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

GUIDE LEAFLET

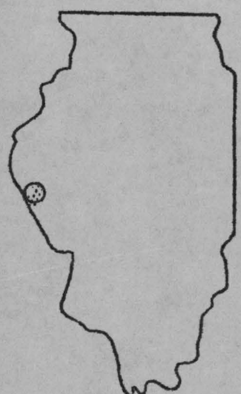
GEOLOGICAL SCIENCE FIELD TRIP

Sponsored by
ILLINOIS STATE GEOLOGICAL SURVEY, URBANA

QUINCY AREA

Adams and Pike Counties

Quincy and Barry Quadrangles



Leaders
George Wilson, David Reinertsen, William Cote, and Robert Major
Urbana, Illinois
May 7, 1966

GUIDE LEAFLET 1966 B HOST: Quincy Senior High School

QUINCY 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 Quincy 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 (see figure 1 and attached Pleistocene Time Table).

The oldest glacial age is the Nebraskan, named after the state of Nebraska where extensive Nebraskan deposits are buried beneath the younger glacial drift. In Illinois the Nebraskan deposits are also buried, and there are only rare exposures of Nebraskan till. A warm climatic interval called the Aftonian (interglacial) Age followed the melting of the Nebraskan glacier, and a soil was formed in the top of the Nebraskan drift.

The next glacial climate produced the Kansan glacier, which left thick deposits of till 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 a soil was 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 (fig. 2), reaching southward to Carbondale and Harrisburg. After several thousand years, a warm age, called the Sangamonian, caused the Illinoian ice sheet to melt away. During Sangamonian time, the upper part of the deposits left by the Illinoian glacier was weathered and a soil developed, as in the preceding Yarmouthian and Aftonian intervals. 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, the rock materials carried by the ice were deposited. These materials are called glacial drift. Some of the glacial drift

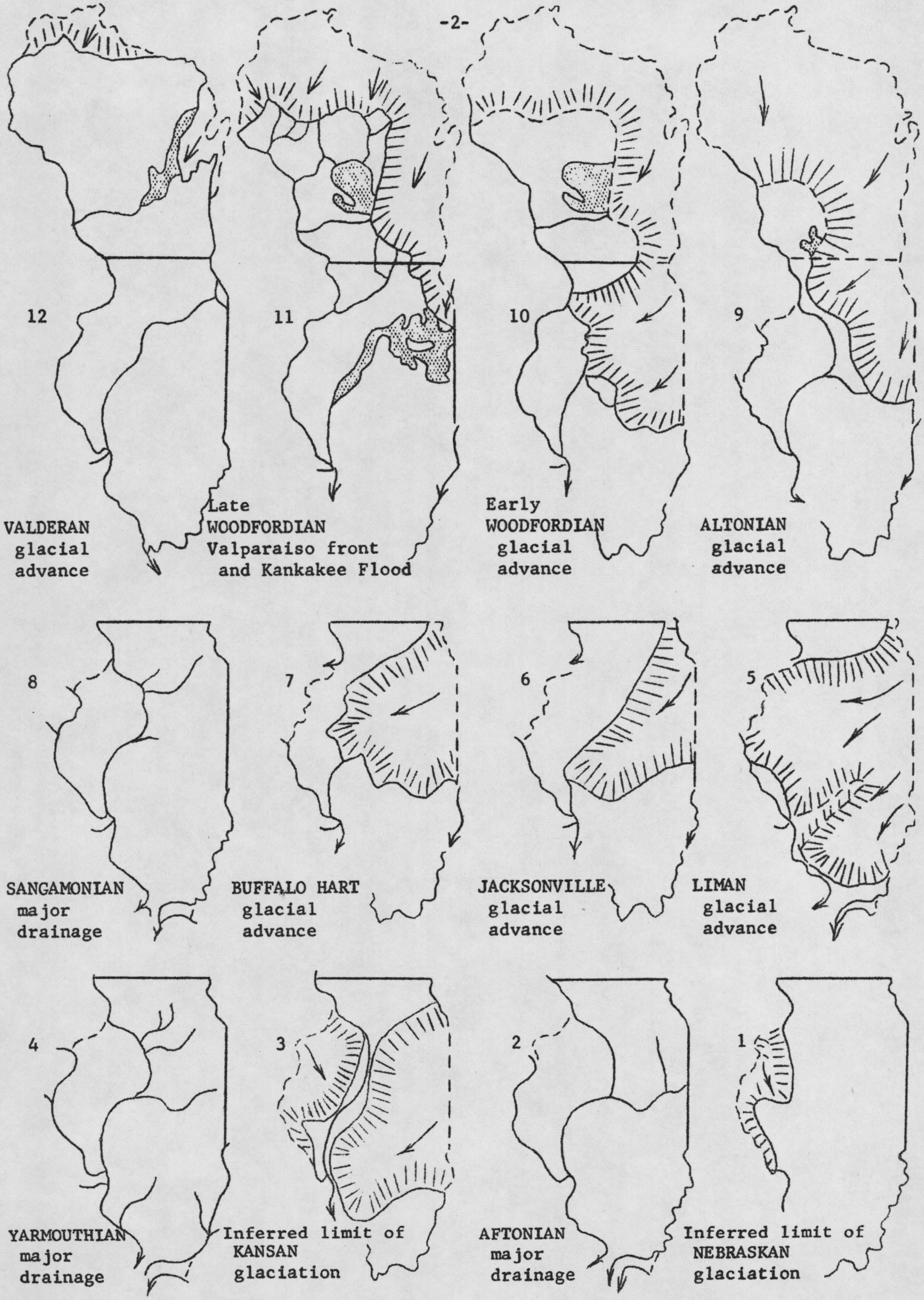


Fig. 1 - Pleistocene glacial and interglacial intervals in Illinois

was washed out with the meltwaters. The coarsest material (gravel, sand) carried by the meltwater was deposited nearest the ice front, and the finer material (silt, clay) was carried farther away, some all the way to the sea. Where the outwash material was spread widely along the front of the glacier, outwash plains were formed. Where the outwash was deposited in the stream valleys it formed valley train deposits. Many valley trains in Illinois are buried beneath younger glacial drifts.

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.

An end moraine is an accumulation of till and outwash deposited along an ice margin when the rate of advance and the rate of melting of a glacier were essentially in balance. As more and more rock debris was carried to the edge of the glacier, it piled up and formed 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. 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 floodplains and dropped these materials on the bluffs and uplands to form deposits of loess. Loess mantles most of Illinois. Near the large river valleys, such as the Mississippi, it is as much as 60 to 80 feet thick, but it thins rapidly away from the valleys.

