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ILLINOIS STATE ACADEMY OF SCIENCE  
GEOLOGY AND BOTANY FIELD TRIP

GUIDE LEAFLET

CHARLESTON AREA

April 29, 1961

COLES AND CLARK COUNTIES

OAKLAND, TOLEDO, CASEY,  
AND KANSAS QUADRANGLES




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Guide leaflet and map prepared by  
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Guide Leaflet No. 61



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Illinois Academy of Science

CHARLESTON FIELD TRIP

- 0.0 0.0 Caravan assembles at parking lot of Eastern Illinois University Gymnasium and Science Building, heading north.
- 0.2 0.2 TRAFFIC LIGHT. Obey signal. Turn right on Lincoln Street.
- 0.2 0.4 TRAFFIC LIGHT. Obey signal. Continue straight ahead.
- 0.6 1.0 TRAFFIC LIGHT. Obey signal. Junction Lincoln Street and Highway 130. Turn left on Highway 130. Charleston Community High School on left.
- 0.9 1.9 STOP. Junction Highway 16. Turn right (east).
- 0.9 2.8 Top of kame at south end of esker that trends along west side of the Embarrass River.
- 0.5 3.3 Slow. Turn left (north).
- 0.3 3.6 Slow. Railroad. EXTREME CAUTION.
- 0.3 3.9 The house on the left is located on top of a kame.
- 0.2 4.1 Low esker on right.
- 0.1 4.2 T-road east.
- 0.2 4.4 Crossing small esker.
- 0.4 4.8 Slow. Turn right (east).
- 0.8 5.6 T-road north. Continue straight ahead.
- 0.1 5.7 T-road south. Continue ahead.
- 0.4 6.1 Crossing esker.
- 0.1 6.2 Descending into Embarrass River Valley.
- 0.1 6.3 Limestone quarry and sand and gravel pit on right.
- 0.0 6.3 Bridge over Embarrass River.
- 0.1 6.4 Millersville limestone exposed in abandoned pit on left.
- 0.5 6.9 STOP 1. Humphrey's Quarry.

The following section of Pleistocene glacial deposits and Pennsylvanian



bedrock exposed in the northeast wall of the quarry is:

		Feet
Wisconsinan	Shelbyville	Sand and gravel concentrated along esker on the upland near valley 20±
		Till, oxidized, leached, and jointed in upper part, lower part gray, calcareous 10-15
		Sand and gravel, brown, oxidized 5+
		Till, gray, calcareous 10-15
		Till, silt and fine sand, dark gray to black, locally peaty 2- 3
		Till, gray, calcareous; irregular bottom surface 10+
	Pro Shelbyville	Gravel, oxidized and iron stained, containing armored till balls 5-15
Illinoian	Shelbyville	Soil, (Sangamonian), colluvial (till wash material), sandy, humic 2½
		Till (Illinoian), calcareous with sand lenses 2½
		Limestone (Livingston), light gray, fossiliferous 3- 4
		Shale, green with limestone lenses and nodules, fossiliferous 5- 8
		Limestone, gray, massively bedded, fossiliferous 6
		Shale, green 1
		Shale, black ½- 1
		Limestone, dark gray, crinoidal, massively bedded 5- 6
Pennsylvanian		

This exposure of Pleistocene Epoch, or Epoch of Ice Ages, and of Pennsylvanian Period deposits is unequalled anywhere else in this area. The Pleistocene sequence contains records of two stages of glaciation, the Illinoian and Wisconsinan; the development of an interglacial soil, the Sangamonian; and oscillations of the glaciers during the Shelbyville substage of the Wisconsinan.

The Pleistocene Epoch is our most recent division of geologic time and is believed to have been less than one million years in length. Four stages of glaciation occurred in the northern hemisphere during this epoch. The area of Illinois glaciated during each stage is shown on the accompanying diagram in the order of age. Note that the Charleston region was glaciated during the three youngest stages. There is no record of Kansan glaciation at this stop, but Kansan deposits have been identified a few miles to the south.

Approximately eight miles to the south is the Shelbyville end moraine, the terminal moraine of the last, or Wisconsinan, stage in Illinois. The Shelbyville is triple-crested in this area. The south portion of Charleston is located in the inner crest, and Fox Ridge State Park is located on the outer crest. The three crests and the sequence exposed at this stop suggest that the Shelbyville end moraine was not formed during one stand of the ice. Instead, there appears to have been two withdrawals and readvances of the ice corresponding to the middle and inner crests. The peaty zone and the stratified sand and gravel separating the Shelbyville till support these events and relationships.





The sand and gravel resting on the Sangamon soil is thought to be pro-Shelbyville outwash deposited in advance of the Shelbyville glaciation.

On the upland on the east and west sides of the Embarrass River are sinuous ridges composed of stratified drift (sand and gravel) called eskers. The most common mode of origin of eskers appears to have been in tunnels in or at the base of the glacier during the late phase of deglaciation. The sinuous characteristic of the eskers developed here is quite typical. Some eskers have tributaries resembling a stream pattern.

