

**KANSAS GEOLOGICAL SURVEY
OPEN-FILE REPORT 35-1**

Rock Formations of Kansas

by

Raymond C. Moore

Disclaimer

The Kansas Geological Survey does not guarantee this document to be free from errors or inaccuracies and disclaims any responsibility or liability for interpretations based on data used in the production of this document or decisions based thereon. This report is intended to make results of research available at the earliest possible data, but is not intended to constitute final or formal publications.

KANSAS GEOLOGICAL SURVEY
1930 Constant Avenue
University of Kansas
Lawrence, KS 66047

Rock Formations of Kansas

By RAYMOND C. MOORE, State Geologist
Kansas Geological Survey, Lawrence.

The following tabulation of the rock formations of Kansas, prepared at request of the Kansas Geological Society, shows the present classification of stratigraphic units, in part tentative, that are recognized in the state, with brief description of lithologic characteristics. Figures representing average thickness are given in most cases, accompanied by indication of approximate maximum observed thickness (shown in parentheses). Space does not permit discussion of certain doubtful and tentative features shown in the table. Classification of the Dakota beds is especially in doubt, awaiting completion of studies by Dr. A. C. Tester.

Acknowledgments are due Drs. N. D. Newell and M. K. Elias for assistance in preparing parts of the table and to a committee of the Kansas Geological Society under chairmanship of Mr. Jas. I. Daniels for data on thicknesses of subsurface units.

System Series Group	Formation	Member	Thickness Feet	Lithologic Character and Special Notes	
Recent	Alluvium		0-100±	Gravel, sand, silt and clay deposits of stream valleys. Includes some terrace materials.	
	Dune sand, loess		0-50±	Sand and silt deposited by winds, chiefly in southern and western Kansas.	
Quaternary Pleistocene	Sanborn fm.		35 (180)	Sand and gravel overlain by loess, chiefly in western Kansas.	
	Belleville fm.		60 (200)	Sand, gravel and clay, in north-central Kansas. May correspond in age to McPherson formation.	
	McPherson fm.		100 (250)	Sand, gravel and clay, in west-central Kansas.	
	Kansan drift		10 (60)	Glacial till. May be partly contemporaneous with McPherson formation.	
Tertiary Oligocene Pliocene	Ogallala fm.		125 (210)	"Mortar beds" composed of sand and fine gravel cemented by calcium carbonate, clay. Includes algal limestone. Mammal bones, grass seeds.	
	Woodhouse clay		20 (60)	Bright-colored mottled clay, fragmentary mammal bones.	
Cretaceous Montana	Beecher Island sh.		100	Gray shale, limonite concretions. Black and gray shale.	
	Undifferentiated Salt Grass sh.		600		
	Pierre sh.		60		
	Niobrara chalk	Lake Creek sh.		200	Black and dark-gray flaky shale, gypsum locally abundant.
		Weskan sh.		170	
		Sharon Springs sh.		155	
		Smoky Hill chalk		400 (700)	
		Hays ls.		60 (80)	
		Codell ss.		10	
	Colorado	Carlisle sh.		200	Gray fissile shale with concretions in upper part. Chalky shale with thin limestones in lower part.
		Fairport sh.		100	
	Dakota	Pfeifer sh.		20	Chalky shale with thin chalky limestones. Fencepost limestone bed at top. In Hamilton County where the Pfeifer and Jetmore members are not separable, they are combined under the term Bridge Creek shale member.
Jetmore chalk			20		
Hartland sh.			35 (50)	Chalky limestone and shale. "Shell limestone" at top. Bluish-gray chalky shale with a few thin limestones. Hard crystalline limestone and chalky shale.	
Lincoln ls.			20		
Graneros sh.			40	Bluish-gray clay shale, sandy shale and lenses of shaly sandstone.	
Sandstone Hodgeman sh.			15-100	Dark-gray and black shale and brown sandstone, mostly marine.	
Rocktown ss.			25-200	Yellow brown sandstone and reddish or vari-colored shale, mostly nonmarine.	
Terra Cotta sh.			25-200	Light and dark brown sandstone, dark-gray and black shale and thin shaly limestone, mostly marine.	
Mentor ss.			100-200	Yellow-brown sandstone, nonmarine.	
Marquette ss.			50		
Kiowa sh.		50	Massive red or gray sandstone.		
Big Basin ss.		12			
Cimarron	Shale		20	Maroon-colored shale. Hard white dolomite.	
	Day Creek dol.		4		
	Whitehorse ss.		200	Fine-grained light-red sandstone and sandy shale. Dull-red clay shale with some thin dolomitic limestone beds.	
	Dog Creek sh.		30 (44)		
	Shiner gyp.		5 (25)	Massive gypsum.	
	Jenkins sh.		5 (50)		
	Medicine Lodge gyp.		20 (27)	White to gray, massive gypsum.	
	Flowerpot sh.		175 (195)		
	Cedar Hills ss.		250	Variegated gypsiferous clay shale. Hard bright-red massive sandstone with inter-bedded red sandy shale.	
	Harper ss.		700		
Sumner	Shale and Gauda salt		500±	Light-gray and red shale and salt beds.	
	Wellington sh.		550±		
	Carlton ls.		18	Light-gray flaggy limestone with pelecypods, insects and plant remains near base.	
	Buckeye sh.		235		
	Strickler ls.		2	White flaggy limestone, unfossiliferous. Gray calcareous shale.	
	Newbern sh.		11		
	Hollenberg ls.		7	Brown flaggy limestone with good microfauna. Gray, green and red clay shale.	
	Pearl sh.		27		
	Herington ls.		8	White to buff, massive and flaggy impure dolomitic limestone with dominantly molluscan fauna. Gray to olive drab clay shale.	
	Nolans ls.		14		
Paddock sh.		14	White to gray limestone and calcareous shale, fossiliferous.		
Krider ls.		6			
Odell sh.		20	Olive drab, gray and maroon clay shale. Light bluish-gray flaggy to platy earthy limestone.		
Luta ls.		7			
Cresswell ls.		9	Gray massive to thin-bedded chert-bearing limestone, chertoid remains generally common.		
Grant sh.		12			
Chase	Stovall ls.		2	Light-gray clay shale with thin fossiliferous limestone beds near top. Dark-gray granular fossiliferous limestone, commonly chert-bearing.	
	Gage sh.		40		
	Towanda ls.		11	Gray, green and red clay shale, with fossiliferous zone near top. Drab to greenish flaggy limestone with common gastropods.	
	Holmesville sh.		30		
	Ft. Riley ls.		10	White to buff massive fossiliferous limestone. Light-gray calcareous shale.	
	Oketo sh.		5		
	Florence ls.		25	Bluish-gray limestone with abundant nodules and beds of bluish dense chert.	
	Blue Rapids sh.		28		
	Kinney ls.		11	Greenish and red, clay shale, locally with limestone bed near middle. Gray limestone and shale.	
	Wymore sh.		29		
Schroyer ls.		9	Olive-green, gray and red clay shale. Gray cherty limestone.		
Havensville sh.		20			
Threemile ls.		11	Olive and gray calcareous shale. Gray to bluish massive, chert-bearing limestone.		
Speiser sh.		17			
Big Blue	Funston ls.		5	Bluish-gray to buff massive limestone, gastropods common. Gray, green and red clay and sandy shale.	
	Blue Rapids sh.		28		
	Crouse ls.		13	Gray massive limestone and calcareous shale, fossiliferous. Gray, green and red shale and gypsum.	
	Eastly Creek sh.		15		
	Middleburg ls.		5	Dark-gray massive impure limestone with numerous small high-spined gastropods. Green, gray and red calcareous shale.	
	Hooser sh.		8		
	Elsas ls.		7	Bluish-gray limestone and shale, fossiliferous. Green and red shale, locally with platy beds.	
	Stearns sh.		18		
	Morrill ls.		2	Dark-gray limestone, molluscan fauna. Light-gray and olive calcareous shale, brachiopods and bryozoans abundant.	
	Florena sh.		9		
Cottonwood ls.		6	Light-gray to buff massive limestone with abundant fusulines, locally nodules of chert. Light-green and red clay shale, containing some thin impure limestone beds.		
Neva ls.		18			
Salem Pt. sh.		7	Light-gray to white, massive to flaggy limestone. Dark-gray hard calcareous shale. Gray to buff, impure limestone, with molluscan fauna.		
Burr ls.		8			
Council Grove	Greenola ls.		33	Green, gray and red clay shale. Buff very impure unfossiliferous limestone.	
	Roca sh.		21		
	Howe ls.		1	Dark-gray to black, fossiliferous clay shale. Gray, massive limestone with abundant fusulines.	
	Bennett sh.		8		
	Glenrock ls.		5	Gray, green and red shale, unfossiliferous. Buff massive to thin-bedded limestone, few fossils.	
	Johnson sh.		15		
	Long Creek ls.		5	Light-gray calcareous shale and thin limestone with extremely abundant fusulines, brachiopods and bryozoans.	
	Hughes Creek sh.		39		
	Americus ls.		5	Gray limestone and black clay shale, fusulines common. Gray, green and red shale.	
	Oaks sh.		21		
Houchen Ck. ls.		1	Gray "mamillary" algal limestone. Green, gray and red shale, unfossiliferous.		
Stine sh.		23			
Adair	Five Point ls.		4	Gray massive to flaggy limestone, fossiliferous. Gray, greenish and red shale, unfossiliferous.	
	West Branch sh.		29		
	Falls City ls.		6	Gray to buff massive limestone and shale, upper part coquinaid, porous. Dark-gray shale with thin limestones, pelecypods abundant.	
	Hawxby sh.		13		
	Aspinwall ls.		4	Light-gray and buff fine-grained limestone, locally fossiliferous. Green and red clayey and sandy shale.	
	Shale		16		
	Indian Cave ss.		0-120	Light-brown massive and cross-bedded sandstone, lenses of conglomerate locally near base. Gray massive limestone weathering brown. Fossils common, especially <i>Maryinifera</i> .	
	Brownville ls.		2-4		
	Pony Creek sh.		15 (25)	Dark-gray and yellowish shale. Gray limestone and shale. The Grayhorse limestone occurs at top and Nebraska City limestone at base.	
	Caneyville ls.		15 (25)		
French Creek sh.		30 (42)	Gray and brownish clayey and sandy shale, with sandstone and Lorton coal in many places near top. Bluish-gray limestone weathering slightly red.		
Jim Creek ls.		1 (2)			
Friedrich sh.		35 (45)	Gray and yellowish brown clayey and sandy shale, locally with sandstone. Light-gray limestone and shale, large fusulines abundant in some beds.		
Grandhaven ls.		12 (20)			
Dry sh.		5 (15)	Gray shale. Gray to buff limestone, large fusulines common in some beds.		
Dover ls.		10 (24)			
Wabansaw	Table Creek sh.		12 (57)	Gray and brownish shale, in places with prominent sandstone in upper part. Dark-gray massive limestone, locally with abundant small fusulines.	
	Maple Hill ls.		2		
	Pierson Pt. sh.		14 (24)	Dark-gray shale, locally sandy and with coal bed near top. Blue-gray to brown massive limestone with abundant large fusulines.	
	Tarkio ls.		4 (10)		
	Willard sh.		30 (46)	Gray and brownish clayey and sandy shale, locally with sandstone at top. Dark-blue limestone and shale, in part with common fusulines (formerly called upper Emporia).	
	Elmont ls.		2 (19)		
	Harveyville sh.		8 (17)	Gray shale, locally with platy sandstone near middle. Dark-blue dense hard limestone, fusulines common (formerly called lower Emporia).	
	Reading ls.		3 (15)		
	Auburn sh.		36 (50)	Bluish-gray and yellowish shale, with thin persistent limestone and local sandstone beds. Dark bluish-gray massive limestone with large fusulines and other fossils.	
	Wakarusa ls.		5 (13)		
Soldier Creek sh.		5 (26)	Gray and yellowish clay shale.		