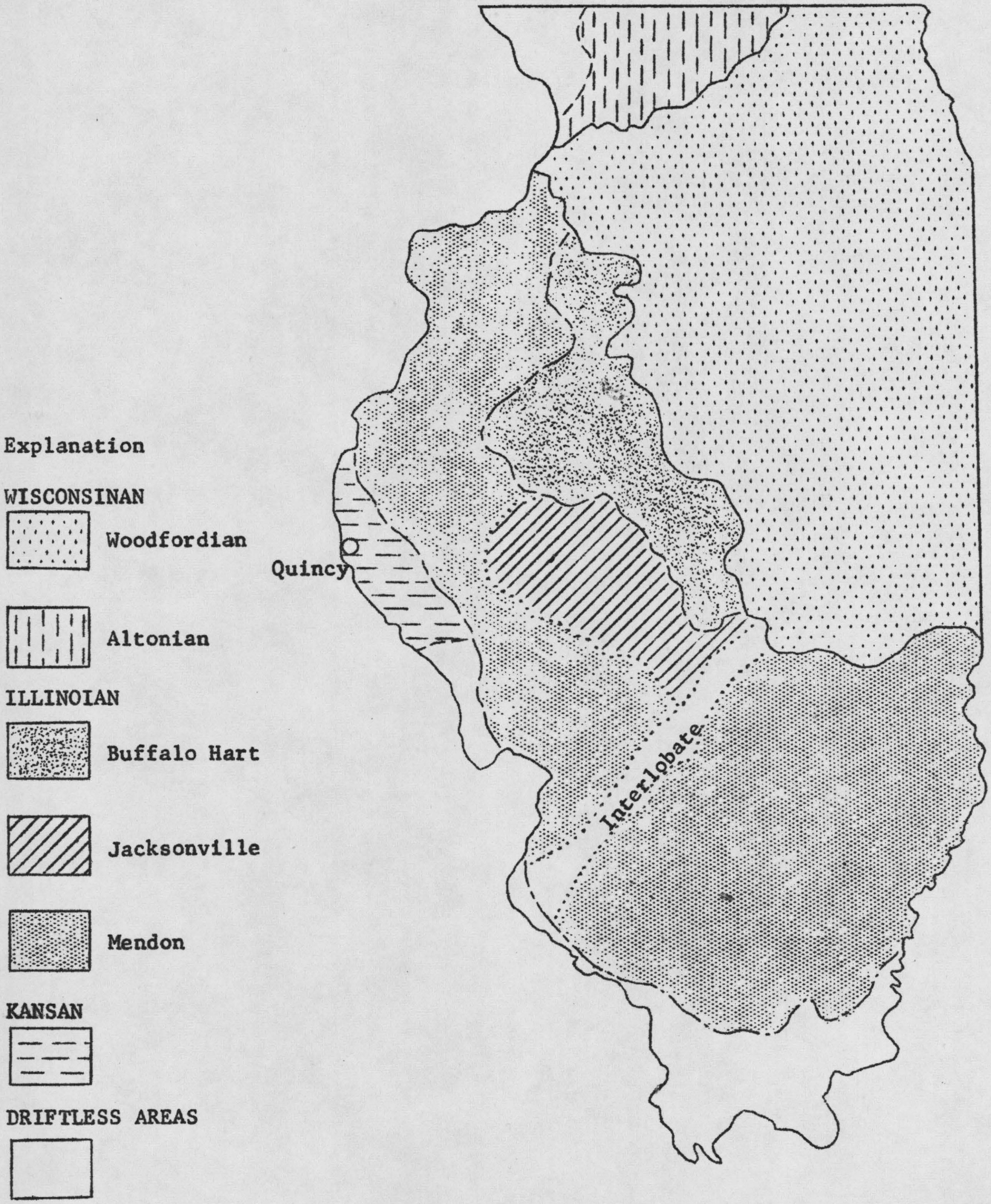
The importance of the Pleistocene Epoch to Illinois is emphasized by the rich soils formed in the glacial deposits and by the abundant deposits of sand and gravel. The glacial outwash, especially buried valley trains, is an important source of ground water. The state would not have these valuable resources if the glaciers had not invaded Illinois.

Physiography and Geology of the Quincy Area

The Quincy area lies within the maturely Dissected Till Plains Section of the Central Lowlands Province (see attached map). The area was glaciated during Kansan time and probably during Nebraskan time (figs. 1 and 2), although no till of definite Nebraskan age has been found. The field trip area was not glaciated during the Wisconsinan or Illinoian Ages and is located about 15 to 20 miles southwest of the Illinoian glacial boundary (figs. 2 and 3). Glacial deposits, exposed best along stream valleys, include Nebraskan outwash, Kansan till and outwash, Illinoian loess and outwash, and Wisconsinan loess. Wisconsinan outwash forms extensive fill in the Mississippi River Valley.

Drainage of the area is southwestward toward the Mississippi River which occupies a fairly narrow, rock-walled gorge cut into Mississippian limestones. Erosion of the valley probably started during late Tertiary time, but the major deepening was during early Pleistocene time. Occurrences of Kansan and Nebraskan drift in the tributary valleys indicate that they were also established before the glacial epoch or during early Nebraskan time. Glacial drift in the area is thin and the Kansas till plain is deeply dissected. The topography is rugged and reflects the irregularities of the bedrock surface. Sinkholes formed in the Mississippian limestones occur in the upland adjacent to the valley.

Fig. 2. Areas underlain by tills of the Kansan, Illinoian, and Wisconsinan Stages. Older tills can be traced beneath younger tills in the subsurface.



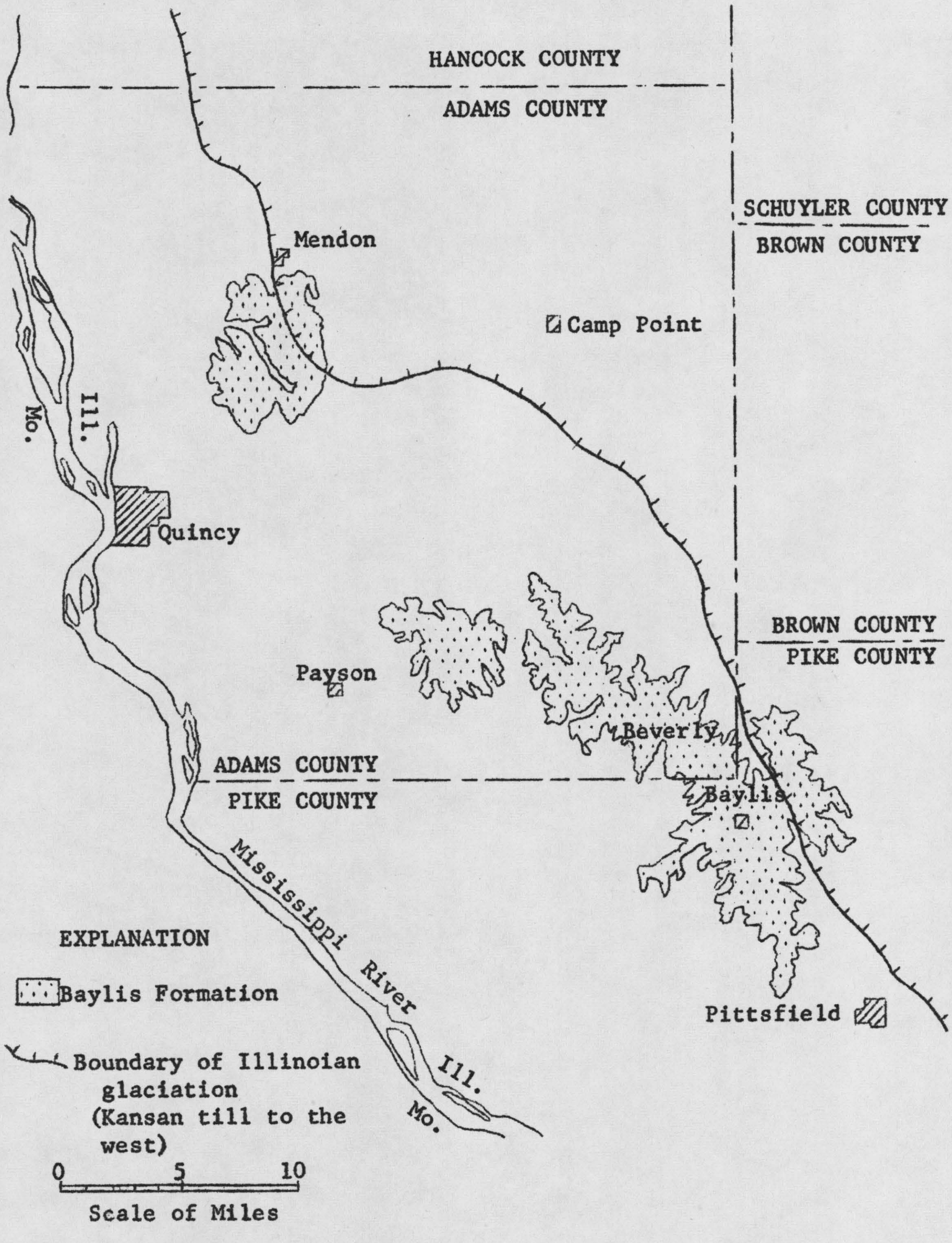


Figure 3 - Map showing the distribution of the Baylis Formation of Cretaceous age in western Illinois and the boundary of Illinoian glaciation.

