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REVIEW

R.R. Angerstein's Travel Diary, 1753-1755. Industry in England and Wales from a Swedish Perspective. Edited by Torsten and Peter Berg (2001). Science Museum, London. 378+xxiipp. £34.95.

Probably some scores of eighteenth century travel diaries by foreign visitors contain information about mining and smelting, but, apart from the small number translated and published, they are very difficult to track down and, for most of us, even more difficult to translate into English. As substantial a work as this, is therefore particularly welcome and even more so because Angerstein had an especial interest in the extractive industry.

Born in 1718, he came from a prosperous family background, with his father a mill-owner and his mother the daughter of a wealthy merchant. He thus received a good education, finishing at the University of Uppsala, and became employed by the Bergscollegium at age twenty. He received support in 1749 from the Swedish Mining and Trade Councils for a continental tour to investigate trading and industrial developments, travelling through Denmark, Germany, Carinthia, Hungary, Italy and France, before arriving at Harwich in September 1753.

He stayed much of the time in London, perhaps extending his English, and his tours (in England and Wales only) took place from then until his departure from Dover in 1755. From the present viewpoint (the reviewer's), the two most important were his May and June 1754 tour which took him via Salisbury and Weymouth to the farthest reaches of Cornwall, back to Bristol and then Birmingham and back to London, and his July -August tour which included Newcastle and Carlisle, south through Lancashire and Birmingham again to London.

He obviously enjoyed the social life of the capital too, but his interest in things mechanical is shown in his drawings of two of the four sets of water pumping machinery erected under the arches of London Bridge c.1720 by George Sorocold of Derby: each wheel operated four pumps actuated by iron-toothed reduction gearing and cranks. It is not hard to imagine these operating mining machinery, in which trade Sorocold had made his name. His northern tour which took him into Derbyshire brought him to Nottingham from Newark alongside the navigable River Trent. He came via Bulwell (where the iron used at the forge came from Wingerworth near Chesterfield) and Basford where there was a works for red lead (illustrated by a view of the red-lead furnace), a foundry for lead shot and a white lead manufactory, reputedly with the best quality product in England. About two tons of lead were roasted for red lead each week and he noted the increase in weight of about 11%, and also the increase in value from about 34 shillings for the raw lead and the selling price of some £40 for the oxide product.

A little further west he encountered the Magnesian Limestone and identified calcite crystals in it, despite its sandstone-like appearance. It was being quarried and burnt to lime in a kiln built within the rock itself. The coal seams nearby (Cinderhill?) were sunk through the limestone to the coal and, in the illustration were worked using a horse gin (of which the shaft headstock-legs were omitted from the diagram). Four or five feet thickness of coal was worked. In Derby he found potteries producing china and white-ware, the components for which were imported from other areas of the country. He was always enquiring of the origins of materials, especially so if, like the iron used at Evans and Storrer's Derby slitting mill, some of it came from Sweden. Copper was also rolled there, coming partly from the nearby Denby copper smelting works. Brass, using Derbyshire calamine had been formerly made there, but manufacture was by then based at Cheadle.

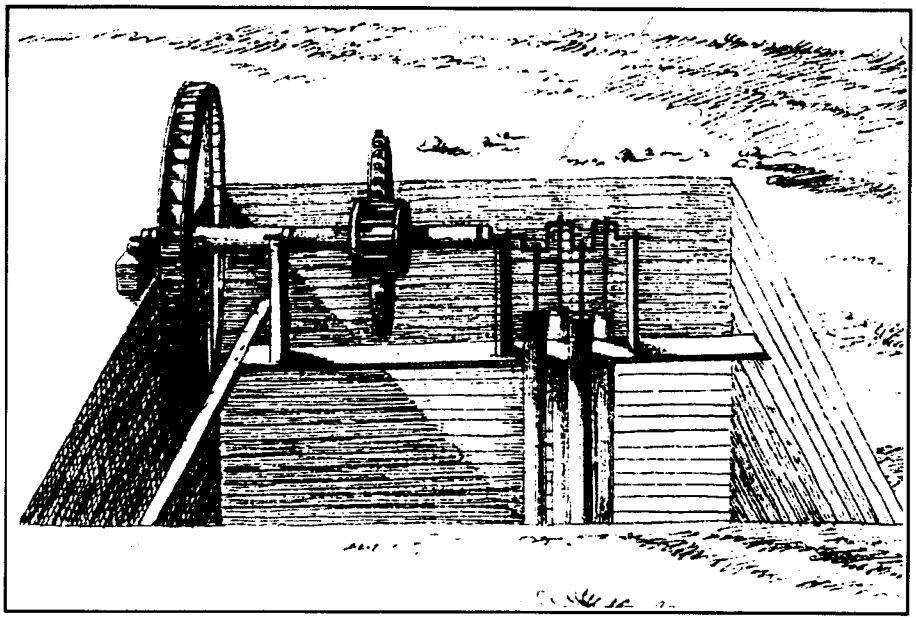
At Crich there was lime burning and lead mining and, a little distance to the west, what sounds like fireclay-brick production from clay mines some 17 yards deep, location not known, but related to the Gritstone measures. The lead mines were sunk 36 to 40 fathoms to what he described as a greenish clay with green marble crystals, probably some variety of chloritic mineral (it occurs within my garden too), within decomposed olivine-basalt or pyroclastic tuff some two yards thick: the green-marble was impersistent, disappearing within a few yards in one case. The ore was found in the 8 fathom-thick limestone below this, and in lower limestones still separated by two further clay beds. The ore only penetrated the basaltic bed an inch or two. He described the weights and measures used, including the 22½ cwt fodder used locally and the 19½ cwt fodder used in London, neither of which match the 2256 lb fodder he cited used at Basford, suggesting he found the measures difficult too!

