THE

MINERAL VEINS

OF

SHELVE.

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SHELVE is a mining district. The land is poor and profitless on the surface, while the rocks beneath are rich in mineral wealth. The veins of lead have been worked at intervals since soon after the Romans landed in Britain, and they still yield large quantities of ore. When they were first discovered it is probable that the lead was exposed in ridges down the hill sides, for even now the siliceous contents of some of them can be traced along the surface; and between the Grit Mines the Ryder Vein forms a projecting wall for several yards. The very early occupation of this secluded part of England by the Romans shows that they attached considerable importance to its mineral wealth.

Evidences of ancient mining operations on a large scale are exposed on the western side of Shelf Hill, over the present workings of the Roman Gravels Lead Mining Company. There are conclusive proofs that the Romans worked these veins or lodes at the Gravels, for not only have their coins, pottery,* and mining implements been found among the rubbish, but a Roman pig of lead was found some years ago at the bottom of the trench along the Roman Vein, with the curious wooden spades represented in the following woodcut:

Oak Spades found in the Roman Mine at the Gravels.

16 inches by ¾.

14 inches by ¾.

Both the pig of lead and the spades, with other Roman relics, are preserved at Linley Hall, the seat of the Rev. T. F. More, who is the owner of Shelf Hill and other property in the neighbourhood, and whose residence is charmingly situated in "one of the most lovely spots in this island."
There are two other pigs of lead that have been found in the neighbourhood of Shelve; one, from Snailbeach, is in the British Museum, and the other, from Snedd, in the Mayer collection at the Liverpool Museum, is shown in the following woodcut. They all bear the same inscription of the Emperor Hadrian (A.D. 117—138).

**ROMAN PIG OF LEAD, FROM SNEAD.**

![Image of a pig of lead](image)

These pigs of lead prove that the mines were in operation early in the second century, when the Romans were peaceably settled in some of the secluded dales that descend from the higher ground. In the Roman trench two old candles were also found, the tallow having been changed into adipose, and the wicks were made of hemp.

The ancient excavations at the Gravels are the only works of the kind in the district. They originally consisted of three artificial cuttings of a remarkable character. Following the course of the Sawpit, Roman, and Second North Veins, they extend as furrows up the side, and over the crest of the hill. Those over the two first-named veins are the most distinctly traceable, but the Roman is in every respect the most important excavation. In its present condition it presents a deep groove up the hill-side, and is continued over the top in the form of an irregular trench, ending in a series of holes, like shafts whose upper edges have fallen in, the whole being along the outcrop of the Roman Vein, in a south-easterly direction, for about two hundred yards. At the end of the main opening the lode have been followed underground, and the contents of the vein extracted. The depth of the open-workings is now from twenty to fifty feet, but as the bottom of them is obscured with debris the lower part cannot be seen. Not only is the width of the vein apparent where its contents has been abstracted, but its filling of carbonate of lime and slaty rock is conspicuous at the termination of the cutting. Where exposed the vein is from two to six feet wide; but lower down in the mine it varies from six inches to ten feet in width. The ancient miners worked out the vein to the depth of about one hundred feet, but not to so low a level as the bottom of the valley; and the surface of the ground along which the brook now runs is several feet higher than it was
formerly. The top of the shaft, on the hill, at the end of the Roman Vein, is two hundred and thirty feet above the Sawpit level at the bottom, and about fifty feet above the highest end of the ancient trench. Just under where the old miners abandoned their work a large quantity of lead was left; and as they did not exhaust the ore within their reach, or were stopped by water flowing them out, no reason can be assigned for the suspension of their operations. The form of the cutting along the Roman vein is very different now, compared with what it was before the present mine was opened. Fifty years ago its condition was that of a simple unbroken furrow along the outerop of the vein, and it is currently reported in the district that some old levels with traces of shafts formerly existed; but there is nothing of the kind now. Its present excavated appearance is the result of mining operations which have since taken place below the surface. The vein was found to be very productive immediately below the bottom of the ancient trench, which was, however, almost filled with debris, and the extraction of this ore, some thirty or forty years ago, caused the contents of the old works to fall in at several points. The sides of the openings and some shafts that had been sunk have since fallen in, and the present rugged aspect of the whole produced. The result of this partial subsidence allows the parts of the veins that have not been worked to be seen from the surface, and a small excavation, into which a string of ore has been followed, is exposed in one of the fissures, while the general and irregular course of the lode is clearly discernible.