The rugged topography of the Dissected Till Plains Section contrasts with the younger, more even, and relatively less dissected Illinoian till plain (Galesburg Plain) east of the field trip area. Southward into Pike County the glacial drift thins, and Kansan till occurs sparsely in the northern part of the Lincoln Hills Section. In the southern part, loess is the only glacial material present, and if the area was glaciated by either Kansan or Nebraskan ice, erosion has destroyed the evidence.

Bedrock exposed in the field trip area consists of Mississippian limestones, shales, and siltstones of the Valmeyeran and Kinderhookian Series (see attached geologic map). Limestones predominate in the geologic section, and are the basis of an active quarrying industry. These limestones are extensively exposed along the Mississippi bluff, which marks the northwestern margin of the Illinois Basin, a large structural feature covering most of Illinois. In the southern part of the field trip area, Devonian siltstone and shale are exposed. Farther south near Hannibal, Ordovician limestones are exposed, and in eastern Adams County there are Pennsylvanian rocks. About 10 miles east of the field trip area, Cretaceous sands and gravels are exposed along a topographic high passing through the towns of Beverly and Baylis (fig. 3). These deposits are isolated from known Cretaceous sediments about 200 miles to the east in Iowa and about 240 miles to the south in extreme southern Illinois.

Itinerary

0.0 0.0 Assemble in parking lot on the south side of Quincy Senior High School.

0.0 0.0 Enter 30th Street and turn left (south).

0.2 0.2 STOP. Turn right (west) on Route 96 (State Street).

0.4 0.6 Enter Quincy City Limits.

0.1 0.7 STOP. Turn left (south) on South 24th Street.

1.0 1.7 STOP. Harrison Street. Turn right (west).

1.0 2.7 STOP. Intersection of Harrison Street and South 12th. Turn right (north) on South 12th Street.

0.1 2.8 CAUTION. Turn left onto Jackson Street. Continue ahead (west) on Jackson Street.

0.4 3.2 STOP. South 8th Street. Turn left and continue ahead (south).

0.3 3.5 Turn right and head downhill on the second driveway south of the Indian Mounds Park entrance sign. SLOW.

0.2 3.7 Stop 1. Burlington Limestone in Indian Mounds State Park.

The Burlington is coarse crinoidal limestone and is the most prominent formation in the bluffs from Quincy southward to near Alton, a distance of some 80 miles. It caps the bluff at most places and forms the divide between the Illinois and Mississippi Rivers. Its prominence is partly attributable to the cherty character of the formation which leads to the accumulation of a residual chert cap as weathering proceeds. The residual chert cap inhibits further weathering.

In the Quincy area the Burlington Limestone is 70 to 80 feet thick. The formation thickens southward and in Calhoun County some 60 miles to the south it is 200 feet thick.

The exposure here consists of two lithologically distinct units - an upper very cherty, thin-bedded unit and a lower, less cherty, more massive unit. The lower unit is the upper part of a high-purity limestone member referred to as the "Quincy Beds" and is the basis for the limestone industry just a quarter of a mile to the south. The Quincy Beds exposed here contain more chert than is characteristic. The abundance of chert led to the abandonment of the quarry just south of the Gardner-Denver Plant on Route 57. Farther south the same beds are almost chert-free.

At this stop both fossils and attractive chert specimens can be collected. Especially prominent are the large brachiopods Sprifer grimesi.

Depositional History of the Mississippian Sedimentary Rocks

In the Quincy area the Mississippian formations are exposed along the southern margin of the Illinois Basin (see attached geologic map of Illinois), a sub-circular structural depression 250 to 300 miles in diameter covering most of Illinois, southwestern Indiana, and western Kentucky. The lower Mississippian formations (Kinderhookian) are largely shale, limestone, siltstone, and sandstone; the middle Mississippian (Valmeyeran) formations are dominantly limestone; but the upper Mississippian (Chesterian) formations consist of limestones, sandstones, and shales, with the sandstones and shales dominant.

The Mississippian rocks in the Mississippi Valley are predominantly marine limestones, and most of them are richly fossiliferous. They have a total cumulative thickness of between 2000 and 2500 feet and comprise the type section for which the Mississippian System was named. They thin northward and are beveled by post-Mississippian erosion. Towards the southeast they thicken into the deepest part of the basin.

During Mississippian time, the Midcontinent of North America was a generally low-lying, stable platform. Clear, warm, shallow seas invaded the region, and the Mississippi Valley remained almost continually submerged throughout the Mississippian Period. During the middle part of the period the seas reached far to the north, and relatively pure limestones, such as the Burlington Limestone, were deposited over enormous areas on the continental platform. During the latter part of the period the seas became more restricted, and much sandstone and shale was deposited.

The Mississippian sea in which the limestones were deposited was fairly shallow, probably only a few hundred feet deep. Some of the limestones consist almost entirely of cemented fossil fragments, indicating very shallow water in which wave action was vigorous. Some of the limestones are very cherty, which renders them less desirable for crushed stone for concrete aggregate. Because of its great hardness, the chert is destructive to mining and crushing equipment.

The origin of the chert is not well understood by geologists. It apparently was not deposited in its present form at the same time as the limestones, because most of the chert nodules are fossiliferous and have replaced the limestone. Colloidal and finely-divided silica were probably deposited in small amounts with the limestone, and some was also deposited as the siliceous hard parts of microscopic plants and animals. Later, during solidification of the limestones, this disseminated silica was concentrated by solution and redeposition in the irregular layers and nodules that are seen today.

0.0 3.7 Leave Stop 1. Continue ahead (west).

0.2 3.9 Enter Gardner-Denver parking area. On the right a residual chert deposit occurs above the Burlington Limestone.

Proceed SLOWLY through parking lot and STOP. Gardner Expressway. Turn right on Route 57 and proceed north. At several places along the Expressway the Burlington Limestone is exposed.

0.6 4.5 Behind the Quincy Humane Society note the small channel cut into the limestone.

0.2 4.7 Stop 2. Roadcut in Pleistocene drift over Burlington Limestone on the right side (east) of the highway. PARK AS FAR TO THE RIGHT AS POSSIBLE.

The drift exposed here fills a small bedrock valley of an early Pleistocene tributary to the Ancient Mississippi River. Two till units, an upper reddish gray till and a lower brownish gray till, are present (fig. 4). The contact between the tills is sharp, suggesting an erosion surface, and in the right half of the exposure stratified outwash sands and silts occur between them. The top of the lower till is very cherty. The upper till is also overlain by a thin layer of stratified sand.

