

## Chautauqua Hills: Rocks and Minerals

The Chautauqua Hills are a sandstone-capped rolling upland that extends into the Osage Cuestas from the southern Kansas border. Approximately 10 miles wide, these hills extend as far north as Yates Center in Woodson County. Small patches of similar terrain can be found as far north as Leavenworth County.

The Chautauqua Hills formed primarily in the thick sandstones of the Douglas Group. During the Pennsylvanian Period, about 286 million to 320 million years ago, rivers and streams flowed into the sea in this area. Sand and other sediments collected in the estuaries and at the mouths of the rivers in deltas. When the seas dried up, the sediments were buried and compacted—the sands became sandstone and the muds became shale. Over millions of years, uplift and erosion exposed the sandstone and shale at the earth's surface. Further erosion has dissected the area into a series of low hills, capped by more resistant sandstone.



*Sandstone outcrop in the Chautauqua Hills.*

Because of rock outcrops in this region, the hills are generally not cultivated but are used instead for pasture. The Verdigris, Fall, and Elk rivers cross the area in narrow valleys walled by sandstone bluffs. Topographic relief in the region is never more than 250 feet.

Many of the hills are covered by stands of black jack oaks, scrub oaks, and other hardwood species. This mix of medium-tall grasslands and scattered stands of deciduous trees is called the Cross Timbers by scientists who map vegetation. In Kansas, the extent of the Cross Timbers is almost identical to the extent of the Chautauqua Hills physiographic region.

### Common Rocks and Minerals

**Sandstone.**—The characteristic rocks in the Chautauqua Hills are the thick sandstones that cap the hills and are exposed along creek and river valleys. Sandstone is a common sedimentary rock, made up largely of quartz grains cemented together by calcium carbonate, iron oxide, or silica. In eastern Kansas, sandstone is often interbedded with shale and limestone. It also occurs as channel deposits, cutting through older deposits of shale and limestone.

The sandstones capping the Chautauqua Hills are the Tonganoxie Sandstone Member of the Stranger Formation and Ireland Sandstone Member of the Lawrence Formation. Both are thick rock formations, the remains of deposits that filled a large, ancient river valley during the Pennsylvanian Period.

Some sandstones are marked by ridges and troughs that look like the ripples often seen in loose sand in a stream, shallow lake, sea, or sand dune. By studying ripple marks preserved in sandstone and comparing them with similar marks found in today's sand, geologists can make shrewd assumptions about what the environment was like when these sandstones were deposited. Fossil ripple marks provide information about the direction of the current, the environment, and, to a degree, the depth of the water. Some researchers believe that wind-created ripples are not preserved and that virtually all fossil ripple marks were formed in water.



*Ripple marks in Chautauqua Hills sandstone.*

## Places to Visit

*U.S. Highway 160.*—The characteristic sandstone-capped hills of the region can be seen along a stretch of U.S. Highway 160, between the town of Longton in Elk County and the junction with Kansas Highway 39 in Montgomery County. The sandstones capping the hills along this route are the Tonganoxie Sandstone Member of the Stranger Formation and Ireland Sandstone Member of the Lawrence Formation. Both are the remains of deposits that filled a large, ancient river valley during the Pennsylvanian.

*Redbud Trail.*—One way to get a feel for the beautiful scenery of the region is to drive the Redbud Trail during the annual Redbud Tour. Hosted by the Sedan Area Chamber of Commerce, a mapped route takes visitors through the county, winding through the Chautauqua Hills and Osage Cuestas regions. The tour takes place when the



*Redbuds blooming in Chautauqua Hills.*

redbuds are in full bloom, usually in April. For exact dates and more information, contact the Sedan Area Chamber of Commerce, P.O. Box 182, Sedan, KS, 67361 (316) 725-5221 or go to their website at <http://skyways.lib.ks.us/kansas/towns/Sedan/events.html>.



*Fossiliferous limestone on display at The Hollow in Sedan, Kansas. The majority of fossils are Pennsylvanian rugose coral.*

*City Park in Sedan.*—Located just a block from downtown Sedan, The Hollow is a good place to see Douglas Group sandstones. At the park's entrance is a display of Chautauqua County limestone containing numerous fossils of rugose coral. These corals lived at the bottom of shallow seas during the Pennsylvanian Period.

## Sources

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