

The Rocks of Troopers Hill

By Andrew Mathieson

Troopers Hill is made up of a thick pile of layers of rock which must have been well known to the generations of miners and quarrymen who extracted coal, fireclay and sandstone from them for centuries. However much of that knowledge has been lost and no one now is quite sure what lies under the hill. There are at least 9 coal seams there and some of these were exposed at the surface. Local geologist Tom Fry recalled one seam 5-6ft. thick revealed on the west side of the hill in 1968, but all the other seams are probably much thinner. He also remembered that a very thin seam was worked by unemployed men in 1913 on the hill near the bottom of Troopers Hill Road, where sadly a friend of his died after the shaft collapsed.



Andrew Mathieson leading a geology walk on Troopers Hill February 2013

The rocks are sandstone, mudstone, coal and clay, and they all dip to the south at between 25 and 45 degrees. They belong to the Upper Carboniferous Coal Measures, and are near the base of the Pennant Sandstone. The rock types, structures and fossils suggest that they were formed when the area was covered by a forested swamp. At this time (about 300 million years ago) the area is thought to have been near the equator with a tropical climate. The rocks were next squeezed by huge forces, which crumpled them into a large arched fold that runs east-west through Kingswood. The Trooper's Hill rocks lie on the south side of this structure.

Pennant Sandstone

The sandstone at Troopers Hill is called Pennant, since the early geologists took the name traditionally used by miners and quarrymen. The Pennant forms a thick mass of sandstone in the middle of the local Coal Measures around Bristol, as well as in the Forest of Dean and South Wales. The name is thought to have been derived from the Welsh words penn and nant, meaning head of the valley. The rock is well exposed in the Gully Quarry, just south of Trooper's Hill chimney. The sandstones exposed on the north side of the Gully display cross bedding, indicating that the original sand grains were carried by running water in rivers. On the south of the Gully the rocks are coarser grained with coal pebbles and fossil imprints of tree trunks, suggesting that at times the water was flowing fast enough to erode sediment and move large pieces of wood.



Close up of fossilised tree bark, by Steve England

Pennant was quarried at many sites in the local coalfields and provided stone for thousands of buildings, including the chimney at the top of Trooper's Hill. It sometimes splits into thin slabs which were much used for paving, kerbs, steps, gravestones, and, in earlier times, for roofing.

Mudstone

The mudstones were known as duns by the miners. They are less well exposed but can be seen in the paths to the south of Troopers Hill, and they indicate a period when the waters in the swamps must have been still. They had no commercial value.

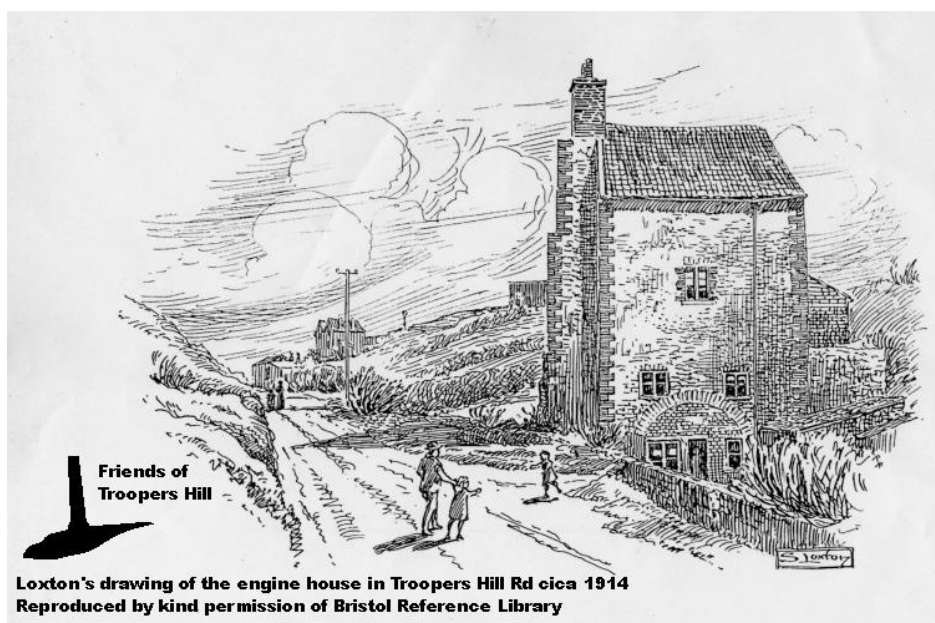
Coal

The miners called the coal seams “veins” and gave them names which were used at each pit in the area where they were found, from Newton St Loe, near Bath, to St Phillips Marsh, in Bristol. Some seams thinned to nothing and others split, which made the naming uncertain in places. Each seam is thought to be the compressed remains of deposits of peat, built up from the remains of the trees of the forest.

