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VOL. II

COAL DEPOSITS

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COAL DEPOSITS OF IOWA

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PREFACE.

No systematic investigation of Iowa's coal deposits has ever been accomplished. The state is regarded by her citizens and outsiders alike so preeminently agricultural that usually her mineral resources are almost entirely overlooked. Yet her geological features are none the less interesting scientifically, none the less important from an economic standpoint.

The mineral wealth of a community can only be developed through a liberal appreciation of its proper functions. Geology ranking first among the useful sciences, has for one of its leading objects the investigation of the natural resources of a region. It considers the character of the different soils and their capabilities for agricultural purposes; the extent and value of the different deposits of coal and lead, iron and other ores; the distribution, properties and uses of the exhaustless beds of valuable clays; the accurate determination of the areas for artesian waters; the analysis of the mineral, well and river waters; the relative value and durability of the numerous kinds of building stones; and all kindred subjects which are of the utmost importance to the great body of the people.

Agriculture and geology are daily becoming more and more intimate in their relations. Nowhere has this interdependence been more clearly understood and nowhere have the benefits been more apparent than in certain

European countries. Some of the older states of the Union, especially those along the Atlantic border, have followed the same line of work with the most happy results. For to-day it is almost universally conceded that a good geological map of the region is practically a soil map also. The proper appreciation of the close relations of the two sciences cannot fail therefore to impress the truth of the statement.

In pointing out the various mineral deposits of Iowa a knowledge of the distribution of the geological formations is of prime importance. The sequence of strata is measurably complete, and will be briefly considered farther on.

Although the greatest factor in her mineral wealth, the coal industry of Iowa has been allowed from the beginning to take care of itself. Until recently not a single area in the state had been accurately mapped, nor the extent, thickness and stratigraphical peculiarities of the deposits made out. Surprising as it may seem, carefully made estimates show that more money is wasted in many counties every year in ill-advised and poorly conducted efforts to discover coal and other minerals than would annually support a well conducted, systematic investigation of the entire state. Throughout the region are to be seen numberless abandoned diggings, most of them the fruitless attempts to obtain coal in places where success is as utterly hopeless as can be imagined. Deserted shafts tell of useless expenditure and loss of capital that might easily have been avoided had some authoritative information concerning the geological structure of the particular localities been accessible.

The subject of coal in Iowa is so important in its bearings upon the material prosperity of the state that it

requires a careful treatment in all its numerous phases. This treatment is a work of great magnitude. It cannot be accomplished in a few months; for several years are required to make the observations, accumulate the facts, and carry on the proper tests.

There is contemplated, therefore, in this connection a series of publications, which will eventually resolve itself into four or five categories more or less closely related. Each of the groups of facts will probably be embraced in separate parts, the first of the series appearing with the present volume. There is proposed:

(1) A preliminary report, somewhat general in its character, perhaps, but something which will supply temporarily a great and ever increasing demand for information pertaining to the coal deposits of the state. This desire for authoritative accounts of the different portions of the great Iowa Coal field is shared not only by the citizens of the state but by many persons with means who now reside in distant parts of the Union, but who are desirous of making safe investments in the state, of starting new industries and of becoming soon, perhaps, residents.

(2) A detailed account of the geological features of the coal districts. This should embrace a full description of the different kinds of beds and their associations, the minute structure of the coal-bearing strata in all its details, the exact relations of the different seams, the distances from the surface that it is necessary to go in order to reach them, the pointing out of notable and easily recognized strata which will act as guides in searching for particular seams of coal, and all kindred information of practical import.

(3) A discussion of practical mining in the state, the methods employed and improvements to be made, the kinds of machinery used and its advantages, the best methods and apparatus for prospecting and like information tending toward a greater development of the industry, including the utilization of coal dust, slack and the lignites of the Cretaceous strata of northwestern Iowa.

(4) A description of the uses and properties of Iowa coals, together with chemical analyses of all the principal varieties from the different counties, the adaptabilities of the various kinds for steam, domestic, and metallurgical purposes and for gas-making.

Since the work of investigating the coal deposits of the state has been taken up, innumerable calls have been received from persons and corporations in more than two-thirds of the entire number of counties to look into their localities "first." In addition there has been a multitude of letters asking for special information and advice and numerous personal visits made by persons residing outside, as well as within, the limits of the state. All these demands have been satisfied as far as reliable information upon the particular phases of the question would permit. But, it was clearly manifest from the beginning that it would be an absolute physical impossibility to answer every earnest call in the manner that was perhaps expected. Nevertheless every effort has been made to give advice of practical importance in the specific cases. These inquiries indicate how deep and how active is the interest in regard to the greatest of Iowa's natural resources; how urgent is the need for organized work in determining the exact nature and extent of the mineral wealth of the state.

It was foreseen at the outset that but little progress could be made in extending the examination of the coal deposits to all parts of the state in which there was any likelihood of obtaining the mineral in quantities of commercial value unless the subject was taken up in a perfectly systematic way. With this object always in view localities were visited first, which, it was thought, would furnish most readily a key to the structure, character and disposition of the coal beds over large areas. After the geological features of these districts were thoroughly understood the investigations were extended in all directions into the neighboring regions as rapidly as was consistent with accurate work. In this way the extent of territory covered and the amount of practical information secured was far in excess of that which it would have been possible to obtain in any other way.

