

THE FARM CREEK EXPOSURE NEAR PEORIA,
ILLINOIS—A TYPE PLEISTOCENE SECTIONMORRIS M. LEIGHTON, ILLINOIS GEOLOGICAL SURVEY,
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INTRODUCTION

The Peorian interglacial stage was named by Leverett¹ on the basis of the relations of a body of loess to the Illinoian and Wisconsin drift sheets in certain exposures east of Peoria, Illinois. One of these was a stream-cut exposure along Farm Creek, 7 miles east of Peoria, and another a railway cut along the Toledo, Peoria and Western Railway, about half a mile farther east. Photographs of these cuts, taken by Doctor Calvin, are shown on Plate XI of Monograph XXXVIII, opposite page 128, and general descriptions are given in the legends and on pages 128 and 187, but no detailed description has been published, to the writer's knowledge, such as is desirable for type exposures.

In connection with Pleistocene investigations for the Illinois Geological Survey, the writer had occasion to visit these exposures during the field season of 1920. The railway cut was so badly slumped and grassed over that a study could not be made of it, but the Farm Creek exposure was in exceptionally good condition for inspection. A detailed description was, therefore, made, which includes some important points not heretofore recorded.

LOCATION

So far as can be determined from the post office map of Tazewell County, the Farm Creek exposure is located near the south line of the SE. $\frac{1}{4}$ sec. 30, T. 26 N., R. 3 W., on the south side of the stream just east of the Toledo, Peoria and Western Railway bridge. The small stream swings against the south valley wall at this place and undercuts actively enough to keep the face of the exposure fairly clean. At the time of visit the face was somewhat freer of slump than it was at the time the photograph, above referred to, was taken.

¹Leverett, Frank: The Illinois Glacial Lobe, U. S. Geol. Survey, Monograph XXXVIII, 1899, p. 187.

DIMENSIONS AND FORMS

The cut is about 100 feet high, 225 feet long in an east-west direction, and, with the exception of minor details, it has about the same form as shown in the photograph by Dr. Calvin. The general form and sequence of materials is sketched in the accompanying diagram.

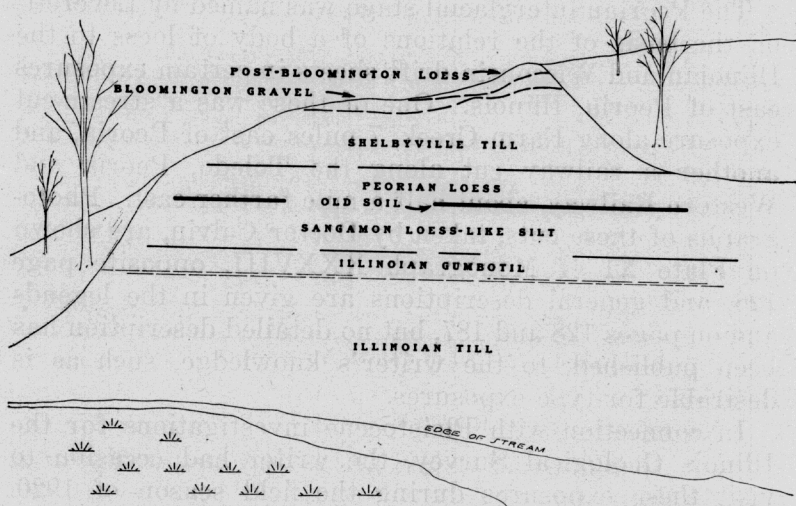


Fig. 1. The Stratigraphic Succession at the Farm Creek Exposure.

STRATIGRAPHIC SECTION

The following stratigraphic section is shown:

	Feet
Post Bloomington:	
8 c.	Soil, light gray, loessial.....1-1½
8 b.	Leached loess, brown, jointed by roots and surface weathering, thickness about..... 3½
8 a.	Calcareous loess, yellow, no shells found, thickness...0-2½
Early Wisconsin:	
7.	Bloomington gravel, discontinuous, brown, limestone pebbles present beneath calcareous loess, absent for a few inches directly beneath leached loess, thickness...0-4
6.	Shelbyville till, typical pebbly clay till with lens of gravel 8-10 feet thick on east side, and about 10 feet below the top, the gravel contains till balls, till oxidized yellow in upper 2-6 feet with very faint maroon or orange tinge, bluish gray below where damp; light gray on dry surface, with slight maroon tinge, calcareous, thickness 32
Peorian:	
5.	Loess, grayish yellow, with rusty streaks and spots, fossiliferous, shells fragile and larger ones crushed and difficult to extricate, cleavage planes through the loess made by the pressure which crushed the shells, calcar-

