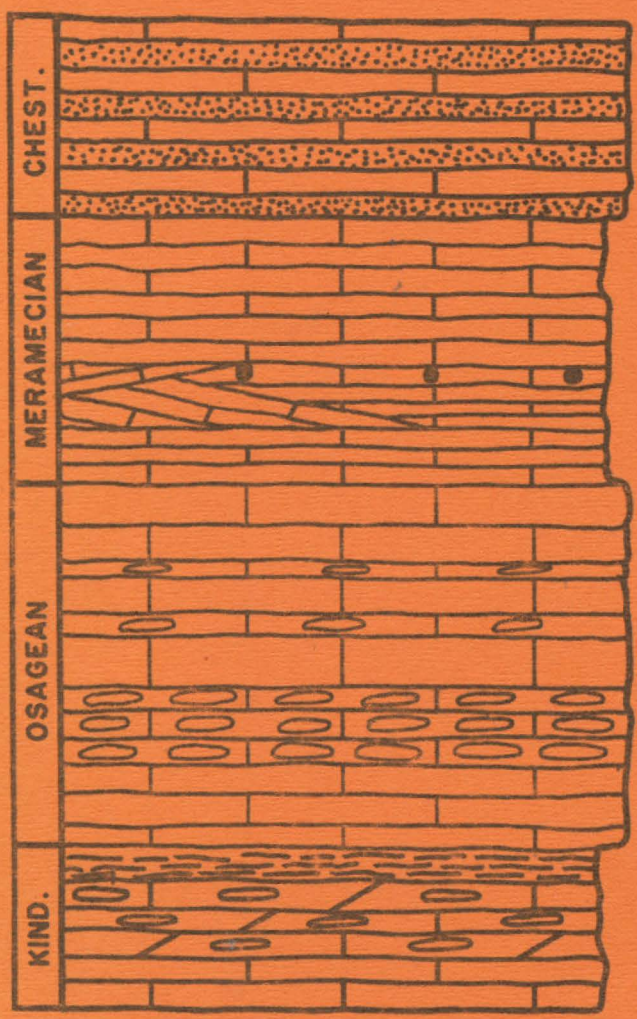
THE MISSISSIPPIAN SYSTEM



SUPPLEMENT 1 TO VOLUME 40,
THE STRATIGRAPHIC SUCCESSION IN MISSOURI

SUPPLEMENT 1 TO VOLUME 40
THE STRATIGRAPHIC SUCCESSION IN MISSOURI
1976

THE MISSISSIPPIAN SYSTEM

By Thomas L. Thompson
Kenneth H. Anderson

MISSOURI DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGY AND LAND SURVEY
GEOLOGICAL SURVEY Wallace B. Howe, State Geologist
P.O. Box 250, Rolla, MO 65401

THOMPSON, THOMAS L., and KENNETH H. ANDERSON, 1976, The Mississippian System: Mo. Dept. of Nat. Resources, Geological Survey, Supplement 1 to v. 40— The stratigraphic succession in Mo., 90 p., 1 fig., 1 tbl.

Edited by Jerry D. Vineyard, chief of Publications, Information & Graphics.; Barbara Harris, managing editor; Larry N. Stout, technical editor. Typeset by Golda Roberts. Graphics by George C. Miller, Billy G. Ross and Randal Rinehart.

CONTENTS

ILLUSTRATION

TABLE

THE MISSISSIPPIAN SYSTEM

SUPPLEMENT 1 TO VOLUME 40
THE STRATIGRAPHIC SUCCESSION IN MISSOURI

by

Thomas L. Thompson and Kenneth H. Anderson

INTRODUCTION

Howe and Koenig (1961, p. 7) compiled Volume 40, THE STRATIGRAPHIC SUCCESSION IN MISSOURI, "...to serve as both an expositional and graphic guide to the stratigraphic succession in the state as recognized by the Missouri Geological Survey..." Its purpose was to present a review and basic description of those stratigraphic units formally recognized by the Missouri Geological Survey (now the Division of Geology and Land Survey, Missouri Department of Natural Resources).

In the years since the publication of Volume 40 many new concepts have developed concerning the stratigraphic succession in Missouri, and several new formations have been proposed for addition to this succession. In 1965, the Missouri Geological Survey adopted the principles established by the CODE OF STRATIGRAPHIC NOMENCLATURE (AAPG, 1961). This was followed by the establishment of a list of formal names of rock stratigraphic units of Missouri to serve as a standard for uniform usage of nomenclature by the staff and to be reflected in all Survey publications.

The stratigraphic framework presented in Volume 40 is still valid. It is now felt, however, that additional information such as author and original description, location of type section, and synonymy of relevant previous Missouri stratigraphic terminology, would aid stratigraphers. Therefore, this SUPPLEMENT to Volume 40 is written with the specific aim of updating formally accepted Missouri stratigraphic terminology and of presenting additional and specific data relevant to the stratigraphic succession in Missouri. Subsequent SUPPLEMENTS will be prepared and released system by system. This, THE MISSISSIPPIAN SYSTEM, is the first to be completed.

The type region of the Mississippian System is the Upper Mississippi River Valley, extending from Burlington, Iowa, to southeastern Missouri and southwestern Illinois. Within Missouri are the type sections for 14 Mississippian formations and one member of a formation. The type areas for two of the four recognized Mississippian series, Osagean and Meramecian, are entirely within the State of Missouri, and Missouri shares with Illinois the type areas for the other two series, Kinderhookian and Chesterian. The locations of these Mississippian type sections and areas in Missouri are shown on figure 1.

Obviously, it is beyond the limits of this report to list in synonymy all

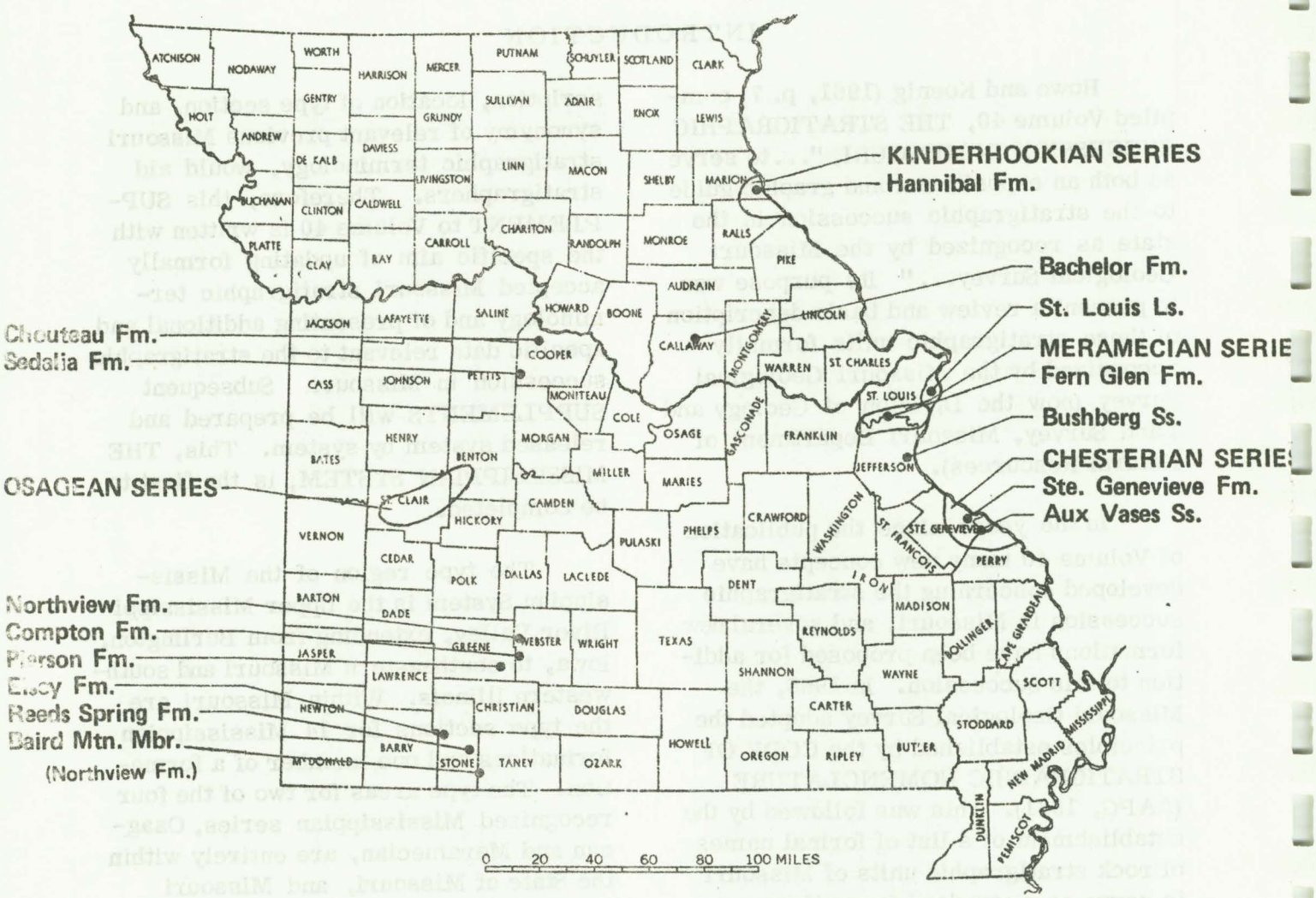


Figure 1

Map of Missouri illustrating the location of type sections of those Mississippian formations named from exposures in Missouri, and type areas of the Mississippian series.

reports that have been published describing Mississippian strata. Thus, the synonymies include only those reports considered to be of major stratigraphic import; those that originally defined, amended, reinforced, or redefined the concepts of stratigraphic units in Missouri. Numerous studies have been left out due to their limited scope or repetition of terminology.

Of interest to this report is the extreme variability of nomenclature presented by C. R. Keyes, former State Geologist of Missouri (1893-1897). Table 1 is a comparison of the time-stratigraphic framework of the Mississippian System as defined by Keyes over the 50-year span of his geologic activity (1892-1942); his proposal of 1901 is closest to that presently in use.

As a point of explanation to those using the synonymies, the parenthetical statement upper part means that only the upper part of that author's stratigraphic unit is within the presently accepted definition of the particular unit under discussion. Likewise, middle part and lower part mean that only the middle or lower part of that author's listing is within the presently defined boundaries of that unit. The designation part means that some undefined fraction of the author's unit is included within the presently defined unit.

Explanatory statements following the stratigraphic synonyms that are those designated or determined subsequent to the publication of the reference indicated, not intended or implied by the original author(s), are marked by the symbol **.

ACKNOWLEDGMENTS

The authors acknowledge Samuel Ellison, University of Texas, Austin, for his aid in locating certain old publications that were not available in Missouri.

TABLE 1

MISSISSIPPIAN TIME–STRATIGRAPHIC FRAMEWORK OF MISSOURI
(AS PRESENTED BY C.R. KEYES, 1892-1942)

Year	System / Period	Divisions (lower to upper)
Present	Devonian	Grassy Creek Shale; Louisiana Limestone
Present	MISSISSIPPIAN SYSTEM	Kinderh. S.: Hannibal Formation, Chouteau Formation; Osagean Series: Pierson-Fern Glen, Burlington Limestone, Keokuk Limestone; Meramecian Series: Warsaw Formation, Salem Formation, St. Louis Limestone, Ste. Genevieve Formation; Chesterian S.: Aux Vases Sandstone
1892	MISSISSIPPIAN SERIES	Kinderh. group; Osage group; St. Louis group; Kaskaskia group
1895-1900	MISSISSIPPIAN SERIES	Kinderh. group; Augusta group; St. Louis group; Kaskaskia group
1901	MISSISSIPPIAN SERIES	Chouteau group; Augusta group; St. Louis group; Kaskaskia group
1914	EARLY CARBONIC PERIOD	Waverly series; Mississippian series; Tennessean series
1919-1931	EARLY CARBONIC PERIOD	Waverlyan (Kinderh.); Louisian series; Tennessean series
1933	EARLY CARBONIC SUB-PERIOD	Kinderhookian series; Mississippian series; Chartresan series; Oshawanan series
1938-1939	DEVONIC PERIOD	Kinderhookian series
1938-1939	EARLY CARBONIC PERIOD	Louisian series; Chartresan series; Oshawanan series
1940	(Linnian)	Kinderhookian series
1940	EARLY CARBONIC PERIOD	Mississippian series; Chartresan series; Oshawanan series
1941	LATE DEVONIC	Kinderhookian series
1941	LEEIC PERIOD	Mississippian series; Chartresan series; Oshawanan series

MISSISSIPPIAN SYSTEM (Winchell, 1872)

Original description -- From Williams (1891, p. 136), Winchell is quoted as stating the proposal for "...the use of the name Mississippi limestone series or Mississippi group as a geographical designation for the Carboniferous limestones of the United States which are so largely developed in the valley of the Mississippi River."

Type area -- Named from exposures along the Mississippi River Valley from Iowa to southern Missouri.

Date	Author(s)	Nomenclature
To present	European	Lower Carboniferous System
1838	Owen	Subcarboniferous group (included Chattanooga Shale)
1847	Owen & Norwood	Subcarboniferous (restricted, excluded Chattanooga)
	Englemann	Carboniferous or "Mountain limestone on the Mississippi"
1855	Swallow	Carboniferous or Mountain limestone Cliff limestone (part)
1857	Hall	Lower Carboniferous limestone
1859	Shumard	Lower Carboniferous or Mountain limestone
1866	Worthen	Subcarboniferous limestone
1872	Winchell	Mississippi limestone series of Mississippi group (excluded Kinderhookian strata)
1891	Williams	Mississippian series
1892	Keyes	Mississippian series
1895	Rowley	Sub-Carboniferous
1898	Shepard	Mississippian Series
1901	Keyes (b)	Mississippian series
1903	Buckley	Lower Carboniferous system
1904	Buckley & Buehler	Mississippian (Sub-Carboniferous) system
1905	Van Horn	Mississippian (Lower Carboniferous) system
1907	Buehler	Mississippian series
	Marbut	Mississippian (Lower Carboniferous)
1910	Schuchert	Mississippic Period Tennesseic Period
1914	Keyes (a)	Early Carbonic Period
1923	Keyes (a)	Early Carbonic or Louisian Period
1933	Keyes (a)	Early Carbonic Sub-Period
1934	Keyes (a)	Louisian Period
1938	Keyes (a)	Early Carbonic Period
1941	Keyes (c)	Leeic Period (excluded Kinderhookian)
1944	Branson	Mississippian System
1961	Spreng	Mississippian System

Remarks -- Although the name "Mississippi" as a stratigraphic term was originally proposed by Winchel, it was Williams (1891) who formally proposed its usage as a major time-stratigraphic unit. Although not the original description of the Mississippian, Williams (p. 135) stated:

> "The formations resting upon the Devonian where these occur and in other places upon the Silurian, are under the names 'Mountain limestone', 'Carboniferous limestone', 'Subcarboniferous', and 'Lower Carboniferous'. No one of these names is satisfactory, and as these formations are bound together by a common general fauna and constitute a conspicuous feature in the geology of this region, it is proposed to call them the Mississippian series. This series is defined stratigraphically as that series of rocks, prevailingly calcareous, which occupies the interval between the Devonian system and the Coal Measures, and is typically developed in the States forming the upper part of the Mississippi River, viz, Missouri, Illinois, and Iowa. The name is a slight modification in form and usage of a name proposed by Alexander Winchell in 1870."

Keyes (1892) accepted Williams' concept of the Mississippian series" until 1914 (see Table 1), when he determined that Winchell's original description was only for those strata from the present Chouteau-Salem sequence. Thus, he restricted "Mississippian series" to be synonymous with Osagean Series, and a little of the uppermost Kinderhookian and lowermost Meramecian Series of the present classification. This concept apparently was not accepted by anyone else.

KINDERHOOKIAN SERIES (Meek and Worthen, 1861b)

Original description (Meek and Worthen, 1861b, p. 288) -- "The name 'Kinderhook Group' is now proposed by these authors to include the beds lying between the Black Slate and the Burlington Limestone, which have heretofore been considered the equivalents of the Chemung Group of New York."

Type area -- East bluffs of the Mississippi River Valley in the vicinity of the town of Kinderhook, Pike County, Illinois; Berry 15' Quadrangle. Keyes (1941) proposed a new type section at Burlington, Iowa, but this was not accepted by later stratigraphers.

Date	Author(s)	Nomenclature
1852	Owen	Argillo-calcareous group
1855	Swallow	Chemung group
1859	Shumard	Chemung group
1861	Meek & Worthen (a)	rejected Chemung group
	Meek & Worthen (b)	Kinderhook Group (Grassy Creek to base of Burlington Limestone)
1866	Worthen	Kinderhook group (included Louisiana Limestone)
1874	Broadhead	Chouteau group (to replace Chemung group)
1891	Williams	Chouteau group
1892	Keyes	Kinderhook group (upper part, included Louisiana Limestone)
1894	Keyes (a)	Kinderhook stage (included Louisiana Limestone)
1895	Keyes	Kinderhook group (as above)
1896	Williams	Chouteau fauna (determined to be younger than Chemung of New York)
1897	Keyes (c)	Kinderhook group (upper part)
1898	Shepard	Kinderhook formation
1901	Keyes (b)	Chouteau group
1904	Buckley & Buehler	Tullahoma formation (up to Ste. Genevieve County, Mo.; lower part named by Stafford and Killebrew, 1900, from Tennessee)
1907	Buehler	Kinderhook group (upper part)
1910	Schuchert	Kinderhookian series of Mississippic Period (included Chattanooga, Louisiana, and Fern Glen)
1911	Ulrich	Waverlyan series (lower part)
	Fenneman	Kinderhook formation (part; include Fern Glen Formation)
1914	Weller	Kinderhook group
	Keyes (a)	Waverlyan series (upper part)
	Keyes (b)	Mississippian series (lower part)
		Waverlyan series (upper part)

1919	Keyes	Louisian series (lower part)
1920	Weller	Iowan series (lower part)
1924	Krey	Kinderhook series of Lower Mississippian Sub-system (part)
1928	Moore	Kinderhook group (upper part)
	Weller & St. Clair	Kinderhook group (upper part)
1933	Keyes(a)	Kinderhookian series (upper part)
		Mississippian series (lower part)
1934	Keyes(c)	Kinderhook series (upper part; all of series in Devonic Period)
1938	McQueen & Greene	Kinderhook group
	Branson(a)	Lower Mississippian series
1939	Grohskopf, et al.	Kinderhook group (part)
1940	Keyes(a)	Linnian series (top of; Devonian in age)
		Mississippian series of Leeic Period (base of)
1941	Keyes(c)	Kinderhookian series of Yorkic Period (top of; Devonian in age)
1944	Branson	Kinderhook group (lower part of Lower Mississippian series)
**1948	Weller, et al.	Easley group of Kinderhookian series (**Fabius group of Kinderhookian series now considered to be Devonian in age)
1950	Kaiser	Kinderhookian series
1952	Beveridge & Clark	Kinderhookian series
1961	Scott & Collinson	Kinderhookian series (as presently defined)
	Spreng	Kinderhookian series
1963	Carlson	Kinderhookian Series
1968	Goebel	Kinderhookian Stage of Lower Mississippian Series (in Kansas)
1970	Thompson & Fellows	Kinderhookian series

Remarks -- Scott and Collinson (1961) designated, on the basis of conodonts, the base of the Kinderhookian Series as the contact between the "Glen Park" and the Louisiana Limestone in northeastern Missouri. Elsewhere, the base of the Kinderhookian Series is defined at the base of the Bachelor Formation or Hannibal Shale. The top of the Series was designated by Thompson and Fellows (1970) as being at the base of the Pierson Formation in southwestern Missouri, the base of the Fern Glen Formation in eastern Missouri (Thompson, 1975).

