

In addition, the Algæ living on the surface of fresh water, as Messrs. C. E. Bertrand and B. Renault have stated to be the case in bog-heads, as well as a few remains of rare animals of the coal epoch, may have contributed to the formation of coal.

If we glance at the great Franco-Belgian deposit, not taking into consideration the important faults which furrow it and break the continuity of its beds, and also some anomalies of its southern limit, due to the Grande Faille, it will be seen that it has the form of a veritable basin, the hade of the axis of the basin being almost parallel to the ordinary inclination of the deposit, and the northern slope being formed of *plateures*,* whilst its southern declivity presents alternately inverted perpendicular veins and *plateures*, whose whole dip is towards this hade of the basin's axis.

This last is far from being everywhere of uniform depth; it may even bifurcate and crop out, as in the region of Sampson, near Andenne, where the Carboniferous limestone, on appearance at the surface, separates our great coal-basin into two distinct smaller ones.

The lower coal-seams which were first formed lie north, south, east, and west, over nearly the whole of the surface of these two basins. The strata above press upon the former, and are of less extent finally; the uppermost seams towards the longitudinal axis of the deposits in the region where the line of the hade attains its greatest depth form basins more and more limited, and embedded in those of the preceding seams.

Still, if the surface extent of the coal-beds rapidly diminishes in proportion as it rises in the series, the richness of the coal-formation generally varies in the inverse order—that is to say, if a portion of the upper seams is compared with that of the oldest bed it will be found that the wealth of carbon of the former is much greater than that of the latter, in consequence of the variation in number and sometimes in thickness of the veins of coal.

For example, let us in the Liège basin compare the upper series, comprised at La Haye and at Horloz between the wall of the Cerisier seam and that of the Grignette seam, with the lower series, which at the shafts of Val-Benoît commences under the seam Olyphon-Stenaye, and stops at the wall of the seam Désirée-Grande-Pucelle, one of the lowest workable seams known in the basin.

These two seams, separated by about 600 yards of coal-rock, have nearly the same thickness measured perpendicularly to the strata; the first is 220 yards thick, and the latter 210 yards, but their wealth in combustible differs greatly.

In the first series, not including the Cerisier seam, there are ten exploited, having a total thickness in coal of 26ft., and nine unworkable beds or small veins, with a thickness of 8ft. in coal, or in all 34ft. for a total thickness of 220 yards—that is to say, 16ft. of coal for 109 yards of ground, with only an average distance of 35ft. between the beds or small veins. In the second series the only workable seam is Désirée, which is about 2ft. thick in coal; and between Olyphon and this seam only five small veins have been met with, whose thickness in coal cannot be estimated at more than 2ft. 6in., or in all 4ft. 6in., or only 2ft. 3in. in coal for 109 yards, with an average distance of 36 yards between the seams or small veins. The upper series, therefore, is seven times richer than the lower series, if we reckon the seams and the thin veins; and, for bringing the comparison down to an industrial point of view, we only take into consideration the seams capable of being exploited. The value is thirteen times as great.

On the other hand, if, by means of the mining-chart published for the Liège basin of the manuscript horizontal plans of the region of Huy, as well as by means of the vertical sections of the chart, we determine approximately the outcrop of the Grignette seam, that of the Désirée-Grande-Pucelle seam, and the intersection of this last by the Grande Faille, which has suppressed a portion of its southern slope, we see that the surface under which the former is spread is hardly a tenth part of that under which the second is found, not reckoning the coal-formation of the plateau of Herve.

This has been omitted, not only because the synonymy of the beds of this region with those of the Valley of the Meuse is still a matter of doubt, but chiefly for the reason that it has suffered a more considerable denudation, which might mar our comparison.

The two seams placed together for comparison are characterized by undulations and folds, as well as by superpositions following the vertical due to certain faults. Consequently, we should obtain for each of them, if they were stretched out, a surface greater than that comprised between the outcrops or the meeting of the Grande Faille; but, without fear of any important misstatement, it may be admitted that the relation between the development of these seams would scarcely differ from the relation 1 is to 9·6 existing at present between their horizontal surfaces.

The same considerations may be extended, approximately, to the seams and small veins of the two series of obviously the same thickness which we have chosen; and, in comparing them in their whole extent, we may remark that, setting aside their industrious utilisation, the total quantity of coal contained in the former is nearly seven-tenths of that contained in the latter.

I conclude from this that the vegetable deposits which have formed the coal remaining there, after the denudation of the coal-formation in each of the two series under consideration, were also nearly of the same relation as regards quantity.

We may suppose, with many good authors, that the whole of our coal-formation was originally almost horizontal, that the upper beds had then an extent almost as great, if not greater, than the lower seams, and that compressions, local upheavals, and a colossal denudation following have given to this formation its present appearance in basins more circumscribed as they are more recent.

The original horizontality of the coal and of enormous denudations are admitted in the work already mentioned, by Messrs. F. L. Cornet and A. Briart, "Sur le Relief du Sol on Belgique après les Temps Paléozoïque," in which work an ingenious explanation is given of the puzzling irregularity which has determined at Boussu, Thulin, Hainin, &c.,—that is to say, almost in the centre of the Borinage coal-basin—the existence of a portion of old formations, where in inverted order

* Veins which, after sinking vertically or obliquely, assume a horizontal direction.