

GEOLOGY

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XIV. NOTES ON THE PALEONTOLOGY OF THE COMANCHEAN OF LOVE COUNTY, OKLAHOMA.*

Fred M. Bullard

Norman, Oklahoma

The importance of paleontology in stratigraphic work needs no emphasis. Some of the outstanding facts regarding the paleontology of the Comanchean rocks of Love county that the writer has found helpful in his field work will be given in hopes that others working in the area or similar areas will find them of assistance.

It seems desirable before taking up a discussion of the various fossil horizons to give a brief summary of the stratigraphy of the Comanchean rocks of Love county. The following is the general section of the Comanchean of this region.

Group	Formation Top	Thickness in feet.
Washita	Bennington limestone -----	10
	Bokchito formation -----	120
	Caddo formation -----	150
	Kiamichi formation -----	35
Fredericksburg	Goodland limestone -----	25
Trinity	Trinity sand -----	0-600

The Trinity sand is a loose, unconsolidated pack sand usually white to brown in color. It however contains many lentils of clay and shale and is characteristically extremely variable both in composition and in thickness. It contains few fossils. Overlying the Trinity sand is the Goodland limestone. It is a hard, massive, white, semicrystalline limestone averaging about 25 feet in thickness. It is very fossiliferous especially in the lower part which contains considerable clay.

Overlying the Goodland limestone is the Kiamichi formation. It consists chiefly of a marly clay with a hard bed of limestone almost completely filled with oyster shells (*Gryphea navia Hall*)

*Extract from complete report on the "Geology of Love County, Oklahoma," being published by the Okla. Geol. Survey.

at the top of the formation. The Caddo formation consists of alternating beds of limestone and shale. It is the most abundantly fossiliferous formation in the area. The Bokchito formation, which overlies the Caddo formation, consists chiefly of shale with a few beds of brown sandstone and shell beds which have been replaced by iron. The youngest Comanchean formation in Love county is the Bennington limestone. It is a bluish brown hard massive limestone containing an abundance of a peculiar pelecypod (*Exogyra arietina* Roemer).

The lowest definable fossil horizon in the Comanchean of Love county occurs in the basal bed (Walnut Clay equivalent) of the Goodland limestone. It is marked by an abundance of fossils, particularly a rather small easily recognizable echinoid, *Enallaster texanus* Roemer. This species, so far as is known, does not occur abundantly at any other horizon in the section. Other fossils occurring in abundance at this horizon include; *Exogyra texana* Roemer, *Protocardia texana* Conrad and *Cyprimeria texana* Roemer.

The top of the Goodland limestone contains a peculiarly marked ammonite, *Schloenbachia acutocarinata* Shumard. This ammonite is limited in vertical distribution occurring only in the upper few feet of the Goodland limestone, a few scattered individuals ranging into the basal part of the Kiamichi formation.

The top of the Kiamichi formation is marked by a hard shell conglomerate varying from one to two feet in thickness. This shell conglomerate is composed almost entirely of *Gryphea navia* Hall. This species also occurs rather abundantly in the clay underlying the shell conglomerate. An ammonite, *Schloenbachia belknapi* Marcou, very similar to *Schloenbachia acutocarinata* Shumard occurs in the upper part of the Kiamichi formation, a few forms ranging into the basal part of the Caddo formation.

The lower part of the Caddo formation, that is the lower 22 feet constitute the next horizon. Throughout this horizon there is an abundance of *Inoceramus comancheanus* Cragin. They do not occur abundantly at any other horizon in the section. The extremely large ammonite, *Desmoceras brazoense* Shumard dominates the lower part of the Caddo formation. Although limited to the upper part of this horizon, they occur in such abundance and are so large that they are by far the most prominent fossil in the entire Comanchean section. Other ammonites found in the lower part of the Caddo formation include; *Schloenbachia trinodosa* Boese and *Hamites comanchensis* Adkins & Winton. An abundant horizon of *Hemiphaedusa whitci* Clark occurs immediately above the *Desmoceras brazoense* Shumard horizon in the lower part of the Caddo formation.

The middle member of the Caddo formation, which consists of about 60 feet of clay shale does not contain any fossils in abundance. It is, in fact, rather noticeable because of the absence of fossils.

