

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

MILAN - ROCK ISLAND AREA

Rock Island and Henry Counties
Milan, Coal Valley, Port Byron, Green Rock,
Davenport East, and Silvis Quadrangles



Leaders
George Wilson, Edgar Odom, Garnett Dow, Walter Parham

Urbana, Illinois
September 17, 1960

GUIDE LEAFLET 1960D

HOST: Milan Grade School

MILAN GEOLOGICAL SCIENCE FIELD TRIP

ITINERARY

Suggestion: Have someone in the car read the itinerary en route.

- 0.0 0.0 Assemble at Milan Grade School heading north.
- 0.0 0.0 STOP. Turn right on U. S. 67 and 92 (east).
- 0.1 0.1 Junction 67 and 92. Continue ahead on Illinois 92.
- 0.5 0.6 Cross Mill Creek.
- 0.3 0.9 Crossing terrace in Rock River Valley. There are numerous terraces in the Rock River Valley which were formed by deposition of glacial outwash during the "Ice Age."
- 0.3 1.2 Note the Black Hawk Hill to the far south. The Rock River Valley is much larger than such a stream would normally make. It is a misfit stream. In other words it occupies a valley that is larger than would be possible for a stream of its size to make. This wide valley was carved during the "Ice Age" when much larger volumes of water poured down the Rock River than at present.
- 1.0 2.2 Note rounded slopes of the Black Hawk Hills.
- 0.3 2.5 Rising to a higher terrace in the Rock River Valley.
- 0.8 3.3 Quad-City Airport. Note the sand dune on the left.
- 0.4 3.7 Turn right on Highway 150 south.
- 0.8 4.5 Turn left. Continue ahead on Route 150.
- 0.3 4.8 Highway 150 is on a terrace on the south side of Rock River Valley.
- 0.4 5.2 Entering Coal Creek Valley. Note the smooth rounded slopes of the Black Hawk Hills on right and left.

The rounded slopes of the Black Hawk Hills along the Rock Valley reflect the extent of erosion by the numerous intermittent streams that are rapidly cutting into the upland. The cycle of erosion through which any land surface passes is divided into three stages—youth, maturity and old age. The land surface within one-half mile of the Rock Valley is in an early mature stage and is characterized by numerous valleys and narrow interstream uplands. Beyond this narrow belt near the Rock Valley and far to the south the surface is in a youthful stage with broad interstream uplands and fewer valleys. These are excellent examples of the progressive stages of the erosional cycle.

- 0.7 5.9 Bridge over Coal Creek.
- 0.3 6.2 Note shale outcropping in right bank of Coal Creek.
- 0.4 6.6 Bridge over Coal Creek.
- 0.2 6.8 Entering Coal Valley. Speed limit 20 miles per hour.
- 0.1 6.9 Note outcrop of Pennsylvanian (Coal Measures) sandstone on far left.
- 0.3 7.2 Bridge over Coal Creek.
- 0.8 8.0 Note the general flatness of the upland. This area is in a youthful stage of erosion.
- 1.0 9.0 Turn left on county blacktop road.
- 1.5 10.5 Cross Shaffer Creek.
- 0.4 10.9 Crossroad. Turn left, north.
- 0.2 11.1 Turn left on road to Gem Mine at Radio Station WDLM.
- 0.3 11.4 Stop 1. Gem Coal Mine.

The Gem Mine formerly worked the Rock Island No. 1 Coal at a depth of approximately 100 feet. Coal was very important in the early industrial development of the Quad-City Area. From 1850 to 1900, hundreds of coal mines existed in this area. Mostly small mines worked the Rock Island No. 1 Coal bed. This bed of coal outcrops in many of the stream valleys in the area. The mines were mostly the drift or bank type.

The extensive coal reserves of Illinois were formed during the Pennsylvanian Period of geological history, a time of extensive swamps. The Rock Island No. 1 Coal is one of the oldest commercial beds in the Pennsylvanian System, and here it outcrops at the northern edge of the Illinois coal basin.

In the Rock Island area the Pennsylvanian rocks overlie limestones and dolomites of Devonian and Silurian age. In central and southern Illinois the Pennsylvanian rocks overlie Mississippian strata. To explain the absence of the Mississippian strata in northern Illinois we must digress to a bit of geological history.

Throughout the long interval of geologic time represented by the Silurian, Devonian, and Mississippian Periods, the Earth's crust under the Quad-City Area underwent little disturbance and most of the time was covered by the waters of shallow inland seas. Near the end of Mississippian time, however, the crust here was

tilted so that the once horizontal layers were inclined toward the south. At the same time the area was lifted to a considerable height above the sea.

Weathering and erosion immediately began attacking this new upland area, carving the surface into hills and valleys and dissolving a part of the soluble limestones. In the Quad-City Area erosion cut down into the Devonian limestone, wearing away all of the once overlying Mississippian beds in the process. Surface waters moving down through joint crevices in the Devonian limestone dissolved out small caverns and formed sink holes. These later filled with fallen rock from the walls and with sands and clays from the waters of the advancing Pennsylvanian sea. The Pennsylvanian sediments were deposited in a blanket over all of the Quad-City Area and far northward. Today most of these Pennsylvanian rocks have also been removed by later erosion, and only a few patches remain as evidence of the former extent of the coal-bearing layers.

Pennsylvanian sediments are unlike older sediments in this region in that they consist of many different rock types, the outstanding type being coal. In Illinois, coals are commonly overlain by black sheety shale ("roof slate") followed by limestone with marine fossils. The limestone is usually overlain by gray shale also containing marine fossils. Beneath the coal there is an underclay, in turn sometimes underlain by an underclay limestone or shale, and then sandstone. This type of rhythmic succession of different kinds of strata is repeated in much the same sequence some 50 times where the Pennsylvanian rocks are thickest. Each rhythmic succession of Pennsylvanian rocks is called a cyclothem. An attached sheet shows an ideally complete cyclothem, but seldom do we find all the units present.

The thickness of the Pennsylvanian System and individual cyclothem varies greatly from place to place. An example of this is the interval between the Colchester (No. 2) Coal and the base of the Pennsylvanian which averages about 125 feet in western Illinois, while in the southeastern part of the state this part of the Pennsylvanian column is represented by about 1200 feet of strata. Although deposition started relatively early in Pennsylvanian time in western Illinois, it either proceeded very slowly or was interrupted frequently by intervals when no sediments were deposited.

The many different rock types in the Pennsylvanian System indicate many rapid changes of environment which took place repeatedly. At that time rivers were bringing sediments from the north and east, possibly as far away as the present Atlantic coast and the region south of Hudson Bay. The midwest was a low flat swampy area lying just a little above sea level, but subject to frequent marine invasions as the land rose or sank, or the sea level raised or lowered. That these conditions

existed is evident from the nature of the sediments. Many of the shales, limestones, and ironstones above the coals contain marine fossils. The coals are believed to have formed in broad fresh-water marshes somewhat like the Dismal Swamp of Virginia. Most of the sandstones, conglomerates, underclays, underclay limestones, and some shales probably accumulated in fresh-water environments such as river valleys, lagoons, lakes, or lowland plains. There is no area in the world today that has conditions like those that existed during "Coal Measures" time.