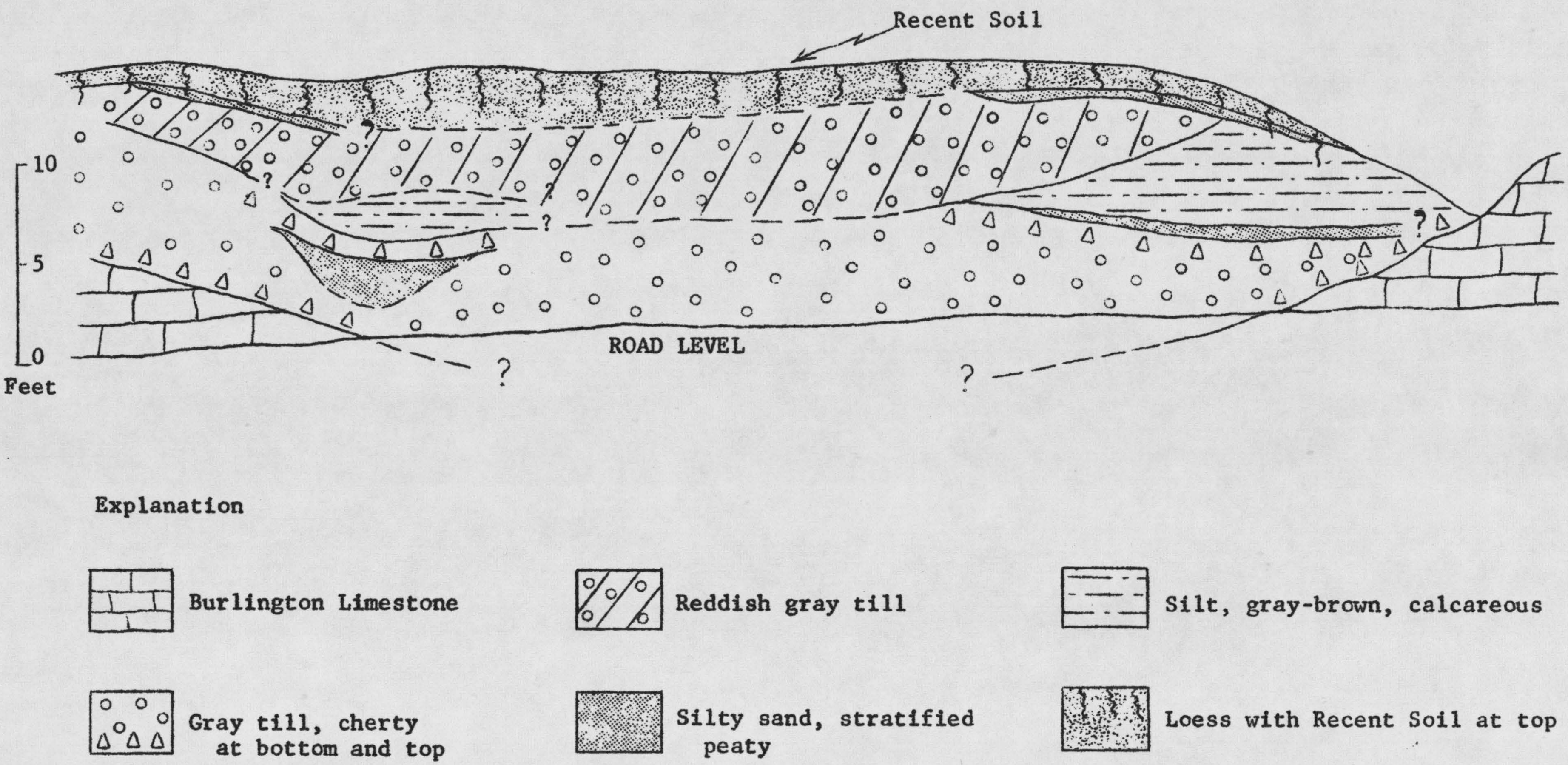
Both of the tills are probably Kansan in age, each representing a separate advance of the Kansan glacier with a short erosional break in between. The outwash between the tills was deposited prior to the second advance. The slightly different colors of the two tills, the sharp contact between them, and the cherty character of the lower one suggests the possibility that they may be of different ages - Kansan over Nebraskan.

The color difference between the tills could be explained as due to slightly greater weathering of the upper till. The lower till is calcareous throughout with no indication of weathering to represent the long Aftonian weathering interval. The peaty silty-sand lens in the left side of the exposure occurs within the lower till and does not represent a major break in till deposition. The cherty zone at the top of the lower till could represent an erosional lag deposit formed during the period of ice withdrawal, and the absence of an Afton Soil could be explained by this erosion.

The stratified sands and grayish brown calcareous silts between the tills strongly resemble pro-Kansan sands and silts that were deposited as outwash ahead of the advancing Kansan glacier and which are exposed elsewhere in the Quincy area. However, in the absence of a definite weathered zone between the tills, the lower till cannot be called Nebraskan. No tills of definite Nebraskan age have been found by Survey geologists in drift exposures in Adams County.

Both the Nebraskan and Kansan glaciers advanced into western Illinois from the northwest from a center west of Hudson Bay, Canada,

Figure 4. Drift exposure at Stop 2.



and thus moved across the same source rocks. Survey geologists have studied the textures and mineralogies of Kansan and Nebraskan tills elsewhere in western Illinois to attempt to distinguish between them but have found them to be identical.

0.0 4.7 Leave Stop 2. Continue ahead (north).

0.1 4.8 Turn right (east) onto Jefferson Street and continue ahead. On the right note the thick exposure of loess above the limestone.

0.2 5.0 Turn right (south) on South 5th Street and continue ahead past cemetery on the right.

0.3 5.3 STOP. Jackson Street. Turn right and head (west) downhill toward Gardner Expressway. To the west is the wide Mississippi Valley. Here at Quincy the river is close to the east bluff.

0.2 5.5 STOP. Gardner Expressway. Turn left and continue ahead (south). CAUTION.

0.5 6.0 CAUTION. Pedestrian crossing and parking lot entrance from right.

0.2 6.2 On the left is a quarry in the Burlington Limestone that in the past has been a favorite collecting area for fossil collectors. This quarry belongs to Gardner-Denver Company. DO NOT ENTER WITHOUT PERMISSION.

1.0 7.2 Limestone plant and millworks on the right. The old quarry and mine entrances are on the left side of the highway. For about a mile there is a succession of quarries and limestone mines in the bluff.

0.9 8.1 The Menke Stone and Lime Company plant on the right. The mine is on the left. SLOW. WATCH FOR HEAVY TRUCKS ENTERING HIGHWAY.

1.7 9.8 24th Street crossing. Continue ahead (south) on Route 57.

1.4 11.2 SLOW. Enter village of Marblehead. Marblehead Lime Company plant on right and mine on left.

0.2 11.4 Cross Mill Creek.

0.2 11.6 SLOW. Bear left and leave highway. Proceed ahead up the hill towards the southeast.

0.1 11.7 Follow road (east) onto the upland area.

1.4 13.1 Crossroads. Continue ahead (east).

0.1 13.2 <u>Stop 3</u>. Sinkholes in Burlington Limestone.

On the uplands in this vicinity there are several circular depressions called sinkholes. On the left is a large one with water standing in the bottom. Farther to the left towards the farm is a smaller sinkhole with no water in it. A short distance to the northeast is another water-filled sinkhole.

A landscape with numerous sinkholes is known as karst topography. Sinkholes develop in regions that are underlain by thick, highly jointed limestone. Downward percolating rainwater takes up organic acids from the soils, enters the joints, and dissolves the limestone. As time passes, underground drainage increases, and a network of subterranean channels and caverns is formed. Sinkholes are formed both by surface solution and by collapse of the roofs of near-surface caverns.

There are four conditions which contribute to the development of karst topography. First, there must be at or near the surface a soluble rock, preferably limestone, and the limestone should be flat-lying or nearly so. The limestone should be dense, highly jointed, and preferably thinly bedded. The limestone should not be porous, because the rainwater will be absorbed and move through the whole body of the rock, rather than be concentrated along joints and bedding planes. These first two conditions are satisfied by the Mississippian limestones underlying the uplands in the Quincy area.

A third condition is that there be entrenched major valleys below the uplands. These valleys act as outlets toward which the ground water can move in the subsurface. The Mississippi River satisfies this condition. The fourth condition is that there must be ample rainfall.

0.0 13.2 Leave Stop 3. Continue ahead (east).

1.5 14.7 Turn right (south) at crossroads.

1.0 15.7 Turn right (west).

0.2 15.9 T-road intersection from left. Continue straight ahead (west).

0.6 16.5 Stop 4. Harkness Creek Section in stream bank on the left.

At this exposure two till units separated by a 6-foot bed of outwash gravel can be seen. The gravel is red and appears to be intensely weathered. Later, at Stop 5, we will see a red gravel almost identical in appearance and considered by Survey geologists to be Nebraskan outwash. It occurs at about the same elevation. There the gravel contains an Afton Soil. If the gravel here at Stop 4 is the same one, then the till below is Nebraskan in age, making it one of the rare exposures of Nebraskan till in western Illinois.

Another possibility is that the outwash is Kansan in age and splits two Kansan tills. In this case, the two tills represent separate advances of the Kansan glacier with the deposition of the outwash either during retreat of the earlier glacier or during the advance of the later one. This exposure is a new one and will be studied by Survey geologists more fully in the near future.