The Millersville (Livingston) Limestone is the uppermost named member of the Bond Formation, McLeansboro Group of Pennsylvanian Strata in Illinois. It is correlatable with the Livingston Limestone of eastern Illinois and Indiana, and with the LaSalle Limestone of northern Illinois.

At its type outcrop in Sec. 28, T. 1 N., R. 1 W., Christian County, only about 16 feet of the lower part are exposed. In drill holes in western Coles County it is as much as 50 feet thick, characterized by a 7 or 8 foot upper bench, separated by about 6 feet of shale from a thicker lower part. Towards the south part of Illinois it tends to become shaly and silty and may be represented by two or more thin benches of limestone separated by shale and siltstone.

The limestone is very fossiliferous. The spoil banks are the best collecting spots.

- 0.4 7.3 Turn right (south).
- 0.2 7.5 The stable about a quarter of a mile to the right is located on an esker.
- 0.2 7.7 EXTREME CAUTION. Railroad. STOP. Highway 16, turn right.
- 0.5 8.2 Descending into Embarrass River Valley.
- 0.3 8.5 Bridge over Embarrass River.
- 1.7 10.2 T-road north.
- 0.5 10.7 Again crossing kame.
- 0.9 11.6 Slow. Junction Highway 130. Turn left on 130.
- 0.3 11.9 Inner margin of third ridge of the Shelbyville moraine.
- 0.6 12.5 TRAFFIC LIGHT. Obey signal. Continue straight ahead.
- 0.8 13.3 Outer margin of innermost third ridge of the Shelbyville moraine.
- 0.9 14.2 Turn left on Highway 130.
- 0.3 14.5 Beginning descent into Embarrass Valley.
- 0.3 14.8 Excellent view of Embarrass Valley on the right.





- 0.4 15.2 Bridge over Embarrass River.
- 1.3 16.5 Beginning ascent of the back slope of the middle ridge of the Shelbyville moraine.
- 0.1 16.6 Slow. Turn left on Hutton-Westfield Road.
- 0.7 17.3 Oak and hickory grove on the right.
- 0.7 18.0 Turn left on road to Westfield. For the next four miles our route will be on, or just south of, the middle ridge of the Shelbyville moraine.
- 1.4 19.4 Crest of the second ridge of the Shelbyville moraine.
- 1.1 20.5 Crossroad.
- 1.3 21.8 The outer slope of the second crest of the Shelbyville moraine affords a good view of the outer ridge to the south. The point of the outer ridge to the south is at an interlobate angle.
- 1.0 22.8 Back-slope of the outer crest of the Shelbyville end moraine to the right.
- 0.5 23.3 Turn left.
- 0.1 23.4 STOP 2. Kame on outer crest of Shelbyville end moraine. Excellent view of frontal slope to the south.

