State of Illinois
Department of Registration and Education
STATE GEOLOGICAL SURVEY DIVISION
Morris M. Leighton, Chief

ALTON AREA
Madison County

Leader
Gilbert O. Raasch
Urbana, Illinois
October 25, 1947

GUIDE LEAFLET 47-F
Host: Alton High School
ITINERARY

0.0 Start in front of Alton High School and proceed west (right) onto College Avenue.
0.2 Turn left (S.) on Rock Springs Drive. Outcrops of Mississippian Limestone on right side of drive.
0.6 Stop. Turn right (W.) onto Brown St.
1.1 Stop. Pearl St. Continue ahead on Brown St.
1.2 Turn right (W.) onto Union Street.
1.4 Stop. Central Ave. Continue ahead on Union St.
1.6 Turn left (S.) onto Liberty St.
1.7 Turn right (W.) onto 9th St.
2.0 Stop. Henry St. Continue ahead on 9th St.
2.4 Stop. Alby St. Continue ahead on 9th St.
2.5 Danger. Railroad Crossing.
2.6 Stop. Belle St. Continue ahead and ascend steep grade.
3.1 Turn left (SW) at Standard Filling Station, onto State St.
3.6 Turn right (W.) onto Bluff St.
3.8 Turn left (S.) and (3.9) enter Riverview Park.
   STOP I. Panorama of Mississippi Valley and bluffs. Sink hole topography in foreground.
3.8 Leave park and drive east on Belleview.
4.0 Stop. Turn right on State St.
4.4 Stop. 4th St.
4.5 Stop. Turn right (W.) onto W. Broadway. Bluffs on right are Mississippian, St. Louis Limestone, showing cross-bedding.
5.2 Cement Mines in St. Louis Limestone on right.
5.5 Triple forks; take center road up hill.
5.7 Stop in quarry. Danger—do not cross 440 volt electric cable.
   STOP II. Mississippian Formations; St. Louis Limestone overlain by St. Genevieve Limestone (upper levels of quarry). St. Louis Limestone is dense and shows local brecciation and undulation due to solution at early, but undetermined, date. St. Genevieve Limestone contains granular and oolitic layers and is sparingly fossiliferous.
   Above the limestone is several feet of deeply weathered glacial till overlain by about 60 feet of windblown loess. Land snail shells common in lower part of loess; near base, lime concretions have yielded bones of many types of Pleistocene mammals (see section on geologic history).
5.7 Reverse route.
5.8 Pull right onto driveway at shanty.
   STOP III. High piles of overburden stripped from bedrock surface in quarry permit study of drift materials and lime concretions.
5.9 Turn right onto river road.
6.4 STOP IV. To collect fossils from St. Genevieve Limestone in levee bank.
6.4 Reverse route.
6.9 Turn left and ascend steep hill on dirt road (not recommended in wet weather).
7.3 Danger. Jefferson Avenue at hillcrest. Turn left onto Jefferson Avenue.
7.7 Stop. Turn left (N.) onto State St.
7.9 Turn left (W.) onto Danforth St.
Cross ravine and enter Fairmount. Continue ahead on winding pavement. Note pond in sinkhole on right.

9.0 Road passes between river bluff on left and deep wooded sinkholes on right.

9.1 Forks; keep left.

9.3 Forks; keep right.

9.5 Leave Fairmount via Logan St.

9.9 Stop. Turn right onto State St.

10.6 Junction State and 9th Sts.; continue ahead on 9th, descending hill.

11.1 Stop. Belle St. Continue ahead on 9th St.

11.2 Danger. Railroad Crossing.

11.3 Stop. Alby St. Continue ahead on 9th St.

11.7 Stop. Henry St. Continue ahead on 9th St.

12.0 Turn left (N.) onto Liberty St.

12.1 Stop. Turn right (E.) onto Union St.

12.3 Stop. Central Ave. Continue ahead on 9th St.

12.5 Turn left (N.) onto Brown St.

12.6 Stop. Pearl St. Continue ahead on Brown St.

13.1 Turn left (N.) onto Rock Springs Drive.


13.6 Park at east picnic ground.

STOP V. Basal Pennsylvanian sandstone separated by unconformity from underlying Mississippian limestone.

LUNCH STOP.

13.6 Reverse route.

13.7 Stop. Turn right (W.) onto College Ave.

14.8 Go round circle to right and north onto Central Avenue.

15.5 Danger. Sharp turns at railroad overpass. Continue west on Elm St.

15.9 Turn right (N.) on Alby St.

16.0 Cross railroad overpass and turn left into brick plant.

STOP VI. Brick clays are quarried from Pennsylvanian clays dug north of the plant. Through the courtesy of the Alton Brick Company, a tour will be made of the brick plant.