The plants and trees that grew in "Coal Measures" time were very luxuriant. In the jungle-like growths, the plants most common were huge tree ferns that had fronds five or six feet long and grew to a height of more than 50 feet. Along with them were seed ferns, now extinct, giant scouring rushes, and large scale trees, which grew to heights of 100 feet or more.

The large scale trees we find preserved in the coals do not have growth rings. The luxuriant growth and lack of growth rings probably indicates that the climate that prevailed at this time was warm and without seasonal change. As the plants fell into the swampy waters, they were partially preserved, buried by later sediments and converted into coal.

- 0.0 11.4 Turn around and return to county blacktop road.
- 0.3 11.7 STOP. Turn left on county blacktop road.
- 0.8 12.5 Crossroads. Continue ahead.
- 0.4 12.9 Note loess outcrop on right.
- 0.5 13.4 Note V-shape of the stream valleys, indicating this region is in the youthful stage of the erosion cycle.
- 0.1 13.5 Note loess outcrop on right.
- 0.3 13.8 Note waste pile of abandoned coal mine.
- 0.1 13.9 Stop 2. Exposure of Illinoian till, Sangamon Soil, and Peoria Loess.

A complicated series of Pleistocene (Ice Age) events are represented in this section. The section is as follows:

Feet

Peoria Loess, brownish yellow, silty,
calcareous at base, numerous loess
kindchens

	<u>Feet</u>
Brownish-gray silt, compact, calcareous, contains fossil snail shells (<u>Succinea gelida</u>)	4
Sangamon Soil, largely clay with a few pebbles at base, black to gray	4
Illinoian till, deeply oxidized, leached numerous pebbles and boulders	4
Gravel zone underlain by gray till, iron stained on surface, pebbly throughout	20
Pennsylvanian shale, black, fissile	15

Tens and hundreds of thousands of years ago most of Illinois, together with most of northern North America, was covered by huge ice sheets or glaciers. These glaciers expanded from centers in what is now eastern Canada. They developed when the mean annual temperatures in the region were somewhat lower than now, so that not all of the snow that fell during the winters melted during the summers. The snow residues accumulated year after year until a sheet of ice became so thick that as a result of its weight the lower-most part began to flow outward, carrying with it the soil and rocks on which it rested and over which it moved. The process continued until the glacier extended into our country as far south as the Missouri and Ohio Rivers.

When the glaciers melted, all of the soil and rocks which they had picked up and carried as they advanced were released. Some of this material or drift was deposited in place as the ice melted. Such material consists of a thorough mixture of all kinds and sizes of rocks and is known as till. Some of the glacial drift was washed out with the meltwaters. The coarsest outwash material was deposited nearest the ice front and gradually finer material farther away. The finest clay may have been carried all the way to the ocean. Where the outwash material was spread widely in front of the glacier, it forms an outwash plain; where it was restricted to the river valleys, it forms what are called valley trains.

At times, especially in the winters, the outwash plains and valley trains were exposed when the meltwaters subsided. The winds picked up silt and fine sand from these surfaces, blew it across the countryside, and dropped it to form deposits of what is known as loess. Glacial loess mantles most of Illinois. Near the large river valleys, it may be as much as 60 to 80 feet thick. Far from the valleys, it may be measured only in inches if it can be identified at all.

It is now commonly known that there were four major ages of glaciation during the Pleistocene or Great Ice Age (see accompanying table) and that between each there was a long interglacial age in which conditions were much as they are today. It is also commonly known that during each major glaciation there were a number of retreats and readvances. This was particularly true during the last or Wisconsinan Age.

A discussion of the Pleistocene (Ice Age) history of the Rock Island region would require a sizable volume, in fact the story is still not fully known. Present facts indicate that this epoch of geologic history began about one million years ago when the Nebraskan glacier advanced over the area. This oldest of the glaciers is named Nebraskan because the typical Nebraskan glacial deposits are best developed in the state of Nebraska. Nebraskan deposits are not abundant in Illinois, probably because weathering during the warm Aftonian Age after the retreat of the Nebraskan glacier destroyed them.

The next glacial episode produced the Kansan glacier which again advanced from the west. Thick deposits of till and outwash sand and gravel were deposited in Illinois when the Kansan glacier withered away.

The Kansan Age was followed by the warm Yarmouthian Age during which erosion carved valleys and hills in the Kansan deposits.

The third glacial advance, the Illinoian, was important to the residents of Illinois. It covered 80 percent of Illinois, reaching southward to Carbondale and Harrisburg. In contrast to the preceding glacial advances, the Illinoian glacier came from the east rather than the west. It pushed westward into eastern Iowa at this point.

In this section evidence of the Illinoian glacier is revealed by 24 feet of till. This mixture of clay, pebbles, and boulders was deposited when the ice melted.

At the top of the Illinoian till is a fossil soil that developed during the Sangamonian Age. This soil resembles present day soils in color, texture, and depth of development. This fact lends support to the theory that the climate existing during interglacial times was similar to the present climate. The theory that we are living in an interglacial interval has been advocated by numerous glacial geologists. We should not brush this thought aside for it is estimated that a drop of only 5 degrees in the average annual temperature would bring another glacier down upon us.

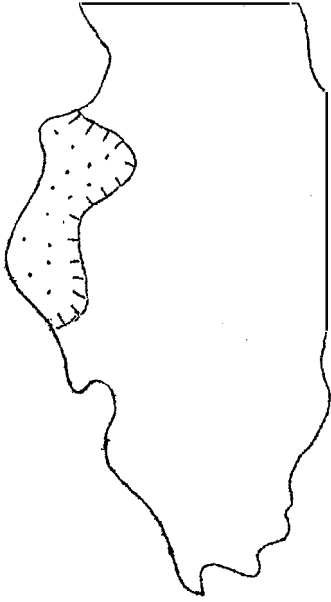
The last glacial age is called the Wisconsinan. The Wisconsinan glacier advanced from the east, and it is thought that an early advance may have extended over this area. However, there are no

deposits present in this section that support this idea. The gray silt overlying the Sangamon Soil is probably early Wisconsinan. The silt, a wind-blown loess, was derived from the Rock Valley when the Wisconsinan glacier stood 40 miles to the east. The thick loess overlying the Succinea gelida zone was deposited as the Wisconsinan glacier retreated eastward into the Lake Michigan Basin. The loess is the youngest glacial material in the area.

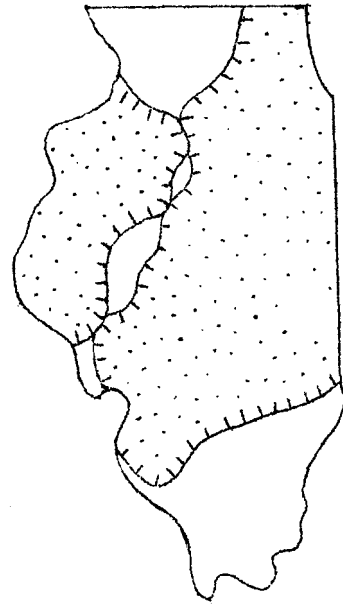
The end of the glacial epoch is not definitely known but recent carbon 14 dates indicate that the last ice melted from the northeast border of Illinois just 8,000 years ago.

- 0.3 14.2 Note outcrop of black fissile shale on right. Note waste pile from abandoned drift mine on the left.
- 0.2 14.4 Terrace on south side of Rock River Valley.
- 0.2 14.6 STOP. Turn right (east) on Illinois 6.
- 0.4 15.0 Note rounded smooth slopes of loess hills on right.
- 0.3 15.3 Cross Mosquito Creek.
- 0.3 15.6 CAUTION. Cross Chicago, Burlington & Quincy railway tracks.
- 0.6 16.2 Note abandoned coal mine on far right.
- 0.4 16.6 SLOW. Junction 84. Turn left.
- 0.1 16.7 STOP. Turn left on Illinois 84.
- 0.1 16.8 Descending into Green River Valley.
- 0.4 17.2 Crossing the Green River. This is very near the junction of the Green with the Rock River.
- 0.2 17.4 CAUTION. Chicago, Burlington and Quincy railway tracks.
- 0.1 17.5 Entering the village of Green Rock. Speed limit 45 miles per hour.
- 0.6 18.1 Enter the village of Colona.
- 0.1 18.2 Crossing the abandoned Illinois and Mississippi Canal. Now abandoned, this canal connected Chicago and the Mississippi River utilizing portions of the Rock and Illinois Rivers.
- 0.2 18.4 Colona School on right.
- 0.2 18.6 SLOW. Turn right on Cleveland road.

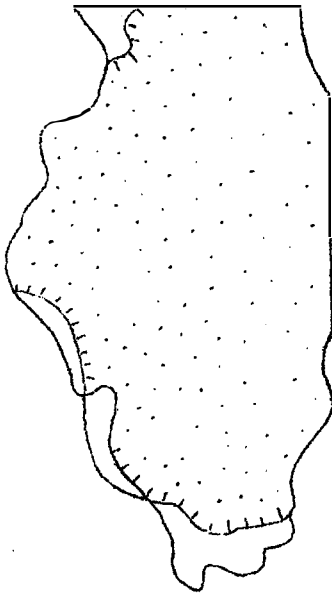
STAGES OF GLACIATION



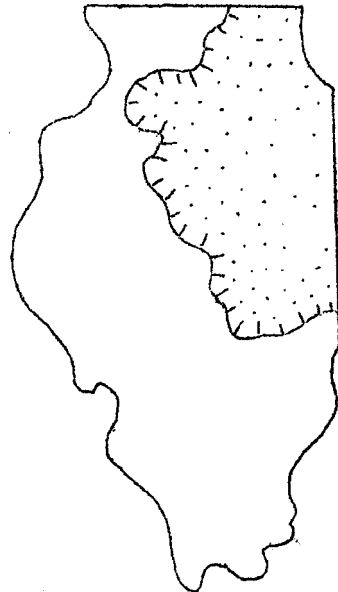
NEBRASKAN
(1st Stage)



KANSAN
(2nd Stage)



ILLINOIAN
(3rd Stage)



WISCONSINAN
(4th Stage)

- 0.1 18.7 CAUTION. Crossing Chicago, Rock Island, and Pacific railway tracks. (three tracks.)
- 1.4 20.1 Note sand dunes on the left, grassed over and on which oak trees are now growing.
- 0.4 20.5 Sand dunes on left.
- 0.3 20.8 Going across sand dunes. These dunes are along the south valley wall of the Rock River.
- 0.4 21.2 Note sand on left. Turn left. Continue ahead toward Cleveland.
- 0.4 21.6 SLOW. Turn right into Cleveland Quarry road.
- 0.7 22.3 Stop 3. Cleveland Quarry.

This quarry is in the lower part of the Davenport Member of the Wapsipinicon Limestone of Devonian age and is near the northernmost occurrence of Devonian strata in this area, while across the Rock Valley an abandoned quarry worked the underlying Silurian dolomite. Mr. Bob Ellis, the owner of this quarry, indicated that drill hole data reveal that the Silurian dolomite lies only a few feet below the floor of the present working level.

This exposure of the Wapsipinicon Limestone is interesting because it illustrates the brecciated (broken and fractured) nature of zones in this formation, a typical characteristic throughout the Rock Island area. The top of the major breccia zone, extending from near the base to within several feet of the top of the section in some places, is irregular with 8 to 12 feet of relief. The depressions in this surface contain limestone, sandstone and shale beds.

Any theory of the origin of this brecciation must take into account the character of the beds above and below. Gypsum is known to be associated with certain zones of the Wapsipinicon Formation. The brecciation may be a result of solution of interbedded gypsum soon after deposition, causing a collapse of the beds. The irregular surface at the top of the major breccia zone might possibly arise from compaction after solution or submarine erosion soon after deposition.

This area was undoubtedly exposed to weathering for many thousands of years prior to the deposition of the Pennsylvanian rocks in the Rock Island area. This is known by the fact that the entire section of Mississippian rocks is missing, presumably eroded away during Mississippian time. Solution along joints in the limestone developed small caverns which were filled by clay when Pennsylvanian deposition began. An X-ray analysis of the gray clay in the cavities indicated that it is of about the

composition of the underclays below the coals in this region. We shall see a larger Pennsylvanian cavity filling in Devonian limestone at the last stop today.

- 0.0 22.3 Turn around and return to Cleveland road.
- 0.7 23.0 STOP. Turn left on Cleveland road.
- 3.0 26.0 CAUTION. Chicago, Rock Island and Pacific railway tracks.
- 0.1 26.1 Turn right. STOP. Enter Illinois 84 (west).
- 0.7 26.8 Bridge over Rock River.
- 0.8 27.6 Turn right. Continue ahead on Illinois 84.
- 0.4 28.0 Entering town of Carbon Cliff. Note Flue Liner Manufacturing Plant on the left. The flue liners are made from Pennsylvanian underclay mined in the area.
- 0.7 28.7 Note abandoned slope coal mine on the left behind red house.
- 0.5 29.2 SLOW. Junction 2 and 92. Keep to right.
- 0.3 29.5 STOP. Turn right on 2 and 92. The Rock Island Railroad yard on right.
- 0.7 30.2 Note swampy nature of the terrain in the Rock River Valley.
- 0.4 30.6 CAUTION. Railroad crossing. Chicago, Burlington, and Quincy.
- 1.1 31.7 Note terrace on left.
- 0.7 32.4 Road is now paralleling the north side of the Rock River Valley along the south side of Cordova Island.
- 1.4 33.8 SLOW. Turn left at large barn adjacent to highway.
- 0.3 34.1 Turn left. Continue ahead on gravel road.
- 1.3 35.4 T-road south. Continue ahead.
- 0.2 35.6 Turn left, west.
- 0.2 35.8 T-road north. Continue straight ahead.
- 0.3 36.1 Zion Lutheran Church on left.
- 0.6 36.7 Upland surface of Cordova Island.
- 1.1 37.8 Turn right into Illini Forest Preserve. Stop 4. Lunch. This is a good time to discuss any questions that might have arisen from the morning discussions.

- 0.2 38.0 Turn around.
- 0.1 38.1 STOP. Turn right on county road. The Forest Preserve area is located on the eastern loess covered bluff of the Mississippi River.
- 0.6 38.7 STOP. Turn right on Illinois 80. This is the temporary Great River Road of Illinois, a proposed scenic highway along the entire length of the Mississippi River.
- 0.4 39.1 Mississippi River on left.
- 0.5 39.6 Lock and Dam, No. 14. The locks and dams from the mouth of the Illinois River to the Twin Cities are designed primarily to establish a permanent 9-foot navigation channel throughout this 635-mile stretch of waterway.
- 0.6 40.2 Excellent view of the Iowa shore.
- 1.2 41.4 The town to the northeast is Claire, Iowa, the boyhood home of Buffalo Bill.
- 1.5 42.9 Entering village of Rapid City. The town is built on a Wisconsinan terrace 580 to 600 feet above sea level.
- 0.7 43.6 SLOW. Turn right on county blacktop road at Phillips 66 Service Station.
- 0.3 43.9 Stop 5. View of the Mississippi River flowing in the Cordova Gorge.

The deep steep-walled Cordova Gorge is a comparatively youthful channel of the Mississippi River, actually less than 20,000 years old. The origin of the Cordova Gorge is part of the intricate Ice Age history of the mighty Mississippi River, a stream known to be over 1 million years old.

According to present thinking, during the Nebraskan Age, the Aftonian Age, the Kansan Age and the Yarmouthian Age, the Mississippi River turned southeastward north of Cordova and flowed through the Meredosia Channel and the Green River Basin to the "big bend" of the Illinois River near Bureau, thence southward to the mouth of the Illinois River. Thus, the Mississippi Valley above Cordova and the present valley below Muscatine and Andalusia were separate independent drainage systems.

The advance of the Illinoian (third) glacier over this area into eastern Iowa, thus blocking the southeastern channel, forced the Mississippi to establish a temporary channel in eastern Iowa. This channel in front of the Illinoian ice sheet extended approximately from the mouth of the Maquoketa River, north of Savanna through the Goose Lake channel in eastern Clinton County, across northeastern Scott and Muscatine Counties, westward to southeastern Washington County, thence southward through Henry and Lee Counties

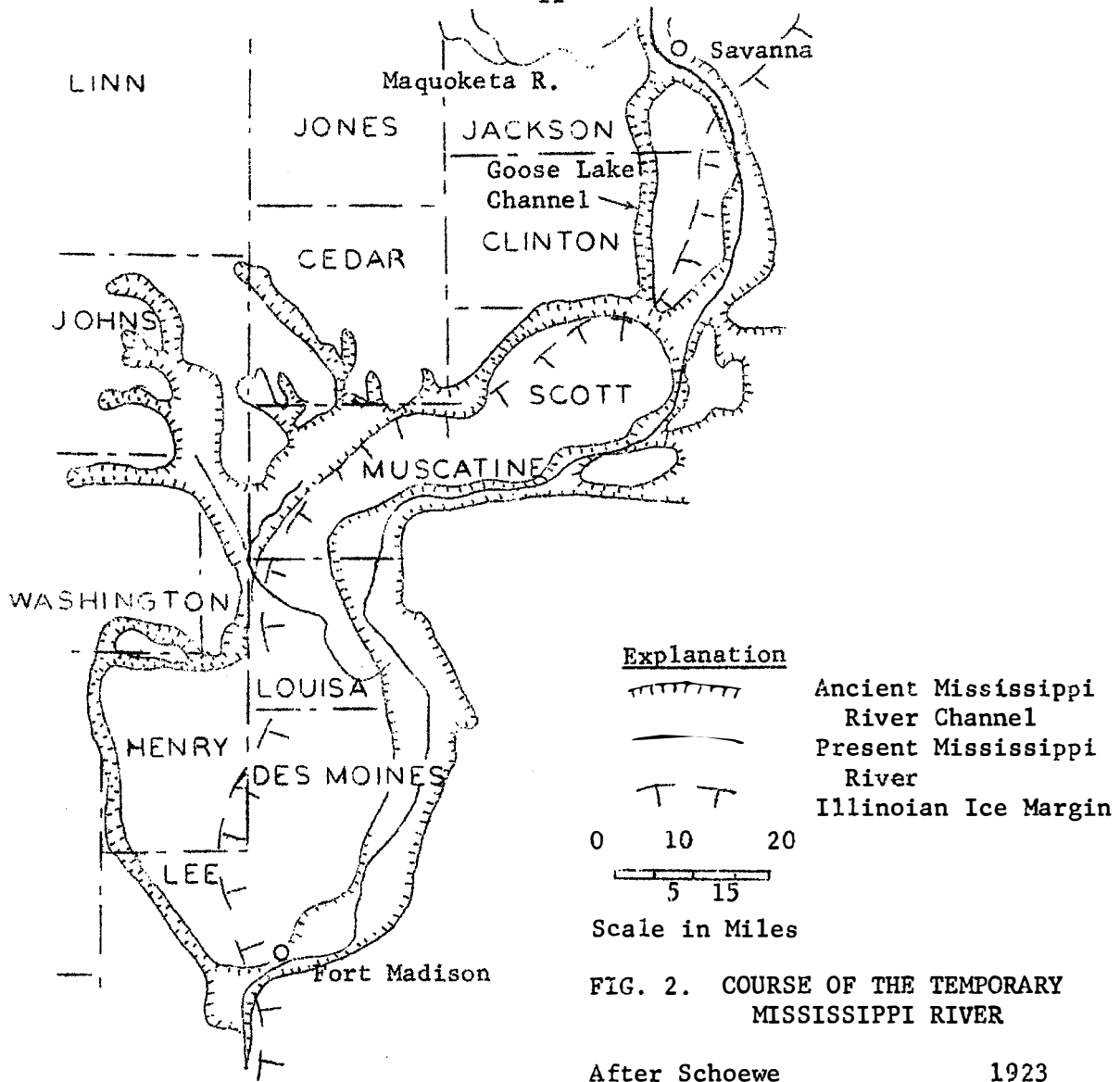


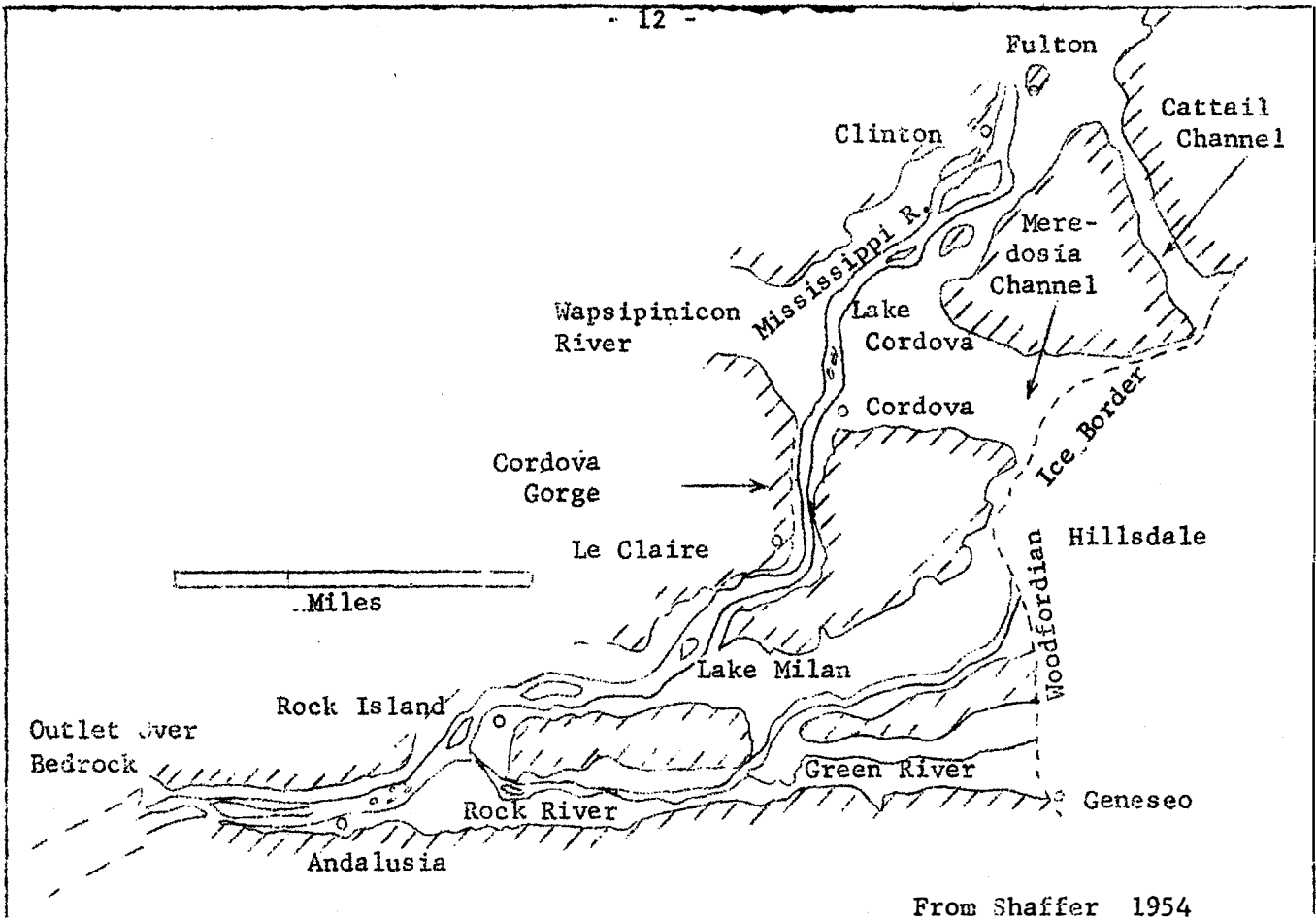
FIG. 2. COURSE OF THE TEMPORARY MISSISSIPPI RIVER

After Schoewe 1923

to the present Mississippi channel near Fort Madison, Iowa (see figure). Upon withdrawal of the Illinoian ice sheet, the Mississippi reoccupied its former southeasterly channel to the "big bend" of the Illinois River where it remained during the Sangamonian Age and during the early portion of the Wisconsinan Age.

During the early portion of the Wisconsinan Age the middle of the Cordova Gorge formed a low rock divide between a north flowing stream which joined the Mississippi at Cordova and a southward flowing stream whose course ran around Rock Island and up the present Rock Valley to a confluence with the Mississippi in southwestern Whiteside County.

Approximately 20,000 years ago, the Wisconsinan Shelbyville glacier pushed westward into the Princeton Valley and the Green River Lowland, the southeastern channel of the Mississippi. The first blocking of the channel occurred at the "big bend". Here



GLACIAL LAKE MILAN (RESTRICTED) AND LOW-WATER STAGE OF GLACIAL LAKE CORDOVA

the ice ponded the old Mississippi to form the first stage of glacial Lake Milan. At this time, Lake Milan extended from the "big bend" to the rock divide at Andalusia, but as the glacier advanced up the valley and into the Green River Lowland, the lake became progressively smaller. The outlet of Lake Milan was over the rock-floored divide at Andalusia.

When the Shelbyville glacier reached the west wall of the Rock Valley, glacial Lake Cordova was formed in the Meredosia Channel area. The waters spilled over the low divide near Cordova and cut the Cordova Gorge. The Shelbyville glacier continued advancing and reached eastern Iowa by way of the Meredosia Lowland. This advance blocked the Mississippi channel at Fulton and created glacial Lake Savanna whose waters were temporarily diverted along the front of the ice sheet through the Goose Lake Channel and down the Wapsipinicon River to re-enter the Cordova Gorge at Cordova. Upon retreat of the Shelbyville glacier, the river reoccupied the former channel from Fulton to Cordova, thence southward through the Cordova Gorge, past Moline, Rock Island, Andalusia, and Muscatine along its present course.

0.4 44.3 Note deep ravines on right side of road. The ravines extending back from the Mississippi River in this area are very steep indicating their youthfulness.