Crewe's Hole Pit was sited at the south end of Troopers Hill, and is marked by the remains of

the chimney of the mine engine house. Air Balloon Pit was next to Air Balloon Road, about half a mile north of the Hill. The mining geologist John Anstie was employed to gather information on all the local coal mines for the Royal Commission on Coal. He collected some details of what had been found in these pits, although both were disused when he visited the area in about 1870 and he was concerned that the information might not be completely reliable. He also observed that “the outcrops of the Devil's seam, Buff and Parrot seams, follow parallel lines about 500 yards to the north of those of the Millgrit and Rag seams ... (and at) ..Trooper's Hill .. the shallow works on all of them are clearly traceable.” He noted that the Air Balloon Pit only worked for three or four years as the seams were too variable to be worked economically.

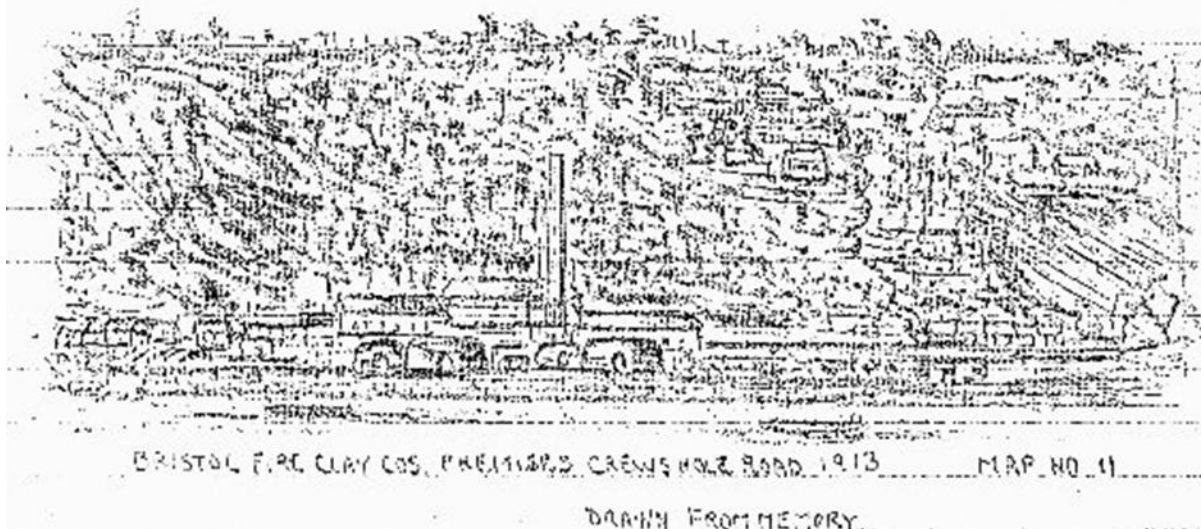
Tom Fry was brought up near Troopers Hill and knew the area very well. He recalled one seam 5-6ft. thick revealed on the west side of the hill in 1968 before the council used the area as a rubbish tip. Tom recalled that in around 1910, his father used to warn him of the dangers of the hill, telling him that it was all undermined. His father worked in the Fireclay Mine. Tom also recalled the collapse of an old sloping shaft in the floor of the main quarry, the sides of which had been walled with mortared stone, and that he could trace the sites of at least six shallow mines on the Hill.