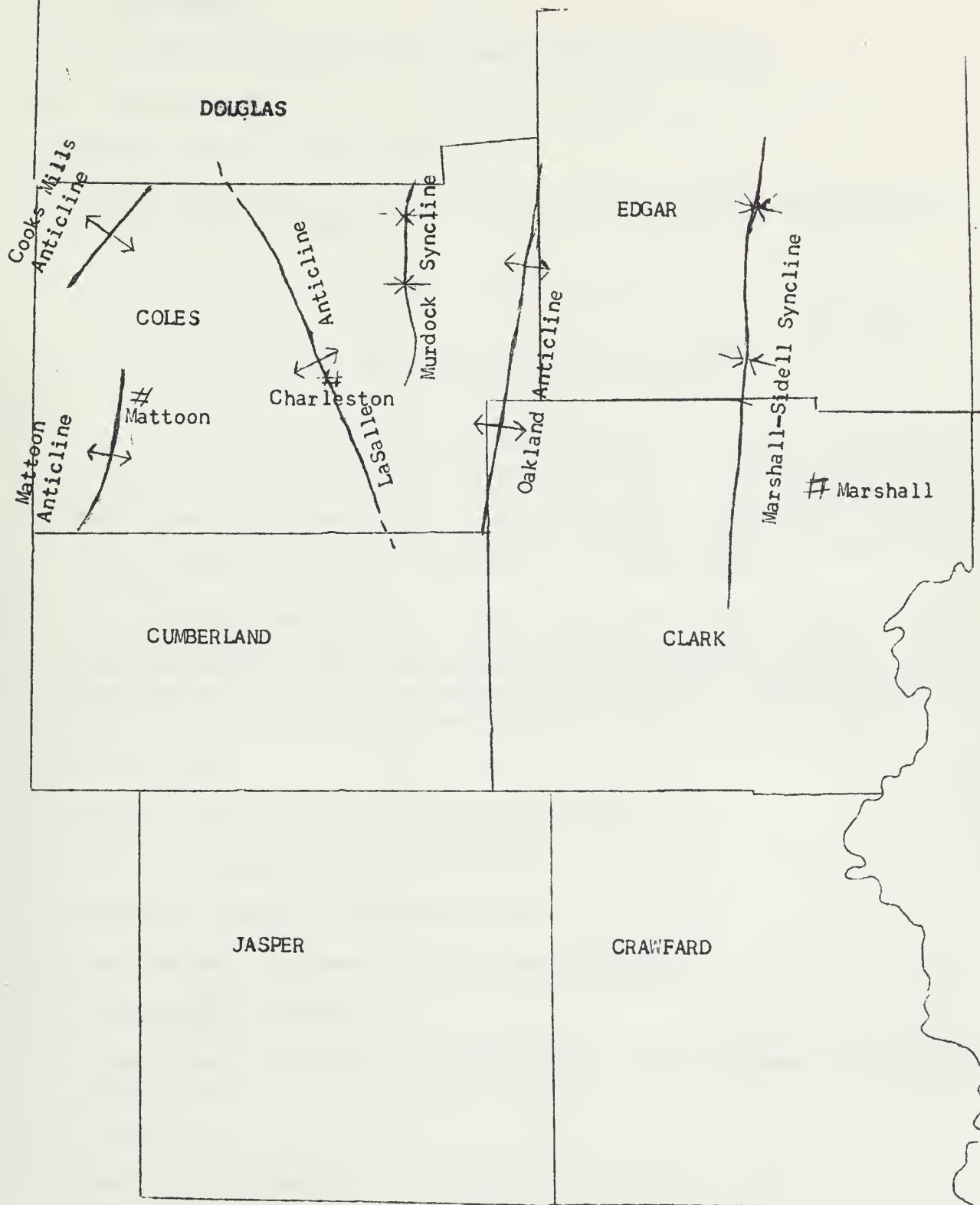
From this point the general crest (760 feet) of the Shelbyville end moraine stands about 120 feet above the outwash plain to the south. The small kame situated here on the crest is approximately 20 feet (780+) above the general crest of the outer ridge. At this location the moraine marks a re-entrant angle in the margin of the glacier.

Approximately one mile to the north the middle crest of the moraine stands out boldly. The average elevation of the middle crest is also approximately 760 feet. Here where the outer ridge makes a re-entrant angle, the middle ridge has overridden the back slope of the outer ridge. The inner or third crest is located approximately one and one-half miles north of the middle crest but cannot be seen from this point.

- 0.1 23.5 Turn right. Second crest of the Shelbyville moraine stands out prominently to the north.
- 0.6 24.1 Entering Westfield.
- 0.2 24.3 Turn left.
- 0.1 24.4 STOP 3. Lunch. Westfield High School. Discussion of Major Structural Features (features shown in the accompanying illustration).
- 0.1 24.5 Turn right.
- 0.1 24.6 STOP. Turn left.
- 0.2 24.8 Turn right, Westfield Business District.



MAJOR STRUCTURAL FEATURES OF THE CHARLESTON AREA





- 0.5 25.3 STOP. Highway 49. Continue ahead.
- 0.2 25.5 Note gravelly nature of till.
- 0.1 25.6 Kame on right.
- 0.6 26.2 Note kame on right with steep slope on the north side.
- 0.2 26.4 T-road north.
- 0.5 26.9 Terrace on north side of road.
- 0.3 27.2 STOP 4. Exposure of Shelbyville Till and Peorian Loess, and Discussion of Sub-glacial Channel.

The section exposed is as follows:

Peorian loess	3- 4 feet
Shelbyville till with pockets of gravel containing large boulders (Note colluvium on north side of exposure where surface slopes toward valley.)	10-15 feet

The valley of the North Fork of the Embarrass River and its tributaries served as a sub-glacial channel when the Shelbyville glacier stood at the position of the outer crest of the moraine. The sub-glacial channel drained water that collected on the sub-glacial floor near the margin of the ice. It also served as an outlet for post-glacial drainage when the ice margin stood at the position of the second crest.

The approximate pattern of the sub-glacial drainage system is shown on the topographic map by the distribution of the present streams. Note that the present tributaries do not cross the middle crest of the moraine and that two of the major tributaries trend east-west along the back slope of the moraine. Fine gravel and sand are present along the valley.

- 0.3 27.5 T-road north.
- 0.1 27.6 Bridge over North Fork of the Embarrass River.
- 0.1 27.7 Exposure of gravelly Shelbyville till.
- 0.2 27.9 Exposure of gravelly Shelbyville till.
- 0.1 28.0 Note the swell and swale nature of the topography.
- 0.5 28.5 Gravelly till on right.
- 0.1 28.6 Crest of the outer ridge of the Shelbyville. Two low kames on right side of road.
- 0.2 28.8 T-road north.
- 0.3 29.1 Note the gentle descent of the slope to the south.
- 0.5 29.6 Crossroad. Margin of frontal slope of Shelbyville moraine.





