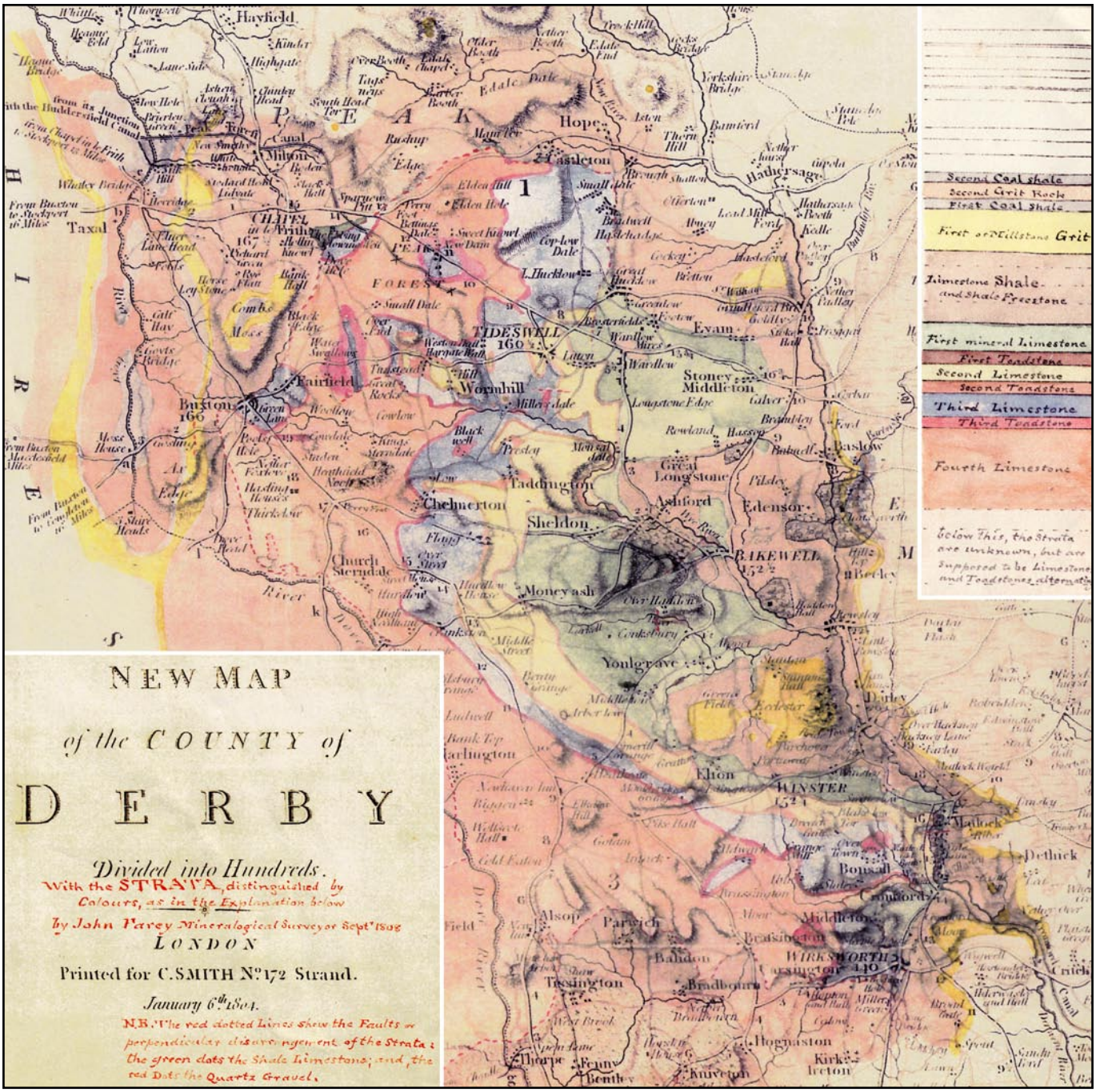

Figure 1. *Part of Farey's map; the insets of the key and title block are not in their original positions, on a sheet that extended far beyond the area with the geology.*

These Banks papers include an incomplete geological map of Derbyshire (Sutro M. 2:24) dated September 1808 by Farey, which is here reproduced in part for the first time. This geological map had been hand coloured onto the printed topographical map, published by C. Smith, 172 Strand, London, in 1804, on a scale of 3 miles to the inch. This 1804 map was confusingly listed, as by Farey, by Carter (1987) who failed to realise, never having seen it, that Farey's were only these geological additions. The map is clearly also the same "mineralogical map of Derbyshire by Mr. Farey laid before the Geological Society by the President, from Sir Joseph Banks, on 2 December 1808" (Geological Society, Council minute book).