BON VOYAGE!!!
### GENERALIZED GEOLOGIC COLUMN
**FOR THE ALTON AREA**

Prepared by the Illinois State Geological Survey

<table>
<thead>
<tr>
<th>ERAS</th>
<th>PERIODS</th>
<th>EPOCHS</th>
<th>FORMATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Genozoic</strong></td>
<td>Age of Mammals</td>
<td>Quaternary</td>
<td>Pleistocene <em>Recent post-glacial stage</em> <em>Wisconsin glacial stage</em> <em>Sangamon interglacial stage</em> <em>Illinoian glacial stage</em> <em>Yarmouth interglacial stage</em> Kansan glacial stage Aftonian interglacial stage Nebraskan glacial stage</td>
</tr>
<tr>
<td><strong>Mesozoic</strong></td>
<td>Age of Reptiles</td>
<td>Cretaceous</td>
<td>Pliocene Miocene Oligocene Eocene Present in extreme southern Illinois only.</td>
</tr>
<tr>
<td><strong>Paleozoic</strong></td>
<td>Age of Amphibians and Early Plants</td>
<td>Jurassic</td>
<td>Not present in Illinois</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Triassic</td>
<td>Not present in Illinois</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Permian</td>
<td>Not present in Illinois</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pennsylvanian</td>
<td>Only lower part of Carbondale Group and Tradewater Group; largely shale and sandstone.</td>
</tr>
<tr>
<td><strong>Proterozoic</strong></td>
<td>Age of Invertebrates</td>
<td>Ordovician</td>
<td>Known only from deep wells</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Silurian</td>
<td>A couple hundred feet penetrated in deep wells</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Devonian</td>
<td>Limited thickness of sandstone and limestone penetrated in deep wells, below river level.</td>
</tr>
<tr>
<td><strong>Archeozoic</strong></td>
<td></td>
<td>Mississippian</td>
<td>St. Genevieve and St. Louis limestones exposed in river bluffs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Upper</td>
<td>Lower</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cambrian</td>
<td>Known only from deep wells below 2,000 feet.</td>
</tr>
</tbody>
</table>

*Referred to as "Pre-Cambrian time." "Granite" in bottoms Deposits present in the Alton area.
DEEPLY BURIED FORMATIONS

The oldest bedrock which comes to the surface in the field trip area is limestone of Mississippian Age. Below this Mississippian (St. Louis) Limestone are older Mississippian strata, chiefly limestone and shale. Their presence is known from a study of the rock penetrated in deep wells in the Alton area. These show, below the Mississippian, a few feet of Devonian dolomite, then a couple hundred feet of Silurian dolomite, underlain by 1600 feet of Ordovician strata down to a depth of over 2000 feet. From this point downward for another 1300 feet, the deepest wells penetrate sandstone and dolomite of Cambrian Age. A well drilled at St. Louis in 1869 found these Cambrian beds to be resting on Pre-Cambrian granite at a depth of 380 feet below the surface. This is in general the same granite complex that comes to the surface in the Lake Superior Region, and forms the Canadian Shield, claimed by some authorities to include the world's oldest rocks.

Nearly all of the formations found in the deep wells contain fossil remains of marine animals. These show clearly that ancient seas covered this part of Illinois as they did much of the interior of North America. The nearly horizontal attitude of the layers and the almost unconsolidated condition of some of them shows also that there has been very little disturbance of the earth's crust since the time when the Cambrian deposits were laid down. If we go back into Pre-Cambrian Time, however, there is evidence that high mountains were formed and eroded away not only once, but three times, before the coming of the Cambrian Sea. Evidence for this is deeply buried in Illinois, but clearly evident where these ancient rocks come to the surface farther north.

EXPOSED MISSISSIPPIAN FORMATIONS

The high gray bluffs along the Mississippi and ledges that form cascades in the ravines are made of limestone of Mississippian Age. The lower mass of this limestone belongs to the St. Louis formation, while above are generally one or two score feet of thinner bedded, more fossiliferous, granular, and oolitic St. Genevieve Limestone. The St. Louis Limestone is prevailingly dense, fine-grained, massive. Often the masses are broken and shattered, because of solution of part of the rock far in the geologic past. This ancient solution effect is not to be confused with more recent activities which are responsible for the enlarged crevices, caverns, and sink holes so common around Alton. The St. Louis Limestone is the rock chiefly responsible for the formation of Mammoth Cave and many other famous Kentucky caverns.

In places the St. Louis Limestone has coral masses which were reefs formed by the coral Lithostrotion canadense; but none were observed in the Alton area. In the St. Genevieve, brachiopod shells and bryozoan fronds are the most common fossils.
PENNSYLVANIAN STRATA

Although the St. Genevieve Limestone is the youngest Mississippian formation present in the area today, it was not the last to be deposited there. The sea remained in the area long enough to deposit over a thousand feet of strata above the St. Genevieve. At the close of this latest, Chester stage of the Mississippian, the sea finally withdrew and the region became a land area. Thereupon the streams and the rain and the winds set to work to carve away the landscape. So effective was their work, that before the return of the sea in Pennsylvanian Time, the Mississippian strata had been stripped away, down to the hard St. Genevieve Limestone.

