Kansas City on the Rocks: Geology Field Trip for K-16 Teachers

Sponsored by the National Association of Geoscience Teachers Central Section

Carl Priesendorf
Department of Geology
Longview Community College
Lee's Summit, MO 64081

Janis Treworgy
Earth Science Department
Principia College
Elsah, IL 62028

William Slattery
Department of Geological Sciences and Teacher Education
Wright State University
Dayton, OH 45435

Bedrock Stratigraphy

The surface bedrock of the Kansas City area is composed of lithified sediment that was deposited approximately 300 million years ago during the Pennsylvanian Period. Thinly bedded limestones, shale, sandstone and coal are the most common rocks of the region, and are evidence of a wide variety of ancient sedimentary environments that existed in the region. Many of the limestones were deposited as lime mud on the bottom of shallow tropical seas that covered much of the mid-continent. Thin layers of coal are composed of the carbonized remains of ancient plants that grew in vast swamps. Layers of sandstone are evidence of ancient beaches and rivers that existed in the area. Many of the limestone and shale formations are abundantly fossiliferous, and give us a glimpse into the life that existed during the period. The Pennsylvanian Period was a time of constantly shifting coastlines across the mid-continent due to sea level fluctuations. Changes in sea level are thought to have been caused by extensive ice age activity. As ice accumulated on the land, sea levels dropped, causing the oceans to "retreat" from the continental interior (regression). As glacial ice melted, sea levels would rise, and gradually "invade" the interior of the continent (transgression). During the Pennsylvanian Period, sea levels changed dramatically numerous times, causing the coastline to shift back and forth across the mid-continent. The shifting of sedimentary environments due to sea level fluctuations causes the thinly bedded nature of the rocks. One of the most notable features of Pennsylvanian sedimentation is cyclothems. A complete cyclothem consists of perhaps as many as 10 sedimentary rock units. A typical cyclothem is made of a lower sequence of continental deposits (sandstone, shale, coal), and an upper sequence of marine sediments (limestone, shale). A single advance and retreat of the sea is a cyclothem, and over 50 cyclothems are recognized in Missouri and Kansas.

Field Trip Stops

(Fig. 1)

Stop 1 Interstate 435 and Holliday Drive
Park along roadside near entrance ramp. Approximately 150 feet of Pennsylvanian age strata is exposed at this location. The stratigraphic section includes the Chanute Formation (base of the section), extending into the Plattsburg Formation at the top of the section (Fig. 2).

Stop 2 87th Street and Blue River Road
Park in gravel area near middle of outcrop. A nearly 100 foot thick section of lower Kansas City Group is exposed at this location. Prominent limestone cliff faces are composed of the Bethany Falls Member of the Swope Formation and the Winterset Member of the Dennis Formation (Fig. 2).

Stop 3 Interstate 470 and View High Drive
Park along side street on east side of View High Drive. Stratigraphy is similar to Stop 2, however offers better opportunity to collect lower part of the Winterset Member of the Dennis Formation (Fig. 2).

Stop 4 Interstate 470 and Raytown Road
Park on exit ramp along Interstate 470 near Raytown Road. Exposures exhibit numerous faults associated with a paleocollapse structure discovered during highway excavations in 1976 (Gentile, 1984).

