GUIDE LEAFLET

GEOLOGICAL SCIENCE FIELD TRIP

Sponsored by
ILLINOIS STATE GEOLOGICAL SURVEY, URBANA

BELVIDERE AREA

Boone, Winnebago, McHenry Counties
Belvidere, Rockford, Kings, Kirkland, Genoa and Harvard

Leaders
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Urbana, Illinois
May 18, 1963

GUIDE LEAFLET 1963C
HOST: Belvidere High School
To the Participants:

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

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

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

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

We hope you enjoy today's trip and will come again.
SUMMARY OF THE GEOLOGICAL HISTORY OF THE BELVIDERE AREA

Pleistocene (Ice Age)

About 35 thousand years ago, a towering glacier (Wisconsinan Ice Sheet) covered the Belvidere area. As this glacier melted away, it liberated great quantities of stone and earth which it had carried from as far north as Canada. It also liberated great quantities of water which washed this material far down the valleys of the Kishwaukee and Rock Rivers.

If we go back in time before the coming of this Ice Sheet, we find a long, mild period of some 150,000 years preceded by another cold period during which an earlier glacier (Illinoian Ice Sheet) moved down to cover most of Illinois, including the Belvidere area. The rock and earth left behind by the Illinoian Glacier when it melted filled most of the valleys and left a thinner layer of "glacial till" over the uplands. North of Rockford, the Rock River found its old, drift-choked valley, but to the southward it got lost and cut a new valley through the glacial drift and into the underlying bedrock.

Before the time of the Illinoian Glacier there were other cold periods, but their glaciers did not reach the Belvidere area.

The Lost Interval

Before the Ice Age there was a long "lost interval" of time of hundreds of millions of years during which the Belvidere area stood at moderate elevations above the sea. Under these conditions, the land was slowly eroded, the sediments carried off to distant seas so that no rocks formed and no fossils were preserved to tell us of events of those ancient days. The coral seas of Silurian time, and perhaps also those of the Devonian period that followed, spread over the Belvidere region and deposited limestones rich in the fossils of sea life. But these limestones, except the lowermost Silurian dolostones, have been worn away by the erosion which followed during the "lost interval" and we must interpolate our story from outcrops in nearby areas to east and west.

Ancient Illinois Seas

The youngest bedrock layers which remain in the Belvidere area are the very ancient Silurian and Ordovician limestones. Many of these layers hold abundant fossil remains of the sea life of the time. At this early date, no land life existed and there probably were no vertebrates, such as fish. (Possible fish remains have been found in Ordovician rocks in Colorado). The most advanced animals of that day were the somewhat crab-like trilobites and the cephalopods. Present day cephalopods include the octopus, squids, and the cuttle fish, but the "Pearly Nautilus," the hero of Oliver Wendell Holmes' famous poem, is the living cephalopod closest to those of the ancient Ordovician seas. Here, hundreds of millions of years ago in geologic time, the Nautilus' ancestors lived, some of them in coiled and chambered shells, others in curved or long straight shells which varied in size from a couple inches to many feet long.

Besides these creatures there were snail-like gastropods, the earliest known clams (pelecypods), the oldest true corals, sponges, and large numbers and variety of brachiopod shells and spreading or branching bryozoa. Bryozoan animals, like many corals, live in colonies of little stone houses, but the
soft animals enclosed within are much smaller and different in structure. They are still common today but not well known because of their obscure appearance, indicated by their name, "moss animals."

Buried Formations in the Belvidere Area

Wells drilled into the rock in the Belvidere area encounter a thick sandstone formation not far below the surface. This St. Peter Sandstone contains little or no evidence of the existence of life in the way of fossil remains, trails, or burrows. Some geologists think it is a fresh-water deposit (life had not yet learned to live in fresh water); others, that it was deposited by the wind.

Whatever the interpretation of the St. Peter Sandstone origin, we know that dry land existed here immediately before, because limestones which in most places lie below the sandstone are missing in the Belvidere area. Studies show that they were worn away by erosion before St. Peter time. For this reason, the St. Peter Sandstone rests directly on rocks of Cambrian Age.