The geology shown is understandably incomplete, since it was produced only one year after Farey had started his Survey. Farey's explanation of it reads

The STRATA, distinguished by Colours, as in the Explanation below, by John Farey, Mineralogical Surveyor, Sept. 1808, [which hand-drawn Explanation occurs in the southeast margin, which shows the sequence from] Second Coal Shale, down to the Fourth Limestone, below this the Strata are unknown, but are supposed to be Limestones and Toadstones alternating. N.B. The red dotted Lines show the Faults or perpendicular disarrangement of the Strata; the green dots the Shale Limestone, the red dots the Quartz Gravel.

Such colouring is only shown on the northwest quadrant of the map, from Ashbourne to the Edale valley. The map thus covers much of the limestone outcrop of the White Peak, but only a little of the Millstone Grit country north of Buxton and along the Derwent Valley. The limestone country south of a line approximating to the Bonsall Fault is coloured as though it was all the Fourth Limestone, and the dolomitized area now known around Brassington had not yet been distinguished. No detail understandably was given of any outcrops in Staffordshire. Stratigraphic subdivisions of the limestone country are coloured separately. Together, these show that Farey had already recognized the sequence of alternating limestones and toadstones, as he named later in his *General Survey* and then numbered downwards; "First Mineral Limestone", "First Toadstone", "Second Limestone", "Second Toadstone", "Third Limestone", "Third Toadstone", to "Fourth Limestone". The stratigraphic column above these limestones is also recorded, upwards, starting with "Limestone Shale and Shale Freestone", then "First, or Millstone, Grit", "First Coal Shale", "Second Grit Rock" to "Second Coal Shale". Only the lowest two divisions of the Millstone Grit Series are shown on the map, but none too clearly.

Another hand-written note adds that "faults are indicated by red dotted lines", but the only major example Farey shows is that all around the limestone-shale boundary, all the way between Wirksworth, Buxton, Hartington, Waterhouses, Ilam to Cromford.. Farey was evidently puzzled by the proximity of the Fourth Limestone to the shales, a contact now known to be due to an unconformity, with Edale shales banked up against Bee Low Limestones. A separate drawing entitled "for explaining th[is] fault, as shown in J. Farey's small Map of the great Limestone District in Derbyshire, made for Sir Joseph Banks, 9 September 1808" survives elsewhere in the Sutro Library collection (Geol. 1:2a). Again Farey, as a pioneer, had faced problems in explaining such an abnormal contact. It could be due either to faulting, as Farey assumed, or to unconformity (as we know today). But the concept of unconformity was then hidden to English geologists, however well it was understood by Scottish ones as a result of James Hutton's explanations. Tomkeieff (1962) has explained this problem well, and Challinor has discussed the particular problems which Farey faced with this supposed Great Derbyshire Fault (1976).

Few of the many other types of fault later illustrated in Farey's fold-out diagram in the *General Survey* are shown. No mineral veins are indicated. The outcrops of the First, Second and Third Limestones are reasonably close to the presently known distribution of the Eyam, Monsal Dale and Bee Low Limestones respectively, with the Fourth Limestone being anything below these.

Farey had also finished, in February 1808, a long section between Lincolnshire, passing through Revesby, Banks' Lincolnshire seat, to his Derbyshire seat at Overton, started in the autumn of 1807, and some 3 metres long (Sherborn, 1929). Although several hand-drawn copies were circulated, this section, like Farey's others across the Peak District (1808) and Sussex (1807), was not published until reproduced by Ford (1967). Farey's 1812 Hampshire section was only first published by Ford and Torrens (2001). But the Sutro collection additionally includes "A [coloured] Section of Strata of the great Mineral Limestone District and its bordering Strata in Derbyshire, passing thro' Buxton and Bakewell; shewing the great Faults and Denudation of the Strata between Goyte Moss and Baslow Collieries, as represented in the Sketch from Mr. John Farey's Mineralogical Map, September 1808" (Sutro, M 2:22). This shows the same western part of Farey's Peak District section as in that reproduced by Ford (1967).

