EARTH SCIENCE FIELD TRIP

GUIDE LEAFLET

PONTIAC-STREATOR AREA

LASALLE AND LIVINGSTON COUNTIES
PONTIAC AND STREATOR QUADRANGLES

Leader
GILBERT O. RAASCH
ILLINOIS STATE GEOLOGICAL SURVEY, URBANA
October 25, 1952

GUIDE LEAFLET 52-E
HOST: PONTIAC TOWNSHIP HIGH SCHOOL

ILLINOIS GEOLOGICAL SURVEY LIBRARY
0.0 0.0 Caravan assembles, headed west on north side of Pontiac Township High School.

0.0 0.0 Go right (north) on Main Street.

0.1 0.1 Bear left on Main and cross railroads.

0.1 0.2 Turn left (west) onto brick pavement.

0.1 0.3 Stop sign. Continue ahead on old No. 66.

0.1 0.4 Pavement curves left; continue ahead (W) on gravel.

0.1 0.5 DANGER. Stop sign. Cross Route No. 66 and continue ahead (W).

0.5 1.0 Stop sign. Turn right (N) on Route No. 23.

0.7 1.7 STOP NO. 1. Park on right shoulder of highway.

Walk across highway past southend of old quarry.

MARINE LIMESTONE - PENNSYLVANIAN

At the top of the excavation can be seen about 5 feet of buff clay full of sand, pebbles, and boulders. This is glacial till, dropped by the melting of the Wisconsin continental glacier which existed here less than 50,000 years ago.

The glacial till rests on limestone bedrock which constitutes the quarry stone. The stone, crushed to different degrees of fineness, is used chiefly for road macadam, concrete aggregate, and agricultural limestone for counteracting soil acidity.

A maximum of 12 feet of limestone is exposed above the quarry floor, which is in a bluish, more shaly limestone containing an abundance of fossils.

Where ditching cuts down through the quarry floor, it shows that the lowest limestone layer is granular and made up of ground-up remains of shells, crinoids, etc. A limited thickness of blue clay separates this limestone from a black "slaty" shale which is the lowest rock exposed in the vicinity.

The limestone is known as the LaSalle formation, of Pennsylvanian (Coal Period) age. Beneath this limestone are other Coal Period Strata down to a distance of 500 feet below the surface. Most of this 500 feet thickness is shale, but there are also layers of sandstone, limestone, and coal. The shale was deposited as mud, the sandstone as sand, and the coal as peaty, half-decayed vegetation.

Abundant fossils of sea life in the LaSalle limestone show that the rock formed in marine water which was clear and shallow. Most abundant here are brachiopods, especially smooth-shelled Composita and small, rough-shelled Marginifera, but many other types of shells occur, along with crinoidal remains, small cup corals (Lophophylum profundum) and bryozoa of both the lacy (Fenestella) and branching type.

Like other Pennsylvanian limestones in Illinois, the LaSalle is relatively thin, indicating that the sea invasions were relatively shortlived here at that time.
0.0 2.5 Continue ahead (N).

1.2 3.7 Turn left (W) on gravel road to Rowe. Route continues across the Ancona-Pontiac lake flat.

1.3 5.0 CAUTION. Railroad crossing in Rowe.

1.8 6.8 Cross Wolf Creek, which here flows in an abandoned channel of Vermilion River.

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The land on either side of the highway is very flat and very black. To the west the view is terminated by trees along the Vermilion River, but to the east, a rise of the country can be noted in the distance. The rising country marks the west edge of the Chatsworth Moraine, which here runs NW-SE. A similar trending belt of higher, rolling country lies about 5 miles to the southwest. This is the Cropsey Moraine.

Both of these belts of higher country were formed during a time when the Wisconsin Ice Sheet was retreating northeasternward, toward Lake Michigan. The retreat of the ice front was not constant. Local periods of cooler climate brought about a limited readvance of the glacier, just as a retreating army may counter-attack and make limited advances in the course of its general withdrawal.

Where the ice readvanced and stood for sometime before resuming its withdrawal, increased quantities of earth and stone were pushed and carried forward. When the ice finally disappeared, the earth and stone released by the ice remained as a strip of higher country, or moraine, to mark the temporary ice stand.

Between the Cropsey and Chatsworth moraines, the low country received much water from the melting ice to the east. Vermilion River had not yet come into being to carry off the drainage, which tended to be blocked by ice masses or glacial debris in the Illinois valley.