When it is remembered that the area of the Coal Measures in Iowa is over 20,000 square miles, and that the numerous Carboniferous outliers, or isolated basins, and the regions bordering the productive coal deposits which must be gone over in determining even approximately the limits of the formation, occupy fully 5,000 square miles more, the magnitude of the undertaking and the amount of labor that has been expended may be readily appreciated. Many details, of course, still remain to be brought out, yet within the limited time allowed it is not to be expected that the work could be made symmetrically complete. However, the report is comprehensive in its nature, giving all the leading facts connected with the industry, and the occurrence and distribution of the coal throughout the state.

Of special and practical import to prospector and miner alike are the facts brought out in regard to the stratig-

raphy of the coal bearing strata of the state. In this line of work the natural outcrops have been by far the most valuable. Records of shafts, diggings and borings have also been of value but not to the extent that might be supposed at first glance. These records have been kept by many different persons and their worth for geological purposes has varied greatly. Of the many hundreds, or thousands, of drill holes which have been made in the different parts of the state very few are of much use in checking geological observations. With the great majority of the holes put down in prospecting for coal no record of the strata passed through has been kept and as a rule only the presence or absence of coal noted. It does not appear to have occurred to many prospectors that other horizons are often just as valuable aids in the search for coal as the coal seams themselves. In nearly every coal district there are certain beds which are easily recognizable and which have a definite position in regard to the coal beds themselves; that is, their position is constantly a certain number of feet above particular coal veins. When these beds are encountered and recognized it is easy to calculate within a very short distance how far down it is necessary to go in order to reach the given coal horizon. When no attention is paid to such beds as are here considered it is possible that borings may be stopped within a few feet of a valuable coal seam without its presence being detected. The money spent in prospecting under such circumstances is of course wasted. In the same way carefully kept records of borings of artesian wells, and records of drillings for other purposes would be of great value to the community in pointing out the probable occurrence of particular mineral deposits.

There is another element in the uncertainty which usually surrounds the average drill record. Aside from the unfortunate employment of incompetent persons who really know little or nothing about the character of the rocks and the geology of the region the use of the ordinary churn drill is to be deplored. The claims of drillers are in most cases very extravagant. Even under the most favorable circumstances there is already great difficulty in ascertaining the exact thickness and the lithological character of the several strata passed through, so that only in a general way can the record be relied upon. At best every precaution must be taken to get even approximate results. The larger coal operators and those who are most successful in prospecting for coal on a large scale use the diamond drill altogether, which furnishes a core of the rocky layers passed through. By means of the core, which is essentially a small vertical column passing through the successive strata, all details relating to the composition and thickness of the different layers are readily obtained and may be referred to at all times by a simple examination of the section secured. All the important horizons may be determined, whether they are the coal veins themselves or the more persistent beds which are capable of serving as guides in determining the location of the seams. The cost of the diamond drill outfit is somewhat greater to be sure at first than that of ordinary drilling apparatus and this fact probably explains why, notwithstanding its many advantages, it is not more generally used. The record and information obtained, however, are very much more satisfactory and accurate than where other instruments are employed. There remains evidently the same ultimate cost of prospecting whatever form of apparatus be employed.

The statistics of the Iowa coal production during past years have been published independently by the statistical department of the United States Geological Survey and by the Iowa State Mine Inspectors. The former does not take into consideration country banks, and consequently a very considerable percentage of the coal production is not noted, while more than a quarter of the total number of counties producing coal are not mentioned at all. According to law the State Mine Inspectors confine their labors to only those mines working more than ten men, so that here too a very considerable portion of the annual production is overlooked. The importance of the country bank is much greater than is commonly regarded. The leading coal producing districts of to-day are in many cases simply the localities where twenty-five years ago only a few country banks were operated. The development of these fields has been in large part made possible through the building of railroads over which the product of the mines may be shipped to less favored localities. The country banks thus often determine the line along which railroad building is to be carried. The location of the deserted mines is also of importance as indicating the presence of coal. The abandonment of the old openings do not necessarily imply that the seams have been entirely exhausted. In the majority of cases, mines of this class often suggest rather that the work has been interfered with, or that the territory owned or leased, being somewhat limited, has been exhausted.

In most cases it has been found unadvisable to designate by special names the different coal seams as is done in the fields of the Eastern United States. In only a few instances are the Iowa coal seams extensive enough to warrant the application of distinctive names; though

whenever they assume sufficient prominence they are called after the leading places where they are mined.

To Professor Calvin sincere thanks are due for many kind suggestions in connection with the work. In the preparation of the chapters on the coal mines operated in the various districts the field notes of the different members of the Survey have been freely drawn upon. Messrs. E. H. Lonsdale, A. C. Spencer, A. J. Jones, C. H. Gordon, and especially H. F. Bain, have contributed liberally in the descriptive matter. The drawings illustrating the work were made chiefly by Mr. F. C. Tate. The chemical analyses have been made by Prof. G. E. 'Patrick, chemist to the Survey. A few other analyses have been included, among them those made by Profs. Whitney and Emory.