PALEOGEOLOGY OF OUACHITA GEOSYNCLINE, OKLAHOMA AND TEXAS

AUGUST GOLDSTEIN, JR.[1]
Tulsa, Oklahoma

The Ouachita geosyncline was one of the most extensive geosynclines of Paleozoic time, extending a minimum of more than 1300 miles from southwestern Alabama through a sinuous course into northern Mexico. The mountain system which resulted when the sediments of this great geosynclinal prism were compressed, deformed, and uplifted must have been the dominant topographic feature of southern North America during Permian time.

During the Mesozoic and Tertiary, these mountains were largely worn down and overlapped by younger sediments, and the southern end of the mountain range was downwarped as the Gulf Coast geosyncline began to form. To study the stratigraphy and structure of this great mountain system we have only several relatively small windows through which the old mountains are exposed, and data obtained from sample study of somewhat less than 400 wells which have been drilled into these rocks along the buried portion of the mountain system.

The largest and best-known exposure of this mighty mountain range is in the Ouachita Mountains of Oklahoma and Arkansas, where an area about 200 miles long and 50 miles wide is exposed. In Texas, the mountain system is buried for almost its entire length, coming to view only in the relatively small windows of the Marathon and Solitario uplifts of extreme southwest Texas, and in tiny exposures at Persimmon Gap and Dog Canyon near the entrance to Big Bend National Park. The rocks exposed in the Ouachita Mountains and in the Marathon and Solitario uplifts are weakly metamorphosed to unmetamorphosed sediments of geosynclinal facies; structurally these areas are quite similar, being characterized by abundant folding and numerous overriding or superposed thrust faults.

Most of the wells have been drilled along the frontal zone of the buried portion of the mountain system and they have penetrated weakly metamorphosed to unmetamorphosed rocks similar to those exposed in the Marathon and Solitario uplifts and in the Ouachita Mountains. However, enough have been drilled at a considerable distance gulfward from the frontal zone to indicate that the Luling-Mexia-Talco fault system may mark the inner boundary of a more highly metamorphosed structural and stratigraphic unit, gulfward from the Luling-Mexia-Talco fault system there is a phyllite-slate-metaquartzite sequence with imposed slaty and fracture cleavages. Metamorphic grade in these rocks clearly exceeds that of rocks exposed in the Ouachita Mountains or in the Marathon and Solitario uplifts.

Surface outcrops and wells furnish information only about the outer 60-70 miles of the width of the buried mountain system. Reasoning by analogy to the Appalachian Mountain System, we deduce that the entire mountain system may be from 140-200 miles wide. We would expect to encounter more numerous igneous intrusives and more highly metamorphosed sediments as deeper wells are drilled farther gulfward.

[1]Bell Oil and Gas Company.