XXI.—*Notice of Two Models and Sections of about Eleven Square Miles, forming a part of the Mineral Basin of South Wales, in the Vicinity of Pontypool, and presented to the Geological Society by*
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[Read June 18th, 1830.]

THE object of the author in preparing the models, was to employ to advantage a considerable accumulation of local details relating to the structure and contour of this district, and thus to exhibit, in the most instructive form, a faithful representation of a part of the South Welsh Coal Field. To avoid confusion, and to convey a distinct illustration of geological arrangement, as well as of natural features and artificial characters, two models appeared indispensable. One of these, therefore, exhibits the external or pictorial characters of the area selected; the other, which is more immediately interesting to the geologist, develops the internal structure, and the position and inclination of the various mineral and coal strata*.

Elevation.—The lowest point shown, is about 350 feet, and the highest 1563 feet above the high-water level of the Usk at Newport. The summit level of the Monmouthshire canal is stated to be 447 feet above the basin at Newport. The Pen Twyn iron-works are situated 179 feet, and the Aber-sychan furnace 256 feet, higher than the canal summit; and from the latter works to the top of Blaen Sychan the rise is about 900 feet more. The point called *Pen Rhiw Ffranch*, by spirit level was found to be 890 feet, and by barometrical observation 881 feet, above the canal.

The district offers a characteristic specimen, in miniature certainly, of an extensive range of similarly constructed country. Amongst its most striking features are the regular form of the *Pens*, or promontories, which project from the principal mountain ranges, and the deeply eroded ravines which descend into the adjacent valleys, offering to the speculative some elucidation, not the less instructive because on a small scale, of the action of water. The

* Plate XLII. represents the second of these models, but the direction of the ravines being shown by the rivulets, and the form of the *Pens* by the range of the strata, the shading of the hills has been omitted.

It is necessary to premise that the north-east and south-west angles of the models have been filled up from comparatively imperfect observation, the author being in possession of less abundant data. These points must be received as approximations, introduced to preserve the general effect.

streams which these *Cwms*, or deep ravines, contain, have a progressively diminishing inclination as they proceed from their sources. We have shown the profiles of three of these mountain rivers, noting the fall in feet per mile in the respective divisions of each.

Nant Ddû Brook, subdivided into five portions or lengths.

1st or upper portion, has an average inclination of 1040 feet per mile for $\frac{1}{4}$ mile.	
2nd portion ————— 450 —————	$\frac{1}{2}$ mile.
3rd ————— 275 —————	$\frac{1}{2}$ mile.
4th ————— 240 —————	$\frac{1}{2}$ mile.
5th, to its junction with the Afon Llwyd, falls only 110 —————	1 mile.

Burgwm Brook.

- 1st, or upper half mile, descends on a plane of 800 feet in a mile.
 2nd, second half mile 660 feet per mile.
 3rd, three fourths of a mile to the Afon 230 feet per mile.

Sychan Brook, in three portions.

- 1st. — $\frac{3}{4}$ of a mile from its source, descends with a fall of 650 feet per mile.
 2nd. — $\frac{3}{4}$ of a mile at the rate of..... 444 feet per mile.
 3rd. — $\frac{3}{4}$ of a mile to its junction with the Afon, only 230 feet per mile.
 The Afon for the succeeding mile proceeds with an inclination of 90 feet only.

Inclination of Strata.—The prevailing dip is about 3 inches' fall in each yard, or from 400 to 450 feet per mile. At Abersychan and Verteg the direction of the dip is nearly west by compass, and consequently the level course is not far from north and south.

Faults.—These of course have been but partially explored in a district which has only been recently penetrated by mining operations. We have traced upon the model the direction of one which was encountered at an early stage of the works at Abersychan, and passes for an unknown distance along the bottom of the Sychan Valley. A level which was conducted along a coal vein suddenly passed into a bed of iron mine, whose proper position was 50 feet above the coal; and thus, for a time, the same level served on one side of the fault for working coal, and on the other, through this change of position, for working the iron ore*.