System Series Group	Formation	Member	Thickness Feet	Lithologic Character and Special Notes		
Wabansaw	Burlington ls.		6 (16)	Gray to brown massive, in part pseudo-brecciated limestone, <i>Ostya</i> common.		
	Silver Lake sh.		32 (44)			
	Rulo ls.		2	Dark-gray massive to shelly limestone, fairly fossiliferous.		
	Cedar Vale sh.		22 (38)			
	Happy Hollow ls.		3 (14)	Gray to salmon-colored massive limestone with abundant robust fusulines.		
	White Cloud sh.		60 (75)			
	Howard ls.		13 (20)	Dark to light-gray limestone and shale, in part contains persistent Nodaway coal. An important stratigraphic unit.		
	Severy sh.		65 (75)			
	Virgil	Coal Creek ls.		4 (5)	Dark bluish thin-bedded fine-grained limestone and shale, very fossiliferous.	
		Holt sh.		2 (4)		
Du Bois ls.			1	Bluish-gray massive fine-grained limestone with molluscan fauna.		
Turner Creek sh.			1.5 (3)			
Topeka ls.			7 (20)	Blue gray massive limestone, weathering brown, separated by shale beds. The Sheldon limestone of Condra is an algal-molluscan bed believed to belong at the top of this member.		
Hartford ls.			7 (20)			
Jones Point sh.			5 (15)	Bluish-gray clayey and calcareous shale, locally with abundant mollusks and also containing land plants.		
Dashner ls.			5 (11)			
Shawnee		Calhoun sh.		30 (50)	Gray and yellowish brown, clayey, calcareous and sandy shale, very fossiliferous in places.	
		Ervine Ck. ls.		20 (32)		
	Larsh-Mission Ck. sh.		4 (8)	Gray shale in upper part, black fissile shale in lower part. The Haynes limestone appears here to north.		
	Rock Bluff ls.		1.5 (2.5)			
	Oskaloosa sh.		6 (10)	Dark bluish-gray dense fine-grained massive limestone with vertical joints, fusulines.		
	Ozawkie ls.		5 (30)			
	Deer Creek ls.		35	Gray to brown massive limestone beds separated in places by shale, fusulines and algal remains common.		
	Turner sh.		36 (58)			
	Dodge	Avoca ls.		1.5 (4)	Gray and yellowish-brown clayey and sandy shale. Locally contains sandy impure Oat limestone.	
		King Hill sh.		5 (8)		
Bel ls.			8 (16)	Dark bluish-gray limestone, fusulines common. Gray clay shale.		
Queen Hill sh.			3 (4)			
Big Springs ls.			2 (6)	Blue-gray dense massive fine-grained limestone with vertical joints, fusulines abundant.		
Doniphan sh.			3 (10)			
Spring Branch ls.			6 (12)	Gray massive limestone weathering brown, and shale, contains algal beds at top.		
Stull sh.			24 (42)			
Dodge		Clay Creek ls.		2	Gray and brownish clayey and sandy shale, locally with sandstone near top.	
		Jackson Park sh.		50 (80)		
	Kanwaka sh.		75	Bluish-gray massive to shelly limestone, fusulines common.		
	Heebner sh.		5 (7)			
	Dodge	Kerford ls.		4 (8)	Dark-gray, fine-grained or oolitic, massive to slabby limestone, in part with fusulines and in part with molluscan fauna.	
		Heumader sh.		3 (5)		
		Plattsmouth ls.		18 (27)	Dark-gray clay shale.	
		Leavenworth ls.		2		
		Snyderville sh.		12 (70)	Bluish-gray fine-grained dense limestone with vertical joints.	
		Toronto ls.		8 (10)		
Dodge		Lawrence sh.		140 (200)	Gray and buff argillaceous to silty shales, sandstone beds, especially in the south, persistent coal near top (Williamsburg). Includes Ireland channel ss. 0-80 feet.	
		Local Unconformity Haskell ls.		2 (4)		
		Vinland sh.		8 (14)	Blocky, even, gray limestone, locally oolitic. Argillaceous to silty shale.	
		Tonganoxie ss.		50 (80)		
	Dodge	Iatan ls.		9 (18)	Thin-bedded, drab, sparsely fossiliferous limestone, weathers in a single massive ledge.	
		Weston sh.		75 (140)		
		Little Kaw ls.		2 (8)	Bluish-gray to buff clay shale with limonite concretions. Fossiliferous in the north.	
		Victory Junction sh.		2 (14)		
		Olathe ls.		15 (50)	Blocky, bluish, sandy limestone. Sandy gray shale; buff sandstone.	
		Eudora sh.		5 (50)		
Captain Creek ls.			8 (40)	Thin-bedded, wavy limestone, white to light-gray. Gray clay shale, commonly with black fissile layer near middle.		
Vilas sh.			20 (100)			
Springhill ls.			14 (60)	Gray even limestone, becomes massive, crystalline, and white toward south. Gray, silty to argillaceous shale.		
Hickory Creek sh.			1 (40)			
Merriam ls.		1 (3)	Drab to yellowish granular limestone with fine gray limestone below. Limy gray or yellowish shale.			
Bonher Springs sh.		15 (30)				
Dodge	Farley ls.		19 (30)	Silty gray shale with maroon clay layer near top. Variable limestone, light-gray crystalline or drab, shale, a cross-bedded in the north with very spicuous gray shale at middle.		
	Island Creek sh.		2 (40)			
	Argentine ls.		20 (28)	Gray clay shale; thickest near Missouri river. Thin-bedded, wavy, light-gray to buff limestone.		
	Quindaro sh.		1 (5)			
	Frisbie ls.		2 (3)	Blocky, dense, bluish limestone, locally undifferentiated from Argentine.		
	Raytown ls.		4 (35)			
	Muncie Creek sh.		1 (3)	Bluish-gray, even limestone, where thick becomes crystalline and light-gray or white. Gray clay shale; around Kansas City with black fissile layer.		
	Paola ls.		1.5			
	Dodge	Chanute sh.		25 (60)	Bluish, dense limestone, blocky. Gray silty shale, with coal near middle (Thayer) and massive sandstone occupying upper half (Cottage Grove).	
		Corbin City ls.		0.5 (60)		
Cement City ls.			7 (9)	Granular or oolitic drab limestone. Prominent only around Independence, Kansas.		
Quivira sh.			4 (8)			
Westerville ls.			6 (10)	Thin-bedded, wavy, fine-grained white limestone.		
Wea sh.			5 (10)			
Block ls.			3 (6)	Gray to greenish clay shale with black fissile layer at middle. Gray limestone, upper part oolitic or cherty, lower part blocky gray limestone.		
Fontana sh.			5 (35)			
Dodge		Winterset ls.		25 (35)	Limy or silty buff shale. Bluish, thin-bedded, fine-grained limestone with shaly partings. Gray clay shale.	
		Stark sh.		5		
	Canville ls.		2	Dove-gray to light-gray cherty limestone, upper part oolitic or with black chert in northeastern Kansas. Gray shale with black fissile layer.		
	Galesburg sh.		25 (125)			
	Bethany Falls ls.		15 (25)	Blocky, dense, bluish limestone. Silty gray shale; in southern Kansas where thickest contains upper massive sandstone (Dodds Cr.) and persistent coal (Cedar Bluff) at middle.		
	Hushpuckney sh.		6			
	Middle Creek ls.		2	Variable limestone, upper part generally massive mottled algal limestone or oolite, lower part even gray limestone. Gray shale with black fissile layer.		
	Ladore sh.		8 (75±)			
	Dodge	Hertha ls.		4 (10)	Blocky, dense, blue limestone. Variable buff heavy-bedded limestone with an upper phase of brecciated algal limestone (Schubert Creek?) and a more constant crystalline or fine-grained lower division (Sniabar).	
		Bourbon formation		150±		
Unconformity Unnamed sh.			?	Undifferentiated shaly beds containing sandy lenses, local limestone, black shale, and channel sandstones at the base (Warrensburg). Gray variable limestone, possibly coalesces northward with the Altamont.		
Lenap ls.			2 (20)			
Nowata sh.			20 (45)	Gray silty and argillaceous shale. Gray crystalline irregular limestone.		
Altamont ls.			10 (15)			
Sandera sh.			60 (100±)	Sandy shale, flaggy sandstone, prominent limestone in the north (Worland) occurs near middle? Mulberry coal in lower part. Ferruginous massive limestone.		
Pawnee ls.			10 (50)			
Labelle sh.			20 (75)	Gray sandy and argillaceous shale. Wavy-bedded crystalline white to light-gray limestone.		
Upper ls.			10 (18)			
Dodge	Middle sh.		7	Gray clay shale with black fissile layer. Drab, massive, magnesian limestone.		
	Lower ls.		5 (18)			
	Upper shale		75±	Silty and sandy gray to buff shale with coal (Mulky) overlain by black shale at top and coal (Bevier) near base.		
	Ardmore ls.		2±			
	Dodge	Cherokee sh.		350±	Blocky, bluish-gray, fine-grained limestone. Heterogeneous shales with at least seven coal horizons, each underlying black fossiliferous shales which are in turn locally capped by a limy layer.	
		Lower shale		350±		
		Sandstone		30±	Massive, cross-bedded brown sandstone. Blue-gray limestone and shale, local thin deposits filling sinks and depressions as in John district and several hundred feet in the Dodge City basin. May include some Morrow beds in this area. Unconf. at base.	
		Mississippi ls.		?		
		Dodge	Absent along Nemaha granite ridge and other major uplifts.		?	Light-gray fine to coarse-grained limestone with abundant chert (Boone), underlain in places by bluish noncherty limestone and greenish-blue or in part reddish shale (Fern Glen). Average 2-400 ft.
			Chattanooga sh.		?	
Absent along major uplifts.				?	Shale gray and bluish with local thin limestone beds (Chouteau-Hannibal). Shale mostly black fissile, (Chattanooga), in places with sand (Misener) at base.	
Hinton lime				544 ft. in Hay No. 1, sec. 30, T. 6 S., R. 6 E. Absent on major uplifts.		
Marquette sh.				125 ft. in Johnson No. 1, sec. 30, T. 18 S., R. 2 W. Absent on major uplifts.	Dark-gray or greenish soft clay shale.	
Vada lime				185 ft. in Morrison No. 2, sec. 20, T. 32 S., R. 21 W. Absent on major uplifts.		
Absent along major uplifts.			?	Light-colored coarse sandstone and thin beds of green shale, limestone and dolomite.		
Absent along major uplifts.			?			
203 ft. in Williams No. 1, SW NW SW, sec. 16, T. 35 S., R. 3 W. Absent on major uplifts.			?	Light-gray, white and buff crystalline dolomite, chert and some sandstone. Commonly called "St. Louis lime."		
Absent along major uplifts.			?			
990 ft. in Eckhard No. 1, Sec. 9, T. 35, S. R. 6 E. Absent on high parts of Central Kansas and Nemaha uplifts.		?	Pink granite, dark schist and other types of crystalline rocks.			
Absent along major uplifts.		?				

Rock Formations of Kansas

By RAYMOND C. MOORE, State Geologist
Kansas Geological Survey, Lawrence.

The following tabulation of the rock formations of Kansas, prepared at request of the Kansas Geological Society, shows the present classification of stratigraphic units, in part tentative, that are recognized in the state, with brief description of lithologic characteristics. Figures representing average thickness are given in most cases, accompanied by indication of approximate maximum observed thickness (shown in parentheses). Space does not permit discussion of certain doubtful and tentative features shown in the table. Classification of the Dakota beds is especially in doubt, awaiting completion of studies by Dr. A. C. Tester.

Acknowledgments are due Drs. N. D. Newell and M. K. Elias for assistance in preparing parts of the table and to a committee of the Kansas Geological Society under chairmanship of Mr. Jas. I. Daniels for data on thicknesses of subsurface units.