The Cambrian strata are the oldest rocks which bear clear-cut evidences of life in the form of fossils. Many types of life present in the Ordovician limestones had not come into existence in Cambrian time, when the most prominent animals were trilobites, shiny-shelled brachiopods, and gastropods that had not yet learned to coil to a spire. The Cambrian rocks come to the surface to the north, in central Wisconsin; in the Belvidere area they carry valuable underground water supplies.

Wells in Belvidere do not penetrate deeper than the Cambrian, but we know from studies farther north that below this there is a "foundation" of very ancient, twisted and altered crystalline rocks. Some of these rocks once were sediments. Others are igneous rocks that were long ago intruded as molten masses deep underground or extruded to the surface as lava flows. The Precambrian rocks are the most ancient known to man.
BELVIDERE GEOLOGICAL SCIENCE FIELD TRIP

Abstract

Deposits critical to an understanding of the enigmatic early Wisconsinan Glacial Stage are exposed in the Belvidere area. Winnebago drift, of Altonian age, was deposited before the Shelbyville, which until recently was considered the earliest "classical" Wisconsinan.

Sand and gravel is extensively exploited from terraces in Wisconsinan valley-train deposits along the Kishwaukee River and its tributaries.

Four Tertiary erosion surfaces (peneplains) have been developed upon the Ordovician Galena Dolomite and the Silurian Edgewood Dolomite. Erosional remnants on these surfaces form bedrock highs which stand up above the general ground level as roughly circular hills. Limestone and dolomite quarries often are located on the bedrock highs, since the overburden is generally thin. Other topographic highs are kames of glacial origin and are utilized locally as sources of sand and gravel.

An erosional unconformity is well exposed in a quarry at Garden Prairie where the Silurian unconformably overlies the Ordovician.

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


BELVIDERE GEOLOGICAL SCIENCE FIELD TRIP

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

Itinerary

0.0 0.0 Assemble on Pearl Street, west side of Belvidere High School. Turn left (west) on Pleasant Street.

0.2 0.2 CAUTION. Railroad crossing.

0.0 0.2 STOP. Continue ahead on Locust Street.

0.4 0.6 The flat surface in this area is a terrace underlain by gravel formed from Bloomington and West Chicago outwash.

0.2 0.8 Kishwaukee River on right.

0.3 1.1 STOP. Turn right. Terrace exposed in ditch on right and left.

0.1 1.2 Bridge over Kishwaukee River.

0.1 1.3 Another bridge over abandoned channel of the Kishwaukee River.

0.1 1.4 SLOW. Turn left (west), then right (north).

0.1 1.5 The terrace here is at the same elevation on both sides of the river.

0.1 1.6 Note gravel operation in terrace deposits on the left.

0.1 1.7 Note higher terrace in Kishwaukee River Valley.

0.3 2.0 Housing developments in this region are making large deposits of sand and gravel unattainable—a poor conservation practice.

0.3 2.3 Stop 1. Discussion of Gravel Terrace and Gravel Pits in Kishwaukee River Valley.

The sand and gravel produced in this area occurs in terraces along the sides of the Kishwaukee River and is of glacial origin. The Kishwaukee served as a major outlet for meltwater from the waning glaciers which invaded the northeastern portion of Illinois between 20,000 and 8,000 years ago. Large volumes of swift flowing water moved down this valley and concentrated the sand and gravel in the upstream area. The finer materials, such as silt and clay, were carried much farther downstream. Technically, sand and gravel deposits of this type are called valley train deposits because they commonly border the valleys of present streams.

The following summary of the history of the Pleistocene Epoch, or "Ice Age," gives some background information significant in the interpretation of the events leading to the developments of the gravels along Kishwaukee Valley.
Summary of the Pleistocene History of Illinois

Tens and hundreds of thousands of years ago most of Illinois, together with most of northern North America, was covered by huge glaciers. These glaciers expanded from centers in central and eastern Canada. They developed when the mean annual temperatures 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 was formed so thick that, as a result of its weight, it 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 Missouri and Ohio Rivers.

Moderation of temperatures halted the glacier. For a while the melting of the ice balanced its accumulation and expansion, so that its margin remained stationary. Later the melting exceeded the accumulation and expansion, and the ice-front gradually melted back until the glacier disappeared entirely.

