

According to this last eminent geologist sometimes the fracture is unique, and brings into direct contact the Lower Devonian and the coal-formation. Sometimes it is accompanied by a second disturbance of the strata, termed by him *Faille Limite*, and which, meeting the former at the same depth, crops out to the north of it. In this latter case the Grande Faille often superposes the Lower Devonian upon a *lambeau de poussée* (out-thrust) enclosed between the two faults, and formed of Upper Devonian, of Carboniferous limestone, and even of certain inferior layers of coal, whilst this *lambeau de poussée* itself rests obliquely on the productive coal-formation through the medium of the *Faille Limite*. It also happens, besides, that the lip south of the Grande Faille is formed by the Silurian formation. Moreover, it is possible that the Carboniferous limestone is in exceptionally normal contact, although inverted, with the part south of the coal-level, as, for example, at l'Ouest d'Andenne.

The important disturbance of the strata in question inclines towards the south at an angle which, in Belgium, is scarcely ever greater than from 40 to 45 degrees, and is sometimes even less. It is continued in the Departments of the Nord and Pas-de-Calais, and ten years ago attempts were made to show that it even extends into Pembrokeshire, running along the coal-basins of Bristol and South Wales. However that may be, it is certain that a movement of great amplitude, contemporary with the compression which has caused the great folds of the Franco-Belgian basin, was produced after the Grande Faille subsequently to the deposit of the coal-formation. Seeing the great importance of this fracture of the earth's surface, I consider it to be very probable that it was favoured by the existence of a breakage previous to the deposit of coal, a fracture which traversed the oldest formations to the south of the region where to-day the Grande Faille crops out, having nearly the same direction as this latter, and an inclination possibly greater.

On the other hand, in 1878, at Landenne-sur-Meuse, a description was given of a very important fault which was termed "*Faille Silurienne du Champ d'Oiseaux*." Its longitudinal direction is east-north-east, with an average inclination of 61 degrees, north-north-west—that is to say, in a contrary direction to the Grande Faille, and has resulted in placing the Silurian formation above the Carboniferous limestone, the psammities of Condroz, &c. It is estimated that this fault extends in an easterly direction, at least, as far as Hozémont, and that, if it likewise existed before the coal, it might form, along this minimum length of nineteen miles, the northern limit of a movable keystone of the terrestrial crust, whose southern limit was constituted by the great fracture anterior to the coal, the existence of which is admitted.

If we suppose that to the north of the surface upon which the deposits which formed the Franco-Belgian coal-basin accumulated, there were a succession of faults, analogous to the *Faille Silurienne du Champ d'Oiseaux*, and anterior to these deposits, these latter would have been supported upon a great *claveau**, and would have been liable to experience, during the coal period, a succession of intermittent downward movements, whose amplitude would vary according to the direction which the faults frequently show.

Nevertheless, it was not necessary that faults should have rendered the formations of the north independent of the coal-deposits. It is sufficient for my purpose that these deposits might have been depressed, without the formations to the south participating in this movement, while experiencing a rotary motion around an axis, or a succession of axis, more or less approaching the limit of the deposits: in other words, while these latter suffered a depression the formations of the north were uplifted.

On the one or the other hypothesis, then, we have only to consider a local depression proportioned to the thickness of the coal strata, with a relative or actual elevation of south and north borders. This would remove the objection urged by M. de Lapparent, as well as that of M. Grand-Eury.

Let us add that this raising of the edges would have for result a change in the velocity of the running-waters, whose rapidity, increasing with the difference of level, would render them capable of deeply ravining the soil.

After a period of tranquility, during which a luxuriant vegetation was developed, and succeeded by other vegetation, and after experiencing the alterations and transports preparatory to its conversion into a bed of coal, of which we have several times spoken, a fresh movement took place. Then, without it being necessary to have recourse to the intervention of any very considerable quantity of pluvial waters, because the climate was probably very equitable, the increase in the declivities, subsequent to the increased relative height of the edges of the deposit-basin, was sufficient to promote the arrival into this basin of materials of terrestrial origin.

When the downward tendency of the basin was next arrested the hollowing of its slopes became gradually less and less, a moment arrived when their modified declivities would no longer permit the rain-waters to ravine them, and where the orographical conditions favoured afresh the development of an active vegetation. We may also suppose that some spores, seeds, and even complete vegetable plants having resisted, thanks to their exceptionally favourable situations, the process of removal undergone by the majority of the vegetable plants, as well as the greater part of the surface of the soil, developed and afterwards gave place to a fresh vegetation, which soon becoming as luxuriant as the first gave rise to a second bed of coal.

Moreover, during the formation of the strata all vegetable life had not ceased, since numerous vegetable fossils are met with in them.

Setting aside the coal-basins where limestone of marine formation is found, as in certain basins of North America, whose areas of deposits must from time to time have communicated with the sea, and having chiefly in view the Franco-Belgian basin, we must therefore consider the strata to have been formed of materials of essentially terrestrial origin during successive periods of depression of the deposit-basins, while the great development of vegetation which gave rise to each coal-seam corresponds to a period when this movement was more or less completely arrested.

* Fr., keystone.