The upper part of the Caddo formation, including about 75 feet of alternating beds of limestone and shale immediately overlying the clay shale member constitutes the next horizon. It is characterized by a great number of forms rather than the marked abundance of any single species. Two important and easily recognizable echinoids occur in this horizon, namely *Holaster simplex* Shumard and *Hemiaster elegans* Shumard. The well known ammonite *Schloenbachia leonensis* Conrad also occurs at this horizon. A rather abundant Pecten horizon was found near the top of the Caddo formation. A few scattered individuals of *Ostrea carinata* Lamarck were also found near the top of the Caddo formation. The uppermost beds of the Caddo formation also contain, in considerable abundance, *Exogyra americana* Marcou. Large fucoids occur abundantly throughout the Caddo formation, but so far as known are limited to this formation.

The Bokchito formation, which consists principally of clay shale and sandstone with occasional shell beds is not very fossiliferous except locally. Several of the shell beds have been replaced by iron, but the fossils in many cases are not well preserved. The most prominent of these shell beds is found near the top of the formation and consists principally of *Protocardia texana* Conrad, with numerous other fossils in lesser abundance.

The Bennington limestone is characterized by an abundance of *Exogyra arietina* Roemer. It also contains a few *Ostrea quadriplcata* Shumard and a few echinoids.

Two specimens of a brachiopod (*Terrabratula wacoensis* Roemer) were found in the Comanchean section of Love county, one in the lower part of the Caddo formation immediately overlying the *Desmoceras brazoense* Shumard horizon and the other in the Bennington limestone.

A generalized summary of the facts and their significance.

Enallaster texanus in abundance denotes lower Goodland limestone.

Schloenbachia acutocarinata indicates upper Goodland limestone.

Gryphea navia is characteristic of the Kiamichi formation.

The following fossils indicate Lower Caddo: *Inoceramus comancheanus*, *Hamites comanchensis*, *Schloenbachia trinodosa*, *Desmoceras brazoense*, *Hemiaster whitei*.

The following fossils indicate Upper Caddo; *Hemiaster elegans*,

Holaster simplex, *Ostrea carinata*, *Schloenbachia leonensis*.

The large Fucoids are characteristic of the Caddo formation.

Shell beds replaced by iron are characteristic of the Bokchito formation.

Exogyra arictina is characteristic of the Bennington limestone.

XV. PRELIMINARY NOTES ON A NEW GEOLOGIC MAP OF THE ARBUCKLE MOUNTAINS OF OKLAHOMA

C. E. Decker

From Department of Geology, University of Oklahoma

In a preliminary report on the geology of the Arbuckle and Wichita mountains, Joseph A. Taff in professional paper 31, U. S. G. S., in 1904 published a geologic map with scale about $5\frac{1}{4}$ miles per inch. Differentiation of formations was made then as follows:

Pre-Cambrian	-----	Igneous rock
Mid-Cambrian	-----	Reagan sandstone
Cambro-Ordovician	-----	Arbuckle limestone
Ordovician	-----	Simpson formation
Ordovician	-----	Viola limestone
Silurian	-----	Sylvan shale and Hunton limestone
Devonian	-----	Woodford chert
Carboniferous	-----	Conglomerates, sandstone & shale
Carboniferous	-----	Permian "Red Beds"

The Hunton formation was divided into three members. Of these, the lower part of the lower member was correlated with the Clinton of Ohio and St. Clair limestone of Arkansas, and the upper part with the Niagaran. The middle member is correlated with the Helderbergian of New York and the upper member is tentatively correlated with the Oriskany of New York and the Camden chert of Tennessee. Thus the Hunton formation included members belonging to two different periods.

In 1910 the same geologic map with minor changes was reprinted to accompany Bulletin 3 of the Oklahoma Geological Survey. But in connection with this map a number of new structural sections were made by Chester Reeds, showing the major structural features which he worked out in connection with his physiographic studies of the mountains. In this text the Pennsylvanian rocks southwest of the mountains are given the name of the Glenn formation in a columnar section accompanying the report.

In 1911 Chester A. Reeds, after extended faunal studies, published an article in the American Journal of Science on the Hunton Formation of Oklahoma, and at this time he subdivided this forma-