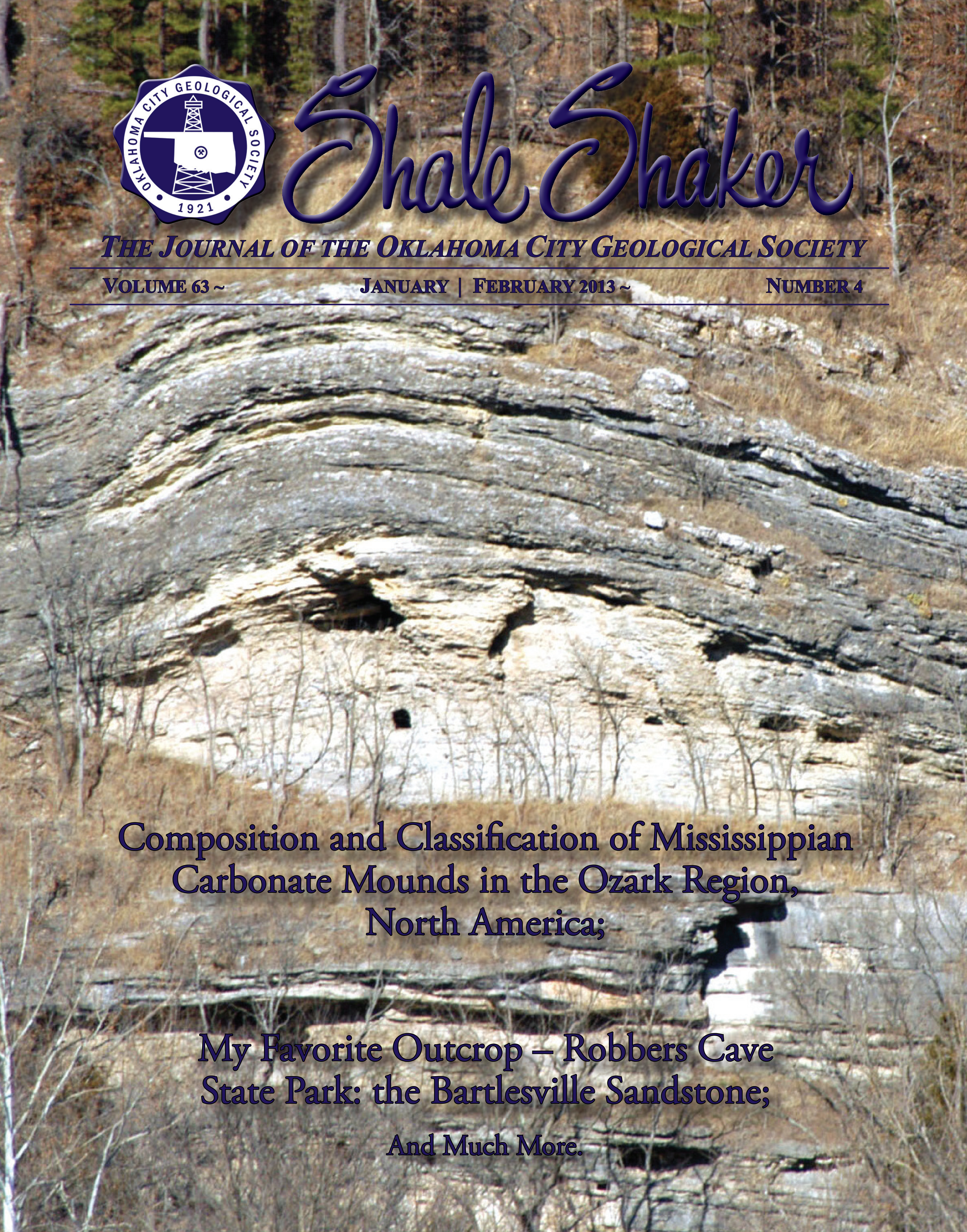

Shale Shaker

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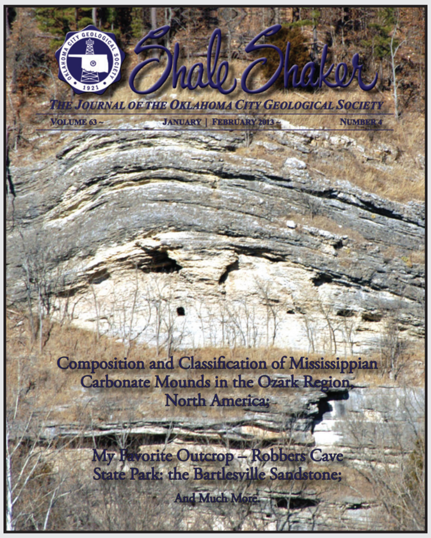
Composition and Classification of Mississippian Carbonate Mounds in the Ozark Region, North America;

My Favorite Outcrop – Robbers Cave State Park: the Bartlesville Sandstone;

And Much More.



About the Cover

Michael Root creates the covers of the Shale Shaker. His cover for this Issue utilizes an image provided by Morgan Unrast. The image presents a stacked mound complex in the Pierson Limestone (Osagean), Delaware County, Oklahoma. Underlying the Pierson Limestone is the Northview Shale (Kinderhookian), while the Reeds Spring Limestone (Osagean) overlies the mound complex. Morgan's Master Thesis, "Composition and Classification of Mississippian Carbonate Mounds in the Ozark Region, North America," can be found in this Issue.

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My Favorite Outcrop ~ Robbers Cave State Park: The Bartlesville Sandstone

One of my favorite places to visit in Oklahoma is Robbers Cave State Park. It is located about 20 miles east of McAlester and five miles north of Wilburton in the southeast part of the state (Figure 1). Here, spectacular bluffs exposing the Bartlesville sandstone form a picturesque background rising almost 800 feet above the west shoreline of Lake Carlton (Figure 2).

The Bartlesville sandstone (surface equivalent of the Bluejacket Sandstone) is the lower member of the Desmoinesian Boggy Formation. In the park area, it consists of repeated coarsening-upward sequences of fine-grained sandstone and interbedded shale (Figure 3). This