- 0.7 45.0 T-road south. Continue ahead.
- 0.5 45.5 STOP. Turn right, south.
- 0.1 45.6 The drainage in this region is to the east into the Rock River, although we are only one-half mile from the Mississippi River.
- 1.5 47.1 STOP. Turn right, south, on Illinois 92 and 2.
- 0.5 47.6 Note the hills on the far side of the valley and the difference in their elevation.
- 1.0 48.6 Silurian dolomite outcropping in bed of stream on left.
- 0.2 48.8 Upper terrace along the Rock River Valley.
- 1.4 50.2 Note the point of Cordova Island on which the East Moline State Hospital is located.
- 0.4 50.6 Illinois 92 and 2 crosses an abandoned valley of Rock and Ancient Mississippi Rivers. There are no streams that occupy this valley today. Glacial Lake Milan covered this area during early Woodfordian time.
- 1.0 51.6 Entering Silvis.
- 0.4 52.0 Crossing bridge over the Rock Island Railroad yards. KEEP IN LEFT LANE.
- 0.1 52.1 CAUTION. Turn left on Illinois 84.
- 1.2 53.3 SLOW. Entering village of Carbon Cliff.
- 0.1 53.4 The Van Packer Flue Liner plant on right.
- 0.5 53.9 SLOW. Turn right on East Moline road. This is the Moline 23rd Avenue road.
- 1.0 54.9 SLOW. Turn left on detour highway 2, 80 and by-pass 92.
- 0.7 55.6 The road cuts here are made in loess. Approximately 20 feet is exposed.
- 1.0 56.6 Note shale outcropping below loess in ditch on right.
- 0.2 56.8 The road is on a terrace along the Rock River Valley.
- 1.1 57.9 Outcrop of Pennsylvanian sandstone and black shale on right in ditch.
- 0.0 57.9 Stop 6. Discussion of Rock River Valley.

Like the Mississippi, the story of the Rock River is interesting and enlightening. Further upstream, the Rock River Valley

is very ancient, but in this section of Illinois it was not established until the erosion of the Cordova Gorge.

Many terraces at several levels, extensive sand dunes and thick loess deposits adjacent to the Rock Valley tell a story of vast quantities of glacial meltwater flowing down the valley during the retreat of successive Wisconsinan glacial advances further east. The terraces record former levels of the Rock Valley floor when it was filled to the top of the terraces with glacial outwash sediments deposited by the meltwaters.

Along Rock Valley through almost its entire length, are numerous rock exposures, hence the name Rock River. In the small stream on the right side of the road occur Pennsylvanian sandstone underlain by black shale. A thin coal seam lies a few feet below the stream level beneath the black shale.

- 2.8 60.7 SLOW. 19th Street. Turn left. Obey the traffic signals. We are traveling on U. S. 6 and U. S. 150 and Illinois 92. Speed limit 50 miles per hour.
- 1.0 61.7 Bridge over the Rock River.
- 0.5 62.2 SLOW. Junction 6 and 92.
- 0.2 62.4 CAUTION. Traffic signals. Obey the traffic signals, continue ahead on highway 150.
- 0.4 62.8 Note the terrace on the south side of the Rock River Valley.
- 0.3 63.1 SLOW. Continue straight ahead on Indian Bluff road.
- 0.9 64.0 Indian Bluff Forest Preserve road. Continue straight ahead.
- 1.1 65.1 Bridge over Case Creek.
- .2 65.3 Note the low terrace in the Rock River Valley.
- 0.1 65.4 STOP. Turn right. CAUTION on entering Knoxville road.
- 0.1 65.5 Bridge over Mill Creek.
- 0.1 65.6 Note the Black Hawk Watch Tower on the bluff to far right.
- 0.1 65.7 Turn left into Milan Quarry road.
- 0.3 66.0 Stop 7. Collinson Bros. Quarry (Milan). CAUTION. STAY OFF THE QUARRY FACE.

This large quarry exposes a vertical thickness of over 85 feet of Devonian strata. The Devonian is divided into three formations, the Wapsipinicon, Cedar Valley and Grassy Creek.

In the lower part of the quarry, 40 feet of Wapsipinicon Limestone is exposed. The formation is made up of thick layers of a grayish white, cream, or gray brown, very fine-grained to dense rock, which in places shows fine, wavy laminations, and in others is brecciated (broken into fragments and re-cemented). This brecciation is confined within individual layers. No fossils are present in these layers, which presumably formed as a chemical precipitate in waters other than normal sea water.

The top of the Wapsipinicon Formation in the quarry is somewhat broken and irregular, and the sediment of the overlying Cedar Valley Formation has penetrated along joints and cracks in the lower limestone. This indicates a lapse of time between the deposition of the two limestone formations. Such a structure is called an unconformity.

The limestone layers of the Cedar Valley Formation are present chiefly in the south face of the quarry, to a thickness of over 40 feet. All of these layers carry marine fossils, although the types change at various levels.

The lowest Cedar Valley unit is a light bluegray, rather coarse limestone which breaks into high blocks under quarrying action. It is about 5 feet thick and notable for the abundance of corals.

Above this coral layer is about a 35-foot thickness of dull bluish gray earthy limestone containing considerable shale, especially in the middle portion, where it is weakest. At some levels brachiopods and other fossils weather out. In the fresh rock, pelecypods (clams) are common at some levels.

Forming the rim of the quarry are about 8 feet of buff-colored limestone in thin layers that are jammed with crinoid columns. Beautiful lacy bryozoa occur at some levels, and many other types of fossils reward the patient collector.

Above the crinoidal layers, is a hard grayish layer made up almost entirely of corals, and still higher, in patches upon the stripped bedrock surface above the quarry are remnants of a layer studded with large brachiopod shells.

