

cent, the trunks of which were sometimes very lofty, though, in consequence of their rapid growth, very fragile. The leaves, the branches, and the trunks themselves, brought down by early decay or by the winds, fell into the swamp where they had lived, but they were not further removed from their place of origin than are the leaves of our forest-trees when dispersed by the autumn winds. This immense quantity of *débris* soon covered the whole extent of the marshes themselves, being preserved there in the same manner as the vegetation of our peat moors. So far as these last are concerned, there was transport, but only for a very short distance, which may be called interior transport, in opposition to the transports of other theories, which it always has been supposed were of an exterior character."

The following is a picture which M. Briart presents of the coalfield of our country in course of formation: "Let us picture to ourselves this immense low plain, like some Indian jungle, or a steppe of the Caspian Sea, extending, until lost to view, both east and west, but arrested towards the south by blue mountains, which limit the horizon on this side, and are the first upliftings of the Ardennes. Since the already remote period of these elevations the country has continued to subside, and the sea commenced to cover the immense depression. The Secondary basins were filled as early as the Devonian formation. Then came the Carboniferous formation, which completed the process of making these deposits horizontal. The first sedimentary strata of the coal period are deposited in their turn, and the sea retires towards the north. There it forms a coast-line, and slight dunes are raised, which, like a protecting-belt, stopped the way to the plain. Through the action of the tides, continued through a long period, the watercourses, which carry along their muddy deposits, are made to flow back. The level is raised higher and higher, and everything is in admirable preparation for the coming formation. The marine period is succeeded by a period of brackish waters, and soon this is replaced by a period entirely of fresh water. The muddy waters are gradually diverted, the vast plain covered with shallow water, and no longer receiving sedimentary deposits. With but little delay an abundant vegetation springs up, and the plain is transformed into an immense forest. The watercourses being now above the fluctuations of the waves, they meander peaceably and quietly, and a few open glades lend variety to the scene. All the rest is boundless forest. If we penetrate therein we can, through the limpid waters, easily see the turfy bottom, in which there are implanted a multitude of trunks of every kind, and which, as they rise into the air, display their most varied and wonderful foliage."

The author then gives a concise description of the coal flora, and continues as follows: "We see this vegetation, so strange, and which fresh research tends to render stranger still, according to the conditions of existence, the nature of the ground, and the depth of the water, grow and mingle in very diverse proportions. As far as our eye can see the landscape is the same, and over all there rests an atmosphere peaceful and humid, and the sun pours upon this luxuriant vegetation a light which hardly sifts through the opaline haze of hot countries. The uniform temperature which reigns over the entire globe prevents the violent atmospheric disturbances which vegetation of such rapid growth would be unable to withstand. On the contrary, we see the vegetation maintain its position, and by the effort of old age simply shed its leaves in proportion as it rises to a height. The fronds of the ferns drop off successively into the marsh, and the leaves of *Sigillaria* and of *Lepidodendrons* follow. The branches and the trunks give way, and pile themselves up one on top of another. Soon the ligneous disappear, and all that remains of this vast accumulation of *débris* are the leaves and bark. A few dead branches preserve the ligneous; they detach themselves in small fragments, and again reunite in small layers that later on will form daloid coal. Every form of vegetation finds in the water the same elements of preservation, and each fallen vegetable generation gives place to the new, which takes root in the *débris* already accumulated."

At last, after having made a rapid sketch of the exceedingly limited fauna of the coal period, M. Briart finishes by describing in the following terms the method which he has conceived of the formation of coal on place: "But the coal-plain should not indefinitely preserve the forest-like aspect just described. The general subsidence of the country continues, at a given moment it is accentuated, and the state of the waters is sharply modified. The streams, which are more and more rapid, make deeper and deeper grooves in the emerged earth, and, spreading into the midst of the coal forest, there transform the limpid waters into muddy and sedimentary waters. The sea returns, at first up the mouths of the rivers, afterwards leaping over the but feeble barriers of the sinking dunes, and drives back the *débris* into the plain. The sand and the clay are deposited sometimes in fresh water, sometimes in salt, presenting the type of a Poldérienne formation. Vegetation disappears; trees, either isolated or in more or less crowded groups, still rear their heads above the waters, strewing with their *débris* the layers of sediment which accumulate at their feet. This state of things continues until these sediments, after a period more or less prolonged, cover up in their turn the *polder*. Then, again, the streamlets become less rapid, and fresh dunes restrain once more the empire of the ocean. The shallower water regains its limpidness, vegetation again takes possession of the domain, of which for a time it had been dispossessed, and a second bed of coal is in process of formation."

We will confine ourselves for the moment to remarking that this theory of the formation of coal on place supposes the successive sinkings of the ground, of which the sum of the amplitudes is at least equal to the present total thickness of the coal-bed; for since the formation of this bed its surface has undergone denudations which are probably of considerable importance, though it is impossible for us to say exactly how much. We can only estimate the thickness measured perpendicularly to the strata that this bed has maintained, remarking that it is only the minimum expression of the subsidences required by this theory which admits of formations primitively horizontal, or at least nearly so.

According to the maps and service sections of the Belgian mining-chart, published for the Liège, Charleroi, and Mons basins, it has been determined that, for the basins, part of these three basins, the maximum thickness of the coal-bed taken from the surface or the base of the dead earth, should it