It is now commonly known that there were four major periods of glaciation during the Pleistocene or Great Ice Age (see accompanying illustration), and that between each there was a long interglacial period 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, glacial stage.

Present facts indicate that the Pleistocene Epoch began about one million years ago when the Nebraskan Glacier advanced over the area. The oldest glacier is named Nebraskan because the most typical Nebraskan glacial deposits are best developed in the state of Nebraska. Nebraskan deposits are not abundant in Illinois, probably because weathering destroyed them during the Aftonian Interglacial Stage after the retreat of the Nebraskan Glacier.

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

The Kansan Stage was followed by the Yarmouthian Interglacial Stage during which erosion carved valley and hills in the Kansan deposits.

The third glacial stage, the Illinoian, is 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 advanced only from the east.

After several thousands of years, climatic conditions caused the melting away of the Illinoian ice sheet. During this warm stage, the upper part of the Illinoian till was weathered and soil developed, as in the case of the preceding Yarmouthian interval. However, this action did not take place to the degree it did during the Yarmouthian, so that the post-Illinoian (Sangamonian) interval is estimated to have lasted only about 150,000 years. The Sangamon Soil resembles present day soils in color, texture, and depth of development. This fact lends support to
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 five degrees in the average annual temperature would bring another glacier down upon us.

The last and most recent glacial stage was the Wisconsin. This episode of glaciation consisted of two major glacial advances—the Altonian, which deposited the Winnebago Till in the Belvidere area, and a later Woodfordian advance. The Woodfordian glacier advanced southward from the Lake Michigan Basin to the present sites of Shelbyville, Charleston, and Peoria, where it formed a terminal moraine that geologists call the Shelbyville Moraine. The Shelbyville Moraine was built by the Wisconsin Glacier approximately 20,000 years ago.

As the Wisconsin Glacier retreated, withdrawals and readvances created a complex sequence of deposits in northeastern Illinois, the most outstanding of which are the moraines. More than 50 separate moraines were formed by this glacier in Illinois alone. The major ones are shown on the Glacial Map of Northeastern Illinois in the back of the guide leaflet.

The significance of the Pleistocene Epoch is emphasized by the rich soils formed from the glacial deposits and the abundant deposits of sand and gravel. We would not have these treasures had the glaciers missed Illinois.

As the glacier melted, all of the soil and rocks which had been picked up as it advanced were released. Some of this material or drift was deposited in place as the ice melted. Such material consists of a mixture of all kinds and sizes of rock fragments and is known as till. Some of the glacial drift was washed out with the melt-waters. 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 valley-trains.

A moraine represents the accumulation of drift at the ice-margin while the advance and melting of the glacier were essentially in balance, when more and more material was being brought to the edge of the advancing ice. With the exception of the Shelbyville Moraine which marks the maximum advance of the Wisconsin Glacier, a moraine marks the position to which the ice-front readvanced after a recession. The Shelbyville is called an end moraine.

The surface relief of moraines is generally greater than that of the drift-plains and is referred to as swell-and-swale, on some moraines knob-and-kettle, topography. Generally, the outer slope and edge of the moraines is interrupted by valleys and re-entrant angles marking the courses of glacial rivers. At some places, there are gaps in the moraines where subglacial streams presumably carried away most of the drift.

As a glacier began to recede, melt water gradually accumulated in local ponds or lakelets between the ice-front and the moraine last formed except where there were drainage channels through the moraine.
such drainage channels are absent, it may be presumed that as the ice-front continued to recede the local ponds and lakelets gradually merged into one large lake which remained until a channel formed through which it could drain.

At times, especially in the winters, the out-wash plains and valley-trains were exposed as the melt waters subsided, the wind picked up silt and fine sand from their surfaces, blew it across the country, 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 measure only inches, if it can be identified at all.

0.2 2.5 STOP. U. S. Highway 20. Continue straight across Highway 20. CAUTION.

0.6 3.1 Rolling hills ahead mark the position of the Shelbyville Moraine.

0.8 3.9 SLOW. Turn right (east) on gravel road.

0.4 4.3 Excellent view of the Kishwaukee River Valley on the right. Note the exceptional width of the valley.

0.3 4.6 Turn left (north) on Illinois 76.

