

CHAPTER I.

INTRODUCTION.

In his essay on "What Knowledge is the Most Worth," Herbert Spencer has arranged human activities in five classes. The first and most important are those which minister directly to self preservation. Providing of food and fuel comes prominently into this category. The former faculty is shared by all animals alike; the latter is possessed by mankind alone. The first utilization of fuel marks perhaps the most important epoch in the entire history of the human race. For it was the discovery and use of fire that raised primeval man above his brute companions. Ever since that early pre-historic time fire has been among the foremost factors in the advancement of humanity, until to-day it forms the one great element of man's material progress.

Possessed, in its childhood days, of a force so subtle, so powerful, so effective, little wonder is it that mankind should have felt so deeply such an influence; an influence pervading all its doings, entering every act of its daily life, guiding even its spiritual course. The hidden powers of fire, its magic effects and marvelous results ranked it with the early races among the forces supernatural. Fire, therefore, in its seeming potency so far beyond that human, early became an object of veneration and of worship. Before it whole nations bowed themselves

trembling and offered up their humble supplications. It was regarded as the giver of all life. The human soul itself was thought to be identical. With the literatures and philosophies which are coupled with the dawn of history, fire has a prominent place among the first causes. The Vedas taught of its tutelary guidance in the daily conduct of man. The Zend-Avesta of the Persians makes fire emblematic of the Supreme power. Long before history records exact dates the religious tenets of the fire worshipers were brought from ancient Bactria and the far East into western Asia. Here more than 600 years B. C. the Greeks found the famous race of the Medes erecting on the mountain tops their altars from which rose the eternal flames so sacred in their belief. Zoroaster is said to be the founder of this celebrated sect of fire worshipers whose descendants flourish to the present day in Persia and western India, where they are known as Guebres and Parsees. Among the Aztecs of ancient Mexico fire was the oldest of divinities, the parent of all gods. With the North American Indians it held an important place in the sacred ceremonies of many tribes. Thus in the early youth of nearly every human race the leading factor of man's material progress was intimately intertwined with his religious creed, completely interwoven with his spiritual life and happiness.

For a long period after man began to be a fire-using animal all the necessary fuel was supplied by the surrounding forests. But as these commenced to disappear rapidly with the advance of civilization attention was turned necessarily towards new sources for the furnishing of heat and light. Mineral supplies were naturally looked for as the living vegetable stores became exhausted. Thus the stored up carbon of bygone ages

began to be drawn upon. From the burning of woods and charcoals man rapidly and readily changed to the use of mineral coals.

Although the use of mineral coal as a fuel is very ancient its mining on an extensive scale dates back only to a comparatively modern period. From the earliest times the Chinese used mineral coal for metallurgical purposes and also obtained illuminating gas from it. Accurate accounts of its properties were given by the Greeks as early as the fourth century, B. C. For a long time previous to this the inhabitants around the northern shores of the Mediterranean knew of its use. Before the Christian era coal was known to the ancient Britons who were using it at the time of the Roman invasion under Julius Cæsar. From these early times, when coal was used only sparingly for smithing purposes by the Britons and Lycurgians the use of the mineral as a fuel spread over Europe and continued to increase until about the middle of the eighteenth century when an unparalleled development of the industry took place through the invention of the steam engine.

"Coal," says Newberry, "is entitled to be considered as the mainspring of civilization. By the power developed in its combustion, all the wheels of industry are kept in motion, commerce is carried on 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 are 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 it holds are nothing else than such sunshine stored in the black casket, to wait the coming, and serve the purposes 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."

Playing such an important rôle in the material advancement of our modern civilization coal must long rank first among the mineral resources to be desired in a country or region ; and fortunate indeed is the community possessing deposits sufficient to supply its wants.

Being one of the prairie states with a situation on the border of the "Great Plains," having a surface with no marked contrasts of altitude, and possessing a soil unrivaled in fertility by any country on the face of the earth, it has been customary to regard Iowa as a strictly agricultural province. Annually the state compares herself with her sister states and the countries of the world as to her rank in supplying various farm products. She finds that as a producer of corn, oats and potatoes she stands first on the list among the states of the Union ; of flax, barley, and hay second, and correspondingly high in other crops. She immediately concludes that she is a great farming country ; and indeed she is, for the total valuation of her farm products every year is nearly half a billion dollars.

