

River Terraces in the Carrollton Area, Dallas County, Texas

L. Gray Pattillo, Jr.

The Carrollton area is located in the northwestern part of Dallas County in the black prairie region of the Gulf Coast province of Texas. The area represented by the map (Pl. 1) covering approximately fifty square miles, is bounded on the north by the Dallas-Denton County line, on the south by the Joe Field road, on the east by meridian $96^{\circ}45'$, and on the west by the 97th meridian.

The area is drained by the Elm fork of the Trinity River, which flows southward through its middle portion, and by Denton Creek and its tributaries (Pl. 1). Grapevine and Hackberry creeks drain the territory west of the river, whereas Furneaux Creek, Perry Branch, and Farmers Branch drain the land to the east. Most streams heading in the area have dendritic patterns.

This paper describes the terraces along streams in the Carrollton area, and gives a brief account of the materials forming them. The accompanying map showing areal distribution of the terraces may be of service to those who investigate the finds of fossil bones and artifacts occasionally taken from alluvial deposits of this area. By referring each find of fossil or artifact to its proper terrace level a late Cenozoic chronology for this area ultimately may be established.

Physiography

The floodplain on both sides of Elm Fork and Denton Creek is low and essentially flat. It varies in width from one to three and one-fourth miles. On the west side of the river the floodplain abuts against steep slopes which rise to form a broad dissected upland area standing 80 to 100 feet above the bottoms (Fig. 1). This high surface is locally called the Eagle Ford upland. The same upland surface appears across the Trinity Valley to the east of the bottoms, but there are three terrace steps intervening between the level of the floodplain and that of the upland.

The lowest terrace, here named the Carrollton, averages about 10 feet above the floodplain. The intermediate or Farmers Branch terrace stands as high as 20 feet above the floodplain. Bethel terrace, highest of the three, forms a step about 70 feet above the floodplain. These three terraces are underlain by alluvium deposited at different times by the local stream system.

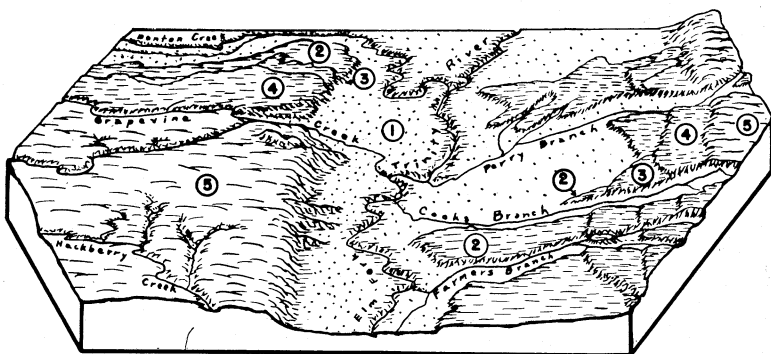


Fig. 1. Physiographic Diagram of the Carrollton Area. (1) Flood-plain. (2) Carrollton Terrace. (3) Farmers Branch Terrace. (4) Bethel Terrace. (5) Eagle Ford Upland.

Above the Bethel terrace the land rises gently a few feet to the level of the Eagle Ford upland. This broad upland has a mature residual soil derived from the underlying Eagle Ford shale of Cretaceous age. The surface of the upland is evidently one produced by erosion, since it cuts across the gently inclined beds of the Eagle Ford.

Evidence for alluvial deposits at elevations higher than that of the Bethel alluvium is restricted to an area on the Leslie Dairy farm three and one-half miles west of Carrollton. Here two small hills rise to an elevation of about 550 feet, or 15 feet higher than any other part of the area. Mantling the tops of the hills is a deposit of coarse sand and stones unlike anything to be found in the Eagle Ford formation. Included in the deposits are well rounded cobbles of quartz, chert, sandstone, and quartzite. This gravel rests with apparent unconformity on the Eagle

Ford, and pebbles derived from the gravel are scattered over adjoining fields.

Bethel terrace: The Bethel terrace is best viewed from the Denton highway west of Carrollton dam (Fig. 2). South of the highway the Bethel surface is essentially level and only slightly dissected by intermittent streams. A narrow remnant of the same terrace forms a step just east of the Missouri, Kansas, and Texas Railroad.

The surface of Bethel terrace slopes very gently to the south at an average of less than two feet per mile. Its elevation at the north is slightly over 500 feet, in the south-eastern corner of the area about 485 feet.



Fig. 2. The Bethel Terrace.