0.1 4.7 Ascending the White Rock Moraine. Note gravelly nature of till in ditch on right.

0.6 5.3 Gravelly Shelbyville Till on left overlain by well developed soil.

1.2 6.5 Gravelly till and soil exposed on left.

0.6 7.1 Shelbyville Till on left.

0.7 7.8 Crossing Beaver Creek.

2.1 9.9 Stop 2. Discussion of White Rock Moraine and Glacial Till Deposits.

The low ridge trending in a northeast-southwest direction is called the White Rock Moraine by glacial geologists. Some consider this moraine equivalent to the Shelbyville Moraine of central and south-central Illinois. Others question whether the ridge is a moraine at all, while others believe that it is related to the early Wisconsinan ice invasion (pre-Shelbyville) that deposited the Winnebago Till to the north and west.

The till which composes the ridge is very pebbly and contains a few large boulders. The unaltered till is overlain by reddish loess or silt that, in color, resembles the pinkish loess deposits derived from Bloomington outwash material (of later age). A well defined soil profile is developed in the loess. The A zone is about eight inches thick.

The sequence of glacial deposits in this area is currently being investigated extensively by Illinois State Geological Survey geologists. Dr. James Hackett recently wrote a Survey Report of Investigations on the "Ground-Water Geology of Winnebago County," and Dr. John Kempton is currently preparing for publication his Ph.D. thesis on the Pleistocene
and ground-water geology of parts of Boone and McHenry Counties. These studies, and others in progress, are oriented toward determining ground-water resource and potential. Water, which we all take for granted, is not too plentiful in some parts of this area. To meet the increasing demand for water, the character and water-yielding potential of the glacial deposits and the bedrock formations must be known. This can be determined only through detailed geologic study.

0.5 10.4 Note gravelly till on left.
0.1 10.5 Turn left (west) on Illinois 173.
0.6 11.1 Note gravel in ditch on right. Melt water from the waning Bloomington and West Chicago Glaciers flowed through this region. On your topographic map you can see linear ridges suggestive of water movement through here. The abundant gravel is also indicative of water action.

1.4 12.5 Entering Caledonia.
0.3 12.8 Underpass beneath the Chicago and Northwestern Railway.
2.7 15.5 SLOW. Turn right (north) on Argyle Road.
0.7 16.2 Note small quarry on far right at base of hill. The bedrock lies very near the surface throughout the region. The bedrock is in the Galena Formation of Ordovician age and is a dolostone (dolomite), a magnesium carbonate (MgCa CO₃).

0.3 16.5 T-road. Continue ahead.
0.6 17.1 Turn left (west) on gravel road.
0.2 17.3 Note excellent view to the west.
0.1 17.4 Gravelly till on right.
0.6 18.0 Bridge over Northwest Tollway. Excellent exposures of the Galena Dolomite occur on the east and west side of the tollway.
0.1 18.1 Very gravelly till on right.
1.4 18.5 Turn right into Porter Brothers Quarry.
0.1 18.6 Turn left and descend hill.
0.3 18.9 Stop 3. Porter Brothers Quarry in the Galena Formation.

The dolostone (dolomite) here is at least 60 feet thick--thin bedded at the top. The lower portion is thick bedded and contains chert bands. The dolostone is part of the Ordovician System--the upper portion of the Galena Group.

The Galena Group was named for the town of Galena, Jo Daviess County, Illinois (Hall, 1861, p. 146-148). It is the uppermost group of the Champlainian Series in the Mississippi Valley and consists of strata from the base of the Spechts Ferry Formation to the top of the Dubuque Formation. The Galena Group normally overlies the Platteville Group and is
overlain by the Maquoketa Group of the Cincinnatian Series. On the flanks of the Ozark Uplift, the Galena overlaps older formations and is in turn truncated by Maquoketa and younger formations. The Galena Group has a varied fossil fauna. The famous sponge *Receptaculites oweni*, and the brachiopod *Rafinesquina, Dalmanella* and *Sowerbyella* are most common.

0.4 19.3 STOP. Turn right (west) on gravel road at exit of Porter Brothers Quarry.

0.1 19.4 Rock River Valley can be seen ahead.

