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DEPARTMENT OF REGISTRATION AND EDUCATION
VERA M. BINKS, Director



CLASSIFICATION OF THE PENNSYLVANIAN ROCKS OF ILLINOIS AS OF 1956

by Harold R. Wanless

CORRELATION CHART

CIRCULAR 217

compiled by Raymond Siever

1956

DIVISION OF THE

ILLINOIS STATE GEOLOGICAL SURVEY

JOHN C. FRYE, Chief

URBANA



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ABSTRACT

The historical development of classification schemes for the Pennsylvanian rocks of Illinois is briefly traced from the latter part of the 19th century, when primary emphasis was given to economically significant coal beds, through various changes in definition of major and minor divisions within the system, to the classification based on the cyclical character of the section in current usage by the Illinois State Geological Survey. The application of this classification to the Pennsylvanian section in different parts of the State is discussed, and standard sections are given for western, central, and southern Illinois giving current terminology. Classification of major divisions of the Pennsylvanian rocks in neighboring areas in relation to the Illinois classification is discussed briefly. A table gives type localities of cyclothems and named beds in current usage by the Survey.

A correlation chart compiled by Raymond Siever shows most of the names currently used for Pennsylvanian units in Illinois by the Survey.

INTRODUCTION

Pennsylvanian rocks occur at the surface or beneath a mantle of Pleistocene glacial deposits in about three-fourths of Illinois. Since the earliest geological studies in the State, in the nineteenth century, the rocks have attracted attention because of their great areal extent and their content of valuable resources of coal, petroleum, clay and shale, limestone, and other materials.

The classification of the Pennsylvanian rocks of Illinois currently used by the Illinois State Geological Survey is shown on the accompanying chart compiled by Raymond Siever. It formalizes and states explicitly the application of this classification scheme to the entire Pennsylvanian section in all parts of Illinois and, as such, supplements the classification used in previously published stratigraphic reports on individual quadrangles, counties, and subregional areas. This report presents a brief history of the development of the classification, some discussion of the status of correlations between various parts of the State, and a tabulation of type localities.

The reasons for adopting this classification scheme, which is based on the use of a cyclothem as a rock unit, have been stated in the past (Weller, 1930, 1931; Wanless, 1931; Wanless and Weller, 1932). Because this report is intended to summarize the application of the classification rather than to discuss its merits, it does not discuss the advantages and disadvantages of cyclothemic classification.

The Survey is currently studying the classification of the Pennsylvanian rocks of Illinois with a view to possible revision. As a first step, this report will clarify stratigraphic nomenclature in use as of 1956.

The manuscript was critically read by H. B. Willman, J. A. Simon, Raymond Siever, and R. M. Kosanke of the Survey.

HISTORY OF CLASSIFICATION

A. H. Worthen (1866, 1868) described general features of the Coal Measures, as the Pennsylvanian system was called then, and proposed a division into Upper and Lower Coal Measures, the dividing horizon being the Shoal Creek limestone. He also numbered some of the coal beds, Nos. 1-7 being designated from localities in or near Fulton County (Worthen, 1870) and Nos. 8-17 from localities in the central part of the coal basin, described in the report on Bond County (Worthen, 1875).

Subsequent studies showed that the coals numbered 2 and 3 in Fulton County are the same coal. Also the numbers 4 and 5 were later discovered to refer to the same coal. The coals numbered 3 and 4 have since been designated Nos. 2 and 5. More recently the number 4 has been applied to a thin but widespread coal, which Worthen failed to recognize, 10 to 50 feet below the No. 5 coal. The number 3 has remained unused in Illinois. Worthen's coal No. 8 has proved to be a widespread thin coal and this number remains in use, but coals numbered 9 to 17 by Worthen have not been so designated since. The practice of numbering coals has proved to be a source of confusion, for generally only commercially important coals are numbered and the numerical system breaks down when coal beds intervening between two successively numbered coals are discovered.

During 1906 to 1908 David White (1907, 1907a, 1909) studied the floras of the Illinois Pennsylvanian strata to determine the Illinois equivalents of the major subdivisions of the Coal Measures of Pennsylvania. White found a flora associated with the No. 2 coal of Fulton County and the Murphysboro coal of southern Illinois, then correlated with No. 2, that he believed to be equivalent to the base of the Allegheny formation. He applied the Appalachian term Pottsville to strata below the No. 2 coal, but because he was uncertain as to whether the Upper Freeport coal (the top of the Allegheny) is equivalent to the No. 6 or No. 7 coal, he did not introduce the terms Allegheny and Conemaugh into Illinois terminology.

The interval from the base of the No. 2 coal to the top of the No. 6 coal was designated Carbondale from a town in southern Illinois which is within the outcrop belt of this formation (Lines, 1912). The Pennsylvanian strata above the No. 6 coal were designated the McLeansboro formation (DeWolf, 1910) because a diamond drill core had been recovered near McLeansboro, Hamilton County, showing about 800 feet of strata above the No. 6 coal. No definite equivalents of the Monongahela (Upper Productive Measures) of Pennsylvania have been recognized in Illinois although the uppermost part of the McLeansboro may be equivalent to Monongahela beds.

Thus major divisions of the Pennsylvanian in Illinois were named the Pottsville, Carbondale, and McLeansboro formations. The nomenclature was not well chosen; the type section of the Pottsville is a conglomerate in the southern anthracite field of Pennsylvania, nearly 700 miles from Illinois; no particular outcrop or series of outcrops was designated as the type exposure for the Carbondale, and the McLeansboro is based on a drill core, only a few feet of the upper McLeansboro outcropping near the town of that name.

While they mapped the geology of several quadrangles in the Illinois coal basin, Savage, Udden, Cady, and others traced several of the coals of the Fulton County area into other parts of the coal basin and named representative key beds such as the Seville and Lonsdale limestones, Vergennes and Vermilion-ville sandstones, and Francis Creek and Farmington shales. They also used geographic names for some of the numbered coals from localities where each is economically important. Thus the No. 1 was called the Rock Island coal, the No. 2 was called the LaSalle coal in northern and the Colchester coal in western Illinois. The No. 5 was called the Springfield coal in central and western Illinois and the Harrisburg coal is southeastern Illinois. The No. 6 coal was called the Belleville in southwestern Illinois and the Herrin coal in southern Illinois. The No. 7 was named the Danville coal in eastern Illinois. The names and numbers were applied in combination, as the Colchester (No. 2) or the Harrisburg (No. 5) coal.

Udden (1912), in describing the geology of the Peoria quadrangle, noted a recurrent sequence of beds associated with coals 5, 6, and 7 and the Lonsdale limestone which more or less closely resemble each other, suggesting a pattern of cyclic or rhythmic sedimentation. He stated that the beds consist, in ascending order, of coal, black shale, limestone, gray shale, sandstone, and underclay. He noted that the relative thickness of the beds varies in the four sequences, but that each lithologic type is represented in each of the four sequences.

In the course of regional studies of the paleontology of the Illinois Pennsylvanian during 1926 to 1928, Weller (1930) noted that the pattern of cyclic sedimentation described by Udden for the Peoria quadrangle is widespread throughout the Illinois coal field. He considered an "ideal cycle" to consist of ten lithologic units of which the lower six, (1) sandstone, (2) sandy shale, (3) "fresh water" limestone, (4) underclay, (5) coal, and (6) gray roof shale, were probably deposited under nonmarine conditions and the remaining four (7) marine limestone, (8) black fissile shale, (9) marine limestone and calcareous shale, and (10) upper gray shale, are of marine origin.

