PREGLACIAL GRAVELS IN HENRY COUNTY, ILLINOIS

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Preglacial deposits of iron-stained chert gravels underlie the glacial drift at a number of localities in the Mississippi Valley region (fig. 1). These gravels, which generally have been referred to the late Tertiary Lafayette formation, are significant in recording geologic events during closing stages of the lost interval between Pennsylvanian bedrock deposition and Pleistocene glaciation. It is the purpose of the present paper to describe gravels from a new locality in western Illinois and to indicate their bearing on late Tertiary geomorphic events.

Description

The gravels are exposed in a highway cut (fig. 2) 7 miles northwest of Kewanee, Henry County, Illinois (400 feet N. of S. W. cor. sec. 3, T. 15 N., R. 4 E.), in the section described below.

	Thickness		*Depth*	
	Ft.	*In.*	*Ft.*	*In.*
Wisconsin drift				
Peorian loess				
Soil, gray	0	6	0	6
Loess, tan, mottled gray, non-calcareous	3	0	3	6
Loess, tan to gray, calcareous, concretions	2	0	5	6
Farmdale loess				
Silt, carbonaceous, peaty, gray with black humus streaks, abundant gastropods in pockets, non-calcareous	0	4	5	10
Loess, maroon-brown, compact, non-calcareous, gastropods	2	0	7	10
Illinoian drift				
Gumbotil, gray-brown, siliceous residuals, non-calcareous except for some secondary enrichment at top	2	6	10	4
Till, yellow-brown, abundant chert mixed with other rock types, non-calcareous	1	0	11	4
Sand, brown, in local channel	1	0	12	4
Tertiary gravel				
Gravel, 80% brown fossiliferous chert, iron oxide patination, rounded to angular, average 1 to 2 inches, irregular basal contact	3	0	15	4
Pennsylvanian (Canton) shale				
Shale, yellow-buff, micaceous, clayey, broken down by weathering	3	6	18	10
Shale, buff-gray, stratified	5	0	23	10

The Tertiary gravels differ from all known glacial deposits in the area in their degree of surface alteration, polish, and uniform siliceous composition. Their lithology, based on a count of 120 pebbles, is 79% chert, 18% vein quartz, and 3% quartzite. Crystalline rocks and local bedrock appear to be completely absent. Nearly all the cherts have a yellow-brown iron oxide patina 1-3 mm. thick which is as hard and dense as the interior of the pebbles. A few cherts have a whitish surface alteration and the quartz and quartzite pebbles show surficial iron-staining.

