

PLEISTOCENE DEPOSITS IN LAWRENCE
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LOCATION

Lawrence County is one of the border counties between Illinois and Indiana, in the southeastern part of the state. Since at this place the Wabash river furnishes the boundary line between the two states, it forms the eastern boundary of the county. The largest tributary entering the Wabash from the west is the Embarrass river and it flows through Lawrence county to its junction with the Wabash in the southeastern part of the county. The southern border of the Illinois Drift Sheet is about thirty miles south, while the moraines marking the southern edge of the Early Wisconsin Drift Sheet are about forty miles north of the county. This portion between the edges of the two drift sheets is significant because the mantle rock which covers the county was derived chiefly from the Illinois and Wisconsin Ice sheets. (See Map.)

ELEVATION

The average elevation of Lawrence County is approximately 450 feet above sea level. The range of elevation is not great, about 250 feet. There are, nevertheless, two distinct physiographic divisions, the upland and the lowland. About one-third of the county is occupied by the lowland of the Wabash and Embarrass rivers, while the remaining two-thirds are upland. The mantle rock which covers the county are Pleistocene deposits of the Illinois and Wisconsin Ice sheets, and because of the number of oil wells that have been drilled in the county it has been possible to learn something of the character and depth of these deposits.

Since this paper deals with differences between the upland and the lowland it is necessary to point out their respective locations.

* This paper should be read with a map of the area before one. The best map of Lawrence County is the topographic map, which may be secured from the State Geological Survey at Urbana, Illinois for from ten to fifteen cents.

The lowland lies along the Wabash and Embarrass rivers, and extends for some distance up the small tributaries. The greatest extent of lowland is along the Wabash river above its junction with the Embarrass. This lowland is narrow in the northeast corner of the county, at which place the hills of the upland push almost to the river, but extending south, it widens rapidly toward the west until it meets the lowland of the Embarrass just north of Lawrenceville, the county seat. Southeast of Lawrenceville, it narrows to a width of two miles at the junction of the two rivers, and below the junction a width of about two miles is maintained. The Embarrass river lowland enters the county from the north with a width of about three miles, and extends in a southeastern direction until it merges with that of the Wabash north of Lawrenceville.

Two tributaries enter the Embarrass river from the west, Indian Creek, about six miles above the river's mouth, and Muddy Creek in the north part of the county. From the northeast, Brushy Fork flows into the Embarrass a few miles below the mouth of the Muddy Creek. A number of artificial ditches drain the wide expanse of lowland between the Wabash and Embarrass rivers and it is significant that almost all the water from these ditches drains into the Embarrass river. The southern part of the county is drained by Raccoon Creek, which flows in a southeastern direction and enters the Wabash a few miles south of the southern boundary of the county.

The upland, occupying the remainder of the area, is divided by the Embarrass river into two portions. One is a V-shaped section in the northeastern part of the county between the lowland of the Wabash and Embarrass rivers. The other occupies the western and southern portions. This second part is comparatively narrow at the north, being about three miles in width. It widens, however, gradually, until along the southern boundary it extends across almost the full width of the county.

The upland is gently rolling, with a difference in elevation between the divides and the valleys of not over fifty feet. The valleys are wide and the divides, between the drainage basins of the small creeks, are low hills

which have such slight relief as to be scarcely recognizable as divides. The lowland consists of flood plains, low and level near the rivers, and terraces that are wide but elevated only slightly above the flood plains. There are two conspicuous hills upon the wide lowland between the Wabash and Embarrass rivers, the Sand Ridge hill east of the Embarrass just opposite Lawrenceville and the Dubois hill just west of the Wabash river opposite Vincennes, Indiana.

The stratified rocks lying just beneath the Toose mantle rock consist of the McLeansboro formation of the Pennsylvania series. Although these upper layers of stratified rocks lie practically in a horizontal position, the difference in the elevation of the upper surface of the solid rock is much greater than the difference in elevation of the upper surface of the soil. This is shown clearly by the following table.

SURFACE OF THE SOIL

Highest point in Lawrence county.....	641 feet
Lowest point in Lawrence county.....	391 feet
Difference	250 feet

SURFACE OF THE ROCK

Highest known rock surface.....	625 feet
Lowest known rock surface.....	249 feet
Difference	376 feet

THE MANTLE ROCK

If the unconsolidated clay, silt, sand and gravel that everywhere cover the solid rock were removed, the topography would be much rougher than at present. The upland would present a topography differing but little from the present one, although it would lie somewhat lower. The lowland, however, would lie many feet below its present surface. The Wabash river would flow from 100 to 175 feet below its present bed, and the Embarrass would join it at as low a level. Brushy Fork and Muddy creeks would join the Embarrass about 50 or 60 feet

lower than at present, and Indian Creek would enter it at least 95 feet lower than at present. There would be a deep depression in the southeast part of the county under what is known as Wolf prairie where drilling has shown that it is 176 feet to solid rock. The wide stretch of country between the Wabash and Embarrass would be in places at least 100 feet lower and would no doubt be rougher, and the Sand Ridge and Dubois hills, with their crests as high as at present and their bases as low as the rivers were then flowing, would stand up as very conspicuous hills.

