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(Upper Pennsylvanian) in Kansas**

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By John Mark Jewett, Philip A. Emery,
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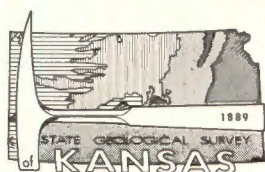
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ABSTRACT

The Pleasanton Group, a span of rocks that is mostly shale but includes some sandstone, limestone, and coal, is described as it occurs in its belt of outcrop in eastern Kansas. These rocks, which for several years previous to 1948 were called the "Bourbon Group," are of early Missourian age (Upper Pennsylvanian). The Group comprises, in ascending order, the Seminole Formation, the Checkerboard Limestone, and the Tacket Formation (a new stratigraphic name introduced in this paper). Another new name, South Mound Shale Member, is introduced for the upper member of the Seminole Formation, whose lower member is the Hepler Sandstone. A thick sequence of dark limestone and shale beds, known as "Bourbon flags" and some lenticular sandstone bodies (Knobtown sandstone) are characteristic of facies of the Seminole-Tacket formations, the name applied to the entire span of Pleasanton rocks in the northern part of its outcrop area where the separating Checkerboard Limestone is not identified.

INTRODUCTION

This report briefly describes the Pleasanton Group, of Late Pennsylvanian age, in eastern Kansas and offers a revised classification of these rocks. This Group is comprised largely of shale with some sandstone and limestone and a very minor amount of coal, with a thickness along the outcrop ranging from 30 to 135 feet. The lower boundary is marked by a disconformity that is designated as the boundary between Desmoinesian and Missourian rocks. By definition, the upper boundary of the Group is at the base of the Hertha Limestone (Moore, *et al.*, 1951, p. 90). In addition to offering a somewhat comprehensive description of Pleasanton rocks, the purpose of this paper is to present formal definitions of the names Tacket Formation and South Mound Shale Member.

PREVIOUS WORK AND ACKNOWLEDGMENTS

No attempt is made here to mention the many geologists who have studied and described the Pleasanton strata in local areas. Knowledge of these beds in Missouri has been contributed by Frank C. Greene (1933), L. M. Cline (1941), and Wallace B. Howe (1953-1961). Data concerning beds of equivalent age in Oklahoma have come from Malcolm C. Oakes (1940). Other workers mentioned in various parts of this paper have added to the general store of information on these rocks.

Many of the data used in this report have been taken from two University of Kansas master of science theses, Hatcher (1961) and Emery (1962), prepared under the supervision of the senior author. This work has been supplemented by detailed studies by Jewett in 1937. Hatcher studied the northern part of the outcrop area in Kansas and Emery the southern part. In addition, Emery studied many exposures throughout the entire outcrop area in Kansas and those in neighboring states.

CLASSIFICATION AND GEOLOGIC SETTING

The Pleasant Group crops out in eastern Kansas in a belt about 1 to 8 miles in width extending from the southeastern part of Miami County to the southeastern part of Montgomery County (Plate 1) (Moore and Landes, 1937; Jewett, 1964). The beds dip to the northwest, generally at about 20 feet per mile. The overlying basal limestone of the Kansas City Group

ity is not discernible in the subsurface a few miles west of the outcrops of lower Pleasanton and upper Marmaton rocks, and it is quite probable that the erosional surface does not extend far to the west. A core taken from a drill hole in Coffeyville, Montgomery County, Kansas, several years ago and examined by Jewett showed a continuous dark shale section between the Checkerboard Limestone and Lenapah Limestone. It is common practice in subsurface studies in eastern Kansas to regard as Pleasanton Group all strata that can be recognized as lying between limestones of the Kansas City Group and the uppermost recognizable Marmaton limestone (Adkison, 1963). In oil-field terms this rock section often is called the "Big shale."

PLEASANTON GROUP

The name Pleasanton, with group rank, was adopted for strata of Missourian age lying below the Hertha Limestone in Kansas (Moore, 1948). By definition the lower boundary of the Group is at the disconformable surface that truncates Desmoinesian rocks, and the upper boundary is at the base of the Kansas City Group. Previously, the name Pleasanton had been used for a larger span of strata (Moore, 1935 [1936], p. 62-72).

