XXIII.—*On the Great Fault called the Horse in the Forest of Dean Coal-Field.*

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THE great fault in the Forest of Dean, called “ the Horse,” ranges in the direction of S. 31° E. by compass, in the Coleford High Delf seam of coal.

The term Fault is used here in conformity with the usual mining phraseology, which assigns that term to any interruption in the regular deposition of the seam, or *vein* of coal. The Horse, however, is not what geologists term a *fault*, as there is no accompanying dislocation of the strata. The coal is deteriorated in quality in some places, in others it is considerably thinner than the average height of the seam or *vein*, and in the principal part of the Horse it is altogether wanting. (See accompanying Section, woodcut, fig. 1.)

It may also be observed, that the miners in Dean Forest apply the term vein to a stratum of coal, while this term in the north of England is applied to mineral veins only; and many similar instances exist in mining districts where local terms convey an erroneous impression, either as compared with the terms used in other places or with the scientific language of Geology.

That portion more particularly called the Horse has been traced by the workings on each side of it in Coleford High Delf seam about two miles, and its breadth varies as shown on the accompanying plan, from 170 to 340 yards. (See woodcut, fig. 2.) The only drift or tunnel which has been carried through it, in a transverse direction, passes under Barn Hill enclosure, between Bixslade and Howler’s-slade valleys, where its width is about 200 yards. (Woodcut, fig. 1.)

It will be seen by the accompanying Section (fig. 1.), that the upper part of

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the seam of coal, to a considerable distance on both sides of it, undulates and is irregular, causing the seam to vary in thickness, while the pavement nearly preserves its ordinary regularity. The depressions of the roof, as shown in the Section, are called "Lows" by the colliers.

The pavement is composed of the ordinary argillaceous deposit which accompanies the seam all through the Forest Basin, and the roof is formed of the strong sandstone which usually reposes upon the Coleford High Delf seam, with the occasional interposition between it and the coal of a thin layer of a black slaty substance.

The coal under the depressions of the roof or lows is generally deteriorated in quality by being intermingled with particles of the sandstone of the roof; but it is not mixed with boulders, angular fragments, and gravel, as has been erroneously imagined. What have been understood to be boulders and gravel are nodules of highly indurated, ferruginous sandstone of various sizes, some very large, scattered irregularly through the thick stratum of sandstone, forming the roof of the Coleford High Delf seam. These nodules are generally of a spherical form, but some of them are kidney-shaped, and others are only sections or parts of spheres. The latter cannot be detached from the surrounding sandstone rock, but form part of it, and generally occur in the middle of the "pannels" of the rock, in the solid part between the beds and partings or backs.

The more perfectly formed nodules, called *Yolks* by the miners, lie in a mould formed in the rock to which they are attached by their ferruginous coating, but the surrounding and immediately adjoining parts of the stone are much indurated, and radiating cracks generally proceed from the sides of the cavities. These yolks occur in all parts, sometimes in the middle of the pannels and sometimes near the joints.

Fig. 1.—Cross Section of the Horse Fault as passed through by the Drift C D of the Plan.

The angular fragments found scattered in the sandstone roof of the coal are obliterated or imperfect casts of vegetable remains. They are of the same sort of sandstone as that which surrounds them, but highly indurated, as is also the adjoining part of the rock to some distance; but they have not the ferruginous appearance of the nodules, although they are equally as hard.

It is reported that similar nodules are found in the sandstone rock between the Coleford High Delf and the Trenchard coal, which lies about sixty yards below.

The sandstone which forms the roof of the coal extends to the surface and varies in thickness according to the undulations of the ground: at the part where the cross-section of the Horse is given, it is about ninety-four yards in the thickest part.

Fig. 2.

Plan of the Horse Fault, with its collateral branches called Lows. (Scale 24 chains to an inch.)

Some portions of the roof in the Horse and Lows consist of a sandstone breccia, containing quartz pebbles similar to those which abound in the pudding-stone of the forest, also fragments of coal, ironstone, and vegetable remains. The pudding-stone of the Forest Basin lies between the carboniferous limestone and the old red sandstone, and it crops out all around the basin, attaining a considerable elevation in the adjoining hills.

The Coleford High Delf is the only seam of coal in which the Horse is clearly developed ; it is the twenty-third seam in the Dean Forest series in the descending order, and the third from the lowest.

Whether the Horse may produce any change in the seams lying above the Coleford High Delf, can be ascertained only by the future working of those seams ; but from the regular and uniform nature of the pavement, and from the entire absence of sandstone in it, there is no reason to think that the Horse goes any lower down than the seam.

