

RHYTHMS IN UPPER PENNSYLVANIAN CYCLOTHEMS¹

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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. "Fresh-water" 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

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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) Cyclothemms 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 cyclothemms 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 cyclothemms above the Trivoli, the first is the simplest with only one cyclothem of each type and the second is the most complex with two cyclothemms 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 cyclothemms, including the Omega, is probably present between the Upper Bogota and Newton cyclothemms.