0.4 19.8 Turn left (west) on blacktop road.

0.2 20.0 SLOW. Turn left (south).

0.1 20.1 Note sandy nature of the soil. There are a few sand dunes in the area.

0.7 20.8 STOP. Highway 173. Turn right.

0.9 21.7 SLOW.

0.1 21.8 Turn left (south) on Illinois 173.

0.1 21.9 Note large gravel pit on right. This pit is located in a gravel terrace bordering the Rock River Valley.

0.1 22.0 Note gravel on left.

0.4 22.4 Excellent view of Rock River Valley on right.

0.6 23.0 Abandoned gravel pit on left.

0.3 23.3 Large gravel pit on far left.

0.1 23.4 Active gravel pit on right.

0.1 23.5 SLOW.

0.2 23.7 SLOW. Turn left (east) on Harlem Road.

0.3 24.0 Note sand dunes on right.

0.4 24.4 Gravelly till on right and left.

0.3 24.7 Abandoned quarry on left in the Galena Formation.

0.6 25.3 SLOW. Turn left (north) into Rock Cut State Park.

0.2 25.5 Stop 4. Lunch. Picnic ground in Rock Cut State Park. (After lunch, the caravan will turn around and return to Harlem Road.)

0.3 25.8 STOP. Turn left (east) on Harlem Road.

1.2 27.0 Bridge over Northwest Tollway.

1.2 28.2 Y-road. Continue ahead.
0.1 28.3 Turn right on gravel road.

0.8 29.1 Note elongate ridge trending in east-west direction and the extremely sandy nature of the soil.

0.5 29.6 T-road. Turn left (east).

1.1 30.7 T-road south. Continue ahead.

0.7 31.4 Christmas tree plantation on right.

0.9 32.3 Turn right (southeast) on Argyle Road.

0.8 33.1 Bridge over Beaver Creek.

0.7 33.8 Note quarry on far right.

0.1 33.9 Turn left. Continue ahead on blacktop road to Belvidere.

0.7 34.6 Crossroad. Continue ahead.

0.6 35.2 Crossroad. Continue ahead.

0.5 35.7 Flat surface of the Kishwaukee River Valley.

0.9 36.6 SLOW.


1.0 37.7 SLOW. Turn left (east) then right (south).

0.1 37.8 SLOW. Bridge.

0.1 37.9 SLOW. Bridge over Kishwaukee River.

0.1 38.0 SLOW. Crossroad. Continue ahead on Stone Quarry Road.

0.2 38.2 CAUTION. Railroad crossing. Rough.

0.8 39.0 STOP. Illinois Highway 5. Continue ahead on blacktop road.

0.4 39.4 Bridge over Northwest Tollway.

0.5 39.9 Note high hill ahead.

2.2 42.1 SLOW. Turn left (east) on Bates Road. CAUTION.

0.4 42.5 Stop 5. Discussion of Bedrock Highs. Mendon Quarry in the Edgewood Dolomite to the north. (Excellent view of the Kishwaukee River Valley to the north.)

The Haley Quarry (now abandoned) was operated more than 25 years ago in a buff to tan-colored dolomite (dolostone) of Lower Silurian age. The rock sequence is shown in the water well log taken at the house on this hill. (Dr. Dommer. Sec. 14, T. 43 N., R. 3 E. Elevation 889 feet.)
No Drift

Silurian

Dolomite (dolostone) very weathered
(in outcrop at Haley Quarry)  
16'  889-873'

Below the stone seen in outcrop:

Ordovician

Shale  
105'  873-668'

Shale and Limestone (Glenwood)  
350'  668-318'

Sandstone (St. Peter) clayey at base  
150'  318-168'

The water well's overall depth is 631'. This bedrock high (889' in elevation) is surrounded by Pleistocene material.

Dr. John Kempton, in a recent study of this area for the Illinois State Geological Survey, found the exposed buff dolomite rock to be of Silurian age.

Several of the hills in this region are from 890-900 feet above sea level, or 150 feet above the inter-hill areas. Most of them are bedrock highs held up by the Silurian Edgewood Dolostone (dolomite). These highs capped by Silurian dolostone are erosional remnants of the more extensive strata overlying the Ordovician System. The quarry on left is in one of the bedrock highs.