Thus at least two lakes existed in the Pontiac region during the ice age. An earlier one, called Glacial Lake Ancona is thought to have developed during the retreat of the glacier from the Cropsey moraine. Later, when the glacier stood along the line West Chicago-Naperville-Lemont-Chicago Heights-Valparaiso, great torrents of water disgorged down the Kankakee and Illinois rivers. The valley was not great enough to carry off the floods which backed up over much of the surrounding country.

Lake Pontiac, formed at the time of this "Kankakee Torrent," stood at a height of about 650 feet and is responsible for the black, slightly mucky soil of the flats. The level expanses, especially that at the 620 foot level, probably were developed earlier, on the bottom of Lake Ancona. Deep weathering sand and gravel just beneath the soil and above the glacial till in many places northwest of Pontiac suggests that they belong to the older lake, Ancona.
1.0 7.8 Cross Vermilion River.

0.3 8.1 Turn right (N) on minor road.

1.3 9.4 **STOP NO. 3.** Along roadside; walk east to river bank.

**PENNSYLVANIAN LIMESTONE AND SHALE**

The cover of glacial drift is remarkably thin over much of the Pontiac-Streator area, and the streams have been able to cut through it, down into the Pennsylvanian bedrock.

Here under about 10 feet of glacial till the following strata are exposed:

- Limestone, fossiliferous, gray, granular, in thin beds with much calcareous ("limey") shale.
  - 5 feet
- Shale, gray and dark purple, soft.
  - 4 feet
- Concealed, to water level
  - 3.5 feet

This is a slightly earlier limestone than that at Stop No. 1, and would be much less satisfactory for commercial purposes because of the high percentage of shale. Because the limestone strata are harder than the shale, they crop out more frequently, giving a false idea of the abundance of this kind of rock.

0.0 9.4 Resume, turning left (W) with road.

0.2 9.6 Road turns right (N).

0.3 9.9 Road turns left (W). A few hundred yards to the north, the river cuts through a third Pennsylvanian limestone, the Lonsdale Formation. This limestone is made up of roundish pellets the size of small pebbles, which are released from the lime matrix on weathering. The Lonsdale is older than the two limestones previously seen. Partly because we are descending the river and partly because the layers themselves are dipping (i.e., sloping) slightly to the southeast, we find increasingly older formations as we go from Pontiac to Streator.

0.4 10.3 Intersection. Turn right (N) on winding road.

0.8 11.1 Cross Vermilion River.

0.1 11.2 Intersection - Turn left (N) on abandoned road.

0.1 11.3 **STOP NO. 4.** Walk Northeast to creek.

A thick ledge of Pennsylvanian limestone (probably Lonsdale) forms the floor of the creek, upstream. Where the creek has cut through the thick stratum, a miniature waterfall and gorge have developed. This illustrates one of the principal causes of water falls, including that responsible for Niagara.

Good outcrops of glacial till form the sides of the valley above the limestone. At the top of the bank, in some places, a foot or so of ashy earth is "loess," deposited as dust by the winds of the glacial period. The minute particles are extremely angular, which causes them to mesh together, so that the loess will stand in vertical banks in spite of its unconsolidated condition.
At other places, a foot or so of weathered gravel, representing bottom deposits of Lake Ancona, can be observed in the bank top. Better outcrops of this gravel overlying glacial till may be seen along Ida Creek, a mile to the north.

Most of the pebbles in the glacial till are subangular and have flat-tish, facetted faces, commonly bearing deep scratches made as the ice dragged them over other rocks. The till also is completely unsorted, a heterogeneous mixture of clay, sand, pebbles, and boulders.

Whenever waters from the melting ice encounter the till, they exercise a sorting function, carrying off the clay to distant regions and depositing the sand and gravel in washed and stratified layers. The action of the water also had the effect of rounding the pebbles and grinding away most of the glacial striations.

0.0 11.3 Turn sharp right and return to road.

0.1 11.4 Turn left (E) on roadway.

0.2 11.6 Cross creek; exposure of glacial till on left; route continues over black soils and flat terrain of glacial lakes Ancona-Pontiac.

0.4 12.0 Intersection; turn left (N).

1.0 13.0 Cross Ida Creek and turn left (W). Several cuts in bank of Ida Creek show weathered Lake Ancona gravel on Cropsey glacial till.

0.5 13.5 Intersection; turn right (N).

0.5 14.0 Enter CORNELL.

0.5 14.5 Stop Sign. Turn left (W) on Route No. 23.

1.8 16.3 Cross Vermilion River.

5.8 22.1 Highway turns right (N) at power line.

