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

GUIDE LEAFLET

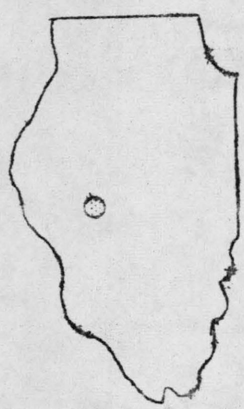
GEOLOGICAL SCIENCE FIELD TRIP

Sponsored by
ILLINOIS STATE GEOLOGICAL SURVEY

BEARDSTOWN AREA

Cass, Schuyler, and Brown Counties

Beardstown, Rushville, Arenzville, Meredosia Quadrangles



Leaders
George M. Wilson, David L. Reinertsen, William Cote

Urbana, Illinois
May 8, 1965

GUIDE LEAFLET 1965B

HOST: Beardstown High School

To the Participants:

The landscape is truly beautiful only when we understand the varied forces that have worked through the ages to develop it. This understanding leads to 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 trips 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.

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

BEARDSTOWN GEOLOGICAL SCIENCE FIELD TRIP

Glacial History of Illinois

A knowledge of Illinois glacial history and the glacial deposits is necessary for full appreciation of many points of geologic interest in the Beardstown area. The following summary is a brief introduction to these subjects and should be read before the field trip begins.

Thousands of years ago much of northern North America was covered by huge glaciers. These glaciers, which advanced from centers in eastern and central Canada, developed when the mean annual temperatures were a few degrees lower than they are now, and the winter snows did not completely melt during the summers. After many years a sheet of ice accumulated that was so thick its weight caused it to flow outward, carrying with it the soil and rocks on which it rested and over which it moved.

The Pleistocene Epoch or "Great Ice Age" began about one million years ago and ended about five thousand years ago. During this epoch, there were four major ages of glaciation, each followed by a long interglacial age characterized by climatic conditions much as they are today.

The oldest glacial age is the Nebraskan, named after the state of Nebraska where extensive Nebraskan deposits are buried beneath the younger glacial deposits. In Illinois the Nebraskan deposits are also buried. A warm climatic interval, called the Aftonian (interglacial) Age, followed the retreat of the Nebraskan glacier.

The next glacial climate produced the Kansan glacier which left thick deposits of fine rock materials and outwash sand and gravel in Illinois when it melted away. The Kansan Age was followed by the Yarmouthian (interglacial) Age. During this age erosion carved valleys and hills, and soils were formed in the Kansan deposits.

The third glacial age, the Illinoian, is particularly important to the residents of Illinois. It covered 80 percent of the state, reaching southward to Carbondale and Harrisburg. After several thousand years, a warm age caused the Illinoian ice sheet to melt. During this warm age, the Sangamonian, the upper part of the deposits left by the glacier was weathered and soil developed, as in the preceding Yarmouthian interval. These ancient Sangamonian soils resemble present-day soils in color, texture, and depth, suggesting that the climate during interglacial times was similar to our present climate.

The last and most recent glacial age in Illinois was the Wisconsinan, which began about 70,000 years ago. The Wisconsinan comprised three major glacial advances--the Altonian, the Woodfordian, and the Valderan. Little is known about the extent of the Altonian glacier, as its deposits were overridden by later glaciers, except in northern Illinois. The Woodfordian glacier advanced southward from the Lake Michigan basin to the present sites of Shelbyville, Decatur, Charleston, and Peoria. The Valderan glacier reached its maximum extent near Milwaukee, Wisconsin, and did not enter Illinois.

When the glaciers melted, they released the rock materials they had picked up as they advanced. These materials are called "glacial drift." Some of the glacial drift was washed out with the meltwaters. The coarsest material carried

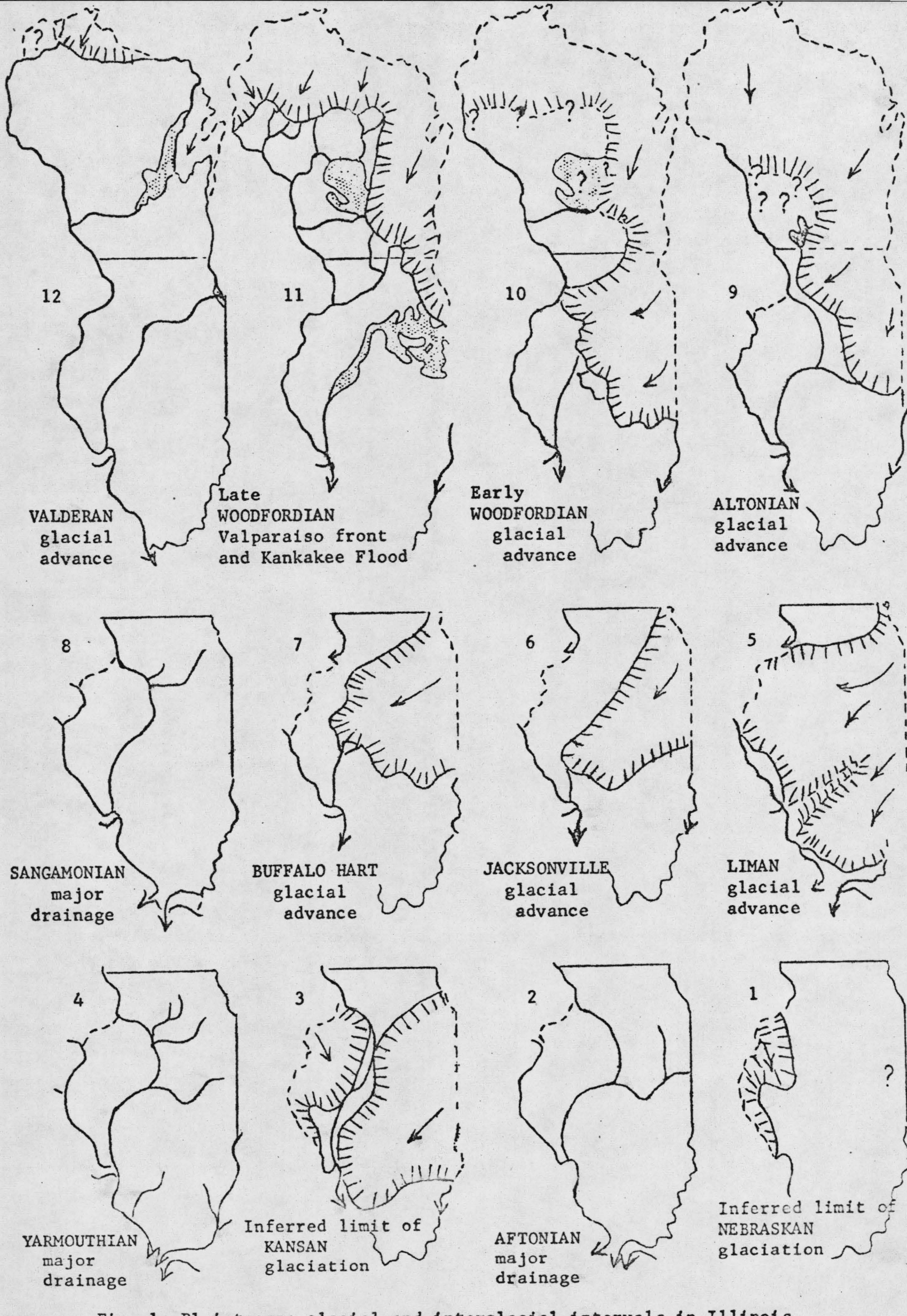


Fig. 1. Pleistocene glacial and interglacial intervals in Illinois

by the meltwater was deposited nearest the ice front, and the finer material was carried farther away, with the finest clay possibly carried all the way to the ocean. Where the outwash material was spread widely along the front of the glacier, it formed an outwash plain. Where the outwash was restricted to the stream valleys, it formed valley train deposits.