Many authors before 1940 included Late Devonian formations, such as the Chattanooga or Grassy Creek Shale, Louisiana Limestone, etc., within their Kinderhookian, as did Meek and Worthen (1861b) in the original description of the "group". Those references in the synonymy are followed by a statement "(upper part)", meaning only the upper part of their Kinderhookian is considered equivalent to the present Kinderhookian.

Those formations identified as falling within the Kinderhookian Series are:

Western Missouri	Eastern Missouri
Northview Formation	Chouteau Group (undifferentiated)
Baird Mountain Limestone Member	
Sedalia Formation	Sedalia Formation
Chouteau Formation	Chouteau Formation
Compton Formation	
"Kinderhook shale" (Boice Sh.)	Hannibal Formation
Bachelor Formation	*Bachelor Formation
	*Bushberg Sandstone

*Not present in region of Hannibal Formation.

Hannibal Formation (Keyes, 1892)

Original description (Keyes, 1892, p. 289) -- "The Hannibal shales (Vermicular shales of Swallow) have a maximum thickness of about 75 feet at the typical locality. In Missouri the upper portion is sandy in places and forms often a rather compact, shaly sandstone, becoming harder northward, where it assumes the character of a substantial sandrock. The latter is apparently entirely absent in the southwestern part of the state. Downward, the shaly sandstone rapidly loses its arenaceous character and passes quickly into bluish or greenish clay-shales which appear remarkably uniform over borad areas."

Type section -- Exposures in the lower part of Lover's Leap, above the railroad yard in the western bluffs of the Mississippi River Valley, southern edge of Hannibal, Marion County, Missouri; NW$\frac{1}{4}$ SE$\frac{1}{4}$ sec. 28, T. 57 N., R. 4 W.; Hannibal East 7$\frac{1}{2}$' Quadrangle. Section described by Koenig and Martin (1961, p. 45).

Date	Author(s)	Nomenclature
**(not) 1852	Owen	Encrinital Group of Hannibal (** = Burlington Ls.)
1855	Swallow	Vermicular sandstones and shales
1861	Meek & Worthen(a)	Vermicular sandstone and shale
1892	Keyes	Hannibal shales
1897	Keyes(b)	Hannibal shales (of Devonian age)
1900	Keyes(b)	Hannibal shales of Kinderhook formation
1907	Buhler	Hannibal formation
	Rowley	Hannibal shale
1910	Schuchert	Hannibal formation
1916	Keyes	Hannibal shales
1924	Krey	Hannibal shale
1928	Moore	Hannibal formation
1938	Branson(b)	Hannibal siltstone
	Keyes(d)	Kinderhook shales (upper part)
1939	Grohskopf, et al.	Hannibal formation
1940	Keyes(b)	Hannibal shales
1944	Branson	Hannibal formation
1948	Weller, et al.	Maple Mill shale (Hannibal shale)
1957	Laswell	Hannibal formation
**1960	Mehl	Cuivre shale (** = basal part of Hannibal)
1961	Mehl	Cuivre Shale (considered to be a possible lower member of the Hannibal)
	Spreng	Hannibal formation
	Collinson	Hannibal formation
1963	Carlson	Boice Shale (in northeastern Missouri)
1968	Canis	Hannibal shale

Bachelor Formation (Mehl, 1960)

Original description (Mehl, 1960, p. 95) -- "The lithology of the Bachelor, ...is markedly varied although it consists dominantly of pale buff quartz sandstone of medium grain size, moderately well to poorly sorted.

"In most places the basal part of the Bachelor...is marked by an abundance of phosphatic nodules that are more or less spherical or flattened, irregular and elongate, and which measure up to several inches in greatest diameter."

Type section -- Exposure in stream bed in the SE¼ NW¼ SW¼ sec. 9, T. 48 N., R. 8 W., Callaway County, Missouri; Fulton 15' Quadrangle.

Date	Author(s)	Nomenclature
1898	Shepard	Phelps Sandstone (Hamilton Stage)
1901	Weller	Phelps Sandstone (resembled Sylamore of Arkansas)
1918	Branson	Sylamore Sandstone
1928	Moore	Sylamore sandstone (doubted equivalence of Phelps to Sylamore)
1933	Branson & Mehl	Sylamore sandstone
1934	Branson & Mehl	Bushberg sandstone (upper part)
	Peck	Sylamore Sandstone
1937	Keyes (d)	"so-called Sylamore sandstone"
1944	Branson (a)	Bushberg formation (upper part)
	Branson (b)	Sylamore sandstone
1950	Kaiser	Sylamore sandstone (in Kinderhookian series)
1952	Beveridge & Clark	Sylamore sandstone
1954	Searight	Sylamore formation
1960	Mehl	Bachelor Formation
1961	Mehl	Bachelor Formation
	Koenig	Sylamore sandstone
	Spreng	Sylamore formation
1964	Gordon	Gaylor Sandstone (in Arkansas)
1968	Canis	Bachelor Formation
	Stinchcomb & Fellows	Bachelor Formation
1970	Thompson & Fellows	Bachelor Formation
1975	Thompson	Bachelor Formation

Remarks -- The thin, widespread sandstone at the base of the Mississippian carbonate section has been variously correlated with the Sylamore Sandstone of Arkansas (a facies of the Late Devonian Chattanooga Shale) and the Bushberg Sandstone of eastern Missouri, depending on the background of the worker and the area under study. Mehl (1960, 1961) reported that the sandstones called Sylamore were Devonian in age in some cases, early Mississippian in others. This age difference was too great to attribute to transgression (Late Devonian to middle

Kinderhookian). Therefore, Mehl proposed the name Bachelor to replace Sylamore for the basal Mississippian sandstone beneath the Chouteau limestones in Missouri.

This formation is characteristically a thin greenish to tan quartzose sandstone, with a calcareous "glint" cement (calcium carbonate in optical continuity). It usually contains phosphatic debris and nodules, and often has chert fragments of underlying strata incorporated in it. In southwestern Missouri, Thompson and Fellows (1970) included a thin shale between the sandstone and overlying carbonate as an upper member of the Bachelor; this shale persists toward the southwest, whereas the sandstone member disappears.

Chouteau Formation (Chouteau Group undifferentiated) (Swallow, 1855)

Original description (Swallow, 1855, p. 101,102) -- "This formation, when fully developed, is made up of two quite distinct divisions.

1st. At the top, immediately under the Encrinital Limestone, we find some forty or fifty feet of brownish gray, earthy, silico-magnesian limestone in thick beds, which contain disseminated masses of white or limped calcareous spar. This rock is very uniform in character, and contains but few fossils. Reticulate corals, and Fucoidal markings like the Caudagalli, are most abundant.

2nd. The upper division passes down into a fine compact blue, or drab thin-bedded limestone, whose strata are quite irregular and broken. Its fracture is conchoidal, and its structure, somewhat concretionary.

"In the northeastern part of the State the Chouteau Limestone is represented by a few feet of coarse, earthy, crystalline rock, like the lower division of the Encrinital Limestone."

Type section -- At Chouteau Springs, Center S½ sec. 16, T. 48 N., R. 17 W., Cooper County, Missouri; Pilot Grove 7½' Quadrangle.

Date	Author(s)	Nomenclature
1855	Swallow	Chouteau Limestone (Chemung Group; part)
1859	Shumard	Chouteau limestone (part)
1861a	Meek & Worthen	Chouteau limestone
1874	Broadhead	Chouteau group (to replace Chemung Group of Swallow)
1892	Keyes	Chouteau limestone (part of Kinderhook stage)
1896	Williams	Chouteau fauna (distinctly younger than Chemung fauna)
1900	Keyes (b)	Chouteau limestone member of Kinderhook formation (part)
1903	Buckley	Chouteau limestone (part)
1905	Van Horn	Chouteau limestone (part)
1907	Buehler	Chouteau limestone (part)
	Marbut	Chouteau limestone (part)
	Rowley	Chouteau limestone (part)
1924	Krey	Chouteau limestone (part)
1928	Moore	Chouteau limestone (restricted, as presently defined)
1933	Keyes (a)	Chouteau limestone (base of Mississippian series)
1938	McQueen & Greene	Chouteau formation
	Branson	Chouteau limestone (part)

1939	Grohskopf, et al.	Chouteau formation
1944	Branson	Chouteau limestone (lower part)
1950	Kaiser	Chouteau limestone
1952	Beveridge & Clark	Chouteau group (part)
1961	Spreng	Chouteau group undifferentiated
	Collinson	Chouteau formation
1963	Carlson	Hampton (Chouteau) Group (in northwestern Missouri)
1968	Canis	Chouteau Limestone (part, excluding Compton)

Remarks -- The great difficulty in understanding early literature concerning the Chouteau is that prior to 1928 the lithology of the Sedalia Formation was included within the Chouteau. Also, some workers still tend to include the Compton within the Chouteau (Canis, 1968). When used as a group, the Compton, Northview, and Sedalia are included under the name Chouteau Group, which then becomes synonymous with Kinderhookian.

Thus, if used after 1928 as a formational name, Chouteau usually is referred to in the manner presently considered the valid interpretation. However, if used as a group, then this unit also may include strata of the Compton, Northview, Sedalia, and Chouteau lithologies.

As presently understood, the type section of the Chouteau as described by Swallow would now consist of the Compton and Sedalia formations ("2nd part") and the Chouteau Formation ("1st part"), with the Northview shale separating the top of the Chouteau from the basal Burlington (or Pierson) beds.

Compton Formation (Moore, 1928)

Original description (Moore, 1928, p. 120) -- "The Compton limestone is a light bluish drab, or grayish blue, compact limestone, very fine-grained and breaking with a conchoidal fracture. ...The beds are generally of moderate thickness, averaging 6 to 8 inches, but in places they are of as much as 2 feet thick. The upper beds merge into the soft bluish shale of the Northview formation. As observed on Finley Creek, the rock is very compact, hard, fine-grained, breaking with a splintery, conchoidal fracture."

Type section -- Originally described by Moore (1928) as along the James River in the vicinity of Compton (the Compton Post Office; no longer present) in Webster County. Beveridge and Clark (1952, p. 73) designated a new type section as "...being in the center $SE\frac{1}{4}$ $NE\frac{1}{4}$ $S\frac{1}{2}$ sec. 3, T. 29 N., R. 19 W., on the west side of a gravel road, Webster County. This section is two miles northeast of the Compton Post Office site, and shows the Compton in its entirety." Thompson and Fellows (1970, p. 14) located this site as "$SE\frac{1}{4}$ $E\frac{1}{2}$ $E\frac{1}{2}$ Lot 2 of the $NE\frac{1}{4}$ sec. 3...". This exposure has been nearly completely buried by relocation of the gravel road to above the outcrop; Fordland 15' Quadrangle.

Date	Author(s)	Nomenclature
1855	Swallow	Lithographic Limestone
1893	Rowley	Lithographic limestone
1894	Keyes	Louisiana limestone
1898	Shepard	Sac formation
		Louisiana limestone
		King formation (in part)
1900	Keyes (b)	Lithographic limestone (not equivalent to the Louisiana limestone)
1901	Weller	Sac limestone
1904	Shepard	Kings limestone
1905	Weller	Hannibal limestone (regarded it as part of what is now the Northview Formation)
	Shepard	Kings Branch limestone
1906	Weller	Chouteau limestone (lower part)
1918	Branson	Chouteau limestone
1928	Moore	Compton limestone
		St. Joe limestone member of Boone formation (lower part)
1944	Branson	Compton member of Chouteau formation
1948	Weller, et al.	Compton limestone
1950	Kaiser	Chouteau limestone (part)
1952	Beveridge & Clark	Compton formation of St. Joe group
1954	Searight	Compton formation of Chouteau group
1961	Spreng	Compton formation of Chouteau group

1968	Canis	Chouteau Limestone (lower part)
1970	Thompson & Fellows	Compton Formation

Sedalia Formation (Moore, 1928)

Original description (Moore, 1928, p. 149) -- "The name Sedalia limestone is here proposed for the gray to light buff 'silico-magnesian' limestone which was termed the Upper Chouteau by Swallow and other geologists. In the words of Swallow who first distinguished the horizon, the 'Upper Chouteau' (Sedalia) limestone is a 'brownish-gray, earthy, silico-magnesian limestone in thick beds, which contain disseminated masses of white or limpid calcareous spar.' The formation is really a siliceous dolomite throughout the region of its typical development.

"The Sedalia is massively bedded, individual layers being in many places 10 to 20 feet in thickness. These massive beds weather in rather smooth, characteristically rounded surfaces unlike either the Chouteau or the Burlington. The rock is somewhat soft on fresh exposure and breaks with an even or subconchoidal fracture. On exposed surfaces it appears locally to be much harder, though this is not a universal peculiarity. At different horizons in the formation layers of grayish or bluish black, very dense, hard chert nodules are commonly found which range in size from 2 to 12 inches in length, 1 to 6 inches in width and 1 to 3 inches in thickness. Locally there are nearly continuous thin chert bands. The dark, flinty chert nodules typically possess an outer rim of white cherty material."

Type section -- Missouri, Kansas and Topeka Railroad Sweeney Quarry, SW¼ SW¼ SE¼ sec. 4, T. 46 N., R. 19 W., Cooper County, Missouri; Clifton City 7½' Quadrangle.

Date	Author(s)	Nomenclature
1855	Swallow	Upper Chouteau Limestone
	Various authors	Chouteau limestone (or formation) (part)
1928	Moore	Sedalia limestone (Osagean in age)
1937	Keyes(a)	Chouteau limestone (rejected Sedalia as a formation name)
1938	McQueen & Greene	Sedalia formation (Osagean in age)
1939	Grohskopf, et al.	Sedalia formation (Osagean in age)
1944	Branson	Sedalia member of Chouteau formation
1948	Weller, et al.	Sedalia limestone (Kinderhookian in age)
1950	Kaiser	Sedalia dolomite
1951	Beveridge	Sedalia formation (Kinderhookian in age)
1952	Beveridge & Clark	Sedalia formation of Chouteau group
(not) 1952	Ruby	Sedalia formation (in Illinois; = Fern Glen Formation)
1954	Searight	Sedalia formation of Chouteau group
1961	Spreng	Sedalia formation (Kinderhookian in age)
	Koenig	Sedalia formation
(not) 1962	Collinson, et al.	"Sedalia" formation (Osagean in age)
1968	Canis	Sedalia Dolomite (Kinderhookian in age)

Remarks -- The best discussion of the present state of understanding of the Sedalia Formation was by Koenig (1961a, p. 79).

> "Another formation in the Illinois-Missouri area of the Lincoln fold which has given rise to a good bit of lively discussion in years past is the Sedalia formation. In central Missouri where the formation was originally defined, the formation is a brown to buff dolomitic limestone and it underlies the Northview formation which is a silty shale. The age of the Sedalia, as well as that of the Northview, is now considered by Missouri geologists to be Kinderhookian, but when it was defined by Moore in 1928 (p. 149) the Sedalia was thought to be Osagean in age. Overlying the Northview in central Missouri, there is a thin unit of yellowish-buff dolomitic limestone which can be traced into southwestern Missouri where it thickens and is named the Pierson formation which faunally has proven to be Osagean in age. It is believed that this same thin unit of central Missouri extends eastward and northward into the Lincoln fold area where it is tentatively recognized as the brown dolomitic limestone bed at the base of the Burlington formation. It is possible, therefore, that the unit, which is designated as "Sedalia" in Illinois, may be the equivalent of what is thought to be an extension of the Pierson into northeastern Missouri."

Moore's original description of the Sedalia included nearly the entire Chouteau of Swallow except for the lower part, which is lithologically the Compton Formation. Thus, Compton and Sedalia constituted the Chouteau of Swallow. In this broad sense, the Sedalia consists of both a lower unit of silty dolomite and/or silty dolomite interfingering with gray lithographic limestone, and an upper unit of cherty calcareous dolomite. Present usage within the Missouri Geological Survey restricts the Sedalia to the silty dolomite, whereas the overlying cherty dolomite is identified as the "Chouteau Formation".

Thus, whereas Moore would include two units, Chouteau and Sedalia for this sequence, the Missouri Survey recognized three, the Compton, Sedalia, and Chouteau (the latter two equal Moore's Sedalia).

Northview Formation (Weller, 1901)

Original description (Weller, 1901, p. 140) -- "In the older geological reports these beds have been known as the Vermicular sandstone and shales from the abundance of worm burrows which occur in the sandstones.

"The sandstones of the formation are abundantly fossiliferous near Northview, in the western edge of Webster county, and therefore this name is suggested for the formation.

"Shepard's investigations have shown that the formation has a thickness ranging from ten to ninety feet. It is typically made up of two members, a lower bluish shale and an upper fine-grained yellowish sandstone. The two members of the formation grade from one into the other with no sharp line of separation, and one member is frequently thickened at the expense of the other, the lower shale member being the most persistent."

Type section -- Originally named for exposures in the vicinity of Northview, Webster County, Missouri. Beveridge and Clark (1952, p. 72) designated the composite of two sections, one as SW$\frac{1}{4}$ SW$\frac{1}{4}$ SW$\frac{1}{4}$ sec. 23, and S$\frac{1}{2}$ SE$\frac{1}{4}$ SE$\frac{1}{4}$ sec. 22, T. 30 N., R. 19 W., on what they thought would be the south (east-bound) lane of U. S. Highway 66 (now Webster County road B); the other exposure, the upper part of the Northview, on the present Interstate Highway 44 east-bound lane, in NE$\frac{1}{4}$ SE$\frac{1}{4}$ SE$\frac{1}{4}$ sec. 22, T. 30 N., R. 19 W. As reported by Thompson and Fellows (1970, p. 17) new construction of Interstate Highway 44 completely obliterated the latter part (upper part) of the type section; Strafford 7$\frac{1}{2}$' and Niangua 15' Quadrangles.