This erosional surface which in places cuts deeply into the underlying Ordovician rocks will be a surface of unconformity below the next rock units in the geologic future. Although the glacial deposits overlie this surface unconformably, it is doubtful that any of the glacial material will be preserved in the geologic record, since we are far above sea level and erosion is swift. At the last stop, there is an unconformity between the Ordovician and Silurian Systems. There is also an erosional unconformity between the Galena and Maquoketa Formations of Ordovician age.

During the Tertiary Period (before glaciation), this region was eroded to a level surface upon the Silurian bedrock, lying nearly at sea level. Such surfaces are called peneplains. Later the region was uplifted and dissected until only remnants of the former surface stood up as monadnocks on the newly formed "pre-Pleistocene" erosion surface. Actually a detailed study would reveal four different erosion surfaces (peneplains), but we cannot differentiate between them by simple visual examination of the topography.
0.6 43.1 T-road. Continue ahead onto gravel road.

0.5 43.6 Turn right (south) on blacktop road.

0.5 44.1 SLOW. Turn left (east) on gravel road.

0.7 44.8 T-road. Continue ahead.

1.4 46.2 STOP. Turn left (north) on blacktop road.

0.3 46.5 Note high hill ahead.

1.0 47.5 SLOW. Turn right (east) on gravel road.

0.1 47.6 Note large gravel pit ahead.

0.1 47.7 Stop 6. Gravel Pit on Crest of Capon Ridge. (This is probably a series of kames. On the right is a broad, flat area called Coon Creek Bottoms. It lies in front of the Marengo Ridge, tentatively correlated with the Bloomington Moraine.)

The elevation of this hill, 920 feet, would suggest that this also is a bedrock high. However, there is a gravel pit in operation at the crest of the hill which has cut about 15 feet deep. Water well records from a similar hill a half-mile away show gravel to a depth of 156 feet. It must be concluded that some of the high hills of the region are Pleistocene kames and not bedrock highs. Kames are more or less conical hills deposited by water flowing off re-entrants in the ice front or into pits or lakes on the ice surface. When the ice melts, the unconsolidated sand and gravel slumps into conical hills.

At Stop 5 we might easily have been convinced that all these hills were erosional remnants, but the evidence at this stop points out the fallacy of making sweeping conclusions from meager facts. Each hill must be examined individually to ascertain its origin. The same line of reasoning applies to all other geologic investigations.

Origin of Kames

Kames are believed to be ice contact features. There are two possible ways such features might originate. Some are bodies of sand and gravel deposited in crevasses or other openings in or on the surface of stagnant, or nearly stagnant, ice which later melted away leaving the sediment in isolated mounds. Others are small deltas or fans built outward from, or inward toward, the ice front, the ice later melting and isolating the mass of sediment to form irregular mounds.

0.9 48.6 T-road. Turn left (north).

0.3 48.9 Ascending to top of kame ridge. Note the numerous abandoned gravel pits on both sides of the road. These pits were active about 25 years ago.

1.0 49.9 The soil is very sandy in this region and has a slight pinkish cast.

0.2 50.1 Turn left (west).

0.3 50.4 SLOW. Turn right (north).
0.3 50.7 Bridge over Northwest Tollway.

0.3 51.0 Kiswaukee River Valley ahead.

0.1 51.1 Turn right (east).

0.3 51.4 Turn left (north).

0.2 51.6 Gravel on left.

0.2 51.8 STOP. Turn right (east) on U. S. Highway 20. Kiswaukee River on the left.

0.2 52.0 Bridge over Coon Creek.

1.7 53.7 Note sandy nature of soil.

0.9 54.6 SLOW. Entering Garden Prairie.

1.8 56.4 Note Bloomington Moraine on horizon. The pinkish cast of the soil in this area indicates that the parent material was in part derived from outwash deposits of Bloomington age which has characteristic pinkish till.

0.1 56.5 SLOW. Turn left into entrance of Garden Prairie Stone Quarry.

0.3 56.8 Stop 7. Garden Prairie Stone Quarry.

The strata exposed in the Garden Prairie Quarry is of Silurian (Alexandrian) and Ordovician (Cincinnatian) age. The rock is mantled by a thin veneer of glacial outwash and wind-blown deposits.