On considering the various phænomena presented by this fault, and the seam of coal on each side of it, we may infer that it occupies the site of a lake which existed at the period of the deposition of the High Delf seam ; and that the carbonaceous matter which formed the seam was accumulated while the water was deep and tranquil.

The undulations in the top of the coal on each side of the Horse, it may be presumed, were occasioned by abrasion, when the water was discharged from the lake ; and that the Horse itself occupies the bed of the river, by which the complete drainage of the lake was effected, and which washed the coal entirely out.

This is the more probable, as those undulations or *lows* appear to have been formed by smaller collateral streams and rills of water. Two of the largest, marked A and B, fig. 2, have been traced to a considerable extent, as shown on the Plan. The other Lows have been found in the workings on each side of the drift C, D, which is on the line of the section.

The sandstone roof of the coal and the filling up of the rills which form the lows, and which are a part of the roof-stone, have been formed by subsequent deposition, and become consolidated by pressure.

The roof is a fine, close, granular sandstone, without ripple marks, containing only a few ill-defined vegetable remains, and has every appearance of tranquil deposition.

The fall of the Horse is conformable with that of the strata, viz. S. 31° E., as far as it has been traced, and at the same rate ; but whether it may continue this conformity, and rise with the seam of coal, to its outcrop, on the S.E. side of the Forest Basin, has not yet been ascertained. The bed of the Horse on its transverse section is nearly horizontal.

There is no indication on the surface by which the Horse can be traced, beyond the limit to which it has been explored in the pits.

In its underground character this fault is similar to those *washes* or aqueous deposits in many coal districts, but it differs from them in not being under the bed of any river, nor in the bottom of a valley, nor does it show itself at the surface.

In the Newcastle coal-field, all the *washes* which have been met with cut through the whole of the strata, from the surface to that on which they repose.

Should subsequent workings prove that the Horse does not extend through the upper seams, it will be evident that the river of which the Horse had been the bed did not cut through the superincumbent strata, but that its period of action was antecedent to their deposition.

In the workings of the Park End Colliery, in Park End High Delf seam, which is the thirteenth in the series, and lies about fifty fathoms above the Coleford High Delf, a great succession of *lows* has been met with in crossing the line of the Horse, and similar to those on each side of it, but no "Fault" corresponding with the Horse itself has been discovered. (See fig. 3.)

The part of the Forest Basin where those irregularities occur is two miles further to the S.E. than the point to which the Horse has been traced in the Coleford High Delf in Vallet's Level. But whether those irregularities at Park End have any connexion with the Horse has not yet been ascertained. The workings at Park End are on the S.E. side of the Basin beyond its centre, where the strata rise in the opposite direction from the point to which the Horse has been traced.

The full extent of the Horse in the Coleford High Delf seam, and whether it has affected any of the other seams, can only be ascertained by the future working of the coal.

The accompanying diagram (fig. 3.) shows the relative position of the Horse and the Lows at Park End.

About half a mile to the S.E. from the line of the section (see fig. 2. and fig. 3.), in the direction of the Horse, is an extraordinary depression of the Coleford High Delf seam of an oval shape, as represented by the tinted portion of the Plan, marked F G. The centre of this part is considered to be twenty feet deeper than the ordinary level of the seam round its margin; but the coal has not yet been worked in it. The fact, therefore, of the Horse presenting the same phænomena in this depression as it does on both sides of it, is yet to be proved, which will be done ere long by the works now in progress. The present workings only skirt the margin of this small basin, which has the appearance of having been a pool in the bottom of the lake thus :

Fig. 3.

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In examining the upper seams at Park End Colliery, in the line of the Horse, there appears to have been some deteriorating cause, and it is a question whether the flowing of the river might not extend over some of those seams by virtue of their lower position as regards level.

There is a bare possibility that the subsidence of the Cannop Brook Valley, if it was prior to the deposition of the upper seams, might occasion such a want of conformity in the action of the river. At all events the deterioration of the upper seam at Park End being exactly in the line or direction of the Horse, is a circumstance which merits notice, and the investigation, if pursued, may probably throw much light on the history of the formation of this basin.

The question is, did the upper seams ever extend over the site of the Horse, or were they only deposited in the depression where they now are? Until it is ascertained whether the Horse follows the High Delf seam of coal only, it will be difficult to form an opinion on this question, but the mining operations of Mr. Mushet and others will shortly bring this to light.