

A PALYNOLOGICAL RESOLUTION TO THE "TUSCALOOSA PROBLEM" IN THE SOUTHEASTERN U.S.

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Stratigraphic relationships within Cretaceous fluvial units in the Southeastern U.S., collectively referred to as the Tuscaloosa Group prior to the 1960's, have been difficult to establish as a result of three interacting factors: 1) the paucity of fossil data minimizes the ability to constrain the age of the units and provide tie points for correlation; 2) the nonmarine origin of the units has led to placement of fluvial Upper Coastal Plain deposits of any age within the group; and 3) facies changes between central Georgia and Upper Coastal Plain units to the west severely limits the usefulness of lithostratigraphic correlations.

Palynological assemblage zones recognized within the type localities of the Tuscaloosa Group and the overlying McShan and Eutaw Formations in western Alabama provide a basis for determining the geographic extent of the "type" Tuscaloosa units, and they offer insights into problems of miscorrelation with other formations. The palynological units recognized include three published zones (informally referred to as zones IV, VA, and VC) and one unpublished but palynologically distinctive interval that occupies a stratigraphic position between zones IV and V (referred to as pre V-post IV).

In western Alabama, the type Tuscaloosa strata are represented by the Coker and Gordo Formations. The nonmarine deltaic to fluvial Coker Formation (the lower part of the Tuscaloosa Group) contains pollen of zone IV, which is considered late Cenomanian in age. The overlying nonmarine fluvial Gordo Formation (the upper part of the Tuscaloosa Group) contains pollen assemblages representative of the pre IV-post V interval, which is tentatively assigned a Turonian age. Zone VA (Coniacian) assemblages occur within the near shore McShan Formation, and zone VC (middle to late Santonian) assemblages occur within the shelfal marine Eutaw Formation, which unconformably overlies the McShan.

In eastern Alabama and westernmost Georgia, age equivalents of the pre V-post IV Gordo Formation (upper Tuscaloosa Group) are absent, and a fluvial facies of the McShan Formation (zone VA) unconformably overlies a fluvial facies of the Coker Formation (lower Tuscaloosa Group; zone IV). The Eutaw Formation (zone VC) maintains its marine character into westernmost Georgia, and provides the most consistent lithostratigraphic control between western Alabama and western Georgia.

In central Georgia and the Carolinas, age equivalents of the McShan and Eutaw Formations are represented by sediments of fluvial origin, as are many of the overlying Upper Cretaceous and Lower Tertiary units. Palynological studies of these units indicate that sediments of zone IV age as well as the pre V-post IV interval (i.e., the entire Tuscaloosa Group of western Alabama) are absent in outcrop in Georgia and the Carolinas, except for limited exposures of zone IV in the Chattahoochee River valley in westernmost Georgia. North and east of the Chattahoochee River, sediments assigned to zone V unconformably overlie crystalline basement rocks and form the basal Cretaceous units of the Upper Coastal Plain. In this area, zone VA has been observed in the Cape Fear Formation, and zone VC in the overlying Middendorf Formation. These assemblages suggest that the Cape Fear Formation represents a fluvial facies of the near shore McShan Formation of western Alabama, and the Middendorf Formation is a nonmarine equivalent of the marine Eutaw Formation of Alabama and westernmost Georgia. The regional unconformity that separates the McShan and Eutaw Formations to the west continues throughout Georgia and the Carolinas, and equates with pollen zone VB (early Santonian?), which has not been observed in the southern Atlantic or eastern Gulf Coastal Plains.

These studies illustrate the utility of palynology in resolving stratigraphic and facies relationships among marine and nonmarine units. When integrated with zonations and age assignments based on other fossil groups, palynology also provides a framework for establishing regional lithostratigraphic and allostratigraphic correlations for basin analysis.