Proceedings of the Iowa Academy of Science

Volume 26 | Annual Issue Article 44

1919

Stratigraphic Delimitation of St. Louis Formation

Charles Keyes

STRATIGRAPHIC DELIMITATION OF ST. LOUIS FORMATION

CHARLES KEYES

Were it not for the fortunate circumstance that our early Carbonic section of the Mississippi valley is already split up and its long recognized geographic title Mississippian Formation restricted in its application to a minor part more nearly coinciding with the original proposal of the name, it is probable that this familiar term would now have to give way to an older designation. In the sense of a sub-periodic title St. Louis, or Louisian, has precedence by many years over either Mississippi, or Mississippian.

In the title St. Louis is focused the complete history of the differentiation of the Paleozoic rocks of not only the Mississippi valley, but of the American continent.

At the time when the name first came into use as a geological title St. Louis Limestone covered all the sequence of rocks lying between the coal measures and the St. Peter sandstone. This procedure was a direct outcome of the first attempts to correlate the Carbonic rocks of the Mississippi valley with the then recently established section of England. Thomas Nuttall[1] who had collected extensively the fossils along the Mississippi river between Dubuque and St. Louis, had found that the forms were similar to, or identical with, those described from the Mountain Limestones of Derbyshire. Although most of his collections were from the middle and southern sections of his Mississippi River trip this explorer, who was primarily a botanist and ornithologist, inferred that all of the limestones which he had encountered were of the same age. This idea seemed to be further supported by the presence of the lead deposits in both Iowa and Missouri. It was this circumstance mainly which later led Schoolcraft[2] to announce the parallelism of the Dubuque dolomites and the Metalliferous (Carboniferous) limestones of England. This, also, was the opinion of Featherstonaugh.[3] Curiously enough, the last mentioned author's elaborate discussion of

[1]Journ. Acad. Nat. Sci. Philadelphia, Vol. II, pt. i, pp. 14-52, 1821.
[2]Narrative Journal of Travels, etc., to Source of Mississippi, Cass Exped., 414 pp., Albany, 1821.
[3]Geol. Rept. Exam. made in 1834 of Elevated Country between Missouri and Red Rivers, 97 pp., 1835. (Twenty-third Cong., 2nd Sess., House Exc. Doc. No. 115.)

Murchison's and Sedgwick's rock formations of England had no connection with the geology of the region which he traversed.

In Ohio, Locke[4] and Mather,[5] and in Indiana, Owen,[6] had already used the term Cliff Limestone for what they thought was the stratigraphical equivalent of the English Cliff formation. This name was an adaptation of the Scottish word Scar Limestone, and Sedgwick's designation of the Carbonic limestone of the Lake District and of Yorkshire. Even so late as 1840 Owen[7] was inclined to regard the Mountain Limestone section as extending downward to what was afterward known as the St. Peter Sandstone, which latter he then considered to be the Old Red Sandstone or Devonian. It was only years subsequently that the Cliff Limestone was, after repeated restrictions, finally made the equivalent of the Niagara Limestone of New York. It was Owen,[8] also, who, suspecting something wrong in the prevailing correlations, proposed to call the section between the Coal Measures and the St. Peter Sandstone the sub-Carboniferous limestones.

This, then, was the state of knowledge concerning the formations below the Coal Measures when the term St. Louis Limestone first appeared as a distinctive geological title. When, in 1847, it was thought necessary especially to designate "the thick limestone which underlay the western edge of the great Illinois coal field," and Dr. Henry Englemann[9] proposed therefor the title St. Louis Limestone, its terranal limitations were, according to present day standards, rather vaguely defined. The then recent efforts of Dr. David Dale Owen, in his Iowa work, to introduce the English classification of geological formations had a profound influence upon the little coterie of geologists which was beginning to occupy the field of the Mississippi valley and which made its headquarters in the city of St. Louis. The naming of the St. Louis Limestone was a phase of the American sub-Carboniferous question, and the problem of the American Paleozoic. It was an attempt at adjustment of the rocks of the continental interior with the general section of Europe.

Two years later, in a letter dated January 14, 1849, to the distinguished paleontologist, Dr. Verneuel, of Paris, Owen uses the term St. Louis Limestone. Shortly after its receipt this letter was pub-

[4]American Jour. Sci., (1), Vol. XL, p. 128, 1838.
[5]Ohio Geol. Surv., 2nd Ann. Rept., pp. 1-40, 1838.
[6]Indiana Geol. Surv., 2nd Rept., p. 17, 1839.
[7]Rept. Geol. Expl. Iowa, Wisconsin and Illinois, p. 14, 1840.
[8]Rept. Geol. Reconnoissance of the State of Indiana, etc., 44 pp., 1839.
[9]Am. Jour. Sci., (1), Vol. 41, p. 119, 1847.

lished by the French geologist[10] in the publication of the Société Géologique de France.

Just what were the exact vertical limitations assigned to the St. Louis Limestone section by Englemann is not a matter of very clear record. Other St. Louisians at that time used the term freely. Most specific, perhaps, is Dr. Henry King. According to him[11] the title covers the entire section between the Coal Measures and the St. Peter Sandstone. The thickness of the formation is estimated to be between 500 and 600 feet. Although King elsewhere mistakes the St. Peter Sandstone for another sandstone lying at the base of the Coal Measures he is still led to believe that there were represented 200 to 300 feet of the Carboniferous limestones, which, however, were found to carry Devonian fossils at the base. Therefore, it may be considered that finally King included in his St. Louis Limestone only those beds between the bottom of the Burlington limestone and the base of the Coal Measures.