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 Stop 4 and at Stop 2 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 and weathered zones. The soils and weathered zones mark major time intervals during which the glaciers had retreated and the glacial deposits were exposed to weathering. Three ancient soils will be seen at Stop 5. Each of the soils has characteristics which are sometimes recognizable in different exposures, and when used with other lithologic criteria they are useful in establishing the ages of glacial deposits. For example, the Sangamon Soil, which marks the break between the Illinoian and Wisconsinan Stages, is typically reddish brown in color.

0.0 16.5 Leave Stop 4. Continue southwest.

0.9 17.4 Turn left sharply before crossing bridge at crossroads. Fall Creek Township Hall on the left.

0.1 17.5 Cross narrow iron bridge. Continue straight ahead (southeast) on gravel road.

0.1 17.6 Turn left and ascend hill towards Bluff Church, formerly Zion Church.

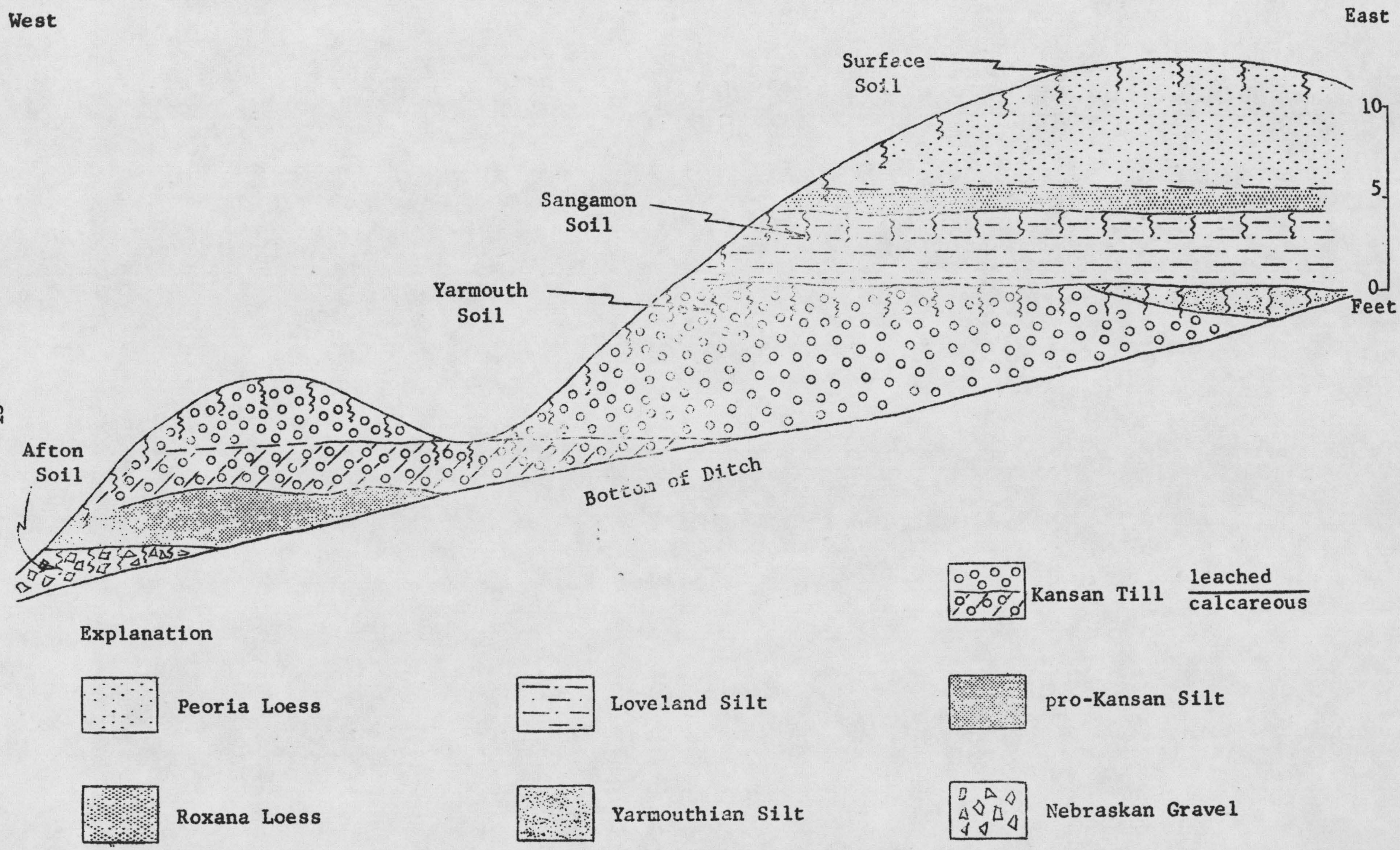
0.3 17.9 Stop 5. Zion Church Section in roadcut on left.

The exposure here at the Zion Church Section is unusual in that it is the only one in Illinois in which there are deposits representing all four glacial stages. Soils of three interglacial stages are also exposed. The section is described below and is diagramatically shown in figure 5.

Description of Section

PLEISTOCENE SERIES	Thickness
WISCONSINAN STAGE	
Woodfordian Substage	
7. Peoria Loess - brown to gray-brown loess, massive, leached in upper 5 feet, thin Recent Soil at top	20'
Altonian Substage	
6. Roxana Silt - pinkish brown to light brown, leached, Mn-Fe nodules in lower part	4'
ILLINOIAN STAGE	
5. Loveland Silt - gray-brown silt, massive, leached, clayey, Sangamon Soil in upper 3 feet with Mn-Fe stains	11'
KANSAN STAGE	
4. Till - brown to gray-brown, massive, leached, scattered pebbles of chert, igneous, and metamorphic rocks; Yarmouth Soil in upper 4-foot clayey zone	25'
3. Till - gray to gray-brown, massive, calcareous, sparse pebbles of chert and igneous rocks	5'
2. Silt - gray to brown, massive to slightly stratified, calcareous, sparse snail fragments and small pebbles	6'

Figure 5. Zion Church Section



Description of Section (continued)	Thickness
NEBRASKAN STAGE	
1. Gravel, sand, silt, and clay - red-brown to yellow-brown, massive to slightly stratified in lower part, leached, pebbles of chert, quartzite, and igneous rocks; represents Afton Soil	4'

waters from its melting

The Wisconsin glacier never reached the Quincy area, but the loess deposits at the top of this exposure record the building of Wisconsinan valley trains in the Mississippi Valley. Two Wisconsinan loess deposits can be distinguished here, an upper gray-brown unit called the Peoria Loess, and a thinner, lower red-brown unit called the Roxana. The Peoria was deposited during Woodfordian time about 22,000 to 12,500 years ago. The Roxana was deposited during Altonian time about 50,000 to 70,000 years ago.

Below the Wisconsinan loess about 11 feet of Loveland Silt, an Illinoian loess deposit, is exposed. The reddish, limonite- and manganese-stained zone in the upper part is the Sangamon Soil, formed during the Sangamonian Age some 200,000 to 70,000 years ago. The Loveland Silt overlies 30 feet of Kansan till in which the Yarmouth Soil is represented by a 4-foot brown to grayish, clayey zone. This soil formed during the Yarmouthian Age 600,000 to 250,000 years ago. The base of the till is exposed in the ditch at the extreme northwest end of the roadcut where it overlies a 6-foot bed of calcareous pro-Kansan outwash silt. Below the silt the Nebraskan Stage is represented by a 4-foot thick bed of intensely weathered outwash sand and gravel in which the Afton Soil is developed. This soil formed more than 700,000 years ago after the Nebraskan glacier had melted away.

0.0	17.9	Leave Stop 5. Continue east.
0.2	18.1	Bluff Hall Church. Continue ahead (east).
0.8	18.9	T-road intersection from left. Continue ahead (east).
0.2	19.1	T-road intersection from right. Continue ahead (east).
1.0	20.1	T-road intersection. Turn right and continue ahead (south).
0.6	20.7	T-road intersection from left. Turn left and continue ahead (east).
1.5	22.2	STOP. T-intersection with blacktop. Turn left and continue uphill (north). Follow highway to Payson.
1.2	23.4	SLOW. Prepare to turn.
0.1	23.5	Crossroads. Turn right (south).
0.1	23.6	Turn left (east).
0.1	23.7	Turn left and enter Payson High School parking lot. <u>Stop 6</u>. Lunch.
0.1	23.8	Leave Lunch Stop. Turn right and retrace route to highway.