Farmers Branch terrace: This terrace forms a narrow step along the Missouri, Kansas, and Texas Railroad south of Carrollton and along the Denton highway west of Carrollton Dam. The maximum elevation of the terrace in this area is about 465 feet. No down-valley slope of the surface could be determined from elevations given on the Carrollton topographic sheet.

Carrollton terrace: The Carrollton terrace is the first step above the floodplain, and is named from the town of Carrollton, which is located on it. Elsewhere in the area this terrace occupies a position intermediate between the

floodplain and the Farmers Branch terrace, except where one or both of these terraces have been removed by erosion.

Alluvium

Alluvial deposits of the Carrollton area range from coarse gravel to silty clay. No attempt was made at careful lithological study of the alluvium except at a few localities.

A small stream by the highway three miles west of Carrollton dam (Station 1 on map) has cut back into the Bethel terrace and offers good exposures of the alluvium. The top 18 to 25 inches consists of dark brown sandy loam. Below this there is a whitish zone about 14 inches thick. This zone owes its color to an abundance of secondary calcium carbonate or caliche, which occurs both as small nodules and as tightly cemented irregular masses. Below this zone a light cream-colored sand extends downward to the bottom of the exposure. One-half mile north of Carrollton at Station 4 (Fig. 1) the Bethel alluvium consists of fine sand and silty clay enriched with secondary calcium carbonate. Other exposures along the Missouri, Kansas and Texas Railroad are like those above described. All samples collected from the Bethel terrace reacted with acid.

Near Cooks Branch and Farmers Branch the Bethel terrace has been channeled and filled with younger materials deposited by those streams. A section exposed on the south fork of Farmers Branch at Station 3 shows 8 to 20 inches of brown, sandy soil. Below this lies a zone of white rock gravel up to 20 inches thick containing fragments of Cretaceous fossils, lumps of shale, white rock pebbles and calcite. This younger material fills an old channel cut into the yellow sandy clay of the Bethel alluvium.

At Station 5 a section of the Farmers Branch terrace may be seen. The top 10 to 14 inches is a sandy soil of dark reddish brown color. Below this is 2.5 to 3 feet of reddish brown sand ranging in texture from fine to coarse. A few small pebbles of dark brown sandstone and chert are scattered throughout. The material does not react with acid.

Below the sand at this locality is coarse gravel into which the overlying deposits are channeled.

Alluvium forming the floodplain of Elm Fork is well exposed at the bridge two miles west of Carrollton. On the west bank five feet of dark gray sandy silt rests unconformably on the Eagle Ford shale. On the east bank similar deposits attain a thickness of nearly 35 feet. In the northern part of the area along Denton Creek and in the Elm Fork floodplain at Trinity Mills the floodplain deposits are sandier and lighter in color.

Unconsolidated slopewash found along the foot of the slope bounding the Eagle Ford upland west of the river cannot be referred to any of the terrace deposits above described. Accordingly this material is shown in a separate pattern on the map, where it is labeled "undifferentiated alluvium".

Comparison With Terraces of the Dallas Area

Shuler¹ has shown that there are three main terrace benches above the floodplain of the Trinity River within the City of Dallas, about 15 miles southeast of Carrollton. The terraces have been designated the Union Terminal, Travis School, and Love Field, in order from lowest to highest.

The writer was able to trace the Bethel terrace four miles southward to Love Field, type locality of the terrace by that name. The lower terraces of the Carrollton area were not traced southward, but it seems likely that the Farmers Branch and Carrollton terraces are equivalent to the Travis School and Union Terminal terraces respectively.

No direct evidence for the age of terraces in the Carrollton area was discovered in the course of field work. Granting the correlations mentioned above, however, it is possible that the Carrollton terrace is mid-Pleistocene, inasmuch as the Union Terminal terrace of Dallas contains a large vertebrate fauna which O. P. Hay has identified as mid-Pleistocene². The Farmers Branch and Bethel terraces

¹Shuler, E. W. "Terraces of the Trinity River, Dallas County, Texas," *Field and Laboratory*. Vol. 3 (1935), pp. 44-53.

²*Ibid.*, p. 52.

are correspondingly older, though by what amount cannot at present be estimated.

It is hoped that this study will stimulate further investigation of the Cenozoic deposits of Dallas County. Once the various terrace deposits of the county have been mapped, the areal distribution of river deposits of different ages should be plotted against the distribution of vertebrate fossils so commonly found in gravel and sand pits along the Trinity River and its tributaries. In this way the faunas of different terrace deposits will become defined, and a Cenozoic chronology for the region may be worked out.

Plate 1. Physiographic Map of the Carrollton Area. See folded map attached.
Errata: The word Carrollton is incorrectly spelled the three times it appears on the map.