1.1 23.2 Cross Long Point Creek; route continues north over glacial lake flats.

3.3 26.5 Stop sign. Cross Route No. 17 and continue ahead (N).

2.3 28.8 Underpass.

0.3 29.1 Cross Vermilion River and enter STREATOR.

0.3 29.4 Turn right (E).

0.4 29.8 Turn right (S) along power line just west of Phillips Station.

0.6 30.4 Enter Baiette and Talbot Coal Mine and park. STOP NO. 5. Walk west into strip pit.

The mine is being worked in a coal bed, which extends widely over Illinois and is known as Coal No. 7 (Sparland Coal). It is here about 50 inches thick, and overlain by gray clay shale (Farmington Shale). The strip mine is on the site of the former Purington Brick Plant, which used the Farmington Shale as its raw material.
0.0 30.4 Reverse route to city street.

0.6 31.0 Turn right (E), then left (N) at Phillips bulk station, onto Illinois Street.

0.6 31.0 Turn right (E) on 12th Street.

0.2 31.2 Railroad crossing.

0.2 31.4 Turn left (N) on Otter Creek Road.

0.5 31.9 CAUTION. Railroad crossing.

0.5 32.4 DANGER. Cross Main St. (Route No. 17) and continue ahead (N).

0.2 31.6 Junction with Otter Creek Road; continue ahead (E) on gravel.

0.4 32.0 CAUTION. Railroad crossing.

0.6 32.6 Intersection; turn left (N). Travel continues over lake flat, with Chatsworth moraine rising ahead and to right.

1.0 33.6 DANGER. Stop sign. Cross Route No. 17 and continue ahead (N).

0.3 33.9 Ascend moraine (airport on left).

0.7 34.6 Intersection at cemetery; continue ahead (N).

0.2 34.8 CAUTION. Railroad crossing.

0.6 35.4 Intersection; turn left (W).

1.0 36.4 Intersection; turn right (N).

0.3 36.7 Turn left (W) just short of bridge over Otter Creek.

0.5 37.2 Turn right (N) into Marilla Park.

0.2 37.4 Cross Otter Creek and bear right to ball field.

0.2 37.6 LUNCH STOP.

0.0 37.6 Reverse route to park exit.

0.4 38.0 Park exit; turn left (E).

0.5 38.5 Intersection; turn right south.

0.3 38.8 Intersection; turn left (E).

1.0 39.8 Intersection; turn right (S).

0.6 40.4 CAUTION. Railroad crossing.
0.2 40.6 Intersection; turn right (W) at cemetery.

0.5 41.1 **STOP NO. 6.** Park along roadside; remain in cars.

We are parked on the summit of the Chatsworth Moraine, overlooking the flats of Lakes Ancona and Pontiac to west and south.

The moraine line runs many miles in a Northwest-Southwest direction, and marks a line along which the edge of the glacier remained stable for a long time. This is another way of saying that the speed of the forward motion of the ice mass was balanced by the rate of its melting back. Thus the ice, with its load of earth and stone, was constantly moving forward and dropping its load along the line of melting. Therefore, when the thick ice mass melted away, the clay and rock was left behind as an irregular ridge standing above the general level of the country.

The gob pile of waste rock from a former coal mine can be seen to the northwest. The red color is the result of oxidation of the iron in the clay or shale.

0.5 41.6 Intersection. Turn left (S) on Otter Creek Road.

1.0 42.6 **CAUTION.** STOP SIGN. Cross Route No. 17 and continue ahead (S) on Otter Creek Road.

1.0 43.6 Intersection; turn right (W) on 12th Street.

0.2 43.8 **CAUTION.** Railroad crossing.

0.2 44.0 **STOP SIGN.** Continue ahead (W) on 12th Street.

0.5 44.5 **CAUTION STOP SIGN.** Turn left (S) on Route No. 23 (Bloomington Street).

0.8 45.3 Cross Vermilion River.

0.2 45.5 Turn right (W) onto blacktop road (NW of underpass).

0.1 45.6 Cross Moon Creek.

0.3 45.9 Turn right (N) into old clay pit of Streator Drain Tile Company.

0.2 46.1 **STOP NO. 7.** Park in northeast part of clay pit.

The pit shows a thin mantle of glacial till upon about 30 feet of gray shale and siltstone, having discontinuous bands of hard calcareous and micaceous sandstone. The surfaces of the sandstone layers bear many worm trail markings, ripple marks, current marks, etc., showing that the rock was deposited as muddy sand in shallow water.