0.1 23.9 T-road intersection. Turn right (north).

0.1 24.0 STOP. Crossroads. Turn left and continue ahead (west) on blacktop to Fall Creek.

3.7 27.7 SLOW. Winding road in vicinity of Fall Creek School. Prepare to STOP.

0.2 27.9 Stop 7. Fall Creek Section.
Walk across concrete bridge to gravel road from right. Walk uphill to old road from right. Follow old road to stone bridge. The section starts in the stream bed below the bridge and continues for several hundred yards along the creek valley.

Fall Creek has cut this scenic gorge into Burlington Limestone. About 55 feet of the Burlington and 4 feet of the underlying Prospect Hill Siltstone are exposed in the section from the upper to the lower falls as follows:

	Feet
Burlington Limestone	
- Limestone, light brown, fine to coarse, thin bedded, slightly cherty, some cross-bedding, crinoidal beds, numerous styolites; upper falls near base of unit	10 to 15
- Limestone, light gray to brownish gray, coarse, thin to thick bedded, some cross-bedding, styolites, slightly cherty, color banding in upper part, large spirifer brachiopods, some crinoidal beds	25
- Limestone, gray, thick bedded, coarse, fossiliferous; numerous large, flattened chert nodules; numerous cavities where chert nodules have been removed by stream action	4 to 5
- Limestone, light gray, upper thin-bedded dolomitic part brownish, fossiliferous, styolites; lower falls near base of unit	12
Prospect Hill Siltstone	
- Siltstone and shale, green, olive-green, greenish brown, brown, thin bedded, silty	4

At the lower falls the contact between the Burlington and the Prospect Hill Siltstone is well exposed. The contact is a major unconformity between the Valmeyeran and Kinderhookian Series as evidenced by the absence of the Starrs Cave Limestone. The unconformity is an erosion surface and indicates that the early Mississippian sea withdrew from western Illinois after deposition of the Kinderhookian sediments. The middle Mississippian sea readvanced across this erosion surface and the Valmeyeran sediments were deposited. Farther south the erosion cut more deeply into older Kinderhookian Rocks, and the Burlington lies directly on the McCraney Limestone and the Hannibal Shale.

0.0 27.9 Leave Stop 7. Continue ahead (southwest).

0.8 28.7 STOP. T-intersection with Highway 57. Turn left (southeast) and cross bridge over Fall Creek. Note the view across the valley toward the northwest, west, and southwest.

0.1 28.8 T-road intersection from right. Continue straight ahead.

2.7 31.5 Turn left (north) on gravel road along Seehorn Creek.

0.4 31.9 <u>Stop 8</u>. Seehorn Hollow Section.

The section occurs along the bank of Seehorn Creek on the right. A pasture fenced by an ELECTRIC FENCE lies between the road and the outcrop, but the section can be reached by walking to the bridge, a short distance to the east, and then following the bank of the stream.

This section (fig. 6) represents the thickest surface exposure of the McCraney Limestone. The McCraney is underlain by the Hannibal Shale and is overlain by the Prospect Hill Siltstone and the Burlington Limestone which are poorly exposed on the hill above.

Several interesting faunas have been collected from the McCraney here, although fossils are relatively scarce. <u>Pentremoblastus</u>, a blastoid genus, is of special interst, because it is the only representative of the <u>Pentremites</u>-type blastoids in the lower Mississippian rocks of North America. A number of microcrinoids and small brachiopods have been collected from the argillaceous dolomite beds in the McCraney.

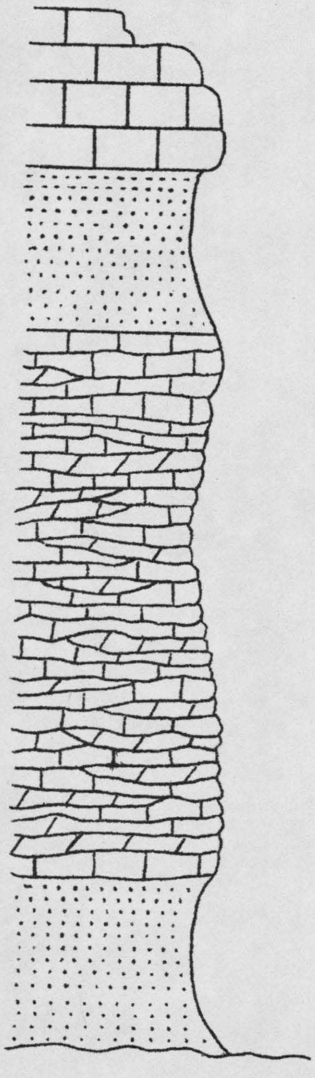


Figure 6. Seehorn Hollow Section.

0.0 31.9 Leave Stop 8. Continue north.

1.8 33.7 T-road intersection. Turn right (south).

0.4 34.1 T-road intersection from left. Continue ahead (south).

0.9 35.0 Two farm lanes enter road from opposite sides. Continue ahead (south).

0.6 35.6 STOP. Intersection with Route 57. Turn left (southeast).

Note the excellent view of the valley and the bluff line in the distance.

0.8 36.4 Bridge across Pigeon Creek.

2.4 38.8 Bridge over Walnut Creek.

0.2 39.0 Intersection with Route 96 from left. Continue ahead (southeast) on Route 57-96.

0.5 39.5 On the left is a high level quarry in the Burlington Limestone. At this exposure the Burlington rests on McCraney Limestone. Below the McCraney is the Hannibal Shale which rests unconformably on the Devonian Saverton Shale. The unconformity between the Hannibal and the Saverton Formations is the contact between the Mississippian and Devonian Systems.

0.4 39.9 SLOW. Prepare to turn left.

0.1 40.0 Turn left onto gravel road and cross culvert over ditch. CAUTION.

0.3 40.3 At farm house with green roof turn left on lane and continue along fence. AT CORNCRIBS ALL BUSES STOP AND UNLOAD PASSENGERS.

0.1 40.4 Cattle guard. SLOW.

0.1 40.5 Crusher and loading equipment.

0.1 40.6 Turn sharply and enter quarry area.

Stop 9. Abandoned quarry in Burlington Limestone.