sequence of strata was deposited along the southern edge of a prograding delta-front. A complete single sequence, if present, consists of, from bottom to top, the bar transition facies, lower bar sandstone facies, and upper bar sandstone facies.

The bar transition facies includes interbedded shale and thin sandstone beds, the later becoming more prevalent up-section. The more resistant weathering of the sandstone-dominated sequence causes the distinctive "coarsening upward" textural profile as seen at outcrop. Sedimentary structures in the bar transition facies include ripple bedding and flaser bedding (Figure 4). In the latter, a contrasting pattern of thin, wavy, sandstone lenses and interbedded shale is characteristic of tidal depositional processes. In the lower bar sandstone facies, bedding is thin to intermediate in thickness (up to several inches thick) and is distinguished by symmetrical ripple bedding (Figure 5). This pattern of ripples is caused by bidirectional currents that are common within the lower bar sandstone facies (shoreface) including that within a tidal-mouth bar.

Locally, the upper part of sandstone sequence is characterized by soft-sediment deformation (flowage) that appears as large spheroidal masses having an enveloping "rind". Such depositional structures are a few feet in diameter and suggest rapid deposition in a mouth-bar setting. Numerous small wood and plant impressions up to several inches long also occur along bedding surfaces in the upper part of most sandstone sequences. The abundance of these plant remains is evidence that this depositional system is close to a terrestrial environment.