The name "Pleasanton" as a stratigraphic term is derived from the city of Pleasanton, Linn County, Kansas. Only a few feet in the upper part of the Group are exposed in Pleasanton. There is a fairly complete exposure a short distance away along a county road, SW sec. 27, T 21 S, R 24 E (Jewett and Muilenburg, 1957, p. 39). A more complete exposure of this span of rocks, formerly called the "Bourbon Group" (Jewett, 1932, p. 99), is in the south valley wall of the Marmaton River along Kansas Highway 3, south of Uniontown, Bourbon County, Kansas.

SEMINOLE FORMATION

The term "Seminole Formation," as used in Oklahoma, is adopted for usage in Kansas as the basal formation of the Pleasanton Group and includes all rocks above the basal Missourian disconformity and below the Checkerboard Limestone. The Formation is present in Kansas from the Oklahoma-Kansas boundary northward to the northernmost limit of the Checkerboard outcrop in central Neosho County, Kansas (Oakes and Jewett, 1943, p. 633, 637, fig. 1 and 634-635; Moore, *et al.*, 1937, p. 41-42).

Seminole was first used as a stratigraphic term by Taff (1901) when he applied the name to a conglomerate in Seminole County, Oklahoma. The name is derived from the Seminole Nation of Oklahoma, and the type area is in the northwestern part of the Colgate Quadrangle (USGS topographic map, 30 min. series, 1898). For further explanation and criteria for extending usage of the name into northern Oklahoma and to the Kansas border consult Branson (1957, p. 94).

Within its area of outcrop the Seminole Formation may be divided into two units; the basal unit is called the "Hepler Sandstone Member" (new combination), and the shale between the Hepler Sandstone Member and the base of the Checkerboard Limestone is called the "South Mound Shale Member" (new name) (Emery, 1962).

HEPLER SANDSTONE MEMBER

For several years sediments now called the "Hepler Sandstone Member" were known as "the basal Missourian sandstone" (Jewett, 1937, p. 36). The name "Hepler sandstone" was applied to this rock in 1940 (Jewett, 1940a). In Kansas the Hepler Sandstone Member is classed as the basal member of the Seminole Formation. Its type section is just north of Hepler in Bourbon County, Kansas.

At most of its exposures in Kansas the Hepler Sandstone is a fine- to very fine-grained, micaceous, and slightly ferruginous, quartzose sandstone. Fresh exposures show rather firm cementation by calcium carbonate; weathered exposures commonly are limonitic. Colors of the Sandstone along the outcrop range from gray to reddish-brown. Hatcher (1961) noted that in the northern part of the outcrop belt a conspicuous concentration of calcium carbonate occurs in the middle part of the formation. The Hepler Sandstone Member is thicker in the northern part of its outcrop area than in the southern part. The thickest section that has been measured, 25.5 feet, is in Linn County, Kansas. The maximum observed thickness of the unit in southern Kansas is 12 feet, but the average throughout the outcrop belt is less than 4 feet. Emery (1962) noted that a marked decrease in grain size accompanied the general southward thinning. Northward from central Bourbon County, Kansas, the grain size of the Sandstone ranges from 1/16 mm to 1/4 mm, but southward the grain size is no larger than 1/8 mm and some grains are of silt size.

have been more or less continuous, to call the rock in Missouri Checkerboard (or *vice versa*) would serve no useful purpose.

In Kansas the Checkerboard Limestone generally is classified as a formation in the lower part of the Pleasanton Group. In extreme northern Oklahoma this formation, the underlying Seminole Formation, and the overlying Coffeyville Formation are assigned to the lower part of the Skiatook Group, a classification that, because of facies changes that occur a few miles north of the state line, is used commonly in Oklahoma (Oakes and Jewett, 1943; Oakes, 1940). The classification that includes the Skiatook Group is discussed later in this paper.

The Checkerboard Limestone is divisible into lower and upper limestones and a separating shale, which may be regarded as unnamed members. The thickness ranges from a feather edge to about 14 feet.

