State of Illinois
Department of Registration and Education
STATE GEOLOGICAL SURVEY DIVISION
John C. Frye, Chief

GUIDE LEAFLET

GEOLOGICAL SCIENCE FIELD TRIP

Sponsored by
ILLINOIS STATE GEOLOGICAL SURVEY

GOLCONDA AREA

Pope and Hardin Counties

Brownfield, Golconda, Harrisburg, and Equality Quadrangles

Leaders
Edgar Odom, George M. Wilson, Guy Dow

Urbana, Illinois
April 21, 1962

GUIDE LEAFLET 1962A HOST: Pope County High School

To the Participants:

It has been said that the landscape is truly beautiful only when we understand the varied forces that have worked through the ages to develop it. The result of this understanding is increasing enjoyment and appreciation of the natural features about us.

The Geological Science Field Trip program is designed to acquaint you with the landscape, rock and mineral resources, and the geological processes that have led to their origin. With this program, we hope to stimulate a general interest in the geology of Illinois and a greater appreciation of the state's vast mineral resources and their importance to the over-all economy.

We encourage you to ask the tour leaders any questions that may occur to you during the trip. Discussion often clarifies points that otherwise would remain confused to many of the participants. We also invite your written comments upon the conduct of the trip so that we might improve them as much as possible.

Additional copies of this guide leaflet, as well as itineraries for trips that have been held in the past, may be obtained free of charge by writing to the Illinois State Geological Survey. Maps are available for 30 cents each.

We hope you enjoy today's trip and will come again.

THE GOLCONDA GEOLOGICAL SCIENCE FIELD TRIP

Suggestion: Have someone read the guide as we travel through the countryside so that the driver will be able to learn the geology of the area also.

Abstract

Bedrock in the Golconda area includes Lower Pennsylvanian Abbott and Caseyville Formations, Chester Series Kinkaid through Renault Formations, and Upper Valmeyeran Ste. Genevieve and St. Louis Formations. Outcrops of the Hardinsburg Sandstone, Cypress Sandstone, Paint Creek Shale and Sandstone, and the Shetlerville Member of the Renault Formation are included for examination and discussion. Pentremites (Blastoids) occur abundantly in the Shetlerville Member.

Numerous faults, expressed at the surface by inclined and off-set beds, occur in the area. Two stops are planned to examine these structures and to discuss their effects on topography, habitation, and development of the area.

Outstanding geomorphic features such as the Pre-Late Wisconsinan course of the Ohio River, cuestas, fault line scarps, and loess mantled bluffs are seen. A soil profile developed in loess is also examined.

Suggested References for Further Study of the Geology of the Field Trip Area

1. Illinois State Geological Survey Bulletin 76, Geology of the Fluorspar Deposits of Illinois, J. Marvin Weller, R.M. Grogan, and F.E. Tippie, 1952, maps and plates.

2. Illinois State Geological Survey Bulletin 58, The Fluorspar Deposits of Hardin and Pope Counties, Illinois; Edson S. Bastin, 1931, maps and plates.

3. Illinois State Geological Survey Report of Investigation No. 60, "Preliminary Geologic Map of the Dongola, Vienna and Brownfield Quadrangles," J.M. Weller, 1939, 11 pp., maps.

4. Illinois State Geological Survey Bulletin 41, Geology of Hardin County and the Adjoining Part of Pope County, Stuart Weller, 1920, 415 pp., maps and plates.

5. Illinois State Geological Survey Report of Investigation No. 211, "Limestone Resources of Extreme Southern Illinois," J.E. Lamar, 1959, 49 pp., maps and plates.

ITINERARY

0.0	0.0	Start from west side of Pope County Community High School. Turn left on Highway 146 (east).
0.1	0.1	Hardinsburg Sandstone outcropping on right and left.
0.4	0.5	Hardinsburg Sandstone outcropping on right and left, dipping west.
0.2	0.7	Valley of Lusk Creek.
0.5	1.2	Bridge over Miller Creek.
0.1	1.3	SLOW, Railroad crossing, entering Golconda.
0.1	1.4	Levee.
0.1	1.5	STOP. Turn right (south) on Adams Street.
0.5	2.0	Leaving Golconda. Continue ahead.
0.2	2.2	Cypress Sandstone outcropping in ditch on right.
0.1	2.3	Cypress Sandstone outcropping on right and left. Note cross-bedding.
0.3	2.6	STOP 1. Soil Profile Developed in Loess Overlying Cypress Sandstone.

What are soils? Roy W. Simonson in the Department of Agriculture 1957 Yearbook on Soils explains:

> Soil is continuous over the land surface of the earth, except for the steep and rugged mountain peaks and the lands of perpetual ice and snow. Soil is related to the earth much as the rind is related to an orange. But this rind (soil) of the earth is far less uniform than the rind of an orange. It is deep in some places, shallow in others. It may be red as soils are in Hawaii (in certain parts of southern Illinois, too) or it may be black as they are in northern Illinois. It may be sand, or it may be clay.
>
> Every soil consists of mineral and organic matter, water, and air. The proportions vary, but the major components remain the same.
>
> Every soil has a profile --- a succession of layers in a vertical section down into loose weathered rock. The nature of the soil profile has a lot to do with the growth of roots, the storage of moisture, and the supplies of plant nutrients. The profile also is basic to scientific studies of soil. The profile carries within itself a record of its history for those who learn to read it.

Most soil profiles contain three major horizons or zones (identified by the letters A. B. and C) which may be thick or thin. The A zone, the uppermost layer in the soil profile, often is called the surface soil. It is the part where life (roots, bacteria, fungi, and small animals) is most abundant. The B zone lies immediately beneath the A and often is called the subsoil. Lying between the A and C zones, it has some of the properties of both as well as properties of its own. The top of the B zone is usually transitional with the A and the bottom is transitional with the underlying C zone.

The C zone is the deepest of the three major horizons and consists of loose and partly decomposed rock. This zone is usually called the parent material. This parent material may have accumulated in place by the breakdown of hard rock, or it may have been moved to where it now is by water, wind, or ice. The major zones outlined above can be further divided on the basis of differences within each zone.

Because the A zone is nearest the surface, it has less soluble substances, contains most of the organic matter present, and may have lost iron and aluminum oxides. The B zone frequently is richer in clay than either the A or C. Mose of its soluble substances have been leached, and concentrations of iron oxides or aluminum oxides, or both, may be present. The C zone underlying the B zone usually contains most of its soluble substances. Commonly, there is evidence of some alteration, especially in the upper part.

The kinds, arrangements, and properties of the horizons in a soil profile record what has happened to that soil since it began to form. This history plays a vital part in development of physical properties as well as in the fertility, tilth, and productivity of the soils.

The soil profiles in this area were developed in parent materials moved here by the wind. This material is called loess. It was derived from the Ohio River valley during the Pleistocene, or Ice Age. We can recognize two zones in this profile: an A zone from 3 to 8 inches thick and a B zone approximately 7 feet thick. There is no C zone. This profile is shown on next page.

Soils vary a great deal from place to place. This variation creates soil types, each defined by a description of a typical profile, allowable deviations from that profile, and other features such as slope, stoniness, and physiographic position.

The soils in this immediate area are called the <u>Hosmer-Stoy Upland</u> Soils. In the Williamson County Soil Report these soil types are described as follows:

> Hosmer silt loam is a light-colored, moderately well drained, upland soil developed under forest on 2 to 18 percent slopes. The parent material is usually about 65 inches or more of loess; but on the steeper areas, where Hosmer grades into Manitou soils, the loess may be as thin as 40 inches. It is associated with Weir, Stoy, and Manitou soils.