Date	Author(s)	Nomenclature
1855	Swallow	Vermicular Sandstone and Shales
1898	Shepard	Hannibal shale
1899	Weller	Vermicular sandstone at Northview
1901	Weller	Northview shale
1910	Schuchert	Northview formation
1928	Moore	Northview formation St. Joe limestone member of Boone formation (part; extreme southwestern Missouri)
1938	Branson, et al.	Northview siltstone and shale
1944	Branson	Northview member of Chouteau formation
1948	Weller, et al.	Northview sandstone
1950	Kaiser	Northview formation
1951	Beveridge	Northview formation
1952	Beveridge & Clark	Northview formation of Chouteau group
1954	Searight	Northview formation of Chouteau group
1961	Spreng	Northview formation of Chouteau group

1968	Canis	Northview Formation
1970	Thompson & Fellows	Northview Formation (with Baird Mountain Limestone Member)

Remarks -- Thompson and Fellows (1970) noted that the Northview becomes more calcareous toward the south from the type section, becoming a greenish-gray argillaceous limestone 1 to 5 feet thick near the Missouri-Arkansas border. This limestone facies of the Northview decreases in thickness in Arkansas and Oklahoma to around 3 inches in the extreme southern part of its extent. In the region of the argillaceous limestone facies, the Northview can be distinguished from Compton by the higher clay content, and by the fact that upon weathering, Northview strata break down rapidly, leaving a reentrant between the Compton and Pierson limestones.

In Arkansas and Oklahoma, Northview can be recognized nearly as far south as the St. Joe limestone is present. At extreme limits of St. Joe deposition, the Northview horizon is lost, probably due to lack of terrigeneous sediment.

Baird Mountain Limestone Member of Northview Formation
(Thompson and Fellows, 1970)

Original description (Thompson & Fellows, 1970, p. 21) -- "The Baird Mountain can usually be subdivided into two portions, a lower thin-bedded 2-inch to 1-foot limestone with finely crystalline matrix and abundant small crinoid ossicles, and an upper foot or so of slabby-bedded argillaceous limestone. Both units are brick red."

Type section -- Quarry on Baird Mountain, immediately south of Table Rock Lake dam; SW¼ NW¼ sec. 26, T. 22 N., R. 22 W.; Taney County, Missouri; Table Rock Dam 7½' Quadrangle.

Date	Author(s)	Nomenclature
1952	Beveridge & Clark	St. Joe Limestone (part)
1970	Thompson & Fellows	Baird Mountain Limestone Member of Northview Formation

Remarks -- The Baird Mountain Limestone Member of the Northview Formation has been recognized only along the southern part of southwestern Missouri, and extends into Arkansas. It is characteristically a red, argillaceous, fossiliferous limestone, usually 1 to 2 feet thick, that is quite distinct from the greenish-gray argillaceous limestone to shale below and the red and gray, mottled limestone of the Pierson above. Branson (1944) had previously noted the presence of thin, red Fern Glen-like Northview members in Stone and Barry Counties. This unit is recognized as neither Northview, as usually defined, nor Pierson, but as a wedge of sediment that was truncated to the north by erosion prior to deposition of Pierson strata. The top of the Baird Mountain marks the top of the Kinderhookian Series.

"Kinderhook Shale"

Date	Author(s)	Nomenclature
1938	McQueen & Greene	Kinderhook shale
1961	Koenig	"Kinderhook shale"
1963	Carlson	Boice Shale (upper part of "Kinderhook shale") Chattanooga Shale (lower part of "Kinderhook shale")

Remarks -- "Kinderhook Shale" is a term long used in western and northwestern Missouri subsurface for a sequence of black to gray and green shales above Devonian carbonates and beneath carbonates of the Mississippian. Carlson (1963) recognized two shales, a lower Devonian black shale (Chattanooga) and an upper gray to green Mississippian (Boice) shale, the latter he regarded as equivalent to the Hannibal shale of eastern Missouri.

Bushberg Sandstone (Ulrich, 1904)

Original description (Ulrich, 1904, p. 110) -- "In the area about Glen Park and Sulphur Springs I have further distinguished, at the base of the Kinderhook and perhaps top of the Devonian, the Sulphur Springs formation. This formation is divisible into three members, a thin sandstone (about 10 feet) at the top to which the name Bushberg sandstone may be applied; beneath this is a 1- to 5-foot bed of oolitic limestone, probably early Kinderhook in age, which may be called Glen Park (oolitic) limestone; and finally, at the base a shale, 0-15 feet thick, either earliest Kinderhook or late Devonian in age, for which no subordinate designation is proposed."

Type section -- Designated by Mehl (1960, p. 69) as "...at the head of a ravine into the Mississippi River at Bushberg, a one time station on the St. Louis, Iron Mountain and Southern Railroad. This is in the NW NE NW sec. 8, T. 41 N., R. 6 W., Jefferson County, Missouri." Herculaneum 7½' Quadrangle.

Date	Author(s)	Nomenclature
1904	Ulrich	Bushberg sandstone member of the Sulphur Springs formation
1910	Schuchert	Bushberg formation
1911	Fenneman	Bushberg sandstone member of Kinderhool formation
1928	Moore	Bushberg sandstone
	Weller & St. Clair	Bushberg sandstone member of the Sulphur Springs formation
1934	Branson & Mehl	Bushberg sandstone
1938	Branson	Bushberg sandstone
1939	Keyes(d)	Hannibal shales (part; rejected Bushberg name)
1947	Hinchey, et al.	Bushberg sandstone formation
1948	Weller, et al.	Bushberg sandstone
1952	Unklesbay	Bushberg formation
1960	Mehl	Bushberg formation
1961	Mehl	Bushberg formation
	Koenig	Bushberg formation
1975	Thompson	Bushberg Sandstone

Remarks -- Of the three members Ulrich considered part of the Sulphur Springs Formation (later raised to the Sulphur Springs Group), only the uppermost, the Bushberg, is Mississippian in age. The Glen Park and unnamed shale are Late Devonian in age.

Gilmore City Formation (Van Tuyl, 1922)

Original description (Van Tuyl, 1922, p. 113) -- "Section in Gilmore Portland Cement Company's quarry.

	FEET
5. Limestone, light gray, fine-grained, thin-bedded, rather soft. Exposed at south end of quarry.	4½
4. Limestone, compact, gray, dense, fine-grained, brittle, very faintly oolitic, massive.	10
3. Limestone, as in bed 2 but filled with crylindrical corals . .	2½
2. Limestone, gray, oolitic, compact, brittle.	4
1. Limestone, gray, massive, slightly crinoidal oolitic, exposed	6".

Type section -- Gilmore Portland Cement Company quarry, 1½ miles northwest of Gilmore City; now Midwest Limestone Company quarry, SW¼ sec. 36, T. 92 N., R. 31 W., Pocahantus County, Iowa.

Date	Author(s)	Nomenclature
1922	Van Tuyl	Gilmore City limestone (in Iowa)
1938	McQueen & Greene	Gilmore City formation
(not) 1960	Wells	Gilmore City formation (= Chapin or Compton limestone, according to Carlson, 1963)
1963	Carlson	Gilmore City Formation

Remarks -- In northwestern Missouri two oolitic horizons occur within the carbonate section above the basal Mississippian Boice Shale of Carlson (1963). The lower oolite is within the Compton (Chapin). The other, above the "Chouteau Group" (Carlson, 1963, p. 6), is the Gilmore City.

McCraney Limestone (Moore, 1928)

Original description (Moore, 1928, p. 51) -- "For reasons presented in the discussion of correlation the compact, bluish drab limestone...which occurs at the top of the Kinderhook section at Kinderhook, Illinois, is regarded as a member (McKerney) of the Hannibal formation. This limestone which is fine-grained and breaks with a sharp conchoidal fracture, is not known in Missouri."

Type section -- In the bluffs on the east side of the Mississippi River Valley immediately north of the town of Kinderhook, on the north and south sides of the mouth of McCraney Creek, SW¼ NW¼ and SE¼ SE¼ sec. 14, T. 4 S., R. 7 W., Pike County, Illinois; Barry 15' Quadrangle.

Date	Author(s)	Nomenclature
1928	Moore	McKerney (sic) beds of the Hannibal formation (in western Illinois)
1935	Moore	McKerney (sic) limestone of the North Hill Member of the Hampton formation (in Iowa)
1940	Keyes(d)	Burlington limestone (lower part; McKerney name rejected)
1956	Workman & Gillette	McCraney formation
1961	Scott & Collinson	McCraney formation (map shows McCraney present in extreme northeastern Missouri subsurface)
1975	Willman, et al.	McCraney Limestone (restricted to western Illinois)

Remarks -- The McCraney Limestone is included in this review because of the reference made to its presence in the subsurface of northeastern Missouri by Scott and Collinson (1961). This has not been verified at this time by other workers of Mississippian stratigraphy.

OSAGEAN SERIES (Williams, 1891)

Original description (Williams, 1891, p. 169) -- Not described, just listed the new name.

Type area -- Named for strata exposed along the Osage River in west-central Missouri; St. Clair and adjacent counties.

Date	Author(s)	Nomenclature
1874	Broadhead	Keokuk group
1891	Williams	Osage group
	Branner	Osage group
1892	Keyes	Osage group (included Warsaw)
1893	Keyes	Augusta limestone (all limestone between the Kinderhook group and the St. Louis Limestone; to the base of the present Salem)
1894	Keyes(a)	Augusta stage
1895	Keyes	Augusta group
1898	Weller	Osage group (excluded Warsaw)
	Keyes	Augusta group (included Warsaw; rejected Osage, type area not representative)
1904	Buckley & Buehler	Tullahoma formation (upper part; recognized up to Ste. Genevieve County, Missouri; named by Stafford and Killebrew, 1900, in Tennessee)
1910	Schuchert	Osage series
1911	Ulrich	Waverlyan series (upper part)
	Fenneman	Osage group (excludes Fern Glen strata)
1914	Weller	Osage group (included Warsaw)
	Keyes(a)	Mississippian series (lower part)
1919	Keyes	Louisian series (middle part)
1920	Weller	Iowa series (middle part; from base of Kinderhookian to top of Ste. Genevieve)
1924	Krey	Osage series of Lower Mississippian Sub-System
1928	Moore	Osage group
	Weller & St. Clair	Osage group
1933	Keyes(a)	Mississippian series (included Warsaw and Chouteau)
1938	McQueen & Greene	Osage group
1939	Grohskopf, et al.	Osage group
1940	Keyes(a)	Mississippian series (included Warsaw and Chouteau)
1941	Keyes(a)	Mississippian series (same)
1944	Branson	Middle Mississippian series
1948	Weller, et al.	Osagean series

1950	Kaiser	Osagian series
1952	Beveridge & Clark	Osagean series
1961	Spreng	Osagean series
1967	Thompson	Osagean Series
1968	Thompson & Goebel	Osagian stage of Lower Mississippian Series (in Kansas)
1970	Thompson & Fellows	Osagean Series
1975	Thompson	Osagean Series
	Willman, et al.	Valmeyeran Series (lower part; in Illinois)

Remarks -- The base of the Osagean Series is presently defined (Thompson and Fellows, 1970; Thompson, 1975) as the base of the Pierson Formation in southwestern Missouri, the base of the Fern Glen in east-central Missouri, and the top of the Chouteau Group in central Missouri (the base of the Burlington limestone). The top of this series is the top of the Short Creek Oolite Member of the Keokuk Limestone in western Missouri, the Keokuk-Warsaw boundary in central and eastern Missouri.

Although Williams (1891) did not designate the type area for the Osagean, Keyes (1893) regarded the most typical region for the Osagean as in the vicinity of Osceola, St. Clair County, Missouri. Kaiser (1950, p. 2157) stated:

> "The lower two-thirds of the Burlington limestone is the only part of the Osagian represented in the Osceola area. The most complete section is at the Hunt-Ballard quarry about 1 mile west of town in the $SE\frac{1}{4}$ $SW\frac{1}{4}$ $SE\frac{1}{4}$ of Sec. 18, T. 38 N., R. 25 W. (locality 56, fig. 1). The lowest beds are best exposed in a railroad cut in the town of Osceola 2 blocks east of the dam across Osage River. No rocks of Keokuk age are present in the Osceola area. Thus, as Keyes (1893, p. 60) pointed out, the type section of the Osage is not well chosen and contains only a part of the Burlington formation. Nevertheless, the term Osagian has gained wide acceptance and should continue to be used."

Those Osagean formations formally recognized in Missouri are:

Western Missouri	Eastern Missouri
Keokuk Limestone	Keokuk Limestone
Short Creek Oolite Member	
Burlington Limestone	Burlington Limestone
Elsey Formation	
Reeds Spring Formation	Fern Glen Formation
Pierson Formation	

1975	Thompson	Fern Glen Formation
	Willman, et al.	Fern Glen Formation
		Meppen Limestone

Remarks -- Thompson (1975) described the Fern Glen of eastern Missouri as the stratigraphic equivalent of the Pierson, Reeds Spring, and Elsey Formations of southwestern Missouri. The Meppen Formation, named to replace "Sedalia" in Illinois, is recognized by geologists in Illinois for what is in Missouri the lower part of the Fern Glen Formation. Thus, both the Meppen and Fern Glen of Willman, et al. (1975) would be within the Fern Glen of Thompson (1975).

Fern Glen Formation (Weller, 1906)

Original description (Weller, 1906, p. 438) -- "Red limestone with greenish blotches, the green color becoming somewhat more marked towards the top, capped by a conspicuous chert band six to eight inches in thickness. In the midst of this bed, besides some scattered chert masses, are two conspicuous, continuous chert bands, each four inches in thickness, one three feet and the other six feet from the base of the bed. ... This red, more or less argillaceous limestone formation has a rather wide geographic distribution, and always contains its own characteristic fauna. ... It is again exposed near Fern Glen station on the Missouri Pacific Railroad, on the Meramec river, twenty miles west of St. Louis. ... Because of its good exposure at Fern Glen, the formation may be called the Fern Glen formation."

Type section -- Named from Fern Glen, southwestern St. Louis County, Missouri. Redescribed and amended to be a composite of two railroad cuts on either side of Fern Glen by Thompson (1975, p. 164), on the north bank of the Meramec River, Center SE$\frac{1}{4}$ sec. 14, and NW$\frac{1}{4}$ SW$\frac{1}{4}$ SW$\frac{1}{4}$ sec. 13, T. 44 N., R. 4 E., St. Louis County, Missouri; Manchester 7$\frac{1}{2}$' Quadrangle.

Date	Author(s)	Nomenclature
1873	Shumard	Chouteau limestone of Chemung group (upper part)
1906	Weller	Fern Glen formation
1909	Weller	Fern Glen formation (Kinderhookian in age)
1910	Schuchert	Fern Glen formation (Kinderhookian series)
1911	Fenneman	Fern Glen limestone member of Kinderhook formation
1924	Krey	Fern Glen formation
1928	Moore	Fern Glen formation
	Weller & St. Clair	Fern Glen formation (of doubtful Osagean age)
1934	Keyes(d)	Burlington limestone (lower part; rejected Fern Glen name)
1937	Keyes(b)	"so-called Fern Glen limestone" (rejected; = basal part of Burlington Limestone)
1939	Keyes(c)	Burlington limestone (lower part)
1944	Branson	Fern Glen member of Chouteau formation
1947	Mehl & Thomas	Fern Glen formation
1948	Weller, et al.	Fern Glen formation (Osagean in age)
1961	Spreng	Fern Glen formation
	Kissling	Fern Glen formation
**1962	Collinson, et al.	"Sedalia" Formation (** = basal part of Fern Glen)
1968	Stinchcomb & Fellows	Fern Glen Formation
**1971	Collinson, et al.	Meppen Formation (** = basal part of Fern Glen; replaced "Sedalia" in Illinois)

Pierson Formation (Weller, 1901)

Original description (Weller, 1901, p. 144) -- "Pierson limestone. -- This is a fine-grained, buff colored, gritty limestone having a maximum thickness, according to Shepard, of thirty feet, being the formation designated by him as the Chouteau limestone."

Type section -- Weller (1901) described the Fern Glen as "...well exposed along Pierson Creek near the zinc mines." Beveridge and Clark (1952) designated the type section as the "...cut on the north side of County Road D in the NE¼ SW¼ SW¼ sec. 29, T. 29 N., R. 20 W., near Turner Station, in Greene County...". This section is just east of the bridge over the James River; Galloway 7½' Quadrangle. Described by Robertson (1967, p. 54-57) and Thompson and Fellows (1970, p. 147). Road D has recently been reconstructed (1976) to expose more of the upper Pierson overlying Elsey than previously described.

Date	Author(s)	Nomenclature
1883	Swallow	Chouteau limestone
1898	Shepard	Chouteau limestone
1901	Weller	Pierson limestone
1910	Schuchert	Pierson formation (Kinderhookian series)
1928	Moore	Pierson formation (restricted to area of Greene County) St. Joe limestone member of Boone formation (upper part; elsewhere in southwestern Missouri)
1944	Branson	Pierson member of Chouteau formation
1948	Weller, et al.	St. Joe limestone (part)
1950	Kaiser	St. Joe limestone (part)
1952	Beveridge & Clark	Pierson formation of St. Joe group
1961	Spreng	Pierson formation
1967	Robertson	Pierson Formation
	Thompson	Pierson Formation
1970	Thompson & Fellows	Pierson Formation

Remarks -- Recent relocation of Greene County Road D has resulted in the exposure of more of the type section of the Pierson than has previously been described. The upper Pierson and overlying Elsey Formations have been exposed in a new roadcut immediately east and uphill from the old roadcut.

Reeds Spring Formation (Moore, 1928)

Original description (Moore, 1928, p. 163) -- "...interstratified dense, dark blue limestone and dark chert ... is characteristic of the Reeds Spring limestone member of the Boone in southwestern Missouri."

Type section -- Exposures in the vicinity of Reeds Spring, Stone County, Missouri; specifically along the Missouri-Pacific Railroad south of the tunnel south of the town; N½ NW¼ SW¼ sec. 31, T. 24 N., R. 22 W., Garber 7½' Quadrangle. Described by Thompson and Fellows (1970, p. 163).

Date	Author(s)	Nomenclature
	Early geologists	"Boone chert"
1910	Schuchert	Boone formation (part of)
1928	Moore	Reeds Spring limestone member of Boone formation
1934	Cline	Reeds Spring formation (suppressed Boone as a synonym of Osage)
1944	Branson	Reeds Spring member of Chouteau formation
1948	Weller, et al.	Reeds Spring limestone
**1950	Kaiser	Reeds Spring formation (**at some sections part includes the Elsey Formation)
1961	Spreng	Reeds Spring formation
1967	Robertson	Reeds Spring Formation
	Thompson	Reeds Spring Formation
1970	Thompson & Fellows	Reeds Spring Formation

Remarks -- In Arkansas, the Reeds Spring Formation has usually been included within the Boone Formation, often called "Boone chert". The northern limit of its distribution appears to be in a region just south of Springfield, in Greene County, Missouri, extending northwestward from Springfield, where the lithologic characteristics of the Reeds Spring become indistinguishable from those of the overlying Elsey, a similar cherty formation. These characteristics include grain-size of the limestone and the type of chert, whether as beds of nodules (Elsey) or as interconnected beds and bands of chert (Reeds Spring) forming usually a box-work structure when the limestone has been removed by weathering.