Singularly enough when Englemann proposed the title St. Louis Limestone it was generally believed that the formation which today we know under this name rested upon the Kaskaskia limestone. This belief was probably held by St. Louisians of that day for many years, until Shumard finally demonstrated the true relations of the two terranes.

Inasmûch as Owen[12] several years previously had restricted the application of the term sub-Carboniferous to the section between the top of the Devonian limestones and the base of the Coal Measures, whereas prior to that time it had been made to include very much more, even all below to the Blue, or Trenton (Galena), Limestone, it is not improbable that the St. Louis geologists were endeavoring to fix the section to a restricted succession by giving it a definite geographic title. In his Iowa work[13] Owen calls what is now generally termed the St. Louis Limestone, at Keokuk, the Concretionary Limestone; but he specifically correlates it with the "Bedded Limestone of St. Louis." It was three years later that Swallow[14] and Shumard[15] at last restricted the term to the limits now commonly accepted.

At the time, therefore, when the title St. Louis Limestone was proposed for a definite geological formation, and for a full decade thereafter, it seems that the term covered approximately the early

[10]Bull. Soc. geol. de France, t. VI, p. 419, 1849.
[11]Proc. American Assoc, Adv. Sci., Vol. V, pp. 182-201, 1851.
[12]Twenty-eighth Cong., 1st Sess., Sen. Doc. No. 407, pl. 3.
[13]Geol. Surv. Wisconsin, Iowa and Minnesota, p. 92, 1852.
[14]Missouri Geol. Surv., 1st and 2nd Ann. Repts., p. 4, 1855.
[15]Ibid., p. 170.

Carbonic section of the region. This is exactly the section which recently we are in the habit of calling the Mississippian formation, the adaptation of Winchell's name[16] of 1869. Being the name of a strictly provincial series the policy of the United States Geological Survey to elevate it to the continental dignity of an abstract time unit of sub-periodic rank appears unavailing.

In the interests of exact synonymy, of the proper appreciation of the canons of priority, and of a just credit to the pioneer workers in a particular provincial field it may be that we shall have to, in the end, recognize for the early Carbonic section of the Mississippi valley the terminology of Englemann and his co-workers, if we finally find it really advisable to retain a definite geographic title for what is really a time-division. By this line of action Louisian would find satisfactory substitution for Mississippian; and this title would have priority over Winchell's name by twenty years. To be sure, both terms have been used in varied senses. Even with the latest tendency to establish a three-fold division of Early Carbonic rocks in the Mississippi valley Louisian would appropriately take precedence over Mississippian as a serial title, for the median number.

The severe restriction of the term St. Louis Limestone to the formation generally known under that title today is probably due primarily to the interpretation of Owen. As already intimated, in his Report on the Geological Survey of Wisconsin, Iowa and Minnesota,[17] published in 1852, he specifically designates the bed the Concretionary Limestone, at the same time parallelling it with the "Bedded Limestone of the City of St. Louis."

At this time the Archimedes Limestones were regarded as the same formation in place of three widely separated strata as subsequently proved to be the case. The present St. Louis formation was thought to overlie it. In this connection, also, there was much confusion existing concerning the Ferruginous Sandstone. The latter was located at the bottom of the Coal Measures, and at the mouth of the Missouri river it was above the St. Louis Limestone. Farther south, near the mouth of the Ohio river, a lithologically similar formation, now called the Aux Vases Sandstone, was erroneously paralleled with the basal Coal Measures bed. For the honor of discovering the true order of succession A. H. Worthen laid claim. This worker, somewhat peeved at Prof. James Hall for first publishing correct details of the section without giving him especial

[16] Proc. American Philos. Soc., Vol. XI, p. 79, 1869.
[17] p. 92.

credit for pointing out the situation stated[18] that he unravelled the puzzle as early as the spring of 1853, while assistant on the Illinois survey, although he could not then publish the facts.

It is probable that Hall, while state geologist of Iowa, gathered his facts on this subject from numerous sources, and that Worthen was only one out of many persons with whom he talked over matters. Moreover, at the very time when Worthen, in company with Hall, visited the Chester locality the triple nature of the Archimedes Limestone was being widely discussed, and doubt was already being thrown upon the generally accepted interpretation. Otherwise it is difficult to understand just why Dr. Norwood, the State Geologist of Illinois, should especially charge his assistant Worthen with the duty of determining the relations of the St. Louis Limestone as recently restricted and the Ferruginous Sandstone.[19]

Although Swallow[20] adhered to the old idea of the location of the St. Louis Limestone (restricted) above the Chester beds, Shumard, in the county reports made at the same time, but the publication of which was held up by the Civil War for fifteen years, clearly recognized the true sequence. Furthermore, in the South, in Ste. Genevieve county, he subdivided the section between the first and third Archimedes limestones (Keokuk and Kaskaskia) into three members: The white oolite below (Spergen), the St. Louis Limestone (proper), and the Ste. Genevieve Limestone.[21] This procedure perhaps led Worthen to include the Spergen and Warsaw in the St. Louis Limestone as he understood it.

[18] Illinois Geol. Surv., Vol. I, p. 42, 1866.
[19] Illinois. Geol. Surv., Vol. I, p. 41, 1866.
[20] Missouri Geol. Surv., 1st and 2nd Ann. Repts., p. 60, 1855.
[21] Missouri Geol. Surv., 1855-1871, p. 292, 1873.