Roman mines, it is said, may be distinguished, apart from their superficial character, by the obvious avoidance of hard projections, which would now be cut away; but probably the mining excavations made a thousand years later, present a similar contrast when compared with the skillful mode of working in the present day. Although the finding of the Roman pig of lead in the trench conclusively proves that the mine at the Gravels was worked by the Romans, it is very probable that their excavations may have been enlarged by more recent miners. It seems unlikely that the openings that they made should have remained untouched during the twelfth and thirteenth centuries, when lead was certainly obtained in abundance, and most likely at the Gravels, besides other places.

A comprehensive view of the ancient mining cuttings on Skeve Hill can be obtained from the opposite side of the valley, on the rising ground on the way to Callow Hill. The open Roman trench is there seen from a higher elevation, and its artificial character rendered very prominent. The excavations resemble quarry workings, and having rugged steep sides a fence has been set about the place. The cuttings or furrows over the Sawpit and Second North Veins are also visible from that place.
All the antiquities that have been found connected with the mines of Shelve seem to have been referred to the Roman period; and although it has been shown that they were worked in the twelfth and thirteenth centuries, it does not appear that anything has been found in the district throwing light on the working of any particular mine during that period; but that they were worked has been satisfactorily proved.

The discovery of lead slag in the neighbourhood of Shelve deserves attention; for, in the article published in the *Intellectual Observer*, referred to at page 1, its author says, "no traces of the washing and smelting places attached to these Roman mines have yet been met with," though the occurrence of slag is common in the neighbourhood, and is well known to the inhabitants. It is abundant on the flat ground on Shelve Hill, just over the north veins above the Gravels, and on the west side of the stream, a few hundred yards north of the inn. The Rev. Edward Tomlinson, M.A., Rector of Hope, informs me that slag occurs opposite the back of the "Tankerville Arms," but on the west side of the stream, and Captain Bennett states that he has observed it at the East Grit Mine. Most of this slag contains particles of lead, for it has been imperfectly smelted; and at the locality above the Gravels there are pieces of what seem to have been portions of the brick lining of the kilns or furnaces. At the present time there is not a vestige of any building at these places that can have had any connection with the smelting process; and possibly some of the slag dates from the Roman, and some from later, periods.

**Gravels Veins.**

At the Gravels there are five principal veins, viz., the Spring Vein, which is the most southern, then the Sawpit, Roman, First North, and Second North Veins. They are all within the space of 1,100 feet where furthest apart, though the Spring Vein is 800 feet to the south of the Sawpit Vein. The Roman Vein is the most valuable one; it has produced seven-eighths of all the lead ore raised from the mine, and is now yielding a large quantity, at the depth of 480 feet below the turnpike road. An adit level passes through the whole of these veins at 120 feet below the surface of the ground at the engine shaft, which is about 30 feet above the road, and 60 feet higher than the brook running in the valley below. None of the veins have been worked beyond the road, except for a few yards, for in that direction the strata change from hard slaty rock to soft shale, in which they are lost. The hard rock can be seen at the surface on the hill side, behind the engine-house, and it dips at an angle of 25° W.N.W. A greenstone dyke can be traced along the hill through the Roman Vein, in a northern direction, under the old buildings at Batholes Mine, until it terminates about a quarter of a mile from the Gravels. This greenstone seems to have hardened the
strata through which it has been forced, and it is evidently the cause of the steepness of the hill at the Gravels, for the hardness of the rock has resisted the denudation that has caused the more gradual descent from Shelfe Hill further to the north and south. The Roman Vein has been followed in a southeasterly direction, and was found to terminate in the same condition as at its other extremity. The following ground-plan of the outcrop of the Gravels Veins (Pl. 2) is reduced from one kindly drawn for the author by Capt. R. H. Vivian, who has also given all the information in his power regarding the working of the veins in early times. The relative position and inclination of both veins, the direction of the road, the adit level, and the greenstone dyke are all shown, while the lines across the Sawpit, Roman, and Second North Veins indicate the traces of ancient mining operations. A folspathic rock, forming a part of the greenstone dyke, has been observed at the bottom of the mine at the depth of six hundred feet, and it may continue more to the south, as shown on the plan. About a quarter of a mile to the east another and more important dyke of the same eruptive rock occurs, and there is a strong probability that a large mass of greenstone underlies Shelfe Hill; and that it has not only hardened the strata around it, but has produced the anticlinal across the hill, with the numerous fissures, which have since become metalliferous veins, by the precipitation of Cal acids, Galena, and Blende therein. The valley along the N.W. of the hill has been denuded in the soft shale, which seems to have been beyond the influence of the greenstone when it was forced upwards in a semi-fluid condition.