The question naturally arises as to the origin of the deposits of mantle rock that have covered the rougher rock topography and have given the region a comparatively gentle undulating surface. The soil under physical and chemical tests shows that it has not been derived from the rocks upon which it rests. It contains particles entirely foreign to the underlying rocks. Over the upland, resting upon the rock surface, is a pebbly boulder clay with some sand and gravel near its basal portion. Its lower part is made of blue clay, but that within 10 or 12 feet of the surface is light yellow clay. The yellow color is due probably to weathering rather than to any original differences in composition from the blue clay. This formation is the glacial till of the Illinois Drift Sheet which spreads over southern Illinois as far south as the spur of the Ozarks.

By examining the logs of a large number of oil wells upon the upland, the variation in the depth of the mantle rock is found to be from 0 to 36 feet. Over the lowland the material of the mantle rock is different from that of the underlying rocks and very different also from the glacial till of the upland. The deposits of this portion are much thicker, showing a variation of from 60 to 176 feet. An examination of these deposits of the lowland shows that they are river laid deposits. They consist of sand, gravel, and silt. With such, the lowlands were elevated from 50 to 175 feet. The evidence given by wells, gravel pits, and any excavation that goes but a short distance below the surface of the lowland indicates that it is underlain by thick deposits of gravel. Above the

gravel may be found sand, and over all the lower portions, above the sand, is silt. In places the sand has been piled up into dunes by the wind, and the higher parts of the lowland and the adjoining parts of the upland are covered with loess. The position of the Wisconsin Ice Sheet leads one to believe with scarcely a doubt that it was the source of supply for the thick lowland deposits.

The source of the Wabash is far north of the southern limit of the Wisconsin Ice Sheet. The source of the Embarrass is also north of the this same position, but it is not very far north. It rises just south of the Champaign moraine, the first stopping place of the Wisconsin Ice edge as it retreated towards the northeast. Its stop at this place was brief. The tributaries of the Embarrass, Muddy, Brushy Fork, Indian and Raccoon creeks had their sources far to the south of the Wisconsin Ice edge.

When the ice edge stood along the line which crosses the state near Shelbyville, Mattoon, Charleston and Paris, the rivers that flowed southward from it were much larger and much more heavily laden with rock material than at present. Throughout the long ages during which the ice advanced, retreated, halted, readvanced and retreated again, until its final disappearance from the region, great torrents of water were borne away by the Mississippi, Illinois, Wabash and Embarrass rivers. It was chiefly by means of the gravel, sand, and silt which the Wabash and Embarrass carried that the low lands of Lawrence County were built up from 50 to 175 feet higher than they were in pre-glacial times. Since the Wabash was a much larger river at the ice edge than the Embarrass and since it had a number of tributaries that also flowed from the ice edge, it contributed much more material toward the building up of the lowland than did the Embarrass; and since its source lies far to the north of the southern edge of the Wisconsin Drift sheet, it and its tributaries continued to furnish gravel, sand, and silt long after the ice edge had retreated north of the source of the Embarrass.

Under the circumstances described above, from the time of the farthest advance of the Wisconsin Ice sheet the Embarrass and Wabash began building up their val-

leys. Since the tributaries of the Embarrass, Muddy, Indian, and Raccoon creeks were not receiving supplies of gravel, sand, and silt, from the ice edge, they could not build up their valleys as fast as did the larger streams. The result was that they were dammed at their mouths and ponded. Lakes covered their valleys which later were filled with lake deposits. On such a basis may be furnished the explanation for the extremely level surface of these tributary valleys.

When the ice edge retreated north of the source of the Embarrass, its supply of gravel, sand and silt were, for the most part, shut off, but the Wabash continued for a long time to build up its valley. The result was that the Embarrass was ponded for a distance up its valley. Under such conditions, it is natural for the drainage ditches, which for the most part follow the lines of old channels, to drain into the Embarrass rather than into the Wabash. This ponded condition also gives a good explanation for the meanders of the lower Embarrass. When the ice edge was near its southern position, the material carried by the Wabash was coarse and the gravel deposits were then laid down. As the ice edge retreated farther to the north, the deposits became finer, and first the sand and then the silt were laid down. When it retreated so far to the north that it was beyond the source of the Wabash and its water found a lower outlet, the river began to lower its bed by cutting through its deposits. This has proceeded only a short distance, but it left broad terraces standing only a little higher than the other portions of the lowland, and it permitted the Embarrass and its tributaries to lower their courses enough to drain the ponds in their valleys, or if they had become filled by lake deposits, it permitted these streams to lower their channels slightly below the level of the surface of those deposits.