Elsey Formation (Robertson, 1967)

Original description (Robertson, 1967, p. 14-15) -- "The Elsey consists of alternating beds of chert and limestone that are 6 to 18 inches thick. The limestone beds are fine-grained to dense, brown to gray and contain very little argillaceous material. The chert is very distinctive. Always present is a white to grayish-white chert which has prominent, very irregular brown mottled areas and contains comparatively large circular spots one sixteenth to one quarter of an inch in diameter. Darker brown or gray cherts similar to those of the Reeds Spring, and lighter porous cherts characteristic of the cherts of the overlying Burlington-Keokuk Formations may also occur within the Elsey Formation. Locally, lenses of white crinoidal limestone ... strongly resemble the limestones of the Burlington-Keokuk."

Type section -- Roadcut on north side of Missouri Highway 248, one-half mile south of bridge over Dry Creek, $1\frac{1}{2}$ mile west of the junction with Highway 173, and $2\frac{1}{2}$ miles south of the town of Elsey, $NW\frac{1}{4}$ $NW\frac{1}{4}$ $SE\frac{1}{4}$ sec. 5, T. 24 N., R. 24 W., Stone County, Missouri; Aurora 15' Quadrangle. Section measured by Robertson (1967, p. 49-51) and Thompson and Fellows (1970, p. 232-234).

Date	Author(s)	Nomenclature
1931	Fowler & Lyden	O, P, and Q beds
1934	Cline	Grand Falls formation (local variant of Reeds Spring formation)
1941	Clark	Grand Falls member of Reeds Spring formation
1944	Branson	Grand Falls (quoted Clark, 1941)
1948	Weller, et al.	Grand Falls Chert
1950	Kaiser	Reeds Spring formation (at some sections)
1952	Beveridge & Clark	Grand Falls formation (stratigraphic unit above Reeds Spring)
1961	Spreng	Grand Falls formation
1967	Robertson	Elsey Formation (restricted "Grand Falls" to local chert developed in Joplin area)
	Thompson	Elsey Formation
1970	Thompson & Fellows	Elsey Formation

Remarks -- Robertson (1967) determined that the chert at Grand Falls, near Joplin, was the result of silicification of more than one stratigraphic formation, and thus, the name "Grand Falls" was not well chosen for the stratigraphic unit it was to represent elsewhere.

Grand Falls Chert (Winslow, 1894)

Original description (Winslow, 1894, p. 417) -- "At Grand Falls, the chert is exposed on both banks of the creek, about 30 feet high, and over a bluff of this rock the creek falls. It is a very dense, hard chert, in massive layers 6 or more feet thick; it has a gnarled and knotted structure, producing an uneven surface; the fracture is distinctly conchoidal."

Type section -- The Grand Falls of Shoal Creek, Center N½ S½ sec. 28, T. 27 N., R. 33 W., just west of Joplin, Newton County, Missouri; Joplin West 7½' Quadrangle.

Date	Author(s)	Nomenclature
1894	Jenney	Seneca chert (as cited by Siebenthal, 1907)
	Winslow	Grand Falls chert
1907	Smith & Siebenthal	Grand Falls Chert member of Boone formation
1944	Branson	Grand Falls chert (part)
1950	Kaiser	Grand Falls chert member of Reeds Spring formation (local facies)
1967	Robertson	Grand Falls chert

Remarks -- As determined by Robertson (1967), the Grand Falls at its type section consists of a silicified sequence of strata that were formerly part of both the Elsey and Reeds Spring Formations; he could recognize chert-types of both formations within the Grand Falls. Therefore, "Grand Falls" is now retained to identify only this local chert unit along Shoal Creek and in the general vicinity of Joplin, Missouri.

Burlington Limestone (Hall, 1857)

Original description (Hall, 1857, p. 190) -- "The encrinital limestone of Burlington, or, as we shall hereafter term it, the Burlington limestone, is characterized by its great numbers of crinoids, of which Drs. D. D. Owen and B. F. Schumard have described numerous species. The rock is in a great measure composed of the broken and comminuted remains of this family of fossils: large masses of the rock consist almost entirely of the separated but unbroken joints of the columns of various species."

Type section -- Exposures in the bluffs of the Mississippi River Valley at the town of Burlington, Des Moines County, Iowa.

Date	Author(s)	Nomenclature
1852	Owen	encrinital group of Burlington (part)
		reddish brown encrinital group of Hannibal
1855	Swallow	Encrinital limestone (part)
1857	Hall	Burlington limestone
1859	Shumard	Encrinital limestone (lower part)
1861	Meek & Worthen (a)	Burlington limestone
1863	Englemann	Encrinital or Burlington limestone
1866	Worthen	Burlington limestone
1873	Shumard	Encrinital limestone
1874	Broadhead	Encrinital or Burlington limestone
1891	Williams	Burlington limestone
1892	Keyes	Burlington limestone
1893	Broadhead	Burlington beds
1894	Keyes (a)	Burlington limestone
1903	Buckley	Upper Burlington limestone
1904	Ulrich	Boone limestone (lower part)
	Buckley & Buehler	Burlington limestone
1905	Ulrich	Tullahoma formation (lower part)
	Van Horn	Burlington limestone
1910	Schuchert	Upper Burlington limestone
		Lower Burlington limestone
1911	Fenneman	Burlington and Keokuk limestone (lower part)
1914	Weller	Burlington limestone
1924	Krey	Burlington-Keokuk limestone (lower part)
1928	Moore	Burlington limestone
	Weller & St. Clair	Burlington formation
1933	Keyes (a)	Burlington limestone
1938	McQueen & Greene	Keokuk-Burlington formation (lower part)
1939	Grohskopf, et al.	Burlington-Keokuk formation (lower part)
1941	Keyes (a)	Burlington limestone
1944	Branson	Burlington limestone

1948	Weller, et al.	Keokuk-Burlington limestone (lower part)
1950	Kaiser	Burlington limestone
1961	Spreng	Burlington formation
	Kissling	Burlington limestone
		"lower Burlington limestone" ("unassigned Osagean limestone" of Kissling, 1960)
1967	Robertson	Burlington Limestone
1968	Stinchcomb & Fellows	Burlington-Keokuk Limestone (lower part)
1970	Thompson & Fellows	Burlington-Keokuk Limestones (lower part)
1975	Thompson	Burlington Limestone
		"lower Burlington Limestone"

Remarks -- The "lower Burlington Limestone" of Kissling (1961) and Thompson (1975) was recognized to illustrate the similarity of Osagean strata in eastern Missouri to those of southwestern Missouri. The "lower Burlington" is very similar to the Elsey Formation.

In some areas of Missouri, particularly the southwestern region, it is difficult to impossible to differentiate Burlington from Keokuk strata, and thus the name Burlington-Keokuk is used for the entire sequence.

Keokuk Limestone (Owen, 1852)

Original description (Owen, 1852, p. 91) -- "4. The latter division passes upwards into the gray, cherty limestones, which form the wall washed by the Mississippi, below the Keokuck Landing."

Type section -- Named from exposures along the western bluffs of the Mississippi River Valley in the vicinity of Keokuk, Iowa. Willman, et al. (1975, p. 138) state the type locality is along and at the mouth of Soap Creek in Lee County, Iowa.

Date	Author(s)	Nomenclature
	Early geologists	Encrinital limestone (upper part)
1852	Owen	Keokuck (sic) cherty limestone
		Lower Archimedes limestone
1855	Shumard	Archimedes limestone (part)
	Swallow	Archimedes limestone (part)
1857	Hall	Lower Archimedes limestone or Keokuk limestone
1859	Shumard	Encrinital limestone (upper part)
1861	Meek & Worthen(a)	Keokuk limestone
1863	Englemann	Keokuk limestone
1866	Worthen	Keokuk group (part)
1868	Englemann	Keokuk limestone
1874	Broadhead	Archimedes limestone (part)
		Keokuk limestone (first use of this name in Missouri)
1892	Keyes	Keokuk limestone
1895	Keyes	Keokuk limestone
		Montrose chert
1898	Marbut	Archimedes limestone (part)
	Gallaher	Carthage limestone (lower part)
1907	Buehler	Keokuk limestone
	Rowley	Keokuk limestone
1910	Schuchert	Keokuk formation
1911	Fenneman	Burlington and Keokuk limestone (upper part)
1914	Weller	Keokuk limestone
1924	Krey	Burlington-Keokuk limestone (upper part)
1928	Moore	Keokuk limestone member of Boone formation
	Weller & St. Clair	Keokuk formation
1933	Keyes(a)	Keokuk limestone
1938	McQueen & Greene	Keokuk-Burlington formation (upper part)
1939	Grohskopf, et al.	Burlington-Keokuk formation (upper part)
1941	Branson & Mehl	Keokuk formation (lower part)
	Keyes(a)	Keokuk limestone
1944	Branson	Keokuk limestone

1948	Weller, et al.	Keokuk-Burlington limestone (upper part)
1950	Kaiser	Keokuk limestone
1961	Spreng	Keokuk limestone
1965	Rexroad & Collinson	Keokuk Limestone
1968	Stinchcomb & Fellows	Burlington-Keokuk Formation (upper part)
1970	Thompson & Fellows	Burlington-Keokuk Limestones (upper part)
	McKnight & Fischer	Joplin Member of Boone Formation

Short Creek Oolite Member of Keokuk Limestone
(Smith and Siebenthal, 1907)

Original description (Smith and Siebenthal, 1907, p. 5) -- "The Short Creek member is a thin but very persistent bed of oolitic limestone. Generally it forms a single, massive, homogeneous bed which in the Joplin area ranges from 18 inches to 8 feet in thickness. ... The spherules are round, never flattened, though some are concave where they touch. ...One of the most constant characteristics of the Short Creek oolite is the regularity in size of the spherules in a hand specimen, though they vary somewhat in size from place to place. ...The individual spherules in the Short Creek are solid, and though apparently formed by concentric growth, rarely show the center darker than the shell. ...The Short Creek spherules are embedded in a calcareous matrix which in places is coarsely crystalline... In most cases the rock has a slightly splintery fracture, and this character is more pronounced the more complete the cementation."

Type section -- According to Smith and Siebenthal (1907, p. 5) "The member is named from Short Creek, a stream flowing westward between the cities of Galena and Empire, Kans., and the type locality is the north bluff of the creek half a mile south of west of the Empire depot and a hundred yards north of the crossing of the Missouri, Kansas, and Texas and Frisco railways." This is just north of the center of the line separating sections 14 and 15, T. 34 S., R. 25 E., Cherokee County, Kansas; Baxter Springs $7\frac{1}{2}'$ Quadrangle.

Date	Author(s)	Nomenclature
1907	Smith & Siebenthal	Short Creek oolite member of Boone formation
1922	Wilson	Short Creek oolite (in Missouri)
1928	Moore	Short Creek oolite of Boone formation
1941	Clark	Short Creek oolite of Keokuk formation
1944	Branson	Short Creek oolite (either top of Keokuk or base of Warsaw)
1950	Kaiser	Short Creek oolite bed
1961	Spreng	Short Creek member of Keokuk formation
1970	Thompson & Fellows	Short Creek Oolite Member of Keokuk Limestone
	McKnight & Fischer	Short Creek Oolite Member of Boone Formation

Remarks -- In southwestern Missouri, the top of the Short Creek is utilized as the contact between the Keokuk Limestone and Warsaw Formation. It is a persistent marker in this region between two very similar limestones.

MERAMECIAN SERIES (Ulrich, 1904)

Original description (Ulrich, 1904, p. 110) -- "(7) The Warsaw limestone (and shales) occur at the base of the group at Meramec Highlands and extend northward from that point. This, together with the overlying Spergen Hill and St. Louis limestones are embraced in a group for which I propose the name Meramec group."

Type area -- Bluffs of the Meramec River Valley west of St. Louis, in St. Louis County, Missouri.

Date	Author(s)	Nomenclature
1855	Shumard	Archimedes group (lower part; included Meramecian and Chesterian strata)
1866	Worthen	St. Louis group
1874	Broadhead	St. Louis group
1891	Williams	Genevieve group (lower part; included Warsaw)
1892	Keyes	St. Louis group (excluded Warsaw)
1894	Keyes(a)	St. Louis stage (excluded Warsaw)
1895	Keyes	St. Louis group (excluded Warsaw)
1901	Keyes(b)	St. Louis group (excluded Warsaw)
1904	Ulrich	Meramec group
1905	Ulrich	Tennessean series (lower part)
1910	Schuchert	Meramecian series of Tennesseic Period (excluded Ste. Genevieve)
1911	Ulrich	Tennessean series (lower part)
	Fenneman	Meramec group
1914	Weller	Meramec group (excluded Warsaw and Ste. Genevieve)
	Keyes(b)	Tennessean series (lower part)
		Mississippian series (upper part)
1919	Keyes	Louisian series (upper part)
1920	Weller	Iowan series (part; included all strata from base of Kinderhookian to top of Meramecian)
1922	Williams	Ste. Genevieve group (lower part)
	Keyes(b)	Mississippian series (upper part; rejected Tennessean series)
1924	Krey	Meramecian series of Lower Mississippian subsystem
1928	Weller & St. Clair	Meramec group
1931	Keyes	Tennessean series (lower part; excluded Warsaw and Salem)
1933	Keyes(a)	Chartresan series (lower part)
		Mississippian series (upper part)
1938	McQueen & Greene	Meramec group

Warsaw Formation (Hall, 1857)

Original description (Hall, 1857, p. 191) -- In discussing the horizon he is calling Warsaw, Hall states "The central and principal portion is highly fossiliferous, abounding in the reticulate bryozoa; and among these the axis of a species of Archimedes occurs in great numbers and of extraordinary size and perfection. So abundant is it that a dozen individuals may sometimes be seen in the space of a few feet...

"This second Archimedes limestone seems not to have been recognized in the section of Dr. Owen; and judging from localities cited, it appears to have been confounded with the lower Archimedes or Keokuk limestone. The position however of the Warsaw Archimedes limestone is above the geode bed..."

Type section -- Exposure along creek at the northern edge of the town of Warsaw, extending upstream to the south side of the highway; SE$\frac{1}{4}$ sec. 4, NE$\frac{1}{4}$ NE$\frac{1}{4}$ sec. 9, and NW$\frac{1}{4}$ sec. 10, T. 4 N., R. 9 W., Hancock County, Illinois; Warsaw 7$\frac{1}{2}$' Quadrangle. Described by Rexroad and Collinson (1965, p. 5).

Date	Author(s)	Nomenclature
1855	Owen	Third Archimedes limestone and geodiferous beds
	Shumard	Third Archimedes limestone (distinct from St. Louis limestone)
1857	Hall	Warsaw or second Archimedes limestone (lower part)
		geode beds
1859	Shumard	Archimedes limestone (part)
1863	Englemann	Warsaw Limestone
1866	Worthen	St. Louis group (lower part)
1868	Englemann	Warsaw limestone
1874	Broadhead	Warsaw limestone of St. Louis group
1892	Keyes	Warsaw beds
1894	Keyes (a)	Geode bed
		Warsaw shales
1898	Gallaher	Carthage limestone (upper part)
1904	Ulrich	Warsaw limestone (and shales)
	Buckley & Buehler	Burlington limestone (Carthage limestone) (part)
1907	Buehler	Warsaw limestone
1911	Fenneman	Warsaw shale
1914	Weller	Warsaw formation
	Keyes(b)	Warsaw shale
1924	Krey	Warsaw-Spergen formation (lower part)
1928	Moore	Warsaw limestone member of Boone formation
	Weller & St. Clair	Warsaw formation
1933	Keyes(a)	Warsaw shale

1938	McQueen & Greene	Warsaw formation
	Keyes(f)	Warsaw shale formation
1939	Grohskopf, et al.	Warsaw-Spergen (Salem) (?) formations (lower part)
1941	Branson & Mehl	Keokuk formation (upper part)
	Keyes(a)	Warsaw shales
1944	Branson	Warsaw limestone
1948	Weller, et al.	Warsaw limestone
1961	Spreng	Warsaw formation
1965	Rexroad & Collinson	Warsaw Formation
1967	Goebel, et al.	Warsaw Formation (southwestern Missouri)

Salem Formation (Cumings, 1901)

Original description (Cumings, 1901, p. 233) -- "Since the term Bedford as the name of a formation is pre-occupied, having been applied to the 'Bedford shale' of northeastern Ohio in 1870, the writer proposed the name Salem limestone for the rocks called Bedford limestone by Hopkins and Siebenthal...

"In suggesting a different name for the rocks under consideration the writer is aware of the claims of Spergen Hill. The latter place, is, however, ...not a good place to study the stratigraphic relationships of the formation as a number of other localities ... The oolitic character of the rock, ..., while more pronounced at some places than at others, everywhere serves as a means of identification and is the character that is especially well developed at Salem."

Type section -- Cumings (1901) did not specify a type section. A quarry described by Gorby (1886, p. 143) then served as the type section until the Salem was quarried away. Shaver, et al. (1970, p. 152) designated a section at "nearly the same place in the Hoosier Lime and Stone Co. quarry (Perry, Smith, and Wayne, 1954, p. 47-49), 0.8 mile west of Salem in the NE$\frac{1}{4}$ sec. 24, T. 2 N., R. 3 E., Washington County", Indiana as the "principal reference section" for the Salem Limestone.

