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The ironstone mines of Shropshire

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BROWN, I.J. (1990). The ironstone mines of Shropshire. *Proceedings of the Shropshire Geological Society*, **9**, 7–9. Summary of a talk describing the occurrence of ironstone within Shropshire and the methods by which it was mined.

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BACKGROUND

Within Shropshire ironstone occurs in the Coal Measures sequence, mostly as nodules or cakes in seams in shales. The nodules vary in size and frequency, with the Pennystone nodules being up to half a metre across and 0.15 m thick. Underlying these ironstone-bearing shales is the Crawstone Sandstone in which ironstone is disseminated throughout the seam. This was the richest source of ore, being up to 40% iron, and outcropped in the banks of the River Severn. Abraham Darby mined it and it was the first seam to be worked out as it was pursued by the early miners, getting thinner towards Wombridge.

In 1870 production was at a maximum with nearly half a million tons of iron nodules picked from the shales. The proportion was 1:10. Thus in that year about 5.5 million tons of shale were picked over. There are now large tips in the Telford area from the ironstone mines.

METHODS OF WORKING

Methods of working varied. Thin seams were worked by the longwall method, thicker ones by the pillar and stall method. The Oakengates and Lawley area was mined extensively for iron and in some areas there are large voids underground as some of the galleries were very large. Most ironstone seams are roofed with thick sandstones for the sequence was generally:

sandstone
shale with ironstone
coal
sandstone
shale with ironstone
coal

However, investigations are currently being made to assess the safety of these areas, as some voids migrate to the surface and can be a hazard.

The aggregate thickness of workable seams increased from 2.4 m at Broseley to 21.9 m at Donnington. The main ironstones worked were the Chance Pennystone, the Transpennystone, the Blackstone, the Brickmeasure, the Ballstone, the Yellowstone, the Blueflat, the Whiteflat, the Pennystone, and the Crawstone. Lesser seams included the Dunearth, the Ragged Robins and the Poor Robins.

In the ironstone boom about 1837 the Coalbrookdale Company alone had 31 mines producing 50,000 tons. In the 1870s production fell from about 0.5 million tons per annum until by 1880 it was down to 0.25 million tons. The decline then was rapid to 1900 when the total was down to 20,000 tons. Production continued at this low level, mainly for the Priorslee furnaces, up to nationalisation in 1947 when the Grange Pit finally closed, at which time about 140 tons per year was produced.

The author then showed slides of the mines, starting with an aerial view of the Priorslee area which had been a prolific ironstone and coal producer. The area was cut by the Lightmoor fault which has a 40 m throw. Botfields had a very large furnace and forge here, described in 1810 as being the largest ironworks in the world. Activity had virtually finished by the turn of the century and when Telford Development took over this was one of the largest areas of dereliction This area had been opencast for ironstone from the early 1800s. An almost complete furnace has been uncovered in recent opencasting, together with its last charge!

Sections of measures from 1812 at Hadley Colliery showed coal and ironstone beds and many shafts to reach them. At Ironbridge there is an ironstone mine dating from the 1840's which can still be entered in good weather. If atmospheric

pressure is low carbon dioxide accumulates making the workings unsafe. This mine, which was operating in the middle of the 19th Century, was one of the last to close.

Next to be shown was a slide of the Crawstone ironstone with a roof of sandstone. Often the sandstones contained large roots of Carboniferous "trees". The working face was only about 0.6 m thick and so some floor was dug out to provide working space. The sandstone dug out was used as backfill for the areas worked, to prevent rockfalls and also to prevent accumulation of carbon dioxide, an asphyxiating gas, which is a greater problem here than the explosive gas, methane. Roadways radiate out from the mine entrance to reach the longwall which encircles the mine entrance. This method, reputed to have been developed at Coalbrookdale, is basically the same as that used in many coal mines today.

Iron mining techniques involved initial removal of the weaker underlying bed so that the ironstone dropped down. Wedges would be left to hold it until the miners were ready, but many were killed when the roof fell in before they were expecting it.