The trail leading up to the lakeshore

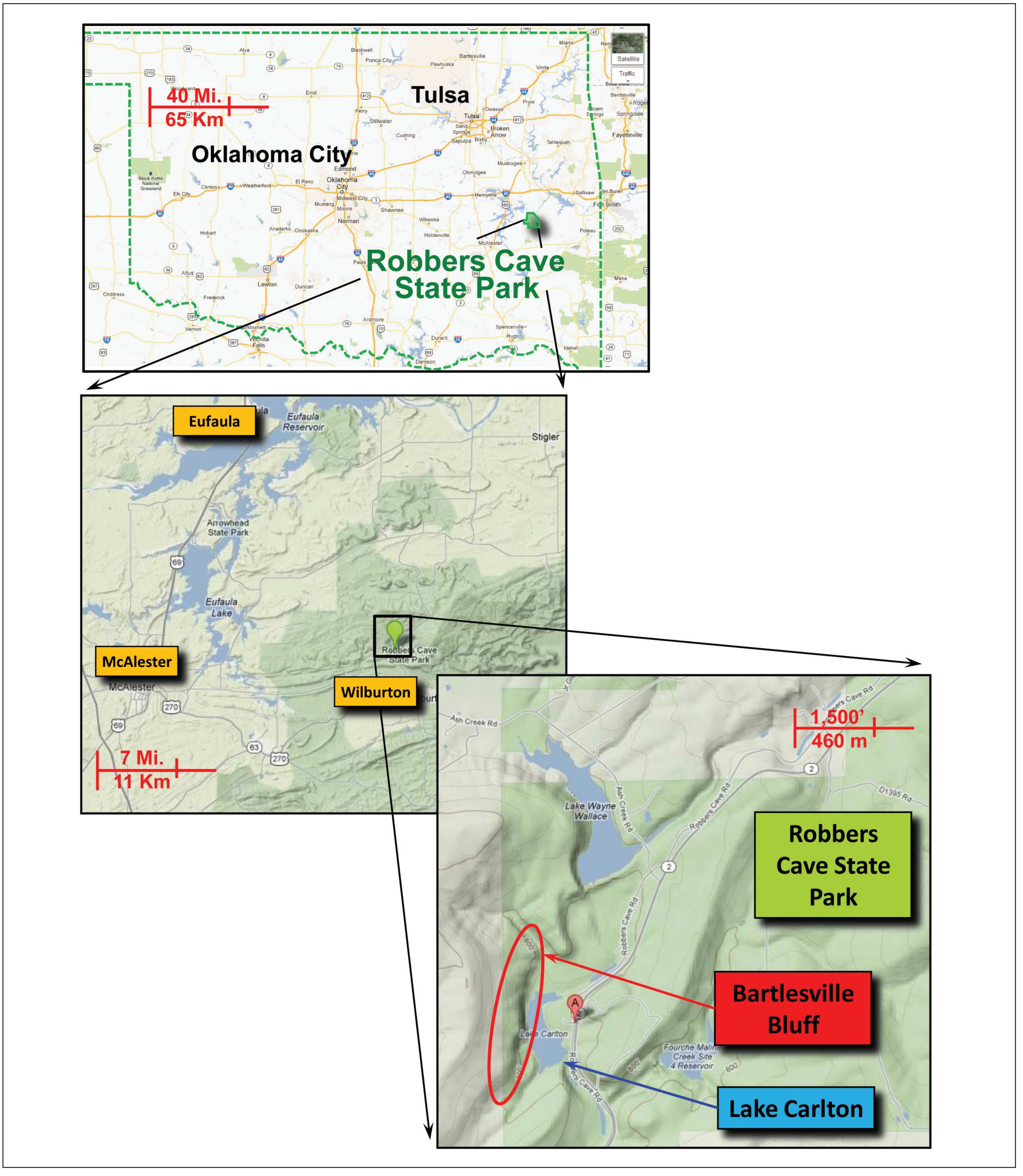

Figure 1: Generalized location map of the Robbers Cave area in southeastern Oklahoma

Figure 2. The bluffs along the west bank of Lake Carlton are about 800 feet high and consist mostly of delta-front and pro-delta sediments of the Bartlesville depositional system. A trail beginning near the dam and extending along the southern shore provides easy access to the steep cliffs. The relatively easy hike is rewarded by a beautiful view of the lake and surrounding country. During the spring, Canadian geese nest on isolated ledges and fill the air with their unmistakable "honking" sounds.

bluffs can be bypassed to examine many interesting areas having unique geomorphic features. The small waterfall flowing over the upper part of a bar sequence (Figure 6) presents a very serene location that few visitors have an opportunity to enjoy. The trail continues north for a little over half a mile and gradually extends into the valley north of the lake. A note of caution: the trail does not make a convenient loop around Lake Carlton but rather continues farther north toward Lake Wayne Wallace (Figure 1) and into the actual "Robbers Cave" area of the park.