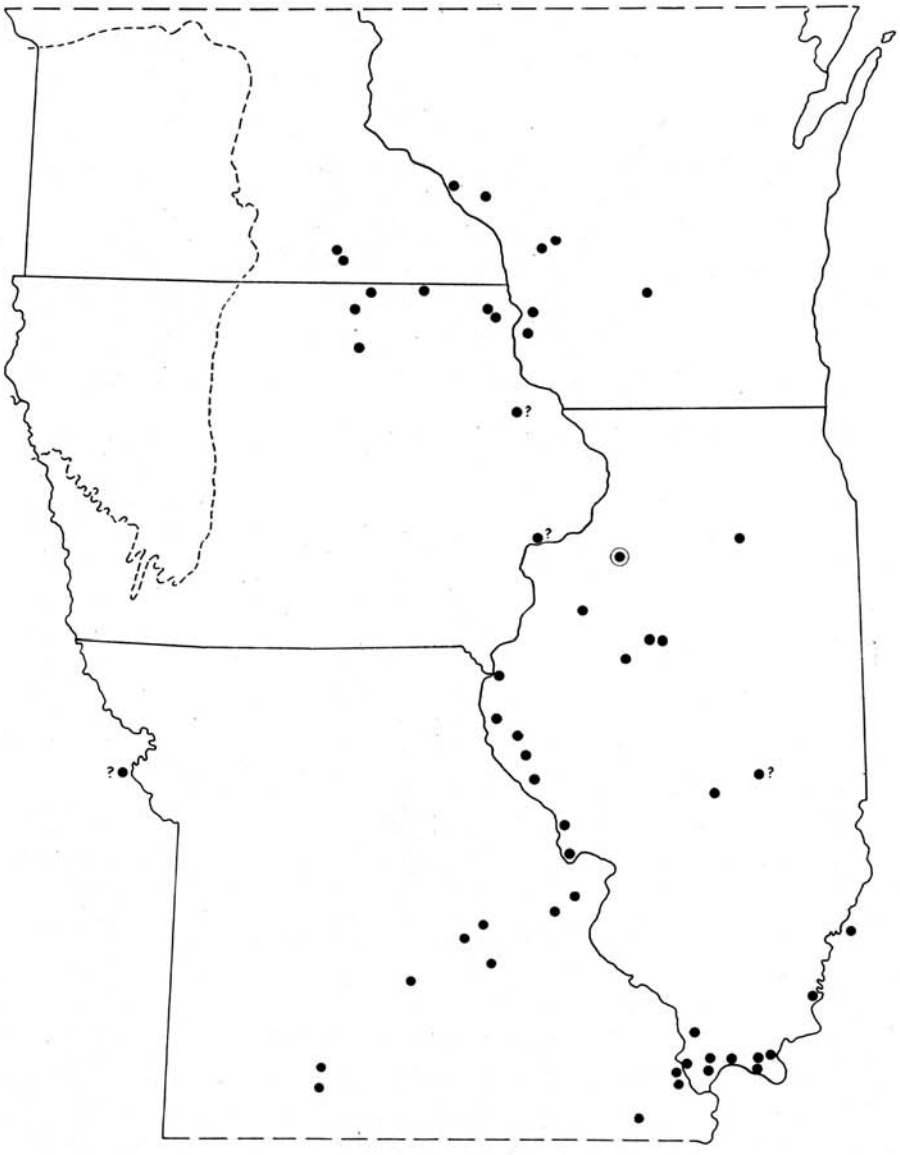

FIG. 1.—Occurrences of preglacial Lafayette-type gravels in the Mississippi Valley region. The Henry County locality is circled. The eastern boundary of Cretaceous deposits in Iowa and Minnesota is shown by a dashed line. Based on references cited and field notes on south-central Missouri by J H. Bretz.

The brown chert pebbles, which make up 70% of the deposit, contain fossil corals, crinoids, and brachiopods of Lower and Middle Silurian age (Heinz Lowenstam, personal communication, 1950).

The pebbles range in diameter from a fraction of an inch to 7 inches, the average being between 1 and 2 inches. The brown chert pebbles are larger than the other types and there is a distinct variation in average size from one part of the exposure to another. All the cherts are angular. Many pebbles are broken rounds, some are chipped, and a few have percussion markings. The gravels are unconsolidated, and the matrix, if it was ever present, has been removed by weathering.

The basal contact of the gravel is irregular and slopes to the south and west. Since the low ridge crest on which the gravels occur slopes northeast, it is clear that the gravels were laid down on a land surface unrelated to the present topography.

The upper part of the Canton shale underlying the gravels is oxidized and mechanically weathered to a depth of about 3 feet. Under the microscope the weathered shale is seen to differ from the unaltered shale in its lack of stratification, disaggregation into silt and clay-size particles, oxidation, and content of limonitic aggregates.

The gravels occur at an elevation of 730 feet near the northern margin of a buried bedrock upland, which locally has an average elevation of about 750 feet and lies 450 feet above the buried bedrock valley of the ancient Mississippi river some 15 miles to the north. The upland surface has been correlated with the Lancaster peneplain of the Driftless Area (fig. 1) (Horberg, 1946, pp. 186-188.) Farther south in western and southern Illinois nearly all occurrences of preglacial gravel are on this surface or equivalent surfaces correlated with the Ozark and Calhoun peneplains.

Correlation and Age

Although it is probable that similar deposits of different ages are represented and that some gravels are reworked, the deposits in the Mississippi Valley region can be correlated in a general way by lithology and physiographic position. On this basis the gravels in Henry County appear to be equivalent with the Windrow formation of Wisconsin, Iowa, and Minnesota (Thwaites and Twenhofel, 1921); the "Tertiary" gravels of LaSalle County (Willman, 1942, pp. 140-141), Peoria County (Udden, 1912, p. 50) and other counties in western Illinois (Worthen, 1866, p. 330; 1870, p. 37; Bannister, 1870, p. 179; Salisbury, 1891, pp. 252-253); the Grover gravel of the St. Louis region (Salisbury, 1892, pp. 183-186; Rubey, 1931); and the Lafayette gravel of southern Illinois and southeastern Missouri (Lamar and Sutton, 1930, pp. 857-859). Correlation with the Rockville conglomerate at Dyersville, Iowa (McGee, 1891, p. 304) and the Pine Creek conglomerate near Muscatine, Iowa (Udden, 1899) is questionable because of the high proportion of crystalline rocks in these deposits. Also it is uncertain whether the two occurrences at lower elevations within the area of the Central Illinois peneplain (fig. 1) are primary or reworked.