- eous throughout, humus streak 2 inches thick about 10 inches below the Wisconsin till, contact with Shelbyville till sharp, thickness..... 6
- Sangamon:
4. Old soil, dark with flakes of carbon, some fragments of old wood in east part of cut, loessial in texture, non-calcareous1-1½
 3. Loess-like silt, on east side brownish in upper 1-1½ feet, grading below into grayish yellow, 2-2½ feet, and again into brownish loess with carbon specks 3-4 feet, the lower 2 feet showing slight trace of effervescence with acid; no effervescence in the upper 5½ feet; no bedding or stratification. On west side this loess-like silt is bluish gray with greenish cast below the old soil; the soil and about 6 inches of the greenish loess is leached; calcareous below, very compact, no bedding or stratification, scattered small pebbles in lower 3 feet; thickness same on both sides of cut....7-8
- Illinoian:
2. Gumbotil, chocolate brown, with reddish specks on east side, brownish to brick red at top with bluish-green spots on west side, tenaceous, hackly fracture, siliceous pebbles, mostly under ¼ inch, non-calcareous, shear zones on west side, thickness about..... 4
- Grades into:
1. Till, very calcareous, few small lime concretions at top, limestone pebbles prevalent, grayish, mostly covered with wash and slump to base of cut..... 41

INTERPRETATIONS

Several important points are to be noted in the interpretation of this section.

1. There can be scarcely any doubt that the lower till is Illinoian in age. The typical Illinoian till occurs but a few miles to the south and southwest with its surface at the same elevation essentially as it is here, and with similar relations to the overlying loess.

South of the Wisconsin drift boundary, gumbotil has been found at the top of the Illinoian, and it is impressive to find it here. As pointed out by Kay and Pearce¹, this peculiar tenaceous, leached, and siliceous pebbly clay appears to be the product of a long interval of chemical weathering of the till before the deposition of the overlying deposit.

2. The overlying loess-like silt, horizon 3 of the section, seems best interpreted as a weathered loess. The color and weathered character of the Illinoian gumbotil below, and the thickness and calcareous content of the loess-like silt above exclude the interpretation that the

¹Kay, G. F., and Pearce, J. Newton: The Origin of Gumbotil. Jour. Geol. Vol. XXVIII, No. 2 (1920), pp. 89-125.

latter is the product of extreme weathering of the gumbotil. The occurrence of rare pebbles in the lower part is not unusual to the basal portion of any loess deposit which rests on a pebbly formation from which pebbles could be introduced secondarily by organic agencies. The calcareousness of the lower part of this deposit, although not notable, indicates that it was deposited subsequent to the weathering of the gumbotil. The upper leached zone of 5½ feet, the brownish color on the east side of the cut, and the overlying old soil show that this loess-like silt was subjected to subaerial agencies of weathering and plant growth for a considerable period before the deposition of the overlying fossiliferous loess.

The presence of this soil zone and the loess-like silt beneath the fossiliferous loess has not been hitherto noted. In the legend of the photograph of the Farm Creek section in Monograph XXXVIII, Pl. XI, Leverett includes all of the deposits between the Illinoian till and the Wisconsin till as "Iowan loess".

In the railway cut, one-half mile to the east, Leverett reports and illustrates by photograph the occurrence of a peat bed, 3 to 5 feet thick, below the so-called Iowan loess, and a 2-to 5-foot bed of silt between the peat bed and the underlying Illinoian till¹. Of the silt, Leverett states that it "bears some resemblance to the overlying Iowan loess in texture, but is not so calcareous and is of a deeper brown color. Whether it is similar in origin to the loess can scarcely be decided." Parenthetically, it may be stated that this monograph was written when the theory of the origin of the loess was swinging from the aqueous hypothesis to the eolian hypothesis, and the discussion carries the spirit of compromise, rather than the present general view that the loess is dominantly eolian in origin.

The peat of the railway cut occupies the same horizon as the old soil in the Farm Creek exposure. The peat here, as Leverett points out, records poor drainage conditions after the weathering of the underlying till. It may well have been a local marsh, such as might result if there were relatively slight irregularities in the deposition

¹Leverett, Frank: The Illinois Glacial Lobe, U. S. Geol. Survey, Monograph XXXVIII, 1899, p. 128; Pl. XI. B.

of the loess on a previous flat surface. The Farm Creek exposure emphasizes the local transition that existed within a short distance from subsurface drainage of an oxidizing character to nearly stagnant drainage of either unoxidizing or deoxidizing character. The brown to grayish-yellow color of the old loess-like silt in the east part of the cut is believed to represent the former condition, while the bluish-gray loess-like silt with greenish cast in the west part represents the latter. The difference in color of this loess-like silt and the normal loess is, therefore, not significant of a difference in mode of origin.