- 0.4 30.0 The Shelbyville moraine trends to the northeast at this point.
- 0.8 30.8 Section along highway west of Doyle's Creek (auxiliary stop if time is available):
- Peorian loess ... brownish yellow, 3 feet  
Farmdale loess ... chocolate colored, 15 inches  
Illinoian till ... deeply leached and oxidized with  
                                gravel concentrate at top
- 0.2 31.0 Bridge over Doyle's Creek.
- 0.9 31.9 Note Sycamore trees on right. Sycamores are more or less confined to the valleys in this region.
- 0.7 32.6 Slope of the Illinoian till plain in this region is to the south. This might possibly be the result of a fine sheet of outwash from the Shelbyville moraine to the north.
- 0.5 33.1 Shelbyville moraine stands out boldly on left (north).
- 0.1 33.2 Note very gentle relief of the Illinoian till plain in this vicinity.
- 0.2 33.4 CAUTION. Crossroad.
- 2.2 35.6 Glacial till exposed on right and left. Note extreme slumping in the banks of the road cut.
- 0.1 35.7 Bridge over Mill Creek.
- 0.4 36.1 Turn left. Village of Dolson just ahead.
- 0.3 36.4 Turn right (east).
- 0.5 36.9 Note extreme flatness of Illinoian till plain.
- 1.2 38.1 Turn left.
- 0.0 38.1 Note outcrop of Pennsylvanian sandstone in ditch on left.
- 0.4 38.5 STOP 5. Rocky Branch Hollow

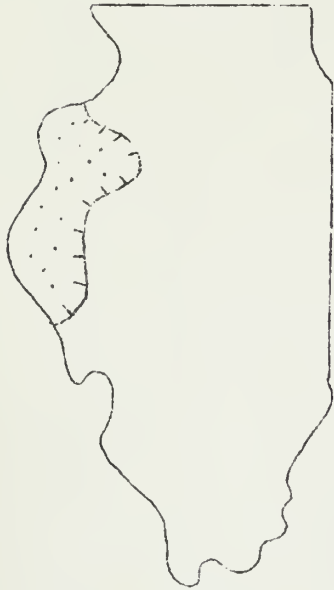
Along the course of Rocky Branch is an excellent exposure of a sandstone cutting into an underlying cyclothem. In the small tributary west of the road, an incomplete cyclothem consisting of sandstone, clay shale (underclay), coal (4"), dark gray to black soft shale, and black sheety shale is exposed. In addition, the basal sandstone of an overlying cyclothem is exposed. Crossing to the east side of the road, the upper sandstone is observed cutting into the basal sandstone of the lower cyclothem, entirely cutting out the intervening members.

The lower sandstone is fine grained and very micaceous, while the upper sandstone is medium to coarse grained, massive and contains only scattered amounts of mica. The contact between the lower and upper sandstone is irregular and numerous coaly streaks occur near the contact. A pebble conglomerate is present in some places at the base of the upper sandstone which reaches a thickness of more than 50 feet in the area.



The Rocky Branch outcrops occur nearly on the axis of the Marshall-Sidell Syncline. The coal (correlation unknown) is believed to occur about 50 feet above the Livingston Limestone. The Livingston outcrops about three miles to the west and to the east in the vicinity of Marshall.