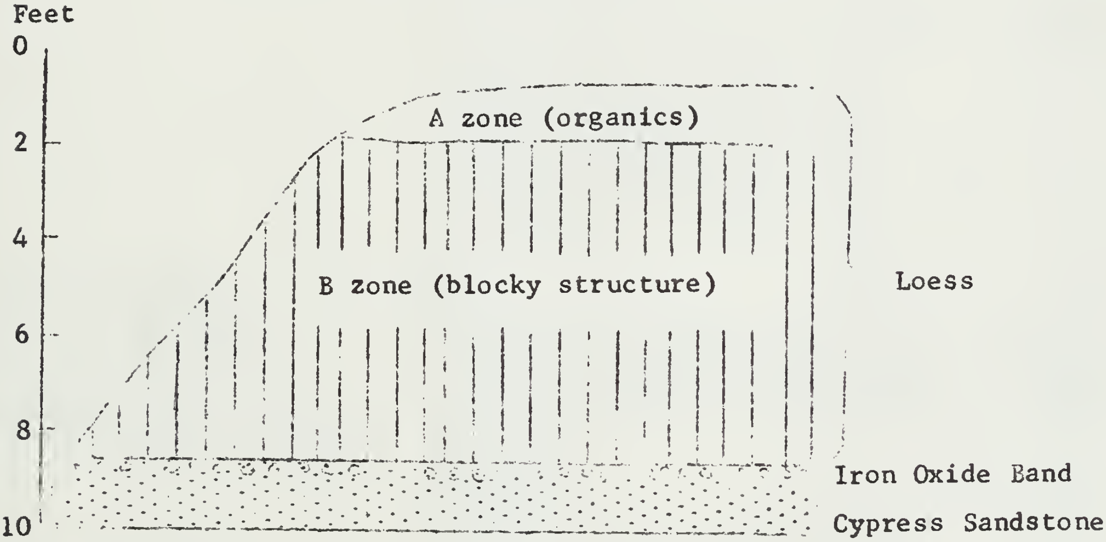
The upper part of the Hosmer profile has good physical properties: good moisture storage capacity and permeability to water and plant roots. However, the slightly to moderately well-developed fragipan in the lower part of the profile restricts root penetration to the gray streaks. Since few roots penetrate the fragipan, little moisture is obtained in this zone.

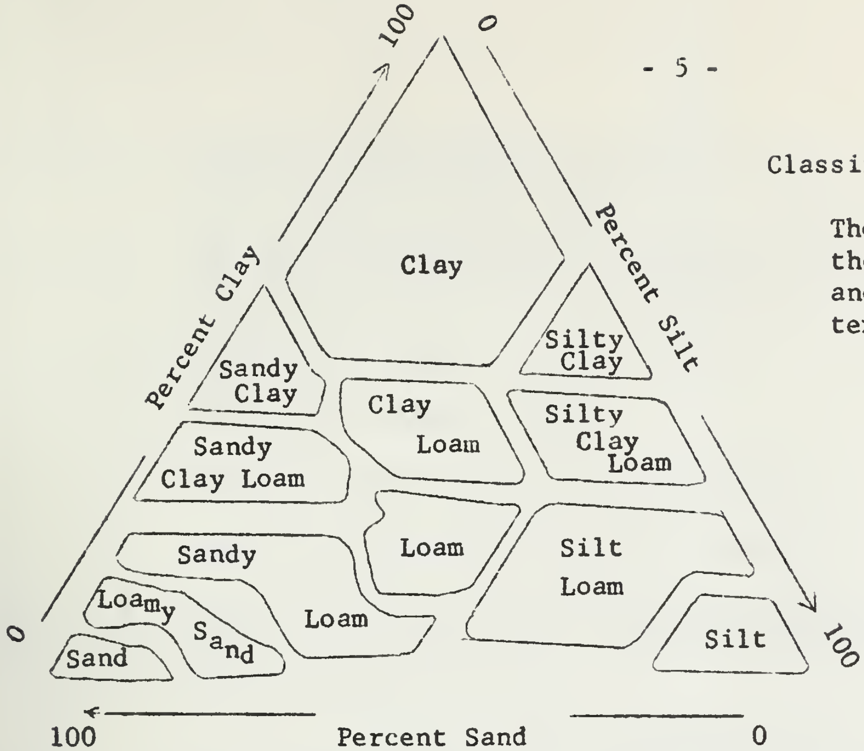
Hosmer is strongly acid, low in available phosphorus, and about medium in available potassium. It responds well to soil treatment and where not too steep is used for grain crops. Slopes over about 7 percent are best used for hay and pasture since erosion is severe if these slopes are cultivated.

Stoy silt loam is a light-colored upland soil found in association with Weir and Hosmer.

The loess from which Stoy has developed may be underlain by weathered bedrock residuum, or sandstone bedrock. Stoy has developed under forest on slopes ranging between 1 and 7 percent and is imperfectly drained.

Stoy is strongly acid, low in available phosphorus, and low to medium in available potassium. Organic matter and nitrogen are also low. However, this soil responds well to soil treatment and is used for corn, soybean, wheat, and hay production.





Classification of Soils by Texture

The texture triangle shows the percentage of sand, silt, and clay in each of the textural classes.

Principal Horizons of a Hypothetical Soil Profile

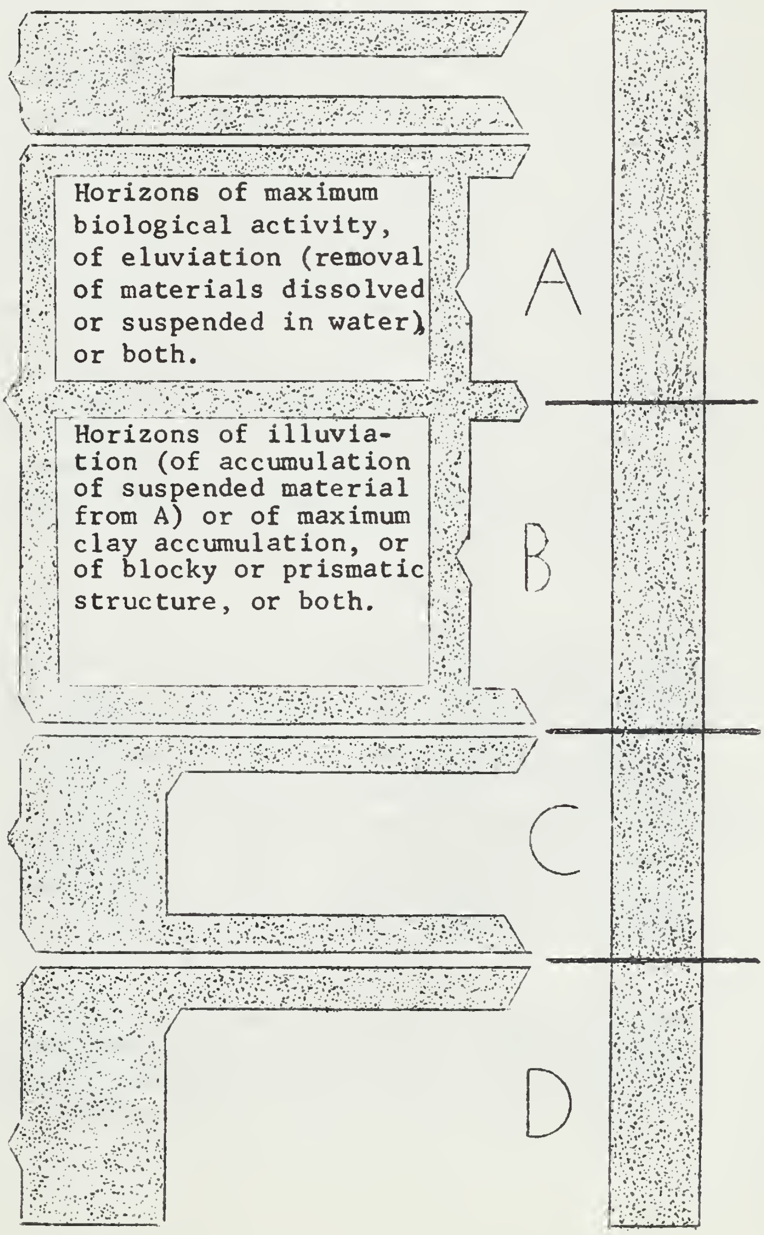
(Not all these horizons are present in any profile, but every profile has some of them.)

A

B

C The weathered parent material. Occasionally absent i.e., soil building may follow weathering such that no weathered material that is not included in the solum is found between B and D.

