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RHYTHMS IN UPPER PENNSYLVANIAN CYCLOTHEMS

*By J. Marvin Weller*

THICKNESS OF GLACIAL DRIFT IN DU PAGE COUNTY,  
ILLINOIS

*By A. C. Mason*

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URBANA, ILLINOIS

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# RHYTHMS IN UPPER PENNSYLVANIAN CYCLOTHEMS<sup>1</sup>

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The concept of cyclothems is familiar to most geologists who have been concerned with the stratigraphy of the Pennsylvanian system in Illinois during recent years. The characteristic repetitions of different types of strata that make up a cyclothem are not, however, the only rhythms occurring in this system. In the McLeansboro group, particularly, complete cyclothems of different types succeed one another in a definite order that is repeated at least three times. These major rhythms or cycles of cyclothems, because of their similarity to one another, have caused confusion in the field that has undoubtedly resulted in miscorrelations at some places where outcrops are not abundant or adequately connected. When they are properly understood and worked out, however, they may furnish the basis for a new classification of the Illinois Pennsylvanian in which the cyclothems are joined into groups and series that are of more significance stratigraphically and historically than the ones now recognized. It is also possible that these larger rhythms may be the long-sought key that will solve some of the perplexing problems of interbasin correlation.

The succession of cyclothems that are now recognized in the McLeansboro is as shown in table I.

These cyclothems are arranged in six groups. The lower two are incomplete and more or less doubtful, but above the base of the Trivoli cyclothem, which is the boundary between the Des Moines and Missouri series of the Midcontinent region, the repetition of four general types of cyclothems is conspicuous. The highest group is represented only by a single basal cyclothem.

(a) The basal cyclothems of these groups are well developed. They possess prominent basal sandstones that appear to be separated from underlying beds by unconformities that at least locally are more than ordinarily well marked. Coal

is generally present and may be locally workable on a small scale. Black sheety shale is conspicuously present at many places and is both underlain and overlain by lenticular, dark colored, and very impure marine limestone of similar lithology. The upper gray shale member of these cyclothems is generally thick.

(b) Cyclothems of the second type are very imperfect or even rudimentary and their presence is generally indicated only by a more or less persistent horizon of marine fossils that may be limestone (Collinsville), sandstone (Collinsville, Upper Macoupin), or "ironstone" (Upper Newton).

(c) Cyclothems of the third type are, like the first, well developed but their characteristics are quite different. Good basal sandstones are present. "Freshwater" limestones are rare and coal seams are thin or absent. Black slaty shale occurs in the Shoal Creek cyclothem but is missing in the LaSalle and Omega cyclothems. The upper marine limestones of these cyclothems are light colored,

TABLE I

<i>Name of Cyclothem</i>	<i>Type</i>
23 Shumway .....	a
22 Woodbury .....	d
21 Gila .....	d
20 Omega or Greenup.....	c
19 Upper Newton .....	b
18 Newton .....	a
17 Upper Bogota .....	d
16 Lower Bogota .....	d
15 Cohn .....	d
14 Upper Livingston "La Salle".....	c
13 Lower Livingston "La Salle".....	c
12 Upper Macoupin .....	b
11 Macoupin .....	a
10 Flannigan .....	d
9 Shoal Creek .....	c
8 Collinsville .....	b
7 Trivoli .....	a
6 Exline .....	d
5 Gimlet .....	c
4 Sparland .....	a?
3 Bankston Fork .....	d?
2 Jamestown .....	c?
1 Brereton (part) .....	c

<sup>1</sup> Reprinted from pages 145-146 of the *Transactions*.

comparatively pure, and massive. They have been quarried at many places and are probably the most conspicuous beds in the upper part of the Pennsylvanian system in Illinois. The upper gray shale members are generally of only average thickness.

(d) Cyclothem members of the last type are thin and incomplete and their marine members commonly contain brackish-water rather than truly marine fossils. On the whole they are difficult to recognize because of their variability and lack of distinguishing characters. Some of these cyclothem members include very prominent "fresh-water" limestones of various kinds. Some have well developed black slaty shale members that locally attain unusual thickness. Coals are generally thin or absent although in one area coal in the Flannigan is mined in a small way.

Truly marine limestones are thin or absent, and the commonest fossils are *Estheria* and ostracodes in the black shales.

Of the three recognized groups of cyclothem members above the Trivoli, the first is the simplest with only one cyclothem of each type and the second is the most complex with two cyclothem members of the third type and at least three of the fourth.

Field work suggests that the Omega limestone of Marion County and the Greenup limestone of Cumberland County are equivalent but the fusulines occurring in these beds are different, and those of the Greenup are believed by Dunbar and Henbest to be much younger. If these limestones have been miscorrelated, a fourth group of cyclothem members, including the Omega, is probably present between the Upper Bogota and Newton cyclothem members.

THICKNESS OF GLACIAL DRIFT IN DU PAGE COUNTY,  
ILLINOIS<sup>1</sup>

A. C. MASON

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A map showing the thickness of glacial drift in Du Page County has been prepared as an aid to the State Department of Public Health in their enforcement of water-supply and sewage-disposal regulations in those regions in which limestone and dolomite constitute the uppermost bedrock and the glacial drift is thin or absent. Water moving underground in limestone and dolomite may receive little or no filtration, and water from the surface recharging these formations is likely to be inadequately filtered unless it has passed through a sufficient thickness of glacial drift. Where less than 50 feet of glacial drift overlies limestone or dolomite from which municipal water supplies are obtained, the Department recommends continuous and adequate chlorination, or, under certain conditions, purification and chlorination. Where the drift is less than 30 feet thick, the Department recommends chlorination of private supplies. In addition, certain local sanitary units, such as township health boards, may permit no private septic-tank sewage disposal unless there is a minimum thickness of 30 feet of glacial drift to filter the effluent.