In the bottom of the pit is about 5 feet of dark, mica-bearing shale containing plant fragments.

Many hard, subrounded clay-ironstone concretions are present in the shale.

**END OF CONFERENCE. BON VOYAGE.**

To return to Pontiac, turn left on leaving pit, and proceed south on Highway No. 23.
BEDROCK FORMATIONS

The bedrock that is exposed in the Pontiac Area — along streams, and in quarries, mines, and clay pits — is all of Pennsylvanian ("Coal Period") age. But below these exposed strata lie several thousand feet of older stratified rock — sandstone, limestone, and shale resting upon a foundation of very hard, crystalline rocks, generally lumped together under the term "basement granite."

FORMATION OF THE GRANITE BASEMENT

These very ancient crystalline rocks formed between 600,000,000 and 2,000,000,000 years ago. During this great span of geologic time, disturbances in the earth's crust folded and fractured the strata and released quantities of molten rock "magma" deep below the surface. Some of this magma cooled slowly deep underground and crystallized as granite and gabbro; some of it reached the surface as lava flows and chilled quickly to such rocks as basalt, felsite, and porphyry. Rocks which had once been sediments were partially remelted and twisted like warm taffy to form gneiss and schist.

These ancient crustal disturbances raised high mountain chains in the interior of the continent. Between the periods of mountain building were very long quiet intervals, during which the forces of erosion had ample time to plane the country down to a low plain and expose the roots of the mountain chains.

FORMATION OF THE STRATIFIED BEDROCK

Following a final bevelling of the "Pre-Cambrian" mountain ranges, waters of the ocean inundated the interior of the continent in Cambrian time and remained here through much of the 250,000,000 years that followed. Sediments and mineralized waters emptying into these ancient seas brought sand, mud, and lime deposits which were laid down over the sea floor to solidify in time to sandstone, shale, and limestone. The shells and skeletons of sea animals that thrived in these waters were buried in the sediments and preserved as fossils, to help us date the rocks and reconstruct the environments of the distant past.

Before the Coal Period, a broad upfold in the earth's crust brought the region above the waters and exposed it to the erosive action of streams and weather. Much rock was removed from the Pontiac-Streator area at that time, especially along the fold known as the LaSalle Anticline.

COAL PERIOD ENVIRONMENT

During the Pennsylvanian, the region again was low enough to receive sediment rather than to have it removed. But at this time conditions in North America were considerably different from what they had been during the earlier times of the inland seas.

In the days of the Coal Period, some 250,000,000 years ago, high mountains were pushing upward along the Atlantic Coast. Illinois was then part of a great swampy lowland, which at times was a vast floodplain delta area, at times was briefly inundated by the sea, and at times was the site of immense everglade-like fresh water swamps. Conditions changed rapidly as sea level rose and fell.

The sands and muds of the delta environments hardened to sandstone and shale in which the leaves of land plants are most commonly found. The muds and limestones deposited during the incursions of the sea contain shells, corals, and bones of sea
creatures. The fresh waters of the great swamps, covered by the rank jungle growth of tree ferns and clubmoss trees, accumulated masses of half rotten vegetation which in time were hardened and compressed to coal. Below the coal seams the unstratified underclays are believed by many to represent the ancient soils in which the vegetation grew.

As the strata of the coal period are studied in detail, there appears a picture of a fairly regular succession of environments from river floodplain deltas to coal swamps, to marine invasions, and back again to freshwater mudflats. This succession was repeated many times, as sea level fluctuated. Such a cycle of strata has been called a "cyclothem" (see appendix).

LONG INTERVAL OF EROSION

Following the Coal Period, Illinois rose to a moderate height above the waters of the sea, and there is no evidence that it was ever again covered by marine waters. The land stood high enough so that the debris from the disintegration of the bedrock was removed and deposited in distant regions. Consequently, for this 250,-000,000 year interval, during which the great dinosaurs of the Mesozoic were succeeded by the strange mammals of the Tertiary, we have no record of events in Illinois, except for its southernmost tip, where the waters of the Gulf of Mexico once extended far up the Mississippi Valley.

ICE AGE HISTORY

Nature's recording of past events in northern Illinois was resumed when the continental glaciers began moving down from the north a scant million years ago. The glacial period was not a time of constant burial of the landscape under thick masses of ice. The glaciers were present only a minority of the time, and between the glaciations were much longer intervals of mild climate.