D Any stratum underneath the soil, such as hard rock or layers of clay or sand, that are not parent material but which may have significance to the overlying soil.



0.2 2.8 Sandstone outcropping on right and left. Bedrock lies at a very shallow depth throughout this region. The loess cover varies from 0-20 feet.

0.8 3.6 The hill on the far right is underlain by sandstone. The front is probably bordered by a fault many of which cut this region.

0.3 3.9 Sandstone on right and left.

0.3 4.2 Sandstone on right and left.

0.4 4.6 The Ohio River can be seen to the left.

0.4 5.0 Sandstone outcropping on right and left.

0.5 5.8 STOP 2. Overlooking the Cache River Bay Creek Lowland, the Abandoned Valley of the Ohio River. Cypress Sandstone outcrops on the right as we descend into the valley.

Since the end of Pliocene time, the interval of geological time that preceded the Pleistocene or "Ice Age " (1,000,000 years), the major rivers that now drain southern Illinois and surrounding regions were present, but they had somewhat different courses than now. The Mississippi followed roughly its present course along the western side of southern Illinois to a short distance north of Thebes in Alexander County, where it turned abruptly into Missouri. The Ohio was only a small stream, heading in western Ohio, until it united with the Wabash north of Shawneetown in Gallatin County. From Shawneetown the Ohio followed its present course to Bay City in Pope County, where it swung to the west and followed a course through the lowland area along the southern base of the Shawnee Hills now occupied by Cache River and Bay Creek. At the time the Ohio flowed along the Cache River-Bay Creek lowland, the Cumberland and Tennessee Rivers united in southern Pope County or western Kentucky, and flowed westward along the present valley of the Ohio. The Mississippi and Ohio then united somewhere to the south of their present junction in Missouri or Arkansas. The courses of the Preglacial Ohio, Mississippi, Tennessee and Cumberland Rivers are shown diagrammatically on page 8.

Although none of the four great glaciers which advanced into Illinois during the Pleistocene or "Ice Age" reached the Golconda area, they were directly responsible for changing the preglacial drainage to its present form. During the Illinoian stage of the Pleistocene Epoch the Mississippi abandoned its preglacial course through Missouri, and eroded a deep gorge in the bedrock near Thebes. The Ohio, Cumberland and Tennessee, as far as we can tell, maintained their preglacial courses until the Wisconsinan (Fourth) glacial stage. During the Wisconsinan stage, the Ohio cut through the narrow divide which separated the Ohio from the Tennessee-Cumberland and captured the valley which it occupies today.

The Cache Valley is one of the most impressive physiographic features in the State. At this point the valley is about 3 miles wide. The north valley side is eroded in Paleozoic rocks and is much steeper than the south which is cut in weaker unconsolidated Cretaceous and Tertiary beds.

The valley is entrenched some 250 to 400 feet below the uplands underlain by Paleozoic rocks. The eastern part is now occupied by Bay Creek, and the western part by the Cache River. Both streams are misfit, that is, they seem to be too small to have eroded the wide valley in which they flow. You will note that the north valley wall is very irregular and that in many places steep cliffs border it, such as the one at this point. Some of the cliffs are clearly the result of down-cutting and lateral erosion by the ancient Ohio, but others are controlled by faulting.

The deposits filling the Cache Valley have a maximum thickness of about 180 feet and are composed of glacial sands, clays and gravels. Much of this fill is believed to be of Wisconsinan age (fourth and last glacial stage), but certainly older deposits are also present. Since good shallow water wells are easily obtained in the valley, few deep wells have been drilled, thus few opportunities for us to study these deposits.

These major drainage changes which occurred during the Pleistocene were probably caused by filling and choking of the preglacial valleys with outwash sands, gravels and clays from the melting ice sheets. The present courses followed by these major rivers are also shown on page 8.

The Cache-Bay Creek Valley has a great industrial potential due to the vast quanities of water that could be pumped from the sands and gravels in the valley. Also, it would be relatively easy to construct a canal from the Ohio to the Mississippi for barge and other river transportation facilities.

0.4 6.2 Turn right.

0.3 6.5 Turn left. Because of the extremely poor drainage in this area, houses and other farm buildings are located on the ridges.

0.9 7.4 Ridge is excellent example of the several elongate ridges in this valley.

0.1 7.5 Note the ponds and small swamps which often occur between elongate ridges.

0.2 7.7 SLOW. Turn left.

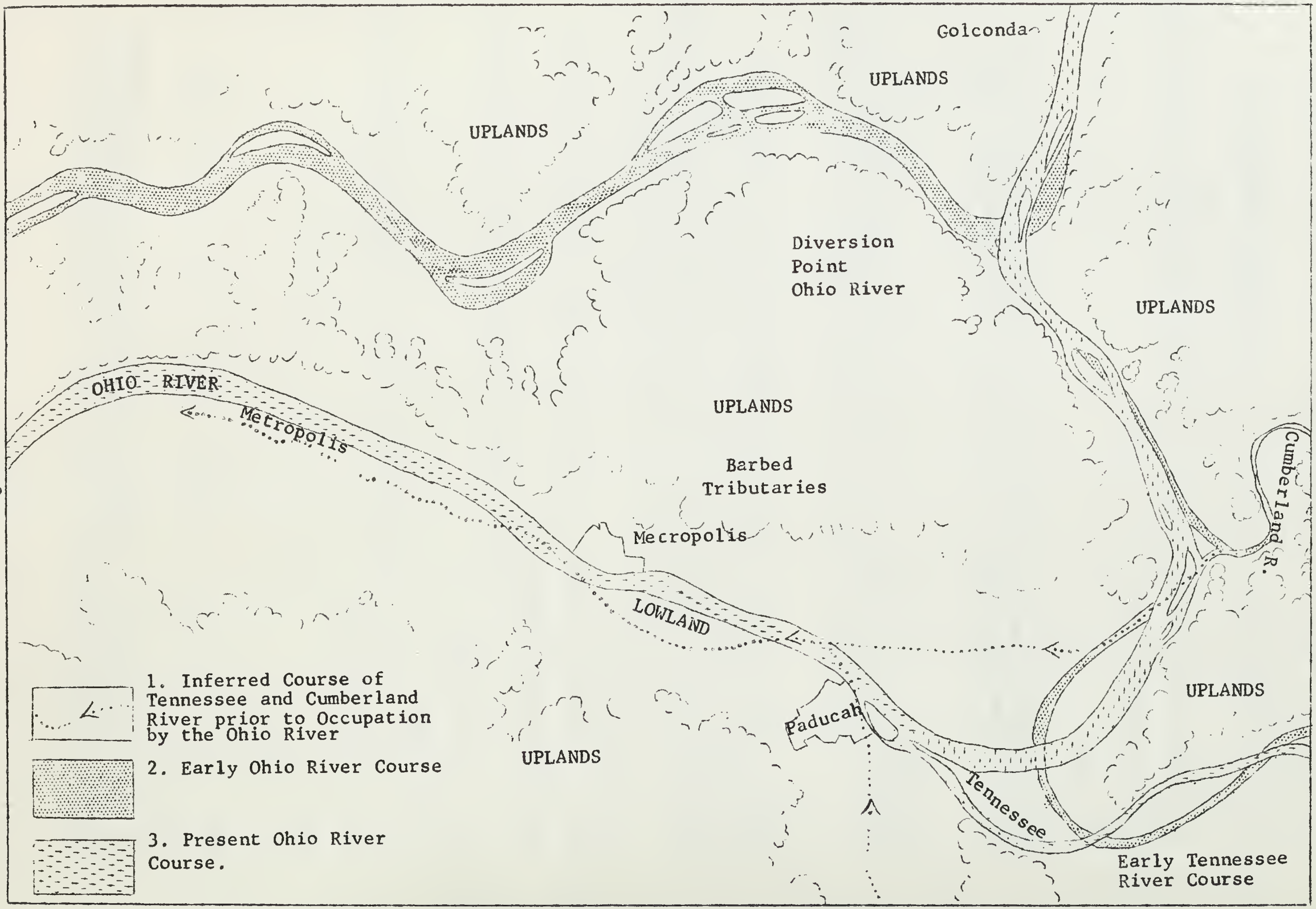
0.3 8.0 Turn right.

