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GEORGE H. GIRTY

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BULLETIN 439

THE FAUNA OF THE MOOREFIELD SHALE OF ARKANSAS

BY

GEORGE H. GIRTY

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THE FAUNA OF THE MOOREFIELD SHALE OF ARKANSAS.

By GEORGE H. GIRTY.

INTRODUCTION.

The section of Mississippian rocks in northern Arkansas includes a bed of black shale which is of considerable interest, both for the fauna it contains and the vicissitudes of nomenclature it has undergone. It is inclosed between two limestone formations known as the Boone and the Pitkin. The sections involving these formations have been especially studied at opposite ends of the line of outcrop—at Batesville, in northeastern Arkansas, and at Fayetteville, in northwestern Arkansas—and it is owing to this circumstance, coupled with imperfect knowledge of the geology of the intervening area, that most of the intricacy of nomenclature has arisen.

In the Fayetteville region, between the black shale and the Boone formation, a thin and discontinuous sandstone occurs. Toward the upper limit of the shale, just below the Pitkin limestone or separated from it by shaly beds measuring up to 60 feet, there is another rather thick sandstone, which also is not persistent. Simonds,[a] who named the formations in the Fayetteville region, called the lower sandstone the Wyman sandstone, the lower shale the Fayetteville shale, and the upper sandstone and shale the Batesville sandstone and Marshall shale, respectively, these names having been imported from the Batesville region.

In the vicinity of Batesville the black shale is divided about midway by a massive quartz sandstone from 30 to nearly 200 feet in thickness. The formations in this region were called by Penrose in 1891,[b] in ascending order, the Fayetteville shale, the Batesville sandstone, and the Marshall shale. Of these names the first was, of course, taken from the Fayetteville region, the second from Batesville itself, and the third from Marshall, a village intermediate between Batesville and Fayetteville.

Although the Arkansas geologists evidently recognized the general equivalence of these beds, they were apparently at fault in correlating

[a] Simonds, F. W., Ann. Rept. Geol. Survey Arkansas for 1888, vol. 4, 1891, pp. xiii et seq.
[b] Penrose, R. A. F., jr., Ann. Rept. Geol. Survey Arkansas for 1890, vol. 1, 1891, pp. 138 et seq.

them in detail, for, according to Adams and Ulrich,[a] the Batesville sandstone is not equivalent to the upper sandstone of the Fayetteville region, as Simonds supposed, but to the lower.

The equivalence of the formations in the two sections is now readily determined from the literature, but the proper nomenclature to be used is a more difficult question. It is complicated by the fact that Simonds's report, which, as already recounted, carries over into the Fayetteville region some of the formations of the Batesville section and correlates them wrongly there, was published before Penrose's account of the Batesville section itself. Now there may readily be opposing views as to whether the two formations, Batesville sandstone and Marshall shale, which Simonds describes in an alien section and under a misapprehension as to their geologic relations, can be considered as properly established in his report. I am rather inclined to the view that they should not be considered established at all until the publication by Penrose in 1891 of the report from which the names were evidently taken. It is clear, however, that these two names must be regarded as established or not established in Simonds's report. If the term Batesville sandstone was not established until Penrose's report was published, then it is evident that the names Wyman and Fayetteville have priority over Batesville and Fayetteville, which Adams and Ulrich adopted for the same formations. If the two terms are regarded as having been established in Simonds's report, the question immediately presents itself, Shall they be held to apply to the formations at Batesville and Marshall, for which the names we know were really intended, or to the formations in the Fayetteville region, with which, in their borrowed usage, they were first associated? According to the latter opinion, with which I do not agree, the terms Marshall and Batesville would apply to the formations which Adams and Ulrich called Fayetteville (in part) and Wedington, the latter being considered a member of the Fayetteville formation. If, however, the names were regarded as fixed to the formations at the locality from which they were derived, the two terms would supersede the names Batesville and Fayetteville employed by Adams and Ulrich. In other words, by priority, if Batesville supersedes Wyman, then Marshall should supersede Fayetteville, while if Fayetteville supersedes Marshall, then Wyman should be employed instead of Batesville. It must be that Fayetteville and Batesville were adopted by these authors, in spite of the inconsistency involved, because of the currency which the terms had received over Wyman and Marshall, a fact which, all things considered, probably justifies their adoption.

[a] Prof. Paper U. S. Geol. Survey No. 24, pp. 26 et seq.

Adams and Ulrich thus use Batesville for the lower sandstone in the Fayetteville section which Simonds had named Wyman, and Fayetteville for the rest of the series up to the Pitkin (Simonds's Archimedes limestone), including therein the formations which Simonds had called Fayetteville shale, Batesville sandstone, and Marshall shale. His Batesville sandstone, left anonymous by correlating the true Batesville with the lower sandstone at Fayetteville rather than with the upper, they named the Wedington, considering it a member of the Fayetteville formation. In the Batesville region the name Batesville is, of course, retained, and since by the correlation of these authors the black shale above rather than that below the Batesville sandstone is equivalent to the Fayetteville shale, the latter term is substituted for the term Marshall. The black shale underlying the Batesville, therefore, which Penrose had called Fayetteville shale, by this correlation became nameless, and the authors mentioned proposed the name Moorefield shale, from a village near Batesville where the beds are well exposed. Since fossils were (erroneously) stated to be rare in the typical Fayetteville shale while they were abundant in the Moorefield, Prof. H. S. Williams suspected that the latter was not the same as the Fayetteville, and, wishing to give it a distinctive name on account of the interesting fauna it contained, had meanwhile introduced the name "Spring Creek limestone" for part of the beds which were later called Moorefield. But the name Spring Creek had already been preoccupied for a formation in Texas. The Arkansas beds, however, had received such prominence through the writings of Williams and others that in this case, as in that of the Batesville sandstone, the law of priority might, it seems to me, have advantageously been disregarded. The accompanying table will help to elucidate the nomenclature involved.

Correlation of formations in northern Arkansas.

F. W. Simonds, 1891 (Ann. Rept. Arkansas Geol. Survey for 1888, vol. 4, p. xlii), Washington County (Fayetteville).	R. A. F. Penrose, 1891 (Ann. Rept. Arkansas Geol. Survey for 1890, vol. 1, p. 113), Batesville region.	H. S. Williams, 1895 (Am. Jour. Sci., 3d ser., vol. 49, pp. 94–96), Batesville district.	S. Weller, 1897 (Trans. New York Acad. Sci., vol. 16, pp. 278–282), Batesville region.
Archimedes limestone			
Marshall shale			
Batesville sandstone			
Fayetteville shale	Marshall shale		
Wyman sandstone	Batesville sandstone	Batesville sandstone	Batesville sandstone.
	Fayetteville shale	Spring Creek limestone—Fayetteville shales to the west.	Spring Creek limestone and shale=Fayetteville shales of Arkansas geologists.
Boone chert and limestone.	Boone chert	Boone chert	Boone chert.