Glacial drift deposited directly by the ice is called till. It is unsorted and unstratified and consists of a mixture of all kinds and sizes of rock fragments. As the Wisconsinan glacier retreated, the ice withdrawals and readvances created a complex sequence of till deposits in northeastern Illinois, the most outstanding of which are end moraines. More than 50 successive end moraines were formed by the Wisconsinan glacier in Illinois alone. The major ones are shown on the accompanying glacial map of northeastern Illinois.

And end moraine is an accumulation of drift at the ice margin when the rate of advance and the rate of melting of a glacier are essentially in balance. As more and more rock debris is brought to the edge of the glacier, it piles up and forms a ridge.

The surface relief of end moraines is generally greater than that of the surrounding area and is referred to as swell-and-swale or knob-and-kettle topography. At some places there are large gaps in the moraines where subglacial streams presumably carried away most of the drift. The flatter areas behind end moraines are called ground moraines or till plains.

At times, especially in the fall and winter, the meltwaters subsided, exposing the valley trains. The wind picked up silt and fine sand from their surfaces and dropped them on the bluffs and uplands to form deposits of loess. Loess mantles most of Illinois. Near the large river valleys it may be as much as 60 to 80 feet thick. It thins away from the valleys.

The importance of the Pleistocene Epoch is emphasized by the rich soils formed from the glacial deposits and by the abundant deposits of sand and gravel. The state would not have these valuable resources if the glaciers had not invaded Illinois.

Itinerary

0.0 0.0 Assemble in parking lot on southwest side of Beardstown High School. State and West 15th Street.

0.0 0.0 Enter West 15th Street. Turn left.

0.1 0.1 Bear left. Continue ahead to junction with Route 125.

0.2 0.3 STOP. Junction with Route 125. Turn right.

0.5 0.8 Junction. Routes 100 and 67. CAUTION. Continue straight ahead.

0.5 1.3 West Sixth Street intersection. Continue straight ahead.

0.3 1.6 Enter Illinois River bridge. Excellent view of the Illinois River Valley.

In the Beardstown field trip area the Illinois Valley is the most prominent topographic feature. The broad, flat expanse of the valley floor contrasts sharply with the topography of the adjacent deeply-dissected uplands. The width of the valley is very impressive. In the Beardstown area its width ranges from about 6 to 12 miles, and toward the northeast it broadens to as much as 20 miles in the vicinity of Kilbourne.

In pre-glacial and early Pleistocene time the Illinois Valley was occupied by the Ancestral Mississippi River, which was joined from the east by the Ancestral Mahomet River between Pekin and Havana (see #2, fig. 1). At that time the floor of the valley was 100 to 150 feet below the present floodplain, which is developed upon thick deposits of glacial outwash and Recent alluvium.

Most of the valley fill near Beardstown was deposited during early Woodfordian time. The Bloomington glacier had advanced as far as Peoria (see #10, fig. 1), and when it wasted away, meltwater transported a large amount of outwash downstream. An immense valley train was deposited in the Illinois Valley, extending from Peoria downvalley past Beardstown.

During late Woodfordian time a large quantity of meltwater again poured down the Illinois Valley. This meltwater came from the melting lobes of the Valparaiso glacier which occupied the LakeErie, Lake Michigan, and Saginaw Bay basins (see #11, fig. 1). It flowed down the Kankakee River and then into the Illinois Valley, creating the Kankakee Flood. Meltwater was produced more rapidly than it could be carried away, and several large glacial lakes were formed behind the Wisconsinan end moraines in northeastern Illinois. The Kankakee Flood eroded the surface of the Bloomington valley train in the Beardstown area, scouring channels and reworking the sand and gravel into elongate bars. Additional scouring of the valley train deposits took place again during Valderan time when overflow from glacial Lake Chicago (see #12, fig. 1) flowed down the Illinois Valley. Several terraces, parts of which can be seen along the itinerary, record these post-Bloomington events.

The post-glacial Illinois River has been a rather sluggish stream with a gradient of only 2 inches per mile in the Beardstown area, and at the present time it is aggrading the valley floor.

0.7 2.3 Leave bridge.

0.6 2.9 Junction, Routes 100, 103, and 67. Turn right on Route 100. In the distance note the steep valley wall.

2.0 4.9 Note the coal-loading dock on the right side of the highway. Coal from the Sun Spot Mine, a strip mine operating in the No. 2 Coal at Vermont, Illinois, is brought here by rail and loaded on barges for shipment to Chicago and St. Louis. The No. 2 Coal outcrops in some of the small valleys which are cut into the bluff seen straight ahead.

1.3 6.2 SLOW. Approaching Frederick.

0.2 6.4 Entering Frederick.

0.1 6.5 Turn left. Turn left again onto gravel road.

0.3 6.8 Stop 1. Frederick South Section. Enter pasture gate and walk up lane (northeast) to borrow pit. The material removed from here was used to build flood dikes.

Nearly all of Illinois is covered by deposits of windblown silt, called loess. Geologists generally agree that the loess is eolian in origin and is genetically related to the major meltwater channels which carried outwash from the melting glaciers (see fig. 1). During the Pleistocene Epoch, the winds blew sand and silt, from the floodplains onto the adjacent bluffs and uplands. The sand and coarse silt formed thick deposits close to the valleys, while the fine silt was carried farther and deposited as a progressively thinner blanket across most of the state. As the winds were dominantly from the west, as at present, the deposits are thicker on the east sides of the valleys. In extreme eastern Illinois the loess is only a thin film barely recognizable in the modern soils. Loess deposition was probably more rapid in the fall and early winter when the meltwaters from the glaciers subsided so that large areas of the floodplain sediments could dry out. The valley train of the Ancient Mississippi River was the major source of the loess in the Beardstown area.