White Grit and East Grit Veins.

These veins were worked about two miles from the Gravels, near the southern extremity of Shelfe Hill, at the White Grit and East Grit Mines, which are half a mile apart. They have both worked the Ryder Vein, which is one of the most important in the district. Nearly at a right angle with the Ryder is the Cross Course Vein, which seems to be a line of dislocation, cutting off the veins that strike against it. There are several other veins, all connected with the Ryder, including the Squalifer, which bifurcates near its southeastern end. They hade or incline downwards in different directions, and at various angles, as indicated by arrows on the ground-plan (Pl. 3), which has been reduced one-half from a map provided for the purpose through the courtesy of Mr. Joseph Whittall, of Linley. Captain W. Bennett has also contributed the result of his long experience in connection with these mines.

In working the Ryder at the White Grit Mine, in a westerly direction, the vein was lost in passing from hard slaty rock into soft shale, but it appeared to continue under the latter. From the end of a level eighty yards below the surface a winze forty yards deep was then sunk, another level was advanced, and the lode worked, until the
shale was again reached at the distance of forty yards, proving the dip to be forty-five degrees. The same operations were carried out three times, when it was decided to try the result of driving a level through the shale, in hope of finding some other vein. This was done, and after penetrating the soft rock about six hundred feet the undertaking was given up, and the mine abandoned several years ago. The uniform inclination of the shale over the slaty rock is very clear from these mining operations at the White Grit, though it is probable that the difference in the nature of the rock is due to the greenstone having hardened the lower strata, which otherwise would have been a soft shale like the overlying beds. The White Grit Mine has been worked to the depth of 600 feet, and the East Grit 630 feet.

A reference to the map of the Geological Survey (No. 60, S.E) indicates the Ryder between the Grit Mines to be a greenstone dyke, and reference has already been made to a siliceous comb projecting above the surface. It extends along the north or underlying side of the vein, and is said by the miners to continue below the surface, wherever the lode has been worked. Though it is not a greenstone it is very probable that, if it could be examined for some distance underground, it would be found to be a doleritic rock, similar to that which crosses the Roman Vein at the Gravels, and the comb of the White Stone Vein at the Bog Mine. On the Survey Map the Weston Vein, the Ryder at Pennerley, and the White Stone Vein, are also indicated by a contiguous line of greenstone. Supposing these particular veins to have been originally dykes, it is evident that their sides must have become fissured, and that they were afterwards converted into lodes. If this was the order of their formation it confirms the conclusion, that the dykes and great protrusions of greenstone are older than the mineral veins, though there can be little doubt of it.

**Pennerley and Bog Veins.**

At the Pennerley Mine there are four important veins, viz., the Ryder, the Big Ore, the Warm Water, and the Red Vein. The Ryder crosses the other three veins at an angle of 35°, but does not appear to throw them off their course; neither are they considered to influence it. These veins fade to the N.W., with the exception of the Ryder, which inclines to the S.E. No greenstone or doleritic band has been noticed along the under side of the latter as shown on the Survey Maps. However, many years ago a deal of lead was obtained from it, so that its condition was then better known. At the present time it is the Big Ore Vein that is principally worked.