The Silurian component of the section is a dolostone, buff to bright brown in color. The Ordovician component is limestone and interbedded shale. The Ordovician is separated from the Silurian by an irregular surface or contact.

The section is as follows:

<table>
<thead>
<tr>
<th>Pleistocene</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>sand</td>
<td></td>
</tr>
<tr>
<td>silt</td>
<td></td>
</tr>
<tr>
<td>till</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Silurian (Alexandrian)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>dolostone (dolomite) -- buff-tan, thinly laminated to thick-bedded at top with inter-laminated greenish blue clay</td>
<td>5-15'</td>
</tr>
</tbody>
</table>
Ordovician (Fort Atkinson)  

**limestone** -- gray with interlaminated greenish gray shale inclusions. Very fossiliferous  
12'

**limestone** -- brownish gray, mottled with small orange limonitic spots. Conglomeritic, with calcite lined vugs  
1'

**limestone** -- dolomitic and shaly, fine to medium grained, light to brownish gray, fossiliferous. Shale very fossiliferous  
7'

The irregular contact of the Silurian on the Ordovician is called an unconformity. It indicates a time lapse between the deposition of the Ordovician and the overlying Silurian strata. It further indicates sub-aerial erosion of the Ordovician sediments prior to the deposition of the Silurian strata. Unconformities are important criteria for differentiating the rock succession into the various time components.

The lower few inches of the Silurian dolostone contain fossils typical of those in the Ordovician limestone and shale. These Ordovician fossils were incorporated in the first few inches of Silurian sediment, a further indication that some weathering of the Ordovician sediments occurred prior to the deposition of the overlying Silurian dolostones.

Fossils are abundant. Good hunting.

We enjoyed the day with you. Please come again. A schedule of next year's trips will be mailed you this summer if you are registered.

-- The End --
<table>
<thead>
<tr>
<th>ERAS</th>
<th>PERIODS</th>
<th>EPOCHS</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proterozoic</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Archeozoic</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Paleozoic</td>
<td>&quot;Ancient Life&quot;</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Age of Invertebrates</td>
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<td></td>
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<tr>
<td></td>
<td>Devonian</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Silurian</td>
<td>Cincinnatian</td>
<td>Dolostone present in Belvidere area</td>
</tr>
<tr>
<td></td>
<td>Ordovician</td>
<td>Champlainian</td>
<td>Dolomites in wells</td>
</tr>
<tr>
<td></td>
<td>Cambrian</td>
<td>Croixan</td>
<td>Trempealeau dol., Franconia greensand, Galesville sandstone, Eau Claire shale, Mt. Simon Sandstone present in deep wells</td>
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<tr>
<td></td>
<td></td>
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<tr>
<td>Mesozoic</td>
<td>&quot;Middle Life&quot;</td>
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<td>Age of Reptiles</td>
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<tr>
<td></td>
<td>Permian</td>
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<tr>
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<td>Pennsylvanian</td>
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<tr>
<td></td>
<td>Mississippian</td>
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<td>Devonian</td>
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</tr>
<tr>
<td></td>
<td>Silurian</td>
<td>Cincinnatian</td>
<td>Dolostone present in Belvidere area</td>
</tr>
<tr>
<td></td>
<td>Ordovician</td>
<td>Champlainian</td>
<td>Dolomites exposed</td>
</tr>
<tr>
<td></td>
<td>Cambrian</td>
<td>Croixan</td>
<td>Trempealeau dol., Franconia greensand, Galesville sandstone, Eau Claire shale, Mt. Simon Sandstone present in deep wells</td>
</tr>
<tr>
<td></td>
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<tr>
<td>Cenozoic</td>
<td>&quot;Recent Life&quot;</td>
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</tr>
<tr>
<td></td>
<td>Age of Mammals</td>
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<tr>
<td></td>
<td>Quaternary</td>
<td>Pleistocene</td>
<td>Recent post-glacial stage</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Wisconsinan Glacial Stage</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Sangamomian Interglacial Stage</td>
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<td></td>
<td></td>
<td></td>
<td>Illinoian Glacial Stage</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Earlier glaciations not represented by deposits in Belvidere area</td>
</tr>
<tr>
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</tr>
</tbody>
</table>