0.1 8.1 Ahead is one of the higher elongate ridges in the valley.

0.1 8.2 SLOW. Rough bridge.

0.2 8.4 STOP 3. Crest of Elongate Ridge Trending East-West Near the Village of Homberg.

Along the present rivers, elongate sand bars are a common feature on the concave side of nearly every bend in the river. The elongate ridges seen in the vicinity of Homberg are sand bars formed on the concave side of the sharp bend in the Ohio as it entered this former valley. The ridge on which the caravan is stopped is somewhat higher than


Golconda
UPLANDS
UPLANDS
Diversion
Point
Ohio River
UPLANDS
OHIO RIVER
Metropolis
UPLANDS
Barbed
Tributaries
Mecropolis
LOWLAND
Cumberland R.
UPLANDS
Paducah
UPLANDS
Tennessee
Early Tennessee
River Course
1. Inferred Course of Tennessee and Cumberland River prior to Occupation by the Ohio River
2. Early Ohio River Course
3. Present Ohio River Course.

those to the south and, also, it occurs on a relatively flat terrace surface. The terrace indicates that the valley probably was once filled at least to this level. It appears that some 20 to 30 feet of material has been removed. The terrace and ridge are at best only a few thousand years old.

0.2 8.6 SLOW. Village of Homberg. Railroad crossing. Continue ahead (north).

0.2 8.8 Turn right.

0.3 9.1 Turn left.

0.3 9.4 Note outcrops on right.

0.2 9.6 Note massive sandstone composing bluff on right. A fault trends parallel to this valley.

0.7 10.3 SLOW. Narrow bridge.

0.4 10.7 Note the gray soil on the left. The gray color is typical of soils developed under forest vegetation.

0.1 10.8 STOP 4. Junction of Homberg and Hodgeville roads. Discussion of Cuesta Seen from This Point.

In areas where folding, tilting, or faulting, of sedimentary rocks has occurred, narrow ridges often develop after the region has undergone considerable erosion. These ridges are an expression of the differences in resistance various kinds of rocks have to the forces of erosion. In this climate, sandstones are more resistant than either limestones or shales. Invariably, the ridges in the Shawnee Hills are capped by sandstone.

Where rocks of varying resistance are folded or faulted causing strata to be inclined, cuestas (unsymmetrical ridges where one side slopes gently and one side steeply) such as this one seen in the distance north of Golconda, are developed. This cuesta is capped by the Hardinsburg Sandstone.

The steep south slope is called the cuesta face. It is an erosional escarpment formed in the Golconda Limestone and Shale. The gentle back slope parallels the gentle northerly dip of the Hardinsburg Sandstone overlying the Golconda Limestone and Shale.

0.5 11.3 Turn left.

0.4 11.7 Note outcropping of sandstone on right.

0.2 11.9 The high ridge which can be seen to the north is underlain by Pennsylvanian Sandstone. A large fault parallels the front of the ridge.

0.1 12.0 STOP. Turn right (east) on Highway 146. Be extremely CAUTIOUS on entering Highway 146.

1.3 13.3 Pope County Community High School on left. A cave has been reported in the area just north of the school along the valley wall of Lusk Creek.

0.6 13.9 Outcrop on left, rocks inclined 5 degrees west.

0.7 14.6 Crossing Miller Creek.

0.1 14.7 CAUTION. Railroad. Entering Golconda.

0.1 14.8 STOP. Continue ahead.

0.2 15.0 Golconda business district.

0.2 15.2 SLOW. Turn left and ascend levee. Turn hard right at top of levee.

0.3 15.5 Note outcrop of massive sandstones on right.

0.2 15.7 STOP 5. Lunch. Ohio River Lock and Dam No. 51. Outcrop of Cypress Sandstone and Underlying Paint Creek Shale.

In the Ohio River bluff at Lock and Dam 51 the Cypress Sandstone and underlying Paint Creek Shales are well exposed. We saw the Cypress outcropping in the ditch at Stop 1 and along the road side at Stop 2.

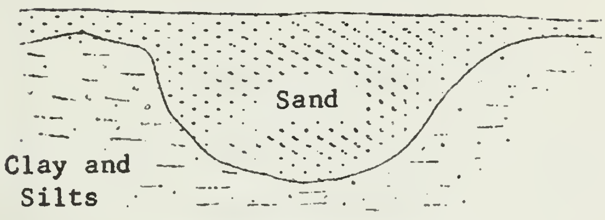
The Cypress is a massive sandstone very similar to the Bethel which occurs below the Paint Creek Formation. The Bethel is not exposed here. In the upper part the Cypress is evenly bedded a characteristic easily observed at Stop 1. The Cypress is massive generally, but in places it tends to be relatively thin bedded such as at Stop 1. It is composed of fine-grained sand, light yellowish brown, buff or even, on fresh surfaces, almost white.

The Paint Creek Formation grades laterally from irregularly bedded sandstone to dominantly shale.

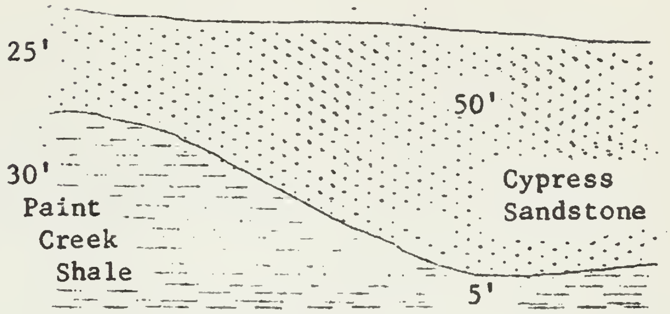
An interesting feature seen at this stop is the rapid thickening of the Cypress Sandstone in a distance of a few hundred feet. Approximately eight sandstone formations, along with eight limestone-shale formations, compose the Chester Series, the upper division of the Mississippian System. Fossil remains in the limestones and shales tell us that they are dominantly marine, or sea, deposits. On the other hand, woody material in the sandstones indicates that they are non-marine, perhaps river flood plain or delta deposits. The limestone-shale and sandstone formations alternate in the Chester rock column suggesting rapidly changing conditions in the Illinois Basin during Chesterian time (275 to 250 million years ago).

At the present time similar deposits are developing in the Mississippi Delta region. As the river reaches the delta, it breaks into a series of branching distributaries. The channels of these distributaries usually contain sand and they are bordered by sand deposits of lesser thickness. The bottom surface of these deposits is U-shaped while the upper surface is usually flat. This is shown in the following diagram:

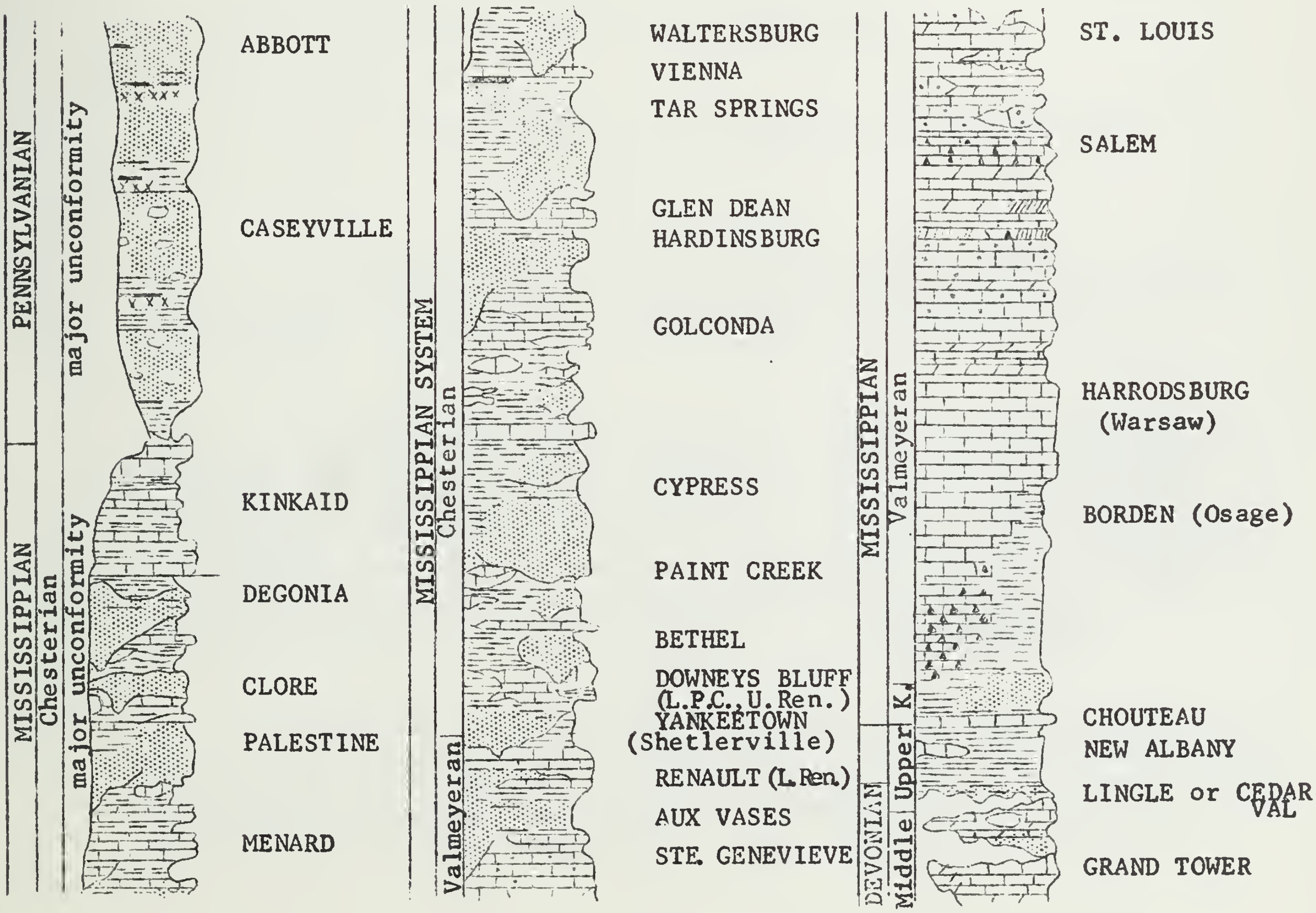
Profile
A Typical Delta
Distributary Channel



Profile
Exposure at Lock and Dam 51



Note that the bottom of the Cypress Sandstone is U-shaped and that it cuts into the underlying Paint Creek Shales. This probably indicates that this was a channel of one of the many distributaries of the delta on which the Cypress Sandstone was deposited. Channel development in the Cypress has been observed in many other places in the area. Plant fossils are relatively numerous at many places in this sandstone.



0.8 16.8 SLOW. Turn hard left.

0.1 16.9 Entering Golconda business district.

0.3 17.2 STOP. Turn right.

0.2 17.4 Bridge over Lusk Creek.

0.2 17.6 South base of cuesta discussed at Stop 4 on right.

0.6 18.2 Hardinsburg Sandstone outcropping on right and left.

0.1 18.3 SLOW. Turn left on gravel road.

0.1 18.4 Turn left.

0.6 19.0 Hardinsburg Sandstone outcropping in ditch on right and left.

0.0 19.0 Note excellent view of Shawnee Hills to the north.

0.7 19.7 Note flaggy sandstone on left.

0.2 19.9 SLOW. Bridge over creek.

0.1 20.0 Sandstone and shale outcropping on left.

0.3 20.3 Sandstone outcropping in ditch on left and right.

0.1 20.4 CAUTION. Crossroad.

0.1 20.5 STOP. Junction Eddyville road. Continue north on Eddyville road.

0.4 20.9 STOP 6. Fault.

Evidence of one of the many faults in this area can be seen in the road cut at this spot. The actual fault is not visible, but strata sharply inclined because of slippage of one side against the other is well exposed.

Southeastern Illinois is cut by a complex series of faults, most of which trend in a northeast-southwest direction. The Golconda area is intensely faulted. The major faults can be located on the topographic map provided each car. There are many known faults not shown on this map and probably many more not yet discovered. Throughout this area, steeply inclined strata -- such as seen here -- are good evidence of a fault close by. The actual fault plane can seldom be observed, but inclined strata adjacent to faults, especially sandstones, are usually present.

Recently, a lake was proposed in the valley of Lusk Creek. Two dam sites were suggested, both in sec. 14, T. 13 S., R. 6 E. The Illinois State Geological Survey was requested to give a geologic evaluation of the dam sites for proposed Shawnee Lake. The Survey's report noted two, and possibly three, faults crossing sec. 14. In addition, the Golconda

Limestone and Shale occur along the side of Lusk Creek valley. This limestone is known to be cavernous and sink holes occur at the surface where the limestone outcrops. The topographic map shows several sink holes in sec. 11 one mile southwest of this point.

Because of the numerous faults and the possibility of leakage through sink holes in the area, both sites in sec. 14 were considered unfavorable. Geological Survey engineers suggested another site upstream in sec. 32, T. 12 N., R. 6 E. for consideration. This site would reduce the area of the lake considerably.

0.5	21.4	Palestine Church on left.
0.6	22.0	War Bluff on right. The bluff is underlain by Lower Pennsylvanian Sandstone.
0.4	22.4	Note outcrops of sandstone on left.
0.3	22.7	Continue straight ahead on gravel road to Raum. Eddyville road turns left at this point.
0.3	23.0	Ford Creek.
0.8	23.8	Village of Raum.
0.3	24.1	Turn right (east).
0.4	24.5	Turn left (north).
0.3	24.8	Note sandstones outcropping on right and left. This is Lower Pennsylvanian Sandstone
1.1	25.9	War Bluff can be seen to the right (south).
0.0	25.9	Note sandstone bluff paralleling road. Sandstone is heavily lichened.
0.3	26.2	Note the pine plantation, a part of the reforestation program in the Shawnee National Forest.
1.0	27.2	SLOW. Ford.
0.5	27.7	Turn hard right.
0.1	27.8	Turn left.
0.2	28.0	Turn left.
0.6	28.6	Turn right at sign Grand Pierre School and Cemetary.
0.7	29.3	Excellent view to right. This is Benham Hill. Note the deep erosion of the abandoned road on the left.

0.6	29.9	Note sandstone outcropping on right. Note that all of the hills in this region are underlain by sandstone. The sandstones are more resistant to erosion than other common rocks in this region.
0.5	30.4	Turn right (south) at sign marking direction to Golconda and One Horse Gap
0.2	30.6	SLOW. Bridge.
0.3	30.9	Sandstones and shales outcropping in ditch on right and left.
0.1	31.0	Note slumping of loess in the roadcuts on right and left.
0.3	31.3	Village of Lusk.
0.6	31.9	SLOW. Bridge
0.2	32.1	Julian Hill on right.
0.5	32.6	War Bluff on right. We have seen War Bluff from the west, north, and east sides.
0.3	32.9	SLOW. Turn left (east).
0.7	33.6	SLOW. Rough bridge.
0.1	33.7	SLOW. Turn right (south).
0.1	33.8	SLOW. Rough bridge.
0.7	34.5	Entering village of Growensville.
0.2	34.7	SLOW. Bridge. Turn left.
0.3	35.0	STOP. Junction of Highway 146, turn left.
0.3	35.3	Sandstone outcropping on right.
1.3	36.6	SLOW. Descending rather steep hill. Note Golconda Limestone outcropping on left. The hill is capped by Hardinsburg Sandstone.
0.8	37.4	Bridge over Big Grand Pierre Creek. Fluorspar mine on right belongs to the Ozark Mahoning Mining Company. They are working a mineralized fault which trends in a northeast direction.
0.8	38.2	Fluorspar mine straight ahead owned by the Minerva Fluorspar Company. It also is tapping a mineralized vein, but a different one than the one being worked by Ozark Mahoning. This area is the western extension of the fluorspar district. The main fluorspar mining district lies in the vicinity of Rosiclare and Cave in Rock.
0.7	38.9	SLOW. Junction of 34 and 146. Continue ahead on 146.
0.4	39.3	St. Genevieve Limestone on right.

0.1 39.4 St. Genevieve Limestone on left and right, dipping about 5 degrees west.

0.2 39.6 One of the major faults in this area runs northeast, parallel to this valley.

0.1 40.0 SLOW. Turn right on gravel road.

0.2 40.2 Note sink hole.

0.2 40.4 STOP 7. Fluorspar Prospect Pit and Discussion of Faults and Topography of Region.

A major fault trends in a northerly direction parallel to the small valley immediately to the west. In the road cut Bethel Sandstone, which occurs above the Ste. Genevieve Limestone in the rock column, is exposed. Across the valley is a quarry working the Ste. Genevieve Limestone at a higher elevation than the outcrop of Bethel Sandstone exposed at this stop. This evidence alone shows that there has been up or down movement on one side of the major fault. Since the Bethel Sandstone outcrops on the east side of the fault at the same elevation as the Ste. Genevieve Limestone which it overlies, we arrive at the conclusion that the east side of the fault has moved down relative to the west side. The pile of rock in the field a short distance from the road marks the spot where a test pit was sunk in the exploration for fluorite mineralization along this fault. Evidently none was found; however, spar has been produced along this fault a short distance to the north and south.

0.1 40.5 Note outcrop of St. Genevieve Limestone on right. Melcher Hill on the right is capped by Bethel Sandstone. Melcher Hill stands 330 feet above the valley, giving some indication of the displacement along the fault which cuts the east side of the hill and parallels the valley.

1.2 41.7 Abandoned fluorite mine on right.

0.1 41.8 Note sandstone outcrop at the top of the hill.

0.1 41.9 Turn left (northeast). A fault trends up this small valley.

0.7 42.6 SLOW. Turn left.

0.2 42.8 Sandstone outcrops on left are of Lower Pennsylvanian. This is one of the few occurrences of Pennsylvanian age rocks in the area. It occurs in a fault block, or graben, paralleled by faults. There is more than 1,000 feet of vertical displacement on many of these faults. The valley is underlain by the Kinkaid, Clore, and Degonia (Upper Mississippian) Formations. Sandstones outcropping on right are part of the Degonia Formation.

0.8 43.6 Igneous dike is known to occur in hill on far right.

0.1 43.7 SLOW. Bridge.

0.1 43.8 SLOW. Bridge.

0.4 44.2 Note numerous tippels to right in the Rosiclare fluorspar mining district. Most of these workings are now abandoned. They were among the richest mines in the district.

Rosiclare is the fluorspar capital of the United States. A large percentage of the fluorspar used in United States industry comes from the Rosiclare and Cave in Rock districts.

The mineral fluorspar, also called fluorite, is hard and glassy consisting of two chemical elements, calcium and fluorine. It is commonly gray or yellowish white, but it sometimes occurs in attractive purple, white, blue, green or black. Some varieties glow in invisible ultraviolet light; this property is named "fluorescence" after the mineral.

More than half of the fluorspar produced in Illinois is used for the manufacture of hydrofluoric acid, a basic material in production of fluorine chemicals. Largest consumer of the acid is the aluminum industry. Hydrofluoric acid also enters into the preparation of many chemicals, including those which play a part in the manufacture of refrigerants, plastics, aerosols, and high energy fuels for rockets and missiles. A large amount of fluorspar is used in the iron and steel industry as a flux and in the ceramic industry for making glass and enamels.

The Rosiclare district has had a long and varied mining history. Prior to the coming of the white man, Indians or prehistoric peoples carved ornaments and images from colorless fluorspar. Because of its beautiful colors, well crystallized fluorite is still highly sought for the carving of small ornamental objects.

The first known mining operation in this region began in 1842 after the discovery of fluorspar and galena by William Pell on his farm about one half mile northwest of Rosiclare. Galena, the ore of lead, was the principal mineral sought and recovered. Pell was not the first to discover lead in the Rosiclare district. The first discovery was made by James Anderson while digging a well on his farm about one mile southwest of Rosiclare.

Between 1842 and 1870 the deposits in the Rosiclare district were worked for their lead content. The spar mined with the galena was largely discarded as waste, for it had only a limited market.

Shipments of fluorspar from mines in this district apparently began in the early seventies. The demand steadily increased between 1870 and 1910. During this 40 year period the Fairview Fluorspar and Lead Company, the Rosiclare Lead Company, and the Rosiclare Fluorspar and Lead Company were the chief producers. The Fairview holdings were sold to the Franklin Fluorspar Company, a subsidiary of Alcoa, in 1924.

About 1910, the Rosiclare and Fairview companies increased the capacity of their mills to 400 tons per day. This might be considered to mark the beginning of the modern era of large-scale production in the Rosiclare district. World War I greatly increased the demand for spar, stimulating exploitation of existing deposits and the search for new ones. In 1919 the Illinois Central Railroad was extended from Golconda to Rosiclare, permitting the shipment of fluorspar by rail. Prior to that time all shipments were made by barge on the Ohio River.

[illegible] many [illegible]

In 1924, the Rosiclare district suffered a great setback. Almost all of the mines along the Fairview-Rosiclare vein were flooded by water probably coming from the Ohio River. The Rosiclare mines remained flooded until 1940 when they were drained. Water is still a major problem, however, even with the large pumps now employed.

During the 16-year interval while the Rosiclare-Fairview mines were flooded, the Daisy and Hillside mines north of Rosiclare supplied most of the spar to maintain the large mill of the Rosiclare Lead and Fluorspar Company. Most of the spar milled by Alcoa during this interval came from their mines in Kentucky.

Since 1940 the demand for fluorspar has remained fairly high. In recent years fluorspar sold for making aluminum, fluorine compounds, and ceramic products, in addition to that sold for making steel, has been an important factor in the growth of this industry. Illinois produced 134,529 tons of fluorspar in 1960--58.5 percent of the fluorspar

0.3 44.5 STOP. Turn left (north) on Highway 34. Rosiclare to right.

0.7 45.2 STOP. Junction Highways 146 and 34. Turn left on Highway 146 and 34. Small cave occurs to the right on the north side of the highway.

0.2 45.4 Crossing fault zone.

1.0 46.4 Sandstone outcropping on right, dipping 3 degrees to 5 degrees to the east.

0.9 47.3 Crossing Three-Mile Creek.

0.5 47.8 Note limestone outcropping in roadcut on right. This is the Kinkaid Limestone, youngest Mississippian formation.

0.2 48.0 Note sandstone and limestone outcropping on right. Note the sandstone dips about 15 degrees to the east. This is on the east side of a large fault trending in a northeast direction, the same fault discussed at Stop 7.

0.4 48.4 St. Genevieve Limestone on right and left. Note that this is on a higher elevation than the sandstone at Stop 7 which stratigraphically lies above this limestone.

0.4 48.8 STOP. Junction Highways 146 and 34, continue ahead on Highway 146.

0.1 48.9 SLOW. Turn left on Shetlerville road.

1.1 50.0 The valley on the right is a large sink hole. Water enters this sink hole, moves underground to the east, and emerges at Cave Spring Cave on the east side of the road about one half mile from the sink hole.

1.1 51.1 Melcher Hill on left

0.1 51.2 Note limestone outcropping in field on right. The hill is capped by Bethel Sandstone.

0.8 52.0 SLOW. Turn right (west).

0.2 52.2 STOP 8. Outcrop of Shetlerville Member of Renault Formation.

0.1 52.3 Red clay zone and sandstone on left marks the position of a northward trending fault. The displacement on this fault amounts to scarcely more than a few feet.

The fossil beds exposed at this locality were, in the most recent publication covering this area, included in the upper part of the lowermost member of the Renault Formation, the Shetlerville Member. The lower part of the Shetlerville consisted mainly of relatively pure limestone. Recent study of the rocks of the Chesterian Series in Illinois has resulted in the reclassification of these strata, and a report is now in preparation by the Illinois State Geological Survey.

The name Shetlerville will be restricted to the lower limestone and will comprise the uppermost of two members of the Renault Formation as the latter is redefined. In the new classification the shale sequence that includes the fossil beds will be correlated to the Yankeetown Sandstone that overlies the Renault Formation in southwestern Illinois. The Yankeetown Formation in the Shetlerville area is mainly shale but includes silty shale and siltstone in various shades of gray, green, and brown common near the top and intercalated limestone beds that range in thickness from minute stringers to several inches most prominent in the lower part. The Yankeetown has an average thickness of about 25 feet in the Shetlerville area.

The fossils which are easily found here are:

Amplexus geniculatus (horn coal)
Talarocrinus
Cystodictya labiosa
Reticularina Subspinosa
Lyropora
Metablastus glaber (Mesoblastus)
Pentremites (short)
Pentremites princetonenses
Pentremites pinguis
Pentremites godoni
Pentremites pulchellus
Punctospirifer transversa

You may continue to the top of the hill where cars may be turned around.

End of Trip
Thanks for coming. See you at Pittsfield, May 5, 1962.

GEOLOGIC COLUMN - GOLCONDA AREA

Prepared by the Illinois State Geological Survey, Urbana

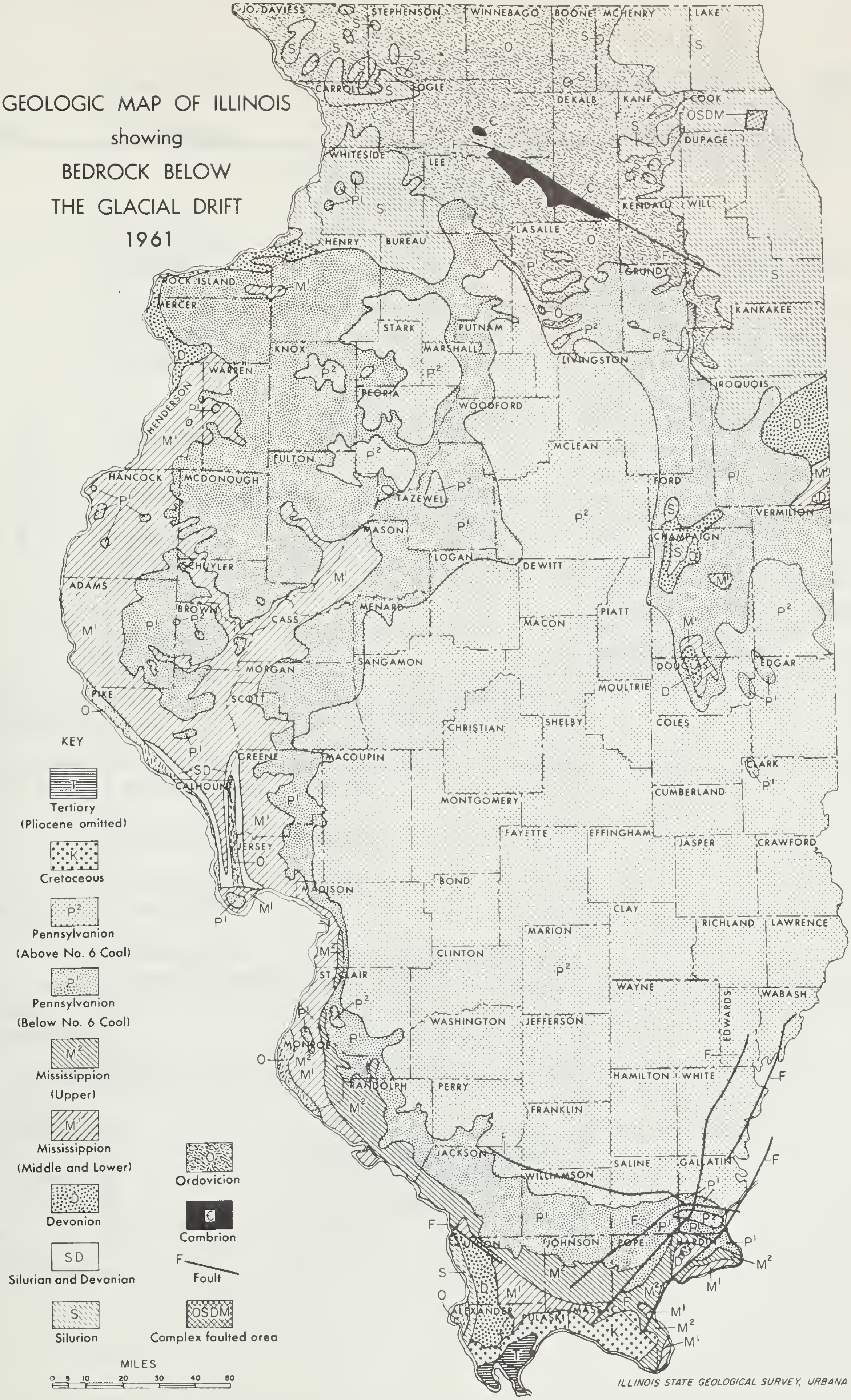
ERAS		PERIODS	EPOCHS	REMARKS
Cenozoic	Age of Mammals	Quaternary	Pleistocene	Recent post-glacial stage Wisconsinan loess Illinoian loess (Stops 1, 2, 3)
		Tertiary	Pliocene Miocene Oligocene Eocene Paleocene	Gravels (Lafayette type) Clay and sand
Mesozoic	Age of Reptiles	Cretaceous		Sand, clay and gravel
		Jurassic		Not present in Illinois.
		Triassic		Not present in Illinois
Paleozoic	Age of Amphibians and Early Plants	Permian		Not present in Illinois
		Pennsyl-vanian	McLeansboro	Shale, coal, limestone, underclay, sandstone
			Kewanee	Coal, Sandstone, shale and limestone
			McCormick	Sandstone, shale and thin coal
		Missis-sippian	Chesterian (Upper Mis-sissippian)	Alternating sandstone, limestone, and shale formations (Stops 5, 6, 7, 8)
			Valmeyeran	Limestone (Stop 7) Limestone and shale
	Age of Fishes	Devonian		Shale Limestone
	Age of Invertebrates	Silurian		Not exposed in field trip area
		Ordovician		Not exposed in field trip area
		Cambrian		Not exposed in field trip area

Proterozoic

Referred to as "Pre Cambrian"

Archeozoic | No data available

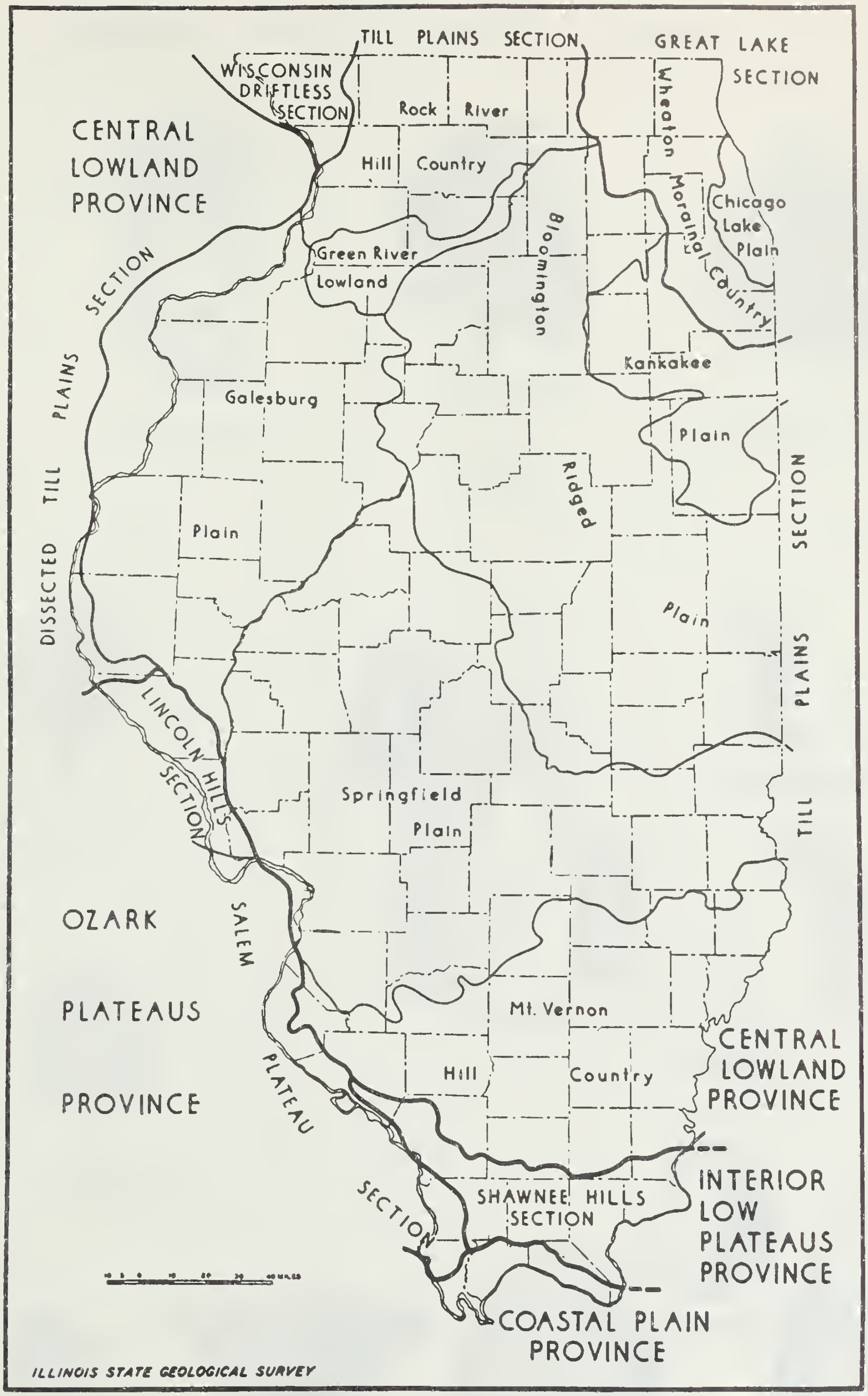
GEOLOGIC MAP OF ILLINOIS
showing
BEDROCK BELOW
THE GLACIAL DRIFT
1961



(47669—15M—11-61)

Time Table of Pleistocene Glaciation
(after M. M. Leighton and H. B. Willman, 1950, J. C. Frye and H. B. Willman, 1960)

Stage	Substage	Nature of Deposits	Special features
Recent	5,000 yrs.	Soil, youthful profile of weathering, lake and river deposits, dunes, peat	
Wisconsinan	Valderan 11,000 yrs.	Outwash	Glaciation in northern Illinois
	Twocreekan 12,500 yrs.	Peat, alluvium	Ice withdrawal, erosion
	Woodfordian 22,000 yrs.	Drift, loess, dunes lake deposits	Glaciation, building of many moraines as far south as Shelbyville, extensive valley trains, outwash plains, and lakes
	Farmdalian 28,000 yrs.	Soil, silt and peat	Ice withdrawal, weathering, and erosion
	Altonian 50,000 to 70,000 yrs.	Drift, loess	Glaciation in northern Illinois, valley trains along major rivers, Winnebago drift
Sangamonian (3rd interglacial)		Soil, mature profile of weathering, alluvium, peat	
Illinoian (3rd Glacial)	Buffalohartan	Drift	
	Jacksonvillian	Drift	
	Paysonian (terminal)	Drift	
	Lovelandian (Pro-Illinoian)	Loess (in advance of glaciation)	
Yarmouthian (2nd interglacial)		Soil, mature profile of weathering, alluvium, peat	
Kansan (2nd glacial)		Drift Loess	
Aftonian (1st interglacial)		Soil, mature profile of weathering, alluvium, peat	
Nebraskan (1st glacial)		Drift	

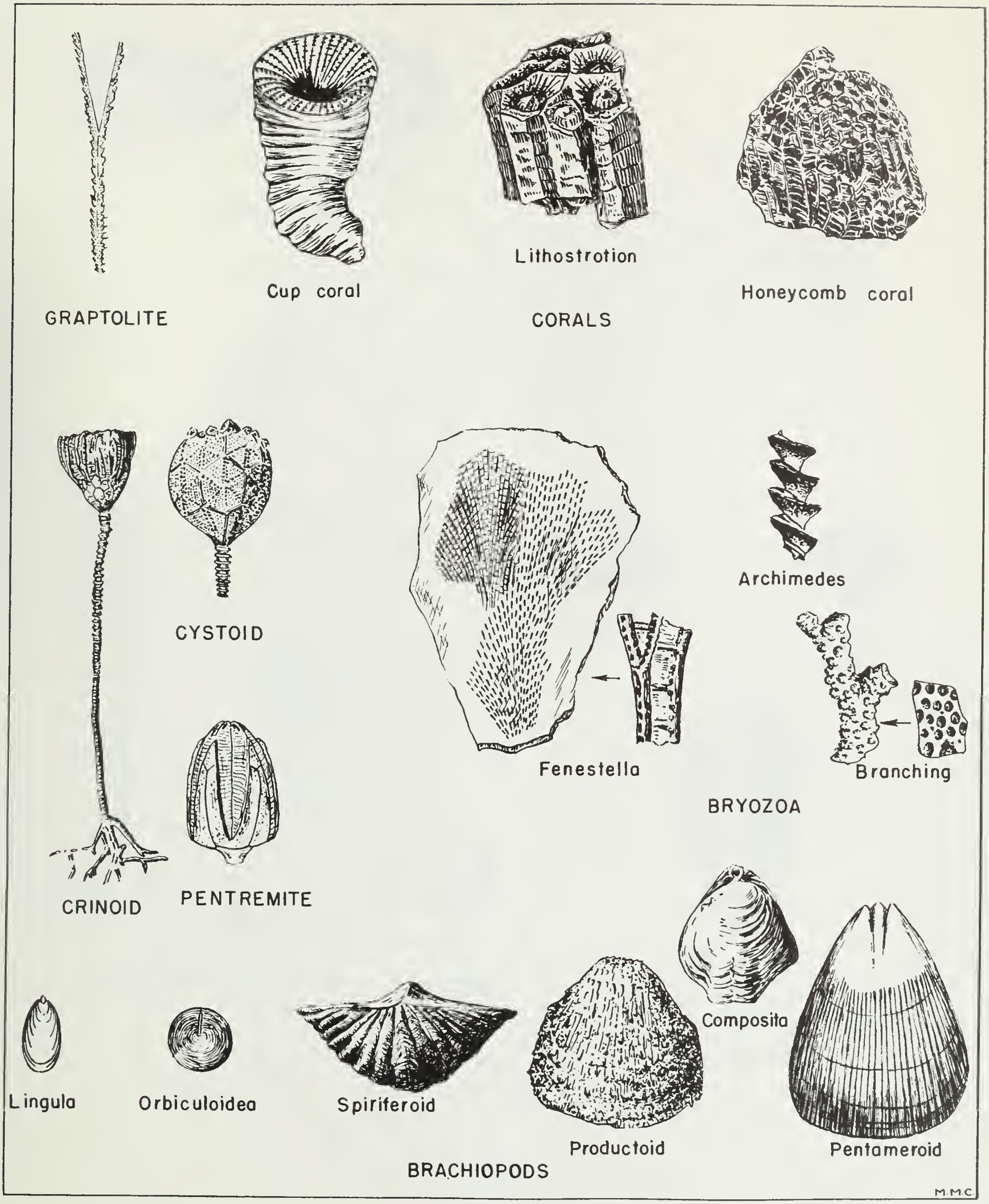


PHYSIOGRAPHIC DIVISIONS OF ILLINOIS

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

(47669—15M—11-61)

COMMON TYPES of ILLINOIS FOSSILS



COMMON TYPES of ILLINOIS FOSSILS