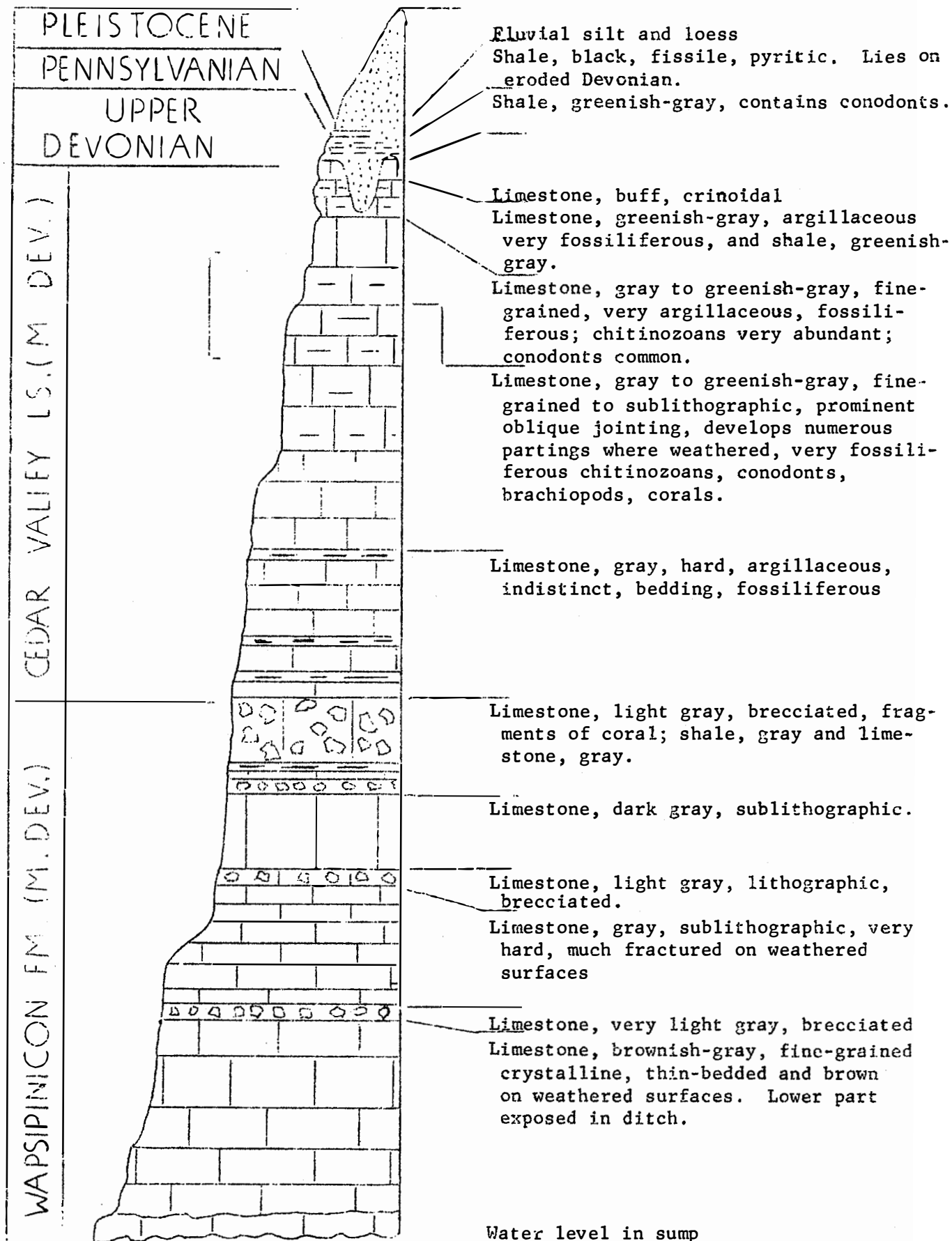
This quarry exposes the finest Devonian section in northwestern Illinois. In spite of this, all of the Devonian strata are not exposed here. Lower strata (Wapsipinicon) occur along the Mississippi at Rock Island and the arsenal. Higher strata are near Andalusia.

Pennsylvanian Sinkholes At a number of levels and places in the quarry, the Devonian rocks are weathered and altered and in contact with patches of sandstone, conglomerate, shale and coal.

These "invading" rock masses are of much later Pennsylvanian age. The origin of these features are explained on pages 2 and 3. A complete section of the Milan Quarry appears on the next page. The section was furnished by Dr. Charles Collinson, nephew of the owners of the Quarry. Dr. Collinson is Associate Geologist in charge of the Paleontology Section at the Illinois State Geological Survey. As a boy, Dr. Collinson passed many hours collecting fossils at this quarry. To the youngsters on the trip, we hope this will be an enjoyable experience, perhaps even the beginning of a career in paleontology, as it undoubtedly was for Dr. Collinson.

Drive carefully on your way home.

Revised March, 1965



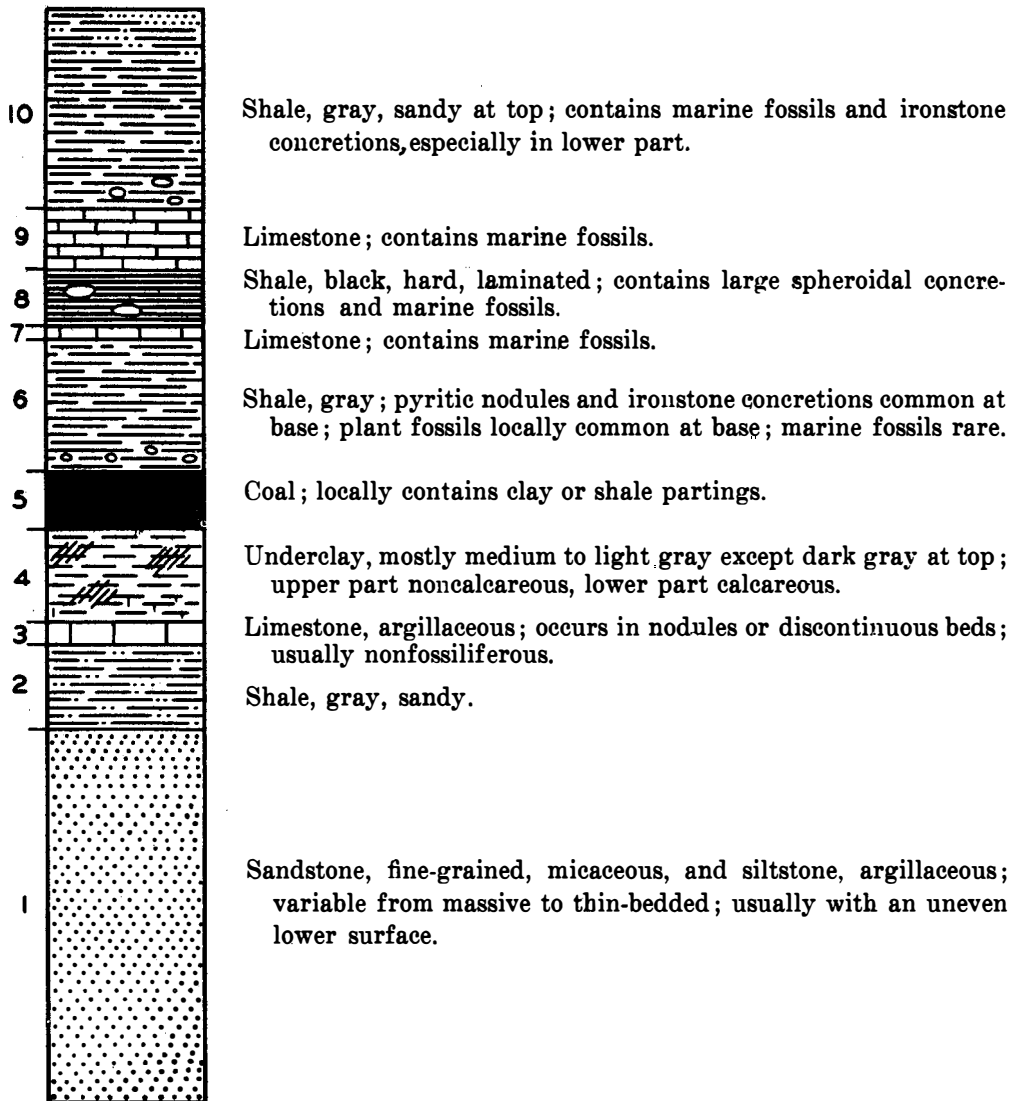
Milan Quarry: E $\frac{1}{2}$, NW $\frac{1}{2}$, Sec. 25, T. 17 N., R. 2 W., Rock Island County (Milan Quad).