Du Page County is located directly west of Cook County and its eastern boundary is less than 5 miles from the western city limits of Chicago. It is a suburban region where water-supply and sewage-disposal problems are common, and it is the only county in Illinois in which all the bedrock at the surface or directly underlying the glacial drift is limestone and dolomite.

The thickness of the glacial drift is the resultant of the elevation of the bedrock surface, the amount of glacial deposition, and the extent of subsequent stream dissection. A contour map of the bedrock surface of Du Page County, based on data obtained from the logs of more than 600 wells in the county, shows that the bedrock surface in general slopes from an

elevation of about 685 feet above sea-level in the northwest part of the county to an elevation of about 560 feet in the southeast corner where a trench in the bedrock has been cut by the Des Plaines River. The preglacial divide between east and southwest drainage appears to have crossed Du Page County from northwest to southeast, 10 to 15 miles west of the present drainage divide. Buried bedrock hills lie along the former drainage divide.

The present ground surface has a general slope towards the southeast, from an elevation of about 840 feet above sea-level near the northwest corner of the county to an elevation of about 590 feet in the southeast corner in the valley trench cut by the Des Plaines River. Standing about 50 to 90 feet above the general surface are a series of arcuate, somewhat discontinuous, morainic ridges trending north to south-southeast. The greater portion of the county is covered by the Valparaiso morainic system which on its west side includes the West Chicago moraine. Beginning near the west border of the county, the ground surface rises to the west towards Minooka Ridge. In the northeast corner of the county, the Tinley moraine forms a prominent ridge. The rest of the county is mostly covered by ground-moraine and outwash plains.

The map showing the average thickness of glacial drift in Du Page County has isopachous intervals of 50 feet, with inclusion of the 30-foot isopach because of its importance for sanitary engineering considerations. The relative accuracy of the map varies in accordance with the amount of data obtained, which in general is greater in the built-up areas. The thickness of the glacial drift varies from a maximum of about 175 feet in the north part of the county to nothing where bedrock crops out in small areas in the south and east parts of the county. The thick-

<sup>1</sup> Reprinted from pages 136-137 of the *Transactions*.

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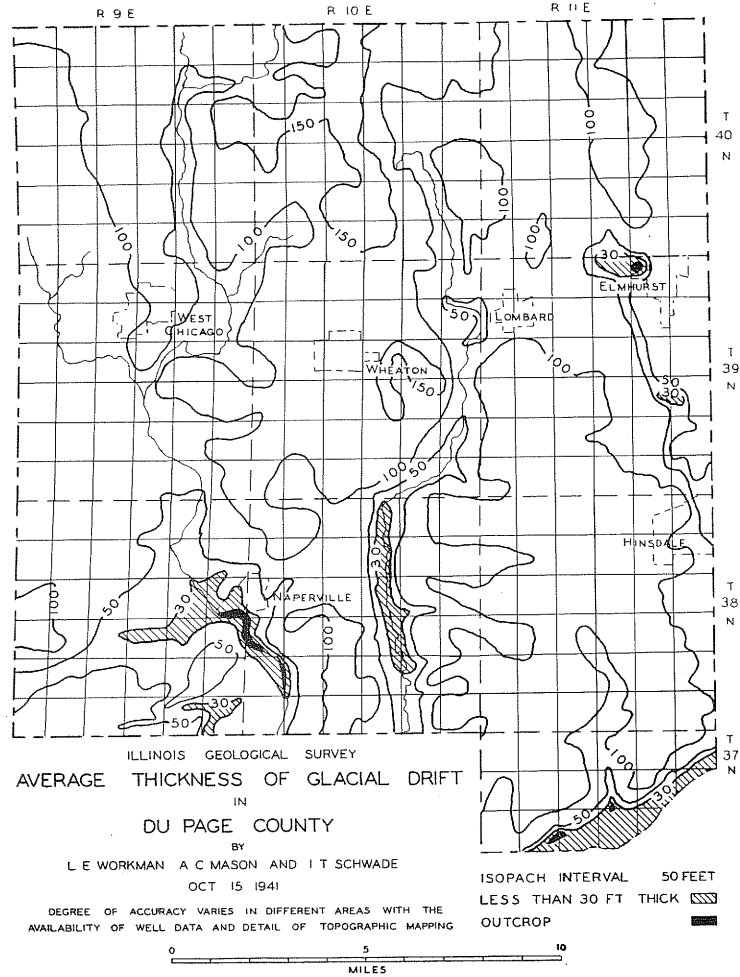
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est drift is found in the north part of the county beneath the highest portions of the West Chicago moraine and the undifferentiated Valparaiso moraine. The drift is less than 30 feet thick where streams have cut into thin ground moraine overlying bedrock hills. These areas are in the vicinity of the West Branch Du Page River near Naperville, the East Branch Du Page River near Lisle, and Salt Creek near and south of Elm-

hurst. Bedrock is exposed near Naperville and in a quarry at Elmhurst. The drift is also less than 30 feet thick in Des Plaines River valley, where bedrock is exposed in quarries and at points along the hillside.

In approximately 90 per cent of the 345 square miles of area of Du Page County the drift is more than 50 feet thick, and in approximately half the county the drift is more than 100 feet thick.



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