

Horses, Kentucky Bluegrass, and the Origin of Upper Ordovician, Trenton-Age Carbonate Reservoir and Source Rocks in East-Central United States, Frank R. Ettensohn, University of Kentucky, Department of Earth and Environmental Sciences, Lexington, KY 40506, fettens@uky.edu

The central Kentucky Bluegrass Region is commonly touted as “The Horse Capital of the World,” and the designation is clearly tied to the origin of the Trenton-age Lexington Limestone and its equivalents throughout east-central Kentucky and nearby areas. These argillaceous limestones weather, largely through solutional processes, to generate flat to gently rolling terrain with phosphate-rich soils that are important in generating solid skeletal framework and enhanced metabolism in the horses that graze on grasses in the area. All of this, however, is related to the tectono-stratigraphic framework during limestone deposition about 450 Ma ago.

Prior to deposition of Trenton-age carbonates, the region was characterized by widespread, peritidal deposition of pure pelletal carbonate muds on the very shallow Blackriver carbonate platform. Abruptly, however, the Blackriver platform collapsed along older Keweenawan, Grenvillian, and Iapetan structural trends and differentiated into structural highs like the Lexington and Galena-Trenton platforms and intervening structural lows like the Sebree Trough and foreland basin. This collapse event was coeval with initiation of the Taconic tectophase at the New York promontory and probably reflects cratonward movement of largely tensional, far-field, tectonic forces during early parts of the tectophase. The structural highs acted as foundations for the extensive buildup of carbonates that would become reservoir rocks in Lexington and equivalent limestones, whereas the intervening lows accumulated dark-mud source beds and were sufficiently depressed to make contact with open seas to the south, which in the existing paleogeographic-paleoclimatic setting, funneled deep, cold, phosphate-rich, oceanic waters into the craton and onto the platforms via upwelling. Later, however, during an apparent change in Taconian subduction polarity that resulted in change to an overall compression regime, the area experienced major deepening and regional tilting that allowed foreland-basin muds to flood the low areas and eventually inundate the carbonate platforms. Hence, the same phosphate-rich limestones that have generated the beautiful Bluegrass terrain and horse-raising industry in central Kentucky are clearly related to the hydrocarbon potential of similar rocks in the larger, east-central U.S. region; both reflect the unique interplay of tectonic, paleogeographic, and paleoclimatic conditions in the area nearly 450 million years ago.