Farey's Ashover project

Farey had also been separately commissioned by Banks to prepare a private, "mineralogical survey" of Banks' large Ashover estate, centered on his Overton Hall, on which Farey first worked from Autumn 1807 to 1809 (Torrens, 1994). This included a very detailed geological map of the area around Ashover, for which Farey had first - in such pre Ordnance Survey days - to construct the base map himself. This included Banks' estate and mines there, which Farey drew up and finally completed late in 1812. Dated December 1812, this too survives, but now only as a "reduction of the Large Survey of Ashover Parish and its Environs", in the Sutro collection (M 2:25; Torrens, 1994).

William Milnes junior (1785-1866) of Ashover, who was elected an Honorary Member of the Geological Society in 1810 (Woodward, 1907) had written to Banks' friend John Lloyd (1749-1815) of Wygfair, in North Wales of this Ashover project, on 17 September 1811

Farey is now here busily employed along with Mr Nuttall [George, Banks' Ashover estate agent] in making a mineral map shewing the range of all the Veins of Lead ore with the bassets [outcrops] of the different strata correctly laid down, and he is also to write a history of this very curious valley. When completed it will, I think, be a very entertaining as well as useful compilation. Sir Joseph has entered into it with great spirit and seems disposed to spare no expense in having it finished in the most accurate manner (National Library of Wales, 12420D, no. 35).

Milnes' next letter, dated 1 December 1812 (no. 36) continues

Mr Farey, and his son William [1795-1836], came here about a fortnight after you left us, and they continued with us till the 9th of November. He worked very hard and finished the first and second circle of the Grit Stone round this parish and next year, I hope, he will be able to complete his mineral map which I think will be one of the most interesting things ever published in this

county. He desired me to say that he was much obliged to you for thinking of him and if you could prevail upon the gentlemen in your neigbourhood to employ him, he is so fond of the pursuit [mineral surveying] that if they thought 2 guineas a day for him and his son too much he would come for less.

This, clearly still incomplete, map of December 1812, also remained unpublished, until it was reproduced by Torrens (1994) and then used as a cover of *Geology Today* (Ford & Torrens, 2001 - where Farey's unit three was more correctly interpreted as Edale Shales [not Head and Boulder Clay]).

This truly remarkable map has since been discussed by David Oldroyd, who claims, that "if one did not know the date, one might easily suppose by its appearance that the map was a late nineteenth-century production" (Oldroyd, 1996, 114). More recently he has discussed the significance of this forgotten map in a much wider context. Now he calls Farey "a genius", and his map "astonishing (which by its appearance might have been made at the end of the 19th C)". The Ashover area later became a major training ground for geological mapping to generations of British undergraduates, including the first author in 1960, when we used the maps produced by Sweeting (1946) and then by Himus and Sweeting (1955). If only we had then known how far we had then failed to reach the high standard set by Farey nearly 150 years before!

His Derbyshire project abandoned

Farey's long Memoir on the Ashover Denudation, to accompany this Map, was duly read for him to the Geological Society of London on 2 and 23 April 1813. The Geological Society's Council Minutes of 2 April 1813 already ominously record how this first part already "consists of minute local observations incapable of abridgement". This Memoir was to comprise much of his planned "Derbyshire Mineral Map and Section". But none of these were ever published; "being rejected, through the intrigues of a few individuals, by the Geological Society" (see Farey to James Sowerby, 7 July 1813, Eyles Collection, University of Bristol library). Farey soon gave full details of his treatment at the hands of the Society in his published letter, dated 16 July 1813 (Farey, 1813). This related how his Memoir, of 120 folio pages, was first presented on 4 February 1813, with a mineral map covering the strata of more than 30 square miles on a scale of 1 and a half inches to a mile, along with, by President Greenough's desire, a large cross section across more than seven miles with another map half a mile wide on a scale of 10 inches to a mile, which section had been "conditionally left with the Society in March 1812 by Banks formerly a member (until February-March 1809)".

Farey relates how about a month after his Memoir was read, Greenough had introduced to him "the gentleman who was to edit the forthcoming volume of the Society's *Transactions"*, This was the politician Henry Warburton (1784-1858) who was elected a Member in 1808. Farey records how Warburton told him the Council were averse to the publication of Farey's paper and who "believed he could say so of every individual thereof, but of this fact he produced no proof, nor have I the opportunity to the present of learning in a regular way any opinion or decision whatever of the Council, or the nature of the objections that have been privately raised". Instead Warburton had produced a new, much abridged, version for Farey, who understandably objected, because of "the inordinate compression it had suffered". Farey was also baffled at the way "loose and inapplicable Anglo-Wernerian terms" had now been added; "having been told by a member of Council that if I did not use Wernerian Terms nobody would read my paper". Later, Farey regretted he had not taken more note of this hint and thus "avoided the loss of many weeks of my time this spring and subsequent vexation".