Although the Wisconsinan glaciers never reached the Beardstown area, the thick loess deposits record the strong influence they had here beyond the glaciated region. Two Wisconsinan loesses are exposed here at Frederick: the Peoria Loess and the Roxana Silt. The upper loess is the Peoria Loess, which was deposited during Woodfordian time 22,000 to 12,500 years ago (see fig. 1 and Pleistocene timetable). In the Beardstown area the Peoria Loess is buff brown in color and strongly calcareous below the surface soil. The bluff color is typical of the Peoria Loess wherever it is exposed in Illinois. Behind the Shelbyville terminal moraine in northeast Illinois the Peoria is divided into two loess units, the Morton Loess and the Richland Loess. The Morton Loess occurs below the Shelbyville till and is equivalent to the lower part of the Peoria Loess exposed here. The Richland Loess, which is equivalent to the upper part of the Peoria, lies above the Shelbyville and younger Wisconsinan tills. Deposition of the Peoria Loess during Woodfordian time was continuous with no intervals of weathering, so that here on the Illinoian drift plain the Morton and Richland Loesses are not differentiated.

Underlying the Peoria Loess is the Roxana Silt, which was deposited during Altonian time 70,000 to 28,000 years ago. Along the Illinois Valley bluffs in this region the Roxana is very thick and well exposed at many places. It is typically pinkish to chocolate brown, and in or close to the bluffs it is calcareous, but less calcareous than the Peoria Loess. Some zones in the Roxana are non-calcareous, which indicates that deposition was periodically interrupted between advances of the Altonian glaciers long enough for the carbonates to be leached out by weathering. A few miles away from the bluffs where it is thinner, the Roxana is leached throughout. The Roxana is sandy here close to the source valley, but farther away the amount of sand rapidly decreases.

There was a time interval of about 6000 years between the deposition of the Roxana and Peoria Loesses, so that a sharp contact generally is found between them. A weak soil zone that contains dark brown peaty silt, woody material, or humus, is developed in the top of the Roxana in some parts of Illinois. The weathering interval during which this soil was formed is called the Farmdalian and was a period of major withdrawal of the Wisconsinan glacier from Illinois prior to the advance of the Woodfordian glacier. In this area the Farmdalian is represented by the leaching of the upper part of the Roxana Loess.

Description of Frederick South Section

The Roxana Silt is well exposed in the west wall above the pit floor. Numerous calcium carbonate concretions, called "Loess Kindchen" occur in the loess about 3 feet below the top. On the slope just above the pit wall the Peoria Loess is about 25 feet thick, but it is poorly exposed. Several feet of lower Roxana lie below the pit floor, and this lower portion can be seen in rather poor exposure overlying several feet of non-calcareous silty sand along the west side of the lane leading up into the pit. The top of the sand is marked by a strikingly reddish Sangamon Soil 3 to 4 feet thick. Below the silty sand is 3 to 4 feet of light gray to tan stratified, calcareous sand. Parts of the sand are cemented and irregular concretionary lumps of it can be taken out. At the extreme north end of the pit a deep gully is being eroded into the pit floor. This erosion has exposed several feet of Illinoian (Jacksonville) glacial till. In the top of the till is another excellent exposure of the reddish Sangamon Soil.

The Pleistocene deposits offer an exciting challenge to the geologist who attempts to unravel the complex geologic history of the Pleistocene Epoch. Exposures like the one here at Frederick and those at Stops 2 and 5 pointedly illustrate some of the difficult problems that must be solved. The geologist must be thoroughly familiar with the glacial deposits and learn to recognize all possible variations in texture, composition, and color. Indeed, sometimes the same stratigraphic unit in two different places is entirely different in appearance. Therefore, it is important to have some means of determining where you are in the stratigraphic column at all times. Fossils are rare in glacial deposits, and although radiocarbon dating is useful whenever shells or woody material is found, this method is not generally used for deposits older than about 40,000 years. Pleistocene geologists must rely mainly upon key horizons or marker beds. The best key horizons are the ancient buried soils, like the Sangamon Soil exposed here. This soil is also exposed at Stop 2. Try to find this key horizon when we arrive there without looking at the itinerary for help.

0.4 7.2 Note outcrop of sandstone on right side of road.

0.1 7.3 Note rounded loess-mantled on knobs to the right on the upper portion of the hill. These rounded landforms are typical of loess-mantled topography.

0.4 7.7 Bridge across Coal Creek. CAUTION.

0.0 7.7 Crossroads. Turn left. The sloping surface on the left is on the alluvial fan of Coal Creek.

0.2 7.9 Culvert. CAUTION. The road is eroded on both sides.

0.3 8.2 Small culvert. CAUTION. The road is washing out.

0.3 8.5 Small culvert. CAUTION.

0.2 8.7 Culvert. CAUTION.

0.2 8.9 Culvert. CAUTION. Y-intersection. Keep left.

0.1 9.0 Culvert. CAUTION. The small valley on the right contains an outcrop of the No. 2 Coal several hundred feet upstream from the road.

0.4 9.4 Mississippian sandstone outcrop on the right.

0.4 9.8 STOP. Intersection with U. S. 67. In roadcut on the right is an outcrop of Pennsylvanian rocks. Two thin coals, an underclay, black shale, sandstone, and limestone are exposed. The limestone is the Seahorne (?) Limestone. Continue straight ahead across highway. CAUTION.

Much of the bedrock immediately underlying the glacial drift in the Beardstown area is of Pennsylvanian age (about 225,000,000 years old). The Pennsylvanian rocks contain all of Illinois' minable coal beds, whose reserves are estimated to be 137 billion tons.

In addition to the coals, there are many different types of sedimentary rocks in the Pennsylvanian System. In Illinois, the 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 limestone or shale, then sandstone. Similar successions of these different kinds of strata are repeated in much the same sequence at least 50 times where the Pennsylvanian rocks are thickest. Each succession is called a cyclothem. An attached sheet shows ideally complete cyclothems, but seldom do we find all the units present.

The thickness of the Pennsylvanian System and individual cyclothems 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. This interval 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.

There is no area in the world today that has conditions exactly like those which existed during "Coal Measures" time. The many different rock types in the Pennsylvanian system indicate that many rapid and repeated changes of environment took place. At that time, rivers were bringing sediments from the north and east, possibly from as far away as the present Atlantic coast and the region south of the Hudson Bay. The mid-west 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 present-day 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, or lowland plains.

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 trees, which grew to heights of 100 feet or more. The large 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.

At several places along the itinerary we will see Pennsylvanian sedimentary rocks that were deposited when the sea inundated the area.

0.8 10.6 Small culvert. CAUTION. Washouts on both sides.

0.4 11.0 Culvert. CAUTION.

0.1 11.1 Stop 2. Pleistocene Section in abandoned gravel pit. When parking, leave an open lane for traffic.