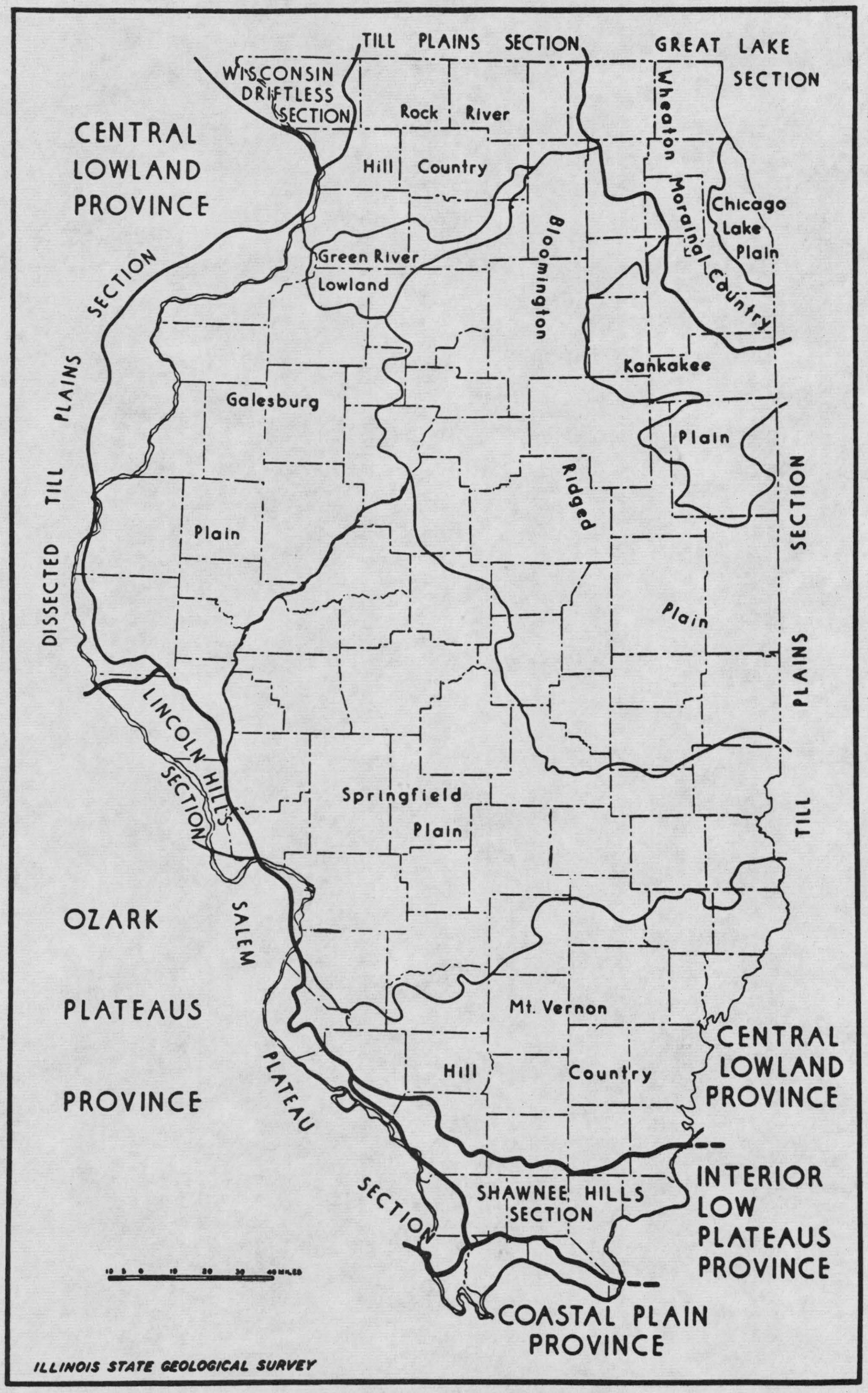
The Burlington here is relatively chert free, very coarse grained, crinoidal limestone. The upper surface of the limestone is strongly weathered and very irregular with small solution cavities. A red, clayey chert residuum of several feet thickness overlies the limestone. The limestone is cross-bedded and very fossiliferous. The lower part is massive, but in the upper part weathering has revealed the bedded nature of the limestone. Some beds consist almost entirely of crinoid remains, which are largely pieces of crinoid columnals, but some calyx plates and occasionally a complete calyx can be collected. Other fossils include brachiopods, bryozoa, and corals.

End of Field Trip

DRIVE CAREFULLY ON YOUR WAY HOME

TIME TABLE OF PLEISTOCENE GLACIATION
(after J. C. Frye and H. B. Willman, 1960)

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 22,000	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	Soil, silt and peat	Ice withdrawal, weathering, and erosion
	Altonian 50,000 to 70,000	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