Lower limestone unit.—The lower unit in the Checkerboard Limestone is gray, brown-weathering limestone that locally is a distinctly cross-bedded coquina composed largely of gastropods and crinoid fragments. In some places it contains abundant brachiopods and other fossils. Insoluble residues reveal plentiful arenaceous foraminifers. The thickness ranges up to 2 feet. It is this part of the Checkerboard Limestone that extends farthest into Kansas.

Shale unit.—The middle shale unit in the Checkerboard Limestone ranges in thickness from a fraction of a foot to about 8 feet and is normally poorly exposed. At one locality in the NE sec. 25, T 28 N, R 15 E, Nowata County, Oklahoma, this shale is gray and contains abundant *Derbyia*, *Composita*, and *Juresania*, as well as *Hustedia*.

Upper limestone unit.—The upper limestone in the Checkerboard Limestone is an impure, gray, brown-weathering, nodular, fine-grained limestone containing gastropods, brachiopods, and in some places abundant arenaceous foraminifers. The thickness is as much as 0.8 foot.

TACKET FORMATION

The new name Tacket Formation (Emery, 1962) is applied to the upper part of the Pleasanton Group, strata that lie between the top of the Checkerboard Limestone and the base of the Hertha Limestone. In the northern part of the Pleasanton outcrop belt the Checkerboard Limestone is absent and the Tacket Formation is in direct contact with the Seminole Formation (Pl. 1). In extreme southern Kansas where the Hertha Limestone is absent or recognized only with

difficulty, the upper boundary of the Tacket Formation is defined as occurring at the top of a zone of black, platy shale that locally underlies a zone of impure limestone concretions or a very thin ledge of abundantly fossiliferous limestone that is recognized as the southern continuation of the Hertha Limestone.

In Kansas the Tacket Formation ranges in thickness from about 15 to 60 or more feet. The unit is comprised chiefly of shale, a considerable part of which is carbonaceous and very dark gray to nearly black. Limestone occurring in thin flaggy layers interbedded with dark shale, known as the Bourbon flags, and sandstone, called the Knobtown, are regarded as facies of the Formation (Pl. 1).

The name Tacket is derived from Tacket Mound (Parsons Quadrangle, U.S.G.S. topographic map, 15 min. series, 1945) in the SW sec. 7, T 32 S, R 19 E, Labette County, Kansas. The type exposure of the Formation is along the west side of sec. 17 (Table 4).

TABLE 4.—Type exposure of the Tacket Formation. Section is in the S sec. 7 and along the west side of sec. 17, T 32 S, R 19 E, Labette County, Kansas.

	Thickness, feet
Kansas City Group	
Swope Limestone	
(members undifferentiated)	
Limestone, poorly exposed on crest of Tacket Mound.	
Ladore Shale	
Shale, much limonitic concretionary material, shale, mostly covered.	45.0±
Coal.	0.1-2
Shale, gray.	2-3.0
Coal.	0.1-2
Shale, gray.	1.0
Coal.	0.1-2
Shale, gray, blocky, plant fossils.	4.0
Shale, mostly covered.	6.0±
Total	59.0±
Hertha Limestone	
Sniabar Limestone Member	
Limestone, bluish-gray, earthy, slabby, sparse chert in upper part, pelecypod fragments near top.	3.0±
Mound City Shale Member	
Shale and thin limestone beds, gray, locally almost all shale, upper 0.5 foot entirely shale throughout exposure.	2.0±
Critzler Limestone Member	
Limestone, brown to bluish-gray, earthy to slightly crystalline, massive, <i>Marginites</i> .	3.4±
(NOTE: This is the southernmost known exposure of Hertha Limestone where, because of rather clear-cut lithologic and stratigraphic relationships, members can be designated. However, individual members are not identified)	

small amount of uranium and fluorine (Runnels, *et al.*, 1953). Locally the shale and nodules contain high amounts of iron sulphide. Fossils seemingly are rare although Emery found *Polygnathus* and *Aviculopectin* in sec. 11, T 28 S, R 20 E. Northward from northern Neosho County to the area of the "Bourbon flags" in northern Bourbon County, the upper shale unit of the Tacket Formation is well-bedded clay shale with a few marine invertebrates.