**Generalized Geologic Column - Belvidere Area**
Prepared by the Illinois State Geological Survey
PHYSIOGRAPHIC DIVISIONS OF ILLINOIS

GLACIAL MAP OF NORTHEASTERN ILLINOIS

GEORGE E. EKBLAW

Revised 1960
## Time Table of Pleistocene Glaciation


<table>
<thead>
<tr>
<th>Stage</th>
<th>Substage</th>
<th>Nature of Deposits</th>
<th>Special features</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recent</strong></td>
<td></td>
<td>Soil, youthful profile of weathering lake and river deposits, dunes, peat</td>
<td></td>
</tr>
<tr>
<td>Valderan</td>
<td>5,000 yrs.</td>
<td>Outwash</td>
<td>Glaciation in northern Illinois</td>
</tr>
<tr>
<td>Twocreekan</td>
<td>11,000 yrs.</td>
<td>Peat, alluvium</td>
<td>Ice withdrawal, erosion</td>
</tr>
<tr>
<td></td>
<td>12,500 yrs.</td>
<td>Drift, loess, dunes, lake deposits</td>
<td>Glaciation, building of many moraines as far south as Shelbyville, extensive valley trains, outwash plains, and lakes</td>
</tr>
<tr>
<td>Woodfordian</td>
<td>22,000 yrs.</td>
<td>Soil, silt and peat</td>
<td>Ice withdrawal, weathering, and erosion</td>
</tr>
<tr>
<td>Farmdalian</td>
<td>28,000 yrs.</td>
<td>Drift, loess</td>
<td>Glaciation in northern Illinois, valley trains along major rivers, Winnebago drift</td>
</tr>
<tr>
<td>Altonian</td>
<td>50,000 to 70,000 yrs.</td>
<td>Soil, mature profile of weathering, alluvium, peat</td>
<td></td>
</tr>
<tr>
<td><strong>Illinoian</strong></td>
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<td>Buffalohartan</td>
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<tr>
<td></td>
<td></td>
<td>Jacksonvillian</td>
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<tr>
<td></td>
<td></td>
<td>Paysonian (terminal)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lovelandian (Pro-Illinoian)</td>
<td>Loess (in advance of glaciation)</td>
</tr>
<tr>
<td><strong>Sangamonian</strong></td>
<td></td>
<td>Yarmouthian (2nd interglacial)</td>
<td>Soil, mature profile of weathering, alluvium, peat</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kansan (2nd glacial)</td>
<td>Drift, loess</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aftonian (1st interglacial)</td>
<td>Soil, mature profile of weathering, alluvium, peat</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nebraskan (1st glacial)</td>
<td>Drift</td>
</tr>
</tbody>
</table>
GEOLOGIC MAP OF ILLINOIS
showing
BEDROCK BELOW
THE GLACIAL DRIFT
1961

Tertiary
(Pliocene omitted)
Cretaceous
Pennsylvanian
(Above No. 6 Coal)
Pennsylvanian
(Below No. 6 Coal)
Mississippian
(Upper)
Mississippian
(Middle and Lower)
Devonian
Silurian and Devonian
Silurian
Fault
Complex faulted area

MILES
0 5 10 20 30 40 50

ILLINOIS STATE GEOLOGICAL SURVEY, URBANA
COMMON TYPES of ILLINOIS FOSSILS

- Graptolite
- Cup coral
- Lithostroption
- Honeycomb coral

- Cystoid
- Fenestella

- Crinoid
- Pentremite

- Lingula
- Orbiculoidea
- Spiriferoid
- Productoid
- Pentameroid

- Bryozoa
- Archimedes
- Branching

- Brachiopods

Plate 1
COMMON TYPES of ILLINOIS FOSSILS

PELECYPODS

"Clam"    "Scallop"

Low-spired

High-spired

Flat-spired

GASTROPODS

Curved cone

Coiled cone  (Nautilus)

Bumastus

Calythene  (coiled)

Straight cone

OSTRACODS  (greatly enlarged)

C EPHA LOPODS

CEPHALOPODS

Calythene  (flat)

TRILOBITES

(55757-25M-5-62)