About three quarters of a mile to the south there is the Bog Mine, where two veins intersect each other at a small angle, and both fade to the south. The Bog Vein has been
worked up to the Stiperstones; and it is said to have been turned and then lost on reaching those hard siliceous rocks. The White Stone Vein possesses a falspathic comb, usually on the north or under side, but sometimes on the other side.

The Bog Mine was discontinued working many years ago; but it is now connected with the Pennerley Mine, which is in active operation. James Nancarrow, Esq., and Captain R. Waters, have interested themselves in the geology of the district, and the latter has prepared a ground-plan (Pl. 4) of the outcrop of the veins, of which the following is a reduced representation. These mines have been worked to a considerable depth; Pennerley to 1,080 feet, and the Bog to 1,200 feet. The veins traverse slaty rock which crops out to the east, from beneath shale, under similar conditions to those of the mines already described, and a little to the north and west of Pennerley there are several masses of greenstone visible on the surface.

The following is a list of the mines in the country around Shelve:—
It is a well-known fact in many mining districts that metalliferous veins are often productive of ore in particular beds only, and that when they run into different ground they change their mineral character. This is the case in the country around Shelve, where the lead ore has already been shown to occur only in strata that have a hard slaty character. In close proximity to the Gravels, strata of slaty rock can be seen dipping into the valley, in which the same beds are represented by a soft splintery shale. The slaty rock, when close to a greenstone dyke, is usually very hard, and often forms slates, presenting a flinty fracture when broken across the line of bedding, as on the highest part of Shelve Hill, where the dip is 30° E.S.E. There are, however, instances where the greenstone does not seem to have hardened the beds with which it came in contact; but these exceptions do not affect the fact that the veins occur in rock that is in proximity to greenstone, or at least where it probably exists beneath the surface. The valuable lead lodes are peculiar to the strata of the Lower Llandeilo (or Arenig) series. The overlying grits of the Upper Llandeilo and the succeeding strata contain veins which have occasionally yielded some lead ore, but are now worked for barytes, which is obtained in large quantities. That the lead ore occurs only in the slaty rock, and not in the shale, is a fact that has been long known to the miners of the district, and has been illustrated by the operations at the Whit Grit Mine. It is for this reason that the mineral veins of Shelve are not worked continuously for any great distance, for no lode has been proved in a continuous line for a mile in length, while the average workable length is very considerably less.

Some of the local miners entertain the opinion that many of the veins extend in an unbroken line across the country for a considerable distance. The Pennerley, Grit Ryder, and the Barytes Vein at Priest Weston, all of which appear to be on the same line, are considered to form an example. It is certainly probable that these particular veins may have a connection, and the geological surveyors

* These are Lead Mines, and are worked at the present time. Those without ones are not worked.
++ Barytes Mines that are now worked. † Those that are not worked.
perhaps considered so, when they found data for assuming them to have been similar greenstone dykes. But in this and other instances the theory chiefly rests, if not entirely, on the coincidence of position, though that described seems the only one that is remarkable. The study of the ground-plans that have been described does not favour the theory of veins extending for any considerable distance, but to rather an opposite conclusion. The ground-plans represent three areas, in which the direction and length of each vein is well known, and either has been, or is now worked, and the principal veins have been found invariably to end in the shale, which always comes in at no great distance, while the others are of limited extent, and are usually branches from the more important lodes.

The mineral veins around Shelve do not present much uniformity in relative position. It was expected that an examination of them would have resulted in some order being discovered by means of which they could be classified into distinct sets, according to the direction of the single veins, and that the conclusions deduced would have been of some practical value; but this has not been the result so far as the observations have been made. It was also contemplated to publish a map indicating the principal veins, where worked, and their probable line of bearing across the country, but the idea was abandoned, as it became evident that the veins seldom continue far, and it was unadvisable to indorse opinions regarding the prolongation of lodes through ground in which they are not likely to be found. That veins occur in the direction of all the points of the compass, is partly evident from the following diagram, which contains only the lodes shown on the three ground-plans, and the star-form would be more complete, and crowded with lines, if all the workable veins in the district could have been introduced. The average direction of the greatest number of the Shelve Veins is, however, W.N.W. by E.S.E., and there are few veins at a right angle to those points.