The overlying soil was formed subsequent to the deposition of the underlying loess-like silt, before the deposition of the overlying loess. Whether its development represents the full period of time involved in the weathering of the underlying loess-like silt can not be denied or affirmed. It represents at least the latter part of this period, and plausibly coincides with the Sangamon soils known elsewhere which are reported to contain boreal vegetable remains. Such vegetation probably lived during the transition from the Sangamon interglacial epoch to the Iowan glacial epoch or even during the Iowan glacial epoch. The loess-like silt is also referred to the latter part of the Sangamon, and the silt of Leverett's railroad section is correlated with it.

3. Horizon No. 5 is typical fossiliferous loess. It contains *Helicina occulta* (Say), *Succinea ovalis* (Say), and *Oreohelix iowensis*, the shells of the latter crushed, but identifiable. These species are common to the Peorian loess but the first two are reported to occur also in recent loess. It is to be noted that the deposit is calcareous to the top, but the oxidized state is in harmony with the evidence at other places recorded by Leverett that an interval of weathering occurred between the deposition of the loess and the overlying Shelbyville till.

The two-inch layer of humus which occurs ten inches below the top of the loess records a cessation of wind deposition. Inasmuch as the writer does not recall any other exposure of Peorian loess—among the scores which he has seen—which shows a definite soil zone within the loess, he is inclined to the view that the soil represents

the latter part of the Peorian epoch, and that the overlying ten inches of loess was deposited during the oncoming of the Shelbyville ice. The alternative view is that this soil occurs within the body of the Peorian loess, recording two sub-epochs of loess deposition in the Peorian epoch, in which case there is the possibility that if there were a leached zone of the loess before the invasion of the early Wisconsin ice that this zone and a part of the calcareous zone were removed by the ice. In a recent report on "The Iowan Drift—a Review of the Evidences of the Iowan Stage of Glaciation", Alden and Leighton present the view that the great body of loess associated with the Iowan drift was deposited almost immediately following the recession of the Iowan ice sheet, but under sufficiently favorable climatic conditions to destroy the glacier and to permit the growth of vegetation and the existence of herbivorous snails¹; in other words, the time of the loess deposition was referred to the early Peorian epoch.

If the first view outlined above is correct, the time of the deposition of the loess in the Farm Creek exposure is more closely connected with the Wisconsin glacial epoch than if the second view were found to be true. On the other hand, it is clear that the Peorian loess was deposited a long time after the deposition of the Illinoian drift.

4. The body of till at horizon No. 6 is unquestionably Early Wisconsin in age, and is clearly Shelbyville since the Bloomington moraine lies to the north of this locality.

5. The overlying gravel is probably outwash from the Bloomington ice, since it occurs above the till and has an elevation in accord with the Bloomington outwash at Peoria.

6. The loess above the Shelbyville till and the Bloomington gravel is not mentioned in the legend accompanying the photograph in Monograph XXXVIII, previously mentioned. Its thickness is from $4\frac{1}{2}$ to 7 feet. The upper $4\frac{1}{2}$ to 5 feet, including the soil, is noncalcareous, and where the noncalcareous portion rests on gravel, the gravel is partly leached. But where the loess is thicker than 5 feet, its base is calcareous and the gravel beneath

¹Iowa Geological Survey, Vol. XXVI, Annual Report for 1915, pages 156-158.

is unleached. This shows that at least a part, if not all, of the loess was deposited in a calcareous state immediately after the retreat of the ice at a rate in excess of leaching, and that subsequently the rate of deposition of the loess either decreased or deposition ceased, giving opportunity for leaching to take place.

SUMMARY

This cut is remarkable in its display of evidence for two glacial epochs, the Illinoian and Wisconsin, and two interglacial epochs, the Sangamon and Peorian. Most of the varieties of interglacial evidence are present, including ordinary weathering, gumbotil development, loess deposits, and soil formation. Not only is the common Peorian loess present, but also the more or less local post-Wisconsin loess. Well deserving is the Farm Creek exposure—7 miles east of Peoria, Illinois—of a place among the type exposures of the Pleistocene of America.