During Illinoian time (250,000 to 200,000 years ago) there were three glacial advances, the Liman, Jacksonville, and Buffalo Hart. Only the first two reached the Beardstown area (see fig. 1), and drift from both of these glaciations is exposed at this stop. The Liman till, called Mendon, can be seen along the west side of the lane leading into the quarry. The Mendon till overlies a deposit of tough, compact, grayish brown, clayey silt. This is the Petersburg Silt. Notice how sharp the contact is between the Mendon till and the silt, and how running water has fluted the surface of the silt in the drainage ditch. The silt is very calcareous indicating that it must have been deposited very shortly before the Liman glacier passed over the area and was not weathered. The silt is very tough and compact, because it was compacted by the tremendous weight of the overriding glacier. The Petersburg Silt is partly a pro- Illinoian loess derived from the outwash of the advancing Liman glacier. At several locations it contains terrestial snail fossils. However, in many outcrops the silt contains aquatic snails and is well bedded, showing that in some places part of the silt is a water-laid deposit.

This gravel pit exposes a thick deposit of Jacksonville outwash sand and gravel, which was deposited ahead of the advancing Jacksonville glacier. Some zones in the outwash are very coarse with very large boulders. A great deal of swiftly flowing meltwater must have poured through this area in order to form such a very coarse deposit. The outwash exhibits excellent current bedding, or cross-bedding.

The upper 6 feet of the outwash is cemented by calcium carbonate to form a conglomerate. The outwash is unweathered and fresh because it was covered up soon after its deposition by the Jacksonville till. Both the outwash and the Jacksonville till contain a tremendous variety of rock types, so that the rock and mineral collector can easily make a nice collection. There is a large amount of Silurian dolomite and chert from the Niagaran formations of the Lake Michigan Basin. Many Precambrian igneous and metamorphic rocks that are known to have come from eastern Canada can also be collected. A very interesting rock is a jasper conglomerate from northeast of Lake Huron. Excellent specimens of itabirite and jaspillite from the Lake Superior iron ore district also occur in the gravels.

A 4- to 5-foot Sangamon Soil is developed in the top of the Jacksonville till, and about 10 to 20 feet of Roxana Silt are also exposed here. A generalized section of the entire section is shown on the next page.

0.1 11.2 Bridge. CAUTION.

0.3 11.5 Abandoned gravel pit high on the hill to the right

0.7 12.2 Y-intersection. Keep left.

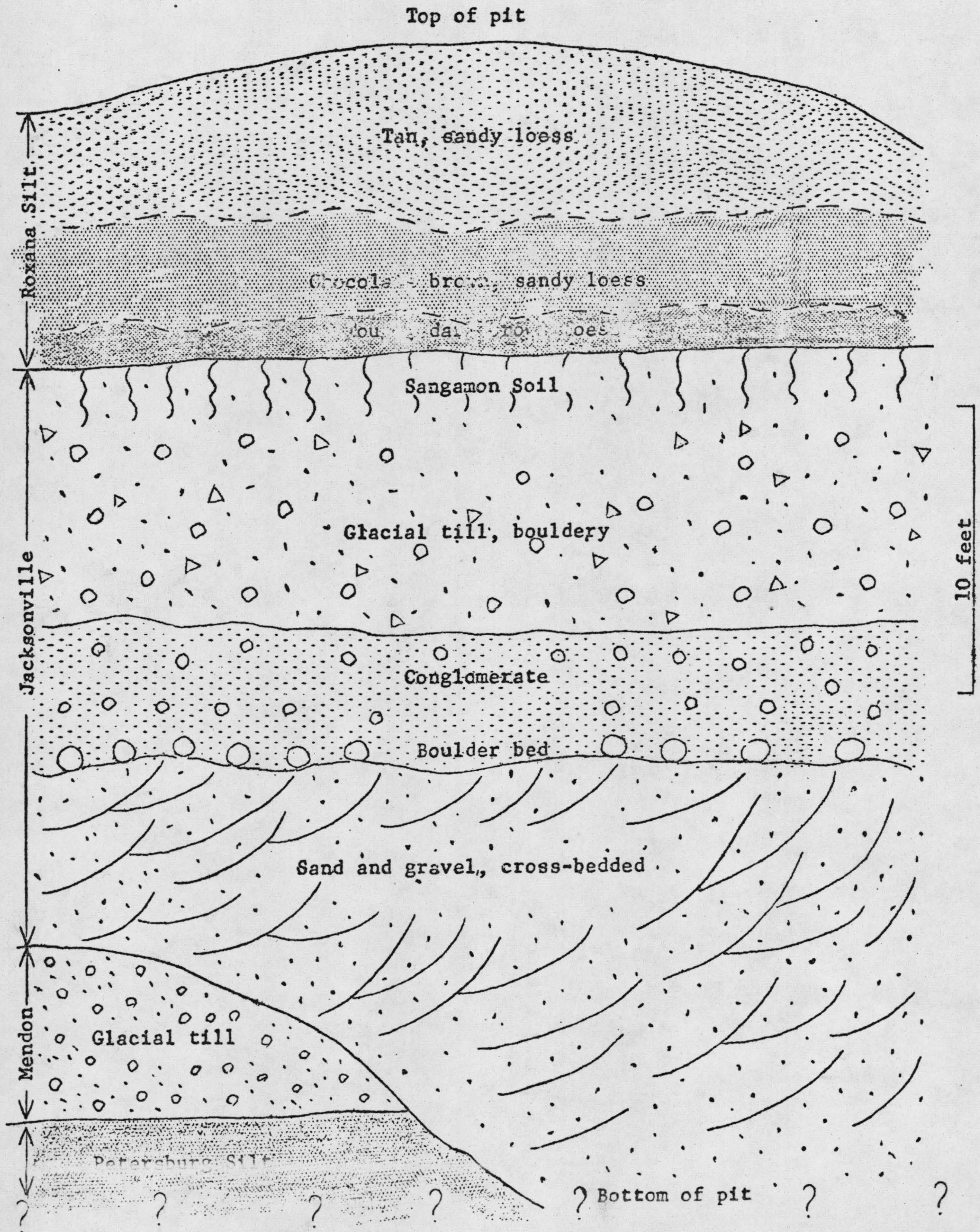


Fig. 2. Generalized vertical section of Pleistocene deposits at Stop 2.

0.1 12.3 Y-intersection with road from right. Proceed down hill--use CAUTION. Keep to the left.

0.1 12.4 Bridge. CAUTION. Keep to left beyond bridge.

0.2 12.6 Note the great width of the Illinois River Valley.

0.5 13.1 CAUTION. Slow down. STOP. Crossroads with State Route 103. Turn right onto highway and continue up hill.

0.5 13.6 Toward the south note the magnificent view of the Illinois Valley.

0.3 13.9 Loess exposure on the right.

0.4 14.3 Note how deeply dissected the upland is here.

1.4 15.7 Country crossroads. CAUTION.

1.6 17.3 Bridge over Town Branch.

1.2 18.5 SLOW.

0.2 18.7 End of Route 103. Junction with U. S. 24. Turn left.