A Tertiary age for the gravels farther south is evidenced by their presence on truncated Eocene formations at the head of the Gulf em-

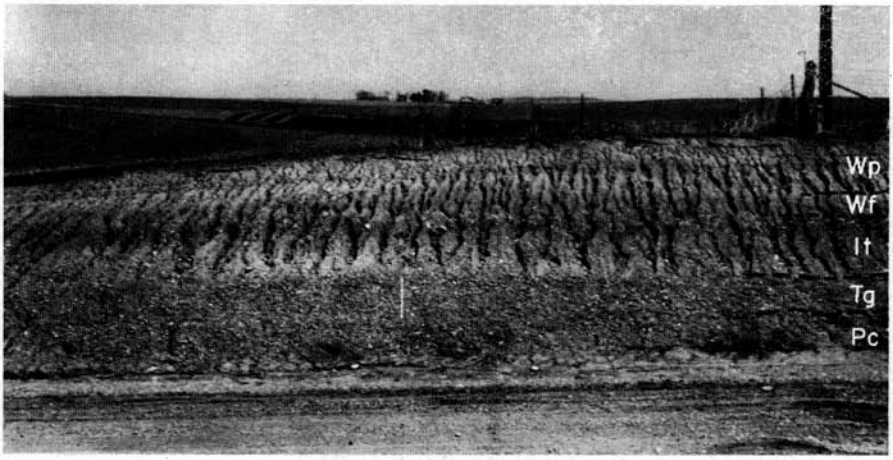

FIG. 2.—Highway cut 7 miles northwest of Kewanee, Illinois. Wp—Peorian loess; Wf—Farmdale loess; It—Illinoian gumbotil and till; Tg—Tertiary gravel; Pc—Pennsylvanian (Canton) shale.

bayment and by the occurrence of Tertiary wood in the gravels near Grover, St. Louis County, Missouri (Rubey, 1931). Because the Eocene formations were beveled by the Ozark peneplain before deposition of the gravels, a late Tertiary age is indicated. A similar age for the gravels in western Illinois is evidenced by their occurrence on a buried bedrock surface which appears to be the northward continuation of the Ozark peneplain (Horberg, 1946, pp. 186-188).

INTERPRETATION

The gravels in Henry County probably were derived largely from residual accumulations on Silurian formations, which occur less than 20 miles to the north, and were deposited, along with pre-Cambrian materials from farther north, by a south-flowing stream. This is evidenced by the composition of the gravels and their angularity and poor sorting. The absence of locally-derived Pennsylvanian rocks in the gravels further suggests that they represent a widespread aggradational deposit rather than a channel fill and also that they are primary rather than locally re-worked from older gravels.

The physiographic position and character of the gravel in Henry County are in full accord with other occurrences in the Mississippi Valley region and suggest that the following major geomorphic events were contemporaneous over a wide area:

1. Development of the Lancaster-Calhoun-Ozark peneplain in middle to late Tertiary time. Weathering of the Canton shale in Henry County.

2. Uplift of gravel-source areas to the north and initiation of a new cycle marked by gravel deposition. Removal of the upper part of the weathered zone on the Canton shale and deposition of gravel in the local area by a south-flowing stream.

3. Development of the Central Illinois peneplain and Havana strath in central Illinois (Horberg, 1946). Weathering of gravels and

probably some subsequent erosion and redeposition in western Illinois.

4. Erosion of deep bedrock valleys and removal of gravels except for patches on remnants of the Lancaster surface.

5. Pleistocene glaciation resulting in further stripping of gravels and their final burial. Henry County probably was glaciated during the Nebraskan and Kansan stages, as well as the Illinoian, although the record at the gravel locality is incomplete.

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