With just pride Iowa, "lovely land," commands the attention of the world to her agricultural wealth and capacities.

But in a moment of righteous enthusiasm the fair State has all but forgotten that she has other resources as boundless as those she has extolled: resources which half the nations of the globe would consider priceless worth if they did but possess them; riches which Nature hath bestowed with lavish hand; wealth which only can hasten the onward progress of humanity. These are her mineral resources. They are the inherited possessions which are bound up in the coals, the clays and the metallic ores.

Foremost among these natural products are the deposits of mineral fuel. The coal fields of Iowa embrace upwards of 20,000 square miles. Fully one-half of this area may be considered as underlain with workable coal seams, much of it by several beds, so that it is safe to say that there are not less than 10,000 square miles, or nearly one-fifth of the entire areal mileage of the state, which is capable of supplying coal in quantities of commercial importance.

It has been seen that, in the case of her agricultural products, Iowa enjoys making comparisons with other states and countries. Why should she not do the same with some of her mineral products? Curious as it may seem, however, Iowa has allowed her mineral industries to take care of themselves. In the half century of her existence as a state she has extended practically no aid whatever in developing her greatest sources of mineral wealth. Her lead deposits, which once afforded the chief supplies of this country, are now scarcely noticed. Her zinc has received but little attention. Her iron ores have never been investigated. With clays enough of all kinds

to supply the world for ages, she has purchased the manufactured products from other states.

These comparisons are not instituted here to depreciate Iowa's mineral capacities. Far from it. They are made rather to show that there lies within her boundaries latent resources and undeveloped possibilities, the extent of which has not been suspected heretofore by the majority of her citizens and the character of which has been entirely unknown to the people of other states.

In her coal she has been somewhat more fortunate than with her other minerals for as a producer she ranks to-day first among the states west of the Mississippi and fifth among the states of the Union.

A glance at the nations of Europe shows that if they were arranged in order as they are powerful and prosperous their respective ranks correspond in a general way with the amounts of coal each of them produces, for upon this fuel depends largely their manufacturing industries.

The latest information from Europe indicates the annual coal product in tons to be, in round numbers, for :

Great Britain.....	190,000,000
Germany.....	85,000,000
France and Belgium.....	45,000,000
Austria.....	9,000,000
Russia.....	6,000,000
Spain.....	1,000,000
Italy.....	400,000
Sweden.....	300,000

England the richest and the most powerful of European countries owes her high position almost entirely to her manufactures ; and from her little isle she has extended her possessions around the globe. The annual coal

production of Great Britain is now in the neighborhood of 200,000,000 tons. As recently estimated by a leading authority: "A very short calculation will suffice to show what an important contribution this makes to her national wealth. The power developed in the combustion of a pound of coal, is reckoned by engineers as equal to 1,500,000 foot-pounds. The power exerted by a man of ordinary strength during a day of labor is about the same; so that a pound of coal may be regarded as equivalent to a day's labor of a man. Hence, three hundred pounds will represent the labor of a man for a year. It was estimated some time ago that upwards of 20,000,000 tons of the annual coal product of Great Britain are devoted to the development of motive power, and that this is equivalent to the labor of 133,000,000 men. These men, in this calculation, are considered as exerting merely brute force; but since they may all be regarded as producers only, and not consumers—the profit on the balance of her coal product fully covering all expenses—we are safe in estimating the contribution made to the wealth of Great Britain, by her annual coal product, as equal to that of 133,000,000 skilled operatives laboring for her enrichment." Now England has an area about the same as Iowa. The United Kingdoms have coal fields which approximate 10,000 square miles which is the estimated extent of Iowa's coal bearing territory, counting on a basis that only one-half of her entire Coal Measure area is capable of producing coal in commercial quantities. Great Britain has of course a much larger population and is near the densely populated districts of the continent. She has also probably a much larger quantity of coal included in her strata than Iowa; but granting all this, the discrepancy cannot be at all near what the

difference in the annual production of the two districts would indicate, for Iowa's is only about one-fortieth that of England. It is also to be remembered that there is no deep mining carried on in Iowa. Rarely do shafts penetrate more than 125 or 150 feet. In the Lancashire coal field of England pits are sunk to a depth of 2,800 feet and in the Somersetshire and Durham regions 1,500 and 2,000 feet are not uncommon depths. Some of the Belgium pits have been carried down 3,400 feet. While it is not probable that these great depths will ever be reached by the shafts of this state there is abundant reason to believe that in many portions only the surface coal has yet been touched. With deeper mining Iowa is certain to increase enormously her known coal supplies. Indeed in a number of places which have long been regarded as territory completely "worked out" the penetration of only fifty feet deeper has rekindled the industry with vigor far greater than ever before.