#### STAGES OF GLACIATION IN ILLINOIS



NEBRASKAN



KANSAN



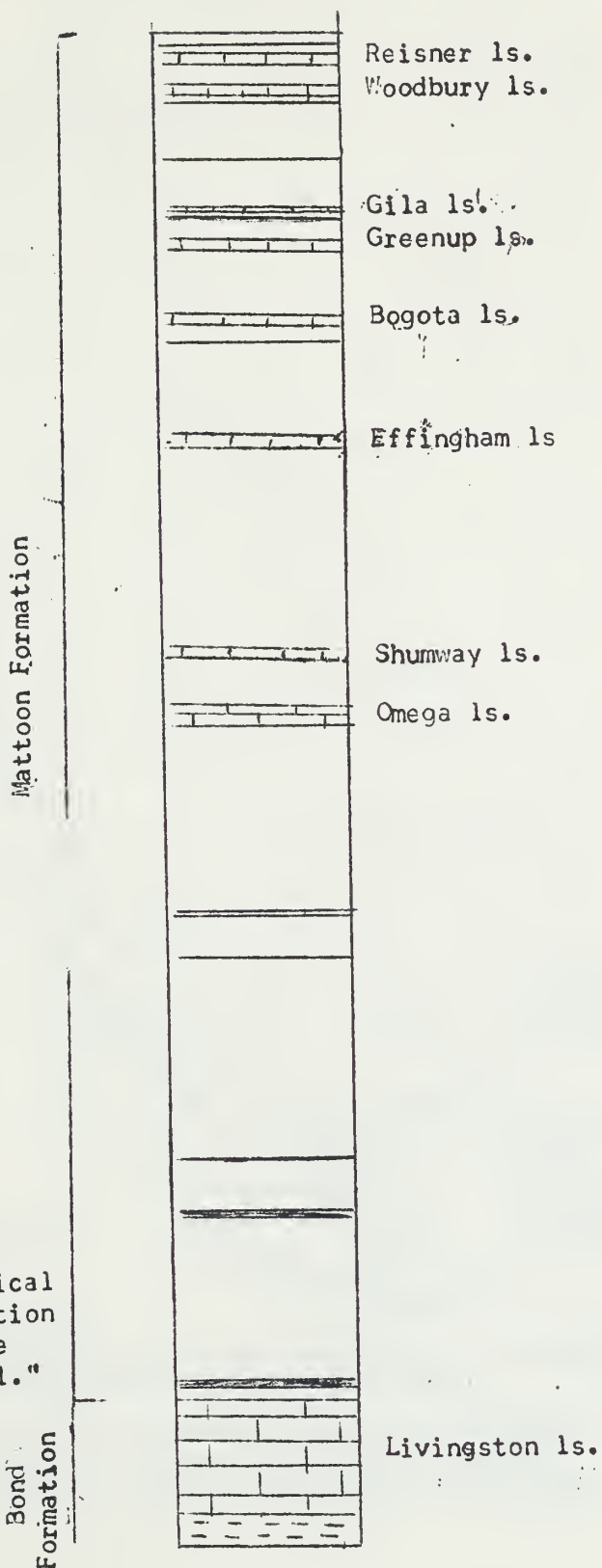
ILLINOIAN



WISCONSINAN



Generalized Section of Upper Pennsylvanian  
Rocks in Southeastern Illinois



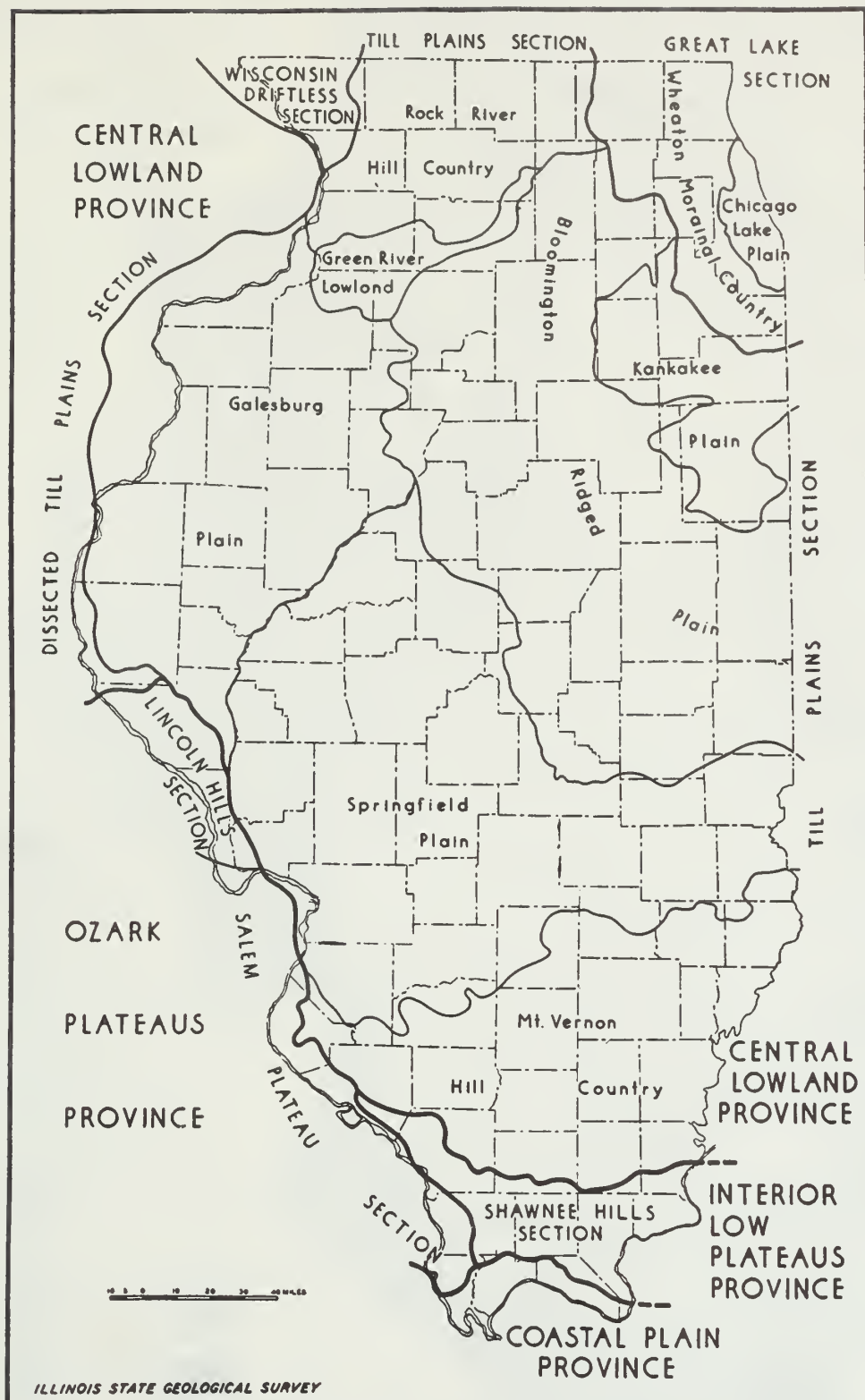
From Illinois State Geological  
Survey Report of Investigation  
214, "Classification of the  
Pennsylvanian Strata of Ill."  
1960.