That Warburton was responsible becomes clear from two undated letters to Greenough, probably from June 1813

I send you the paper in a state, as I conceive, [now] fit for publication. but unless the Gentleman [Farey] engages to return this Abridgement, I do not wish to part with it without first having taken a Copy. He seems to be angry beyond measure. Perhaps if I were to meet him at your house to breakfast on Thursday morning something might be done? I do not wish to bring him, as he lives on the fruits of his labour, out of the way to my part of the town, as this may form a new subject of accusation, Surely 70 pages of quarto letter press are enough for him? (Greenough MSS, University College, London, Add. Mss. 7918, no. 1684).

From this one has confirmation of the extent of the planned abridgement. 120 folio pages had become 70 on quarto, a reduction of about half. Clearly another 'bone of contention' lay in the gulf between the different worlds of the 'gentlemen geologists' of the Geological Society (with Greenough, editor Warburton and secretary Henry Grey Bennet (1777-1836) all rich Old Etonians, active in politics, supported by private incomes, against the 'mineral surveyors', who had to earn precarious livings, using their new, and still unaccepted, knowledge.

Farey's 1819 attempt to publish his map

Much later, a notice in the *Derby Mercury* (28 October 1819) headed "Farey's Large Map of Derbyshire" recorded that Farey had completed his map, in two states, one mineralogical and geological, the other topographical, and that it would now "be prepared for sale", together with "an explanatory memoir, and that they were to be sold by John Cary, the publisher of Mr. Smith's and other Geological Maps, Sections at No. 181 Strand, London".

"Mr. Smith" was William Smith (1769-1839) who had introduced Farey to the science of geology and

its stratigraphic column, for use in mineral surveying, whilst they had both been employed by the Duke of Bedford at Woburn, Bedfordshire over 1800-1802. Cary had commenced the publication of William Smith's planned series of *County Geological Maps* early in 1819, but which had only managed to cover 21 counties, before the project was abandoned in 1824 (Eyles, 1969). Derbyshire was not among them, so Farey's map must have been intended to fill this gap. Sadly Smith's County Maps are excessively rare today, so had clearly not proved a commercial proposition in an England slowly emerging from recession, after years of war with the French (against which Farey also fought equally tenaciously as a pacifist). Farey and Smith both suffered from the still current lack of awareness of the value of geological knowledge. When his *Derbyshire Survey* was finally finished, with the publication of its third volume in October 1817 (despite the first volume having been re-printed in 1815) sales of the three had proved very low. As a result the complete set is today an exceedingly rare item. Stuart Baldwin's catalogue of December 2000, which offered a complete set, noted "it was the first he had seen in 30 years". One of Wheldon and Wesley's last catalogues, of February 2001, offering another, confirmed this, stating "we have not had this work since 1957", i,e for a period of 44 years!

So it was against these financial, and cultural, backgrounds that Farey's Derbyshire map was advertised, but then never appeared. Farey had been paid a total of £450 for his work on the *Derbyshire Report*. But it was not just sales of his books, and maps which had suffered, but Farey himself. In February 1819 Farey had had a printed appeal for work, from "The Owners and Lessees of Coal and other Valuable Minerals", published, on the cover of the *Philosophical Magazine* for February 1819, (volume 53, no. 250). Then, on a 14 March 1819 letter to Jonathan Otley, he used a similar appeal as his own printed letter-head (in Jonathan Otley papers, courtesy of David Oldroyd). Though advertised in this newspaper notice, neither the completed map, nor any memoir ever appeared. Clearly Cary (or Farey) had decided against publication, simply on commercial grounds. Cary had long experience of the problems of publishing such items in an ignorant Britain. In addition he had recently moved his workshop from the Strand between July 1819 and March 1820 (Fordham, 1925). If only Farey's complete Derbyshire map could have been published, it would have been a great advance on any previous area map. Farey's work here was a remarkable achievement here when one realises he had had to start completely from scratch. His tragic final years and the loss of his manuscripts have further been discussed by Ford & Torrens (1989).

Acknowledgments

The late Art Farey, Roger Flindall (Long Eaton), who first led us to the 1819 advert, Frank Glover (at the Sutro Library, San Francisco), Leo Laporte (Redwood City) and David Oldroyd (Sydney) gave us all the help we needed to complete this work.

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