THE APPALACHIAN-OUACHITA OROGEN, SOUTHEASTERN NORTH AMERICA

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The late Paleozoic Appalachian-Ouachita orogenic belt is exposed in the Appalachian and Ouachita Mountains, but large parts are covered by post-orogenic strata of the Gulf Coastal Plain. Large, sinuous curves of the orogenic belt (Alabama recess, Ouachita salient) mimic the shape of a late Precambrian-Cambrian rifted margin, along which the Alabama promontory and Ouachita embayment were framed by northeast-striking rift segments offset by a northwest-striking transform fault. Stratigraphy of the Appalachian-Ouachita foreland, as well as the Appalachian thrust belt in the Alabama recess, includes a Cambrian to Lower Mississippian shallow-marine, passive margin shelf succession and an Upper Mississippian and Pennsylvanian shallow-marine to deltaic, synorogenic clastic wedge derived from the Ouachita orogen. The Appalachian thrust belt consists of large-scale internally coherent thrust sheets, the structural style of which is controlled by a thick unit of Cambrian-Ordovician carbonate rocks of the passive-margin succession. In contrast, the Ouachita thrust belt consists of deep-water facies that record a Cambrian to Early Mississippian passive margin and a Late Mississippian to Pennsylvanian arc-continent collision orogen. Internally complex thrust sheets and disharmonic structures in the Ouachitas contrast with Appalachian structures, reflecting the lack of a stiff layer like that in the Appalachians. A north-to-south profile of the Ouachita orogen includes (1) a peripheral foreland basin, the southern part of which is deformed by north-directed thrust faults; (2) a subduction complex, including a forearc ridge; (3) a thrust-imbricated forearc basin, which has a late orogenic to post-orogenic fill of Desmoinesian to Permian age; and (4) remnants of an arc. Diachronous arc-continent collision began on the east in the Middle Mississippian and progressed westward to close a remnant ocean basin in the Ouachita embayment by Desmoinesian time. The subduction complex was emplaced over autochthonous passive-margin cover on North American continental crust. Northwest-directed Appalachian thrusting post-dated Ouachita thrusting, dismembered the southeastern part of the Ouachita foreland basin, and overrode the eastern part of the Ouachita thrust belt. A northwest-to-southeast profile of the Appalachian orogen includes (1) thrust-imbricated, passive-margin shelf facies and synorogenic clastic rocks of the Ouachita foreland basin; (2) accreted metamorphic terranes that tetonically replaced the passive-margin cover strata on North American continental crust; and (3) African crust and cover accreted to North America.