Total depth of the shaft (probably Old End Mine) was 53 fathoms and from the west (probably the east) an adit, "or so-called sough" had been driven on the 30 fathom level (Hollins Sough intersected Old End at 175 feet). A new adit was driving, begun 3 years earlier from the north (probably south) some 1½ miles away, which had been driven through the clunch or black shale and had then reached the gritstone or sandstone underneath which they were expecting to find the limestone. This equates to the Fritchley or Crich Sough, begun 1753 (Rieuwerts 1987), and it is clear from his narrative that both he and the miners were familiar with many geological concepts.

Between Crich and Matlock Bath he noted two smelting works. The first, almost certainly that belonging to Peter Nightingale at Lea, had the cupola furnaces and a slag mill, which he describes and illustrates, whilst another, closer to Matlock Bath still used the old way, using bellows. This is probably the Lower Mill at Cromford, where the church now stands. He later visited another smelting works using the "old way", on the road to Chatsworth, which suggests the Rowsley Mill. This is probably that illustrated, with considerable detail. Clear illustrations of these types of (Derbyshire) furnaces from before the 10th century have not previously been published.

Calamine, now usually called smithsonite, was described as common, occurring, in the same veins as lead ore. It was roasted, as it came from the mines, in bowls placed within a flat-bottomed reverberatory furnace, a half ton at a time, and was roasted until it was white.

Mines were also described on Cromford Moor sunk to more than 600 feet and passing through clays as at Crich. At Winster, described as a mining town, the Portaway pipe was close to being reached at the Elton Shaft, where it was also expected to intersect a rich "rackwork" or vertical vein (Coast Rake). He descended one of the principal mines, which his illustration and a depth of 100 fathoms (almost certainly an exaggeration) suggests may be Yatestoop Mine. The climbing was hard, on stemples, both down and, especially, up again, so what with trudging through mud sometimes up to the knees (the decomposed basaltic lava or tuff again) he had never before



An example of the illustrations: Fig. 166: Water pump in a mine shaft, Forest of Dean.

been "so worn-out and tired". On then, no doubt, to Chatsworth and easier things, including a life-like lead tree, which could soak visitors with water if turned on.

Accounts for other areas are often as varied and detailed. He describes washing and roasting of copper ores at Middleton Tyas, alum works near Whitby, wooden railways and staithes at Newcastle, silver-refining using the reverberatory furnace just outside the town, large Newcomen engines at Whitehaven, all with illustrations, and there are masses of data for other industries, notably, as might be expected, for iron and steel-making and trades.

His journey to the south-west equally has much "new" information. He visited St Austell first and, two miles to the west noted two steam engines on tin mines installed by Mr Lemon. This was, probably, Polgooth Mine, which had engine cylinders delivered in 1747 and 1750 (Barton 1967 p40-1; Rogers 1976 p51). The engines were on the richer, western side of the estuary. He described driving adits (supported by Norwegian timber) and making leats. Stamp mills and buddles, burning houses and smelting are described and illustrated in some detail. Perhaps it is just his perspective, but the buddles shown in Fig 95 look extremely steep.

Travelling west and north he went to the copper-bearing North Down area, where he saw an engine, the second on the mine in course of erection, which also had water wheels in the adit. This may have been North Downs Mine where the house may have been getting ready for the cylinder delivered in 1756. Chacewater Mine appears to have had its second engine rather too late for this, though it had earlier water wheels. He also saw Bullen Garden and Dolcoath mines, both near Redruth, which had similar features. Copper ore was only partially smelted locally, to matte, at Camborne, then sent on to the Redruth Works near Bristol. Most ore was sent direct to Bristol and South Wales, he noted.

In his "remarks on the genesis of tin ore bodies" (p98) he observed that the tin ore crystallised at the same time as the tin lodes, in many places where it had been covered in earth, how the grains of quartz and feldspar crystals were in the process of being formed and how they increased in hardness downwards . . . formation which here takes place under cover of a foot thick layer of sand and clayey gravel. The vein could not have failed to become deeper and richer through the increase in the height of the rock if only it had been left undisturbed for a few thousand of years. Wrong as these ideas are and were, this is a discerning way of geological thinking.

He was impressed by the spectacular mines at St Agnes - eight miles from Redruth, noting that Cornish miles are considerably longer than English ones (and still appear to be!). Here the Polbero (Polberro) mine, belonging to a Mr Donnisthorne (Donnithorne), which Barton (1967 p39) notes as the richest there, had been so carelessly worked so as to allow a part to collapse: in the year past its production had amounted to some £14400 value (perhaps £10-12m purchasing equivalent today) and in the last quarter 200 blocks of tin, each 300lb weight had been delivered. Water power only was used for pumping and a new leat was being constructed, despite the 90 feet head of the existing leat over the existing 20 feet diameter wheel. Angerstein expected his suggestion that a water pressure engine might be adopted, was futile with such technical ignorance. (Howsoever, it does not seem to have needed a steam engine until the 1780s when a Boulton and Watt engine was installed).

Even limiting this commentary to mining matters, it must be evident the amount of information given in this account is astonishing: many other industrial aspects are as well if not better covered, and there are many other valuable asides and comments useful for general historical purposes. Just as much value as his text are the accomplished sketches included, totalling about as many as there are pages, very many of previously "unknown" or, at least, un-illustrated scenes.

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