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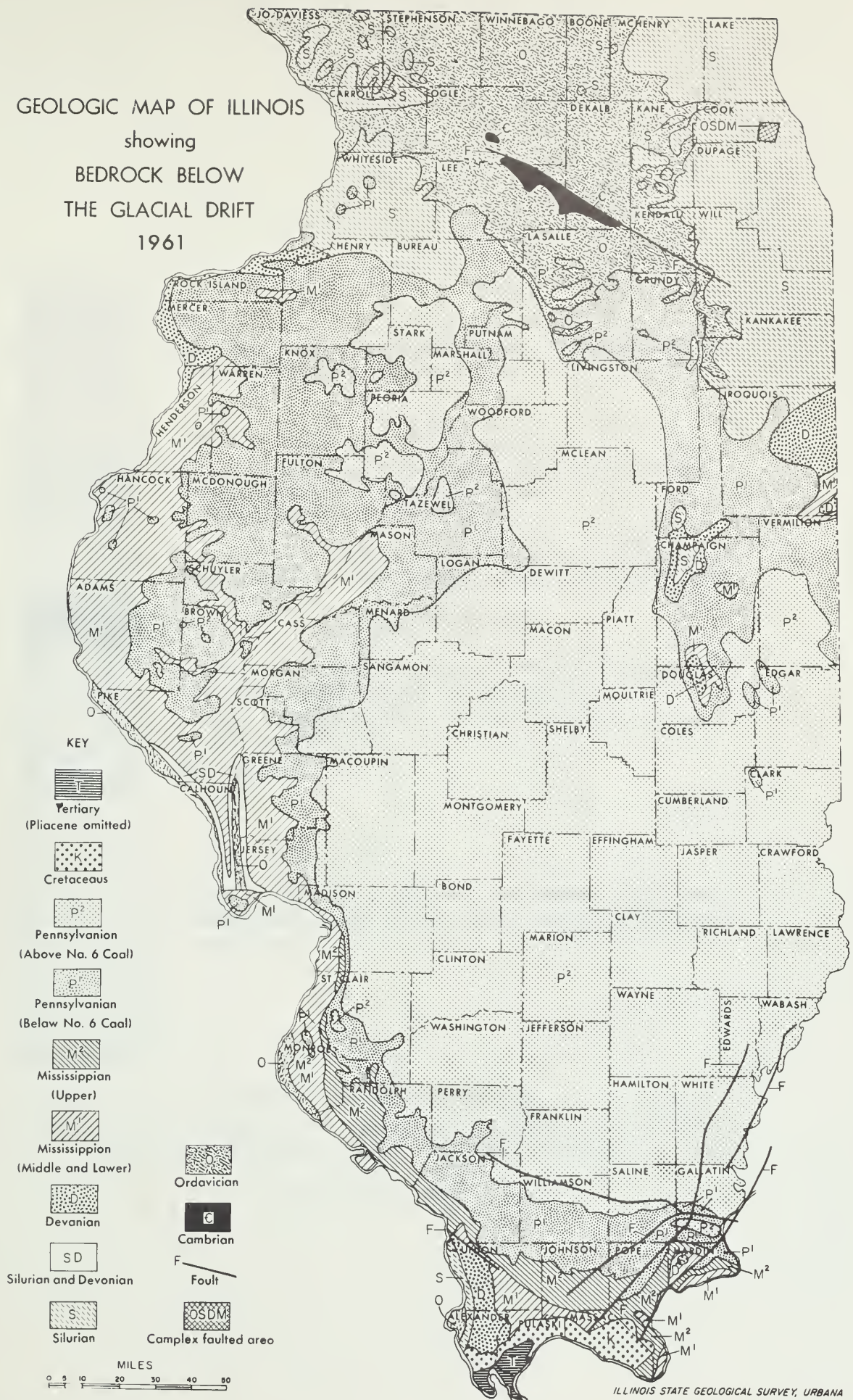
### PHYSIOGRAPHIC DIVISIONS OF ILLINOIS

