

being of a dark purple brown colour, with the septariæ very frequent, and the selanite only so in some parts. At the Eagle Hills they are not so moist, and form rather a compact shale of a bluish buff colour, much stained with feruginous streaks; it cracks up into very small fragments with conchoidal surfaces, the septariæ are neither so abundant. This formation here, if dried and hardened, would much resemble the shales observed at Long River, and at Fork Creek on the Assineboine during the summer of 1857. A little way above the Snake Portage (which place I again visited this autumn) hills rise above the plain level on both sides of the river to about 300 to 500 feet, such as the Black Hills, Snake Hills, and Egg Lake Hills; these consist of coarse grits formed of pink and green grains with a small amount of calcareous cement, quite the same as those observed in the neighbourhood of the Mountain House. They are in thin beds which weather into spheroidal masses, and between these beds of blue and purple clay are found. It is the same sandstone as is found throughout the Edmonton and Mountain House coal basins, forming the floor upon which they rest.

These basins are divided from each other by a great thickness of buff-coloured sandstone of much the same texture, but not so distinctly bedded, which forms a high ridge crossing the country from Red Deer River at the Nick Hills, by the Musquachis on Battle River to the north branch at Abraham's Gates. At these places it forms lofty precipices which I think must be similar to those described as the ramparts on the Mackenzie and Peace rivers.

On Red Deer River, in lat. $52^{\circ} 12' N.$, long. $113^{\circ} W.$, an extensive deposit of coal was discovered associated with the same sands and clays as at Edmonton. The coal forms beds of much greater thickness however, one group of three beds measuring 20 feet, of which 12 feet were pure coal, the remainder being carbonaceous clays. At one place this coal was on fire, the whole bed exposed in a cliff about 300 yards in length being in a glow, the constant sliding of the bank continuing to supply a fresh surface to the atmosphere. For as long as the Indians remember this fire had never been extinguished, summer or winter.

A heavy sulphurous and limey smell pervades the air for miles around.

The extent of this coal deposit along Red Deer River is for 14 miles. In following up the river it is succeeded by the sandstone cliffs, apparently by substitution, as neither the coal group nor the beds of sandstone have any perceptible dip, and this is exactly the same manner in which the passage is effected between the same groups at the Mountain House.

Lower down on the river the coal is succeeded by white marls and sands, with beds of calcareous grit, which weather to a bright red colour. Among these beds there occur a great profusion of fragments of silicified exogenous wood. This group, however, was better exhibited on Battle River, where they dip to north-east at a very low angle. The valley of that river above its elbow is about 14 feet deep, and exhibits in its banks phenomena somewhat like those at La Roche Percée. The strata consist of banded clays and orange-coloured splintery limestone, with one bed quite filled with fragments of silicified wood, of an ashy or black colour. Towards the upper part of the section the clays are filled with sandy concretions, in some of which I found a few beautifully preserved fossils, the principal of which was a small *avicula*, a *cardium*, and other littoral shells.

There is also a bed of nine inches in thickness, composed entirely of rolled fragments, of a species of *ostrea*, cemented together by coarse sand. This bed I detected at several points along the valley, and by using it as a test, found that the whole group had a gentle inclination to north-east. At the point where we crossed Battle River a second time, in lat. $52^{\circ} 28' N.$, long. $111^{\circ} 30' W.$, in the bed of the stream, and at the foot of the section described above, the first coal met with in our progress westward was observed. Whether this be the same coal, however, as that on Red Deer River and at Edmonton, or a thin bed, such as was observed at La Roche Percée, and of quite a different age, I was unable to determine. If the former, then it is certainly overlaid by the *Ostrea* and *Avicula* beds; and these fossils when compared at home will throw much light on the true age of this coal. (I regret to say, that owing to the bursting of the hoops of the kegs in which they were packed for carriage to Edmonton from the Bow Fort, some of these fossils, as well as others, were lost on the road; but I hope yet to have an opportunity of procuring another set.)

This group of strata, characterized by the light-coloured marls which were found in Battle and Red Deer Rivers, was not observed along the north branch. The distance between the two points where they were found on the former rivers was 50 miles in a line due west.

The superficial strata which compose the prairie country preserve their horizontal character, as the Rocky Mountains are approached, until within 40 miles of the eastern limits of the true chain. At this distance they commence to undulate at first gently, but soon assuming most intricate plications. The section along the Little Red Deer River displays the structure of the near range, which is wholly made up of the plications of the more superficial strata. The grits and clays of the Snake Portage again re-appear in this section, and are seen not only to change from their almost horizontal arrangement, but also to lose their original mineral character, the clays becoming indurated and converted into hard shales with a smooth soapy streak, while the sandstone beds are cleared in their original lines of false bedding, and rendered so very much harder, that in the summer, when I observed isolated sections I was not sure of their identity, and only removed my doubts this winter by an examination of the continuous section afforded by Little Red Deer River.

From under this group the septaria clays arise, also much altered in character, but I obtained fragments of the same fossils that were found at Fort Pitt, and the elbow of the south branch of the Saskatchewan, so that I have no doubt of their identity. They are found on the west side of the outer range in the valley which intervenes between it and the main chain.

The Rocky Mountains, as far as the west side of the watershed, consist of parallel ranges running from N.N.W. to S.S.E. between the north branch and Bow River, but south of that changing to nearly