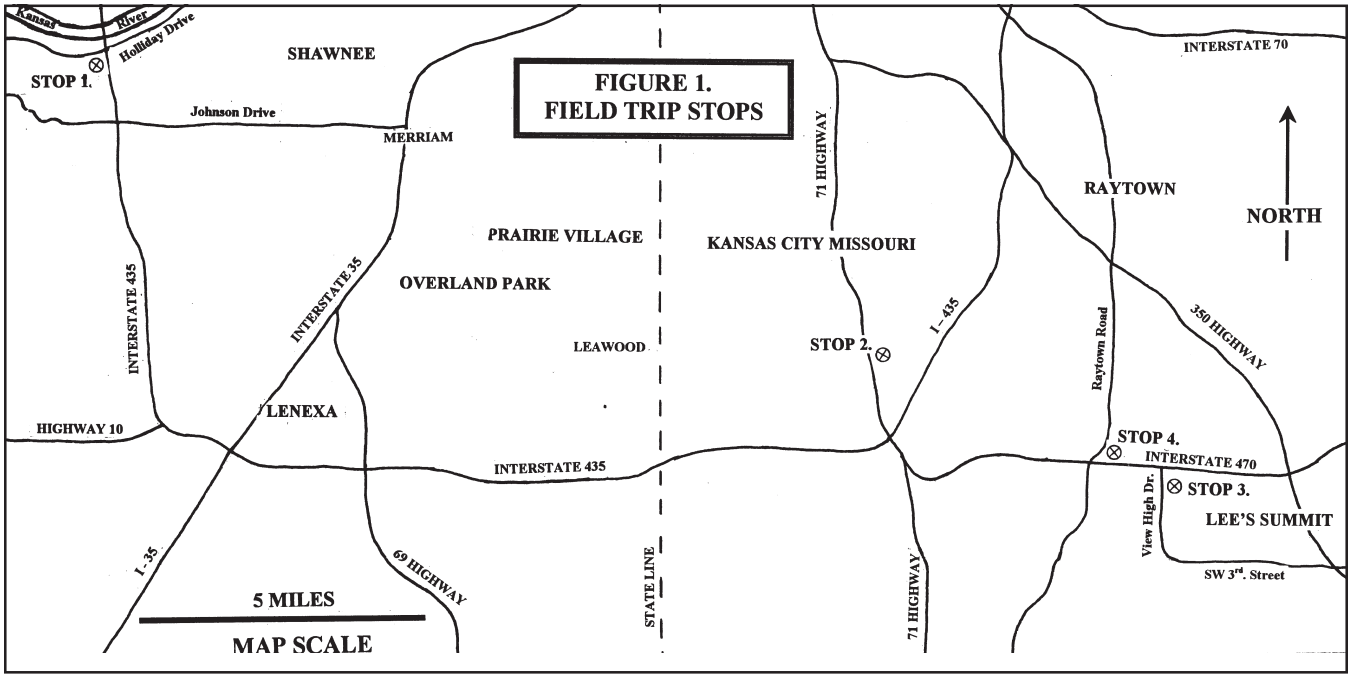

Figure 1.

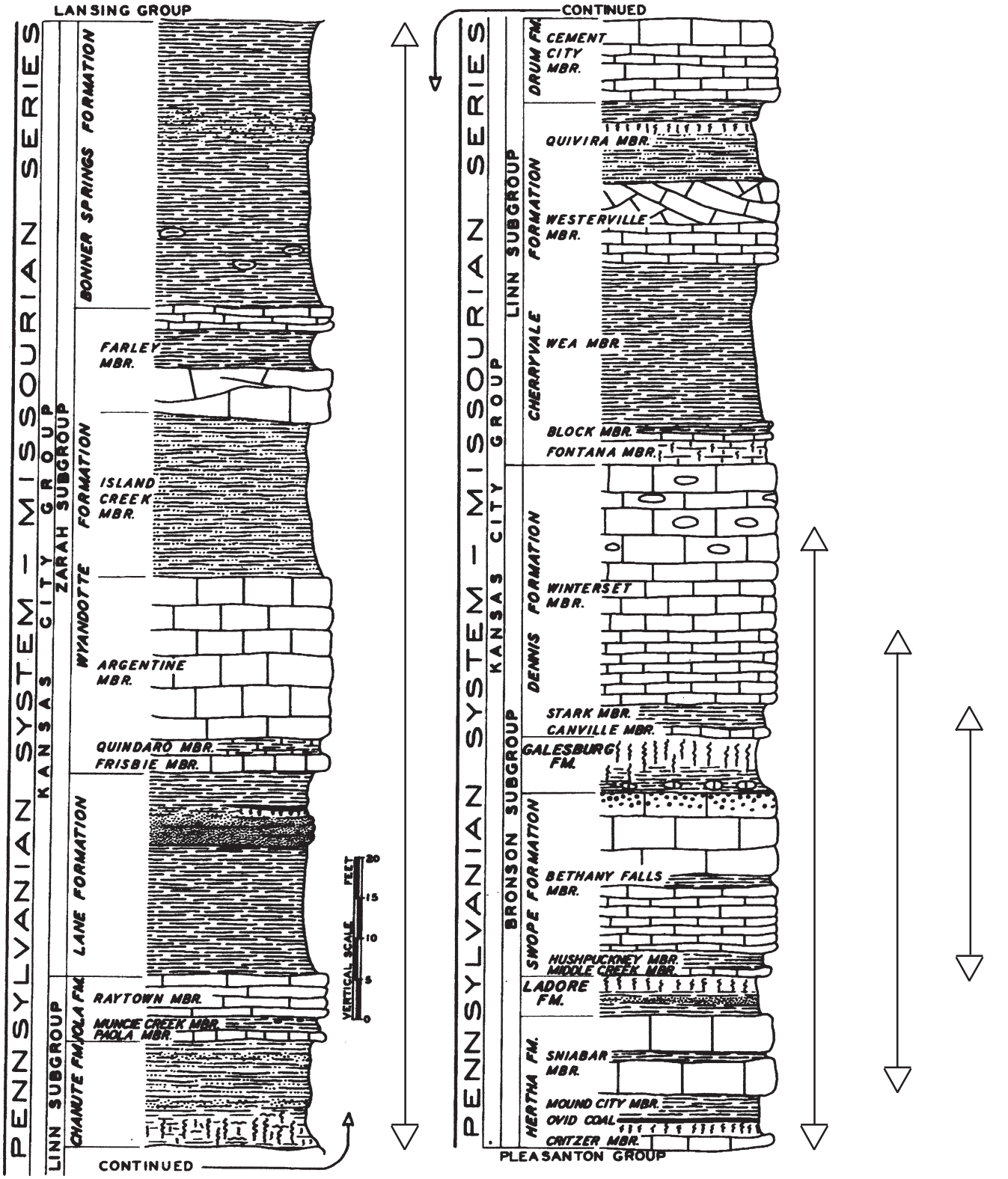

Figure 2. Composite columnar section of the Kansas City Group (after Howe, 1961).

References:

Gentile, R.J., 1984, Paleocollapse structures: Longview region, Kansas City, Missouri: Bulletin of the Association of Engineering Geologists, v.21, no. 2, p. 229-247.

Howe, W. B., and Koenig, J.W. (eds.), 1961, The stratigraphic succession in Missouri: Missouri Geological Survey and Water Resources, Volume 40, 2nd. Series, 185 p.

Thompson, T.L., 1995, The stratigraphic succession in Missouri – revised: Missouri Department of Natural Resources, Division of Geology and Land Survey, 190 p.