# DISTRIBUTION AND RELATIONS

OF THE

## SAINT LOUIS LIMESTONE

IN MAHASKA COUNTY, IOWA.

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Along the margin of the Iowa coal field, where the productive measures thin out rapidly in passing eastward from the Des Moines river, the relation of the Upper Carboniferous strata to the underlying rocks becomes a very important question, not only from a scientific, but also from an economic standpoint. The problem is nowhere of greater practical import than in Mahaska county, which is one of the leading coal districts of the State.

The Saint Louis limestone, forming the uppermost member of the Lower Carboniferous in Iowa, constitutes the floor of the Coal Measures over a very considerable area. Although this fact was early recognized by Owen\* in his geological reconnoissance of the Des Moines river region, and was later discussed in a general way by both Hall<sup>†</sup> and White,<sup>‡</sup> the details of the relations between the two formations have only recently|| been made known.

<sup>\*</sup> Geol. Rep. Wisconsin, Iowa and Minnesota. Washington, 1852.

<sup>†</sup> Geology of Iowa, Vol. I. Albany, 1853.

<sup>‡</sup> Geology of Iowa, Vol. II. Des Moines, 1870.

Keyes: Stratigraphy of the Carboniferous in Central Iowa, Bul. Geol. Soc. America, Vol. II, pp. 277-292. 1891.

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The rolations existing between the two formations vary considerably in different parts of the region in question. In general, however, it may be said that:

(1) The Lower Coal Measures repose unconformably upon the Saint Louis limestone, as shown by Hall.

(2) The time-gap between the two is represented by the great deposit of Kaskaskia which is found extensively developed farther to the southward.

(3) During Kaskaskia times, Iowa was a land surface deeply carved into hills and valleys.

(4) As subsidence took place, these valleys became filled with coal deposits; leaving the hills for a time as islands surrounded by Carboniferous swamps.

(5) Eventually these hill tops themselves became covered, and thus the old Saint Louis surface became completely buried.

(6) The directions of the present water-courses are entirely independent of the old land surface; for the present streams sometimes cut across ancient river valleys now occupied by sandstones, coals and shales, sometimes through old hill tops of limestone.

Considering the geological forma-



tions in Mahaska county in connection with the propositions just stated, it is found, by careful examination of the natural outcrops and road cuttings as well as by borings, that the statements just made are fully substantiated. A somewhat generalized cross-section of the county from northeast to southwest shows clearly the arrangement and relation of the different formations, as recently determined, with considerable detail. (Figure 19.)

The occurrence of the Lower Carboniferous limestone in Mahaska county has been known for more than forty Owen\* mentioned its occurrence at several vears. points on the Des Moines. Worthent recognized it as occurring in the extreme eastern portion of the county along the borders of the Skunk river. White't also makes mention of several localities in which the Lower Carboniferous limestone is found in the region under consideration. The observations lately made in Mahaska and neighboring counties show that the Saint Louis limestone : has a much wider distribution over this region than has heretofore been supposed. It is now known to be exposed in the banks of the three principal streams-the Des Moines, North Skunk and South Skunk rivers-extending entirely across the county. The formation has been traced along the lines mentioned, the exposures being numerous, as well as favorably situated. The limestone was found to be well developed at a number of points fifteen to twenty miles beyond those heretofore reported, thus extending the previously known limits of the Lower Carboniferous to the extreme northwestern corner of the county. The areal distribution of the Saint Louis lime-

‡ Geol. Iowa, Vol. II, p. 267. Des Moines, 1870.

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<sup>\*</sup> Geol. Rep. Wisconsin, Iowa and Minnesota, p. 98. Washington, 1852. † Geol. Iowa, Vol. I, pp. 166-167. Albany, 1858.

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stone in Mahaska county is shown in the accompanying sketch-map. (Figure 20.)



igure 20. Sketch-Map of Mahaska County, showing Distribution of Saint Louis Limestone.

In passing down the North Skunk the Lower Carboniferous beds are first found, well developed, about four miles from the north county line. Down to this point only sandstones and shales of the Coal Measures are exposed. Near the point mentioned, at a place called Union Mills, the limestone is quarried for local use. Below here limerock outcrops at frequent intervals. In some places it is covered only by drift; in others it is overlain by thirty or more feet of Coal Measure strata.

#### "THE BLUFFS."

Near the eastern border of the county the limestone. which is well exposed above the water-level of the North Skunk, is abruptly replaced by sandstone, while some distance farther down the stream the limerock again comes into view suddenly. The stratigraphical relations of the sandstone appear to indicate with but little doubt that it fills an old gorge or eroded depression in the limestone. Another similar section is shown in the adjoining township on the South Skunk, where a sandstone bluff thirty to one hundred feet high and at least three-fourths of a mile long intervenes in like manner between two ledges of limestone. At certain places the bluff just referred to exhibits cross-bedding on a large scale. This is seen again at the point where the C., R. I. & P. railroad crosses the South Skunk, in the northwestern part of the same township. Still another noteworthy occurrence is that on the Des Moines river near the western margin of the county, just below the mouth of Cedar creek. At this locality, which is known locally as "The Bluffs," there is a massive sandstone forming a precipitous escarpment rising to a height of one hundred feet or more and extending a distance of nearly two miles. Both above and below, the limestone is found along the river. Other, though perhaps less prominent, examples of the same phenomena have also been observed in other portions of the county.

On the South Skunk the Saint Louis limestone extends across the county to within a short distance of the northwestern corner. At Peoria it is quarried for local use. Near this point the limerock disappears beneath the water level for two or three miles, reappearing again in Marion county, the intervening area being occupied by sandstone.

While Mahaska is one of the important coal counties of the State, it will be seen, by referring to the general

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section (figure 19), that the Coal Measures are comparatively thin. The greatest thickness of the formation is probably less than one hundred and fifty feet. From this maximum limit it varies down to nothing. This varving difference is not due entirely to the irregularities of the present land surface, for it could exist even if the latter were perfectly level. It is dependent almost wholly upon the unevenness of the floor below, upon which the marginal sediments of the Coal Measures were laid down. This fact explains how a coal seam may lie a hundred feet or more below the present level of an outcrop of Lower Carboniferous limestone only a short distance away, and how, without taking into consideration the facts just described regarding the very uneven character of the Coal Measure floor, it might be readily believed that the limestone was at a higher horizon than the coal; and that therefore the former overlaid the latter. This may be made more clear, perhaps, by examining again figure 19. If a boring was made at A. coal would be found at a depth considerably below that at which the limestone was found at B. Therefore, it would be inferred, naturally, that at B the coal encountered at A might be reached by boring down through the limestone; whereas, geologically, the limestone is beneath the coal-bearing rocks. As a matter of fact, prospecting for coal upon exactly such erroneous inferences as has been mentioned has been carried on in a number of places. It is hardly necessary to say that the attempts resulted in failures.

The relations existing between the Coal Measures and the Saint Louis limestone, as outlined above, for Mahaska county are not peculiar to this district. They may be taken as typical for all the region along the eastern border of the Iowa coal field. The mistakes made in this

#### IMPORTANCE OF SUGGESTIONS.

county have also been made in other regions of the State, and are apt to be repeated again and again; for the general relations, found to be true here, are likewise true elsewhere. The local conditions of course vary in different places, but in the search for productive beds along the thin margin of the Iowa coal-bearing area, the facts described must be kept in mind. It must be remembered that while the coal was laid down long after the limestone, appearances may be so deceptive as to seem to indicate that the limestone is at a higher level than the coal.

In all such cases a careful consideration of local conditions is of prime importance in order to bring out the real relationship of the different beds.

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