

## Basic Geology, Paleontology, & Woody Vegetation Of Bright Leaf Preserve

### Overall

Bright Leaf Preserve is a relatively homogeneous Ashe Juniper/Oak woodland at the eastern edge of the **Edwards Plateau**, a deeply eroded platform of Cretaceous limestone that stretches west as far as the Pecos River and forms the Texas Hill Country.

### Geology

The site is located on the upthrown side of the **Balcones Fault Zone**, which runs north - south through Austin. Movement along the faults has raised the rocks to the west and lowered the rocks to the east, for a net difference in elevation of over 1,000 feet. The faults were active during the Miocene Epoch (5-24 million years ago). There has been no recorded movement along the fault zone in historical times. This fault zone overlies the buried eroded remnants of the Ouachita Mountains, which rose along a suture where continents collided about 300 million years ago.

Most of the rocks at Bright Leaf belong to the upper part of the **Glen Rose** Formation. At the top of Mt. Lucas ridge there is an outcrop of the Walnut Formation. A thin layer of the Edwards Formation caps the ridge. The Glen Rose is early Cretaceous in age, about 108 to 114 million years old. It consists of **limestone, dolomite, and marl** and was deposited in a shallow sea that covered most of Texas in the Cretaceous.

**Limestone** is a sedimentary rock composed mainly of calcium carbonate, a compound of calcium, carbon, and oxygen. Most of the limestone at Bright Leaf is made up of minute fragments of the shells of small marine organisms. Bacteria probably played a large role in precipitating the limy mud that became the rocks that we see.

While the rocks were still soft muds on the floor of a shallow sea, marine worms and other soft-bodied creatures extensively burrowed many of them. Evidence of this burrowing can be seen along the trails where the rocks have a **honeycomb** or holey appearance.

Larger marine invertebrate **fossils** (clams, oysters and snails) are often found in the Glen Rose. At Bright Leaf these large fossils are more common in the Walnut Formation up on Lucas ridge.

Limestone exposed to water sometimes deposits light-colored **travertine** on rock faces. You can see young travertine along the back 'wall' of the large quarry and in some intermittent creeks in the preserve. It appears smoother than the nearby rock.

**Dolomite** is a rock similar to limestone but it contains magnesium. It is a comparatively resistant rock and is used as building foundation stones.

**Marl** is soft rock composed of calcium carbonate mixed with clay. It can wreak havoc on roads and buildings because of localized shrinking and expanding with each dry and wet season.

The two trailside **quarries** at Bright Leaf appear to be from after 1900 and before World War II, based on old government documents. A circa 1900 topographic map of the general Austin area bears no symbols for quarries, while a 1940 aerial photo of the immediate area shows recent digging scars at these two sites.

The larger quarry, which has a prominent, smooth wall and surrounding blocks, located at the east end of Loop Trail 4, may have been dug for dolomite or for road base.

The smaller quarry, a bit downhill (north) of Bright Leaf 's Trail 6, is shallow and poorly preserved, suggesting that low-grade limestone was dug out here, probably for road base.

## **Topography**

The preserve is composed of **canyons** and **ridges** with seeps and **springs** where highly permeable **honeycomb** limestone overlies impermeable beds. The canyons are the result of millions of years of stream **erosion** of the edges of the Edwards Plateau. Erosion in the preserve is an endless process caused by the creek; by naturally occurring, very slightly acid rain which dissolves the limestone; and by the action of tree roots which slowly push the rocks apart as they grow through cracks and crevices.

Because of differential erosion of the alternating layers of harder and softer limestone, the Glen Rose exhibits a “**stair-step**” topography in this area. There is a very good example of this stair-step topography at the southern of the two junctions of trails three and four.

Preserve **elevations** range from approximately **510** feet above mean sea level on the northwest to approximately **888** feet above mean sea level on top of Mt. Lucas near the southern boundary.

The **soils** that develop over the Glen Rose and Walnut Formations on these slopes are the shallow, well-drained, gravelly loams of the Brackett Series.

**Dry Creek** and an unnamed tributary traverse the northern part of the preserve. Dry Creek empties into Lake Austin, an impoundment of the Colorado River. Several tributaries of Dry Creek drain the Northwest Hills area, that is, north of Ranch Road 2222 between Mopac and Mesa Drive, via springs, seeps, and urban run-off. It has probably taken Dry Creek more than a million years to erode its bed to the current level.

This process continues; flooding in November 2001, and several times in subsequent years, moved several very large rocks in the streambed.

### **Woody Vegetation Areas**

Bright Leaf occurs in a **vegetational region** known as the **Balcones Canyonlands subregion of the Edwards Plateau**. The Balcones Canyonlands is a highly dissected area consisting of steep canyons, narrow divides, and high gradients. Past disturbances in the preserve have resulted in patches of relatively undisturbed woodland, especially along the steeper slopes, and partially cleared and cedar-chopped areas.

- The **upland** areas support a partially cleared Ashe Juniper/Oak woodland. This is the predominate vegetation in the preserve. (Ashe Juniper is locally referred to as cedar.)
- The **steeper mesic (wet) slopes** support a more diverse deciduous woodland. These communities are the most multilayered and have the highest plant diversity in both the upper and understory. They have as much as 90 percent canopy cover and support the most mature trees. Trees include Red Oak, Texas Ash, Cedar Elm, and Ashe Juniper. Net-leaf Hackberry and Shin Oak are also present. Shrubs include Lindheimer Silk-tassel, Redbud, Deciduous Holly, Yaupon Holly, Carolina Buckthorn, Red Buckeye, Mexican Plum, Elbowbush, Fragrant Sumac, Evergreen Sumac, and Wafer Ash.
- Alluvial **creek terraces** along Dry Creek support a more mature bottomland forest, including Live Oak, Red Oak, Sugarberry, Sycamore, Elm, Black Willow, Eastern Cottonwood, and a few Walnut trees.
- There are a few relatively small, open, **grassy areas** dotted with scrubby Cedar Elm, Live Oak, Shin Oak, and Bumelia. Smaller shrubs include Agarita, Prickly Pear, and Elbowbush.

Numerous **exotics** (Red-tipped Photinia, Wax-leaf Ligustrum, Heavenly Bamboo, Pyracantha, Japanese Honeysuckle, Chinese Privet, Chinaberry tree, and Chinese Tallow tree) also occur in the preserve. There is ongoing work to remove non-native, invasive plants and trees from the preserve.

As of late 1996, 295 plant taxa had been recorded in the preserve and others are being identified, so it is expected that the number could ultimately reach as many as 500. Forbs, ferns, and grasses are, therefore, not covered in this paper.

## REFERENCES AND ADDITIONAL INFORMATION

The background material on geology is from:

- *A Field Guide to Geology, Eastern North America* by David C. Roberts
- *Roadside Geology of Texas* by Darwin Spearing.

Another good reference is the full color *Geologic Map of the Austin Area* published by the Bureau of Economic Geology, The University of Texas at Austin. It is available at a nominal charge by calling the Bureau at 512-471-1534.

*Texas Fossils*, also published by the Bureau of Economic Geology, is a good introduction to the fossils likely to be found in the preserve. It is also available at a nominal charge by calling the Bureau at 512-471-1534.

This document was compiled by Beck Runte,  
for the Friends of Bright Leaf.