Weller noted that most cyclic successions do not contain the full sequence of ten units and that they may be reduced to only two, coal and underclay. He believed that there were two significant breaks in deposition, first between the upper shale (10) and the overlying sandstone (1) and second at the surface of the underclay (4-5). The break below the sandstone was considered to be marked by the development of channels cut locally as deep as 50 to 80 feet into the underlying strata and generally filled with sandstone coarser than sandstones outside the channel areas. The second break was thought to be shown by apparent leaching of carbonate and some sort of soil development in the underclay just before coal deposition. Weller considered that the time lapse at the top of the underclay might be greater than that at the base of the sandstone, but that there was no evidence of diastrophism in a widespread level surface of clay that was undergoing soil development. He thought there was suggestive evidence of regional uplift that provided gradients sufficient for channel develop-

ment. He therefore proposed that each cycle be considered to start with the unconformable surface on which sandstone deposition took place.

It was later proposed (Wanless, 1931) that the strata recording a cycle of sedimentation constitute a more logical stratigraphic unit for the subdivision of the Pennsylvanian rocks than divisions that were then in use (Pottsville, Carbondale, and McLeansboro). At first the terms "sequence" and "suite" were applied to the sediments formed during a cycle of sedimentation (Wanless, 1929) and later the term "cyclical formations" was proposed (Wanless, 1931). Because of the great variety of lithologic types included in the units, they were considered to differ from normal formations and the term "cyclothem," was introduced (Wanless and Weller, 1932).

The term means literally a "cyclic deposit." A series of names for cyclical units was proposed (Wanless, 1931), covering the part of the Pennsylvanian system exposed in western Illinois. Several additions and changes have been made since then (Weller et al., 1942; Willman and Payne, 1942; Dunbar and Henbest, 1942). The accompanying correlation chart (column 2) incorporates the latest revisions.

In places Pennsylvanian beds below No. 2 coal thin to a few feet. The thinner sections are largely refractory clay in two parts of the basin: in northern Illinois east of the LaSalle anticline and in southwest central Illinois. The latter belt (Cheltenham clay) extends along the outcrop from near Mt. Sterling, Brown County, southward for nearly 150 miles to near Campbell Hill, Jackson County. Farther south and eastward in the deeper part of the Illinois basin in southeastern Illinois the pre-Carbondale strata aggregate as much as 1200 feet as compared with a general maximum of 200 feet in western Illinois.

Because exact correlations between western and southeastern Illinois are uncertain, different names were proposed for the series of cyclothems below the Liverpool cyclothem in southern Illinois. The system was proposed in a chapter on stratigraphy (Wanless, 1939) in an unpublished manuscript on the Lower Pennsylvanian floras of Illinois by the late David White, but many of the new names were published by Weller (1940, pp. 36-42). Studies, by C. B. Read, of the type Pottsville section in Pennsylvania showed that it includes a hiatus between a conglomerate of lower Allegheny age (above) and strata that yield a New River or "Middle Pottsville" flora (beneath). A great series of beds that had been called Upper Pottsville in many parts of the United States is actually unrepresented at Pottsville. Because most of the strata which had been called Pottsville in Illinois belong to the "Upper Pottsville" group, this name for the lower Pennsylvanian in Illinois was abandoned.

For many years early Pennsylvanian beds of western Kentucky had been called Tradewater and Caseyville (Glenn, 1912; Owen, 1856), the names being applied to units that generally correlate with Upper and Middle Pottsville respectively. The type areas of the Tradewater and Caseyville units are within a few miles of southeastern Illinois and the names were adopted as substitutes for the term Pottsville and given the rank of groups (Wanless, op. cit. as quoted in Weller, 1940, p. 36). As thus revised the major divisions of the Illinois Pennsylvanian rocks are:

McLeansboro group (top of column to Anvil Rock [Copperas Creek] sandstone)

Carbondale group (Jamestown through Liverpool cyclothems)
Tradewater group (base of Isabel sandstone to base of Grindstaff
sandstone)

Caseyville group (strata below Grindstaff sandstone).

The terminology for the lower Pennsylvanian cyclothems and named units in southern Illinois, as slightly revised, is as follows:

Tradewater group

Dekoven cyclothem

Dekoven coal

Colbert cyclothem (called Davis by Weller)

Davis coal

Stonefort cyclothem (includes more than one cyclothem)

Stonefort limestone

Stonefort coal

Bald Hill coal

Curlew sandstone

Macedonia cyclothem (includes more than one cyclothem)

Curlew coal

Curlew limestone

New Burnside (Mannington coal of Kentucky)

Murray Bluff sandstone

Delwood cyclothem

Delwood (Ice House coal of Kentucky)

Delwood sandstone

Grindstaff cyclothem

Boskydell marine zone

Willis coal

Grindstaff sandstone

Caseyville group

Pounds cyclothem

Reynoldsburg coal

Pounds sandstone (Makanda sandstone in restricted sense)

Battery Rock cyclothem

Drury shale

Battery Rock coal

Sellers limestone

Battery Rock (Lick Creek) sandstone or conglomerate

Lusk formation

Wayside marine zone

In the above classification the name Colbert is substituted for the former cyclothem name, Davis, because the latter name is pre-empted. However, because coal bed names are informal, the name Davis is retained for the coal bed itself. The type section for the Colbert cyclothem is half a mile west of Colbert school in the SE 1/4 SW 1/4 sec. 23, T. 10 S., R. 7 E., Saline County, Illinois.

On the basis of fossil spores extracted from coals, Kosanke (1950) concluded that all western Illinois coals belong to the Tradewater group, although

the Babylon cyclothem is probably at its base. The Caseyville rocks of southern Illinois extend northward into the Illinois basin but they wedge out before reaching the outcrop area in western Illinois.

Some cyclothems may wedge out or merge, as in the Cheltenham clay district. Exposures and clay mines near Alton show that there are several coal streaks in the Cheltenham clay and that the clays separated by the coal streaks are different in color and other properties. At one location the Seahorne limestone forms the roof of the clay, and the Seahorne, Upper DeLong, Middle DeLong, Pope Creek, and Tarter coal streaks and clays, 6 inches of No. 1 coal, and a foot of Bernadotte sandstone may be recognized in the Cheltenham clay. Elsewhere the Seahorne limestone is missing and the No. 2 coal is the top of the clay. Thus six or more cyclothems may be represented in 20 feet of clay, the underclay of each persisting where all other members have wedged out.

In some areas there is an intercalation of a new cyclic sequence. Along the western border of the basin from Kewanee at the north to Murphysboro on the south, no coal is found in the beds between coal No. 5 and No. 6 of the St. David and Brereton cyclothems. East of the Duquoin monocline, however, the interval between these coals expands and a coal that has been called No. 5a in southern Illinois and No. 10 in western Kentucky intervenes; this coal is associated, at least locally, with most of the rock types of a cyclothem. The marine limestone extends about as far northwest as the Mississippi bluffs near Belleville, Illinois, but the coal is restricted to the area east of the monocline. The name Crab Orchard was proposed for these beds as an additional cyclothem, but has only informal usage because of its prior use for a Silurian formation in Kentucky. This type of intercalation occurs in areas in other parts of the section. In some areas a single bed may be the sole representative of a cycle that is much more complete in other areas.

The interval above the Shoal Creek limestone is not exposed in the region in which the cyclothemic classification was worked out, and as yet virtually no detailed surface mapping has been done in the deeper part of the basin where beds younger than the Shoal Creek crop out. Electric-log studies (Wanless, 1955) show that the younger McLeansboro strata attain a maximum thickness of about 820 feet in southwestern Jasper County.