Germany contains the celebrated coal fields of Saarbrück and Westphalia, besides a number of minor importance, embracing altogether possibly 3,000 square miles. The coal-bearing rocks of the Ardennes in Belgium and the north of France and of the St. Etienne field of the central plateau of France together with numerous smaller areas aggregate only about 2,500 square miles. The other countries of Europe with the exception perhaps of Spain have coal areas very much smaller still.

Coming back now to Iowa she is found to possess coal fields whose areal mileage exceeds that of the greatest of European nations; surpasses by three, four or many more times the total area in any of the other great countries of the eastern hemisphere. To be sure the geological conditions in the British Isles, for instance, have

not been exactly the same as here, and England perhaps has in the aggregate greater deposits of mineral fuel than Iowa, but the fact still remains that Iowa has latent mineral wealth within her boundaries which has never been appreciated anywhere near to the extent that it should be. Besides if there is anything which should be especially emphasized in connection with the present investigation it is the fact that the actual supply of coal in Iowa is many times greater than it has been usually considered and that she is almost infinitely richer in this regard than it was possible even to estimate before definite information on the subject had been collected. Instead of single coal horizons, or two or three perhaps as in some cases, six, eight and even a dozen have been recognized at a single locality. In corroboration only one of many examples will suffice. In Polk county it is the opinion of many that the coal is "practically worked out." Not three seams, as commonly recognized, but half a dozen or more distinct beds have been made out. It would doubtless be a conservative estimate to say that the amount of workable coal now in the county is equivalent to a bed four feet thick over every square mile of its area. This, and only the upper or surface one-third of the vertical depth of the coal-bearing strata yet explored.

Certainly Iowa has not suffered by the comparison of her possibilities in coal wealth with that of other regions.

Outside of a few limited areas in several of the counties very little detailed information has been published concerning the relations of the different coal seams both to one another and to the associated layers.

Among the earliest reliable references to the coal of Iowa are those of D. D. Owen, who made a geological

reconnoissance of the Des Moines valley in 1847 under the auspices of the federal land office. In the hasty canoe voyage up the Des Moines river from Keokuk to the Lizard fork, near the present site of Ft. Dodge, numerous outcrops of coal were observed and located on a map of the stream. Although the trip was hurried this was probably the first successful attempt to bring the greatest of Iowa's mineral resources into public notice.

In 1856 A. H. Worthen, afterwards State Geologist of Illinois, made a similar reconnoissance up the Des Moines river, but added little to Owen's work. Since Owen's trip a number of small mines had been opened in various places, supplying fuel for local use. The following year the same person made an examination of several of the counties in the extreme southeastern part of the state. The presence of coal was noted in a number of places and a few small openings visited, but little definite information was given in the report of these counties.

A decade later official operations were again commenced by the State for a systematic investigation of the mineral resources of Iowa. But unfortunately for the commonwealth, the work, like the former attempt, was suddenly suspended before it had been fairly begun. Being so abruptly cut off, the field notes were necessarily scattered and of far too incomplete a character to adequately present the subject in the form it deserved. Thus, owing to circumstances largely beyond the control of those engaged in the study of the geological features of the region, accounts and expert opinions of the highest economic importance to the different communities were for the most part prevented from reaching the public.

From time to time, short, purely scientific descriptions of local geological phenomena have appeared in different

periodicals; and incidental references to Iowa geology have been made in various official documents of other states and of the federal government. But they are of small popular interest; besides they are inaccessible to the majority of the people.

From the foregoing it will be gleaned that detailed information concerning Iowa's greatest source of mineral wealth is very meager and that the great industry now occupying the time and means of so many people has been allowed to develop unaided and alone. The examination now being carried on indicates plainly that the citizens of the state have not availed themselves to the extent that they might of the natural riches which Nature has bestowed. The near future will show beyond doubt a rapid advance in this industrial pursuit.