Robbers Cave State Park
www.travelok.com

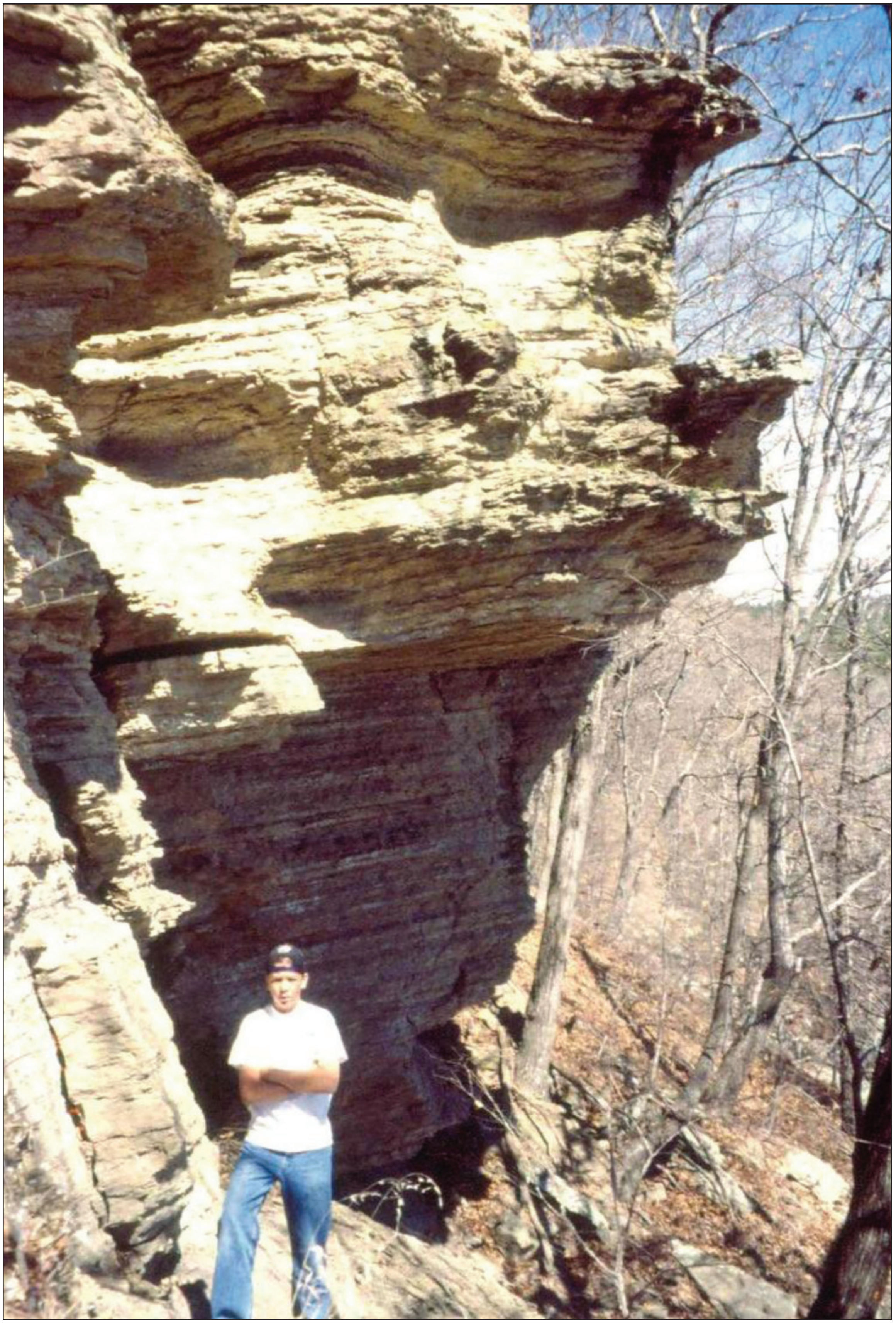

Figure 3. Multiple coarsening-upward sequences occur along the bluffs bordering Lake Carlton. As shown here, the bar transition facies behind Matt Andrews is more easily eroded. It grades upward relatively quickly into the ripple-bedded lower bar facies which is shown in the upper part of the sequence. A note of caution: rattlesnakes are commonly seen along rock ledges and near crevices during the late spring, summer, and early fall

Figure 4 (above). Flaser bedding consisting of discontinuous sandstone lenses and interbedded shale is abundant in the lower part of the coarsening-upward sequence. This type of sedimentary structure is consistent with relatively shallow tidal currents. Note pocket comb for scale.