A slide was shown of the site of an adit which was built in 1840 into the Crawstone. A very early engine house on this site probably housed a simple wheel running the self-acting incline which is now a public footpath. Loaded wagons going down pulled the empty wagons up.

Next to be discussed was the relationship between the ironstone mine and the limestone mine at the Rotunda; they are at about the same horizon but are separated by the Limestone Fault. The mines are not connected – the limestone is entered by a shaft and the ironstone by adits. The outcrop of Pennystone is higher up the hillside and is reflected in the bluish colour of brick produced by its clay, in contrast to the Clunch Clay which gave white bricks. Hence the colour of the buildings in Ironbridge tend to reflect the outcrops of the source rocks for brick making.

The only accessible place for seeing the Pennystone is in Ironbridge. Here the best coking coals, the Clod Coal and Little Flint Coal, also outcrop. The Clunch Clay, a very good firestone clay, and the Big Flint and Little Flint, which are very hard sandstones suitable for building the furnaces, also occur in Ironbridge; so all the raw materials were available in one area.

The Pennystone workings are now difficult to explore because of ventilation problems. However when a fan was being installed recently, the author went in. The main passageway was under the Big Flint sandstone which should have been quite safe, but it fractures easily and large blocks had fallen out of the roof; in part the miners had built brick arch supports.

To work the ironstone all the Pennystone would be brought to the surface for weathering. This would clean the clay off the nodules, which were then picked by women and girls.

A sketch made by the mine inspector in about 1840, at Madeley Wood, showed the girls who did the picking; some picked and some carried while older ones loaded or organised. The ore was sometimes calcined on the way in heaps of coal and iron. Annie Paine of Madeley, who is now 103 years old, was one of the last pickers, working in the mines at the turn of the $19^{th}/20^{th}$ centuries.

The Ballstone measures were rather salty and today the tips from these workings do not support vegetation, unlike those from the Pennystone which support trees; many mounds were planted up until about 1935. A society was founded in 1930 for the reclamation of old tips.

In the 1840s the ironstone was calcined to remove excess sulphur and moisture and improve the quality a little. This was either done in heaps in the open, or in kilns. The ore was then taken to the blast furnaces. These furnaces were cold blast and by the beginning of the century were uneconomic, and closed in 1912. Hot blast, more efficient furnaces had been invented, and were in common use elsewhere.

The Madeley Wood Company mines were worked under franchise, i.e. under chartermasters who sold the ore to the Company. Several villages such as Cuckoo Oak and Aquaduct were built in the early 1840s for ironstone mining communities. Ironmasters built many things of iron: tombs, boats, etc.. The Anstice family were a very important ironstone mining family and the Anstice Memorial Hall at Madeley was built in their memory.

The author had several unresolved questions based on the Annual Mining Returns, for which he invited information. The Great Silurian Mine at Rhysnant produced iron in 1863 for the owner E. Lloyd-Owen. The location of Rhysnant is unknown. Furthermore, ironstone is recorded from Lilleshall but this was a limestone mine so could this be a mistake? Clive mine is listed but there is

no evidence for iron production as this was a copper mine.

Much of the information from this presentation is to be produced in a special publication by the East Midlands Geological Society *[Mercian Geologist Vol. 12 No. 1 1989 pp. 9-27]*.

In response to questions the author said that the ironstones mined were siderites, i.e. iron carbonates which are usually secondary alterations but in fact the nodules all seem to be formed round a 'seed' suggesting that they are of primary deposition.

Asked about weathering, the author thought it took several months; a large area was needed to spread the mixture for the weather to do its work and to allow girls to find the nodules.

Bell pits had been used but were a rather wasteful way of working. Ironstone bell pits have much bigger mounds than coal bell pits because of the greater waste material involved.

Answering other questions, the author said that ironstone mining was not restricted to the Coalbrookdale Coalfield; ironstone workings are documented from the 16th Century in the Clee Hills and two seams were also worked more recently around Billingsley and elsewhere in the Forest of Wyre.

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