(Reprinted from Illinois State Geological Survey Report of Investigations 129, "Physiographic Divisions of Illinois," by M. M. Leighton, George E. Ekblaw, and Leland Horberg)



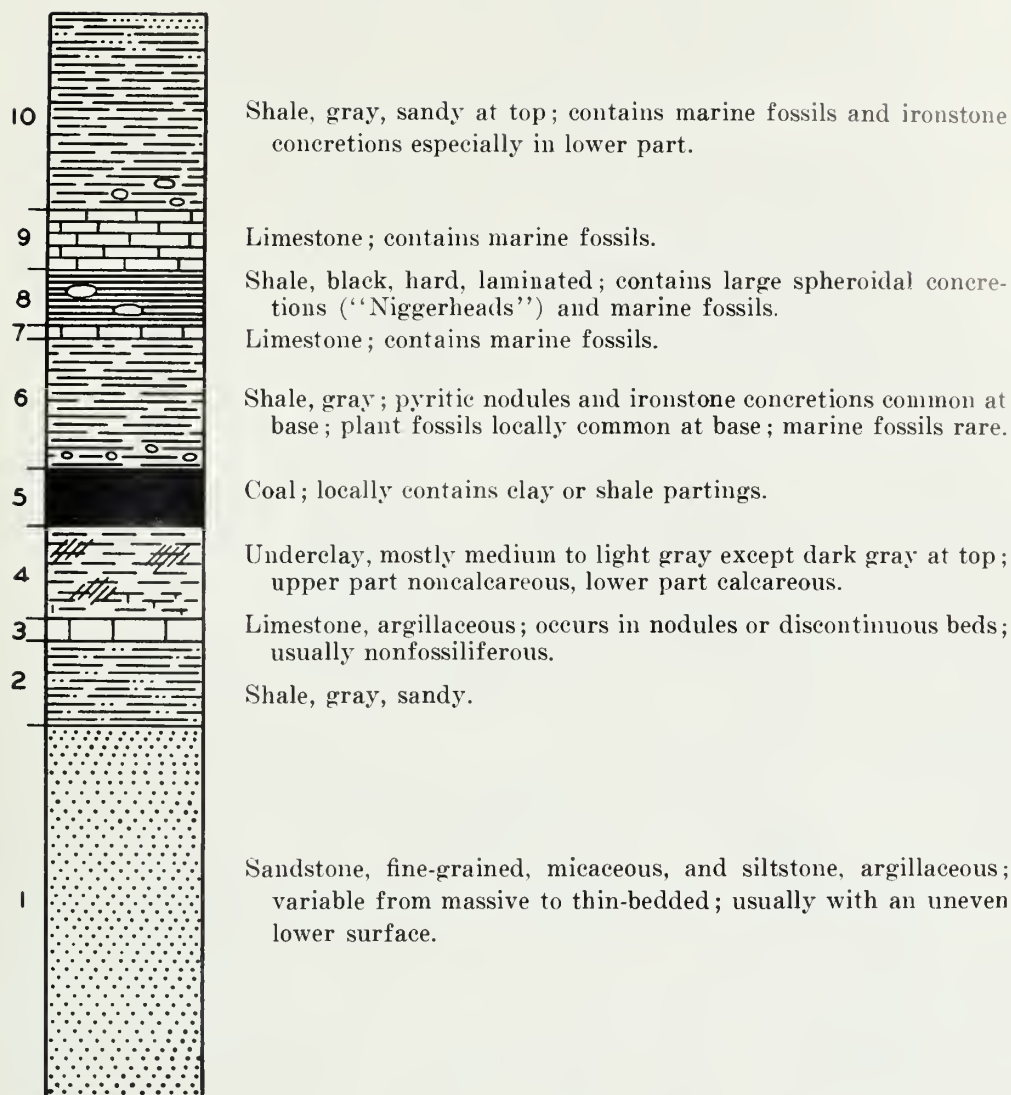
THE  
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WASHINGTON, D. C.