Figure 5: Symmetrical ripple bedding is abundant in the lower bar sandstone facies indicating that current was bidirectional in a shoreface or tidal mouth bar.

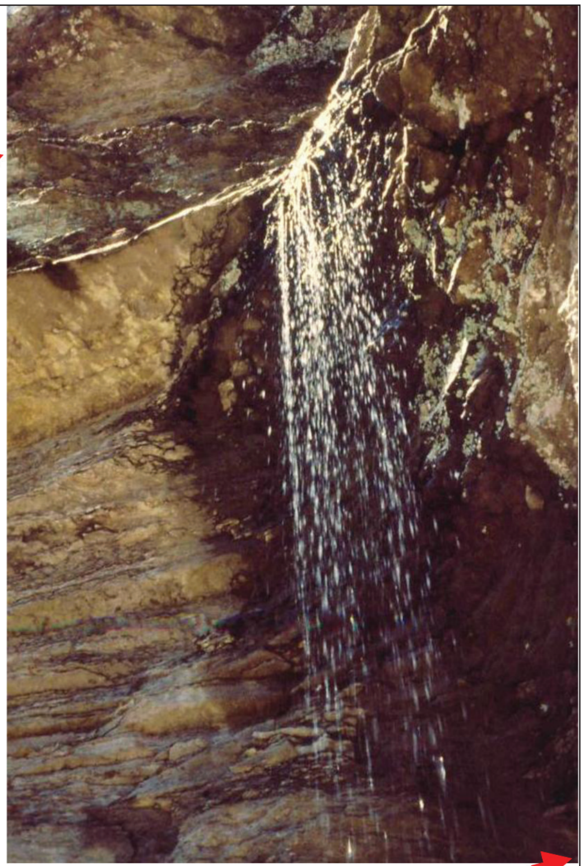

Figure 6. The gradual coarsening-upward textural profile of the Bartlesville sandstone is represented in the weathering profile. Here, a small waterfall (see inset, upper right) cascades over the more resistant sandstone strata that predominates in the upper part of this sequence. My son, Matthew, accompanied me on many trips to this site.

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Richard (Rick) D. Andrews

Biographical Sketch

Richard (Rick) D. Andrews

Rick Andrews is a petroleum geologist for the Oklahoma Geological Survey. He was the lead geologist for the DOE Class I (oil reservoir) FDD project and is the principal author of several hydrocarbon plays including the Springer, Morrow, Cromwell, Hartshorne, Bartlesville, Red Fork, Skinner, and Prue plays. His responsibilities include regional subsurface mapping and analysis of oil and gas reservoirs ("plays") in Oklahoma, detailed reservoir field studies, formation evaluation using wire line logs, presentation of "play" workshops, and field trip leader. Rick was employed 15 years with a major oil company and received additional training in formation evaluation, well log interpretations, reservoir engineering, reservoir testing, depositional environments, sequence stratigraphy, core and outcrop interpretations, subsurface mapping techniques, and surface to subsurface log correlations. He is proficient in many computer applications and in managing large-scale projects. His ties with the energy industry have been very beneficial to the success of all his workshops and field trips.

Since 2008, Rick was a principal instructor for the ConocoPhillips School of Geology & Geophysics newly established class "Subsurface Methods, 4233". His responsibilities include core, sample, and well log interpretations, and formation evaluation. Rick also assists other OU geology and engineering classes as a guest lecturer and field trip leader. He continuously provides technical assistance for many other MS and PhD candidates regarding their research. Rick has earned several degrees, including a BS and MS in Geological Sciences from University of Wisconsin-Milwaukee and a MS in Hydrology from Western Michigan University. Prior to joining the Oklahoma Geological Survey, he worked for Union Energy Mining Division, Union Oil Company of California (UNOCAL), and Geo Information Systems (GIS).