Date	Author(s)	Nomenclature
1843	Nicollet	oolitic limestone of the Gabouri (Ste. Genevieve County, Missouri)
		Archimedes limestone (part)
1847	Englemann	St. Louis limestone (lower part)
1857	Hall	Warsaw Archimedes limestone (upper part)
		"Magnesiam limestone"
1859	Shumard	Archimedes limestone (upper part)
1863	Englemann	St. Louis Limestone (lower part)
1873	Shumard	Third Archimedes limestone (part)
		St. Louis limestone (part)
1892	Keyes	St. Louis limestone (lower part)
1894	Keyes(a)	St. Louis limestone (lower part)
1897	Keyes(a)	St. Louis limestone (lower part)
1904	Ulrich	Spergen Hill limestone
1907	Buehler	Spergen limestone
1910	Schuchert	Spergen formation
1911	Fennaman	Spergen limestone
1914	Weller	Salem limestone (first use in Missouri)
	Keyes (b)	Spergen limestone
1924	Krey	Warsaw-Spergen formation (upper part)
1925	Keyes	Gabouri limestone (proposed to replace "Salem")
1928	Weller & St. Clair	Spergen (Salem) formation

1933	Keyes(a)	Spergen limestone
1938	Keyes(i)	Spergen limestone Gabouri oolite
1939	Grohskopf, et al.	Warsaw-Spergen (Salem) (?) formations (upper part)
1941	Keyes(a)	Spergen oolite
1944	Branson	Salem limestone (Spergen limestone)
1947	Hinchey, et al.	Spergen formation
1948	Weller, et al.	Salem limestone
1960	Baxter	Salem Limestone (described 4 members)
1961	Spreng(a)	Salem ("Spergen") formation
	Spreng (b)	Warsaw and Salem formations (upper part)
1965	Rexroad & Collinson	Salem Formation
1966	Thompson	Salem Formation
1972	Lineback	Salem Limestone

St. Louis Limestone (Englemann, 1847)

Original description (Englemann, 1847, p. 119) -- "The St. Louis limestone underlies the western edge of the great Illinois coal field. It is a very hard, light yellowish or grayish rock, mostly pure carbonate of lime, in some strata mixed with sand, in others including irregular siliceous masses of a dark color, or light colored thin argillaceous strata. The limestone is perfectly compact and fine-grained in some strata, so as to furnish tolerably good lithographic stones; in other strata it is coarser and even completely crystalline."

Type section -- Limestones exposed in the vicinity of St. Louis, Missouri. Most of the original sections have been destroyed or buried by construction. The best and most complete exposures in the vicinity of St. Louis are across the Mississippi River Valley in Madison County, Illinois, on the "Alton bluffs," bluffs above the River Road between Alton and Grafton, Illinois.

Date	Author(s)	Nomenclature
	Early geologists	Lithostrotion limestone
1847	Englemann	St. Louis limestone (middle part; included Warsaw, Salem, and Ste. Genevieve)
1852	Owen	Concretionary limestone (part) "Bedded limestone of St. Louis"
1855	Swallow	St. Genevieve marble (according to Shumard, 1859). St. Louis limestone (middle part)
1859	Shumard	St. Louis limestone (upper part; removed Ste. Genevieve from St. Louis of Swallow; still included Salem)
1863	Englemann	St. Louis Limestone (upper part)
**1892	Keyes	St. Louis limestone (middle part; **includes Salem and Ste. Genevieve)
1894	Keyes(a)	St. Louis limestone (upper part; removed Ste. Genevieve)
1897	Keyes(a)	St. Louis limestone (upper part)
1904	Ulrich	St. Louis limestone (restricted to present definition, removed Salem)
	Buckley & Buehler	St. Louis formation
1907	Buehler	St. Louis limestone member of St. Louis group
1910	Schuchert	St. Louis formation
1911	Fenneman	St. Louis limestone (part; includes Ste. Genevieve beds)
1914	Weller	St. Louis limestone
	Keyes(b)	St. Louis limestone (as presently defined)
1919	Keyes	St. Louis limestone
1924	Krey	St. Louis formation

1928	Weller & St. Clair	St. Louis formation
1931	Keyes	St. Louis limestone
1933	Keyes(a)	Louis limestone
1937	Clark	St. Louis formation (?)
1938	McQueen & Greene	St. Louis formation
	Keyes(i)	Louis limestone
1939	Grohskopf, et al.	St. Louis-Ste. Genevieve (?) formations (lower part)
1940	Keyes(a)	Louis limestone
1941	Keyes(a)	Louis limestone
1944	Branson	St. Louis formation
1948	Weller, et al.	St. Louis limestone
1961	Spreng	St. Louis formation
1963	Rexroad & Collinson	St. Louis Formation
1965	Rexroad & Collinson	St. Louis Limestone
1966	Thompson	St. Louis Limestone
1972	Lineback	St. Louis Limestone

Ste. Genevieve Formation (Shumard, 1859)

Original description (Shumard, 1859, p. 406) -- "Immediately beneath the ferruginous sandstone, we have a second Archimedes limestone, which, for the sake of convenience, we may designate as the Ste. Genevieve limestone.... It is very analogous, in its lithological features, to the upper Archimedes limestone, occurring, however, in thick beds, and the inferior part shades almost imperceptibly into the St. Louis limestone. It is exhibited in the bluffs of the Mississippi, commencing a mile or two below Ste. Genevieve, and from thence extends almost uninterruptedly to the mouth of Aux Vases Creek, receiving, at several points, a capping of Ferruginous sandstone."

Type section -- Named from exposures near Ste. Genevieve, Ste. Genevieve County, Missouri. Weller and St. Clair (1928, p. 217) considered the outcrops along the bluffs of the Mississippi River mentioned by Shumard as, "...the typical expression of the formation."; Sec. 34 (projected), T. 38 N., and Sec. 2, T. 37 N., R. 9 E.; Weingarten 15' Quadrangle.

Date	Author(s)	Nomenclature
1847	Englemann	St. Louis limestone (upper part)
1852	Owen	Second Archimedes limestone
1855	Swallow	St. Louis limestone (upper part)
(not) 1855	Swallow	Ste. Genevieve marble (according to Shumard, 1859, equals St. Louis limestone)
1859	Shumard	Ste. Genevieve limestone (removed from St. Louis limestone)
1873	Shumard	Ste. Genevieve limestone
1892	Keyes	St. Louis limestone (upper part; rejected Ste. Genevieve)
1894	Keyes (a)	Ste. Genevieve limestone
1897	Keyes (a)	Ste. Genevieve limestone
1898	Gallaher	Ste. Genevieve formation
1904	Ulrich	Ste. Genevieve limestone
1907	Buehler	St. Louis limestone member of St. Louis group (part?)
	Weller	Ste. Genevieve limestone (excluded from Chester group)
1910	Schuchert	Ste. Genevieve formation (Chesterian)
**1911	Ulrich	Montesano limestone (**lower part of Ste. Genevieve limestone)
	Fenneman	St. Louis limestone (upper part)
1914	Weller	Ste. Genevieve limestone
1920	Weller	Ste. Genevieve limestone (in Meramec group)
1924	Krey	Ste. Genevieve formation
1931	Keyes	Genevieve limestone

1933	Keyes(a)	Genevieve limestone
1938	McQueen & Greene	Ste. Genevieve formation
	Keyes(i)	Genevieve oolite
1939	Grohskopf, et al.	St. Louis-Ste. Genevieve (?) formations (upper part)
	Keyes(b)	Genevieve oolite
1940	Keyes(a)	Genevieve limestone
1941	Keyes(a)	Genevieve limestone
1944	Branson	Ste. Genevieve formation
1948	Weller, et al.	Ste. Genevieve Limestone
1961	Spreng	Ste. Genevieve formation
1962	Short	Ste. Genevieve Limestone
1963	Swann	Ste. Genevieve Limestone (Genevievian Stage of Valmeyeran Series)
1965	Rexroad & Collinson	Ste. Genevieve Limestone
1966	Thompson	Ste. Genevieve Limestone

CHESTERIAN SERIES (Worthen, 1866)

Original description (Worthen, 1866, p. 321) -- "The Chester group is represented by the lower sandstone, about twelve feet in thickness, overlain by a thin band of limestone two feet thick."

Type area -- The bluffs of the Mississippi River Valley in the vicinity of Chester, Illinois; Chester 15' Quadrangle.

Date	Author(s)	Nomenclature
	Early geologists	Pentramital limestone
1852	Owen	Archimedes limestone
1857	Hall	Kaskaskia limestone (included Aux Vases)
1858	Swallow	Upper Archimedes limestone
1859	Shumard	Archimedes group (upper part)
1861	Meek & Worthen(a)	Chester limestone
1866	Worthen	Chester group
1874	Broadhead	Chester group
1891	Williams	Genevieve group (upper part; replaced Archimedes limestone)
1892	Keyes	Kaskaskia group or "Chester" beds (excluded Aux Vases)
1894	Keyes(a)	Kaskaskia stage
1895	Keyes	Kaskaskia group
1901	Keyes(b)	Kaskaskia group
1904	Ulrich	Birdsville formation (upper part of Chesterian)
		Tribune limestone (between Birdsville and Aux Vases; abandoned by Ulrich in 1916)
1905	Ulrich	Tennessean series (upper part)
1907	Buehler	Birdsville group (in Missouri)
		Chester group
1910	Schuchert	Chester series of Tennesseic period
1911	Ulrich	Tennessean series (upper part)
1914	Weller	Chester group
	Keyes(b)	Tennessean series (upper part)
1916	Ulrich	Birdsville group (excluded Aux Vases)
1917	Butts	Chester series
1920	Weller	Chester series Upper Chester group (above Tar Springs) Middle Chester or Okaw group (Cypress through Golconda) Lower Chester group (Aux Vases through Paint Creek)
1922	Cumings	Chester series Upper Chester stage

		Westbaden stage
		Stephensport stage
	Williams	Ste. Genevieve group (upper part)
	Keyes	Kaskaskia series
1928	Weller & St. Clair	Middle Chester group
		Lower Chester group
1931	Keyes	Tennessean series (upper part)
1933	Keyes(a)	Osahawanan series
1939	Weller	Chester series
		Elvira group (upper Chesterian)
		Homberg group
		New Design group
1940	Keyes(a)	Oshwanan series (sic)
1941	Keyes(a)	Oshawanan series of late Leeic period
1944	Branson	Upper Mississippi series
1948	Weller, et al.	Chesterian Series
		Elvira Group (upper Chesterian)
		Homberg Group
		New Design Group
1957	Rexroad	Chesterian Series
1961	Spreng	Chesterian series
1963	Swann	Chesterian Series (in Illinois)
		Elviran Stage
		Hombergian Stage
		Gasperian Stage
		Genevievian Stage and Valmeyeran Series (upper part; Aux Vases and lower Renault)
1968	Goebel	Chesteran Stage of Upper Mississippi Series (in Kansas)
1972	Thompson	Chesterian Series
1975	Willman, et al.	Chesterian Series
		Elviran Stage
		Hombergian Stage
		Gasperian Stage
		Genevievian Stage of Valmeyeran Series (upper part; Aux Vases and lower Renault)

The following formations are identified within the Chesterian in Missouri:

Western Missouri	Eastern Missouri
	Vienna Limestone
	Tar Springs Sandstone
Fayetteville Formation	Glen Dean Limestone
	Hardinsburg Formation
	Golconda Formation

Batesville Formation	Cypress Formation
	Paint Creek Formation
	Yankeetown Sandstone
Hindsville Limestone	Renault Formation
(Carterville Formation)	Aux Vases Sandstone

Aux Vases Sandstone (Keyes, 1892)

Original description (Keyes, 1892, p. 295) -- "In southern Illinois and southeastern Missouri the Kaskaskia comprises extensive beds of limestone and shale. Everywhere over this district these calcareous portions, which greatly predominate in the lower part of the group, are underlain by a fine grained ferruginous sandrock. This sandstone is recognizable above the City of St. Louis, where it is a dozen feet or more in thickness; southward it rapidly thickens until in the vicinity of the typical locality it attains a maximum measurement of more than 100 feet.

"For convenience in reference and in order to avoid further confusion this great sandstone will be called here the Aux Vases sandstone, from the river of that name in Ste. Genevieve County, Missouri, on which the rock is exposed."

Type section -- Exposures on the bluff at the mouth of River Aux Vases, N½ NW¼ sec. 13, T. 37 N., R. 9 E., Ste. Genevieve County, Missouri; Chester 15' Quadrangle, Kaskaskia 7½' Quadrangle.

Date	Author(s)	Nomenclature
1857	Hall	Ferruginous sandstone
1858	Swallow	Ferruginous sandstone
1859	Shumard	Ferruginous sandstone
1863	Englemann	Ferruginous sandstone
1866	Worthen	Ferruginous sandstone
1892	Keyes	Aux Vases sandstone
1900	Gallaher	Ste. Genevieve sandstone
1904	Ulrich	Cypress sandstone
1907	Buehler	Aux Vases member of Chester group
	Weller	Cypress sandstone
1910	Schuchert	Cypress member of Kaskaskia formation
1914	Weller	Renault formation (lower part)
		Brewerville formation (Weller felt basal Chesterian strata consisted of two formations, the lower was Brewerville, the upper Renault)
	Keyes (b)	Aux Vases sandstone
1917	Ulrich	Aux Vases sandstone
1920	Weller	Aux Vases sandstone
1922	Ulrich	Aux Vases sandstone
	Cumings	West Baden formation (part)
	Keyes (b)	Aux Vases sandstone
1928	Weller & St. Clair	Aux Vases sandstone (proved Brewerville was junior synonym of Aux Vases)
1934	Keyes (b)	Aux Vases sandstone
1941	Keyes (a)	Aux Vases sandstone

1944	Branson	Aux Vases sandstone
1948	Weller, et al.	Aux Vases sandstone
1961	Spreng	Aux Vases sandstone
1963	Swann	Aux Vases Sandstone (placed in top of Valmeyeran Series, Genevievian Stage)
1975	Willman, et al.	Aux Vases Sandstone (Genevievian Stage of Valmeyeran Series)

Renault Formation (Weller, 1914)

Original description (Weller, 1914, p. 24) -- "The formation is exceedingly variable in its lithologic characters, and includes sandstone, shale, and limestone members."

Type section -- Swann (1963, p. 79) stated the Renault was, "...well exposed in the valley of Horse Creek and its tributaries; a typical outcrop is in the lowest gully on the south side of Dry Fork in the SE$\frac{1}{4}$ SW$\frac{1}{4}$ sec. 23, T. 4 S., R. 9 W., Renault (15') quadrangle, Monroe County, Illinois." Named from Renault Township.

Date	Author(s)	Nomenclature
1857	Hall	Kaskaskia limestone (lower part)
1858	Swallow	Upper Archimedes limestone (lower part)
1860	Shumard	Archimedes limestone (lower part)
1866	Worthen	Chester limestone (lower part)
1892	Keyes	Kaskaskia limestone (lower part)
1904	Ulrich	Tribune limestone (lower part)
1907	Weller	Chester limestone (lower part)
	Buehler	Kaskaskia member (lower part)
1910	Schuchert	Tribune member of Kaskaskia formation (part)
1914	Weller	Renault limestone (upper part)
	Keyes (b)	Kaskaskia limestone (lower part)
1917	Ulrich	Renault limestone
1920	Weller	Renault limestone
1922	Ulrich	Renault limestone
	Cumings	West Baden formation (part)
1928	Weller & St. Clair	Renault limestone
1931	Keyes	Kaskaskia limestone (lower part)
1941	Keyes (a)	Kaskaskia limestone (lower part)
1944	Branson	Renault formation
1948	Weller, et al.	Renault formation
1957	Rexroad	Renault formation
1961	Spreng	Renault formation
1963	Swann	Renault Limestone - Gasperian Stage
1975	Willman, et al.	Renault Limestone (both Genevievian and Gasperian in age)

Yankeetown Sandstone (Weller, 1914)

Original description (Weller, 1914, p. 25) -- "Overlying the Renault formation is a thin but most persistent siliceous formation of peculiar lithologic character, locally quartzitic. ... Some of its most typical exposures may be seen in the region adjacent to the Yankeetown school, about 6 miles southwest of Red Bud, from which locality the name of the formation has been derived....

"its color is light, commonly gray, or yellowish, or in many localities nearly white. It is very irregular, and more or less cross-bedded, having a decidedly knotty appearance, and locally is distinctly banded. It is commonly more or less arenaceous and in some localities certain beds are quartzitic. ... Where the formation is encountered in wells it appears to be a very hard, siliceous limestone..."

Type section -- Swann (1963, p. 86) described the type section as, "...located on west side of the Ames-Waterloo Road a few hundred feet south of Prairie Branch Creek and a quarter of a mile north of the southeast corner of sec. 26, T. 4 S., R. 9 W., Renault (15') quadrangle, Monroe County, Illinois."

Date	Author(s)	Nomenclature
1857	Hall	Kaskaskia limestone (lower part)
1858	Swallow	Upper Archimedes limestone (lower part)
1860	Shumard	Archimedes limestone (lower part)
1866	Worthen	Chester limestone (lower part)
1892	Keyes	Kaskaskia limestone (lower part)
1904	Ulrich	Tribune limestone (lower part)
1907	Weller	Chester limestone (lower part)
	Buehler	Kaskaskia member of Chester group (lower part)
1910	Schuchert	Tribune member of Kaskaskia formation (part)
1914	Weller	Yankeetown sandstone
	Keyes(b)	Kaskaskia limestone (part)
1917	Ulrich	Yankeetown sandstone
1920	Weller	Yankeetown chert
1928	Weller & St. Clair	Yankeetown formation
1931	Keyes	Kaskaskia limestone (part)
1939	Weller	Bethel sandstone
1941	Keyes(a)	Kaskaskia limestone (part)
1944	Branson	Yankeetown formation
1948	Weller, et al.	Yankeetown chert
1957	Rexroad	Yankeetown formation
1961	Spreng	Yankeetown formation
1963	Swann	Yankeetown Sandstone - Gasperian Stage

Paint Creek Formation (Weller, 1914)

Original description (Weller, 1914, p. 26) -- "Above the Yankeetown formation is a series of strata approximately 60 feet in thickness, which are shales below, passing into limestones above. Near the base of this Paint Creek formation, either resting directly upon the Yankeetown or separated from it by a few feet of blue or gray shales with perhaps some thin calcareous beds, is a deep-red, clay member.

"In fresh exposures this red bed exhibits little or no stratification; on being subjected to atmospheric agencies it first crumbles into small, angular fragments which eventually disintegrate into a fine, red mud. The appearance of the stratum is more that of a residual clay than anything else familiar to the writer."

Type section -- Swann (1963, p. 76) stated that the Paint Creek was, "Named as a formation by S. Weller (1914) for outcrops in the valley of Paint Creek and its tributaries, typical of which are those in the north-flowing tributary west of McCuen school, E½ sec. 2, T. 5 S., R. 9 W., Renault (15') Quadrangle, Randolph County, Ill."

Date	Author(s)	Nomenclature
1857	Hall	Kaskaskia limestone (part)
1858	Swallow	Archimedes limestone (part)
1860	Shumard	Archimedes limestone (part)
1866	Worthen	Chester limestone (part)
1892	Keyes	Kaskaskia limestone (part)
1904	Ulrich	Tribune limestone (part)
1907	Weller	Chester limestone (part)
	Buehler	Kaskaskia member of Chester group (part)
1910	Schuchert	Tribune member of Kaskaskia formation (part)
1914	Weller	Paint Creek formation
	Keyes(b)	Kaskaskia limestone (part)
1917	Ulrich	Paint Creek formation
1920	Weller(a)	Paint Creek limestone
1922	Cumings	West Baden formation (part)
1928	Weller & St. Clair	Paint Creek formation (part; included Cypress)
1931	Keyes	Kaskaskia limestone (part)
1941	Keyes(a)	Kaskaskia limestone (part)
1944	Branson	Paint Creek formation
1948	Weller, et al.	Paint Creek formation
1961	Spreng	Paint Creek formation
1963	Swann	Paint Creek Group - Gasperian Stage Ridenhower Formation Bethel Sandstone Downeys Bluff Limestone

Cypress Formation (Englemann, 1863)

Original description (Englemann, 1863, p. 19) -- "8. Quartzose sandstones with some shaly portions about 150 feet thick. I have distinguished them by the name of Cypress Sandstones on account of their prominent development on Cypress Creek."

