

geologic map of the Blue Creek Canyon area and highlights some of the principal features examined during the course of the day. Figure 155 is a series of cross sections from this map. Reference should also be made to several diagrams in the article by Donovan in this guidebook.

Outline of Geology

Rocks exposed in the area of Blue Creek Canyon are as follows:

9. Recent alluvium.
8. Post Oak Conglomerate.
7. Cool Creek Formation.
6. McKenzie Hill Formation (6 and 7 are of Ordovician age).
5. Signal Mountain Formation.
4. Fort Sill Formation (4 and 5 are of Cambrian age; 4 through 7 are assigned to the Arbuckle Group).
3. Honey Creek Formation.
2. Reagan Sandstone (2 and 3 are of Cambrian age and are assigned to the Timbered Hills Group).
1. Carlton Rhyolite Group (Cambrian).

Profound unconformities separate the Carlton Rhyolite Group from the Timbered Hills Group, and the Cool Creek Formation from the Post Oak Conglomerate.

The Blue Creek Canyon Fault is a north-trending, high-angle reverse fault that has thrust Cambrian rocks westward over Ordovician rocks (fig. 155). This major fault separates the Blue Creek Horst (to the east) from the Lawtonka Graben. The Ordovician rocks, within the graben, are intensely folded.

Itinerary

First walk, *a-m*; second walk, *n-q*; additional localities, *r-t*. Localities shown in figure 154.

- a. The Post Oak Conglomerate at Red Hill is a breccio-conglomerate consisting of pebble-sized clasts of Ordovician limestone. At the eastern edge of the hill (close to the road), the conglomerate unconformably overlies greatly fractured Carlton Rhyolite. The unconformity is irregular and shows some evidence of penecontemporaneous slippage down the rhyolite slope. Fracturing is probably due to the Blue Creek Canyon Fault, which can be projected to pass close to the exposure beneath the conglomerate. A small copper deposit, consisting of chalcocite and secondary malachite in a gangue of sparry calcite, is located at the unconformity. The hill is a good vantage point for viewing folds in the Ordovician limestones.
- b. At the western end of Red Hill, the Post Oak Conglomerate rests with angular unconformity on the Ordovician McKenzie Hill Formation. The principal branch of the Blue Creek Canyon Fault passes beneath the Post Oak at Red Hill.
- c. A slightly disharmonic first-order anticline can be traced for more than a mile northward from Red Hill. It is one of five first-order folds in the area (one of which is the hanging-wall anticline east of the Blue Creek Canyon Fault).
- d. At several localities, disharmony in first-order folds is resolved into second-order folds that show features such as asymmetry, overturn, cleavage, and faulted-out limbs (fig. 156). Orientation of these minor folds deviates markedly from first-order folds. Cleavage and overturn are generally more common in the southern part of the area, where displacement in the Blue Creek Canyon Fault is greatest (about 2,400 ft).
- e. The base of the Cool Creek Formation is a calcarenite rich in quartz sand, which has weathered to form a conspicuous gully, and is a reasonable lithostratigraphic marker zone. The basal Cool Creek sediment shows much small-scale cross-bedding (fig. 157).
- f. A highly asymmetric first-order syncline within the graben parallels the Blue Creek Canyon Fault. The eastern limb is highly fractured and in places is cut out by the fault. In addition, the limb shows overturned beds that dip as much as 60°.
- g. At the southern end of the outcrop of the Carlton Rhyolite-Timbered Hills unconformity, the Honey Creek Formation directly above the unconformity contains several beds of biomicrite; the most common fossils are orthid brachiopods that formed shell banks of some stability.
- h. The unconformity is well exposed in a small prospect pit. In detail, the surface is extremely irregular and is overlain by a basal breccia and cross-bedded, very coarse-grained calcarenites rich in pelmatozoan fragments (figs. 158, 159).
- i. The Blue Creek Canyon Fault is well exposed where the upper massive member of the Fort Sill Formation is faulted against the Cool Creek Formation, as the former is a ridge-forming element. The fault plane clearly can be seen to dip to the east at a steep angle.
- j. The uppermost massive member of the Fort Sill Formation is a conspicuous feature of the hanging-wall anticline (a "first-order" fold east of the fault). Bedding in this member has been obscured in places by numerous low-angle joints that dip generally to the southeast at about 45°. The contact between the Fort Sill and Signal Mountain Formations is easily determined, because the latter formation does not form significant relief.
- k. At the northern end of Blue Creek Canyon, the Signal Mountain Formation, exposed in a quarry, shows the effects of compression between two branches of the Blue Creek Canyon Fault. Considerable minor fault movement has occurred along weak mudstone layers in the formation. A few yards north of the quarry, the two branches of the fault converge and the Signal Mountain Formation is faulted out completely (fig. 160).
- l. A walk of a few hundred yards west from the quarry crosses several first-order fold axes. The geometry of *en-echelon* relationships is clearly dis-