0.5 19.2 Slow down to 5 mph. Proceed through roadcut. Do not stop. In the vertical cuts on both sides are excellent exposures of a Pennsylvanian channel cut into Mississippian Salem Dolomite.

Throughout early and middle Paleozoic time the Mid-continent region (including Illinois) was a low-lying platform across which several ancient, shallow seas advanced and retreated. At the close of the Mississippian Period the Mississippian sea retreated, and a long interval of weathering and erosion occurred prior to the advance of the Pennsylvanian sea. Upon withdrawal of the Mississippian sea a system of streams extended from the north and northeast across the newly emergent sea floor, cutting channels into the Mississippian sedimentary rocks. During this time, several hundred feet of Mississippian rocks including the entire Chester Series and the upper part of the Valmeyeran Series were stripped away in the Beardstown area.

The channel exposed here was probably a small tributary to a larger stream that crossed the early Pennsylvanian landscape (see fig. 3). The sediments filling the channel are fine-grained sandstones, siltstones, and shales of the Pennsylvanian Abbott Formation. These fine-grained sediments indicate that the stream must have been a rather sluggish stream, much like the present Sangamon and LaMoine Rivers. Vegetation and pieces of tree limbs that became water-logged and sank into the channel muds can now be seen as small streaks and patches of coal in channel sediments. When the Pennsylvanian sea advanced across the area, the channel was drowned and became choked with mud and sand. The channel filled up with sediments and later was preserved when buried beneath a cover of marine sediments.

Everywhere in Illinois the basal Pennsylvanian sedimentary rocks are separated from the underlying Mississippian rocks by an erosion surface. Such an erosion surface separating younger sedimentary rocks from older sedimentary rocks is called an unconformity. The Mississippian-Pennsylvanian unconformity can be

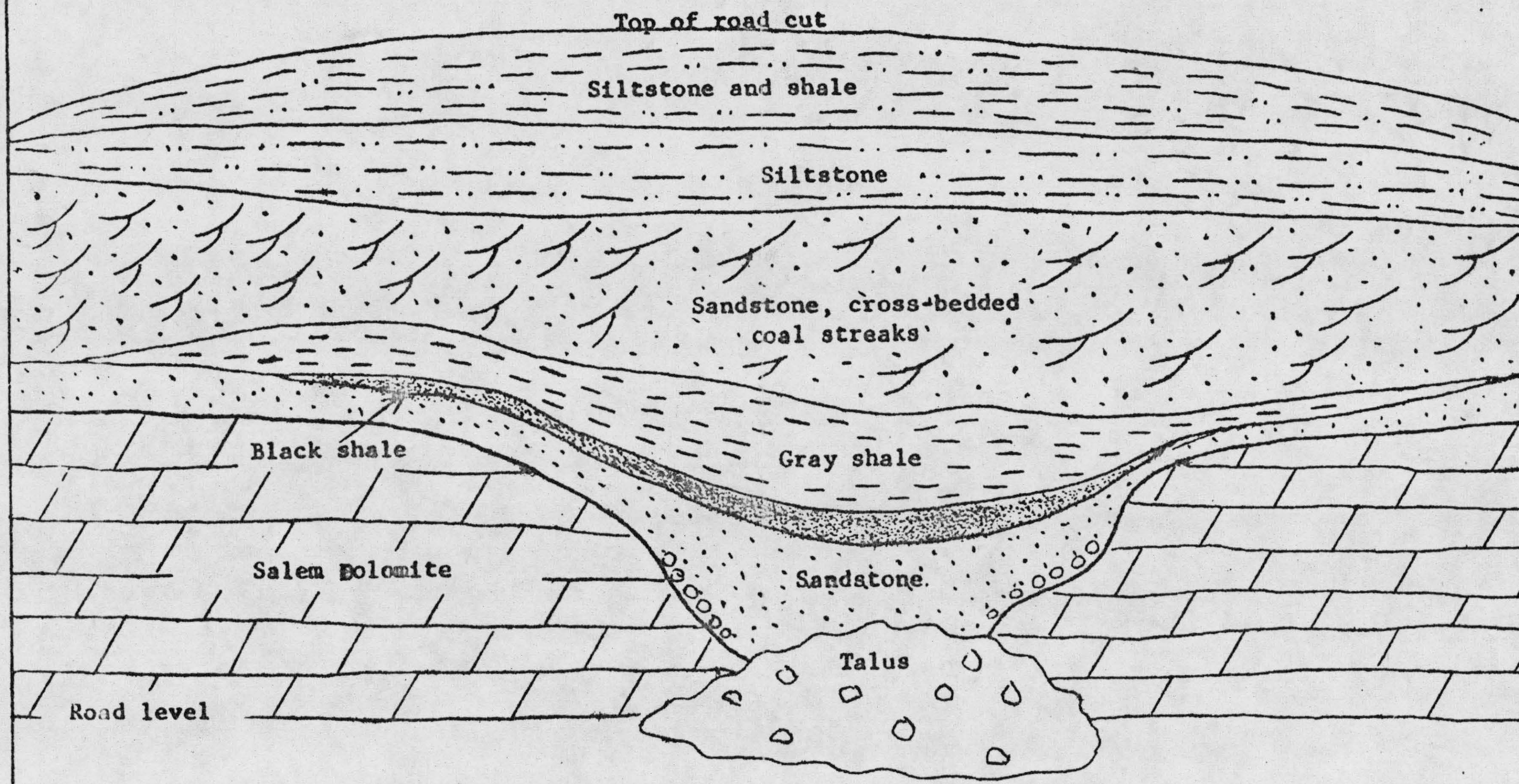


Fig. 3. Pennsylvanian channel in Mississippian Salem Dolomite

seen here as the sharp boundary between the channel sediments and the underlying Mississippian dolomite. Above the contact is a thin, discontinuous conglomeratic zone with chert pebbles.

0.1 19.3 Bridge. LaMoine River.

0.2 19.5 SLOW. Speed zone. Entering village of Ripley.

0.1 19.6 On the right and the left are lower Pennsylvanian coals that occur below the No. 2 Coal. These coals are very thin and discontinuous in this area.

0.4 20.0 Resume safe speed.

2.7 22.7 Rest area on left side of highway.

1.5 24.2 SLOW. Prepare to turn left at Cooperstown marker.

0.2 24.4 Turn left on the gravel road to Cooperstown.

0.7 25.1 SLOW. Continue straight ahead at Cooperstown marker.

1.9 27.0 Entering town of Mt. Sterling. SLOW. Turn left into Brown County High School parking lot.

Stop 3. LUNCH.

0.0 27.0 Leave high school.

0.2 27.2 STOP for Highway 24. Turn right (east).

2.3 29.5 SLOW. Approaching turnoff to Cooperstown.

0.3 29.8 Turn right onto gravel road leading to Cooperstown.

0.2 30.0 Crossroads. Continue straight ahead.

1.3 31.3 T-road. Continue straight ahead.

0.9 32.2 Bridge. Notice slumping on the exposed bank to the left downstream.