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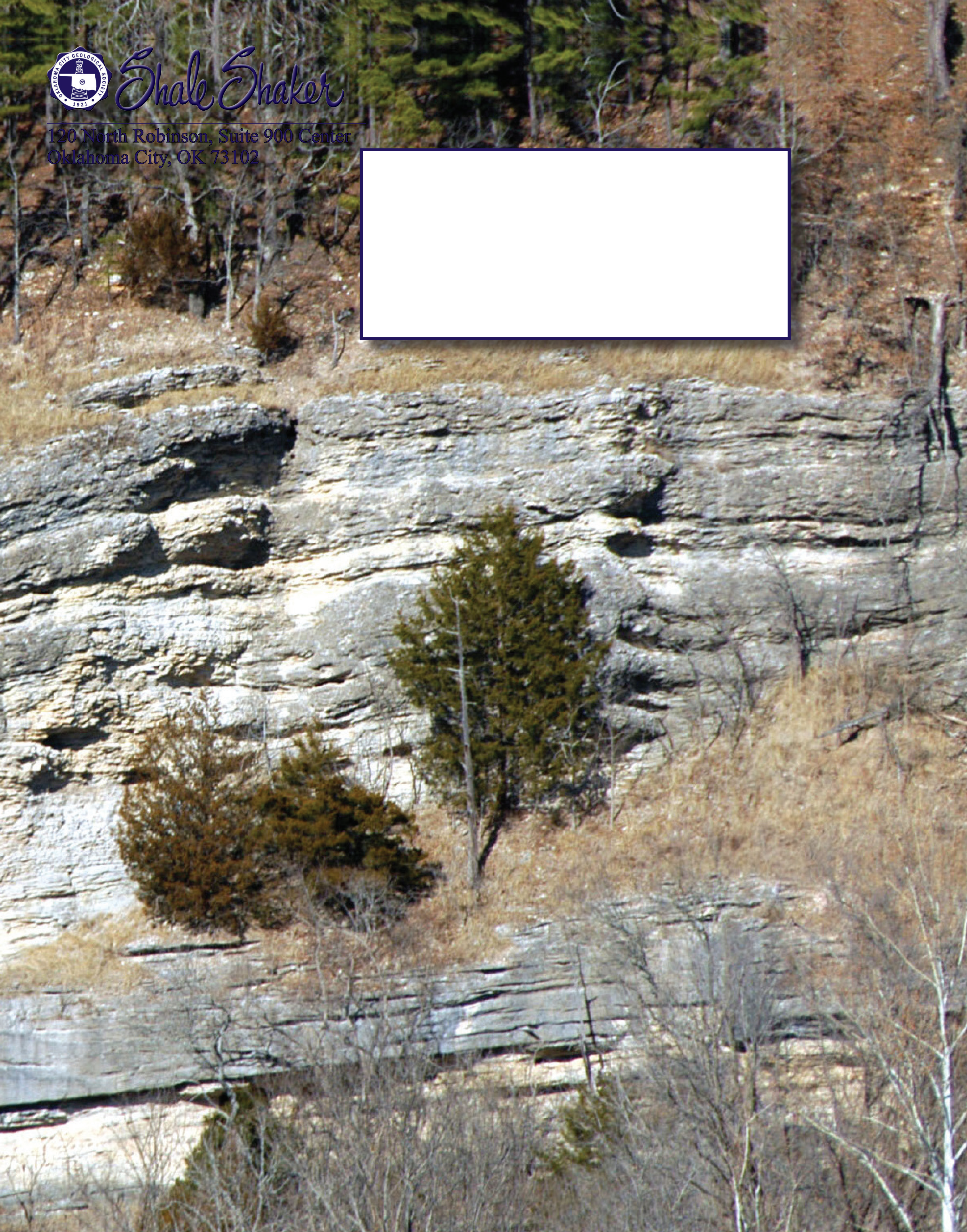

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