Type section -- Swann (1963, p. 64) stated that the Cypress Formation was, "Named by Englemann (1863) for massive sandstone exposures in the Bluffs of Cypress Creek in the southwestern part of T. 12 S., R. 1 E., Dongola Quad., Union County, Ill."

Date	Author(s)	Nomenclature
1857	Hall	Kaskaskia limestone (part)
1858	Swallow	Archimedes limestone (part)
1860	Shumard	Archimedes limestone (part)
1863	Englemann	Cypress Sandstones
1866	Worthen	Chester limestone (part)
1892	Keyes	Kaskaskia limestone and shales (part)
1904	Ulrich	Tribune limestone (part)
**(not) 1904	Ulrich	Cypress sandstone (** = Aux Vases Sandstone)
1907	Weller	Chester limestone (part)
	Buehler	Kaskaskia limestone member of Chester group (part)
**(not) 1907	Weller	Cypress sandstone (** = Aux Vases Sandstone)
1910	Schuchert	Tribune member of Kaskaskia formation (part)
1914	Weller	Ruma formation
	Keyes (b)	Kaskaskia limestone (part)
1917	Ulrich	Ruma sandstone
	Butts	Cypress ("Big Clifty") sandstone
1920	Weller	Cypress sandstone
1928	Weller & St. Clair	Paint Creek formation (upper part)
1931	Keyes	Kaskaskia limestone (part)
1933	Keyes (a)	Cypress sandstone
1934	Sutton	Ruma sandstone
1939	Weller & Weller	Ruma sandstone
	Weller	Cypress sandstone
1940	Keyes (a)	Kaskaskia limestone (part)
1941	Keyes (a)	Kaskaskia limestone (part)
1944	Branson	(did not recognize in Missouri)
1948	Weller, et al.	Cypress sandstone (a shale in Missouri)
1961	Spreng	Cypress formation (a shale in Missouri)
1963	Swann	Cypress Sandstone - Gasperian Stage

Golconda Formation (Brokaw, 1916)

Original description (Brokaw, 1916, Plate 1) -- Brokaw described the Golconda as, "Limestones and shales, variable in color and character; a red shale has been seen in places; thickness 100-215 feet."

Regarding formal definition of the Golconda, Butts (1917, p. 91) states, "The Golconda formation is named from Golconda, Ill., just north of which the full thickness of the formation outcrops on the river bluff. The name was first used by Ulrich in a paper read before the Geological Survey of America in December, 1915. The Golconda includes that part of the Chester section between the Cypress sandstone below and the Hardinsburg sandstone, next to be described, above. At Golconda there is, directly above the Cypress, about 20 feet of dark shale, above which is 10 feet or so of dark, argillaceous, coarsely crystalline or fragmental fossiliferous limestone called the Pterotocrinus capitalis zone... The Pterotocrinus capitalis zone is overlain by 80 feet of shale and limestone, the shale so far as the incomplete exposure permits one to judge, largely predominating and the limestone occurring as layers scattered through the shale. These limestone layers are argillaceous and ferruginous weathering to a lemon yellow color. A thin layer of red shale was observed. Above this shale and limestone segment of the Golconda is about 30 to 40 feet of solid limestone apparently fairly pure calcium carbonate. Directly in contact with this limestone above is the overlying Hardinsburg sandstone..."

Type section -- Swann (1963, p. 68) states that the Golconda Formation was defined from, "...exposures in the Ohio River bluffs above Golconda, secs. 5, 8, and 18, T. 13 S., R. 7 E., Shelterville Quad., Pope County, Ill."

Date	Author(s)	Nomenclature
1857	Hall	Kaskaskia limestone (part)
1858	Swallow	Archimedes limestone (part)
1860	Shumard	Archimedes limestone (part)
1866	Worthen	Chester limestone (part)
1892	Keyes	Kaskaskia limestone (part)
1904	Ulrich	Tribune limestone (part)
1907	Weller	Chester limestone (part)
	Buehler	Kaskaskia member of Chester group (part)
1910	Schuchert	Tribune member of Kaskaskia formation (part)
1914	Weller	Okaw formation (lower part)
	Keyes (b)	Kaskaskia limestone (part)
1915	Ulrich	Golconda formation (oral presentation)
1916	Brokaw	Golconda formation
1917	Butts	Golconda formation
	Ulrich	Okaw formation (lower part)
1920	Weller	Golconda limestone

1928	Weller & St. Clair	Golconda formation
1931	Keyes	Kaskaskia limestone (part)
1933	Keyes (a)	Golconda limestone
1940	Keyes (a)	Kaskaskia limestone (part)
1941	Keyes (a)	Kaskaskia limestone (part)
1944	Branson	Golconda formation
1948	Weller, et al.	Golconda formation
1961	Spreng	Golconda formation
1963	Swann	Golconda Group - Hombergian Stage Haney Limestone Fraileys Shale Beech Creek Limestone

Hardinsburg Formation (Brokaw, 1916)

Original description (Brokaw, 1916, Plate 1) -- Brokaw described the Hardinsburg as, "Moderately fine-grained, yellowish-brown sandstone; small amount of shale; thickness 80-100 feet."

Butts (1917, p. 96) appears to have independently proposed the name, and stated:

"The Hardinsburg is here introduced for the third persistent sandstone stratum from the bottom of the Chester group or the fourth if the Fredonia oolite with the Rosiclare sandstone are included in that group. The name is from Hardinsburg, Breckinridge County, Ky., which is located upon the sandstone. At Hardinsburg a thickness of about 30 feet is exposed. As the sandstone is the highest rock exposed and extends upward to the cover of soil, it is not known how much thicker it may have been originally. It is composed of shaly sandstone above, a coarse-grained massive bed about 10 feet thick in the middle, and 10 feet of somewhat thinner bedded rock below, resting upon limestone in the top of the Golconda formation. ... The usual condition of the sandstone is thin-bedded and flaggy, rather fine-grained and hard, and somewhat argillaceous and ferruginous."

Type section -- Swann (1963, p. 69) locates the type section as, "...exposures in the vicinity of Hardinsburg in 13 and 18-P-57, Hardinsburg Quad., Breckinridge Co., Ky."

Date	Author(s)	Nomenclature
1857	Hall	Kaskaskia limestone (part)
1858	Swallow	Archimedes limestone (part)
1866	Worthen	Chester limestone (part)
1892	Keyes	Kaskaskia limestone (part)
1904	Ulrich	Tribune limestone (part)
1907	Weller	Chester limestone (part)
	Buehler	Kaskaskia member of Chester group (part)
1910	Schuchert	Tribune member of Kaskaskia formation (part)
1914	Weller	Okaw limestone (part)
	Keyes (b)	Kaskaskia limestone (part)
1916	Brokaw	Hardinsburg sandstone
1917	Butts	Hardinsburg sandstone
**(not) 1917	Ulrich	Hardinsburg sandstone (** = Tar Springs Sandstone)
1920	Weller	Hardinsburg sandstone
1928	Weller & St. Clair	Hardinsburg sandstone member of Golconda formation
1931	Keyes	Kaskaskia limestone (part)

1933	Keyes(a)	Hardinsburg Sandstone
1934	Sutton	Hardinsburg sandstone of Okaw formation
1940	Keyes(a)	Kaskaskia limestone (part)
1941	Keyes(a)	Kaskaskia limestone (part)
1944	Branson	(did not recognize in Missouri)
1948	Weller, et al.	Hardinsburg sandstone (not present in Missouri)
1961	Spreng	Hardinsburg formation (shale in Missouri, facies of sandstone in Illinois)
1963	Swann	Hardinsburg Sandstone of Okaw Group - Hombergian Stage

Glen Dean Limestone (Butts, 1917)

Original description (Butts, 1917, p. 97) -- "The Glen Dean limestone is named from Glen Dean in the southern part of Breckinridge County, Ky. This name is adopted because of the excellent exposure of the limestone along the railroad on both sides of Glen Dean.

"The Glen Dean is composed of varying proportions of limestone and shale and includes locally, at least, a little sandstone."

Type section -- Swann (1963, p. 68) described the type section as being, "...cuts along abandoned tracks of the Louisville and Nashville Railroad on either side of the town of Glen Dean in the southern part of 3-N-36 Glen Dean Quad., Breckinridge Co., Ky".

Date	Author(s)	Nomenclature
1857	Hall	Kaskaskia limestone (part)
1858	Swallow	Archimedes limestone (part)
1866	Worthen	Chester limestone (part)
1892	Keyes	Kaskaskia limestone (part)
1904	Ulrich	Tribune limestone (part)
1907	Weller	Chester limestone (part)
	Buehler	Kaskaskia member of Chester group (part)
1910	Schuchert	Tribune member of Kaskaskia formation (part)
1914	Weller	Okaw limestone (part)
	Keyes(b)	Kaskaskia limestone (part)
1916	Brokaw	Sloane Valley formation
1917	Butts	Glen Dean limestone
**(not) 1917	Ulrich	Glen Dean limestone (** = Vienna Limestone)
1920	Weller	Glen Dean limestone
1925	Flint	Glen Dean limestone (first recognized in Missouri)
1931	Keyes	Kaskaskia limestone (part)
1933	Keyes(a)	Okaw limestone
1940	Keyes(a)	Kaskaskia limestone (part)
1941	Keyes(a)	Kaskaskia limestone (part)
1944	Branson	Glen Dean limestone
1948	Weller, et al.	Glen Dean limestone
1961	Spreng	Glen Dean formation
1963	Swann	Glen Dean Limestone of Okaw Group - Hombergian Stage

Tar Springs Sandstone (Owen, 1856)

Original description (Owen, 1857, p. 87) -- "The Tar Springs sandstone, ...is very nearly one hundred feet above low water of the Ohio river, at Cloverport. At this point the sandstone is about fifty-five feet in thickness, and the top of it one hundred and fifty feet approximately above low water on the Ohio river. This sandstone is remarkable in Breckinridge county on account of the fine springs of petroleum which issue at its base, close to its junction with the Archimedes limestone."

Type section -- Owen (1857, p. 87) described the Tar Springs from rocks located "...near where the railroad intersects the line of separation between Breckinridge and Hancock Counties...", Tar Springs, NW¼ 13-P-35, Cloverport Quadrangle, Breckinridge County, Kentucky.

Date	Author(s)	Nomenclature
1856	Owen	Tar Springs sandstone
1857	Owen	Tar Springs sandstone
	Hall	Kaskaskia limestone (part)
1858	Swallow	Archimedes limestone (part)
1866	Worthen	Chester limestone (part)
1892	Keyes	Kaskaskia limestone (part)
1904	Ulrich	Tribune limestone (top of)
1907	Weller	Chester limestone (part)
	Buehler	Kaskaskia member of Chester group (part)
1910	Schuchert	Tribune member of Kaskaskia formation (part)
1914	Weller	Okaw formation (part)
	Keyes (b)	Kaskaskia limestone (part)
1916	Brokaw	Tar Springs sandstone (first use in Illinois)
1917	Ulrich	Hardinsburg sandstone
1920	Weller	Tar Springs sandstone
1925	Flint	Tar Springs sandstone (unpublished; first use in Missouri)
1931	Keyes	Kaskaskia limestone (part)
1933	Keyes (a)	Tar Springs sandstone
1939	McQueen	Tar Springs sandstone (first published use in Missouri)
	Weller	Tar Springs sandstone (Perry County, Missouri)
1940	Keyes (a)	Kaskaskia limestone (part)
1941	Keyes (a)	Kaskaskia limestone (part)
1944	Branson	Tar Springs sandstone
1948	Weller, et al.	Tar Springs sandstone
1961	Spreng	Tar Springs formation
1963	Swann	Tar Springs Sandstone - base of Elviran Stage

Vienna Limestone (Weller, 1920)

Original description (Weller, 1920, p. 396) -- "The Vienna limestone is named from Vienna, Johnson County, Illinois, where the formation is exposed in some of the streets of the town, and in an old quarry just west of the town. As it is commonly exposed, the Vienna exhibits two rather distinct facies, an exceedingly siliceous limestone in the lower portion of the formation, and a shale member above. ... As already stated the limestone is remarkably siliceous. The silica is in part in the form of chert layers, and in part is finely disseminated through the limestone... The chert of the formation is quite persistent in character, the beds commonly being from one to four inches thick and quite regular. ... As the limestone with the chert layers is removed by weathering, the cherts fracture into subcubical masses with two light-colored surfaces, and occur in abundance in the residuum. ... The peculiar character of the weathered products of the Vienna limestone make it about the easiest to recognize of any of the limestone formations of the whole Chester series. The shales of the Vienna are black, fissile, and non-calcareous."

Type section -- Swann (1963, p. 84-85) states that the Vienna Limestone was, "Named by Weller (1920) for exposures in and around Vienna, the particular outcrop generally cited being 14 feet of limestone in a small roadside quarry west of Vienna on the south side of Illinois Highway 146 0.9 mile west of its junction with U.S. 45, NE$\frac{1}{4}$ SW$\frac{1}{4}$ NW$\frac{1}{4}$ sec. 5, T. 13 S., R. 3 E., Vienna Quad., Johnson Co., Ill."

Date	Author(s)	Nomenclature
1857	Hall	Kaskaskia limestone (part)
1858	Swallow	Archimedes limestone (part)
1866	Worthen	Chester limestone (part)
1892	Keyes	Kaskaskia limestone (top of)
1904	Ulrich	Birdsville formation (base of)
1907	Weller	Chester limestone (part)
	Buehler	Birdsville member of Chester group (base of)
1910	Schuchert	Birdsville member of Kaskaskia formation (part)
1914	Keyes(b)	Kaskaskia limestone (part)
1917	Ulrich	Glen Dean limestone
1920	Weller	Vienna limestone
1925	Flint	Vienna limestone (first unpublished use in Missouri)
1931	Keyes	Kaskaskia limestone (part)
1939	Weller	Vienna limestone (first published use in Missouri)
1941	Keyes(a)	Kaskaskia limestone (part)
1944	Branson	(did not recognize in Missouri)
1948	Weller, et al.	Vienna formation
1961	Spreng	Vienna formation
1963	Swann	Vienna Limestone - Hombergian Stage

Hindsville Limestone (Purdue and Miser, 1916)

Original description (Purdue and Miser, 1916, p. 12) -- "The Hindsville member consists mainly of limestone interbedded with some sandstone. The limestone is dark gray on fresh surfaces, but on weathering it becomes lighter. ... In most places it occurs in rather heavy layers and is coarsely crystalline, compact, and of homogeneous texture. ... In places it contains fossils in abundance and in others it is oolitic to pisolitic. ... Parts of the limestone are cross-bedded. ... A bed of conglomerate a few feet thick commonly occurs at the base of the member. ... The sandstone forms thin layers and platy beds, some of them 3 to 4 feet thick. It is soft, yellow to brown, porous, and fine grained, and before weathering is calcareous, thus resembling the sandstone of the Batesville."

Type section -- Exposures near the town of Hindsville, Madison County, Arkansas; Hindsville 7½' Quadrangle.

Date	Author(s)	Nomenclature
1907	Smith & Siebenthal	Carterville formation
1916	Purdue & Miser	Hindsville limestone member of Batesville sandstone
1941	Clark	Hindsville formation (unpublished; first identification in Missouri)
1944	Branson	Hindsville formation Carterville formation
1948	Weller, et al.	Hindsville limestone member of Carterville formation
1952	Beveridge & Clark	Hindsville limestone
1961	Spreng	Hindsville formation Carterville formation
1967	Garner	Batesville formation (lower part)
1968	Ogren	Limestone facies of Batesville Sandstone
1972	Thompson	Hindsville Limestone Carterville (Hindsville) Formation (considered Carterville to be isolated remnants of Hindsville Limestone)

Remarks -- Smith and Siebenthal (1907, p. 5) named the Carterville Formation from exposures just west of Carterville, Jasper County, Missouri (Webb City 7½' Quadrangle). Of this, they said, "The Carterville formation occurs in isolated patches and has a most heterogeneous character. It consists of shaly, lumpy, somewhat conglomeratic, and usually oolitic limestones, calcareous shale, light to dark argillaceous shale, arenaceous shale and shaly sandstone, massive unindurated sandstone, massive hard sandstone, and quartzite; in short, the whole category of sedimentary rocks, with the exception of chert and quartz conglomerate".

Batesville Formation (Penrose, 1891)

Original description (Penrose, 1891, p. 139) -- "Overlying the Fayetteville shale, is a sandstone formation with lenticular beds of gray, black or brown shale. This formation lies on both sides of the White River, reaching to the area of the Fayetteville shale and the chert hills on the north, ... It is well developed at the town of Batesville and has been named, by the State Geologist, the Batesville sandstone. It consists of brown or buff colored, fine grained sandstone, generally soft, though sometimes hard. ... The shales in the sandstone occur as lenticular deposits, often ending very abruptly, though sometimes traceable for several miles. They and the sandstones appear, in many places, to be mutually replaceable."

Type section -- Named from exposures near Batesville, Arkansas. Williams (1900) designated a section 1½ miles southeast of Batesville as the type; Jamestown 7½' Quadrangle.

Date	Author(s)	Nomenclature
1891	Penrose	Batesville formation
**(not) 1891	Simonds	Batesville formation (** = Wedington Sandstone Member of Fayetteville Formation)
1900	Williams	Batesville formation
1941	Clark	Batesville formation (unpublished; first recognized in Missouri)
1944	Branson	Batesville formation
1948	Weller, et al.	Batesville sandstone member of Carterville formation
1952	Beveridge & Clark	Batesville formation
1961	Spreng	Batesville formation
1972	Thompson	Batesville Formation

Fayetteville Formation (Simonds, 1891)

Original description (Simonds, 1891, p. 42) -- "In Washington County the Fayetteville shale is the principal formation lying between the Boone chert and the Archimedes limestone. It receives its name from its occurrence in the valleys about Fayetteville, especially those of the West Fork of the White River and its tributaries. While the prevailing color of the Fayetteville is black, as in most instances where it has been recently exposed, it may be of a bluish or even a yellowish brown color."

Type section -- Exposures in or near Fayetteville, Washington County, Arkansas.