GEOLOGICAL COLUMN - MILAN AREA

ERAS	PERIODS	SERIES OR GROUP	REMARKS
Cenozoic	Quaternary	Pleistocene	Till, loess, terraces.
	Tertiary	Pliocene Miocene Oligocene Eocene Paleocene	Not present in Milan area.
Mesozoic	Cretaceous		Not present in Milan area
	Jurassic		Not present in Illinois
	Triassic		Not present in Illinois
Paleozoic	Permian		Not present in Illinois
	Pennsylvanian	McLeansboro	Not present in Milan area.
		Kewanee	Present in eastern Henry County.
		McCormick	Shale, coal, underclay, sandstone, siltstone.
	Mississippian	Chesterian	Not present in Milan area.
		Valmeyeran Kinderhookian	Not present in Milan area.
	Devonian		Limestone.
Silurian		Dolomite.	
Ordovician		Shale, limestone, and sandstone.	
Cambrian		Shale, limestone, and sandstone.	
Proterozoic Archeozoic	Referred to as Pre-Cambrian Time.		Metamorphic and crystalline rocks.

TIME TABLE OF PLEISTOCENE GLACIATION

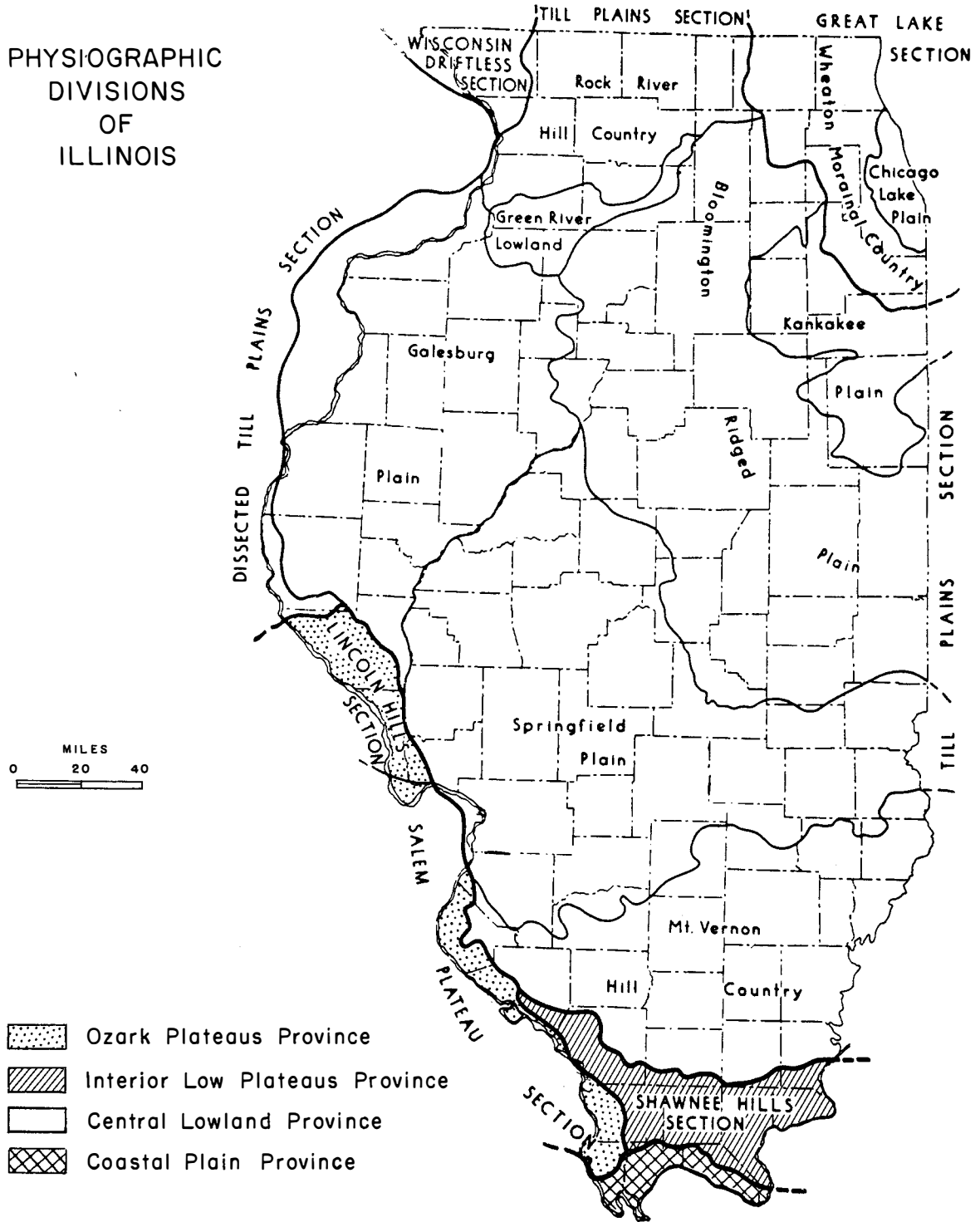
STAGE	SUBSTAGE	NATURE OF DEPOSITS	SPECIAL FEATURES
RECENT	Years Before Present	Soil, youthful profile of weathering, lake and river deposits, dunes, peat	
WISCONSINAN (4th glacial)	5,000		
	Valderan 11,000	Outwash	Outwash along Mississippi Valley
	Twocreekan 12,500	Peat and alluvium	Ice withdrawal, erosion
	Woodfordian	Drift, loess, dunes, lake deposits	Glaciation, building of many moraines as far south as Shelbyville, extensive valley trains, outwash plains, and lakes
	22,000 Farmdalian	Soil, silt, and peat	Ice withdrawal, weather- ing, and erosion
	28,000 Altonian	Drift, loess	Glaciation in northern Illinois, valley trains along major rivers, Winnebago Drift
SANGAMONIAN (3rd interglacial)	50,000 to 50,000	Soil, mature profile of weathering	
ILLINOIAN (3rd glacial)	JUBILEEAN	Drift	Glaciers from northeast at maximum reached Mississippi River and nearly to southern tip of Illinois
	MONICAN	Drift	
	Liman	Drift	
YARMOUTHIAN (2nd interglacial)		Soil, mature profile of weathering	
KANSAN (2nd glacial)		Drift, loess	Glaciers from northeast and northwest covered much of state
AFTONIAN (1st interglacial)		Soil, mature profile of weathering	
NEBRASKAN (1st glacial)		Drift	Glaciers from northwest invaded western Illinois



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)

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