The Wichita Paleoplain in Central Texas

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ABSTRACT

The Wichita Paleoplain (WPP) is the regional unconformity between Lower Cretaceous basal transgressive deposits and the Jurassic, Triassic, Paleozoic, and Precambrian rocks that lie immediately beneath them in the southwestern United States. This ancient buried erosion surface is here investigated and mapped in Central Texas at three levels of detail, applying principles derived from each phase to succeeding phases: (1) on the southeastern flank of the Llano Uplift in detail (phase one); (2) across the Llano Uplift and surroundings at intermediate detail (phase two); and (3) at regional scale throughout Central Texas, synthesizing work from many sources (phase three).

Over most of Central Texas, the WPP is a notably regular buried erosion surface with local relief of less than 100 feet. To the south, however, the Llano Uplift, which served as a structural buttress around which curved the Ouachita structural belt, experienced uplift and faulting related to the late Pennsylvanian Ouachita Orogeny, followed by a long period of weathering and erosion. There, vertical uplift of about 4500 feet and fault displacements of as much as 3000 feet characterize the tectonic effects of the Ouachita Orogeny. The WPP was present over all of that complex terrain. Local paleotopographic relief ranges up to about 400 feet in and around the Llano Uplift, mostly associated with high-standing fault blocks of Paleozoic carbonate and siliciclastic formations, and juxtaposed lowlands underlain by Precambrian crystalline rocks. Analogous paleotopographic relief was present on the WPP over faulted Paleozoic highs to the west, such as the Fort Chadbourne Fault Zone, Edwards Arch, Devils River Uplift, Ozona Arch, and Brown-Bassett structural complex.

Across most of the Llano Uplift, the Lower Cretaceous transgressive sequence of Hensel Sandstone, Glen Rose Formation and Edwards Limestone successively filled-in paleotopography on the WPP. Remarkably, pre-

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sent-day topography appears to have been influenced by WPP paleotopography: today's valleys and ridges commonly overlie corresponding valleys and ridges on the WPP, even though the thick regional blanket of Edwards Limestone lies (or once lay) between them. Also, outliers of Edwards Limestone around the Llano Uplift tend to overlie buried highs on the WPP. Differential compaction and/or isostatic adjustment were probably involved in this concomitance.

Elsewhere, distribution of some ridges and valleys on the buried WPP landscape bear little resemblance to today's stream drainage patterns. For example, the San Saba River may have drained northeastward into the East Texas Embayment, and the Colorado River may not have been a through-flowing stream. Three WPP valleys located in the southern Llano Uplift and related western terranes apparently drained southward into the Rio Grande Embayment.

When corrected for (1) regional northwest rise related to Neogene uplift of the Colorado Plateau; (2) Late Cretaceous and Paleogene regional dip into the Gulf Coast Basin; (3) the crescentic sedimentary wedge of Glen Rose sediments thickening gulfward from the Llano Uplift; and (4) Neogene Balcones uplift of the Edwards Plateau, the WPP appears as a vast, remarkably flat lowland broken only by scattered ranges of hills over the Llano and Devils River uplifts, and the Edwards and Ozona arches.

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