Diagram showing the direction of Veins at the Gravelc, White and East Grit, and Pennerley and Dog Mines.

The principal veins, such as the Ryders, at Pennerley, and the Grit Mines, and the Cross Courses at the White Grit, are probably lines of dislocation; but it is impossible to ascertain the extent of the throw in any of them, though on the whole it appears to be insignificant. Most of the veins are simply fissures containing fragments of the same slate.
irregular strings and nests of Galena and Blende, or almost entirely filled with Baryte. The veins that have originated as fissures probably graduate into faults, for the opposite sides must have been very liable to displacement.

Although the mineral veins of Shelve contain so much lead, with a mere trace of copper, it is remarkable that between the hilly ridge of the Stiperstones and the Longmynd copper is said to be abundant, and a mine has been opened at Westcott where the ore (Redruthite) is unusually rich. The direction and value of the veins in this district are unknown, and, as they have not hitherto been worked, the success of the undertaking seems to be very doubtful. The veins on the east of the Stiperstones have no connection with those immediately around Shelve, though it is possible that the latter may contain copper, at a considerable depth, if they penetrate to the Cambrian strata. It is remarkable that in the Upper Llandoilo rocks the veins principally contain barytes, the Lower Llandoilo rocks lead, and the Cambrian rocks copper.

In this communication an endeavour has been made, by personal observation, and from much valuable information obtained from the managers of the mines in the district, to describe the mineral veins of Shelve. The descriptions that have been given, and the conclusions that have been stated, are as clear as the materials at command will allow. With regard to the value of the mineral ground, and the future prospects of successful mining in the district, it can only be said that it resembles many other localities in uncertainty, for no laws have been discovered by means of which the working of veins can be carried on with any certainty of success.

The Shelve Veins afford few attractions to the mineralogist. Those of Smallbeech and Oven Pipe are the only lodes where those cavities occur in which the minerals had free space to assume a definite crystalline form, and the former mine is remarkable for its fine crystals of Calcite, covered with smaller ones of Quartz. At the Oven Pipe Mine some very beautiful acicular crystals of Calcite have been collected by Captain Waters, and very large cubical crystals of Galena also occur at the same place. Small crystals of Quartz and Blende are common, but it is very rare to see specimens, either of these or any other minerals, worth preserving. The following list contains all the species that are known to occur in the district; but though particular localities are appended to each, it is very likely that most of them might be found at any mine that is extensively worked.
PLATE 1.

SECTION FROM THE STIPERSTONES TO MARTON POOL.

This section exhibits the thickness and subdivisions of the Llandeilo formation, as developed in the country around Shelve. The Lingula Flags form the base, while the upper limit is not defined, for it probably passes gradually into the overlying Caradoc or Bala formation, with which it is intimately connected.
LIST OF MINERALS FOUND IN THE VEINS AROUND
SHELVE.

Quartz,
Calcite, Carb. of Lime.
Pseudomorphs of Flour Spar,
Flurite of Lime.
Baryte, Sulphate of Barytes.
Witherite, Carb. of Barytes.
Petroleum, Bitumen.
Pyrite, Sulphuret of Iron.
Malachite, Green Carb. of Copper.
Erythrite, Sulphuret of Copper.
Wad, Earthy Manganese.
Galena, Sulphuret of Lead.
Chalcopyrite, Oxide of Lead.
Cerussite, Carb. of Lead.
Blende, Sulphuret of Zine.

Gravels and other Mines.
White Grit Mine.
All the Mines.
Gravels Mine.
Cofn Gwynlle.
White Grit Mine.
Oven Pipe.
White Grit Mine.
Gravels.
Westcott.
White Grit.
All the Mines.
Snailbeach & White Grit Mines.
Snailbeach & White Grit Mines.
All the Mines.