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*HORSEBACKS IN THE LOWER COAL MEASURES AND
THEIR ORIGIN.*

BY R. M. HAZELTINE.

Writers on this subject frequently include under this head barren ground, wants, and any place where coal is due and wanting.

Horsebacks are rolls usually coming from the roof of the mine and derive their name from their resemblance to the back of a horse. They are sometimes glazed and are as smooth as glass.

They plunge downward through the coal in the shape of the half of an ellipse in the direction of its major axis, usually though not always, cutting the coal entirely out. These peculiar freaks of nature I divide into three classes; because I can conceive of three circumstances under which they might be found. There are many irregularities in the coal formation in which foreign matter becomes mixed with the coal and all are termed horsebacks by the miner. As the horseback proper is approached by the miner, he first observes a change in the roof, the color and strata being different; the color being generally lighter than the natural roof of the mine, the distance this change occurs from where the horseback is encountered depends upon its size, the greater length of roof that is changed the wider will be the horseback; and some experts will pretty nearly tell the thickness of the horseback in that way. I have known Jonathan Hend to tell time and again with astonishing exactness the distance to the coal on the other side, but whether there is a geological rule for it I am not prepared to say. Horsebacks are usually composed of a conglomerate rock of sand stone and fire clay frequently mixed with other flinty rocks, and they rarely extend above the coal and black slate.

A majority of them are from one to four yards in width, and a thin layer of coal or bottom slate holds its way along the bottom, although this is not universal, for they often form a dam and when first pierced the flow of water frequently drives the miner from his work.

The horseback has been said by some writers to have been caused by sediment settling in the channels of ancient creeks which conducted the waters through the coal marshes on their way to the gulf, or arm of the sea, to which our coal marshes were tributary. This cannot be true for all streams have one or more sources where from rivulets they gradually increase in size as they proceed on their way and receive fresh supplies of water, and it is a fact of broad argument that the water ran in the direction of the dip of the coal vein and toward its connections with the next lower marsh. But a horseback will drop into the coal full size and raise out again just as suddenly as it came in. They very frequently start on the top of a hill on one side of the coal basin and plunge headlong down its

side into the swamp twenty to fifty feet below on a decent of six to ten inches per yard, and then rise up the other side and disappear altogether. Sometimes they run in shape of a horseshoe starting part way up the side of the basin, crossing the swamp and returning to a point opposite the place of starting.

They will appear on the side of the basin and run parallel to the swamp, or ancient water channel, and from ten to forty feet above it, for various distances and disappear as suddenly as they come in. It is clear in my mind that these horsebacks were caused by water pouring over piles of drift which accumulated on the coal marshes during times of great freshets, very much as the drift gathers along our streams.

The water coming from the barren hillsides swept vegetation down toward the swamp. On the way portions of it became lodged forming the drift piles over which the water would pour displacing the soft carboniferous coal matter and depositing in its place the material which formed the shores and capped the hills. After the freshet was over and the marsh was still covered with water portions of this vegetable detritus would settle back over top of the deposit. This accounts for the streaks of coal in some instances among the rocks near the roof. This drift was liable to accumulate in any conceivable shape and of any amount according to circumstances, which accounts for the horsebacks being larger in some places than others. Always in approaching a horseback from either side the coal suddenly becomes thicker, this is another sure indication of its presence and the increase of thickness is caused by the lashing of the water spreading the peat it has displaced over that which was already deposited.

It is also true that above a horseback in the slates the fossil deposit of the ancient forests (the flora) are of unusual thickness and of very much greater variety than over any other portion of the mine. They also lay in great confusion often being a conglomerate mass of the remains of an ancient forest, showing undisputable evidences of their having been piled up in one great mass similar to the piles of drifts now along our large rivers.

The second kind of horsebacks are a low broad roll always coming from the roof; never intrude into the coal more than from one to three feet, and like the first they lay in the coal bed with no reference whatever to the course of the coal marsh or the direction in which the waters ran. They are more numerous near

the head of the long narrow arms which stretch out in every direction from the main body of the coal marsh. They lay with their base on the coal roof never extending into the slate and when the coal is removed readily peel off and no trace of their existence can be observed by the underground traveler. There is no special deposit of fossils or change in the roof but the coal sometimes increases in thickness on each side for a short distance.

They are evidently the result of strong currents of wind blowing from the same direction for a long period, while the coal marsh was covered with water so shallow that the riffles would cap the peat and leave the excavations, which afterward filled with sand.

The third kind are sometimes called "slickensides" being very nearly a verticle section of rock seperating the coal. They frequently are but a few inches in thickness and rarely exceed one or two feet. The sides have the appearance of being polished, and a person unacquainted with them would think he had reached the end of the basin. A few years ago I saw one exposed for eighty or ninety yards and being well up the side of the basin the bank boss thought he had reached the rim of the marsh but it afterwards proved to be only a few inches thick and the coal extended in paying quantities fully fifty yards broad.

In the Church Hill Coal Company's shaft in Liberty Township, in Trumbull Co., there are two of these slips, one on each side of the swamp and running parallel to it for nearly half a mile. They continue along the top of the first raise, a term much used in this region it being ten or twelve feet above the swamp where the sides of the coal marsh usually flattens off, the second raise always being the rim of the basin. Being on the point of the hill and following it so uniformly, leads me to think that the swamp up to this point or near it must have remained submerged, while from the first raise to the top of the second the marsh was exposed to extreme heat. The moisture being evaporated the carboniferous matter contracted and cracked open along the brow of the hill near the water line, and on the submergence again the edges being solidified remain smooth and the rush of the waters filled the crevice with fire clay such as forms the rim of the coal marsh.