System	Series	Group	Formation	Member	Thickness Feet	Lithologic Character and Special Notes			
Quaternary	Recent	Alluvium	Alluvium		0-100±	Gravel, sand, silt and clay deposits of stream valleys. Includes some terrace materials.			
			Dune sand, loess		0-50±	Sand and silt deposited by winds, chiefly in south-central and western Kansas.			
			Unconformity						
			Sanborn fm.		35 (180)	Sand and gravel overlain by loess, chiefly in western Kansas.			
			Unconformity						
			Belleville fm.		60 (200)	Sand, gravel and clay, in north-central Kansas. May correspond in age to McPherson formation.			
			Unconformity						
			McPherson fm.		100 (250)	Sand, gravel and clay, in west-central Kansas.			
			Unconformity						
			Kansas drift		10 (60)	Glacial till. May be partly contemporaneous with McPherson formation.			
Tertiary	Pliocene	Ogallala	Ogallala fm.		125 (210)	"Mortar beds" composed of sand and fine gravel cemented by calcium carbonate, clay. Includes algal limestone. Mammal bones, grass seeds.			
			Unconformity						
			Woodhouse clay		20 (60)	Bright-colored mottled clay, fragmentary mammal bones.			
			Unconformity						
			Tertiary	Pliocene	Montana	Beecher Island sh.		100	Gray shale, limonite concretions.
						Undifferentiated		600	Black and gray shale.
						Salt Grass sh.		60	Gray shale, limestone and limonite concretions.
						Lake Creek sh.		200	Black and dark-gray flaky shale, gypsum locally abundant.
						Weskan sh.		170	Gray shale, large limestone concretions.
						Sharon Springs sh.		155	Black flaky shale, large septarian concretions.
Niobrara chalk		400 (700)				Alternating beds of soft chalk and chalky shale, with some thin bentonite beds.			
Unconformity									
Hays ls.		60 (80)				Massive chalky limestone.			
Tertiary	Pliocene	Colorado				Codell ss.		10	Sandstone.
			Blue Hill sh.		200	Gray fissile shale with concretions in upper part.			
			Fairport sh.		100	Chalky shale with thin limestone in lower part.			
			Pfeifer sh.		20	Chalky shale with thin cherty limestone. Fenestrate limestone bed at top. In Hamilton County where the Pfeifer and Jetmore members are not separable, they are combined under the term Bridge Creek shale member.			
			Greenhorn ls.						
			Jetmore chalk		20	Chalky limestone and shale. "Shell limestone" at top.			
			Hartland sh.		35 (50)	Bluish-gray chalky shale with a few thin limestones.			
			Lincoln ls.		20	Hard crystalline limestone and chalky shale.			
			Graneros sh.		40	Bluish-gray clay shale, sandy shale and lenses of shaly sandstone.			
			Tertiary	Pliocene	Dakota	Solomon fm.		15-100	Dark-gray and black shale and brown sandstone, mostly marine.
Local Unconformity									
Hodgeman sh.		25-200				Yellow brown sandstone and reddish or var-colored shale, mostly nonmarine.			
Local Unconformity									
Ellsworth fm.		25-200				Yellow brown sandstone and reddish or var-colored shale, mostly nonmarine.			
Local Unconformity									
Terra Cotta sh.		100-300				Light and dark brown sandstone, dark-gray and black shale and thin shelly limestone, mostly marine.			
Unconformity									
Belvidere fm.		100-300				Light and dark brown sandstone, dark-gray and black shale and thin shelly limestone, mostly marine.			
Unconformity									
Tertiary	Pliocene	Dakota	Cheyenne ss.		50	Yellow-brown sandstone, nonmarine.			
			Unconformity						
			Greer fm.		12	Massive red or gray sandstone.			
			Shale		20	Maroon-colored shale.			
			Day Creek dol.		4	Hard white dolomite.			
			Whitehorse ss.		200	Fine-grained light-red sandstone and sandy shale.			
			Dug Creek sh.		30 (44)	Dull-red clay shale with some thin dolomitic limestone beds.			
			Shimer gyp.		5 (25)	Massive gypsum.			
			Jenkins sh.		5 (50)	Red clay shale.			
			Medicine Lodge gyp.		20 (27)	White to gray, massive gypsum.			
Tertiary	Pliocene	Dakota	Flowerpot sh.		175 (195)	Variegated gypsiferous clay shale.			
			Enid fm.		250	Hard bright-red massive sandstone with inter-bedded red sandy shale.			
			Cedar Hills ss.		700	Reddish-brown sandstone and sandy shale.			
			Harper ss.		500±	Light-gray and red shale and salt beds.			
			Unconformity						
			Shale and Geuda salt		500±	Light-gray and red shale and salt beds.			
			Wellington sh.						
			Carlton ls.		18	Light-gray flaggy limestone with pelecypods, insects and plant remains near base.			
			Buckeye sh.		235	Gray shale with some thin red shale and gypsum.			
			Strickler ls.		2	White flaggy limestone, unfossiliferous.			
Tertiary	Pliocene	Dakota	Newbern sh.		11	Gray calcareous shale.			
			Hollenberg ls.		7	Brown flaggy limestone with good microfauna.			
			Pearl sh.		27	Gray, green and red clay shale.			
			Herington ls.		8	White to buff, massive and flaggy impure dolomitic limestone with dominantly molluscan fauna.			
			Nolans ls.		14	Gray to olive drab clay shale.			
			Paddock sh.		14	Gray to olive drab clay shale.			
			Krider ls.		6	White to gray limestone and calcareous shale, fossiliferous.			
			Odell sh.		20	Olive drab, gray and maroon clay shale.			
			Luta ls.		7	Light bluish-gray flaggy to platy earthy limestone.			
			Cresswell ls.		9	Gray massive to thin-bedded chert-bearing limestone, echinoid remains generally common.			
Tertiary	Pliocene	Dakota	Grant sh.		12	Light-gray clay shale with thin fossiliferous limestone beds near top.			
			Stovall ls.		2	Dark-gray granular fossiliferous limestone, commonly chert-bearing.			
			Gage sh.		40	Gray, green and red clay shale, with fossiliferous zone near top.			
			Towanda ls.		11	Drab to greenish flaggy limestone with common gastropods.			
			Holmesville sh.		30	Light-gray and red clay shale.			
			Ft. Riley ls.		10	White to buff massive fossiliferous limestone.			
			Barneston ls.		5	Light-gray calcareous shale.			
			Florence ls.		25	Bluish-gray limestone with abundant nodules and beds of bluish dense chert.			
			Blue Rapids sh.		28	Greenish and red, clay shale, locally with limestone bed near middle.			
			Kinney ls.		11	Gray limestone and shale.			
Tertiary	Pliocene	Dakota	Wymore sh.		29	Olive-green, gray and red clay shale.			
			Schroyer ls.		9	Gray cherty limestone.			
			Havensville sh.		20	Olive and gray calcareous shale.			
			Threemile ls.		11	Gray to bluish massive, chert-bearing limestone.			
			Speiser sh.		17	Green, gray and red clay shale with local thin limy and sandy beds.			
			Funston ls.		5	Bluish-gray to buff massive limestone, gastropods common.			
			Bigelow ls.		28	Gray, green and red clay and sandy shale.			
			Crouse ls.		13	Gray massive limestone and calcareous shale, fossiliferous.			
			Easley Creek sh.		15	Gray, green and red shale and gypsum.			
			Middleburg ls.		5	Dark-gray massive impure limestone with numerous small high-spined gastropods.			
Tertiary	Pliocene	Dakota	Hoozer sh.		8	Green, gray and red calcareous shale.			
			Eiss ls.		7	Bluish-gray limestone and shale, fossiliferous.			
			Stearns sh.		18	Green and red shale, locally with platy beds.			
			Morrill ls.		2	Dark-gray limestone, molluscan fauna.			
			Florens sh.		9	Light-gray and olive calcareous shale, brachiopods and bryozoans abundant.			
			Cottonwood ls.		6	Light-gray to buff massive limestone with abundant fusulinids, locally nodules of chert.			
			Eskridge sh.		33	Light-green and red clay shale, containing some thin impure limestone beds.			
			Neva ls.		18	Light-gray to white, massive to flaggy limestone.			
			Salem Pt. sh.		7	Dark-gray hard calcareous shale.			
			Burr ls.		8	Gray to buff, impure limestone, with molluscan fauna.			
Tertiary	Pliocene	Dakota	Roca sh.		21	Green, gray and red clay shale.			
			Howe ls.		1	Buff very impure fossiliferous limestone.			
			Bennett sh.		8	Dark-gray to black, fossiliferous clay shale.			
			Glenrock ls.		5	Gray, massive limestone with abundant fusulinids.			
			Johnson sh.		15	Gray, green and red shale, unfossiliferous.			
			Long Creek ls.		5	Buff massive to thin-bedded limestone, few fossils.			
			Hughes Creek sh.		39	Light-gray calcareous shale and thin limestone with extremely abundant fusulinids, brachiopods and bryozoans.			
			Americus ls.		5	Gray limestone and black clay shale, fusulinids common.			
			Oaks sh.		21	Gray, green and red shale.			
			Houschen Ck. ls.		1	Gray "mamillary" algal limestone.			
Tertiary	Pliocene	Dakota	Stine sh.		23	Green, gray and red shale, unfossiliferous.			
			Five Point ls.		4	Gray massive to flaggy limestone, fossiliferous.			
			West Branch sh.		29	Gray, greenish and red shale, unfossiliferous.			
			Falls City ls.		6	Gray to buff massive limestone and shale, upper part coquina, porous.			
			Hawxby sh.		13	Dark-gray shale with thin limestones, pelecypods abundant.			
			Aspinwall ls.		4	Light-gray and buff fine-grained limestone, locally fossiliferous.			
			Shale		16	Green and red clay and sandy shale.			
			Indian Cave ss.		0-120	Light-brown massive and cross-bedded sandstone, lenses of conglomerate locally near base.			
			Unconformity						
			Brownville ls.		2-4	Gray massive limestone weathering brown. Fossils common, especially <i>Maryinifera</i> .			
Tertiary	Pliocene	Dakota	Pony Creek sh.		15 (25)	Dark-gray and yellowish shale.			
			Caneyville ls.		15 (35)	Gray limestone and shale. The Grayhorse limestone occurs at top and Nebraska City limestone at base.			
			French Creek sh.		30 (42)	Gray and brownish clayey and sandy shale, with sandstone and Lorton coal in many places near top.			
			Jim Creek ls.		1 (2)	Bluish-gray limestone weathering slightly red.			
			Friedrich sh.		35 (45)	Gray and yellowish brown clayey and sandy shale, locally with sandstone.			
			Grandhaven ls.		12 (20)	Light-gray limestone and shale, large fusulinids abundant in some beds.			
			Dry sh.		5 (15)	Gray shale.			
			Dover ls.		10 (24)	Gray to buff limestone, large fusulinids common in some beds.			
			Table Creek sh.		12 (57)	Gray and brownish shale, in places with prominent sandstone in upper part.			
			Maple Hill ls.		2	Dark-gray massive limestone, locally with abundant small fusulinids.			
Tertiary	Pliocene	Dakota	Pierson Pt. sh.		14 (24)	Dark-gray shale, locally sandy and with coal bed near top.			
			Tarkio ls.		4 (10)	Blue-gray to brown massive limestone with abundant large fusulinids.			
			Willard sh.		30 (46)	Gray and brownish clayey and sandy shale, locally with sandstone at top.			
			Elmont ls.		2 (19)	Dark-blue limestone and shale, in part with common fusulinids (formerly called upper Emporia).			
			Harveyville sh.		8 (17)	Gray shale, locally with platy sandstone near middle.			
			Reading ls.		3 (15)	Dark-blue dense hard limestone, fusulinids common (formerly called lower Emporia).			
			Auburn sh.		36 (50)	Bluish-gray and yellowish shale, with thin persistent limestone and local sandstone beds.			
			Wakarusa ls.		5 (13)	Dark bluish-gray massive limestone with large fusulinids and other fossils.			
			Soldier Creek sh.		5 (26)	Gray and yellowish clay shale.			

System	Series	Group	Formation	Member	Thickness Feet	Lithologic Character and Special Notes
Wabenssee	Recent	Wabenssee	Hurlingham ls.		6 (16)	Gray to brown massive, in part pseudo-brecciated limestone, <i>Osguia</i> common.
			Silver Lake sh.		32 (44)	Gray and brownish shale, locally sandy.
			Hulels		2	Dark-gray massive to shelly limestone, fairly fossiliferous.
			Cedar Vale sh.		22 (38)	Gray shale, clayey to sandy, with persistent Elmo coal and local sandstone near top.
			Happy Hollow ls.		3 (14)	Gray to salmon-colored massive limestone with abundant robust fusulinids.
			White Cloud sh.		60 (75)	Bluish-gray and brownish shale, locally with sandstone.
			Howard ls.		13 (20)	Dark to light-gray limestone and shale, in part contains persistent <i>Nodaway</i> coal. An important stratigraphic unit.
			Severy sh.		65 (75)	Gray and brownish sandy shale with persistent platy even-bedded sandstone near top.
			Coal Creek ls.		4 (5)	Dark bluish thin-bedded fine-grained limestone and shale, very fossiliferous.
			Holt sh.		2 (4)	Dark to buff clay shale.
Wabenssee	Recent	Wabenssee	Du Bois ls.		1	Bluish-gray massive fine-grained limestone with molluscan fauna.
			Turner Creek sh.		1.5 (3)	Gray clay shale.
			Topeka ls.			
			Hartford ls.		7 (20)	Blue gray massive limestone, weathering brown, separated by shale beds. The Sheldon limestone of Candra is an algal-molluscan bed believed to belong at the top of this member.
			Jones Point sh.		5 (15)	Bluish-gray clayey and calcareous shale, locally with abundant mollusks and also containing land plants.
			Dashner ls.		5 (11)	Blue-gray and brown limestone and thin shale, fusulinid-bearing in part.
			Calhoun sh.		30 (50)	Gray and yellowish brown, clayey, calcareous and sandy shale, very fossiliferous in places.
			Ervine Ck. ls.		20 (32)	Light to dark-gray, thin and wavy-bedded fine-grained limestone, fusulinids common, except at top.
			Larsh-Mission Ck. sh.		4 (8)	Gray shale in upper part, black fissile shale in lower part. The Haynes limestone appears here to north.
			Rock Bluff ls.		1.5 (2.5)	Dark bluish-gray dense fine-grained massive limestone with vertical joints, fusulinids.
Wabenssee	Recent	Wabenssee	Oskaloosa sh.		6 (10)	Gray shale.
			Ozawie ls.		5 (30)	Gray to brown massive limestone beds separated in places by shale, fusulinids and algal remains common.
			Tecumseh sh.		36 (58)	Gray and yellowish-brown clayey and sandy shale. Locally contains sandy impure Ost limestone.
			Avoca ls.		1.5 (4)	Dark bluish-gray limestone, fusulinids common.
			King Hill sh.		5 (8)	Gray clay shale.
			Beil ls.		8 (16)	Blue gray limestone weathering yellow-brown, contains fusulinids, brachiopods and corals; algal bed at top.
			Queen Hill sh.		3 (4)	Gray shale grading down into black fissile shale.
			Big Springs ls.		2 (6)	Blue-gray dense massive fine-grained limestone with vertical joints, fusulinids abundant.
			Doniphan sh.		3 (10)	Bluish-gray clay shale.
			Spring Branch ls.		6 (12)	Gray massive limestone weathering brown, and shale, contains algal beds at top.
Wabenssee	Recent	Wabenssee	Stull sh.		24 (42)	Gray and brownish clayey and sandy shale, locally with sandstone near top.
			Clay Creek ls.		2	Bluish-gray massive to shelly limestone, fusulinids common.
			Jackson Park sh.		50 (80)	Gray and brown clayey and sandy shale with prominent sandstone beds and some red shale toward south.
			Kereford ls.		4 (8)	Dark-gray, fine-grained or oolitic, massive to shabby limestone, in part with fusulinids and in part with molluscan fauna.
			Heumader sh.		3 (5)	Dark-gray clay shale.
			Plattsmouth ls.		18 (27)	Bluish-gray, fine-grained, thin and wavy-bedded limestone, fossiliferous, chert-bearing in part.
			Heebner sh.		5 (7)	Gray clay shale in upper part, black hard fissile shale in lower part.
			Leavenworth ls.		2	Dark-blue fine-grained dense limestone with vertical joints.
			Snyderville sh.		12 (70)	Gray underlay, in most of north, includes thin sandstone, limestone and red shale toward south.
			Toronto ls.		8 (10)	Gray massive limestone weathering brown, fusulinids common locally.
Wabenssee	Recent	Wabenssee	Lawrence sh.		140 (200)	Gray and buff argillaceous to silty shales, sandstone beds, especially in the south, persistent coal near top (Williamsburg). Includes Ireland channel ss. 0-80 feet.
			Local Unconformity			
			Haskell ls.		2 (4)	Blocky, even, gray limestone, locally oolitic.
			Vinland sh.		8 (14)	Argillaceous to silty shale.
			Tonganoxie ss.		50 (80)	Massive, cross-bedded sandstone, coal beds, sandy shale, persistent coal (Sibley) at top.
			Unconformity			
			Iatan ls.		9 (18)	Thin-bedded, drab, sparsely fossiliferous limestone, weathers in a single massive ledge.
			Weston sh.		75 (140)	Bluish-gray to buff clay shale with limonite concretions. Fossiliferous in the north.
			Little Kaw ls.		2 (8)	Blocky, bluish, sandy limestone.
			Victory Junction sh.		2 (14)	Sandy gray shale; buff sandstone.
Wabenssee	Recent	Wabenssee	Olathe ls.		15 (50)	Thin-bedded, wavy limestone, white to light-gray.
			Eudora sh.		5 (50)	Gray clay shale, commonly with black fissile layer near middle.
			Captain Creek ls.		8 (40)	Gray even limestone, becomes massive, crystalline, and white toward south.
			Vilas sh.		20 (100)	Gray, silty to argillaceous shale.
			Springhill ls.		14 (60)	Drab to yellowish granular limestone with fine gray limestone below.
			Hickory Creek sh.		1 (40)	Limy gray or yellowish shale.
			Merriam ls.		1 (3)	Blocky gray to buff limestone.
			Bonner Springs sh.		15 (30)	Silty gray shale with maroon clay layer near top.
			Farley ls.		15 (30)	Variable limestone—light-gray crystalline or drab, with a cross-bedded argillaceous limestone (Schubert) and a cross-bedded gray shale at middle.
			Island Creek sh.		2 (40)	Gray clay shale; thickest near Missouri river.
Wabenssee	Recent	Wabenssee	Argentine ls.		20 (28)	Thin-bedded, wavy, light-gray to buff limestone.
			Quindaro sh.		1 (5)	Gray or yellowish shale, locally with carbonaceous layer.
			Frishie ls.		2 (3)	Blocky, dense, bluish limestone, locally undifferentiated from Argentine.
			Lane sh.		35 (100)	Gray sandy or clayey shale.
			Raytown ls.		4 (35)	Bluish-gray, even limestone, where thick becomes crystalline and light-gray or white.
			Muncie Creek sh.		1 (3)	Gray clay shale; around Kansas City with black fissile layer.
			Paola ls.		1.5	Bluish, dense limestone, blocky.
			Chanute sh.		25 (60)	Gray silty shale, with coal near middle (Thayer) and massive sandstone occupying upper half (Cottage Grove).
			Corbin City ls.		0.5 (60)	Granular or oolitic drab limestone. Prominent only around Independence, Kansas.
			Cement City ls.		7 (9)	Thin-bedded, wavy, fine-grained white limestone.
Wabenssee	Recent	Wabenssee	Quivira sh.		4 (8)	Gray to greenish clay shale with black fissile layer at middle.
			Westerville ls.		6 (10)	Gray limestone, upper part oolitic or cherty, lower part blocky gray limestone.
			Wea sh.		5 (10)	Limy or silty buff shale.
			Block ls.		3 (6)	Bluish, thin-bedded, fine-grained limestone with shaly partings.
			Fontana sh.		5 (35)	Gray clay shale.
			Winterset ls.		25 (35)	Down-gray to light-gray cherty limestone, upper part oolitic or with black chert in northeastern Kansas.
			Stark sh.		5	Gray shale with black fissile layer.
			Canville ls.		2	Blocky, dense, bluish limestone.
			Galesburg sh.		25 (125)	Silty gray shale; in southern Kansas where thickest contains upper massive sandstone (Dodds Cr.) and persistent coal (Cedar Bluff) at middle.
			Bethany Falls ls.		15 (25)	Variable limestone, upper part generally massive mottled algal limestone or oolitic, lower part even gray limestone.
Wabenssee	Recent	Wabenssee	Hushpuckney sh.		6	Gray shale with black fissile layer.
			Middle Creek ls.		2	Blocky, dense, blue limestone.
			Ladore sh.		8 (75±)	Gray silty shale, some heavy sandstone in the south where thickest.
			Hertha ls.		4 (10)	Variable buff heavy-bedded limestone with an upper phase of brecciated algal limestone (Schubert Creek?) and a more constant crystalline or fine-grained lower division (Snabar).
			Bourbon formation		150±	

Rock Formations of Kansas

By RAYMOND C. MOORE, State Geologist
Kansas Geological Survey, Lawrence.