1.0 33.2 Y-intersection. Turn right (south).

1.3 34.5 Crossing abandoned Illinoian meltwater channel. Turn left at Y-intersection.

1.7 36.2 T-intersection. Turn left on main road.

0.2 36.4 T-road intersection to the right. Turn right to Cooperstown.

0.2 36.6 Entering hamlet of Cooperstown. SLOW.

0.3 36.9 T-road intersection. Continue straight ahead.

1.1 38.0 Crossing Pleistocene channel.

0.4 38.4 T-road intersection to right. Continue straight ahead.

0.1 38.5 T-road intersection to left. Continue straight ahead.

0.5 39.0 Descending into Pleistocene channel.

0.4 39.4 Culvert. CAUTION. Continue beyond culvert.

Stop 4. Abandoned Pleistocene meltwater channel.

At its maximum extent a lobe of the Jacksonville glacier extended about 15 miles past Beardstown down the Illinois Valley. The ice spilled over the northwest valley bluff, but it advanced only a few miles onto the upland. When the glacier began to waste away, the ice on the upland melted first, while the great mass of the glacier remained in the valley. As the glacier continued to melt, a great quantity of meltwater was produced. Some of the water escaped along the edge of the glacier, but the flood was too great, and water became ponded between the northwest valley wall and the glacier. The water backed up into tributary valleys, such as those of the LaMoine River, Little Creek, Camp Creek, and McKee Creek. The levels of the lakes that formed were raised until they spilled over the interstream divides and flowed from one to another toward the southwest. A series of spillway channels, some of them cut deeply into the upland surface, have been found from Peoria to Versailles. The spillway here carried water from a tributary of the LaMoine River into Baehr Branch of Little Creek. This spillway has good topographic expression, but others can be identified only by the outwash that was deposited in them. The locations of several of these spillways have been marked on the itinerary map.

1.3 40.7 Descend into Illinois Valley.

0.4 41.1 Y-intersection from left. Continue straight ahead and bear right.

0.2 41.3 On the hill to the right are abandoned mines in the No. 2 Coal. The No. 2 Coal here is about two feet thick.

0.3 41.6 This is the former hamlet of LaGrange.

0.2 41.8 Entrance to the LaGrange lock and dam, Corps of Engineers, on the left.

0.1 41.9 Quarry in Mississippian rock on the right. The rock has been used for rip-rap in the lock and dam area by the Corps of Engineers.

0.1 42.0 On the left note the large pile of rock that was taken from this quarry to be used along the river.

0.4 42.4 T-road from right. Continue straight ahead.

0.5 42.9 Abandoned quarry on right side of road.

0.3 43.2 Note the terrace along the left side of the road.

0.7 43.9 T-road intersection to the right. Cars only. Turn right, just short of bridge. Buses will continue straight ahead and cross the bridge. The buses will stop short of the next intersection and wait until all cars have passed before continuing ahead.

0.3 44.2 T-intersection. Keep left.

0.1 44.3 T-road intersection. Turn left.

0.2 44.5 Bridge. CAUTION. 5-ton limit.

0.2 44.7 Stop 5. Illinoian torrential gravel. The deposit is located in an abandoned gravel pit southwest of the house.

The poorly-sorted bouldery gravel exposed here is Jacksonville outwash. The deposit consists predominately of cobbles and boulders which were dumped by torrential meltwater pouring into the head of the glacial lake that had backed up into Little Creek Valley. The swiftly flowing meltwater winnowed away most of the finer materials, leaving a coarse concentration of boulders and cobbles. The formation of such a concentration of coarse material indicates that during its deposition, the Jacksonville glacier was not lying stagnant in the Illinois Valley, but was still in motion, continually replenishing the supply of glacial debris. The cobbles and boulders are very angular and only slightly rounded, so they were not transported very far by the meltwater. After deposition the outwash remained exposed to weathering, and unlike the outwash at Stop 2 which was later covered by glacial till, it is considerably weathered. Notice how badly decomposed and friable many of the granitic boulders are.

0.1 44.8 Culvert. CAUTION.

0.1 44.9 Culvert. DANGER.

0.1 45.0 Y-intersection with gravel road. Enter road with CAUTION. At this point buses will rejoin the end of the caravan. Turn right and continue ahead south and southwest.

1.2 46.2 Notice the exposures of Mississippian dolomite in the bluff on the right.

0.2 46.4 Abandoned quarry in Mississippian dolomite on the right.

0.3 46.7 T-road intersection to the right. Continue straight ahead.

0.1 46.8 T-road intersection to the left. Continue straight ahead.

0.4 47.2 Y-intersection from right. Continue straight ahead and bear left.

0.1 47.3 Bridge.

2.1 49.4 Approaching the village of Versailles. CAUTION. WATCH FOR CHILDREN.

0.6 50.0 Village of Versailles.

0.3 50.3 STOP. Intersection with State Route 99. CAUTION. Continue straight ahead. Buses take alternate route to right.

0.4 50.7 CAUTION. Railroad crossing--two tracks.

1.2 51.9 Mississippian rocks in roadcut on the right.

0.2 52.1 T-road intersection to the right. Continue straight ahead.

0.2 52.3 Stop 6A. Warsaw Shale. Stop to collect fossils. Note the striking vertical variations in rock types in the Warsaw at this exposure.

During Mississippian time the Mid-continent region of North America (including Illinois) was a low, stable platform that was submerged most of the time beneath a warm, shallow sea. Throughout most of the first half of the period, when the sea reached far to the north, the waters were clear, and relatively pure limestones, such as the Salem, St. Louis, and Ste. Genevieve Limestones were deposited over enormous areas on the continental platform. At times, especially during the second half of the period, the sea was more restricted and much sandstone and shale were deposited. While the Mississippian rocks were being deposited, most of Illinois, southwestern Indiana, and northwestern Kentucky were occupied by a slowly-subsiding depression on the sea floor called the Illinois Basin. The Mississippian rocks are thickest in the deepest part of the Illinois Basin in southeastern Illinois, where they total about 2500 feet, but around the edges of the basin, as here in the Beardstown area, they are only 500 to 600 feet thick.

On the west and northwest shelf of the basin the Mississippian limestones, shales, and sandstones interfinger and grade into each other laterally and vertically (see fig. 4). These interfingering sedimentary rocks, called facies, were deposited contemporaneously in different parts of a shallow water deltaic environment. The interfingering of the limestones, shales, and sandstones is due to variations in the amounts of land-derived sand and mud that were carried into an area and deposited at any one time. These variations were due to fluctuations in the rate of supply of sand and mud transported seaward by rivers, and to seaward and landward oscillations of the Mississippian shoreline.

