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GEOLOGY OF BLUE CREEK CANYON WICHITA MOUNTAINS AREA

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INTRODUCTION

Lower Paleozoic carbonates crop out extensively in two areas of southern Oklahoma: the Arbuckle–Criner Hills region and the Slick or Limestone Hills north of the Wichita Mountains. The latter area lies in the complex fault zone that separates the Amarillo–Wichita Uplift from the Anadarko Basin. The Arbuckle and Criner areas have received much attention from geologists, but the Slick Hills are less well known. Recent studies have included detailed mapping of parts of the area (Barthelman, 1968; Brookby, 1969) and delineation of major structural units and their bounding faults (Harlton, 1951, 1963, 1972). Harlton's work established two important tectonic elements in the Slick Hills, the Lawtonka Graben and the Blue Creek Horst. The graben is bounded on the south by the Meers Fault and on the north by the Blue Creek Canyon Fault. The latter forms the southern boundary of the horst, which to the north is bounded by the Mountain View Fault (fig. 46). Lower Paleozoic rocks are comprehensively folded, particularly in the graben.

The present study focuses on the exposed part of the Blue Creek Canyon Fault, in Blue Creek Canyon. Recently exhumed from beneath a cover of Permian fanglomerates, this area is beautifully exposed ground. The fault juxtaposes the Carlton Rhyolite Group and overlying Cambrian sedimentary rocks against Ordovician formations of the Arbuckle Group (in the graben). An interpretation of fault movement is offered here that differs from those of previous workers.

A map and outcrop sections (figs. 154 and 155) of the area are given in the account of Stop 10.

GEOLOGIC SUCCESSION

Carlton Rhyolite Group

The Carlton Rhyolite Group, well exposed in this area, comprises lava flows and tuffaceous sandstones. In addition, a pebbly conglomerate (presumably of fluvial origin) occurs between two of the flows. Close to the Blue Creek Canyon Fault, the volcanic rocks clearly have been involved in folding associated with the fault movement.

Timbered Hills Group

The unconformity between the Carlton Rhyolite Group and the overlying Timbered Hills Group, which records a widespread Franconian transgression (Stitt, 1978), is of interest because it shows evidence of considerable relief. In the southern part of the area, the Carlton Rhyolite is overlain by the upper formation of the Timbered Hills Group, the Honey Creek Formation. In the northern part of the area, the rhyolite is overlain by the Reagan Sandstone. The total overlap (onlap) from north to south appears to involve about 200 ft of strata (fig. 47). In detail, the unconformity shows considerable minor relief. In the north, where the Carlton consists of tuffaceous sandstones, the unconformity is planar. In the southern part of the area, where the Carlton consists of lava flows, the unconformity is irregular in detail and shows features characteristic of rocky shorelines (fig. 159). This unconformity also shows great relief where it is exposed in the Arbuckle Mountains (Ham, 1969).

Three distinct facies are developed in the Reagan Sandstone. The first facies is a basal conglomerate consisting of small (average size, 1 inch diameter) pebbles of rhyolite, and is overlain by the second facies, which consists of dark-green, fine-grained,

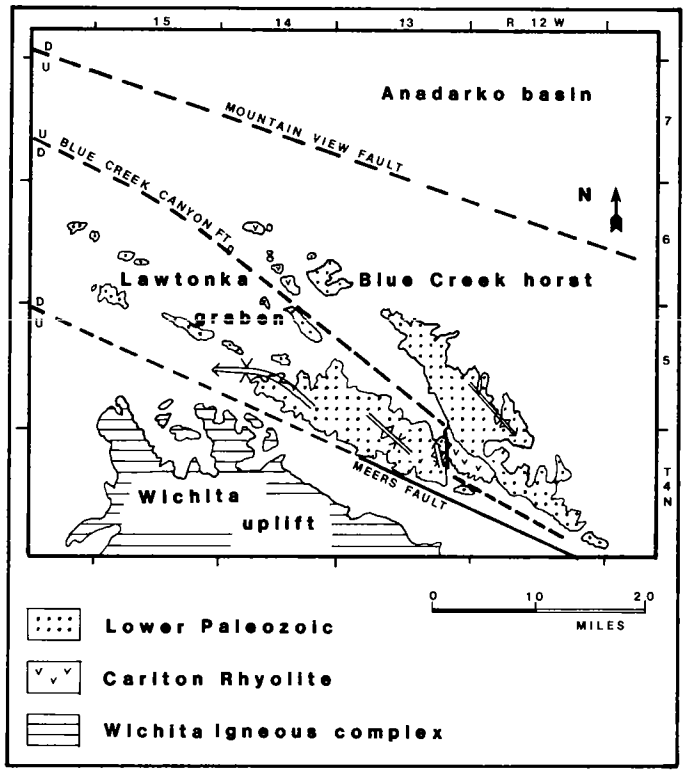

Figure 46. Simplified map of Slick Hills area, showing principal tectonic elements. Terms "graben" and "horst" are followed even though bounding faults of these units are no longer considered normal. Principal fold trends also shown.