Date	Author(s)	Nomenclature
**(not) 1891	Penrose	Fayetteville shale (** = Moorefield Formation)
1891	Simonds	Fayetteville formation
1941	Clark	Fayetteville formation (unpublished; first identified in Missouri)
1944	Branson	Fayetteville formation
1948	Weller, et al.	Fayetteville shale member of Carterville formation
1952	Beveridge & Clark	Fayetteville formation
1961	Spreng	Fayetteville formation
1972	Thompson	Fayetteville Formation

REFERENCES

AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS, 1961, Code of stratigraphic nomenclature: Am. Assn. Petroleum Geologists Bull., v. 54, p. 645-665.

BAXTER, J. W., 1960, Salem Limestone in southwestern Illinois: Ill. Geol. Survey, Circ. 284, 32 p.

BEVERIDGE, T. R., 1951, Geology of the Weaubleau Creek area, Missouri: Mo. Geol. Survey and Water Resources, v. 32, 111 p.

_____, 1970, Geology of the Bassville Quadrangle, Greene County, Missouri: Mo. Geol. Survey and Water Resources, Geol. Quad. Map ser. 4, 35 p.

BEVERIDGE, T. R., and E. L. CLARK, 1952, A revision of the early Mississippian nomenclature in western Missouri, in Guidebook, 16th regional field conference, west-central Missouri, Kansas Geological Society: Mo. Geol. Survey and Water Resources, Rept. Inv. 13, p. 71-80.

BRANNER, J. C., 1891, Preface to the geology of Crowley's Ridge: Annual Rept. Geol. Survey, Ark. for 1889, v. 2, p. 9-19.

BRANSON, E. B., 1918, The geology of Missouri: U. Mo. Studies, Bull. 19, n. 15, 172 p.

_____, 1938a, Stratigraphy and paleontology of the Lower Mississippian of Missouri, Part 1: U. Mo. Studies, v. 13, n. 3, 205 p., pls. 1-20.

_____, 1938b, Stratigraphy and paleontology of the Northview and Hannibal, in Stratigraphy and paleontology of the Lower Mississippian of Missouri, Part 2, E. B. Branson, et al.: U. Mo. Studies, v. 13, n. 4, p. 3-56, pls. 21-25.

_____, 1944a, The geology of Missouri: U. Mo. Studies, v. 19, n. 3, 535 p., 49 pls.

_____, 1944b, Devonian of northeastern Missouri, in Symposium on Devonian stratigraphy: Ill. Geol. Survey, Bull. 68, p. 174-181.

BRANSON, E. B., and M. G. MEHL, 1933, Conodont studies no. 3; Conodonts from the Grassy Creek shale of Missouri: U. Mo. Studies, v. 8, n. 3, p. 171-259, 9 pls.

_____, 1934, Conodont studies no. 4; Conodonts from the Bushberg sandstone and equivalent formations of Missouri: U. Mo. Studies, v. 8, n. 4, p. 265-300, 3 pls.

_____, 1938, Conodonts from the Lower Mississippian of Missouri, in Stratigraphy and paleontology of the Lower Mississippian of Missouri, Part 2, E. B. Branson, et al.: U. Mo. Studies, v. 13, n. 4, p. 128-175, pls. 32-48.

_____, 1941, Conodonts from the Keokuk formation: Denison U. Bull., Jour. Sci. Labs., v. 40, n. 14, p. 179-188, 1 pl.

BROADHEAD, G. C., 1874, Report on the geological survey of the State of Missouri including field work of 1873-1874: Mo. Geol. Survey, 734 p.

_____, 1879, Notes on surface geology of southwest Missouri and southeast Kansas: Kans. City Rev. Sci., v. 3, p. 460-461.

_____, 1893, A critical notice of the stratigraphy of the Missouri Paleozoic: Am. Geologist, v. 12, p. 74-89.

BROKAW, A. D., 1916, Preliminary oil report on southern Illinois - parts of Saline, Williamson, Pope, and Johnson Counties: Ill. Geol. Survey, extract from Bull. 35, p. 19-29.

BUTTS, CHARLES, 1917, Descriptions and correlations of the Mississippian formations of western Kentucky; Part 1 of Mississippian formations of western Kentucky: Ky. Geol. Survey, v. 1, 119 p., pls. 4-28.

BUCKLEY, E. R., 1903, Biennial report of the State Geologist to the 42nd general assembly, 1901-1902: Mo. Bur. Geol. and Mines, 2nd ser., 83 p.

BUCKLEY, E. R., and H. A. BUEHLER, 1904, The quarrying industry of Missouri:. Mo. Bur. Geol. and Mines, 2nd ser., v. 2, 371 p.

BUEHLER, H. A., 1907, The lime and cement resources of Missouri: Mo. Bur. Geol. and Mines, 2nd ser., v. 6, 255 p.

CANIS, W. F., 1968, Conodonts and biostratigraphy of the Lower Mississippian of Missouri: Jour. Paleo., v. 42, p. 525-555, pls. 72-74.

CARLSON, M. P., 1963, Lithostratigraphy and correlation of the Mississippian System in Nebraska: Nebr. Geol. Survey, Bull. 21, 46 p.

CLARK, E. L., 1937, The St. Louis Formation in southwestern Missouri: Mo. Geol. Survey and Water Resources, 59th bienn. rept., 4 app., 13 p.

_____, 1941, The geology of the Cassville Quadrangle: unpub. Ph.D. diss., U. Mo. - Columbia.

CLINE, L. M., 1934, Osage formations of southern Ozark region, Missouri, Arkansas, and Oklahoma: Am. Assn. Petroleum Geologists Bull., v. 18, p. 1132-1159.

COLLINSON, CHARLES, 1961, The Kinderhookian Series in the Mississippi Valley, in Guidebook, 26th regional field conference, northeastern Missouri and west-central Illinois, Kansas Geological Society: Mo. Geol. Survey and Water Resources, Rept. Inv. 27, p. 100-109.

COLLINSON, CHARLES, C. B. REXROAD, and T. L. THOMPSON, 1971, Conodont zonation of the North American Mississippian, in W. C. Sweet and S. M. Bergström, editors, Symposium on conodont biostratigraphy: Geol. Soc. Am., Mem. 127, p. 353-394.

COLLINSON, CHARLES, A. J. SCOTT, and C. B. REXROAD, 1962, Six charts showing biostratigraphic zones, and correlations based on conodonts from the Devonian and Mississippian rocks of the Upper Mississippi Valley: Ill. Geol. Survey, Circ. 328, 32 p.

CUMINGS, E. R., 1901, The use of Bedford as a formational name: Jour. Geology, v. 9, p. 232-233.

_____, 1922, Nomenclature and description of the geological formations of Indiana, in Handbook of Indiana Geology, W. N. Logan, et al.: Ind. Dept. Cons. Publ. 21, pt. 4, p. 403-570.

ENGLEMANN, GEORGE, 1847, Remarks on the St. Louis limestone: Am. Jour. Sci., ser. 2, v. 3, p. 119-120.

ENGLEMANN, HENRY, 1863, On the Lower Carboniferous System as developed in southern Illinois: Trans. Acad. Sci. St. Louis, v. 2, pt. 1, p. 188-190.

_____, 1868, Geology of Clinton and Washington Counties, in Geology and paleontology: Ill. Geol. Survey, v. 3, p. 145-191.

FENNEMAN, N. M., 1911, Geology and mineral resources of the St. Louis Quadrangle Missouri-Illinois; U. S. Geol. Survey Bull. 438, 73 p., 6 pls.

FLINT, R. F., 1925, A report of the geology of parts of Perry and Cape Girardeau Counties including parts of Altenburg, Perryville, and Campbell Hill Quadrangles: unpubl. ms., Geol. Survey, Mo. Dept. of Natural Resources.

FOWLER, G. M., and J. P. LYDEN, 1931, The ore deposits of the Tri-State District (Missouri-Kansas-Oklahoma) (with discussion): Am. Inst. Met. Eng., Tech. Pub. 446, 46 p.

GALLAHER, J. A., 1898, Biennial report of the Bureau of Geology and Mines: Mo. Bur. Geol. and Mines, 68 p.

_____, 1900, Preliminary report on the structural and economic geology of Missouri: Mo. Bur. Geol. and Mines, 2nd ser., v. 13, 259 p.

GARNER, H. F., 1967, Moorefield-Batesville stratigraphy and sedimentation in Arkansas: Geol. Soc. Am. Bull., v. 78, p. 1233-1246.

GOEBEL, E. D., 1968, Mississippian System; in The stratigraphic succession in Kansas, D. E. Zeller, ed.: Kans. Geol. Survey, Bull. 189, p. 17-21.

GOEBEL, E. D., T. L. THOMPSON, T. C. WAUGH, and L. C. MUELLER, 1968, Mississippian conodonts from the Tri-State District, Kansas, Missouri, and Oklahoma; in Short papers on research in 1967, D. E. Zeller, ed.: Kans. Geol. Survey, Bull. 191, pt. 1, p. 21-25.

GORDON, MACKENZIE, Jr., 1964, Carboniferous cephalopods of Arkansas: U. S. Geol. Survey, Prof. Paper 460, 322 p., 29 pls.

GROHSKOPF, J. G., N. S. HINCHEY, and F. C. GREENE, 1939, Subsurface geology of northeastern Missouri, in Biennial report of State Geologist to 60th General Assembly: Mo. Geol. Survey and Water Resources, app. 1, 100 p.

HALL, JAMES, 1857, Observations upon the Carboniferous limestones of the Mississippi Valley: Am. Jour. Sci., ser. 2, v. 23, p. 187-203.

HINCHEY, N. S., R. B. FISHER, and W. A. CALHOUN, 1947, Limestones and dolomites in the St. Louis area: Mo. Geol. Survey and Water Resources, Rept. Inv. 5, 80 p.

HOWE, W. B. and J. W. KOENIG, et al., 1961, The stratigraphic succession in Missouri: Mo. Geol. Survey and Water Resources, 2nd ser., v. 40, 185 p., 1 pl., 27 figs.

JENNEY, W. P., 1894, Lead and zinc deposits of Mississippi Valley: Am. Min. Eng. Trans., v. 22, p. 171-225.

KAISER, C. P., 1950, Stratigraphy of the lower Mississippian rocks in southwestern Missouri: Am. Assoc. Petroleum Geologists Bull., v. 34, p. 2133-2175.

KEYES, C. R., 1892, The principal Mississippian section: Geol. Soc. Am. Bull., v. 3, p. 283-300.

_____, 1893, A new locality for millerite (Keokuk, Iowa): Am. Geologist, v. 11, p. 126.

_____, 1894a, Paleontology of Missouri: Mo. Geol. Survey, v. 4, pt. 1, 271 p., pls. 1-32.

_____, 1894b, Paleontology of Missouri: Mo. Geol. Survey, v. 4, pt. 2, 266 p., pls. 33-56.

_____, 1895, Superior Mississippian in western Missouri and Arkansas: Am. Geologist, v. 16, p. 86-91.

_____, 1896, Serial nomenclature of the Carboniferous: Am. Geologist, v. 18, p. 22-28.

_____, 1897a, Carboniferous formations of the Ozark region: Proc. Iowa Acad. Sci., v. 5, p. 55-58.

_____, 1897b, Some geological formations of the Cap-Au-Gres uplift: Proc. Iowa Acad. Science., v. 5, p. 58-68.

_____, 1897c, Relations of the Devonian and Carboniferous in the Upper Mississippi Valley: Trans. Acad. Sci. St. Louis, v. 7, p. 357-369.

_____, 1897d, Dual character of the Kinderhook fauna: Am. Geologist, v. 20, p. 167-176.

_____, 1898, Remarks on the classification of the Mississippian series: Am. Geologist, v. 21, p. 108-113.

_____, 1900a, Certain faunal aspects of the original Kinderhook: Am. Geologist, v. 26, p. 315-321.

_____, 1900b, Kinderhook stratigraphy: Jour. Geology, v. 8, p. 315-321.

_____, 1901a, Time values of provincial Carboniferous terranes: Bull. Am. Jour. Sci., v. 12, p. 305-309.

_____, 1901b, A schematic standard for the American Carboniferous: Am. Geologist, v. 28, p. 299-305.

_____, 1914a, Scheme of the stratigraphic succession in Missouri: 4 p., Des Moines, Iowa.

_____, 1914b, Serial subdivisions of the early Carbonic succession in the continental interior: Proc. Iowa Acad. Sci., v. 21, p. 189-193.

_____, 1916, Terranal affinities of original Chouteau limestone: Proc. Iowa Acad. Sci., v. 23, p. 113-118.

_____, 1919, Stratigraphic delimitation of St. Louis formation: Proc. Iowa Acad. Sci., v. 26, p. 471-475.

_____, 1922a, Use of Chester as terranal title: Pan-Am. Geologist, v. 38, p. 149-150.

_____, 1922b, Diastrophic aspect of Aux Vases sandstone: Pan-Am. Geologist, v. 38, p. 339-348.

_____, 1923a, Taxonomy of the Mississippian section: Pan-Am. Geologist, v. 39, p. 387-390.

_____, 1923b, Earliest geographic title for Early Carbonic section of Mississippi Valley: Pan-Am. Geologist, v. 39, p. 390-395.

_____, 1923c, Four group arrangement of Early Carbonic terranes: Pan-Am. Geologist, v. 39, p. 395-398.

_____, 1925, Early geological exploits of Joseph Nicollet in the Mississippi Valley: Pan-Am. Geologist, v. 43, p. 321-332.

_____, 1927, Mississippian series, its synonomy and taxonomy: Pan-Am. Geologist, v. 29, p. 135-150.

_____, 1931, Genetic relationships of Hall's Kaskaskia limestone: Pan-Am. Geologist, v. 55, p. 75-77.

_____, 1933a, Standard Carbonic succession in diastatic analysis: Pan-Am. Geologist v. 60, p. 37-54.

_____, 1933b, Titular validity of Golconda limestone: Pan-Am. Geologist, v. 60, p. 63-64.

_____, 1933c, Type locality of Mississippian Osage group: Pan-Am. Geologist, v. 60, p. 361-368.

_____, 1934a, Ste. Genevieve limestone of Iowa: Pan-Am. Geologist, v. 62, p. 215-218.

_____, 1934b, Aux Vases vs. Ferruginous sandstone in Missouri: Pan-Am. Geologist, v. 62, p. 222-223.

_____, 1934c, Serial fauna in the making: Pan-Am. Geologist v. 62, p. 224-226.

_____, 1934d, Faunal integrity of Burlington limestone: Pan-Am. Geologist, v. 62, p. 375-378.

_____, 1937a, Redundancy of Sedalia limestone title in Missouri: Pan-Am. Geologist, v. 68, p. 299-302.

_____, 1937b, Kinship of so-called Fern Glen limestone of Missouri: Pan-Am. Geologist, v. 68, p. 359-361.

_____, 1937c, Genetic significance of geographic distribution of Burlington limestone: Pan-Am. Geologist, v. 68, p. 362-364.

_____, 1937d, Genetic affinities of so-called Sylamore sandstone in central Missouri: Pan-Am. Geologist, v. 68, p. 364-366.

_____, 1938a, Debacle of William's Chouteau fauna: Pan-Am. Geologist, v. 69, p. 365-368.

_____, 1938b, Serial reconditioning of American Carbonic taxonomy: Pan-Am. Geologist, v. 70, p. 61-65.

_____, 1938c, Priority of Swallow's Chester title: Pan-Am. Geologist, v. 70, p. 69-70.

_____, 1938d, Kinderhook formations at type section: Pan-Am. Geologist, v. 70, p. 152-154.

_____, 1938e, Kinderhook centrum: What is it? And where: Pan-Am. Geologist, v. 70, p. 183-196.

_____, 1938f, Diastrophic kinships of Warsaw shales formation: Pan-Am. Geologist, v. 70, p. 289-300.

_____, 1938g, Aux Vases in basilium function: Pan-Am. Geologist, v. 70, p. 301-304.

_____, 1938h, Some curious incongruities of Early Carbonic Meramec division: Pan-Am. Geologist, v. 70, p. 305-307.

_____, 1938i, Possible cycle role of Pella shales of Iowa: Pan-Am. Geologist, v. 70, p. 308-310.

_____, 1938j, Genetic enendation of Chartresan Series: Pan-Am. Geologist, v. 70, p. 363-364.

_____, 1939a, Error of the three archimedian limestones: Pan-Am. Geologist, v. 71, p. 63-66.

_____, 1939b, Fredonia oölite title of Kentucky in synonomy: Pan-Am. Geologist, v. 71, p. 67-68.

_____, 1939c, Invalidation of Fern Glen terrane of Missouri, Iowa, and Illinois: Pan-Am. Geologist, v. 71, p. 235-238.

_____, 1939d, Titular synonomy of Sulphur Springs formation of southeast Missouri: Pan-Am. Geologist, v. 72, p. 66-69.

_____, 1940a, Kinderhook problems in Iowa: Pan-Am. Geologist, v. 73, p. 29-60.

_____, 1940b, Membership of Hannibal shales: Pan-Am. Geologist, v. 73, p. 59-60.

_____, 1940c, Inutility of Wassonville limestone term in Iowa: Pan-Am. Geologist, v. 73, p. 65-68.

_____, 1940d, Invalidity of McKerney limestone of Illinois: Pan-Am. Geologist, v. 73, p. 68-70.

_____, 1940e, Unconformities of Kinderhook: Pan-Am. Geologist, v. 73, p. 137-140.

_____, 1940f, Passing of English River gritstone in Iowa: Pan-Am. Geologist, v. 73, p. 234-236.

_____, 1940g, Fantasy of the Osage fauna: Pan-Am. Geologist, v. 74, p. 297-300.

_____, 1940h, Fallacy of early Carbonic Meramec grouping of Missouri and Illinois: Pan-Am. Geologist, v. 74, p. 311-317.

_____, 1940i, Standard equivalency of Boone Chert of Arkansas: Pan-Am. Geologist, v. 74, p. 374-377.

_____, 1941a, Revised chart of geological formations of Missouri: Pan-Am. Geologist, v. 75, p. 155-157.

_____, 1941b, Revised chart of geological formations of Kansas: Pan-Am. Geologist, v. 75, p. 386.

_____, 1941c, Outlines of Missouri geology: Pan-Am. Geologist, v. 75, p. 337-366.

_____, 1941d, Revised chart of geological formations of Illinois: Pan-Am. Geologist, v. 76, p. 63-64.

_____, 1941e, Type section of Kinderhook at Burlington, Iowa: Pan-Am. Geologist, v. 76, p. 233-236.

_____, 1941f, Synonomic and bogus terranal titles in Kansas, Pan-Am. Geologist, v. 76, p. 303-315.

_____, 1942a, Kinship remoteness of Chouteau and Louisiana limestones of Missouri: Pan-Am. Geologist, v. 77, p. 229-231.

_____, 1942b, Fallacy of Osage group in Iowa: Pan-Am. Geologist, v. 77, p. 313-318.

KISSLING, D. L., 1960, Lower Osagean stratigraphy of east-central Missouri and adjacent Illinois: unpubl. Ph.D. diss., U. Wisconsin - Madison.