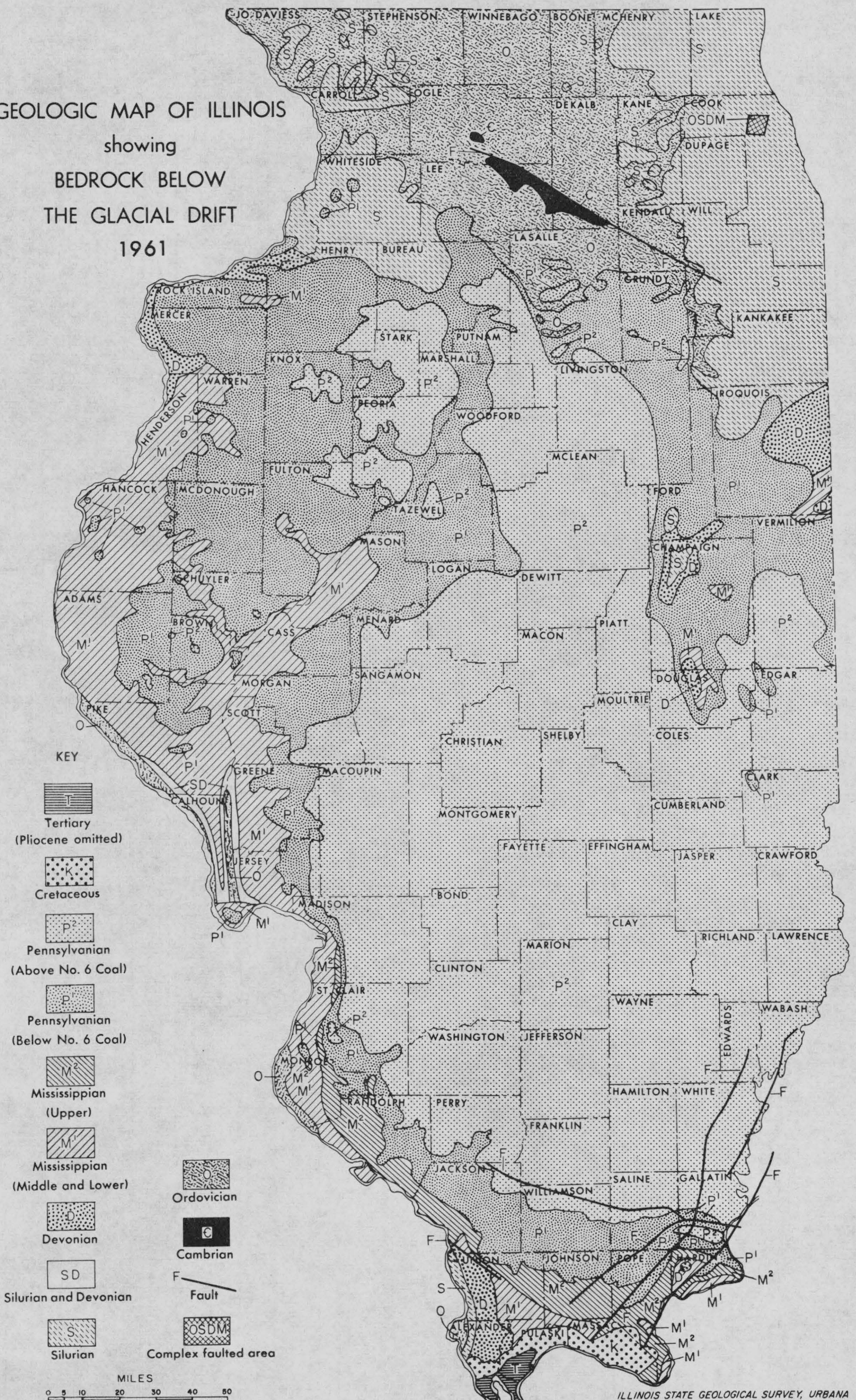


PHYSIOGRAPHIC DIVISIONS OF ILLINOIS

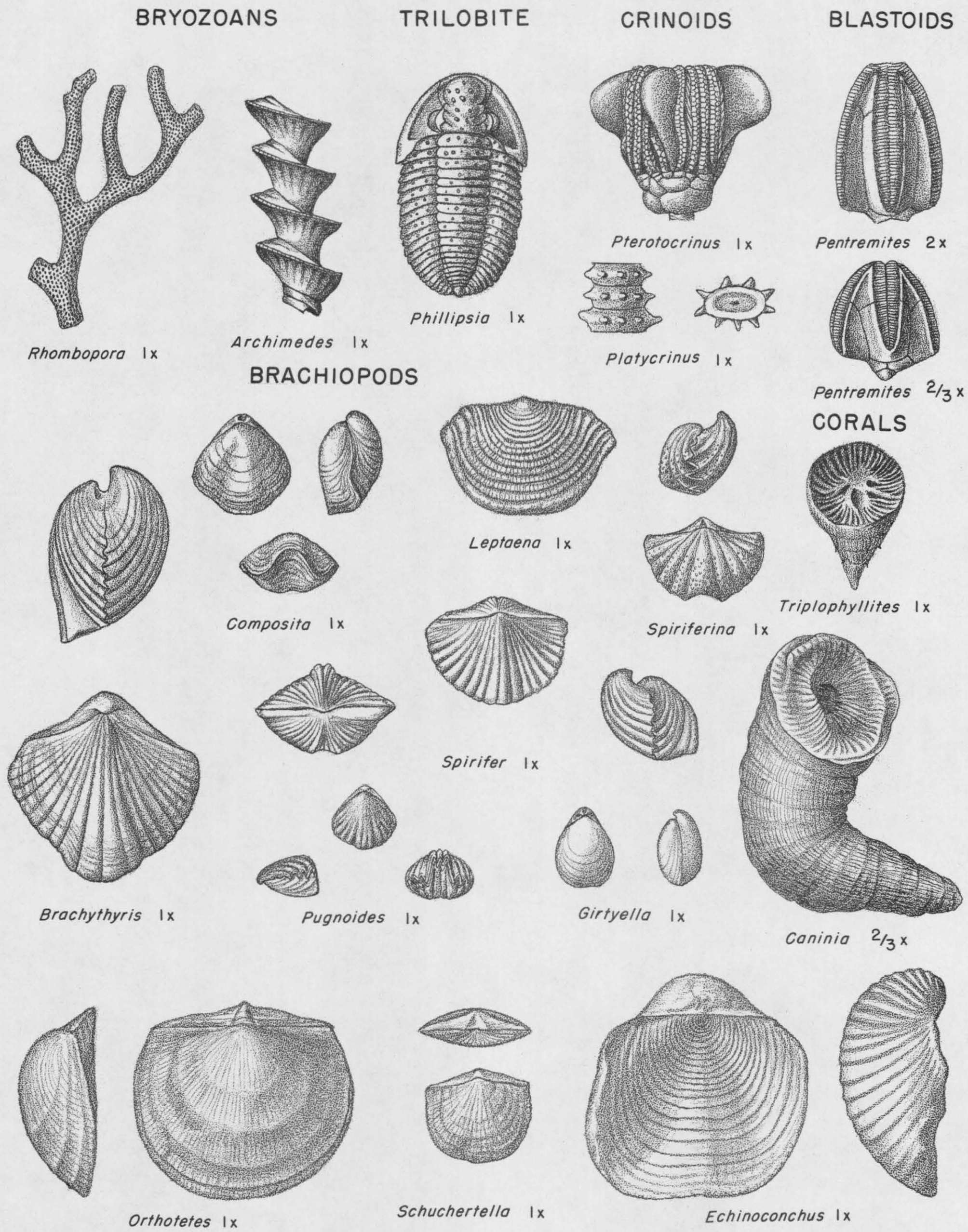
(Reprinted from Illinois State Geological Survey Report of Investigations 129, "Physiographic Divisions of Illinois," by M. M. Leighton, George E. Ekblaw, and Leland Horberg)

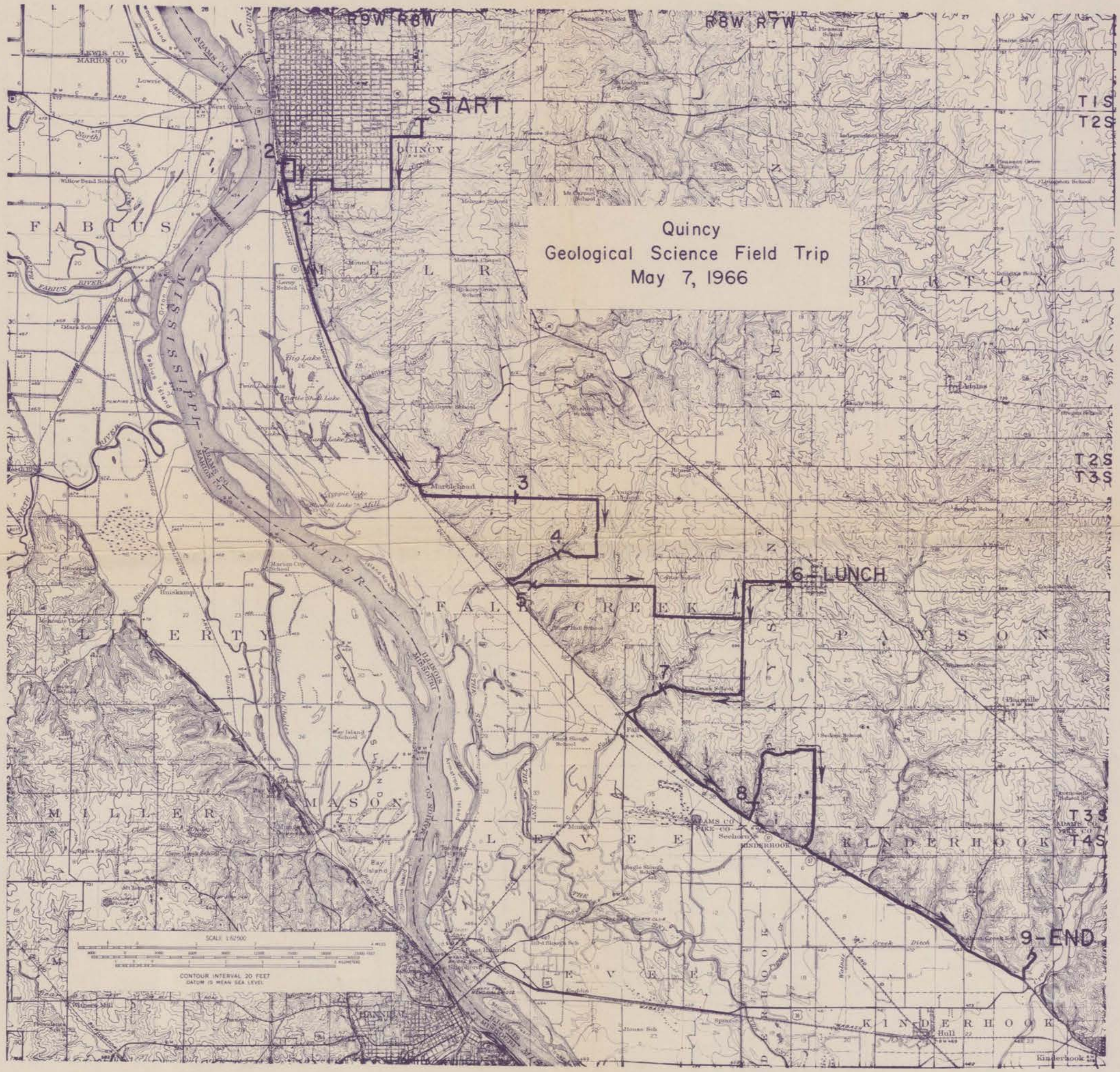
(82536—15M—11-63)

GEOLOGIC MAP OF ILLINOIS
showing
BEDROCK BELOW
THE GLACIAL DRIFT
1961



(47669—15M—11-61)


BRYOZOANS
TRILOBITE
CRINOIDS
BLASTOIDS
Rhombopora 1x
Archimedes 1x
Phillipsia 1x
Pterotocrinus 1x
Platycrinus 1x
Pentremites 2x
Pentremites 2/3x
BRACHIOPODS
CORALS
Composita 1x
Leptaena 1x
Spiriferina 1x
Triplophyllites 1x
Spirifer 1x
Brachythyris 1x
Pugnoides 1x
Girtyella 1x
Caninia 2/3x
Orthotetes 1x
Schuchertella 1x
Echinoconchus 1x


Quincy
Geological Science Field Trip
May 7, 1966
START
1
2
3
4
5
6-LUNCH
7
8
9-END
R9W R8W
R8W R7W
T1S
T2S
T2S
T3S
T3S
T4S
QUINCY
MISSISSIPPI RIVER
FABIUS
MELROSE
BURTON
FALL CREEK
PAYSON
LIBERTY
MILLER
MASON
LEVEE
KINDERHOOK
HANNIBAL
CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL