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THE MIOCENE GROUP OF ALABAMA.[1]

BY LAWRENCE C. JOHNSON.

FIVE or six years ago it was doubtful if the Gulf States had any well-defined Miocene. The brilliant discoveries of Mr. D. W. Langdon, at Chattahoochee and at Alum Bluff on the Apalachicola, set that question at rest for Florida; still there was general doubt of any extension of the same into Alabama.

Dr. Eug. W. Hilgard had defined and located the Grand-Gulf Group in Mississippi, and conjectured it might be Miocene. But he was not perfectly satisfied, and for want of fossils no paleontologist would undertake a decision. This also it would have been bold a few years ago to say had any continuation into Alabama.

Whilst at work for the U. S. Geol. Survey (1889), the Grand Gulf was explored, to a considerable extent, in Louisiana, Mississippi, and Alabama.

Dr. Hilgard, for Mississippi, divided it lithologically into two phases: the first well seen at Grand Gulf, in which quartzites prevail; the second, most abundant, has the peculiar, characteristic silicious clay-stones, found in such masses nowhere outside of this group.

It was the fortune of the writer to observe two other phases in Mississippi:

(1) The quartzitic phase — being only a phase of the next — roughly estimated, extends from the north-west corner of the formation on Big Black River, to a curved line drawn across from Rodney to Pelahatchie. It is most largely developed on Bayou Pierre and Cole's Creek. For convenience it may be called the "Bayou Pierre Phase."

(2) The second, having very irregular boundaries, may have its southern line drawn from Tunica, in Louisiana, by Columbia, Miss., by the mouth of Okatoma Creek, by the Falls on Leaf River near Estabuchie, passing to the southward of Ellisville and crossing Chickasawhay River between Winchester and Waynesboro. For convenience this division will be called the Fort Adams, or the Ellisville phase.

(3) More remote from the Great River, and southing farther, the less silicious the formation becomes, at Hattiesburg, and on that part of Leaf River from Okatoma to Rogers' Creek, and on Chickasawhay above Leakesville, a third phase is exhibited, abounding in phytogene remains — almost lignitic. This is the Hattiesburg phase or formation.

(4) A fourth manifests itself below Leakesville on the Chickasawhay, on the Lower Leaf River and Pascagoula — being clays of a more tenaceous quality — abounding in specks and nodules of calcareous material, and in a few places holding shells of mollusks. One locality of the last, where first discovered, is the Shell Landing below Roberts' Bluff, four miles south-west of Vernal postoffice. This is the Pascagoula phase or formation.

The last three extend into Alabama, though the fourth lies so deep under the great ridge of sands of Mobile County that no overland outcrop has yet been discovered. In the deep boring at Mobile it was reached at about 600 feet. The shells of the boring have been pronounced by Dr. Dall identical with those of Pascagoula, and a list of them furnished by him in this journal, Sept. 16, 1892.

The second and third phases have been traced across Alabama. The second is finely developed at Healing Springs, in the northern part of Washington County. Briar Creek is about the boundary between it and the Eocene, and southward of that it is frequently exposed by the washing away of the surface sands, as far as the head-waters of Bilbo Creek.

The southern part of Washington is underlaid by the Hattiesburg — the third phase. Many of the shallow ponds and cold clay flats are to be accounted for by this fact; and so are the ridges of better soil. Lignitic spots, coming to the surface where drainage is sufficient, have weathered into limited areas of better soil. Such a spot is on the southern branches of Basset Creek, on the St. Stephens and State Line road.

Baldwin and Escambia counties afford a continuation of these parallel lines of silicious clay-stones, of ponds, and of cold clay flats — not without places of better soil. This is the true origin of the well-known strip of red lands on the high ridges northward of Williams and Canoe stations — up West Escambia.

Finally, in the vicinity of Brewton, Burnt Corn, Murder Creek, and Conecuh River, expose sufficient of these three older phases of the Grand Gulf as to leave no doubt with regard to the horizon to which it properly belongs.

Chalk Hill, at N. B. Dixon's (Sec. 1, T. 2, N. of R., 13 E), is a repetition of Chalk Hill at Healing Springs, while the hills near Castleberry on Murder Creek (Sec. 1, T. 2, N. of R., 10 E.), and the exposures on Conecuh at Silas Bluff (Sec. 6 and 7, T. 1, N. R., 12 E.), at Coal Bluff (Sec. 7, T. 1, N. R., 11 E.), and at Roberts, Silas Creek (Sec. 5, T. 1, R. 12 E.) display the Hattiesburg phytogene phase as fairly as Augusta on Leaf River,— with the addition of molluscan fossils not found in Mississippi. These are only in casts, true: because the clay-sandy material, without lime, was too porous to retain calcareous shells.

Of the precise type and horizon of these fossils we are not left in doubt; but to marshal our testimony on the subject, it will be necessary to step across the line, and to bring forward by continuity the Miocene Marls of Florida, to wed these Grand-Gulf clays of Escambia.

II. Wakulla Springs, in the county of the same name, has a peculiar limestone, which is found from St. Mark's Bay into Georgia. Generally fossils are few. The great coral, *Astræa Floridana* or *belea*, and *Orbitolites Floridana*, ever present in these warm sea-formations, are among them. In the deep excavation at Weelaunee, Jefferson County, and the Bloxham well near Tallahassee, fossils are more numerous and of greater variety.

On the Chattahoochee River, at Rock Island, between Port Jackson and the mouth of Flint River, the Wakulla rocks again manifest themselves, and upon the Eocene Vicksburg limestones of Jackson County. Below the mouth of Flint, at the village Chattahoochee, and forming the left bank of the Apalachicola to Aspalaga landing — ten miles — is another phase of the older Miocene.

On Chipola River, at and above Chipola postoffice, is another phase of the older Miocene — the Chipola beds. These lie in and upon the Chattahoochee more silicious form, in which the fossils are very obscure. In the more calcareous ferruginous deposits of Chipola, Farley Creek, and Ten-mile Creek, they are the best preserved in the world. Even the Orbitolites are perfect, instead of a mere impression. Neither of these formations can be said to cross the Choctawhatchee River, westward. The obscurely fossiliferous sandy rocks of Econfina, and at Douglas Ferry on the Choctawhatchee, may be assigned to the Chattahoochee. But west of that great river the territory which should be occu-

[1] Recent investigations made by Lawrence C. Johnson, for the Geological Survey of Alabama, published in advance of the General Report, by permission of Dr. Eug. A. Smith, the Director.