Sandstone in the upper part of the Pleasanton Group in the northern part of its outcrop area is known as Knobtown sandstone. The name is regarded as an informal one in Kansas but nevertheless is a stratigraphic name of good standing and is useful. The Knobtown's type exposure is in Jackson County, Missouri (Greene, 1933, p. 13). The Missouri Geological Survey employs Knobtown as a facies in the upper part of the Pleasanton Group. The Knobtown sandstone is lenticular (Pl. 1). In places there is no sandstone in this part of the stratigraphic section, although nearby the sandstone facies is 20 feet thick. Locally as much as 15 feet of shale occurs between the Knobtown and the Hertha Limestone. The rock is a buff, thin-bedded to massive, very fine-grained, quartzose sandstone. Cross bedding is rare. Fossil plants are fairly common and a few marine invertebrates have been found at a few localities. At places fragments of land plants and marine invertebrates are found together. Geometry of the sandstone bodies does not indicate simple stream channel fillings.

OKLAHOMA EQUIVALENT OF THE PLEASANTON GROUP

Basing correlations on "marker beds" without exact time significance, the Tacket Formation is equivalent to the lower part of the Coffeyville Formation, a designation for strata in northern Oklahoma lying above the Checkerboard Limestone and below the Dennis (Hogshooter) Limestone. The Checkerboard and Dennis limestones are the lowermost limestone formations of Missourian age that continue from

Kansas into Oklahoma as easily identified rocks. In central Labette County, Kansas, where the Hertha Limestone is readily recognized, the Dennis Formation is about 150 feet above the Hertha. At Coffeyville, on the southern border of Kansas, a zone which may represent the southern continuation of the Hertha is about 130 feet below the Dennis Limestone. Because of the change in facies of these rocks it may be convenient to employ in extreme southern Kansas (southward from about the middle part of T 33 S) the classification used in northern Oklahoma (Oakes, 1940, table 1, p. 22; Table 4). However the span of Pleasanton rocks can be identified with considerable confidence in several places in the area.

The history of usage of the stratigraphic term "Coffeyville" was discussed by Oakes (1940, p. 33-36). The current usage is in accordance with a redefinition by Moore, *et al.* (1937). The name is derived from the city of Coffeyville in southern Montgomery County, Kansas. Most of the Formation is exposed in shale pits in the northern part of Coffeyville. The part that is believed to be equivalent to the Tacket Formation is about 20 feet thick. It consists of dark gray shale, seemingly without fossils.

The classification that includes the Coffeyville Formation and that is applicable to parts of extreme southern Kansas is shown in Table 5.

TABLE 5.—Classification of rocks in a part of northern Oklahoma and general classification of a part of the Kansas rock column. Correlations are based on marker beds, not time lines.

Northern Oklahoma	General in Kansas
SKIATOOK GROUP	KANSAS CITY GROUP (lower part only)
Dewey Limestone	Drum Limestone
Nellie Bly Formation	Cherryvale Shale
Hogshooter Limestone	Dennis Limestone
Coffeyville Formation	Lower part of Bronson Subgroup
	PLEASANTON GROUP
	Tacket Formation
Checkerboard Limestone, Checkerboard Limestone	
Seminole Formation	Seminole Formation
MARMATON GROUP	MARMATON GROUP

- SCHOEWE, W. H., 1949, The geography of Kansas: *Kansas Acad. Science Trans.*, v. 52, no. 1, p. 261-333.
- SINGLER, C. R., 1965, Preliminary remarks on the stratigraphy of the Pleasanton Group (Pennsylvanian) in the northern Midcontinent: *The Compass*, v. 42, no. 2, p. 63-72.
- STATE GEOLOGICAL SURVEY OF KANSAS, 1964, Geologic map of Kansas: Map M-1.
- TAFF, J. A., 1901, The Colgate Quadrangle: U.S. Geol. Survey Geologic Atlas of the U.S., Folio no. 74, p. 1-18.