GEOLOGIC MAP OF ILLINOIS  
showing  
BEDROCK BELOW  
THE GLACIAL DRIFT  
1961







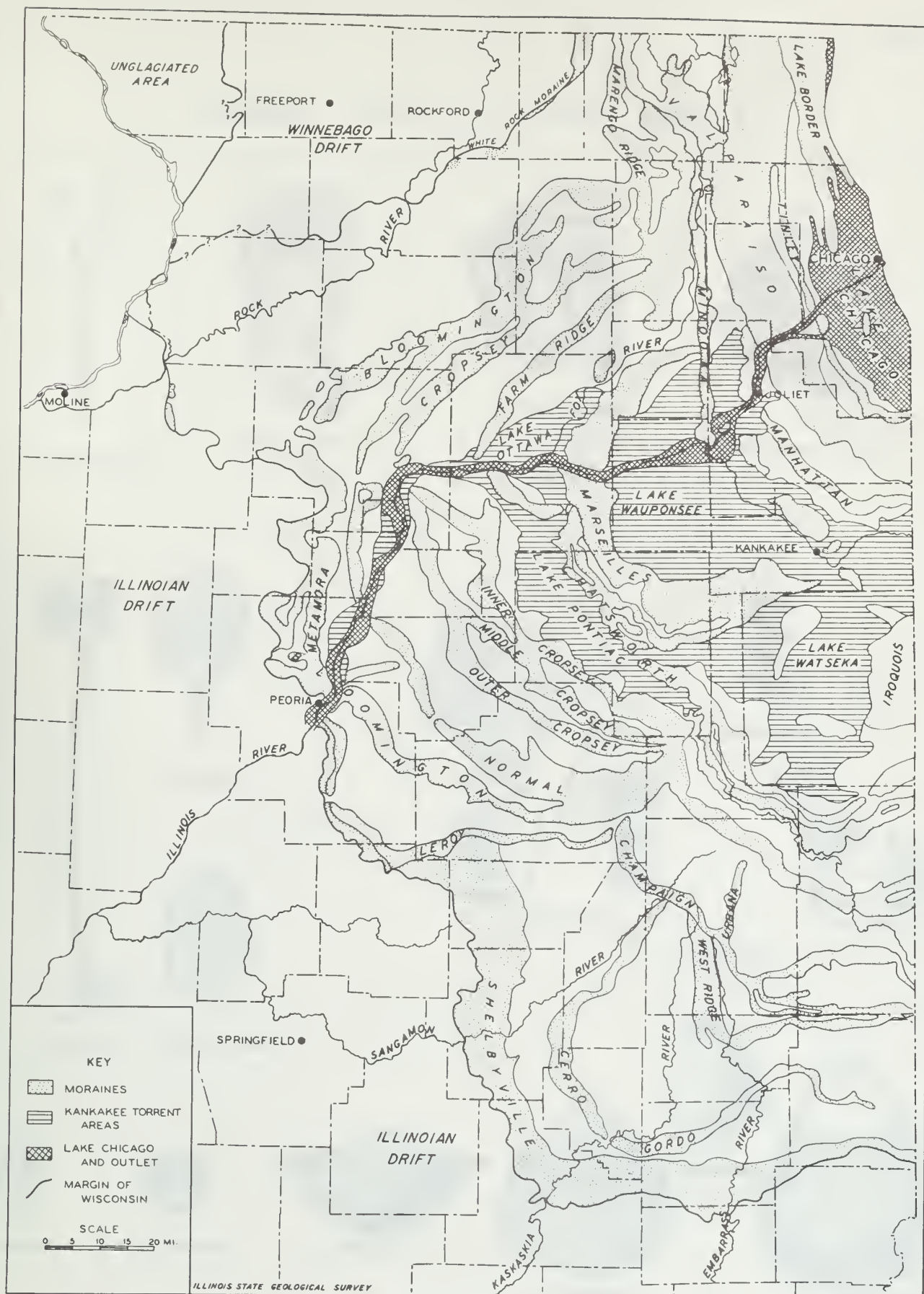


#### AN IDEALLY COMPLETE CYCLOTHEM

(Reprinted from Fig. 42, Bulletin No. 66, Geology and Mineral Resources of the Marseilles, Ottawa, and Streater Quadrangles, by H. B. Willman and J. Norman Payne)







# GLACIAL MAP OF NORTHEASTERN ILLINOIS

GEORGE E. EKBLAW

Revised 1960



COMMON TYPES of ILLINOIS FOSSILS



GRAPTOLITE



Cup coral



Lithostrotion



Honeycomb coral

CORALS



CRINOID



CYSTOID



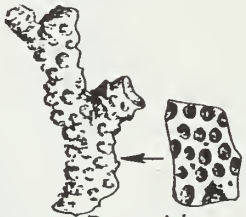
PENTREMITE



Fenestella



Archimedes



Branching

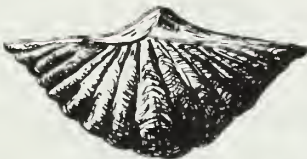
BRYOZOA



Lingula



Orbiculoidea



Spiriferoid



Productoid



Composita



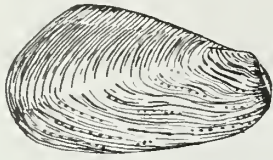
Pentameroid

BRACHIOPODS

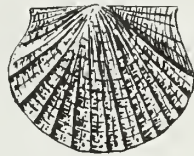




# COMMON TYPES of ILLINOIS FOSSILS



"Clam"



"Scallop"

## PELECYPODS



High - spired



Low - spired



Flat - spired

## GASTROPODS



Curved cone



Coiled cone  
(Nautilus)



Straight cone

## CEPHALOPODS



Bumastus



Calymene  
(coiled)



Calymene  
(flat)

## OSTRACODS (greatly enlarged)



## TRILOBITES