The following tabulation of the rock formations of Kansas, prepared at request of the Kansas Geological Society, shows the present classification of stratigraphic units, in part tentative, that are recognized in the state, with brief description of lithologic characteristics. Figures representing average thickness are given in most cases, accompanied by indication of approximate maximum observed thickness (shown in parentheses). Space does not permit discussion of certain doubtful and tentative features shown in the table. Classification of the Dakota beds is especially in doubt, awaiting completion of studies by Dr. A. C. Tester.

Acknowledgments are due Drs. N. D. Newell and M. K. Elias for assistance in preparing parts of the table and to a committee of the Kansas Geological Society under chairmanship of Mr. Jas. I. Daniels for data on thicknesses of subsurface units.

System Series Group	Formation	Member	Thickness Feet	Lithologic Character and Special Notes
Recent	Alluvium		0-100±	Gravel, sand, silt and clay deposits of stream valleys. Includes some terrace materials.
	Dune sand, loess		0-50±	Sand and silt deposited by winds, chiefly in south-central and western Kansas.
Quaternary	Unconformity			
	Sanborn fm.		35 (180)	Sand and gravel overlain by loess, chiefly in western Kansas.
	Unconformity			
	Belleville fm.		60 (200)	Sand, gravel and clay, in north-central Kansas. May correspond in age to McPherson formation.
Pliocene	Unconformity			
	McPherson fm.		100 (250)	Sand, gravel and clay, in west-central Kansas.
	Unconformity			
Kansas drift		10 (60)	Glacial till. May be partly contemporaneous with McPherson formation.	
Tertiary	Ogallala fm.		125 (210)	"Mortar beds" composed of sand and fine gravel cemented by calcium carbonate, clay. Includes algal limestone. Mammal bones, grass seeds.
	Unconformity			
Oligocene	Woodhouse clay		20 (60)	Bright-colored mottled clay, fragmentary mammal bones.
	Unconformity			
Miocene	Beecher Island sh.		100	Gray shale, limonite concretions.
	Undifferentiated		600	Black and gray shale.
	Salt Grass sh.		60	Gray shale, limestone and limonite concretions.
	Pierre sh.		200	Black and dark-gray flaky shale, gypsum locally abundant.
	Lake Creek sh.		170	Gray shale, large limestone concretions.
	Weskan sh.		155	Black flaky shale, large septarian concretions.
	Sharon Springs sh.		155	Black flaky shale, large septarian concretions.
	Niobrara chalk		400 (700)	Alternating beds of soft chalk and chalky shale, with some thin bentonite beds.
	Unconformity			
	Hays ls.		60 (80)	Massive chalky limestone.
Cretaceous	Carlisle sh.		10	Sandstone.
	Codell ss.		200	Gray fissile shale with concretions in upper part.
	Blue Hill sh.		200	Chalky shale with thin limestone in lower part.
	Fairport sh.		100	Chalky shale with thin chalky limestone. Fence-post limestone bed at top. In Hamilton County where the Pfeifer and Jetmore members are not separable, they are combined under the term Bridge Creek shale member.
	Pfeifer sh.		20	Chalky limestone and shale. "Shell limestone" at top.
	Greenhorn ls.		20	Bluish-gray chalky shale with a few thin limestones.
	Hartland sh.		35 (50)	Hard crystalline limestone and chalky shale.
	Lincoln ls.		20	Bluish-gray clay shale, sandy shale and lenses of shaly sandstone.
	Graneros sh.		40	Dark-gray and black shale and brown sandstone, mostly marine.
	Solomon fm.		15-100	Yellow brown sandstone and reddish or var-colored shale, mostly nonmarine.
Dakota	Local Unconformity			
	Hodgeman sh.		25-200	Light and dark brown sandstone, dark-gray and black shale and thin shaly limestone, mostly marine.
Unconformity				
	Belvidere ss.		100-300	Yellow-brown sandstone, nonmarine.
Unconformity				
	Cheyenne ss.		50	Massive red or gray sandstone.
Unconformity				
	Greer fm.		12	Maroon-colored shale.
Cimarron	Big Basin ss.		20	Hard white dolomite.
	Shale		4	Fine-grained light-red sandstone and sandy shale.
Woodward fm.	Day Creek dol.		200	Dull-red clay shale with some thin dolomitic limestone beds.
	Whitehorse ss.		30 (44)	Massive gypsum.
Cave Creek fm.	Dog Creek sh.		5 (25)	Red clay shale.
	Shimer gyp.		5 (50)	White to gray, massive gypsum.
Enid fm.	Jenkins sh.		175 (195)	Variegated gypsiferous clay shale.
	Flowerpot sh.		250	Hard bright-red massive sandstone with inter-bedded red sandy shale.
Unconformity				
	Harper ss.		700	Reddish-brown sandstone and sandy shale.
Wellington sh.	Shale and Geuda salt		500±	Light-gray and red shale and salt beds.
	Carlton ls.		18	Light-gray flaggy limestone with pelecypods, insects and plant remains near base.
Buckeye sh.			235	Gray shale with some thin red shale and gypsum.
	Strickler ls.		2	White flaggy limestone, unfossiliferous.
Donegal ls.	Newbern sh.		11	Gray calcareous shale.
	Hollenberg ls.		7	Brown flaggy limestone with good microfauna.
Pearl sh.			27	Gray, green and red clay shale.
	Herington ls.		8	White to buff, massive and flaggy impure dolomitic limestone with dominantly molluscan fauna.
Nolans ls.	Paddock sh.		14	Gray to olive drab clay shale.
	Krider ls.		6	White to gray limestone and calcareous shale, fossiliferous.
Odell sh.			20	Olive drab, gray and maroon clay shale.
	Luta ls.		7	Light bluish-gray flaggy to platy earthy limestone.
Cresswell ls.			9	Gray massive to thin-bedded chert-bearing limestone, echinoid remains generally common.
	Grant sh.		12	Light gray clay shale with thin fossiliferous limestone beds near top.
Stovall ls.			2	Dark-gray granular fossiliferous limestone, commonly chert-bearing.
	Gage sh.		40	Gray, green and red clay shale, with fossiliferous zone near top.
Towanda ls.			11	Drab to greenish flaggy limestone with common gastropods.
	Holmesville sh.		30	Light-gray and red clay shale.
Barneston ls.	Ft. Riley ls.		10	White to buff massive fossiliferous limestone.
	Oketo sh.		5	Light-gray calcareous shale.
Blue Rapids sh.			28	Bluish-gray limestone with abundant nodules and beds of bluish dense chert.
	Kinney ls.		11	Greenish and red, clay shale, locally with limestone bed near middle.
Wymore sh.			29	Gray limestone and shale.
	Schroyer ls.		9	Olive-green, gray and red clay shale.
Wreford ls.	Havensville sh.		20	Gray cherty limestone.
	Threemile ls.		11	Olive and gray calcareous shale.
Speiser sh.			17	Green, gray and red clay shale with local thin limy and sandy beds.
	Funston ls.		5	Bluish-gray to buff massive limestone, gastropods common.
Bigelow ls.	Blue Rapids sh.		28	Gray, green and red clay and sandy shale.
	Crouse ls.		13	Gray massive limestone and calcareous shale, fossiliferous.
Easley Creek sh.			15	Gray, green and red shale and gypsum.
	Middleburg ls.		5	Dark-gray massive impure limestone with numerous small high-spined gastropods.
Bader ls.	Hooser sh.		8	Green, gray and red calcareous shale.
	Eiss ls.		7	Bluish-gray limestone and shale, fossiliferous.
Stearns sh.			18	Green and red shale, locally with platy beds.
	Morrill ls.		2	Dark-gray limestone, molluscan fauna.
Beattie ls.	Florens sh.		9	Light-gray and olive calcareous shale, brachiopods and bryozoans abundant.
	Cottonwood ls.		6	Light-gray to buff massive limestone with abundant fusulinids, locally nodules of chert.
Eskridge sh.			33	Light-green and red clay shale, containing some thin impure limestone beds.
	Neva ls.		18	Light-gray to white, massive to flaggy limestone.
Grenola ls.	Salem Pt. sh.		7	Dark-gray hard calcareous shale.
	Burr ls.		8	Gray to buff, impure limestone, with molluscan fauna.
Roca sh.			21	Green, gray and red clay shale.
	Howe ls.		1	Buff very impure unfossiliferous limestone.
Red Eagle ls.	Bennett sh.		8	Dark-gray to black, fossiliferous clay shale.
	Glenrock ls.		5	Gray, massive limestone with abundant fusulinids.
Johnson sh.			15	Gray, green and red shale, unfossiliferous.
	Long Creek ls.		5	Buff massive to thin-bedded limestone, few fossils.
Foraker ls.	Hughes Creek sh.		39	Light-gray calcareous shale and thin limestone with extremely abundant fusulinids, brachiopods and bryozoans.
	Americus ls.		5	Gray limestone and black clay shale, fusulinids common.
Hamlin sh.	Oaks sh.		21	Gray, green and red shale.
	Houchen Ck. ls.		1	Gray "mamillary" algal limestone.
Five Point ls.	Stine sh.		23	Green, gray and red shale, unfossiliferous.
			4	Gray massive to flaggy limestone, fossiliferous.
West Branch sh.			29	Gray, greenish and red shale, unfossiliferous.
	Falls City ls.		6	Gray to buff massive limestone and shale, upper part coquina, porous.
Hawxby sh.			13	Dark-gray shale with thin limestone, pelecypods abundant.
	Aspinwall ls.		4	Light-gray and buff fine-grained limestone, locally fossiliferous.
Towle sh.	Shale		16	Green and red clay and sandy shale.
	Indian Cave ss.		0-120	Light-brown massive and cross-bedded sandstone, lenses of conglomerate locally near base.
Unconformity				
	Brownville ls.		2-4	Gray massive limestone weathering brown. Fossils common, especially <i>Maryinifera</i> .
Pony Creek sh.			15 (25)	Dark-gray and yellowish shale.
	Caneyville ls.		15 (35)	Gray limestone and shale. The Grayhorse limestone occurs at top and Nebraska City limestone at base.
French Creek sh.			30 (42)	Gray and brownish clayey and sandy shale, with sandstone and Lorton coal in many places near top.
	Jim Creek sh.		1 (2)	Bluish-gray limestone weathering slightly red.
Friedrich sh.			35 (45)	Gray and yellowish brown clayey and sandy shale, locally with sandstone.
	Grandhaven ls.		12 (20)	Light-gray limestone and shale, large fusulinids abundant in some beds.
Dry sh.			5 (15)	Gray shale.
	Dover ls.		10 (24)	Gray to buff limestone, large fusulinids common in some beds.
Table Creek sh.			12 (57)	Gray and brownish shale, in places with prominent sandstone in upper part.
	Maple Hill ls.		2	Dark-gray massive limestone, locally with abundant small fusulinids.
Pierson Pt. sh.			14 (24)	Dark-gray shale, locally sandy and with coal bed near top.
	Tarkio ls.		4 (10)	Blue-gray to brown massive limestone with abundant large fusulinids.
Willard sh.			30 (46)	Gray and brownish clayey and sandy shale, locally with sandstone at top.
	Elmont ls.		2 (19)	Dark-blue limestone and shale, in part with common fusulinids (formerly called upper Emporia).
Harveyville sh.			8 (17)	Gray shale, locally with platy sandstone near middle.
	Reading ls.		3 (15)	Dark-blue dense hard limestone, fusulinids common (formerly called lower Emporia).
Auburn sh.			36 (50)	Bluish-gray and yellowish shale, with thin persistent limestone and local sandstone beds.
	Wakarusa ls.		5 (13)	Dark bluish-gray massive limestone with large fusulinids and other fossils.
Soldier Creek sh.			5 (26)	Gray and yellowish clay shale.

System Series Group	Formation	Member	Thickness Feet	Lithologic Character and Special Notes	
Missouri	Burlington ls.		6 (16)	Gray to brown massive, in part pseudo-brecciated limestone, <i>Osagia</i> common.	
	Silver Lake sh.		32 (44)	Gray and brownish shale, locally sandy.	
	Rudels sh.		2	Dark gray massive to shelly limestone, fairly fossiliferous.	
	Cedar Vale sh.		22 (38)	Gray shale, clayey to sandy, with persistent Elmo coal and local sandstone near top.	
	Happy Hollow ls.		3 (14)	Gray to salmon-colored massive limestone with abundant robust fusulinids.	
	White Cloud sh.		60 (75)	Bluish-gray and brownish shale, locally with sandstone.	
	Howard ls.		13 (20)	Dark to light-gray limestone and shale, in part contains persistent Nodaway coal. An important stratigraphic unit.	
	Severy sh.		65 (75)	Gray and brownish sandy shale with persistent platy even-bedded sandstone near top.	
	Iowa	Coal Creek ls.		4 (5)	Dark bluish thin-bedded fine-grained limestone and shale, very fossiliferous.
		Holt sh.		2 (4)	Dark-gray to black clay shale.
Du Bois ls.			1	Bluish-gray massive fine-grained limestone with molluscan fauna.	
Turner Creek sh.			1.5 (3)	Gray clay shale.	
Topeka ls.					
Hartford ls.			7 (20)	Blue gray massive limestone, weathering brown, separated by shale beds. The Sheldon limestone of Canada is an algal-molluscan bed believed to be local at the top of this member.	
Jones Point sh.			5 (15)	Bluish-gray clayey and calcareous shale, locally with abundant mollusks and also containing land plants.	
Dashner ls.			5 (11)	Blue-gray and brown limestone and thin shale, fusulinid-bearing in part.	
Calhoun sh.			30 (50)	Gray and yellowish brown, clayey, calcareous and sandy shale, very fossiliferous in places.	
Nebraska		Ervine Ck. ls.		20 (32)	Light to dark-gray, thin and wavy-bedded fine-grained limestone, fusulinids common, except at top.
	Larsh-Mission Ck. sh.		4 (8)	Gray shale in upper part, black fissile shale in lower part. The Haynes limestone appears here to north.	
	Deer Creek ls.		1.5 (2.5)	Dark bluish-gray dense fine-grained massive limestone with vertical joints, fusulinids.	
	Oskaloosa sh.		6 (10)	Gray shale.	
	Ozawie ls.		5 (30)	Gray to brown massive limestone beds separated in places by shale, fusulinids and algal remains common.	
	Tecumseh sh.		36 (58)	Gray and yellowish-brown clayey and sandy shale. Locally contains sandy impure Ost limestone.	
	Avoca ls.		1.5 (4)	Dark bluish-gray limestone, fusulinids common.	
	King Hill sh.		5 (8)	Gray clay shale.	
	Eell ls.		8 (16)	Blue gray limestone weathering yellow-brown, contains fusulinids, brachiopods and corals; algal bed at top.	
	Kansas	Queen Hill sh.		3 (4)	Gray shale grading down into black fissile shale.
Big Springs ls.			2 (6)	Blue-gray dense massive fine-grained limestone with vertical joints, fusulinids abundant.	
Doniphan sh.			3 (10)	Bluish-gray clay shale.	
Spring Branch ls.			6 (12)	Gray massive limestone weathering brown, and shale, contains algal beds at top.	
Stull sh.			24 (42)	Gray and brownish clayey and sandy shale, locally with sandstone near top.	
Kanawha sh.					
Clay Creek ls.			2	Bluish-gray massive to shelly limestone, fusulinids common.	
Jackson Park sh.			50 (80)	Gray and brown clayey and sandy shale with prominent sandstone beds and some red shale toward south.	
Oreall ls.		Kereford ls.		4 (8)	Dark-gray, fine-grained or oolitic, massive to shabby limestone, in part with fusulinids and in part with molluscan fauna.
		Heumader sh.		3 (5)	Dark-gray clay shale.
	Plattsmouth ls.		18 (27)	Bluish-gray, fine-grained, thin and wavy-bedded limestone, fossiliferous, chert-bearing in part.	
	Heebner sh.		5 (7)	Gray clay shale in upper part, black hard fissile shale in lower part.	
	Leavenworth ls.		2	Dark-blue fine-grained dense limestone with vertical joints.	
	Snyder ls.		12 (70)	Gray underlay in most of north, includes thin sandstone, limestone and red shale toward south.	
	Toronto ls.		8 (10)	Gray massive limestone weathering brown, fusulinids common locally.	
	Lawrence sh.			140 (200)	Gray and buff argillaceous to silty shales, sandstone beds, especially in the south, persistent coal near top (Williamsburg). Includes Ireland channel ss. 0-80 feet.
		Local Unconformity			
		Haskell ls.		2 (4)	Blocky, even, gray limestone, locally oolitic.
Stranger fm.			8 (14)	Argillaceous to silty shale.	
Tonganoxie ss.			50 (80)	Massive, cross-bedded sandstone, coal beds, sandy shale, persistent coal (Sibley) at top.	
Iatan ls.			9 (18)	Thin-bedded, drab, sparsely fossiliferous limestone, weathers in a single massive ledge.	
Weston sh.			75 (140)	Bluish-gray to buff clay shale with limonite concretions. Fossiliferous in the north.	
Stanton ls.		Little Kaw ls.		2 (8)	Blocky, bluish, sandy limestone.
		Victory Junction sh.		2 (14)	Sandy gray shale; buff sandstone.
		Olathe ls.		15 (50)	Thin-bedded, wavy limestone, white to light-gray.
	Eudora sh.		5 (50)	Gray clay shale, commonly with black fissile layer near middle.	
	Captain Creek ls.		8 (40)	Gray even limestone, becomes massive, crystalline, and white toward south.	
	Vilas sh.		20 (100)	Gray, silty to argillaceous shale.	
	Springhill ls.		14 (60)	Drab to yellowish granular limestone with fine gray limestone below.	
	Hickory Creek sh.		1 (40)	Limy gray or yellowish shale.	
	Merriam ls.		1 (3)	Blocky gray to buff limestone.	
	Bonner Springs sh.			15 (30)	Silty gray shale with maroon clay layer near top.
Parley ls.			10 (35)	Variable limestone - light-gray crystalline or drab, with cross-bedding in the north with conspicuous gray shale at middle.	
Island Creek sh.			2 (40)	Gray clay shale; thickest near Missouri river.	
Argentine ls.			20 (28)	Thin-bedded, wavy, light-gray to buff limestone.	
Quindaro sh.			1 (5)	Gray or yellowish shale, locally with carbonaceous layer.	
Frisbie ls.			2 (3)	Blocky, dense, bluish limestone, locally undifferentiated from Argentine.	
Lane sh.			35 (100)	Gray sandy or clayey shale.	
Raytown ls.			4 (35)	Bluish-gray, even limestone, where thick becomes crystalline and light-gray or white.	
Iola ls.			1 (3)	Gray clay shale; around Kansas City with black fissile layer.	
Paola ls.			1.5	Bluish, dense limestone, blocky.	
Chanute sh.			25 (60)	Gray silty shale, with coal near middle (Thayer) and massive sandstone occupying upper half (Cottage Grove).	
	Drum ls.		0.5 (60)	Granular or oolitic drab limestone. Prominent only around Independence, Kansas.	
	Cement City ls.		7 (9)	Thin-bedded, wavy, fine-grained white limestone.	
	Quivira sh.		4 (8)	Gray to greenish clay shale with black fissile layer at middle.	
	Westerville ls.		6 (10)	Gray limestone, upper part oolitic or cherty, lower part blocky gray limestone.	
	Wea sh.		5 (10)	Limy or silty buff shale.	
	Block ls.		3 (6)	Bluish, thin-bedded, fine-grained limestone with shaly partings.	
	Fontana sh.		5 (35)	Gray clay shale.	
	Dennis ls.		25 (35)	Dove-gray to light-gray cherty limestone, upper part oolitic or with black chert in northeastern Kansas.	
	Stark sh.		5	Gray shale with black fissile layer.	
Galesburg sh.	Canville ls.		2	Blocky, dense, bluish limestone.	
			25 (125)	Silty gray shale; in southern Kansas where thickest contains upper massive sandstone (Dodds Cr.) and persistent coal (Cedar Bluff) at middle.	
	Bethany Falls ls.		15 (25)	Variable limestone, upper part generally massive mottled algal limestone or oolitic, lower part even gray limestone.	
	Swope ls.		6	Gray shale with black fissile layer.	
	Hushpuckney sh.		2	Blocky, dense, blue limestone.	
	Middle Creek ls.		8 (75±)	Gray silty shale, some heavy sandstone in the south where thickest.	
	Hertha ls.		4 (10)	Variable buff heavy-bedded limestone with an upper phase of brecciated algal limestone (Schubert Creek?) and a more constant crystalline or fine-grained lower division (Sniabar).	
	Bourbon formation		150±	Undifferentiated shaly beds containing sandy lenses, local limestone, black shale, and channel sandstones at the base (Warrensburg).	
	Unconformity				
	Lenap sh.		2 (20)	Gray variable limestone, possibly coalesces northward with the Altamont.	
Nowata sh.		20 (45)	Gray silty and argillaceous shale.		
Altamont ls.		10 (15)	Gray crystalline irregular limestone.		
Bandon sh.			60 (100±)	Sandy shale, flaggy sandstone, prominent limestone in the north (Worland) occurs near middle? Molluscan coal in lower part.	
	Pawnee ls.		10 (50)	Ferruginous massive limestone.	
	Labette sh.		20 (75)	Gray sandy and argillaceous shale.	
	Upper ls.		10 (18)	Wavy-bedded crystalline white to light-gray limestone.	
	Middle sh.		7	Gray clay shale with black fissile layer.	
	Lower ls.		5 (18)	Drab, massive, magnesian limestone.	
	Upper shale		75±	Silty and sandy gray to buff shale with coal (Mulky) overlain by black shale at top and coal (Bevier) near base.	
	Ardmore ls.		2±	Blocky, bluish-gray, fine-grained limestone.	
	Lower shale	</			

Rock Formations of Kansas

By RAYMOND C. MOORE, State Geologist
Kansas Geological Survey, Lawrence.
1934 - See *Cristoforo Colombo*, Bull. 22

The following tabulation of the rock formations of Kansas, prepared at request of the Kansas Geological Society, shows the present classification of stratigraphic units, in part tentative, that are recognized in the state, with brief description of lithologic characteristics. Figures representing average thickness are given in most cases, accompanied by indication of approximate maximum observed thickness (shown in parentheses). Space does not permit discussion of certain doubtful and tentative features shown in the table. Classification of the Dakota beds is especially in doubt, awaiting completion of studies by Dr. A. C. Tester.

Acknowledgments are due Drs. N. D. Newell and M. K. Elias for assistance in preparing parts of the table and to a committee of the Kansas Geological Society under chairmanship of Mr. Jas. I. Daniels for data on thicknesses of subsurface units.

System Series Group	Formation	Member	Thickness Feet	Lithologic Character and Special Notes	
Recent	Alluvium		0-100±	Gravel, sand, silt and clay deposits of stream valleys. Includes some terrace materials.	
	Dune sand, loess		0-50±	Sand and silt deposited by winds, chiefly in south-central and western Kansas.	
Quaternary Pleistocene	Sanborn fm.		35 (180)	Sand and gravel overlain by loess, chiefly in western Kansas.	
	Belleville fm.		60 (200)	Sand, gravel and clay, in north-central Kansas. May correspond in age to McPherson formation.	
	McPherson fm.		100 (250)	Sand, gravel and clay, in west-central Kansas.	
	Kansas drift		10 (60)	Glacial till. May be partly contemporaneous with McPherson formation.	
	Ogallala fm.		125 (210)	"Mortar beds" composed of sand and fine gravel cemented by calcium carbonate, clay. Includes algal limestone. Mammal bones, grass seeds.	
Tertiary Pliocene	Woodhouse clay		20 (60)	Bright-colored mottled clay, fragmentary mammal bones.	
	Montana	Beecher Island sh.	100	1250±	Gray shale, limonite concretions.
		Undifferentiated	600		Black and gray shale.
		Salt Grass sh.	60		Gray shale, limestone and limonite concretions.
		Lake Creek sh.	200		Black and dark-gray flaky shale, gypsum locally abundant.
		Weskan sh.	170		Gray shale, large limestone concretions.
	Sharon Springs sh.	155	Black flaky shale, large septarian concretions.		
	Niobrara chalk	Smoky Hill chalk	400 (700)	750	Alternating beds of soft chalk and chalky shale, with some thin bentonite beds.
		Hays ls.	60 (80)		Massive chalky limestone.
	Unconformity	Codell ss.	10	300	Sandstone.
Blue Hill sh.		200	Gray fissile shale with concretions in upper part.		
Fairport sh.		100	Chalky shale with thin limestones in lower part.		
Colorado	Pfeifer sh.	20	300	Chalky shale with thin chalky limestones. Fence-post limestone bed at top. In Hamilton County where the Pfeifer and Jetmore members are not separable, they are combined under the term Bridge Creek shale member.	
	Jetmore chalk	20		Chalky limestone and shale. "Shell limestone" at top.	
	Hartland sh.	35 (50)		Bluish-gray chalky shale with a few thin limestones.	
	Lincoln ls.	20		Hard crystalline limestone and chalky shale.	
	Graneros sh.	40		Bluish-gray clay shale, sandy shale and lenses of shaly sandstone.	
	Solomon fm.	Sandstone		15-100	Dark-gray and black shale and brown sandstone, mostly marine.
	Hodgeman sh.				
	Local Unconformity	Rocktown ss.		25-200	Yellow brown sandstone and reddish or vari-colored shale, mostly nonmarine.
	Ellsworth fm.	Terra Cotta sh.			
	Local Unconformity	Mentor ss.		100-300	Light and dark brown sandstone, dark-gray and black shale and thin shelly limestone, mostly marine.
Belvidere fm.	Marquette ss.				
Unconformity	Kiowa sh.				
Unconformity	Chyenne ss.	50	300	Yellow-brown sandstone, nonmarine.	
	Greer fm.	Big Basin ss.		12	Massive red or gray sandstone.
Ogallala Pliocene	Woodward fm.	Day Creek dol.	4	250	Hard white dolomite.
		Whitehorse ss.	200		Fine-grained light-red sandstone and sandy shale.
		Dog Creek sh.	30 (44)		Dull-red clay shale with some thin dolomitic limestone beds.
		Shimer gyp.	5 (25)		Massive gypsum.
	Cave Creek fm.	Jenkins sh.	5 (50)	50	Red clay shale.
		Medicine Lodge gyp.	20 (27)		White to gray, massive gypsum.
	Enid fm.	Flowerpot sh.	175 (195)	1050	Variogated gypsiferous clay shale.
		Cedar Hills ss.	250		Hard bright-red massive sandstone with inter-bedded red sandy shale.
	Unconformity	Harper ss.	700	550±	Reddish-brown sandstone and sandy shale.
		Shale and Gauda salt	500±		Light-gray and red shale and salt beds.
Wellington sh.	Carleton ls.	18	20	Light-gray flaggy limestone with pelecypods, insects and plant remains near base.	
	Buckeye sh.	235		Gray shale with some thin red shale and gypsum.	
	Strickler ls.	2		White flaggy limestone, unfossiliferous.	
Donegal ls.	Newbern sh.	11	20	Gray calcareous shale.	
	Hollenberg ls.	7		Brown flaggy limestone with good microfauna.	
Pearl sh.	Herington ls.	8	28	White to buff, massive and flaggy impure dolomitic limestone with dominantly molluscan fauna.	
	Paddock sh.	14		Gray to olive drab clay shale.	
Nolans ls.	Krider ls.	6	30	White to gray limestone and calcareous shale, fossiliferous.	
	Odell sh.	20		Olive drab, gray and maroon clay shale.	
Winfield ls.	Luta ls.	7	30	Light bluish-gray flaggy to platy earthy limestone.	
	Cresswell ls.	9		Gray massive to thin-bedded chert-bearing limestone, echinoid remains generally common.	
Stovall ls.	Grant sh.	12	40	Light-gray clay shale with thin fossiliferous limestone beds near top.	
	Stovall ls.	2		Dark-gray granular fossiliferous limestone, commonly chert-bearing.	
Gage sh.	Towanda ls.	11	40	Gray, green and red clay shale, with fossiliferous zone near top.	
	Holmesville sh.	30		Drab to greenish flaggy limestone with common gastropods.	
Barneston ls.	Ft. Riley ls.	10	40	White to buff massive fossiliferous limestone.	
	Oketo sh.	5		Light-gray calcareous shale.	
Blue Rapids sh.	Florence ls.	25	46	Bluish-gray limestone with abundant nodules and beds of bluish dense chert.	
	Kinney ls.	11		Greenish and red, clay shale, locally with limestone bed near middle.	
Wymore sh.	Schroyer ls.	9	40	Gray limestone and shale.	
	Havensville sh.	29		Olive-green, gray and red clay shale.	
Wrexford ls.	Threemile ls.	11	40	Gray cherty limestone.	
	Speiser sh.	17		Olive and gray calcareous shale.	
Bigelow ls.	Funston ls.	5	46	Gray to bluish massive, chert-bearing limestone.	
	Blue Rapids sh.	28		Green, gray and red clay shale with local thin limy and sandy beds.	
Easy Creek sh.	Crouse ls.	13	20	Bluish-gray to buff massive limestone, gastropods common.	
	Middleburg ls.	5		Gray, green and red clay and sandy shale.	
Bader ls.	Hooser sh.	8	20	Gray massive limestone and calcareous shale, fossiliferous.	
	Eiss ls.	7		Gray, green and red shale and sandy shale.	
Stearns sh.	Morrill ls.	2	17	Dark-gray massive impure limestone with numerous small high-spired gastropods.	
	Florens sh.	9		Green, gray and red calcareous shale.	
Beattie ls.	Cottonwood ls.	6	17	Bluish-gray limestone and shale, fossiliferous.	
	Eskridge sh.	33		Light-green and red clay shale, containing some thin impure limestone beds.	
Grenola ls.	Neva ls.	18	33	Light-gray to white, massive to flaggy limestone.	
	Salem Pt. sh.	7		Dark-gray hard calcareous shale.	
Roca sh.	Burr ls.	8	49	Gray to buff, impure limestone, with molluscan fauna.	
	Howe ls.	1		Green, gray and red clay shale.	
Red Eagle ls.	Bennett sh.	8	14	Buff very impure unfossiliferous limestone.	
	Glenrock ls.	5		Dark-gray to black, fossiliferous clay shale.	
Johnson sh.	Long Creek ls.	5	49	Gray, massive limestone with abundant fusulids.	
	Hughes Creek sh.	39		Gray, green and red shale, unfossiliferous.	
Foraker ls.	Americus ls.	5	45	Buff massive to thin-bedded limestone, few fossils.	
	Oaks sh.	21		Light-gray calcareous shale and thin limestone with extremely abundant fusulids, brachiopods and bryozoans.	
Hamlin sh.	Houchen Ck. ls.	1	45	Gray limestone and black clay shale, fusulids common.	
	Stine sh.	23		Gray, green and red shale.	
Five Point ls.	West Branch sh.	29	20	Gray massive to flaggy limestone, fossiliferous.	
	Falls City ls.	6		Gray, greenish and red shale, unfossiliferous.	
Hawxby sh.	Aspinwall ls.	4	15-135	Gray to buff massive limestone and shale, upper part coquinoled, porous.	
	Towle sh.	16		Dark-gray shale with thin limestones, pelecypods abundant.	
Unconformity	Indian Cave ss.	0-120	15-135	Light-gray and buff fine-grained limestone, locally fossiliferous.	
	Brownville ls.	2-4		Green and red clayey and sandy shale.	
Pony Creek sh.	Caneyville ls.	15 (35)	45	Light-brown massive and cross-bedded sandstone, lenses of conglomerate locally near base.	
	French Creek sh.	30 (42)		Gray massive limestone weathering brown. Fossils common, especially <i>Margaritifer</i> .	
Jim Creek ls.	Friedrich sh.	35 (45)	49	Dark-gray and yellowish shale.	
	Grandhaven ls.	12 (20)		Gray limestone and shale. The Grayhorse limestone occurs at top and Nebraska City limestone at base.	
Dover ls.	Maple Hill ls.	2	57	Gray and brownish clayey and sandy shale, with sandstone and Lorton coal in many places near top.	
	Pierson Pt. sh.	14 (24)		Bluish-gray limestone weathering slightly red.	
Tarkio ls.	Willard sh.	80 (46)	57	Gray and yellowish brown clayey and sandy shale, locally with sandstone.	
	Elmont ls.	2 (19)		Light-gray limestone and shale, large fusulids abundant in some beds.	
Harveyville sh.	Reading ls.	3 (15)	57	Gray shale.	
	Anburn sh.	36 (50)		Gray to buff limestone, large fusulids common in some beds.	
Wakarusa ls.	Soldier Creek sh.	5 (26)	57	Gray and brownish shale, in places with prominent sandstone in upper part.	
				Dark-gray massive limestone, locally with abundant small fusulids.	

System Series Group	Formation	Member	Thickness Feet	Lithologic Character and Special Notes	
Wichitana	Burlingame ls.		6 (16)	Gray to brown massive, in part pseudo-brecciated limestone, <i>Osagia</i> common.	
	Silver Lake sh.		32 (44)	Gray and brownish shale, locally sandy.	
	Rubels		2	Dark-gray massive to shaly limestone, fairly fossiliferous.	
	Cedar Vale sh.		22 (38)	Gray shale, clayey to sandy, with persistent limo coal and local sandstone near top.	
	Happy Hollow ls.		3 (14)	Gray to salmon-colored massive limestone with abundant robust fusulids.	
	White Cloud sh.		60 (75)	Bluish-gray and brownish shale, locally with sandstone.	
	Howard ls.		13 (20)	Dark to light-gray limestone and shale, in part contains persistent Nodaway coal. An important stratigraphic unit.	
	Severy sh.	Coal Creek ls.	4 (5)	30	Gray and brownish sandy shale with persistent platy even-bedded sandstone near top.
		Holt sh.	2 (4)		Dark bluish thin-bedded fine-grained limestone and shale, very fossiliferous.
		Du Bois ls.	1		Dark-gray to black clay shale.
Turner Creek sh.		1.5 (3)	Bluish-gray massive fine-grained limestone with molluscan fauna.		
Hartford ls.		7 (20)	Gray clay shale.		
Jones Point sh.	Jones Point sh.	5 (15)	30	Blue gray massive limestone, weathering brown, separated by shale beds. The Sheldon limestone of Condra is an algal-molluscan bed believed to belong at the top of this member.	
	Dasher ls.	5 (11)		Bluish-gray clayey and calcareous shale locally with abundant mollusks and also containing land plants.	
	Calhoun sh.	30 (50)		Blue-gray and brown limestone and thin shale, fusulid-bearing in part.	
Deer Creek ls.	Ervine Ck. ls.	20 (32)	35	Light to dark-gray, thin and wavy-bedded fine-grained limestone, fusulids common, except at top.	
	Larsh-Mission Ck. sh.	4 (8)		Gray shale in upper part, black fissile shale in lower part. The Haynes limestone appears here to north.	
	Rock Bluff ls.	1.5 (2.5)		Dark bluish-gray dense fine-grained massive limestone with vertical joints, fusulids.	
	Oskalooza sh.	6 (10)		Gray shale.	
	Ozawkie ls.	5 (30)		Gray to brown massive limestone beds separated in places by shale, fusulids and algal remains common.	
Tecumseh sh.	Avoca ls.	1.5 (4)	36 (58)	Gray and yellowish-brown clayey and sandy shale. Locally contains sandy impure Ost limestone.	
	King Hill sh.	5 (8)		Dark bluish-gray limestone, fusulids common.	
Lecompton ls.	Beil ls.	8 (16)	29	Blue gray limestone weathering yellow-brown, common fusulids, brachiopods and corals; algal bed at top.	
	Queen Hill sh.	3 (4)		Gray shale grading down into black fissile shale.	
	Big Springs ls.	2 (6)		Blue-gray dense massive fine-grained limestone with vertical joints, fusulids abundant.	
	Doniphan sh.	3 (10)		Bluish-gray clay shale.	
	Spring Branch ls.	6 (12)		Gray massive limestone weathering brown, and shale, contains algal beds at top.	
Stull sh.	Stull sh.	24 (42)	75	Gray and brownish clayey and sandy shale, locally with sandstone near top.	
	Clay Creek ls.	2		Bluish-gray massive to shelly limestone, fusulids common.	
Jackson Park sh.	Jackson Park sh.	50 (80)	80	Gray and brown clayey and sandy shale with prominent sandstone beds and some red shale toward south.	
	Kereford ls.	4 (8)		Dark-gray, fine-grained or oolitic, massive to shaly limestone, in part with fusulids and in part with molluscan fauna.	
Heumader sh.	Heumader sh.	3 (5)	50	Dark-gray clay shale.	
	Frattsmouth ls.	18 (27)		Bluish-gray, fine-grained, thin and wavy-bedded limestone, fossiliferous, chert-bearing in part.	
Hesbner sh.	Hesbner sh.	5 (7)	50	Gray clay shale in upper part, black hard fissile shale in lower part.	
	Leavenworth ls.	2		Dark-blue fine-grained dense limestone with vertical joints.	
	Snyderville sh.	12 (70)		Gray underlay in most of north, includes thin sandstone, limestone and red shale toward south.	
Toronto ls.	Toronto ls.	8 (10)	80	Gray massive limestone weathering brown, fusulids common locally.	
	Lawrence sh.	140 (200)		Gray and buff argillaceous to silty shales, sandstone beds, especially in the south, persistent coal near top (Williamsburg). Includes Ireland channel ss. 0-80 feet.	
Stranger fm.	Local Unconformity-Haskell ls.	2 (4)	80 (100)	Blocky, even, gray limestone, locally oolitic.	
	Vinland sh.	8 (14)		Argillaceous to silty shale.	
Tonganoxie ss.	Tonganoxie ss.	50 (80)	100	Massive, cross-bedded sandstone, coal beds, sandy shale, persistent coal (Sibley) at top.	
	Iatan ls.	9 (18)		Thin-bedded, drab, sparsely fossiliferous limestone, weathers in a single massive ledge.	
Weston sh.	Little Kaw ls.	2 (8)	35 (140-1)	Bluish-gray to buff clay shale with limonite concretions. Fossiliferous in the north.	
	Victory Junction sh.	2 (14)		Blocky, bluish, sandy limestone.	
Olathe ls.	Olathe ls.	15 (50)	35 (140-1)	Sandy gray shale; buff sandstone.	
	Eudora sh.	5 (50)		Thin-bedded, wavy limestone, white to light-gray.	
Captan Creek ls.	Captan Creek ls.	8 (40)	80	Gray clay shale, commonly with black fissile layer near middle.	
	Vilas sh.	20 (100)		Gray even limestone, becomes massive, crystalline, and white toward south.	
Springhill ls.	Springhill ls.	14 (60)	25 (100)	Gray, silty to argillaceous shale.	
	Hickory Creek sh.	1 (40)		Drab to yellowish granular limestone with fine gray limestone below.	
Merriam ls.	Merriam ls.	1 (3)	100	Blocky gray to buff limestone.	
	Bonner Springs sh.	15 (30)		Silty gray shale with maroon clay layer near top.	
Farley ls.	Farley ls.	15 (35)	60	Variable limestone, light-gray crystalline or drab, oolitic and cross-bedded in the north with conspicuous gray shale at middle.	
	Island Creek sh.	2 (40)		Gray clay shale; thickest near Missouri river.	
Quindaro sh.	Quindaro sh.	1 (5)	25 (60)	Thin-bedded, wavy, light-gray to buff limestone.	
	Frisbie ls.	2 (3)		Gray or yellowish shale, locally with carbonaceous layer.	
Raytown ls.	Raytown ls.	4 (35)	12 (40)	Blocky, dense, bluish limestone, locally undifferentiated from Argentine.	
	Muncie Creek sh.	1 (3)		Gray sandy or clayey shale.	
Paola ls.	Paola ls.	1.5	8 (60)	Bluish-gray, even limestone, where thick becomes crystalline and light-gray or white.	
	Chanute sh.	25 (60)		Gray clay shale; around Kansas City with black fissile layer.	
Corbin City ls.	Chanute sh.	25 (60)	8 (60)	Bluish, dense limestone, blocky.	
	Drum ls.	0.5 (60)		Gray silty shale, with coal near middle (Thayer) and massive sandstone occupying upper half (Cottage Grove).	
Cement City ls.	Drum ls.	7 (9)	8 (60)	Granular or oolitic drab limestone. Prominent only around Independence, Kansas.	
	Quivira sh.	4 (8)		Thin-bedded, wavy, fine-grained white limestone.	
Westerville ls.	Quivira sh.	4 (8)	10	Gray to greenish clay shale with black fissile layer at middle.	
	Wea sh.	5 (10)		Gray limestone, upper part oolitic or cherty, lower part blocky gray limestone.	
Block ls.	Block ls.	3 (6)	10	Bluish, thin-bedded, fine-grained limestone with shaly partings.	
	Fontana sh.	5 (35)		Gray clay shale.	
Dennis ls.	Winterset ls.	25 (35)	10	Dove-gray to light-gray cherty limestone, upper part oolitic or with black chert in northeastern Kansas.	
	Stark sh.	5		Gray shale with black fissile layer.	
Canville ls.	Canville ls.	2	125	Blocky, dense, bluish limestone.	
	Galesburg sh.	25 (125)		Silty gray shale; in southern Kansas where thickest contains upper massive sandstone (Dodds Cr.) and persistent coal (Cedar Bluff) at middle.	
Bethany Falls ls.	Bethany Falls ls.	15 (25)	10	Variable limestone, upper part generally massive mottled algal limestone or oolitic, lower part even gray limestone.	
	Hushpuckney sh.	6		Gray shale with black fissile layer.	
Middle Creek ls.	Middle Creek ls.	2	10	Blocky, dense, blue limestone.	
	Ladon sh.	8 (75±)		Gray silty shale, some heavy sandstone in the south where thickest.	
Hertha ls.	Hertha ls.	4 (10)	10	Variable buff heavy-bedded limestone with an upper phase of brecciated algal limestone (Schubert Creek?) and a more constant crystalline or fine-grained lower division (Sialbar).	
	Bourbon formation	150±		Undifferentiated shaly beds containing sandy lenses, local limestone, black shale, and channel sandstones at the base (Warrensburg).	
Unconformity	Unconformity	?	10	Gray variable limestone, possibly coalesces northward with the Altamont.	
	Lenape ls.	2 (20)		Gray silty and argillaceous shale.	
Nowata sh.	Nowata sh.	20 (45)	10 (15)	Gray crystalline irregular limestone.	
	Altamont ls.	10 (15)		Sandy shale, flaggy sandstone, prominent limestone in the north (Worland) occurs near middle? Mulberry coal in lower part.	
Bardonia sh.	Bardonia sh.	60 (100±)	10 (50)	Ferruginous massive limestone.	
	Pawnee ls.	10 (50)		Gray sandy and argillaceous shale.	
Labette sh.	Labette sh.	29 (75)	30±	Wavy-bedded crystalline white to light-gray limestone.	
	For Scott ls.	10 (18)		Gray clay shale with black fissile layer.	
Lower ls.	Middle sh.	7	18	Drab, massive, magnesian limestone.	
	Lower ls.	5 (18)		Silty and sandy gray to buff shale with coal (Mully) overlain by black shale at top and coal (Bevier) near base.	
Ardmore ls.	Ardmore ls.	2±	350±	Blocky, bluish-gray, fine-grained limestone.	
	Lower shale	350±		Heterogeneous shales with at least seven coal horizons, each underlying black fissile shales which are in turn locally capped by a limy layer.	
Sandstone	Sandstone	30±	30±	Massive, cross-bedded brown sandstone.	
	Unconformity				Blue-gray limestone and shale, local thin deposits filling sinks and depressions as in Joplin district and several hundred feet in the Dodge City basin. May include some Morrow beds in this area. Unconf. at base.
Mississippi lme	Mississippi lme		30±	Absent along Nemaha granite ridge and other major uplifts.	
	Unconformity				Light-gray fine to coarse-grained limestone with abundant chert (Boone), underlain in places by bluish noncherty limestone and greenish-blue or part reddish shale (Fern Glen). Average ±400 ft.
Chattanooga sh.	Chattanooga sh.		30±	Max. 260 ft. in Voshell pool, T. 21 S., R. 3 W.	
	Unconformity				Shale gray and bluish with local thin limestone beds (Chouteau-Hannibal).
Huntton lme	Huntton lme		30±	Absent along major uplifts.	
	Unconformity				Shale mostly black fissile, (Chattanooga), in places with sand (Misener) at base.
Maquoketa sh.	Maquoketa sh.		30±	544 ft. in Hay No. 1, sec. 30, T. 6 S., R. 6 E. Absent on high parts of R. 6 E. Absent on major uplifts.	
	Unconformity				White, gray, bluish and brown limestone and dolomite, in part cherty. A little shale and some sandstone commonly present.
Viola lme	Viola lme		30±	125 ft. in Johnson No. 1, sec. 30, T. 18 S., R. 2 W. Absent on major uplifts.	
	Unconformity				Dark-gray or greenish soft clay shale.
Huntton lme	Huntton lme		30±	185 ft. in Morrison No. 2, sec. 20, T. 32 S., R. 21 W. Absent on major uplifts.	
	Unconformity				Gray to brown dolomite, coarsely crystalline and fine-grained limestone, in part cherty.
Simpson	Simpson		30±	203 ft. in Williams No. 1, SW NE SW, sec. 16, T. 35 S., R. 3 W. Absent on major uplift	

Rock Formations of Kansas

By RAYMOND C. MOORE, State Geologist
Kansas Geological Survey, Lawrence, Kansas
1934 - See *Catalogue*, p. B-11, 22

The following tabulation of the rock formations of Kansas, prepared at request of the Kansas Geological Society, shows the present classification of stratigraphic units, in part tentative, that are recognized in the state, with brief description of lithologic characteristics. Figures representing average thickness are given in most cases, accompanied by indication of approximate maximum observed thickness (shown in parentheses). Space does not permit discussion of certain doubtful and tentative features shown in the table. Classification of the Dakota beds is especially in doubt, awaiting completion of studies by Dr. A. C. Tester.

Acknowledgments are due Drs. N. D. Newell and M. K. Elias for assistance in preparing parts of the table and to a committee of the Kansas Geological Society under chairmanship of Mr. Jas. I. Daniels for data on thicknesses of subsurface units.

System	Series	Group	Formation	Member	Thickness Feet	Lithologic Character and Special Notes			
Quaternary	Recent		Alluvium		0-100±	Gravel, sand, silt and clay deposits of stream valleys. Includes some terraced materials.			
			Dune sand, loess		0-50±	Sand and silt deposited by winds, chiefly in south-central and western Kansas.			
Quaternary	Pleistocene		Sanborn fm.		35 (180)	Sand and gravel overlain by loess, chiefly in western Kansas.			
			Bellefonte fm.		60 (200)	Sand, gravel and clay, in north-central Kansas. May correspond in age to McPherson formation.			
			McPherson fm.		100 (250)	Sand, gravel and clay, in west-central Kansas.			
			Kansas drift		10 (60)	Glacial till. May be partly contemporaneous with McPherson formation.			
			Ogallala fm.		125 (210)	"Mortar beds" composed of sand and fine gravel cemented by calcium carbonate, clay. Includes algal limestone. Mammal bones, grass seeds.			
			Woodhouse clay		20 (60)	Bright-colored mottled clay, fragmentary mammal bones.			
			Beecher Island sh.		100	Gray shale, limonite concretions.			
			Undifferentiated		600	Black and gray shale.			
			Salt Grass sh.		60	Gray shale, limestone and limonite concretions.			
			Pierre sh.		200	Black and dark-gray flaky shale, gypsum locally abundant.			
Tertiary	Oligocene & Pliocene		Lake Creek sh.		200	Black and dark-gray flaky shale, gypsum locally abundant.			
			Weskan sh.		170	Gray shale, large limestone concretions.			
			Sharon Springs sh.		155	Black flaky shale, large septarian concretions.			
			Niobrara chalk		400 (700)	Alternating beds of soft chalk and chalky shale, with some thin bentonite beds.			
			Hays ls.		60 (80)	Massive chalky limestone.			
			Codell ss.		10	Sandstone.			
			Carille sh.		200	Gray fissile shale with concretions in upper part.			
			Fairport sh.		100	Chalky shale with thin limestones in lower part.			
			Pfeifer sh.		20	Chalky shale with thin chalky limestones. Fence-post limestone bed at top. In Hamilton County where the Pfeifer and Jetmore members are not separable, they are combined under the term Bridge Creek shale member.			
			Greenhorn ls.		20	Chalky limestone and shale. "Shell limestone" at top.			
Cretaceous	Cretaceous		Hartland sh.		35 (50)	Bluish-gray chalky shale with a few thin limestones.			
			Lincoln ls.		20	Hard crystalline limestone and chalky shale.			
			Graneros sh.		40	Bluish-gray clay shale, sandy shale and lenses of shaly sandstone.			
			Solomon fm.		15-100	Dark-gray and black shale and brown sandstone, mostly marine.			
			Ellsworth fm.		25-200	Yellow brown sandstone and reddish or vari-colored shale, mostly nonmarine.			
			Terra Cotta sh.		200	Light and dark brown sandstone, dark-gray and black shale and thin shelly limestone, mostly marine.			
			Belvidere fm.		100-300	Yellow-brown sandstone, nonmarine.			
			Marquette ss.		50	Massive red or gray sandstone.			
			Greer fm.		20	Maroon-colored shale.			
			Woodward fm.		4	Hard white dolomite.			
Cretaceous	Cretaceous		Whitehorse ss.		200	Five-grained light-red sandstone and sandy shale.			
			Dog Creek sh.		30 (44)	Dull-red clay shale with some thin dolomitic limestone beds.			
			Shimer gyp.		5 (25)	Massive gypsum.			
			Jenkins sh.		5 (50)	Red clay shale.			
			Medicine Lodge gyp.		20 (27)	White to gray, massive gypsum.			
			Flowerpot sh.		175 (195)	Variegated gypsiferous clay shale.			
			Emid fm.		250	Hard bright-red massive sandstone with inter-bedded red sandy shale.			
			Harper ss.		700	Reddish-brown sandstone and sandy shale.			
			Wellington sh.		500±	Light-gray and red shale and salt beds.			
			Strickler ls.		2	White flaggy limestone, unfossiliferous.			
Cretaceous	Cretaceous		Donegal ls.		11	Gray calcareous shale.			
			Hollenberg ls.		7	Brown flaggy limestone with good microfauna.			
			Pearl sh.		27	Gray, green and red clay shale.			
			Herington ls.		8	White to buff, massive and flaggy impure dolomitic limestone with dominantly molluscan fauna.			
			Nolans ls.		14	Gray to olive drab clay shale.			
			Krider ls.		6	White to gray limestone and calcareous shale, fossiliferous.			
			Odell sh.		20	Olive drab, gray and maroon clay shale.			
			Luta ls.		7	Light bluish-gray flaggy to platy earthy limestone.			
			Cresswell ls.		9	Gray massive to thin-bedded chert-bearing limestone, echinoid remains generally common.			
			Grant sh.		12	Light-gray clay shale with thin fossiliferous limestone beds near top.			
Cretaceous	Cretaceous		Stovall ls.		2	Dark-gray granular fossiliferous limestone, commonly chert-bearing.			
			Gage sh.		40	Gray, green and red clay shale, with fossiliferous zone near top.			
			Towanda ls.		11	Drab to greenish flaggy limestone with common gastropods.			
			Holmesville sh.		30	Light-gray and red clay shale.			
			Barneston ls.		5	White to buff massive fossiliferous limestone.			
			Oketo sh.		5	Light-gray calcareous shale.			
			Florence ls.		25	Bluish-gray limestone with abundant nodules and beds of bluish dense chert.			
			Blue Rapids sh.		28	Greenish and red, clay shale, locally with limestone bed near middle.			
			Kinney ls.		11	Gray limestone and shale.			
			Wymore sh.		29	Olive-green, gray and red clay shale.			
Cretaceous	Cretaceous		Schroyer ls.		9	Gray cherty limestone.			
			Havensville sh.		20	Olive and gray calcareous shale.			
			Threemile ls.		11	Gray to bluish massive, chert-bearing limestone.			
			Speiser sh.		17	Green, gray and red clay shale with local thin limy and sandy beds.			
			Funston ls.		5	Bluish-gray to buff massive limestone, gastropods common.			
			Blue Rapids sh.		28	Gray, green and red clay and sandy shale.			
			Crouse ls.		13	Gray massive limestone and calcareous shale, fossiliferous.			
			Easily Creek sh.		15	Gray, green and red shale and gypsum.			
			Middleburg ls.		5	Dark-gray massive impure limestone with numerous small high-spired gastropods.			
			Itooser sh.		8	Green, gray and red calcareous shale.			
Cretaceous	Cretaceous		Eiss ls.		7	Bluish-gray limestone and shale, fossiliferous.			
			Morrill ls.		2	Green and red shale, locally with platy beds.			
			Florens sh.		9	Dark-gray limestone, molluscan fauna.			
			Cottonwood ls.		6	Light-gray to buff massive limestone with abundant fusulinids, locally nodules of chert.			
			Esckridge sh.		33	Light-green and red clay shale, containing some thin impure limestone beds.			
			Neva ls.		18	Light-gray to white, massive to flaggy limestone.			
			Salem Pt. sh.		7	Dark-gray hard calcareous shale.			
			Burr ls.		8	Gray to buff, impure limestone, with molluscan fauna.			
			Roca sh.		21	Green, gray and red clay shale.			
			Howe ls.		1	Buff very impure unfossiliferous limestone.			
Cretaceous	Cretaceous		Bennett sh.		8	Dark-gray to black, fossiliferous clay shale.			
			Glenrock ls.		5	Gray, massive limestone with abundant fusulinids.			
			Johnson sh.		15	Gray, green and red shale, unfossiliferous.			
			Long Creek ls.		5	Buff massive to thin-bedded limestone, few fossils.			
			Hughes Creek sh.		39	Light-gray calcareous shale and thin limestone with extremely abundant fusulinids, brachiopods and bryozoans.			
			Americus ls.		5	Gray limestone and black clay shale, fusulinids common.			
			Oaks sh.		21	Gray, green and red shale.			
			Houchen Ck. ls.		1	Gray "mamillary" algal limestone.			
			Stine sh.		23	Green, gray and red shale, unfossiliferous.			
			Five Point ls.		4	Gray massive to flaggy limestone, fossiliferous.			
Cretaceous	Cretaceous		West Branch sh.		29	Gray, greenish and red shale, unfossiliferous.			
			Falls City ls.		6	Gray to buff massive limestone and shale, upper part conchoidal, porous.			
			Hawxby sh.		13	Dark-gray shale with thin limestones, pelecypods abundant.			
			Aspinwall ls.		4	Light-gray and buff fine-grained limestone, locally fossiliferous.			
			Shale		16	Green and red clayey and sandy shale.			
			Indian Cave ss.		0-120	Light-brown massive and cross-bedded sandstone, lenses of conglomerate locally near base.			
			Brownville ls.		2-4	Gray massive limestone weathering brown. Fossils common, especially <i>Marginifera</i> .			
			Pony Creek sh.		15 (25)	Dark-gray and yellowish shale.			
			Caneville ls.		15 (35)	Gray limestone and shale. The Grayhorse limestone occurs at top and Nebraska City limestone at base.			
			French Creek sh.		30 (42)	Gray and brownish clayey and sandy shale, with sandstone and Lorton coal in many places near top.			
Cretaceous	Cretaceous		Jim Creek ls.		1 (2)	Bluish-gray limestone weathering slightly red.			
			Friedrich sh.		35 (45)	Gray and yellowish brown clayey and sandy shale, locally with sandstone.			
			Grandhaven ls.		12 (20)	Light-gray limestone and shale, large fusulinids abundant in some beds.			
			Dry sh.		5 (15)	Gray shale.			
			Dover ls.		10 (24)	Gray to buff limestone, large fusulinids common in some beds.			
			Table Creek sh.		12 (57)	Dark-gray massive limestone, locally with abundant small fusulinids.			
			Maple Hill ls.		2	Dark-gray shale, locally sandy and with coal bed near top.			
			Pierson Pt. sh.		14 (24)	Blue-gray to brown massive limestone with abundant large fusulinids.			
			Tarkio ls.		4 (10)	Gray and brownish clayey and sandy shale, locally with sandstone at top.			
			Willard sh.		30 (46)	Dark-blue limestone and shale, in part with common fusulinids (formerly called upper Emporia).			
Cretaceous	Cretaceous		Elmont ls.		2 (19)	Dark-blue dense hard limestone, fusulinids common (formerly called lower Emporia).			
			Reading ls.		3 (15)	Bluish-gray and yellowish shale, with thin persistent limestone and local sandstone beds.			
			Auburn sh.		36 (50)	Dark bluish-gray massive limestone with large fusulinids and other fossils.			