_____, 1961, Lower Osagean stratigraphy of east-central Missouri, in Guidebook, 26th regional field conference, northeastern Missouri and west-central Illinois, Kansas Geological Society: Mo. Geol. Survey and Water Resources, Rept. Inv. 27, p. 142-148.

KOENIG, J. W., 1961a, The Lincoln fold of northeastern Missouri, in Guidebook, 26th regional field conference, northeastern Missouri and west-central Illinois, Kansas Geological Society: Mo. Geol. Survey and Water Resources, Rept. Inv. 27, p. 75-80.

_____, 1961b, Unassigned Devonian or Mississippian formations, in The stratigraphic succession in Missouri, W. B. Howe and J. W. Koenig, et al.: Mo. Geol. Survey and Water Resources, 2nd ser., v. 40, p. 41-49.

KREY, FRANK, 1924, Structural reconnaissance of the Mississippi Valley area from Old Monroe, Missouri, to Nauvoo, Illinois: Mo. Bur. Geol. and Mines, 2nd ser., v. 18, 86.

LASWELL, T. J., 1957, Geology of the Bowling Green Quadrangle, Missouri: Mo. Geol. Survey and Water Resources, Rept. Inv. 22, 64 p.

LINEBACK, J. A., 1972, Lateral gradation of the Salem and St. Louis Limestones (Middle Mississippian) in Illinois: Ill. Geol. Survey, Circ. 474, 23 p.

McKNIGHT, E. T., and R. P. FISCHER, 1970, Geology and ore deposits of the Pitcher Field Oklahoma and Kansas: U. S. Geol. Survey Prof. Paper 588, 165 p., 11 pls.

McQUEEN, H. H., 1939, in Guidebook, 13th annual field conference, Kansas Geological Society, 3rd and 4th days: Kans. Geol. Soc., p. 59-64.

McQUEEN, H. S., and F. C. GREENE, 1938, The geology of northwestern Missouri: Mo. Geol. Survey and Water Resources, 2nd ser., v. 25, 217 p.

MARBUT, C. F., ed., 1898, Areal geology (Sheets 5-10): Mo. Geol. Survey, v. 12, 656 p.

_____, 1907, The geology of Morgan County: Mo. Bur. Geol. and Mines, 2nd ser., v. 7, 97 p.

MEEK, F. B., and A. H. WORTHEN, 1861a, Remarks on the age of the Goniatite limestone at Rockford, Indiana, and its relations to the "Black slate" of the western states, and to some of the succeeding rocks above the latter: Am. Jour. Sci., v. 32, p. 167-177.

_____, 1861b, Note to the paper of Messrs. Meek and Worthen on the age of the Goniatite limestone: Am. Jour. Sci., v. 32, p. 288.

MEHL, M. G., 1960, The relationships of the base of the Mississippian System in Missouri: Denison U. Bull., Jour. Sci. Labs., v. 45, p. 57-107.

_____, 1961, Basal relationships of the Mississippian in northeastern Missouri, in Guidebook, 26th regional field conference, northeastern Missouri and west-central Illinois, Kansas Geological Society: Mo. Geol. Survey and Water Resources, Rept. Inv. 27, p. 89-94.

MEHL, M. G., and L. A. THOMAS, 1947, Conodonts from the Fern Glen of Missouri: Denison U. Bull., Jour. Sci. Labs., v. 40, p. 3-19, pl. 1.

MOORE, R. C., 1928, Early Mississippian formations of Missouri: Mo. Bur. Geol. and Mines, 2nd ser., v. 21, 283 p.

_____, 1935, The Mississippian system in the upper Mississippi Valley region, in Guidebook, 9th annual field conference, Upper Mississippi Valley, Kansas Geological Society: Kans. Geol. Soc., p. 239-243.

NICOLETT, J. N., 1843, Report intended to illustrate a map of the hydrographical basin on the upper Mississippi River: U. S. 26th Cong., Sen. Doc. 237, House Doc. 52, 170 p.

OGREN, D. E., 1968, Stratigraphy of Upper Mississippian rocks of northern Arkansas: Am. Assoc. Petroleum Geologists Bull., v. 52, p. 282-294.

OWEN, D. D., 1838, Report on a geological reconnaissance of the State of Indiana made in the year 1837: Indianapolis, 34 p.

_____, 1852, Description of Carboniferous rocks in Iowa, including that of coal field west of the Mississippi lying partly in Iowa and partly in Missouri (incidental references to Missouri, p. 90-140): Geol. Survey Wisconson, Iowa, and Minnesota, 638 p., Philadelphia.

_____, 1855, Catalog of geological specimens collected by D. D. Owen: Smithsonian Rept. 9 for 1854, p. 393-396.

_____, 1856, Report of the geological survey of Kentucky, made during the years 1854 and 1855: Ky. Geol. Survey, v. 1, ser. 1, 416 p.

_____, 1857, Sub-Carboniferous rocks in Breckinridge, Meade, and Hardin Counties, in Second report of the geological Survey of Kentucky made during the years 1856 and 1857: Ky. Geol. Survey, v. 2, ser. 1, 85-92.

_____, 1858, Geological reconnaissance of northwestern counties of Arkansas, in First annual report: Ark. Geol. Survey, p. 105-109.

OWEN, D. D., and J. G. NORWOOD, 1847, Description of a remarkable fossil echinoderm from the limestone formation of St. Louis, Missouri: Am. Jour. Sci., v. 2, 2nd ser., p. 225.

PECK, R. D., 1934, The North American Trocheliscids, Paleozoic Charaphyta: Jour. Paleo., v. 8, p. 88-119.

PENROSE, R. A. F., Jr., 1891, Manganese, its uses, ores, and deposits: Annual Rept. Geol. Survey Ark. for 1890, v. 1, 642 p.,

PURDUE, A. H., and H. D. MISER, 1916, Description of the Eureka Springs and Harrison Quadrangles (Arkansas-Missouri): U. S. Geol. Survey Atlas, Folio 202, 22 p.

REXROAD, C. B., 1957, Conodonts from the Chester Series in the type area of southwestern Illinois: Ill. Geol. Survey, Rept, Inv. 199, 43 p., 4 pls.

REXROAD, C. B., and CHARLES COLLINSON, 1963, Conodonts from the St. Louis Formation (Valmeyeran Series) of Illinois, Indiana, and Missouri: Ill. Geol. Survey, Circ. 355, 28 p., 2 pls.

_____, 1965, Conodonts from the Keokuk, Warsaw, and Salem Formations (Mississippian) of Illinois: Ill. Geol. Survey, Circ. 388, 26 p., 1 pl.

ROBERTSON, C. E., 1967, The Elsey Formation and its relationship to the Grand Falls Chert: Mo. Geol. Survey and Water Resources, Rept. Inv. 38, 62 p.

ROWLEY, R. R., 1893, Range of Chouteau fossils (Missouri): Am. Geologist, v. 12, p. 49-50.

_____, 1895, Description of a new genus and five new species of fossils from the Devonian and sub-Carboniferous rocks of Missouri: Am Geologist, v. 16, p. 217-223.

_____, 1907 (1908), The geology of Pike County: Mo. Bur. Geol. and Mines, 2nd ser., v. 8, 122 p.

RUBY, W. W., 1952, Geology and mineral resources of the Hardin and Brussels Quadrangles (in Illinois): U. S. Geol. Survey, Prof. Paper 218, 179 p., 21 pls.

SCHUCHERT, CHARLES, 1910, Paleogeography of North America: Geol. Soc. Am. Bull., v. 20, p. 427-606.

SCOTT, A. J., and CHARLES COLLINSON, 1961, Conodont faunas from the Louisiana and McCraney Formations of Illinois, Iowa, and Missouri, in Guidebook, 26th regional field conference, northeastern Missouri and west-central Illinois, Kansas Geological Society: Mo. Geol. Survey and Water Resources, Rept. Inv. 27, p. 110-141, 2 pls.

SEARIGHT, T. K., 1954, The geology of the Humansville Quadrangle: Mo. Geol. Survey and Water Resources, Rept. Inv. 15, 50 p.

SHAVER, R. H., et al., 1970, Compendium of rock-unit stratigraphy in Indiana: Ind. Geol. Survey, Bull. 43, 229 p.

SHEPARD, E. M., 1898, A report on Greene County: Mo. Geol. Survey, v. 12, Sheet Report 5, p. 13-245.

_____, 1904, Table of geological formations (Missouri and Arkansas sections): Bull. Bradley Geol. Field Sta., Drury College, v. 1, pt. 2, p. 41.

_____, 1905, Key to the geologic horizons of Greene Co.: Bull. Bradley Geol. Field Sta., Drury College, v. 1, pt. 2.

SHORT, N. M., 1962, Ste. Genevieve (Mississippian) formation at the type locality in Missouri: Am. Assoc. Petroleum Geologists Bull., v. 46, p. 1912-1934.

SHUMARD, B. F., 1855, Geological section on the Mississippi River from St. Louis to Commerce, in Annual report 1-2: Mo. Geol. Survey, p. 139-208.

_____, 1859, Observations on the geology of the county of Ste. Genevieve, Missouri: Trans. Acad. Sci. St. Louis, v. 1, p. 404-405.

_____, 1873, Ozark County; Wright County; Pulaski County; Phelps County; Crawford County; Cape Girardeau County; Perry County; Ste. Genevieve County; Jefferson County; Clark County, in Reports on the geological survey of the State of Missouri, 1855-1871: Mo. Bur. Geol. and Mines, p. 189-323.

SIMONDS, F. W., 1891, The geology of Washington County, Arkansas: Annual Rept. Geol. Survey Ark. for 1888, v. 4, p. 1-148.

SMITH, W. S. T., and A. C. SIEBENTHAL, 1907, Description of the Joplin District (Missouri-Kansas): U. S. Geol. Survey, Geol. Atlas, Folio 148, 20 p.

SPRENG, A. C., 1961a, The Middle Mississippian Series (Osagean and Meramecian) of northeastern Missouri, in Guidebook, 26th regional field conference, northeastern Missouri and west-central Illinois, Kansas Geological Society: Mo. Geol. Survey and Water Resources, Rept. Inv. 27, p. 149-155.

_____, 1961b, Mississippian System, in The stratigraphic succession in Missouri, W. B. Howe and J. W. Koenig, eds.: Mo. Geol. Survey and Water Resources, 2nd ser., v. 40, p. 49-78.

STAFFORD, J. M., and J. B. KILLEBREW, 1900, Elements of geology of Tennessee: Nashville, Tenn., 264 p.

STINCHCOMB, B. L., and L. D. FELLOWS, 1968, Geology of the Maxville Quadrangle, Jefferson and St. Louis Counties, Missouri: Mo. Geol. Survey and Water Resources, Geol. Quad. Map Ser. 2.

SUTTON, A. H., 1934, Stratigraphy of the Okaw in southwestern Illinois: Jour. Geology, v. 42, p. 621-629.

SWALLOW, G. C., 1855, The first and second annual reports of the geological survey of Missouri: 239 p.

_____, 1858, Explanations of the geological map of Missouri, and a section of its rocks: Am. Assoc. Adv. Sci. Proc., v. 11, pt. 2, p. 1-21.

_____, 1883, Geology of Greene County, in History of Greene County, Missouri: Western Historical Co., p. 573-575.

SWANN, D. H., 1963, Classification of Genevievian and Chesterian (Late Mississippian) rocks of Illinois: Ill. Geol. Survey, Rept. Inv. 216, 91 p., 1 pl.

THOMPSON, T. L., 1966, Late Meramecian conodont faunas from the fort Bellefontaine and Vigus North quarries, St. Louis County, Missouri, in Guidebook, Am. Assoc. Petroleum Geologists annual meeting, April, 1966, Middle Ordovician and Mississippian strata, St. Louis and St. Charles Counties, Missouri: Mo. Geol. Survey and Water Resources, Rept. Inv. 34, p. 42-48.

_____, 1967, Conodont zonation of lower Osagean rocks (Lower Mississippian) of southwestern Missouri: Mo. Geol. Survey and Water Resources, Rept. Inv. 39, 88 p., 6 pls.

_____, 1972, Conodont biostratigraphy of Chesterian strata in southwestern Missouri: Mo. Geol. Survey and Water Resources, Rept. Inv. 50, 48 p., 1 pl.

_____, 1975, Redescription and correlation of the Fern Glen Formation of Missouri, in Studies in stratigraphy: Geol. Survey, Mo. Dept. of Natural Resources, Rept. Inv. 57, pt. 5, p. 141-172.

THOMPSON, T. L., and L. D. FELLOWS, 1970, Stratigraphy and conodont biostratigraphy of Kinderhookian and Osagean rocks of southwestern Missouri and adjacent areas: Mo. Geol. Survey and Water Resources, Rept. Inv. 45, 263 p., 10 pls.

THOMPSON, T. L., and E. D. GOEBEL, 1968, Conodonts and stratigraphy of the Meramecian Stage (Upper Mississippian) in Kansas: Kans. Geol. Survey, Bull. 192, 56 p., 5 pls.

ULRICH, E. O., 1904, Preliminary notes on classification and nomenclature of certain Paleozoic rock units in eastern Missouri, in The quarrying industry in Missouri, E. R. Buckley and H. A. Buehler: Mo. Bur. Geol. and Mines, 2nd ser., v. 2, p. 109-111.

_____, 1905, Determination and correlation of formations, in Zinc and lead deposits of northern Arkansas, G. I. Adams: U. S. Geol. Survey, Prof. Paper 24, p. 90-113.

_____, 1911, Revision of the Paleozoic systems: Geol. Soc. Am. Bull., v. 22, p. 291-680.

_____, 1915, Kinderhookian age of the Chattanoogan series (abstrt.): Geol. Soc. Am. Bull., v. 26, p. 96-99.

_____, 1916, The Chester controversy (abstrt.): Geol. Soc. Am. Bull., v. 27, p. 157.

_____, 1917, The formations of the Chester series in western Kentucky and their correlations elsewhere, in Mississippian formations of western Kentucky: Ky. Geol. Survey, 272 p., 11 pls.

_____, 1922, Some new facts bearing on correlations of Chester formations: Geol. Soc. Am. Bull., v. 33, p. 805-852.

UNKLESBAY, A. G., 1952, Geology of Boone County, Missouri: Mo. Geol. Survey and Water Resources, 2nd ser., v. 33, 159 p.

VAN HORN, F. B., 1905, The geology of Moniteau County: Mo. Bur. Geol. and Mines, 2nd ser., v. 3, 104 p.

VAN TUYL, F. M., 1922, The stratigraphy of the Mississippian formations of Iowa: Iowa Geol. Survey, v. 30, p. 33-349, 6 pls.

WELLER, J. M., 1939, Mississippian system, in Guidebook, 13th annual field conference, Kansas Geological Society: Kans. Geol. Soc., p. 131-137.

WELLER, J. M., et al., 1948 (reprinted 1963), Correlation of the Mississippian formations of North America: Geol. Soc. Am. Bull., v. 59, p. 91-196.

WELLER, J. M., and H. S. McQUEEN, 1939, Catalog of formation names of southwestern Illinois and southeastern Missouri, in Guidebook, 13th annual field conference, Kansas Geological Society: Kans. Geol. Soc., p. 159-171.

WELLER, STUART, 1898a, Classification of the Mississippian series: Jour. Geology, v. 6, p. 303-314.

_____, 1898b, Osage vs. Augusta: Am. Geologist, v. 22, p. 12-16.

_____, 1899, Kinderhook faunal studies: I. The fauna of the vermicular sandstone at Northview, Webster Co., Missouri: Trans. Acad. Sci. St. Louis, v. 9, p. 9-51.

_____, 1901, Correlation of the Kinderhook formations of southwestern Missouri: Jour. Geology, v. 9, p. 130-148.

_____, 1905, The northern and southern Kinderhook faunas: Jour. Geology, v. 13, p. 617-634.

_____, 1906, Kinderhook faunal studies: IV. The fauna of the Glen Park limestone: Trans. Acad. Sci. St. Louis, v. 16, p. 435-471.

_____, 1907, Notes on the geology of southern Calhoun County (Illinois): Ill. Geol. Survey, Bull. 4, p. 219-333.

_____, 1909, Correlation of the middle and upper Devonian and the Mississippian faunas of North America: Jour. Geology, v. 17, p. 257-285.

_____, 1914, The Mississippian brachiopoda of the Mississippi Valley basin: Ill. Geol. Survey, Mon. 1, 598 p.

_____, 1920, The Chester series in Illinois: Jour. Geology, v. 28, p. 271-303, 395-416.

WELLER, STUART, and STUART ST. CLAIR, 1928, Geology of Ste. Genevieve County, Missouri: Mo. Bur. Geol. and Mines, 2nd ser., v. 22, 352 p.

WELLER, STUART, and J. M. WELLER, 1939, Preliminary geological maps of the pre-Pennsylvanian formations in part of southwestern Illinois: Ill. Geol. Survey, Rept. Inv. 59, 15 p.

WELLS, J. S., 1960, Corning field and Tarkio field in Missouri, in Kansas oil and gas fields, northeast Kansas: Kansas Geol. Soc., v. 3, p. 199-210.

WILLIAMS, H. S., 1891, Correlation papers - Devonian and Carboniferous: U. S. Geol. Survey, Bull. 80, 279 p.

_____, 1896, Origin of Chouteau fauna: Jour. Geology, v. 4, p. 283-290.

_____, 1900, The Paleozoic faunas of northern Arkansas: Annual Rept. Geol. Survey Ark. for 1892, v. 5, p. 267-362.

_____, 1922, Upper Paleozoic faunas of Missouri: Pan-Am. Geologist, v. 37, p. 35-40.

WILLMAN, H. B., et al., 1975, Handbook of Illinois stratigraphy: Ill. Geol. Survey, Bull. 95, 261 p.

WILSON, M. E., 1922, The occurrence of oil and gas in Missouri: Mo. Bur. Geol. and Mines, 2nd ser., v. 16, 284 p.

WINCHELL, A., 1872, Report of a geological survey of the vicinity of Belleplaine, Scott County, Minnesota: St. Paul, Minn., 16 p.

WINSLOW, ARTHUR, 1894, Lead and zinc deposits: Mo. Geol. Survey, v. 6 and v. 7, 763 p.

WORKMAN, L. E., and TRACY GILLETTE, 1956, Subsurface stratigraphy of the Kinderhook Series in Illinois: Ill. Geol. Survey, Rept. Inv. 189, 46 p.

WORTHEN, A. H., 1866, Stratigraphical geology - Tertiary deposits and coal measures; Sub-Carboniferous Series, in Geology: Geol. Survey of Ill., v. 1, p. 40-118.

THE MISSISSIPPIAN SYSTEM

supplement 1 to volume 40, the stratigraphic succession in missouri

MISSOURI DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGY AND LAND SURVEY

GEOLOGICAL SURVEY

P. O. BOX 250
ROLLA, MO 65401