In the Pennsylvanian seas and coastal swamps there was deposited a great thickness of sediment, hardened today to shale, with included sandstones, fossiliferous limestones, and rich coal seams. Then the sea again withdrew, near the end of Pennsylvanian Time, and there is no evidence that it ever returned to this part of Illinois. With the withdrawal of the sea, the land area was exposed to erosive forces, which in places have stripped away all of the Pennsylvanian beds and uncovered the older formations. A limited thickness of Pennsylvanian shale, with sandstones below, remains in part of the Alton region. A short distance east of the city, higher beds, including the important No. 5 and No. 6 coal seams outcrop around the edge of the great central Illinois coal basin.

LONG INTERVAL OF EROSION

The long period of erosion after Pennsylvanian Time has been mentioned. It seems in fact that erosive agencies during this period were more active at some stages than at others. When there is no important change in sea level, the land surface eventually wears down to a low, not quite flat plain, called a peneplain. At this point, erosion can go no further, unless and until the land surface is once again raised by crustal movements.

GEOLOGIC HISTORY OF THE MISSISSIPPI

It is probable that this condition existed in western Illinois for a considerable portion of the long time interval between the Pennsylvanian and the Ice Age (Pleistocene). There is certainly evidence that it existed just before the opening of the Pleistocene. Then, with renewed uplift, the Mississippi began to cut its gorge deep into the bedrock. The river of that day flowed past the site of Alton about where it flows today; but farther upstream its course corresponded closely with that of the present Illinois. Above the mouth of that river, what is today the Mississippi was at that time a rather minor tributary.
When the Illinoian Ice Sheet moved southwest, it forced the old Mississippi, which had flowed from Rock Island to Hennepin and then down the Illinois, out of this channel and westward, there to cut a new channel corresponding closely to its present course. The glacier, at the same time, crossed the old valley in the Alton area and thereby dammed the river. Thus for a short period, a lake existed in the valley upstream from Alton and Grafton. Terraces built in this glacial lake can be seen today around Pere Marquette Park.

ILLINOIAN GLACIAL TILL

The Illinoian Ice Sheet is the only one known to have reached Alton. There were three other periods of glaciation, however, during the Pleistocene. Two of these, the Nebraskan and Kansan, were earlier than the Illinoian, and one, the Wisconsin, was later. Between each of these glacial stages were intervals of mild climate enduring for hundreds of thousands of years. (There is no assurance that we are not now living in a fourth interglacial stage).

The Illinoian glacier originated in northeast Canada east of Hudson's Bay. Its extreme edge reached Alton early in Illinoian Time and left a mantle of glacial debris as it melted away. Today five to ten feet of this glacial till lie upon the bedrock of the Mississippi Bluffs. In it are fragments of granite and other ancient igneous rocks transported over 1000 miles from the Canadian Shield. Because of the long period of time since the deposition of the Illinoian till, it has been greatly altered by weathering, so that the lime has been leached out of the upper portion and carried downward, while many of the pebbles of hard igneous rock are disintegrated to sand.

THE LOESS

While the Illinoian Glacier slowly retreated northeastward as the climate became progressively milder, great quantities of debris from the melting ice washed into the Mississippi. Strong westerly winds, whipping across the mud and sand flats, picked up the finer material and broadcast it over the bluff tops. In time, deposits of wind blown loess tens of feet thick accumulated here. This material is referred to as the Sangamon loess.

The Wisconsin Glacier stopped nearly 100 miles east of Alton, but once again, streams from the melting ice poured down the valley and loess accumulated on the eastern heights. In the Alton area, these two loess deposits together total in places over 60 feet. They are conspicuous above the bluffs and quarry faces and are the basis for much of the upland soil. In fresh exposures, the loess, because of its fineness, uniformity and compactness, forms nearly vertical banks.
ICE AGE ANIMALS

The region just northwest of Alton is famous for the large numbers of bones of land animals found at the base of the loess just above the Illinoian till. Their position indicates that they lived here in late Illinoian Time, while that glacier was retreating to the northeast. Among the bones, the following have been recognized (M.M. Leighton. Journ. of Geology, 1921, Vol. 29, page 513):

<table>
<thead>
<tr>
<th>Extinct ground sloth</th>
<th>Extinct musk ox</th>
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<tbody>
<tr>
<td>Extinct horse</td>
<td>Mastodon</td>
</tr>
<tr>
<td>Extinct peccary</td>
<td>Canadian Beaver</td>
</tr>
<tr>
<td>Large extinct deer</td>
<td>A Giant Beaver</td>
</tr>
<tr>
<td>Extinct moose</td>
<td>Ground Hog</td>
</tr>
<tr>
<td>Extinct reindeer</td>
<td>Pouched Gopher</td>
</tr>
<tr>
<td>Extinct American eland</td>
<td>Brown Bear</td>
</tr>
</tbody>
</table>
PHYSIOGRAPHIC DIVISIONS OF ILLINOIS
