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*EARLY COAL MINING.*

"Coal," says Dr. Newberry, "is entitled to be considered as the mainspring of our civilization. By the power developed in its combustion, all the wheels of industry are kept in motion, commerce is carried with rapidity and certainty over all portions of the earth's surface, the useful metals are brought from the deep caves in which they have hidden themselves, and purified and wrought to serve the purposes of man. By coal, night is, in one sense, converted into day, winter into summer, and the life of man, measured by its fruits, greatly prolonged. Wealth with all its comforts, the luxuries and triumphs it brings, is its gift. Though black, sooty, and often repulsive in its aspects, it is the embodiment of a power more potent than that attributed to the genii in oriental tales. Its possession is, therefore, the highest material boon that can be craved by a community or nation. Coal is also not without its poetry. It has been formed under the stimulus of the sunshine of long past ages, and the light and power which it holds are nothing else than such sunshine stored in the black casket, to wait the coming, and serve the purpose, of man. In the process of formation, it composed the tissues of those strange trees that lifted up their scaled trunks, and waved their feathery foliage over the marshy shores of the carboniferous continent, where not only no man was, but gigantic salamanders and mail-clad fishes were the monarchs of the animated world."

In the early ages of the world, the products of the forest were sufficient to supply the wants of mankind, but as the race increased in numbers, and its wants began to multiply, attention was turned to the mineral fuels of the earth. The peculiar appearance of a coal bed, exposed in the flanks of a hill, or laid bare by the action of water along the banks of a stream, would doubtless attract the attention of the earliest inhabitants of a country, and accident or experiment would reveal its combustible properties. We have no knowledge of the people who first discovered the existence and uses of coal, but the history of coal mining can be traced back to a period long before the commencement of the Christian era.

The first time coal is expressly mentioned in the works of ancient authors, occurs in the writings of Theophrastus, the pupil of Aristotle, who lived nearly three hundred years before Christ. In his book on Stones, chapter XXVIII, this author remarks:

“Those substances that are called coals, and are broken for use, are earthy; they kindle, however, and burn like wood coals. These are found in Lyguria, where there is amber, and in Elis, on the way to Olympus, over the mountains. They are used by smiths.” Pliny also speaks of a black substance as available for medicinal and ornamental purposes. Frequent allusions are made to coals of fire in the Scriptures; but they doubtless have reference to charcoal. The Chinese are known to have used coal from the very earliest times, and to have extracted the inflammable gases from this mineral for illuminating purposes.

The coal fields of Great Britain appear to have been the first opened in Europe. The primeval Britons, those savage and roving clans who inhabited the island at the time of its invasion by Julius Cæsar, a people possessed of perceptive faculties of a high order, were doubtless acquainted with the existence and properties of coal. They could only mine it along its outcrop, where it exposed itself in full view to the naked eye, and their tools would be of the very rudest kind, composed partly of wood and stone, since they had no knowledge of the use of iron. In a coal mine in Monmouthshire, in Wales, there was found, some years ago, a flint axe sticking in the coal; and near Stanley, in Derbyshire, the miners in holing through into some old workings, found tools formed out of solid oak, without any iron whatever. The Romans, while in Britain, were well acquainted with the existence of the coal mines, and carried on mining to considerable extent. Cinder beds still exist among the ruins of several Roman stations, in which Roman coins and Roman inscriptions have been found. The Ardley main coal of Lancashire, which crops out along the river Douglas, has been mined along that stream, for over a hundred yards in one direction, in the form of polygonal rooms, altogether different from any British manner of mining, the symmetry and regularity of plan resembling the tessellated pavement of Roman villas.

Coal is mentioned for the first time in English history, in the year 1180, when the Bishop of Durham granted some lands to a collier, to mine coal for the use of a blacksmith, at Counden, in the County of Durham. During the reign of Henry III., that monarch, in the year 1239, granted a charter to the people of New-Castle-on-Tyne, conferring upon them the privilege of mining coal; and in 1240 coal appears to have been shipped to London.

In 1280, the coal trade of New Castle had assumed considerable importance. By the beginning of the next century, the use of coal had become so general in London that the citizens became alarmed for their health, believing the coal smoke induced disease of the lungs and chest, and they petitioned Parliament to prohibit the burning of coal as an intolerable nuisance. Accordingly, the Lords and Commons, in Parliament assembled, complained to the King (Edward I.) in behalf of the citizens of London, and humbly petitioned him to prohibit the use of coal, as a public nuisance; and the King issued a proclamation forbidding the burning of coal in London, and its suburbs, and commanded all persons to make their fires of wood, except blacksmiths, "to avoid the sulphurous smoke and savour of the firing." But the proclamation of the King appears to have been generally disregarded, and on a second complaint from Parliament, a royal commission was appointed, with strict orders to punish all delinquents by fines, and to destroy all furnaces and kilns which burned coal. The self-interest of the manufacturing establishments, and the necessity of the common people, however, appear to have been more potent than both royal proclamations and arbitrary commissions, for coal not only continued to be used, but within twenty years afterward, it is said to have found its way to the royal palace itself.

Coal was mined in Scotland during the 12th century. At this time we have reliable accounts of grants being made to mine coal. In the year 1189, the Earl of Winchester made a grant to the monks of the Abbey of Newbattle to work coal; and in the year 1294 a mining grant was executed in favor of the Abbot of Dumferline, to open a coal "heugh." In 1322, Robert Bruce, the Hero King of Scotland, granted to Henry Cissor the lands of Kilbaberton for mining purposes. The coal mines of the Lothians and Fife, appear to have been the first opened. Both Agricola and Camden mention that in their days there were abandoned pits in Scotland, filled with water; and Æneas Silvius, afterwards Pope Pius the II., who traveled through Britain about the middle of the 15th century, relates that in Scotland the beggars were in the habit of receiving as an alms, at the church doors, pieces of coal, which they burn instead of wood, of which their country was destitute.

The coal mines of Wales would seem to have been opened about the same time as those of Scotland and England. We have

authentic accounts that coal was mined and used during the reign of Edward the I.

The first systems of mining consist in "stripping" the coal, that is, in uncovering the bed and quarrying it out in open day. After all the crop coal was mined which could be mined in this primitive manner, drifting into the hill, by following the lead or strike of the seam, was resorted to. If the coal dipped, it could not be followed far, owing to the accumulating waters; but if the seam were level-free, and the waters of the mine discharged themselves by gravitation, the subterranean excavations were pushed boldly forward. The first tools of the miners, the pick and shovel, were made of wood, and then of stone. As civilization advanced, and the arts and sciences began to be understood, improvements were made in mining implements, and the working tools of the coal hewer were made of iron, and pointed with steel. The common pick for undermining and shearing the sides of the coal seams has been in use in British mining since the days of William the Conqueror, retaining nearly its original shape and structure.

The coal, placed in sacks, was carried from the working faces to the mouth of the drift on the backs of the miners. Then wheelbarrows were invented, upon which the coal was wheeled out to day,, and the terms barrow-man and barrow-way are still in use in many British mining districts. In ancient workings, where the coal dipped under water, day-levels were frequently cut through the solid rocks, to discharge the water. Some of these levels were not more than eighteen inches wide, and they were cut with remarkable smoothness and accuracy. In time, shallow pits were sunk, generally beside some running stream, the water of which was utilized for hoisting the coal through the shaft, and then escaping by means of a day-level.

Although coal is now regarded not alone as the source and mainstay of the national prosperity of England, but even of modern civilization itself, it was necessity rather than choice which led to its application, not only as a household fuel, but to even industrial purposes. We have seen that during the reign of Edward the First, it was banished from the city of London, as an intolerable nuisance. Even as late as the year 1661, more than three and a half centuries afterwards, a memorial was sent to the Crown by Sir Kenelm Digby, remonstrating against the use of coal, of which

the following is an extract: "This coal flies abroad, fouling the clothes that are exposed a-drying on the hedges, and in the spring-time besoils all the leaves so that there is nothing free from its contamination; and it is for this that the bleachers about Harlem prohibit, by an express law (as I am told) the use of coals for seven miles about town. Being thus incorporated with the very air which ministers to the necessary respiration of our lungs, the inhabitants of London, and such as frequent it, find it in all their expectorations; the spittle and other excrements which proceed from them, being for the most part of a blackish and fuliginous color; besides the acrimonious soot produces another sad effect by rendering the people obnoxious to inflammations, and comes in time to excruciate the lungs, when a mischief is produced, so incurable that it carries away multitudes by languishing and deep consumptions, as the bills of mortality do quickly inform."

British writers of this period lamented to see manufactures arise which made use of coal as a necessity in their establishments. In Stowe's annals, by Homes, published in 1632, we are told the nice dames of London would not come into any room where coal was burned, nor willingly eat of food which was cooked by a coal fire.

Until the beginning of the 17th century, coal was mainly used for household purposes, and in blacksmith forges, and by brewers, dyers and other artificers who required a strong fire. It was not till the discovery of steam, and its practical application to industrial purposes that the coal trade began to assume real importance. This mighty power, dependent upon coal, like Samson upon his hair, for strength, at once opened up a multitude of uses for coal.

Then came the manufacture of gas from coal, and the discovery of the hot blast in smelting iron; and finally the steamboat and railroad locomotive, which made the use of coal an indispensable article of modern civilization, and almost as important an element as water.

Before the application of steam by Newcomen, for raising the waters of the mine, the subterranean excavations were limited to drift mining, or to comparatively shallow and dry shaft workings. The machinery in use for hoisting water from pits, previous to the middle of the 18th century, consisted of chain pumps, barrels, and sometimes ox-shins operated by horse power. The horse and gin, which is often now employed for raising material in the first stages of sinking shafts, was used for hoisting coal.

The Germans were the first to employ rails and cars for moving the coal from the working faces to the bottom of the mine. Agricola, writing in 1550, mentions the form of the wagon then in use. It was rectangular in shape, bound with iron, and was mounted on four small wheels. The manner of working the coal in those early days, was simple and rude. All the coal was removed as the workings progressed forward, except pillars of just sufficient size and strength for the immediate support of the superincumbent rocks. As a result, most of the mines were lost by the creep of the floor, or by the pillars crushing, before the excavations were pushed to the limits of the field sought to be won.

John Carr, of Sheffield, England, introduced wooden rails in British mines in the year 1775. Gunpowder was long discovered and employed for warlike purposes, before the miner thought of its assistance in breaking out the rock or coal.

Before the introduction of railways and cars in British mines, the coal was generally carried from the working faces to the bottom, and in the large coal mines to the top, of the pit on the backs of bearers. These bearers were often women and half-grown girls, and in England were clothed in the same garb as the men. In the Scottish coal mines, the coal was carried in wicker cribs, fitted on the backs of the bearers. The cribs were held in place by leather straps passing round the forehead. In some mines, as many as two hundred female bearers were working at once, and the coal was carried to the top of the shaft by long winding stairways. An ordinary load of these female bearers consisted of one hundred and seventy pounds. Robert Bald, the eminent coal viewer of Scotland, has estimated the day's work of the female bearers of that country, as equal to carrying a hundred weight from the level of the sea to the top of Ben Lomond. The powers of endurance of some of these bearers, and the loads they carried, would scarcely find credence in these modern days. A Scottish song, written by a miner on a bearer, his contemporary in the mines, thus alludes to her prowess:

"She could carry on her back what wad harry a naggy—  
For trained to the coal heugh was Meg Killbeggie."

This slavish practice was not confined to Great Britain, but prevailed in equal extent in the coal mines of Continental Europe, and to this day women work in the mines of Belgium. In the mines of

St. Etienne, in France, the female bearers were compelled to carry a certain number of loads of coal up the winding stairway of the shaft as a day's work. Barefooted, and supported by a staff, these poor creatures toiled harder than galley slaves.

The shameful practice of employing delicate females in the coal mines of Great Britain, continued until the year 1842, when an act of the Legislature, based upon the report of a commission appointed by Parliament to inquire into the nature and results of female labor in the coal pits, was passed, which abolished a system replete with poverty, and shame and demoralization, at the very thought of which the sensitive mind revolts with horror. The same law also prohibited the employment of boys under ten years of age from working in the mines.

Of the coal fields of Continental Europe, the mines of Zwickau, in Saxony, were working in the 14th century, and it is claimed that mining operations can be traced back as far as the 10th century. In the year 1348, the metal workers of Zwickau were forbidden to use coal in their works, owing to the supposed deleterious character of the smoke.

The working of coal in Belgium, is traced back to the 12th century, at which time we have authentic accounts of mining operations, at Plenevaux, near Leige; and not long afterward we learn of the mines of Charleroi being worked. Coal was used in the manufacture of arms in this country from very early times—some historians asserting, even before the invasion of the Romans under Cæsar.

The Belgian miners have a tradition that the existence and use of coal was revealed to an old blacksmith, a poor but worthy man, named Houillos, by an angel from Heaven. The blacksmith, who lived in the village of Plenevaux, was one day sitting in his shop brooding over his hard lot (for he was so poor that his family was nearly reduced to starvation), when an aged man (the angel in disguise), with a gray beard, came into the shop and entered into conversation with Houillos. The blacksmith told of his poverty and of the necessities of his family, remarking that if charcoal was not dear he could do well enough. The old man was moved to pity. "My friend," said he, "go over to that mountain and you will find veins of black earth which will make a stronger heat in the forge than charcoal." Houillos repaired to the spot, and digging

into the hillside, found the black stones, some of which he carried back to his forge, and so great a heat was produced, that he actually forged a horse shoe at a single heat. Over-joyed with the discovery, Houillos communicated the tidings to all his neighbors and all his fellow-craftsmen. A grateful posterity has conferred his name upon the mineral—houillis being the French for coal. The miners of Belgium delight to tell the story of Houillos, the ancient miner of Plenevaux.\*

We have no authentic account of mining in France till the 14th century. The history of the introduction of coal in Paris was similar to its introduction in London. It was condemned and its use forbidden in the city, because of the noxious sulphurous vapors which it was supposed to give off in the act of combustion, and the iron merchants were prohibited from using it in their shops, on the pain of fine and imprisonment. As late as the year 1769, when the first shipments of coal were made from New Castle to Paris, it was accused of polluting the air, of causing disease of the chest and lungs, and even impairing the beauty and delicacy of the female complexion. The matter was appealed to the Academy of Science and Medicine, which decided in favor of the coal; but popular clamor would not be appeased, and for several years the hated English mineral was the subject of much bitter invective.

The first discovery of coal in America was made by a Catholic priest, Father Hennepin, in the year 1669, in what is now the State of Illinois. His Journal, published in 1698, contained a map illustrating his travels, and he points out a coal mine on the Illinois river, where a bed of coal was exposed to view along the banks of that stream.

The Richmond coal field, of Virginia, was first developed in this country, coal having been mined as early as 1750. In 1775, and during the progress of the war of independence, the coal from the mines near Richmond was employed in the manufacture of shot and shell for the patriot army. In 1789, coal was shipped from Richmond to Philadelphia, New York and Boston.

The city of Pittsburgh was laid out in 1664, and twenty years afterward privilege was granted by William Penn, to mine coal in the hills fronting the river. Bituminous coal was first mined in the United States, in any systematic manner, in the Pittsburgh coal region;

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\*Underground Life.

for although the coal of the Richmond coal field was used, and even shipped to the markets of the east, before any attention was paid to the Pittsburgh coal, the early efforts of mining in the Richmond basin consisted not in underground mining, but in quarrying the coal.

The existence of the anthracite deposits of Pennsylvania was known as early as 1766, in which year a specimen of the coal of the Wyoming region was shipped to England. In 1768, this coal was first used by two blacksmiths by the name of Gore, who were originally from New England, but had settled in the Wyoming valley. They found the coal exposed in open day, on the flanks of the mountains, and applied it in their forges in the place of charcoal, with flattering success. The coal of the Lehigh region was discovered by a hunter named Phillip Ginter, in the year 1791, while returning home from a hunting expedition. He had heard of the coal of the Wyoming valley, and was always looking well about in the hope of discovering coal. He took some of it home and showed it to his neighbors, and pieces of it were sent to Philadelphia for the opinion of more competent judges.

For many years anthracite coal was used for no other purpose than the blacksmith's forge. Being very difficult of ignition, it was believed it could only be employed to advantage while under the action of a strong blast. In 1808, Judge Jesse Fell, of Wilkesbarre, conceived the idea of burning anthracite in a common parlor grate. Before going to the expense of building an iron grate, he resolved to make the experiment in one constructed of wood. The effort was crowned with complete success; and the Judge, himself a blacksmith, at once commenced the work of fashioning an iron grate. Henceforth he enjoyed his evenings before a glowing fire of anthracite coal. The success attending the Judge's experiment was a matter of wonder to all his neighbors, who, for many days and weeks, thronged from far and near to witness the burning of a stone coal parlor fire.

Before this time, a number of efforts had been made in Philadelphia to use the stone coal of the mountains, but without success. In 1803, the Lehigh Coal-Mine Company, among whose members was the celebrated Robert Morris, shipped six barges of coal from the Lehigh region to Philadelphia, four of which were lost by the way, and the remaining two, after much difficulty, were disposed

of to the city authorities to be used as fuel for one of the city engines. But the coal could not be made to burn; it was pronounced to be "black rocks" instead of coal, and was broken up into gravel and thrown upon the side walks. Five years elapsed before another effort was made to introduce the Lehigh coal in the eastern cities, and again it was a failure. In the year 1814, five barges were loaded at the mines, two of which reached Philadelphia in safety, and the coal found ready sale at \$21 a ton, for by this time the secret of burning anthracite coal had been discovered, and the foundation of the anthracite coal trade had been laid.

The discovery of this secret was the result of an accident. In 1812, Col. Shoemaker, of Pottsville, the owner of a coal mine in Schuylkill County, went to Philadelphia with nine wagon loads of coal. But he could find no purchasers for his "black rocks." The people of Philadelphia had been imposed upon before, by the black rocks of the mountains, and were now on their guard. Finally, the Colonel induced Messrs. Mellon and Bishop, of the Fairmount Nail and Wire Works, to purchase one load at the cost of hauling; the proprietors of the Delaware County Rolling Mill took another on the same conditions; and the other seven loads were left with parties with which to make an experiment, the Colonel assuring all that the coal was genuine coal, and not "black rocks," and was now in very general use in the mountain regions. The coal, however, could not be made to burn, and the poor Colonel, who had at a great expense and labor, hauled it all the way from Pottsville, was denounced as a scoundrel.

The workmen of the Fairmount Nail and Wire Works, having spent a whole forenoon in fruitless efforts to ignite the coal, closed up the furnace doors, and went home for dinner in disgust. On their return they were utterly amazed on beholding a glowing fire; the furnace doors were red hot, and the furnace itself raised to a melting heat. Here, then, was the secret discovered. All their former efforts had consisted in poking and stirring the fire, after it began to get some headway, to assist it: real assistance lay in letting it alone. The news of this success soon spread abroad, and the despised "black rocks" forthwith rose in public estimation and value.

The efforts of capitalists were now directed to perfecting the navigation of the Lehigh and Delaware rivers. In 1820, improve-

ments were so far completed, that coal was shipped to Philadelphia without serious risk. The first railroads made in the United States were coal roads to the mines. The road from Mauch Chunk to the Summit mines, constructed in 1827, was followed by the Lehigh and Susquehanna Railroad.

The Schuylkill region was partially opened in 1822, and in 1825 coal boats were sent from Pottsville to Philadelphia. The Midland coal field, of the Shamokin region, came later into prominence, and it was not until the year 1839 that shipments were made.

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