Fireclay

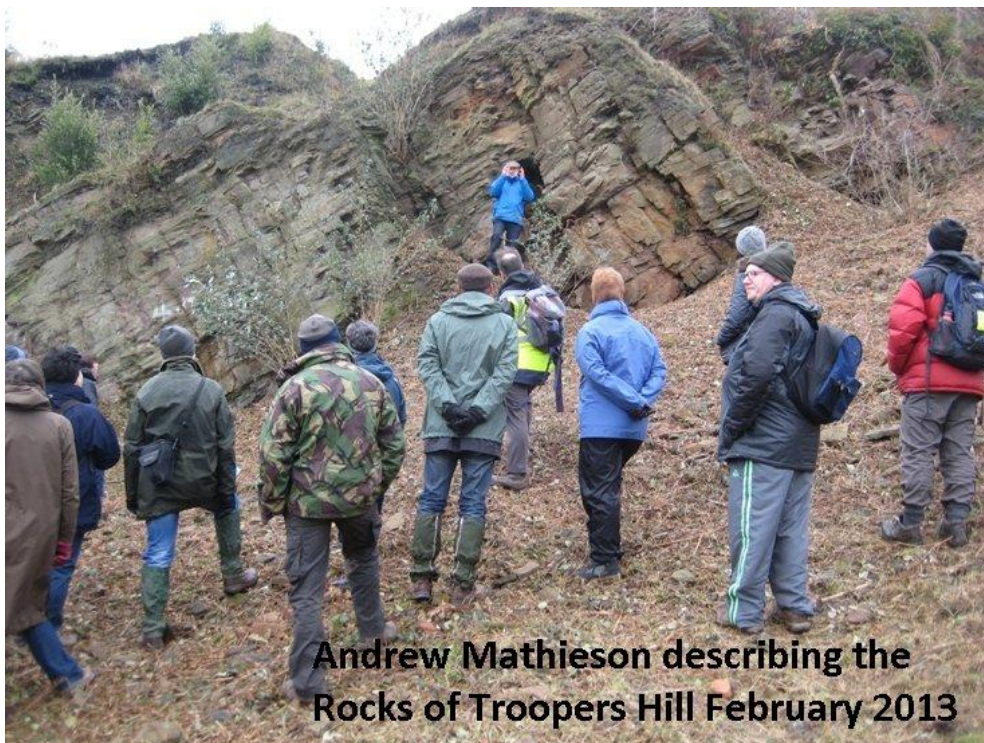
Crews Hole Fireclay Works by Tom Fry

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Fireclay is usually found beneath a coal seam and is basically the clay soil where the trees grew which provided the peat deposits. Fireclay is rich in clay minerals which means that when fired into bricks or tiles, they can withstand high heat. Tom Fry noted that the Troopers Hill fireclay was used to produce high quality terra cotta tiles that were used in many local buildings.

Three fireclay beds are known to have been worked beneath Trooper's Hill.



**Andrew Mathieson describing the
Rocks of Troopers Hill February 2013**

Rock Sequence in Troopers Hill

The following summary is based on the present rock exposures, a few published records and archive sources, and includes information from nearby coal mines, particularly the Hanham and Pylemarsh pits. The recorded beds of rock are listed from top to bottom, and the names of the coal seams are in bold type.

	Coal Measures 120 ft. (recorded for Crewe's Hole Pit) *
	Millgrit Vein 2 ft 6 in (recorded for Crewe's Hole Pit)
	Coal Measures 40 ft. (recorded for Crewe's Hole Pit) - Recorded as "Duns" between Bath and Bristol
	Rag Vein variable (recorded for Crewe's Hole Pit) **
	Coal Measures average 39 ft. (between Bath and Bristol) - Recorded as "Duns" between Bath and Bristol
	Flashy Vein Clay 4-5 ft. (recorded in the Fireclay Mine) ***
	Coal Measures approx. 20 ft. (recorded in the Fireclay Mine)
	Devil's Vein between 9 in. and 3 ft.(between Bath and Bristol)
	Dibb Clay 5 ft. (recorded in the Fireclay Mine)
	Coal Measures approx. 10 ft. (recorded in the Fireclay Mine)
	Rock approx. 33 ft. (recorded in the Fireclay Mine)
	Coal Measures approx. 30 ft. (Trooper's Hill)
	Buff Vein between 1 ft. to 8 ft. (between Bath and Bristol)
	Buff Clay 6 ft. (recorded in the Fireclay Mine)
	Coal Measures average 60 ft. (between Bath and Bristol)
	Parrot Vein 1 – 3 ft. (between Bath and Bristol, but not proved at the nearest pits)
	Coal Measures approx. 20 ft.
	Coal Measures 180 ft. (recorded for Air Balloon Pit)
	Drake Vein 1 ft 6 in (recorded for Air Balloon Pit)
	Coal Measures 58 ft. 6 in. (recorded for Air Balloon Pit)
	Scrag Vein 3 ft. (recorded for Air Balloon Pit)
	Coal Measures 31 ft. (recorded for Air Balloon Pit)
	Smith-Coal Vein 1 ft. 4 in. (recorded for Air Balloon Pit)
	Coal Measures 28 ft. 8 in. (recorded for Air Balloon Pit)
	Dolly Vein 1 ft. (recorded for Air Balloon Pit)

* Tom Fry's memory of a very thin coal seam worked in 1913 may be in the Coal Measures above the Millgrit Vein at Trooper's Hill. If so then it could be the **Francombe Vein**, which varied in thickness from 6 in. to 2 ft. between Bath and Bristol, and is found at an average of 40 ft. above the Millgrit.

** The Geological Survey has re-interpreted the seams recorded in the Crewe's Hole Mine and considers that that the two seams are the **Upper and Lower Millgrit Veins**, since the Millgrit is split into two seams as at the nearest pits, each 2 ft. 6 in. thick and with 27 ft. of Coal Measures between. This would leave the Rag Vein to be accounted for on Trooper's Hill, and a thickness of some 30 ft. of Coal Measures between the Upper Millgrit and the Rag Veins.

*** The name Flashy Vein Clay suggests that there is a **Flashy Vein** coal seam above the fireclay, but no record has been found of this seam at Trooper's Hill or at any of the other mines between Bath and Bristol.

References

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Andrew led the walk and wrote this information on behalf of the Avon RIGS Group, which helps to conserve local geological sites (including Troopers Hill). For more information see www.avonrigs.org.uk

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