The sandstones occur as tongues and lenses which were deposited in distributary and tidal channels. These sandstones grade laterally into sandy shales and sandy limestones and dolomites. The shales were deposited in quiet water areas between distributary channels and in depressions on the sea floor. The limestones were generally deposited farther from shore than the shales and sandstones, but some limestone was deposited nearer shore wherever the water was clear and mud-free. The limestones are richly fossiliferous, and some zones consist largely of a hash of crinoid and bryozoan fragments broken by wave action. Oolitic and cross-bedded zones also indicate shallow water, high energy conditions.

0.1 52.4 Culvert. CAUTION.

0.3 52.7 APPROACHING DANGEROUS CROSSROADS. Continue straight ahead over brow of hill. Approaching bridge over McKee Creek. 3000 lb. limit.

0.6 53.3 Ascending valley slope onto upland. Toward the north note how wide McKee Creek Valley is. In other places the valley is much narrower where it is cut into more resistant bedrock. Note this on the itinerary map.

0.9 54.2 T-road intersection to the right. Continue straight ahead. Note the landslide scars on some of the hillsides in this area.

1.0 55.2 T-road intersection to the left. Continue straight ahead.

0.1 55.3 T-road intersection to the left. Continue straight ahead.

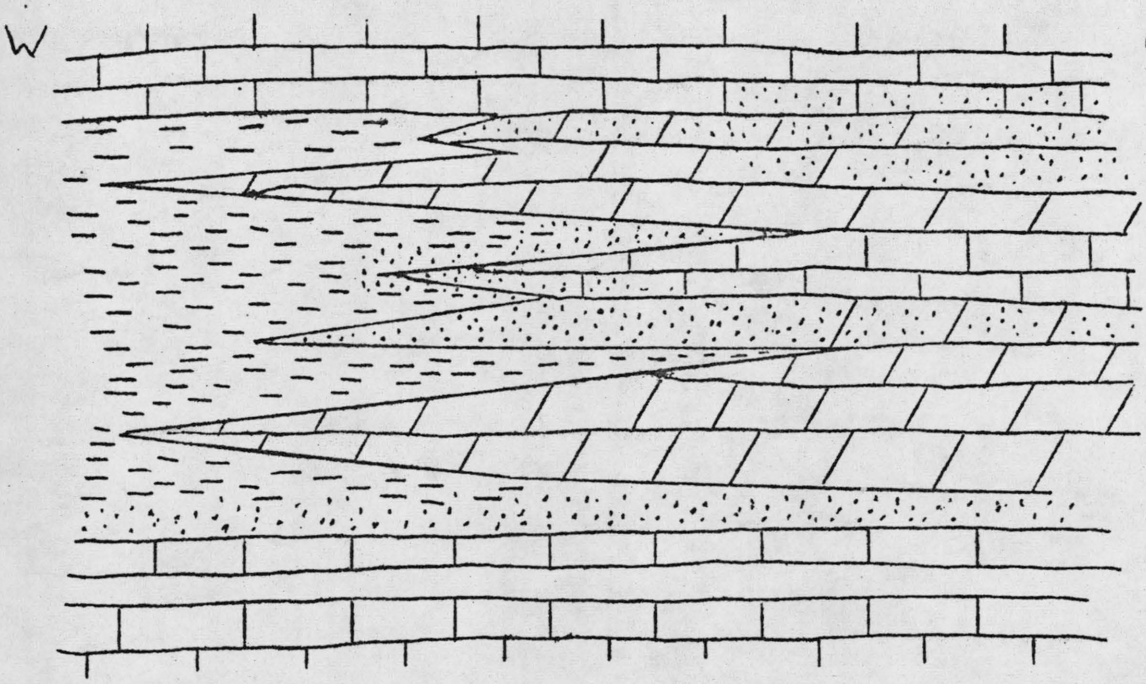


Fig. 4. Hypothetical cross-section illustrating kinds of facies relationships in Mississippian sedimentary rocks of western Illinois.

0.5 55.8 T-road intersection to the left. Continue straight ahead.

0.1 55.9 T-road intersection to the right. Continue straight ahead.

0.7 56.6 STOP. Intersection with Route 107. Turn right and proceed down hill. SLOW. Buses will rejoin the caravan here.

0.7 57.3 Stop 6. Quarry in Salem Limestone.

The Mississippian rocks here consist predominantly of dolomite and limestone with minor amounts of sandstone and shale. About 25 feet of brown dolomite underlies the quarry floor. The dolomite is fossiliferous, but the fossils have been largely destroyed by dolomitization.

Above the quarry floor is about 6 to 10 feet of coarse-grained, cross-bedded fragmental limestone (Salem ?), which consists of a hash of fossil fragments. This limestone was quarried for building stone, and is similar to the Salem Limestone, known as the "Indiana Limestone", that is quarried for building stone in Indiana.

Section exposed in north quarry face

		Ft.	In.
Penn.	Fireclay, buff-tan, silty	1	6
	Shale, light gray, fine, well laminated	2	
	Coal zone, carbonaceous shale		½
	Siltstone, gray, carbonaceous, Stigmaria	2	
	Siltstone, medium gray, Stigmaria		10

Section exposed in north quarry face (Continued)

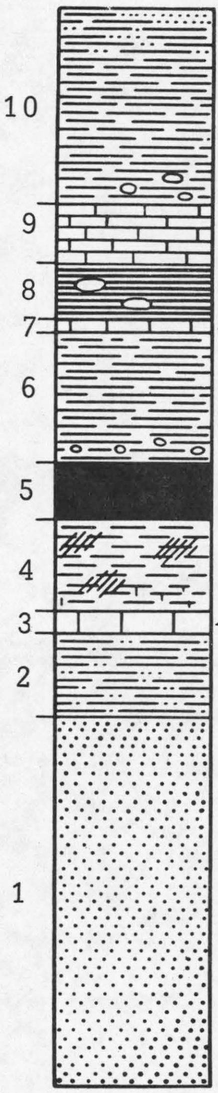
		Ft.	In.
Penn.	Sandstone, loose, clayey, light gray	1	5
	Clay, mottled, green		10
Mississippian	Limestone, weathered and oxidized, bright red with opalescent chert in and under the limestone	½-2	
	Shale, green, silty, with irregular nodules of chert	3	
	Siltstone, dolomitic with shale laminations, fossiliferous	4	
	Shale, gray, medium grained, well laminated	2	
	Siltstone, gray, fine, with medium gray shale interlaminations	4	
	Dolomite, buff	1	6
	Limestone, light gray, oolites and Endothyra	6	
	Dolomite, gray, silty	1	6
	Siltstone, dark gray, fossiliferous		6
	Dolomite, buff	10	

End of trip.

Drive carefully on your way home.

GEOLOGICAL COLUMN - Beardstown Area

ERAS	PERIODS	EPOCHS	REMARKS
Cenezoic	Quaternary	Pleistocene	Recent alluvium Wisconsinan loess Illinoian drift. Kansan drift?
	Tertiary	Pliocene Miocene Oligocene Eocene Paleocene	Not present in Beardstown area.
Mesozoic	Cretaceous		Not present in Beardstown area.
	Jurassic		Not present in Illinois.
	Triassic		Not present in Illinois.
Paleozoic	Permian		Not present in Illinois.
	Pennsylvanian	McLeansboro	Shale, coal, underclay, sandstone, limestone.
		Kewanee	Shale, coal, underclay, sandstone, limestone.
		McCormick	Shale, coal, underclay, sandstone, limestone.
	Mississippian	Chesterian	Not present in Beardstown area.
		Valmeyeran Kinderhookian	Limestone, shale, and sand-stone, in outcrop.
	Devonian		Black shale and limestone in deep wells.
	Silurian		Limestone.
	Ordovician		Shale, limestone, and sandstone.
	Cambrian		No data available.
Proterozoic Archeozoic	Referred to as Precambrian.		No data available.



Shale, gray, sandy at top; contains marine fossils and ironstone concretions, especially in lower part.

Limestone; contains marine fossils.

Shale, black, hard, laminated; contains large spheroidal concretions and marine fossils.

Limestone; contains marine fossils.

Shale, gray; pyritic nodules and ironstone concretions common at base; plant fossils locally common at base; marine fossils rare.

Coal; locally contains clay or shale partings.

Underclay, mostly medium to light gray but dark gray at top; upper part noncalcareous, lower part calcareous.

Limestone, argillaceous; occurs in nodules or discontinuous beds; usually nonfossiliferous.

Shale, gray, sandy.

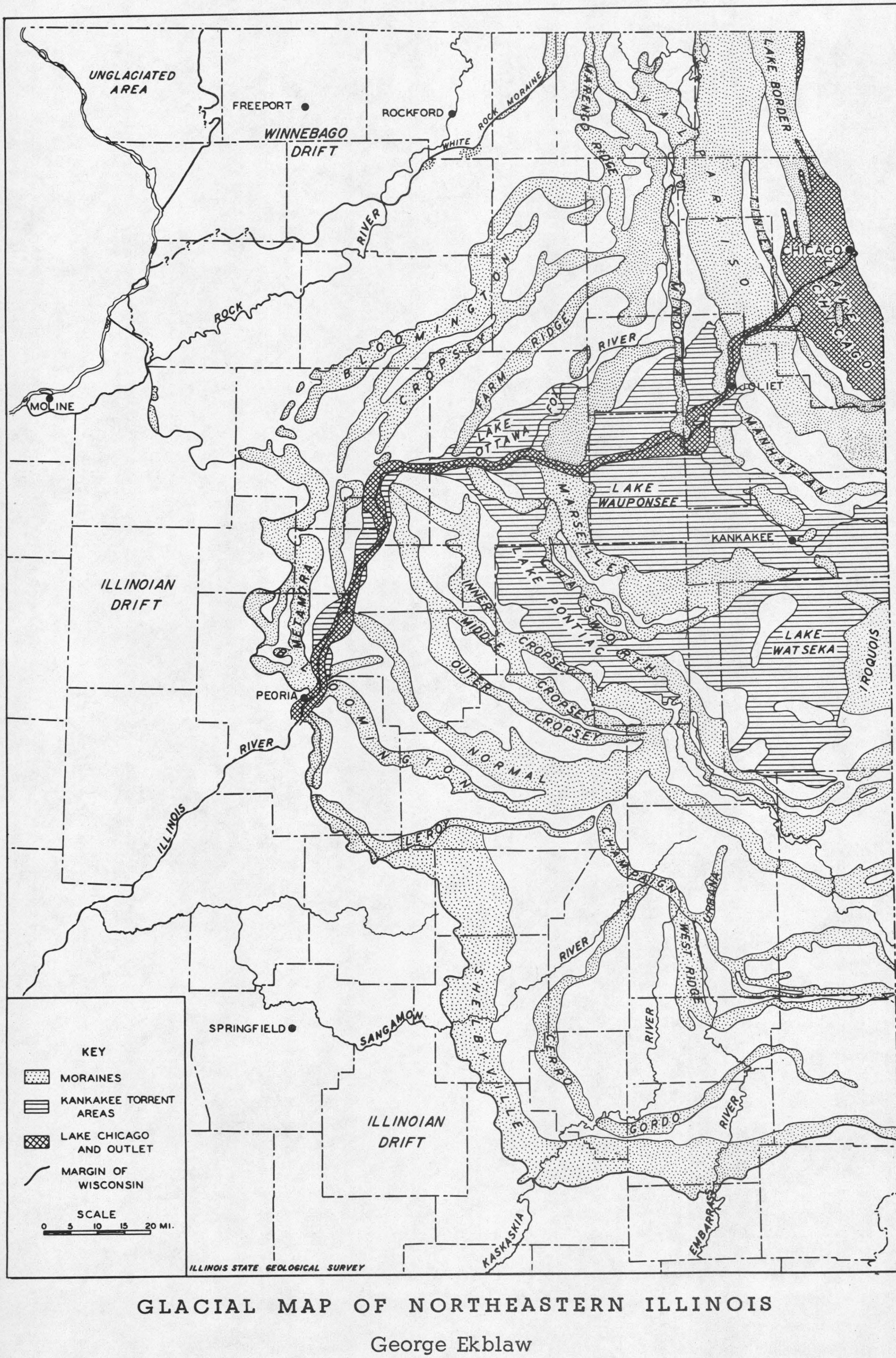
Sandstone, fine grained, micaceous, and siltstone, argillaceous; varies from massive to thin bedded; usually has an uneven lower surface.

AN IDEALLY COMPLETE CYCLOTHEM

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

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

Stage	Substage	Nature of Deposits	Special Features
Recent		Soil, youthful profile of weathering, lake and river deposits, dunes, peat	
Wisconsinan	5,000 yrs. Valderan 11,000 yrs.	Outwash	Outwash along Mississippi Valley
	Twocreekan 12,500 yrs.	Peat and 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 years	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)	Buffalo Hart Jacksonville Liman	Drift Drift Drift, loess	Glaciers from northeast at maximum reached Mississippi River and nearly to southern tip of Illinois
Yarmouthian (2nd interglacial)		Soil, mature profile of weathering, alluvium, peat	
Kansan (2nd Glacial)		Drift Loess	Glaciers from Northeast and northwest covered much of state
Aftonian (1st interglacial)		Soil, mature profile of weathering, alluvium, peat	
Nebraskan (1st Glacial)		Drift	Glaciers from northwest invaded western Illinois



GLACIAL MAP OF NORTHEASTERN ILLINOIS

George Ekblaw

Revised 1960


BEARDSTOWN
GEOLOGICAL SCIENCE FIELD TRIP
MAY 8, 1965
R3W
R2W
R1W
R1E
T19N
T1N
T18N
Start
2
3 Lunch
4
5
6A
End 6B
T1S
T17N
T2S
T16N
R2W T2S
R13W
R12W
MT STERLING
WOODSTOCK
BAINBRIDGE
BEARDSTOWN
VERSAILLES