At Pontnewynydd, and passing upwards in the direction of Nant Ddû Brook, a considerable fault appears, by which all the strata in the promontory called *Pen y Tranch* are brought down, and probably are thrust forward in a mass, somewhat beyond the eastern boundary of the coal field, perhaps more than 300 feet below their proper position. On the south, or opposite side of

* The direction of the fault is shown on the model, but not the nature of the disturbance. See also the Map, Pl. XLII.

this promontory, is a corresponding fault of about 220 feet passing up the ravine in a parallel direction to the fault on the north side of Pen y Tranch.

So far as the present survey carries us, the three or four principal faults pass apparently along the troughs of the valleys. Without entering upon the debatable ground of the origin of valleys, and the agency of existing causes in modifying the earth's surface, we have certain facts, by no means unimportant in the controversy, showing that extensive fissures range along those ravines, or, by a transposition of terms, that the rivers have formed their channels in ancient fissures.

Thickness of Strata.—The series of beds exhibited is probably not less than 1800 feet thick above the limestone. Within this space are about 20 beds of coal, varying in thickness from 1 to 10 feet, and amounting in the aggregate to about 60 feet. Not more than 6 of these are usually worked; the greater portion of the mineral treasures being comprised within an inconsiderable part of the general section. At Abersychan the principal workable beds are contained in a thickness of 119 yards, at the bottom of the series. They consist of 13 beds of bituminous coal, of the aggregate thickness of 42 feet 8 inches, and will readily supply upwards of 30,000 tons per acre. Alternating with the coal-seams are numerous courses of argillaceous iron ore, capable of supplying 15,000 tons of mine per acre.

Almost all these beds, whether of iron ore or of coal, bear different names in different localities. This is not remarkable, when we observe the variations of position and thickness at inconsiderable distances in what are considered to be the same veins. On placing, side by side, several sections derived from iron-works in this neighbourhood, it will be seen that in the thickness of the mineral series, *collectively*, there is a certain agreement; but that in the position of the members of the same series, *individually*, there are frequently striking variations; the coal-beds being often widely separated at some points, and at others, brought either almost into contact, or new veins are introduced. This will be best exemplified by a series of sections, which, when reduced to a common scale, admits of ready comparison.

Aggregate thickness of the strata containing the principal mineral and coal beds, from the "*Bottom Vein Mine*" to the "*Black Pins*" inclusive:

	Yds.	Ft.	In.
At Abersychan and Pen Twyn Works	119	0	2
At Verteg, two miles north { 1st section	119	1	5
{ 2nd section	120	2	6
At Blaen Afon, four miles north.....	134	0	4
At Coalbrook Vale, six miles north-north-west.....	127	2	6
At Rumney Vale, ten miles north-west	215	2	2

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At the last point a remarkable expansion of the beds occurs, being nearly double the Abersychan section. The intermediate members are so changed in position, and so many additional beds are introduced, that there is a difficulty in recognising the series.

The following summary exhibits the mineral contents of these strata at different points :

	No. of principal beds of Coal.	Thickness of Coal beds.			Iron ore.		Beds of Fire Clay.	Thickness of Fire Clay.	
		Ft.	In.		Ft.	In.		Ft.	In.
At Abersychan	13	42	8	6	1½	10	47	3	
At Verteg {	1st section 14	43	9	0	0	7	45	6	
	2nd section 23	46	5½	4	8½	13	42	7	
Blaen Afon	22	51	7	0	0	0	24	0	
Coalbrook Vale	17	38	8	7	4	5	13	6	
Rumney	26	55	1	60	veins	7	28	4	

The above sketch will, it is presumed, with the assistance of the models, suffice to convey an adequate knowledge of this district. Newport is the principal port where the coal and iron of this neighbourhood are shipped, averaging upwards of 2000 tons daily. By the official returns of the Monmouthshire Canal Company, it appears that in the year 1829 there were brought down to the wharfs of Newport 104,129 tons of iron, and 513,974 tons of coal.