tary mouth bar and distal bar lithofacies and Lewis marine central bar lithofacies constitute the primary Mississippian reservoirs in the basin. Primary interparticulate porosity has been reduced through the development of quartz overgrowths and/or calcite cementation. Secondary porosity involves leaching of carbonate allochems, calcite cement, and/or matrix. The Carter prodelta and interdistributary bay shales and Lewis marine shales make excellent petroleum source rocks. These shales contain amorphous and herbaceous kerogen. The state of alteration of the kerogen indicates that the thermal history of the basin has been favorable for the generation and preservation of hydrocarbons, principally gas. The petroleum-trapping capabilities of these strata have been enhanced because of their association with normal faults.

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Bellerophontaceans from Hancock, Maryland—Gastropod (Torted) or Monoplacophoran (Untorted)?

Mollusk specimens from the Briery Gap Sandstone Member of the Foreknobs Formation in Hancock, Maryland, were previously assigned to the gastropod genus *Bellerophon*. In recent years, the controversy of whether *Bellerophon* belongs to the molluscan class of torted gastropod or that of untorted monoplacophoran has resurfaced. Because of the need for better understanding of molluscan evolutionary history, resolving this controversy is very important for an interpretation of fossil phylogenies as a whole, thus increasing the effectiveness of fossils as biostratigraphic tools.

In determining whether or not these animals were torted or untorted, past emphasis on muscle scar patterns has been proven inadequate due to the lack of specimens exhibiting suitable scars. The emphasis is presently being directed toward other aspects of shell morphology, such as apertural slits and secondary shell layers known as "inductura." The position of the inductura relative to the slit is significant and implies that the animal is oriented in a particular fashion within its shell. This position, in turn, helps to determine whether the animal was torted or not and hence whether it is a gastropod or a monoplacophoran.

Because original shell material was absent, recreating the shell was necessary in evaluating the morphology. This was achieved by replicating the shell using liquid latex. The pouring, hardening, and extraction of latex from external molds yielded replicas exhibiting detailed shell features. Observed was the location of the lateral inductural deposits opposite the apertural slit, implying that the animal's coiled shell was carried over its extended foot as a result of torsion, and therefore the animal belongs to the class Gastropoda.

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Thermal Maturity of Carboniferous Strata, Ouachita Thrust Fault Belt

The Ouachita thrust fault belt, a large, relatively untested hydrocarbon province, contains more than 30,000 ft (9,100 m) of Carboniferous flysch rich in potential source and reservoir rocks. To estimate the thermal maturity of these strata, vitrinite reflectance (in oil) was measured from more than 90 bulk samples of the Carboniferous-age Stanley, Jackfork, Johns Valley, and Atoka Formations. Inasmuch as no subsurface samples were available, the freshest possible outcrop samples were used for the analysis, despite the possible deleterious effects of oxidation on the accuracy of measured reflectance values.

Iso-reflectance contours generally trend parallel to structural grain in the western two-thirds of the Ouachitas. The "core" areas where pre-Carboniferous strata are exposed, as well as areas immediately adjacent to the core, are well defined by reflectance values greater than 2.0%. Outward from the core areas toward the north and south, reflectance values tend to decrease, although some minor variations owing to complex structure are present. In Arkansas, samples from the thrust-fault belts both north and south of the Benton uplift yield reflectance values between 1.0 and 2.0%. In Oklahoma, samples from the area north of the Broken Bow uplift yield reflectance values between 0.5 and 1.0%.

In the eastern third of the Ouachitas, iso-reflectance contours obliquely cut structural grain, and reflectance values are significantly higher. Samples from the Benton uplift give reflectance values higher than 3.0%, and measured values approach 5.0% from samples in and near the core. Although there is a general decrease outward from the core area to both the north and south, reflectance values greater than 2.0% characterize the entire width of the Ouachitas in this eastern area.

Reflectance values obtained from samples collected from both sides of major thrust faults in the western Ouachitas reveal that older, upthrown strata are more thermally mature than younger, downthrown strata. In contrast, samples collected from analogous structural positions in the eastern Ouachitas display identical thermal maturities on both upthrown and downthrown sides of thrust faults.

In the western two-thirds of the Ouachitas, stratigraphic depth of burial appears to have been the primary factor that controlled thermal maturity. The Carboniferous strata at the surface in this area are well within the window of oil and gas generation and preservation. The anomalously high thermal maturity of Carboniferous strata in the eastern third of the Ouachitas is probably the result of heat dissipated from Mesozoic rifting and intrusive events. This thermal overprint places the maturity of these strata beyond the limits of oil preservation and locally beyond the limits of wet gas preservation.

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Eustatic Control of Synchronous Stratigraphic Development: A Case for Facies Prediction in Basin Modeling

Field studies document an apparent eustatic control on facies patterns in isolated basins along a tectonically active margin. In the San Diego embayment and along northern Baja California, progradational-retrogradational shoreline sequences characterize Late Cretaceous and Eocene fore-arc basin-margin stratigraphy. Extensive paleontologic control helps establish the age and distribution of facies changes along these depositionally compact, steep-gradient margins. The observed depositional sequences may be stratigraphically arranged into three scales and patterns of sedimentary cycles. Timing of the two largest cycles provides relative sea level curves that correlate exceptionally well with worldwide sea level curves of Vail and others.

The major depositional cycle is asymmetric—a "hemicycle" hundreds of meters thick, characterized by a thin, basal retrogradational sequence overlain by a thick progradational sequence—and corresponds to eustatic supercycles. Depositional hemicycles are composed of smaller scale rhythmic successions controlled by sea level cycles and paracycles. Depositional pulses produced by local conditions, in turn, overprint these two larger scales of sedi-