The first or Nebraskan glacial advance is not believed to have reached the Pontiac-Streator area, but during the second or Kansan glacial stage, an ice advance from the Canadian northeast crossed the area. Only remnants of the deposits of this glaciation remain in the deeper valleys. Elsewhere later ice movements stripped away the Kansan glacial drift, while the remnants remaining were deeply buried.

During the 3rd or Illinoian period of glaciation, nearly all of Illinois disappeared under the ice. But like the Kansan deposits, those of the Illinoian were buried by the glacial drift, left behind by the 4th (Wisconsin) glaciation. Since this is the last of the invasions, believed to have left the upper Great Lakes only 5,000 years ago, its deposits are well preserved and readily accessible for study.

Thus it has been possible to subdivide the Wisconsin glacial stage into four substages. Of these, the earliest or Iowan did not reach the Pontiac-Streator area, nor did the 3rd (Cary) or 4th (Mankato). The 2nd or Tazewell glaciation, then, is responsible for the moraines and glacial lake plain which dominate the topography of the conference area. However, the Cary stage exercised an indirect effect in being responsible for the discharge of the waters that were ponded as "Lake Pontiac."

RECENT GEOLOGICAL PERIOD

The time since the disappearance of the Wisconsin glacier, being only a few thousand years, is so short that we have no way of knowing whether the Ice Age is ended, or whether we are merely at the beginning of a mild interval to be followed by a fifth glaciation after 100,000,000 years or so. Meanwhile, the downward cutting
of the valleys, which began with the withdrawal of the ice, continues except where man has called a temporary halt through dam construction or soil erosion control. But by his many excavations, for road pits, mines, and quarries, man has already greatly affected the landscape at a rate quite as rapid and nearly as extensive as that of the ice masses of the past. And man has been working here only a little over a century.
GLACIAL GEOLOGY IN NORTHEASTERN ILLINOIS
Compiled by George E. Ekblaw from data furnished by the Survey
January 1, 1942
PHYSIOGRAPHIC DIVISIONS OF ILLINOIS

### Time Table of Pleistocene Glaciation
*(after M. M. Leighton and H. B. Willman, 1950)*

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<td>Late</td>
<td>Fluvial deposition - Mississippi, Illinois, and Ohio river valleys; dune sand, some loess deposits along Mississippi River Valley; and deposits in Lake Chicago.</td>
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<tr>
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<td>Mankato</td>
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<td>Tazewell</td>
<td>Drift, loess, dunes, lake deposits.</td>
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<td>Farmdale</td>
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<td>(Pro-Wis.)</td>
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<td>Soil, mature profile of weathering, alluvium, peat.</td>
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<td>Nebraskan</td>
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<td>(1st glacial)</td>
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</table>
COMMON TYPES of ILLINOIS FOSSILS

- GRAPTOLITE
  - Cup coral
  - Lithostracion
- CORALS
  - Honeycomb coral
- CYSTOID
  - Archimedes
  - Fenestella
  - Branching
- CRINOID
  - Pentremite
  - Lingula
  - Orbiculoidea
  - Spiriferoid
- BRYOZOA
  - Composita
  - Pentameroid
- BRACHIOPODS
  - Productoid
COMMON TYPES of ILLINOIS FOSSILS

PELECYPODS

"Clam"

"Scallop"

Low-spired

High-spired

Flat-spired

GASTROPODS

Curved cone

Coiled cone (Nautilus)

Straight cone

CEPHALOPODS

Bumastus

Calymene (coiled)

OSTRACODS (greatly enlarged)

TRILOBITES

Calymene (flat)
### GEOLOGICAL COLUMN PONTIAC-STREATOR AREA

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<td>Carbondale Group</td>
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<td>Not present in Illinois</td>
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<td></td>
<td>Pliocene</td>
<td>Not present in Northern Illinois</td>
</tr>
<tr>
<td><strong>Quaternary</strong></td>
<td><strong>Age of Mammals</strong></td>
<td>Sangamon Interval</td>
<td>Wisconsin-Tazewell Substage</td>
</tr>
<tr>
<td><strong>Wisconsin Glacial Epoch</strong></td>
<td></td>
<td>Kansan Glacial</td>
<td>Pleistocene deposits</td>
</tr>
<tr>
<td><strong>Illinoian Glacial</strong></td>
<td></td>
<td></td>
<td>Cropsey and Chatsworth moraines, Glacial Lakes Ancona &amp; Pontiac.</td>
</tr>
<tr>
<td><strong>Archeozoic</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>Proterozoic</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Archeozoic</strong></td>
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