There is one excellent marker about 200 to 250 feet above the Shoal Creek limestone in eastern and central Illinois, called the Millersville limestone in central Illinois and the Livingston limestone in the area east of the LaSalle anticline. It seems likely, on the basis of lithologic similarity and conodont study (Stevenson, 1955), that the LaSalle limestone of northern Illinois is also a correlative.

Simon (1946) worked out a sequence above the Shoal Creek limestone in Bond County and proposed the terms "Sorento," "Bunje," and "Flat Creek," named in ascending order, for three cyclothemic units in the lower half of the interval. Electric-log studies seem to show that the successions are persistent throughout most of the basin. Another persistent cyclic succession intervenes between the Flat Creek and Millersville. The term "Reel limestone" has been used for the limestone of this succession in southeastern Illinois. Although the cyclothems mentioned have not previously been published as a series, the succession may be put together as follows:

Millersville cyclothem
Millersville (Livingston, LaSalle?) limestone
Unnamed cyclothem
Reel limestone
"Flat Creek" cyclothem

"Bunje" cyclothem

"Sorento" cyclothem

Shoal Creek cyclothem

Shoal Creek (New Haven) limestone

The Millersville limestone, thickest of all Pennsylvanian limestones, shales out southward along a line crossing Christian, Fayette, Effingham, Jasper, and Crawford counties. The stratigraphic positions of the Millersville limestone and its associated strata can be carried through much of the southern part of the basin where the limestone is missing.

In several counties of the deeper part of the basin strata higher than the Millersville limestone are about 550 feet thick. Several beds and a number of cyclothems have been named in this interval. Most of the field work on these younger beds by Weller and Newton (1937) and S. E. Ekblaw preceded the development of the Illinois basin oil field, which began in 1937 and prevented proposed correlations from place to place from being checked with subsurface information. The area is one of shallow dissection and there are extensive flat prairies without any outcrops. The study of the younger beds is hampered even now by the fact that electric logs of oil-test drillings extend only up to the base of the surface pipe at depths of 80 to 200 feet and there is thus no record, or only a partial record, of the youngest Pennsylvanian rocks. The following is a list of some proposed names for the higher beds in what seems to be their sequence in descending order.

Upper Bogota cyclothem Lower Bogota cyclothem Woodbury cyclothem Gila cyclothem Greenup cyclothem Greenup limestone Newton cyclothem "Effingham" beds Shumway cyclothem Shumway limestone Omega cyclothem Omega limestone Shelbyville coal and associated beds Cohn cyclothem Millersville cyclothem Millersville (Livingston, LaSalle?) limestone

Probably the interval contains other beds and other cyclic sequences not here named. In northern Illinois the Little Vermilion cyclothem overlies the LaSalle limestone and is in turn overlain by an unnamed cyclothem, neither of which have been correlated with the Illinois basin succession.

In summary, 39 cyclothems have been proposed in central and western Illinois and 38 in southern Illinois, not including more local successions such as those associated with coal No. 5a and the Cutler Rider coals.

CLASSIFICATIONS IN NEIGHBORING AREAS

Moore (1936, 1944) and others have presented evidence that in the northern mid-continent region there were a few significant episodes of tectonism during the Pennsylvanian period, especially in the tectonically unstable area of southern Oklahoma, and that tectonism there is reflected elsewhere in regional uplift and channel-cutting or in truncation of older strata. He noted that these breaks also are reflected in faunal changes that can be traced outside the disturbed area, including the disappearance of <u>Fusulina</u>, <u>Chaetetes</u>, <u>Prismopora</u>, and <u>Mesolobus</u> at the end of the Des Moines stage. The genera listed are all present in the Lonsdale limestone of the Gimlet cyclothem but have not been found in the Trivoli cyclothem. It is not certain whether any of them are in the intervening Exline cyclothem.

Correlation and matching of many Illinois beds with corresponding beds of southern Iowa were reported by Weller et al. (1942). Fusulinid studies by Dunbar and Henbest (1942) show that the Shumway and Greenup limestones may be of Virgil age, though no physical evidence of a break corresponding to that at the Virgil-Missouri boundary has been noted. Spores from coal and leaf floras indicate that the Caseyville is of Morrowan age.

In Indiana the terms Pottsville, Allegheny, and Conemaugh are used as major divisions of the system; these are divided into groups, formations, and members named entirely from Indiana localities. The coals are designated by roman rather than arabic numerals, and Nos. V, VI, and VII correspond in part with equivalent arabic-numbered coals in Illinois.

In western Kentucky three of the major units of classification correspond to those in Illinois - Carbondale named from an Illinois locality, and Tradewater and Caseyville named from Kentucky localities. The equivalent of the McLeansboro in Kentucky is divided into two formations, the Lisman below and the Henshaw above. The column has not been divided into cyclothems, and the coals, although numbered, do not have numbers that correspond to those in Indiana or Illinois. The two principal coals, Nos. 9 and 11, are correlatives of Illinois coal No. 5 and No. 6.

TYPE LOCALITIES

Type localities for many named units have been described and published, but others are discussed in unpublished manuscripts. Publications that assigned some of the older names before 1920 did not identify the precise type locality. In the following table the locality is stated by county, township, range, section, and location in the section. They are arranged as nearly as possible in stratigraphic order, beginning with the oldest beds, and include groups, formations, cyclothems, and named beds or members. Where the type locality for a cyclothem and bed is the same, the locality is listed only once. Type localities are described in abbreviated form and no attempt has been made to cite the references.

True stratigraphic order is not possible because some of the type localities are too far apart to permit accurate correlation.

TABLE OF TYPE LOCALITIES

Caseyville group	Name	State	County	Т.	R.	Sec.	Part
Mayside sandstone	Caseyville group	Kentucky	Union	Vicinity	of	Caseyville	on Ohio River
Mayside sandstone	Lusk cyclothem	Illinois	Pope	12-13 S	6E		
### Battery Rock cyclothem				128	5E		
Battery Rock cyclothem	Wayside sandstone	Illinois	Johnson	118	2E	30	$N_{\overline{2}}^{1}$
Lick Creek sandstone						31	NE NW
Drury shale	Battery Rock cyclothem	Illinois	Hardin	118	10E	26	
Sellers limestone Illinois Hardin 11S 10E 21 SE Pounds cyclothem Illinois Gallatin 10S 8E 35, 36 Headwater Reynoldsburg coal Illinois Johnson 11S 4E 32 Tradewater group Kentucky Union Along Tradewater River below Sturgis Grindstaff cyclothem Illinois Gallatin 10S 8E 28 NE Willis coal Illinois Gallatin 10S 9E 30 Babylon cyclothem Illinois Fulton 7N 1E 14 Boskydell marine zone Illinois Jackson 10S 1W 8 NE Delwood cyclothem Illinois Pope 11S 6E 5 5 Ice House coal Kentucky Union An ice house 2 miles south of DeKoven 1arter cyclothem Illinois Fulton 5N 1E 2 SE Ice House coal Illinois Sulton 10S 6E 27 NW	Lick Creek sandstone	Illinois	Johnson	118	2E	31	NE
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Reynoldsburg coal Illinois Johnson 11S 4E 32	Sellers limestone	Illinois	Hardin	118	10E	21	SE
Tradewater group Kentucky Union Along Tradewater River below Sturgis	Pounds cyclothem	Illinois	Gallatin	10\$	8E	35, 36	
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Pope Creek cyclothem Illinois Mercer 14N 2W 33 cen. Macedonia cyclothem Illinois Saline 10S 6E 27 NW Murray Bluff sandstone Illinois Saline 10S 5E 35 NE Curlew limestone, coal, and sandstone Illinois Fulton 6N 1E 23 SW SW Bernadotte sandstone Illinois Fulton 5N 2E 19 SW Rock Island coal (No. 1) Illinois Rock Island 17-18N 1E Murphysboro coal Illinois Jackson 9S 2W 9 SE DeLong cyclothems (Upper, Middle, and Lower) Illinois Saline 10S 5E 30 SW Stonefort cyclothem Illinois Saline 10S 5E 30 SW Bald Hill coal Illinois Fulton 3N 3E 4, 5 S½ Cheltenham clay Missouri St. Louis Cheltenham district, St. Louis Wiley cyclothem Illinois Fulton 7N 2E 16 SW NW	Ice House coal	Kentucky	Union	An ice h	ouse	e 2 miles so	outh of DeKoven
Macedonia cyclothem Illinois Saline 10S 6E 27 NW Murray Bluff sandstone Illinois Saline 10S 5E 35 NE Curlew limestone, coal, and sandstone Illinois Fulton 6N 1E 23 SW SW Bernadotte sandstone Illinois Fulton 5N 2E 19 SW Rock Island coal (No. 1) Illinois Rock Island 17-18N 1E Murphysboro coal Illinois Jackson 9S 2W 9 SE DeLong cyclothems (Upper, Middle, and Lower) Illinois Saline 10S 5E 30 SW Bald Hill coal Illinois Fulton 3N 3E 4, 5 S½ Cheltenham clay Missouri St. Louis Cheltenham district, St. Louis Wiley cyclothem Illinois Fulton 7N 2E 16 SW NW	Tarter cyclothem	Illinois	Fulton	5N	1E	2	SE
Murray Bluff sandstone Illinois Saline 10S 5E 35 NE Curlew limestone, coal, and sandstone Kentucky Union Indian Hill, near Curlew Seville cyclothem Illinois Fulton 6N 1E 23 SW SW Bernadotte sandstone Illinois Fulton 5N 2E 19 SW Rock Island coal (No. 1) Illinois Rock Island 17-18N 1E Murphysboro coal Illinois Jackson 9S 2W 9 SE DeLong cyclothems (Upper, Middle, and Lower) Illinois Knox 9N 2E 6, 8 Stonefort cyclothem Illinois Saline 10S 5E 30 SW Bald Hill coal Illinois Williamson 10S 4E 35 SE Seahorne cyclothem Illinois Fulton 3N 3E 4, 5 S½ Cheltenham clay Missouri St. Louis Cheltenham district, St. Louis Wiley cyclothem Illinois Fulton 7N 2E 16 SW NW	Pope Creek cyclothem	Illinois	Mercer	14N	2W	33	cen.
Curlew limestone, coal, and sandstone Kentucky Union Indian Hill, near Curlew Seville cyclothem Illinois Fulton 6N 1E 23 SW SW Bernadotte sandstone Illinois Fulton 5N 2E 19 SW Rock Island coal (No. 1) Illinois Rock Island 17-18N 1E Murphysboro coal Illinois Jackson 9S 2W 9 SE DeLong cyclothems (Upper, Middle, and Lower) Illinois Knox 9N 2E 6, 8 Stonefort cyclothem Illinois Saline 10S 5E 30 SW Bald Hill coal Illinois Williamson 10S 4E 35 SE Seahorne cyclothem Illinois Fulton 3N 3E 4, 5 S½ Cheltenham clay Missouri St. Louis Cheltenham district, St. Louis Wiley cyclothem Illinois Fulton 7N 2E 16 SW NW	Macedonia cyclothem	Illinois	Saline	108	6E	27	NW
And sandstone Kentucky Union Indian Hill, near Curlew Seville cyclothem Illinois Fulton 6N 1E 23 SW SW Bernadotte sandstone Illinois Fulton 5N 2E 19 SW Rock Island coal (No. 1) Illinois Rock Island 17-18N 1E Murphysboro coal Illinois Jackson 9S 2W 9 SE DeLong cyclothems (Upper, Middle, and Lower) Illinois Knox 9N 2E 6, 8 Stonefort cyclothem Illinois Saline 10S 5E 30 SW Bald Hill coal Illinois Williamson 10S 4E 35 SE Seahorne cyclothem Illinois Fulton 3N 3E 4, 5 S\frac{1}{2} Cheltenham clay Missouri St. Louis Cheltenham district, St. Louis Wiley cyclothem Illinois Fulton 7N 2E 16 SW NW	Murray Bluff sandstone	Illinois	Saline	10\$	5E	35	NE
Seville cyclothem Illinois Fulton 6N 1E 23 SW SW Bernadotte sandstone Illinois Fulton 5N 2E 19 SW Rock Island coal (No. 1) Illinois Rock Island 17-18N 1E Murphysboro coal Illinois Jackson 9S 2W 9 SE DeLong cyclothems (Upper, Middle, and Lower) Illinois Knox 9N 2E 6, 8 Stonefort cyclothem Illinois Saline 10S 5E 30 SW Bald Hill coal Illinois Williamson 10S 4E 35 SE Seahorne cyclothem Illinois Fulton 3N 3E 4, 5 S½ Cheltenham clay Missouri St. Louis Cheltenham district, St. Louis Wiley cyclothem Illinois Fulton 7N 2E 16 SW NW	•	Kentucky	Union	Indian	Hill	l. near Curl	.ew
Bernadotte sandstone Illinois Fulton 5N 2E 19 SW Rock Island coal (No. 1) Illinois Rock Island 17-18N 1E Murphysboro coal Illinois Jackson 9S 2W 9 SE DeLong cyclothems (Upper, Middle, and Lower) Illinois Knox 9N 2E 6, 8 Stonefort cyclothem Illinois Saline 10S 5E 30 SW Bald Hill coal Illinois Williamson 10S 4E 35 SE Seahorne cyclothem Illinois Fulton 3N 3E 4, 5 S\frac{1}{2} Cheltenham clay Missouri St. Louis Cheltenham district, St. Louis Wiley cyclothem Illinois Fulton 7N 2E 16 SW NW	Seville cyclothem	-				·	
Rock Island coal (No. 1) Illinois Rock Island 17-18N 1E Murphysboro coal Illinois Jackson 9S 2W 9 SE DeLong cyclothems (Upper, Middle, and Lower) Illinois Knox 9N 2E 6, 8 Stonefort cyclothem Illinois Saline 10S 5E 30 SW Bald Hill coal Illinois Williamson 10S 4E 35 SE Seahorne cyclothem Illinois Fulton 3N 3E 4, 5 S½ Cheltenham clay Missouri St. Louis Cheltenham district, St. Louis Wiley cyclothem Illinois Fulton 7N 2E 16 SW NW	•	Illinois	Fulton	5N	2E	19	SW
Murphysboro coal Illinois Jackson 9S 2W 9 SE DeLong cyclothems (Upper, Middle, and Lower) Illinois Knox 9N 2E 6, 8 Stonefort cyclothem Illinois Saline 10S 5E 30 SW Bald Hill coal Illinois Williamson 10S 4E 35 SE Seahorne cyclothem Illinois Fulton 3N 3E 4, 5 S\frac{1}{2} Cheltenham clay Missouri St. Louis Cheltenham district, St. Louis Wiley cyclothem Illinois Fulton 7N 2E 16 SW NW	Rock Island coal (No. 1)	Illinois	Rock Island		1E		
Middle, and Lower) Illinois Knox 9N 2E 6, 8 Stonefort cyclothem Illinois Saline 10S 5E 30 SW Bald Hill coal Illinois Williamson 10S 4E 35 SE Seahorne cyclothem Illinois Fulton 3N 3E 4, 5 S\frac{1}{2} Cheltenham clay Missouri St. Louis Cheltenham district, St. Louis Wiley cyclothem Illinois Fulton 7N 2E 16 SW NW		Illinois	Jackson	9 S	2W	9	SE
Stonefort cyclothem Illinois Saline 10S 5E 30 SW Bald Hill coal Illinois Williamson 10S 4E 35 SE Seahorne cyclothem Illinois Fulton 3N 3E 4,5 S $\frac{1}{2}$ Cheltenham clay Missouri St. Louis Cheltenham district, St. Louis Wiley cyclothem Illinois Fulton 7N 2E 16 SW NW		Illinois	Knox	9N	2E	6.8	
Bald Hill coal Illinois Williamson 10S 4E 35 SE Seahorne cyclothem Illinois Fulton 3N 3E 4, 5 $S_{2}^{\frac{1}{2}}$ Cheltenham clay Missouri St. Louis Cheltenham district, St. Louis Wiley cyclothem Illinois Fulton 7N 2E 16 SW NW		Illinois	Saline	10S	5E	ĺ	SW
Seahorne cyclothem Illinois Fulton 3N 3E 4,5 $S_{\frac{1}{2}}^{\frac{1}{2}}$ Cheltenham clay Missouri St. Louis Cheltenham district, St. Louis Wiley cyclothem Illinois Fulton 7N 2E 16 SW NW	·						SE
Cheltenham clay Missouri St. Louis Cheltenham district, St. Louis Wiley cyclothem Illinois Fulton 7N 2E 16 SW NW							
Wiley cyclothem Illinois Fulton 7N 2E 16 SW NW							
	·					•	
Colbert cyclothem Illinois Saline 10S 7E 23 SE SW	Wiley cyclothem	Illinois	Fulton	7N	2E	16	SW NW

TABLE OF TYPE LOCALITIES (continued)

Name	State	County	Т.	R.	Sec.	Part
Davis coal	Kentucky	Union	Davis M	ine,	near Del	Koven
Greenbush cyclothem	Illinois	Warren	8N	lW	24	$E_2^{\frac{1}{2}}$
DeKoven cyclothem	Kentucky	Union	Near De	Koven	Station	า
Carbondale group	Illinois	Jackson	None de	signa	ted	
Abingdon cyclothem	Illinois	Knox	9N	2E	6	cen.
Isabel sandstone	Illinois	Fulton	4N	3E	16	NW NE
Liverpool cyclothem	Illinois	Fulton	5N	4E	17, 20,	21
Palzo sandstone	Illinois	Williamson	105	4E	16	SE
Browning sandstone	Illinois	Schuyler	2N	1E	18	
Colchester (No. 2) coal	Illinois	McDonough	5N	4W	12, 13	
Francis Creek shale	Illinois	Fulton	5N	1E	22	NE SW
Oak Grove limestone	Illinois	Fulton	5N	3E	6	SW SE
Purington shale	Illinois	Knox	11N	2E	17	SW
Summum cyclothem	Illinois	Fulton	4N	2E	3	NE
Pleasantview sandstone	Illinois	Schuyler	2N	1E	31	Along Mill Cr.
Kerton Creek coal	Illinois	Fulton	ЗN	2E	15	cen. NE
Summum No. 4 coal	Illinois	Fulton	4N	2E	3	NE
Hanover limestone	Illinois	Greene	10N	11W	27	NE SW
St. David cyclothem	Illinois	Fulton	6N	4E	17	SE SE
Covel conglomerate	Illinois	LaSalle	33N	3 E	26	SE SW
Springfield (No. 5) coal	Illinois	Sangamon	16N	4W	16*	
Harrisburg (No. 5) coal*	Illinois	Saline	In coal Harris		in the	vicinity of
Canton shale	Illinois	Fulton	6N	4E	9	cen.
Briar Hill (No. 5a) coal	Illinois	Saline	9N	7E		
Brereton cyclothem	Illinois	Fulton	7N	4E	1	SE NE
Cuba sandstone	Illinois	Fulton	6N	3E	8	E_2^1 SE
Vermilionville sandstone	Illinois	LaSalle	32N	2E	9	SE
Herrin (No. 6) coal*	Illinois	Williamson	In coal Herrin		in the	vicinity of
Grape Creek coal	Illinois	Vermilion	19N	11W	33	NW NW
Herrin limestone	Illinois	Williamson	In coal Herrin		in the	vicinity of
Brereton limestone	Illinois	Fulton	7N	4E	1	SE NE
Sheffield shale	Illinois	Bureau	16N	6E	24	cen.
Jamestown cyclothem	Illinois	Perry	58	4W	34	NW NE

TABLE OF TYPE LOCALITIES (continued)

Name	State	County	Т.	R.	Sec.	Part
Pokeberry limestone	Illinois	Schuyler	2N	lW	26	N_{2}^{1} SW
McLeansboro group	Illinois	Hamilton	48	5E	25	
Bankston cyclothem	Illinois	Saline	None	design	ated	
Anvil Rock sandstone	Kentucky	Union	$1\frac{1}{2}$ m	iles NW	of DeK	oven
Bankston Fork limestone	Illinois	Saline	9S	5E	19	NE NW
Sparland cyclothem	Illinois	Marshall	12N	9E	2	
Copperas Creek sandstone	Illinois	Fulton	None	design	ated	
Galum limestone	Illinois	Perry	6 S	4W	13	N cen.
No. 7 coal	Illinois	Fulton	7N	4E	3, 10	
Danville (No. 7) coal	Illinois	Vermilion	19N	11W	7	E 1/2
Piasa limestone	Illinois	Jersey	- 8N	10W	25	E_{2}^{1}
Cutler limestone	Illinois	Perry	6 S	4W	2, 3	
"Cutler Rider No. 1 coal"	Illinois	Williamson	None	design	ated	
"Cutler Rider No. 2 coal"	Illinois	Williamson	None	design	ated	
"Cutler Rider No. 3 coal"	Illinois	Williamson	None	design	ated	
Farmington shale	Illinois	Fulton	8N	4E		
Gimlet cyclothem	Illinois	Marshall	12N	9E	16	SE
Lonsdale limestone	Illinois	Peoria	8N	7E	14	
West Franklin limestone	Indiana	Posey	7S	12W	24	
Exline cyclothem	Iowa	Appanoose	67N	17W	6	SE
Scottville limestone and coal	Illinois	Macoupin	12N	9W	16	W ¹ ∑ SW
Collinsville limestone	Illinois	Madison	None	design	ated	
Trivoli cyclothem	Illinois	Peoria	8N	5E	3	SE
No. 8 coal	Illinois	Gallatin	9S	10E	17, 18	
Turner cyclothem	Illinois	Putnam	33N	1W	29	NW NE
Carlinville cyclothem	Illinois	Macoupin	10N	7W	35	SW SW
Burroughs beds	Illinois	Macoupin	10N	7W	27	NW SW
Macoupin cyclothem	Illinois	Macoupin	9N	7W	2	N_{2}^{1} cen.
Shoal Creek cyclothem	Illinois	Clinton	4N	3W	34	
New Haven limestone	Illinois	Gallatin	7 S	10E	20	NE
Mt. Carmel sandstone	Illinois	Wabash	18	12W	21	
Hicks cyclothem	Illinois	Bureau	16N	11E	33	NW SW
"Sorento" cyclothem	Illinois	Bond	6N	4W	6,7	E½ edge
"Bunje" cyclothem	Illinois	Bond	6N	4W	7	S ¹ / ₂
"Flat Creek" cyclothem	Illinois	Bond	6N	5W	24	cen. E_2^1

TABLE OF TYPE LOCALITIES (continued)

Name	State	County	т.	R.	Sec.	Part
Hall cyclothem	Illinois	Bureau	16N	11E	33	NW SW
Reel limestone	Illinois	Wabash	1N	11W	8	
Millersville cyclothem	Illinois	Christian	12N	1W	28, 34	
Livingston limestones (Upper and Lower)	Illinois	Clark	11N	11W	6	SE NW
LaSalle limestone	Illinois	LaSalle	33N	1E	14	
Friendsville coal	Illinois	Wabash	1N	13W	13, 24	
Cohn cyclothem	Illinois	Clark	11N	12W	1	NE
Little Vermilion cyclo- them	Illinois	LaSalle	33 N	1E	11	SW SW
Merom sandstone	Indiana	Sullivan	7N	10W	7	
Shelbyville coal	Illinois	Shelby	None o	design	ated	
Omega cyclothem	Illinois	Marion	ЗИ	4E	18,19,30 Lis	t Fork and ee Branch
Shumway cyclothem	Illinois	Effingham	9N	5E	26 SI	E SE SW
"Effingham" beds	Illinois	Effingham	8 N	6E		ry to Salt ½ mile Effingham
Newton cyclothem	Illinois	Jasper	7N	10E	15,16,22, 27	
Greenup cyclothem	Illinois	Cumberland	9N	9E	2, 3	
Gila cyclothem	Illinois	Jasper	8N	9E	31 Mint	Creek
Woodbury cyclothem	Illinois	Cumberland	9N	8E	32	$S^{\frac{1}{2}}$ SE
Bogota cyclothem	Illinois	Jasper	5N 6N	8E 8E	17 29,32,33	NE NE

^{*} Named from subsurface exposures in coal mines.

REFERENCES

- Cady, G. H., 1952, Minable coal reserves of Illinois: Illinois Geol. Survey Bull. 78, 138 p.
- DeWolf, F. W., 1910, Studies of Illinois coal: Illinois Geol. Survey Bull. 16, p. 177-301.
- Dunbar, C. O., and Henbest, L. G., 1942, Pennsylvanian Fusulinidae of Illinois: Illinois Geol. Survey Bull. 67, 218 p.
- Glenn, L. C., 1912, A geological reconnaissance of the Tradewater River region, with special reference to the coal beds: Kentucky Geol. Survey Bull. 17, 75 p.
- Kosanke, R. M., 1950, Pennsylvanian spores of Illinois and their use in correlation: Illinois Geol. Survey Bull. 74, 128 p.
- Lamar, J. E., 1925, Geology and mineral resources of the Carbondale quadrangle: Illinois Geol. Survey Bull. 48, 172 p.
- Lines, E. F., 1912, The stratigraphy of Illinois with reference to portland cement materials: Illinois Geol. Survey Bull. 17, p. 59-76.
- Moore, R. C., 1936, Stratigraphic classification of the Pennsylvanian rocks of Kansas: Kansas Univ. Bull. 22, 256 p.
- Moore, R. C., et al., 1944, Correlation of Pennsylvanian of North America, Bull. Geol. Soc. Am., v. 55, no. 6, p. 657-706.
- Owen, D. D., 1856, Report of the geological survey in Kentucky made during the years 1854 and 1855: 416 p.
- Simon, J. A., 1946, Correlation studies of Upper Pennsylvanian rocks in southwest-central Illinois: unpublished Master's thesis, Univ. of Illinois, 36 p.
- Stevenson, W., 1955, Pennsylvanian conodonts of Illinois: unpublished Master's thesis, Univ. of Illinois. 56 p.
- Udden, J. A., 1912, Geology and mineral resources of the Peoria quadrangle, Illinois: U.S. Geol. Survey Bull. 506, 103 p.
- Wanless, H. R., 1929, Geology and mineral resources of the Alexis quadrangle: Illinois Geol. Survey Bull. 57, 230 p.
- Wanless, H. R., 1931, Pennsylvanian cycles in western Illinois: Illinois Geol. Survey Bull. 60, p. 179-193.
- Wanless, H. R., (1939), Lower Pennsylvanian stratigraphy, in White, C. D., Lower Pennsylvanian floras of Illinois: unpublished manuscript, U.S. Geol. Survey.
- Wanless, H. R., 1939a, Pennsylvanian correlations in the Eastern Interior and Appalachian coal fields: Geol. Soc. Am. Spec. Paper 17, 130 p.
- Wanless, H. R., 1955, Pennsylvanian rocks of the Eastern Interior Basin: Bull. Am. Assoc. Petr. Geol., v. 39, no. 9, p. 1753-1820.

- Wanless, H. R., and Weller, J. M., 1932, Correlation and extent of Pennsylvanian cyclothems: Bull. Geol. Soc. Am., v. 43, p. 1003-1016.
- Weller, J. M., 1930, Cyclical sedimentation of the Pennsylvanian period and its significance: Jour. Geol., v. 38, p. 97-135.
- Weller, J. M., 1931, The conception of cyclical sedimentation during the Pennsylvanian period: Illinois Geol. Survey Bull. 60, p. 163-179.
- Weller, J. M., 1940, Geology and oil possibilities of extreme southern Illinois: Illinois Geol. Survey Rept. Inv. 71, 71 p.
- Weller, J. M., and Newton, W. A., 1937, Stratigraphic studies of Pennsylvanian outcrops in part of southeastern Illinois: Illinois Geol. Survey Rept. Inv. 45, 31 p.
- Weller, J. M., et al., 1942, Interbasin Pennsylvanian correlations, Illinois and Iowa: Bull. Am. Assoc. Petr. Geol., v. 26, p. 1585-1593.
- White, C. D., 1907, Report on the field work in the coal districts of the State: Illinois Geol. Survey Bull. 4, p. 201-203.
- White, C. D., 1907a, Report on field work done in 1907: Illinois Geol. Survey Bull. 8, p. 268-272.
- White, C. D., 1909, Paleobotanical work in Illinois in 1908: Illinois Geol. Survey Bull. 14, p. 293-295.
- Willman, H. B., and Payne, J. N., 1942, Geology and mineral resources of the Marseilles, Ottawa, and Streator quadrangles: Illinois Geol. Survey Bull. 66, 388 p.
- Worthen, A. H., 1866, Geology of Illinois: Physical features, surface deposits, stratigraphical geology, Tertiary deposits, and Coal Measures; Subcarboniferous limestones, Devonian and Silurian systems: in Geological Survey of Illinois, v. I, (Coal Measures, p. 40-76), Geol. Survey of Illinois.
- Worthen, A. H., 1868, Coal Measures and Lower Carboniferous limestone: in Geological Survey of Illinois, v. III, p. 1-19, Geol. Survey of Illinois.
- Worthen, A. H., 1870, Fulton County: <u>in</u> Geological Survey of Illinois, v. IV, p. 90-110, Geol. Survey of Illinois.
- Worthen, A. H., 1875, Bond County: <u>in</u> Geological Survey of Illinois, v. VI, p. 128-134, Geol. Survey of Illinois.





		MATION	Carthage Is.		
SHELBURN WF.DIT.	Parker Is. Parker coal (?) Inglefield ss. Ditney coal W. Franklin Is. Maria Creek Is. Busseron ss.	LISMAN FORMA	Madisonville Is.		
ER FM.	No. VII coal U. Millersburg coal L.Millersburg coal Universal Is.		No. 14 coal Bankston Fk. Is. Anvil Rock ss.		
DUGG	No. ∑a coal	z	No. I2 coal Providence Is. No. II coal		
JRG	Alum Cave Is.	ORMATION	No. 10 coal No. 9 coal		
PETERSBURG	Houchin Creek Is. No. №a coal	Ш	No. 8b coal		
. ⊠	No. IV coal Velpen Is.	RONDAL	No. 8 coal		

												Circular 217, Plate I				
		MISSOURI	1		WESTERN	NORTHERN	S.W. ILLINOIS	5 S.W. ILLINOIS	6 S. CENTRAL	7 S.E.	8 SOUTHERN	9 EASTERN	IO NORTHERN	SOUTHERN	W. KENTUCKY	13
		(COMPOSITE	Ξ)	WES	ILLINOIS ST OF ILLINOIS	ILLINOIS BUREAU, GRUNDY,	(NORTHERN) BOND, GREENE,	(SOUTHERN)	ILLINOIS COLES, CUMBER-	ILLINOIS	ILLINOIS	ILLINOIS	INDIANA	INDIANA	(WESTERN)	W. KENTUCKY (EASTERN)
		~~ ~ .		RIV		LA SALLE, LIVING- STON COUNTIES	PIN, MADISON, MORGAN, SANG- AMON, ST.CLAIR COUNTIES		LAND, EFFING- HAM, FAYETTE, MOUTRIE, SHEL- BY COUNTIES	CLAY, EDWARDS, FRANKLIN, HAMIL- TON, JEFFERSON, MARION, RICH- LAND, WABASH, WAYNE, WHITE COUNTIES	GALLATIN, HARDIN, JOHNSON, POPE, SALINE, WILLIAM- SON COUNTIES	CLARK, CRAW- FORD, EDGAR, LAWRENCE, VERMILION COUNTIES	CLAY, FOUNTAIN, PARKE, SULLIVAN, VIGO, VERMILLION, WARREN COUNTIES	DAVIESS, GIBSON, GREEN, KNOX, PIKE, SPENCER, WARRICK COUNTIES	CHRISTIAN, HENDER- SON, HOPKINS, MUEHLENBERG, UNION, WEBSTER COUNTIES	BUTLER, EDMUN- SON, GRAYSON, HART, OHIO COUNTIES
	E	NSEE			500'*	600'	1000'	1500'	1500'	2400'	2500'	1000'				
	STAGE	WABAUI		M					Bogota cycle							
R E S	ILIAN	LECOMPTON FM OREAD FM.?							Woodbury Is. Gila Is.							
N H	VIRG	LECOMPTON FM. ?				УСГОТНЕМ			Greenup Is. Newton cycle "Effingham" beds						≯ Mt. Gilead ss.]	
N A -	ш	STRANGER FM.? IATAN LS. FM.? STANTON FM.?	Haskell Is. ? Tanganoxie ss			CYCLO			Shumway Is.						Mt. Gilead ss. Vanderburg ss. Plant Spring ss.	
SYLVA	E PEDE	STANTON FM.?	FM. ?			Little Vermilion cycle			Omega Is. Trowbridge coal Shelbyville coal	Opdyke coal (?)	Ψ.	Merom ss. Cohn cycle	Merom ss.		Dixon ss.	
Z Z	∀ ⊢	WYANDOTTE FN	M. Argentine Is			LaSalle Is.	~~~		Millersville Is.		СУСГОТН	Upper Livingston Is. Lower Livingston Is.	Livingston Is.			
02	NA	DRUM FM.	Raytown? Is			L A S	"Flat Creek" cycle = "Bunje" cycle "Sorento" cycle			Reel Is. (?)	Flannigan coal		ω			_
	$\supset z $	DENNIS FM.	Winterset Is. Bethany Falls I	GROU		Hall Is.	Shoal Creek Is.		Shoal Creek Is.	Mt.Carmel ss. Shoal Creek is,	Shoal Cr.(New Haven)Is New Haven coal		요 교 교		Carthage Is.	
	SS	HERTHA FM.	Sniabar Is. Ovid coal	SBORO		Hicks Is.	Macoupin cycle Burroughs beds Carlinville Is. Carlinville coal				_		A U G H		ATION	
	PLEASAN-		Knobtown ss.	EAN	Trivoli Is. Trivoli (No.8) coal Trivoli ss. Exline Is.	Turner Is.	No. 8 coal Trivoli ss. Scottville Is. 2/	Trivoli ss.	No. 8 coal Trivoll ss.	No. 8 coal Trivoli ss.	No. 8 coal Trivoli ss.		ъ ш 2	Parker Is. Parker coal (?) Inglefield ss.	FORM	
		HOLDENVILLE F LENAPAH FM. NOWATA FM.	Morfleet Is. Warrensburgs	2 2	Lonsdale Is.	Lonsdale is.	U.Scottville coal		W. Franklin Is.	W. Franklin Is.	W. Franklin Is. 3rdCutler Rider coal	W. Franklin Is.	W.Franklin Is. Maria Creek Is.	Ditney coal W. Franklin Is. Marla Creek Is.	Z Madisonville Is.	
			Laredo coal		Gimlet ss. Farmington sh.	Gimlet ss. Farmington sh.					2nd Cutler Rider coal "Liberty" ss. Ist Cutler Rider coal		Busseron ss.	Busseron ss.	_ _	
	d	ALTAMONT FM.	Worland Is. Lake Neosho St Amoret Is. Bandera Quarry	. ON A	Sparland (No.7) coal	Sparland (No.7) coal	Piasa Is. No. 7 coal	Cutler is. Cutler coal Galum Is.	No. 7 coal	Cutler Is. Cutler or No.7 coal	Cutier is.	Danville (No.7) coal	No. VII coal	No. VII coal U. Millersburg coal		
	GRO		Mulberry coal Coal City Is.	S P A R		SPARLA		Bankston Fk. Is.		Bankston Fk. Is.	"Cutler" ss. Bankston coal			L.Millersburg coal ?	No. 14 coal	
	ATON	PAWNEE FM.	Mine Cr. sh.	1.2	Copperas Cr. ss.	Copperas Cr. ss.	Anvil Rock ss.	Anvil Rock ss.	Anvil Rock ss.	Anvil Rock ss.	Bankston Fk. Is.		Universal Is.	Universal Is.	Bankston Fk. Is. Anvil Rock ss.	
	A R R	I ADETTE EM	Myrick Sta. Is	NO.	Sheffield sh. Brereton is. Herrin (No.6) coal	NO Brereton Is.	Herrin Is.	Herrin Is.	Herrin Is.	Jamestown Is. Jamestown coal Herrin Is.	Jamestown Is- Jamestown coal Herrin Is.			9000	No. 12 coal Providence Is.	
	2		Lexington coal Higginsville Is Flint Hill ss.	RER	Big Creek sh. Cuba ss.	Vermilionville ss.	Herrin (No. 6) coal	Herrin (No.6) coal	Herrin (No.6)coal	Herrin (No. 6) coal	Herrin (No.6) coal	Grape Cr. coal	No. ☑ coal ? 3/	No. ⊻ b coal	No. II coal	-
		FT.SCOTT FM.	Houx Is. Summit coal	8 6	Canton sh. St. David Is. Springfield(No.5)coal	Canton sh. St. David Is.	St. David Is. Springfield (No.5) coal	Briar Hill (No.5a) coal St. David Is. Harrisburg (No.5)coal	St. David Is. Harrisburg(No.5)coal	Briar Hill (No.5a) coal St. David Is. Harrisburg (No.5)coal	Briar Hill (No. 5a)coal Absher Is. Harrisburg (No.5) coal	No. 5 coal	No. 又a coal Alum Cave Is. No. 又 coal	No. Ya coal Alum Cave Is. No. Y coal	No. 10 coal	
ы ы ы	-	MULKY FM.	Blackjack Cr.Is Mulky coal Breezy Hill Is	L E	Covel conglomerate Hanover is. Summum (No.4) coal	Covel conglomerate Hanover Is. Summum(No.4) coal	Hanover Is. Summum (No. 4) coal	No. 4 coal	No. 4 coal	No. 4 coal	No. 4 coal	No. 4 coal	の 一 と Houchin Creek Is. 山 No.区 a coal	Houchin Creek Is.	O R R	
N H R		LAGONDA FM. BEVIER FM.	Lagonda ss. Bevier coal	O N D A	Kerton Creek coal Pleasantview ss. Purington sh.	Pleasantview ss.	Roodhouse coal				No. 4	100.4 0001	> No.1x a coal	No. ⊠a coal	No. 8b coal	
NA	<u>ی</u> ا	VERDIGRIS FM.	Wheeler coal Ardmore is.	A R B ERPOOL	Oak Grove beds Jake Creek sh. Francis Creek sh.	Francis Creek sh.				No. 2a coal	No. 2a coal	No, 2a coal	No. IV coal U Velpen is.	No. IV coal Velpen Is.	No, 8 coal	
Z		CROWEBURG FM.	Croweburg coal		Colchester (No.2) coal Browning ss.	La Salle (No.2) coal "Utica" clay "Ottawa" clay	Colchester (No.2) coal	Colchester (No.2) coal	No. 2 coal	No. 2 coal	No. 2 coal	No.2 coal	ン Velpen (Ⅲa) coal ス	∠ Velpen (Шa) coal	Schultztown coal	
1 0	GROL			H ABINGDON	Isabel ss.	"Goose Lake" clay			Palzo ss.	Palzo ss.	Palzo ss.				Sebree ss.	
Ф 0 П 5	S		Mineral coal ?	REENBUSI	Greenbush cogl	Undifferentiated TRADEWATER and possibly	Cheltenham fire clay		1		KOVEN	Indiana III coal	No. III coal	No. III coal		
ш с	1	SCAMMON FM.	Scammon coal	WILEY G	Wiley coal	CASEYVILLE ss.		Davis coal		DeKoven coal Davis coal	DeKoven coal 4/ Davis coal	DeKoven coal Davis coal		Σ L L	De Koven (No.7) coal	
1001		TEBO FM.	Tiawah Is. (=Loutre Is.) Tebo coal	SEAHORNE	Seahorne Is.		Seahorne Is.	Seahorne Is. Vergennes ss.			COLBE			0 1 0 1		
Σ		WEIR FM.	Weir-Pittsburgcoal Cheltenham clay of E. Mo.	O U P	U. DeLong coal		!		TRADEWATER gp. (undifferentiated)	Stonefort Is. Stonefort coal	Stonefort Is. Stonefort coal	Stonefort Is.		7 1 0	Z O	
			<u> </u>	R GR	M.DeLong coal						Bald Hill coal	TRADEWATER gp. (undifferentiated)	Silverwood coal	No. II coal	ORMAT	
	-			WATE						-	Curlew coal		w		Curlew ss.	Mining City coal
	В	SEVILLE FM.	Seville Is. Bluejacket coal	R A D E	Seville Is. Rock Island (No.1) coal		Litchfield coal(?)	Murphysboro coal (?)	Assumption coal (?)	Curlew is.	Curlew Is.		Minshall Is.	Minshall Is.	Curlew Is.	
	GROU	BLUEJACKET FM.	Bluejacket ss.	T CR.	Bernadotte ss.	•		Upper part of 5/	Assumption court(:)		New Burnside coal Murray Bluff ss.		Minshall coal	Minshall coal	← Empire coal Empire coal	Mannington coal Aberdeen ss.
	E B S	DRY WOOD FM.	Dry Wood coal	POPE	Pope Creek coal Pope Creek ss.	?~~		Ava sh.		L.TRADEWATER gp.	Delwood coal Delwood ss.		U. Block coal	U. Block coal	Ice House	
	X	ROWE FM.	Rowe coal	TARTER	Tarter coal			Boskydell ss.			Willis coal		L. Block coal	L. Block coal	Bell coal	
		WARNER FM. RIVERTON FM.	Warner ss.	BABYLON	Babylon coal Babylon ss. "Sub-Babylon" coal		Babylon ss.	<u> </u>	? 6/	? 6/	Grindstaff ss.	? 5/	Mansfield ss.	Ferdinand Is.(?)	Grindstaff ss.	
N A								5/ Makanda ss. (Lower)	CASEYVILLE gp. (undifferentiated)	CASEYVILLE gp. (undifferentiated)	Reynoldsburg coal	CASEYVILLE gp. (undifferentiated)		Fulda Is. (?) Cannelton coal	No. la coal	
NIAN				GROUP					~		DO C K			Mansfield ss.	U. Caseyville congl.	Bee Spring ss.
PENNSYLV/				VILLE				Drury sh.		~~~	Battery Rock coal Sellers Is.		3	S S S S S S S S S S S S S S S S S S S	CAS	Main Nolin coal
O W A N				CASEY				Wayside coal Wayside ss.			Battery Rock ss.			Σ V		<pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre></pre></pre>
0 W E		MISSISSI	IPPIAN			SILURIAN		~~~			Lusk sh.		MISSISSIPPIAN	No. I a coal		
- Σ		ORDOVIC	CIAN		MISSISSIPPIAN	ORDOVICIAN	MISSISSIPPIAN	MISSISSIPPIAN	MISSISSIPPIAN	MISSISSIPPIAN	MISSISSIPPIAN	MISSISSIPPIAN	DEVONIAN	No. I coal MISSISSIPPIAN	MISSISSIPPIAN	MISSISSIPPIAN
01						s "Davie"				1						

Only named units ar stratigraphically significant beds are included. In almost every case there are varying thicknesses of intervening beds.

* Approximate composite thickness of Pennsylvanian.

† Italicized names are infarmal.

The McWain sandstane is younger than Macaupin but It is unclear whether it is part of the Shaal Creek ar a higher cycle.

The Collinsville Is. of St.Clair county is believed to be equivalent to the Scattville Is.

3. Same daubt exists an the precise carrelation of the section abave Indiana \(\tilde{V} \) coal with eastern Illinais section. The Indiana \(\tilde{V} \) here referred to was formerly called Indiana \(\tilde{V} \) af the Clinton coal field of N.Ind.

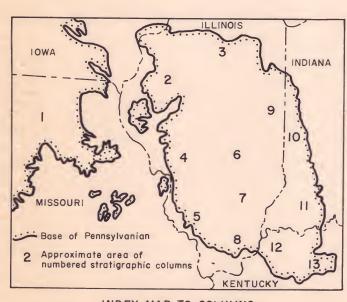
4. The name "Colbert" replaces "Davis", farmerly used for cyclothem.

5. The Makanda farmation as originally defined extended from the tap of the Drury formation to the base of the Murphysbora caal and includes several well-defined cycles naw given individual names elsewhere. The Makanda ss. (Lawer) refers only ta the massive lower member as expased in Giant City State Park, near Makanda.

The identification of the Caseyville-Tradewater boundary in the sub-surface is questionable.

CORRELATION CHART OF CLASSIFICATION OF THE PENNSYLVANIAN ROCKS OF ILLINOIS AS OF 1956

> compiled by Raymond Siever



INDEX MAP TO COLUMNS





CIRCULAR 217

ILLINOIS STATE GEOLOGICAL SURVEY

URBANA