			Wakarusa ls.		5 (15)	Gray and yellowish clay shale.			
			Soldier Creek sh.		5 (28)	Gray and yellowish clay shale.			
			Cretaceous	Cretaceous		Burlingame ls.		6 (18)	Gray to brown massive, in part pseudo-brecciated limestone, <i>Osgia</i> common.
						Silver Lake sh.		32 (44)	Gray and brownish shale, locally sandy.
						Rulo ls.		2	Dark-gray massive to shelly limestone, fairly fossiliferous.
						Cedar Vale sh.		22 (38)	Gray shale, clayey to sandy, with persistent limo coal and local sandstone near top.
						Happy Hollow ls.		3 (14)	Gray to salmon-colored massive limestone with abundant robust fusulinids.
White Cloud sh.		60 (75)				Bluish-gray and brownish shale, locally with sandstone.			
Howard ls.		13 (20)				Dark to light-gray limestone and shale, in part contains persistent Nodaway coal. An important stratigraphic unit.			
Savery sh.		65 (75)				Gray and brownish sandy shale with persistent platy even-bedded sandstone near top.			
Coal Creek ls.		4 (5)				Dark bluish thin-bedded fine-grained limestone and shale, very fossiliferous.			
Holt sh.		2 (4)				Dark-gray to black clay shale.			
Cretaceous	Cretaceous		Du Bois ls.		1	Bluish-gray massive fine-grained limestone with molluscan fauna.			
			Turner Creek sh.		1.5 (3)	Gray clay shale.			
			Topeka ls.		7 (20)	Blue gray massive limestone, weathering brown, separated by shale beds. The Sheldon limestone of Condra is an algal-molluscan bed believed to belong at the top of this member.			
			Hartford ls.		7 (20)	Bluish-gray clayey and calcareous shale locally with abundant mollusks and also containing land plants.			
			Jones Point sh.		5 (15)	Blue-gray and brown limestone and thin shale, fusulinid-bearing in part.			
			Dashner ls.		5 (11)	Blue-gray and brown limestone and thin shale, fusulinid-bearing in part.			
			Calhoun sh.		30 (50)	Gray and yellowish brown, clayey, calcareous and sandy shale, very fossiliferous in places.			
			Ervine Ck. ls.		20 (32)	Light to dark-gray, thin and wavy-bedded fine-grained limestone, fusulinids common, except at top.			
			Larsh-Mission Ck. sh.		4 (8)	Gray shale in upper part, black fissile shale in lower part. The Hayles limestone appears here to north.			
			Rock Bluff ls.		1.5 (2.5)	Dark bluish-gray dense fine-grained massive limestone with vertical joints, fusulinids.			
Cretaceous	Cretaceous		Oskaloosa sh.		6 (10)	Gray shale.			
			Ozawie ls.		5 (30)	Gray to brown massive limestone beds separated in places by shale, fusulinids and algal remains common.			
			Recumseh sh.		36 (58)	Gray and yellowish-brown clayey and sandy shale. Locally contains sandy impure Ost limestone.			
			Avoca ls.		1.5 (4)	Dark bluish-gray limestone, fusulinids common.			
			King Hill sh.		5 (8)	Gray clay shale.			
			Bell ls.		8 (16)	Blue gray limestone weathering yellow-brown, common fusulinids, brachiopods and corals; algal bed at top.			
			Queen Hill sh.		3 (4)	Gray shale grading down into black fissile shale.			
			Big Springs ls.		2 (6)	Blue-gray dense massive fine-grained limestone with vertical joints, fusulinids abundant.			
			Doniphan sh.		3 (10)	Bluish-gray clay shale.			
			Spring Branch ls.		6 (12)	Gray massive limestone weathering brown, and shale, contains algal beds at top.			
Cretaceous	Cretaceous		Stull sh.		24 (42)	Gray and brownish clayey and sandy shale, locally with sandstone near top.			
			Clay Creek ls.		2	Bluish-gray massive to shelly limestone, fusulinids common.			
			Jackson Park sh.		50 (80)	Gray and brown clayey and sandy shale with prominent sandstone beds and some red shale toward south.			
			Kerford ls.		4 (8)	Dark-gray, fine-grained or oolitic, massive to shabby limestone, in part with fusulinids and in part with molluscan fauna.			
			Heumader sh.		3 (5)	Dark-gray clay shale.			
			Plattsmouth ls.		18 (27)	Bluish-gray, fine-grained, thin and wavy-bedded limestone, fossiliferous, chert-bearing in part.			
			Heebner sh.		5 (7)	Gray clay shale in upper part, black hard fissile shale in lower part.			
			Leavenworth ls.		2	Dark-blue fine-grained dense limestone with vertical joints.			
			Snyderville sh.		12 (70)	Gray underlayer in most of north, includes thin sandstone, limestone and red shale toward south.			
			Toronto ls.		8 (10)	Gray massive limestone weathering brown, fusulinids common locally.			
Cretaceous	Cretaceous		Lawrence sh.		140 (200)	Gray and buff argillaceous to silty shales, sandstone beds, especially in the south, persistent coal near top (Williamsburg). Includes Ireland channel ss. 0-30 feet.			
			Local Unconformity Haskell ls.		2 (4)	Blocky, even, gray limestone, locally oolitic.			
			Vinland sh.		8 (14)	Argillaceous to silty shale.			
			Tonganoxie ss.		50 (80)	Massive, cross-bedded sandstone, coal beds, sandy shale, persistent coal (Sibley) at top.			
			Stranger fm.		80 (100)	Thin-bedded, drab, sparsely fossiliferous limestones, weathers in a single massive ledge.			
			Iatan ls.		9 (18)	Bluish-gray to buff clay shale with limonite concretions. Fossiliferous in the north.			
			Weston sh.		75 (140)	Blocky, bluish, sandy limestone.			
			Little Kaw ls.		2 (8)	Sandy gray shale; buff sandstone.			
			Victory Junction sh.		2 (14)	Thin-bedded, wavy limestone, white to light-gray.			
			Olathe ls.		15 (50)	Gray clay shale, commonly with black fissile layer near middle.			
Cretaceous	Cretaceous		Eudora sh.		5 (50)	Gray even limestone, becomes massive, crystalline, and white toward south.			
			Captain Creeks.		8 (40)	Gray, silty to argillaceous shale.			
			Vilas sh.		20 (100)	Drab to yellowish granular limestone with fine gray limestone below.			
			Springhill ls.		14 (60)	Limy gray or yellowish shale.			
			Hickory Creek sh.		1 (40)	Blocky gray to buff limestone.			
			Merriam ls.		1 (3)	Silty gray shale with maroon clay layer near top.			
			Bonner Springs sh.		15 (30)	Variable limestone, light-gray crystalline or drab, oolitic and cross-bedded in the north with conspicuous gray shale at middle.			
			Farley ls.		15 (35)	Gray clay shale; thickest near Missouri river.			
			Island Creek sh.		2 (40)	Thin-bedded, wavy, light-gray to buff limestone.			
			Argentine ls.		20 (28)	Gray or yellowish shale, locally with carbonaceous layer.			
Cretaceous	Cretaceous		Quindaro sh.		1 (5)	Blocky, dense, bluish limestone, locally undifferentiated from Argentine.			
			Friskie ls.		2 (3)	Gray sandy or clayey shale.			
			Lane sh.		35 (100)	Bluish-gray, even limestone, where thick becomes crystalline and light-gray or white.			
			Raytown ls.		4 (35)	Gray clay shale; around Kansas City with black fissile layer.			
			Muncie Creek sh.		1 (3)	Bluish, dense limestone, blocky.			
			Paola ls.		1.5	Gray silty shale, with coal near middle (Thayer) and massive sandstone occupying upper half (Cottage Grove).			
			Chanute sh.		25 (60)	Granular or oolitic drab limestone. Prominent only around Independence, Kansas.			
			Corbin City ls.		0.5 (60)	Thin-bedded, wavy, fine-grained white limestone.			
			Cement City ls.		7 (9)	Gray limestone, upper part oolitic or cherty, lower part blocky gray limestone.			
			Quivira sh.		4 (8)	Limy or silty buff shale.			
Cretaceous	Cretaceous		Western ls.		6 (10)	Bluish, thin-bedded, fine-grained limestone with shaly partings.			
			Wea sh.		5 (10)	Gray clay shale.			
			Block sh.		3 (6)	Dove-gray to light-gray cherty limestone, upper part oolitic or with black chert in northeastern Kansas.			
			Fontana sh.		5 (35)	Gray shale with black fissile layer.			
			Winterset ls.		25 (35)	Blocky, dense, bluish limestone.			
			Dennis ls.		5	Silty gray shale; in southern Kansas where thickest contains upper massive sandstone (Schubert Creek?) and a more recent crystalline or fine-grained lower division (Sniabar).			
			Stark sh.		2	Undifferentiated shaly beds containing sandy lenses, local limestone, black shale, and channel sandstones at the base (Warrensburg).			
			Canville ls.		2	Gray variable limestone, possibly coalesces northward with the Altamont.			
			Galesburg sh.		25 (125)	Gray silty and argillaceous shale.			
			Bethany Falls ls.		15 (25)	Gray crystalline irregular limestone.			
Cretaceous	Cretaceous		Swope ls.		6	Sandy shale, flaggy sandstone, prominent limestone in the north (Worland) occurs near middle? Mulberry coal in lower part.			
			Hushpuckney sh.		6	Ferruginous massive limestone.			
			Middle Creek ls.		2	Gray sandy and argillaceous shale.			
			Ladore sh.		8 (75±)	Wavy-bedded crystalline white to light-gray limestone.			
			Herthals.		4 (10)	Gray clay shale with black fissile layer.			
			Bourbon formation		150±	Drab, massive, magnesian limestone.			
			Unconformity Unkiah sh.		?	Silty and sandy gray to buff shale with coal (Mulky) overlain by black shale at top and coal (Bevier) near base.			
			Lenape ls.		2 (20)	Blocky, bluish-gray, fine-grained limestone.			
			Nowata sh.		20 (45)	Heterogeneous shales with at least seven coal horizons, each underlying black fissile shales which are in turn locally capped by a limy layer.			
			Altamont ls.		10 (15)	Massive, cross-bedded brown sandstone.			
Cretaceous	Cretaceous		Bardona sh.		60 (100±)	Blue-gray limestone and shale, local thin deposits filling sinks and depressions as in Joplin district and several hundred feet in the Dodge City basin. May include some Morrow beds in this area. Unconf. at base.			
			Pawnee ls.		10 (50)	Light-gray fine to coarse-grained limestone with abundant chert (Boone), underlain in places by bluish noncherty limestones and greenish-blue or part reddish shale (Fern Glen). Average ±400 ft.			
			Labette sh.		20 (75)	Shale gray and bluish with local thin limestone beds (Chouteau-Hannibal).			
			Upper ls.		10 (18)	Shale mostly black fissile, (Chattanooga), in places with sand (Misener) at base.			
			Port Scott ls.		7	White, gray, bluish and brown limestone and dolomite, in part cherty. A little shale and some sandstone commonly present.			
			Middle sh.		5 (18)	Dark-gray or greenish soft clay shale.			
			Lower ls.		5 (18)	Gray to brown dolomite, coarsely crystalline and fine-grained limestone, in part cherty.			
			Upper shale		75±	Light-colored coarse sandstone and thin beds of green shale, limestone and dolomite.			
			Ardmore ls.		2±	Light-gray, white and buff crystalline dolomite, chert and some sandstone. Commonly called "Sillaceous lime."			
			Arbuckle lime		990 ft. in Eckhard No. 1, Sec. 9, T. 35, S. R. 6 E. Absent on high parts of Central Kansas and Nemaha uplifts.				
Cretaceous	Cretaceous		Simpson		203 ft. in Williams No. 1, SW NE SW, sec. 16, T. 35 S., R. 3 W. Absent on major uplifts.				
			Unconformity						
			Arbuckle lime		990 ft. in Eckhard No. 1, Sec. 9, T. 35, S. R. 6 E. Absent on high parts of Central Kansas and Nemaha uplifts.				
			Unconformity						