

## **Alabama Physiographic Provinces – Part 1**

### **Physical Geography: The Geological Basis for Alabama's Landscape Regions**

Geographers and Geologists divide the land into different regions based on key physical characteristics such as topography, the drainage patterns of streams, dominant vegetation types, soils, and other features of the natural environment. In a sense it is geology, or the region's predominant rock types, their physical properties, and their surface distribution that is responsible for many, if not all, of these regional landscape distinctions.

Alabama can be subdivided into at least six physiographic provinces-geographical regions with a distinctive set of physical features. Geographers apply several systems to define landscape regions, some simple and others more complex. We will use a simple, geology-based system that takes into account the type and age of local rocks, in addition to the general surface features of the land. Using this system Alabama can be subdivided into seven physiographic provinces, each of which can be further subdivided into sub regions. The dominant vegetation of any area is closely tied to the physical characteristics of the environment such as soil types and climate. A region's soils result from the types of rocks that underlie the area, which along with local climate affects how the area's rocks weather into soils.

Geology not only controls an area's landscape and topography, but in doing so determines the route that rivers and streams follow as they make their way to the sea. Stream drainage systems develop over time based on the differences in durability, or resistance to erosion of surface rocks. The surface distribution of hard and soft rocks across Alabama has controlled how the state's watersheds have evolved through time. Stream position, size, and gradient, or slope, are all determined by how the land has been shaped by erosion.

Several of Alabama's rivers are guided through valleys carved into softer, more soluble rocks such as limestone and dolostone. At some point the Tennessee, Coosa, and Cahaba Rivers all follow routes where limestone-type rocks have eroded away over time.

Perhaps the most important of all geological as well as geographical boundaries in Alabama is the Fall Line. The Fall Line represents the approximate point where streams leave the upland valleys bounded by older, more resistant rocks in the northern part of the state to begin a more gentle, winding path across a broader and more level flood plain. With less energy of flow below the Fall Line rivers begin to drop some of their load of sediment carried down from the eroding uplands. This loss of sediment

due to gravity over time has created the fertile river “bottomlands” that have been so important to Alabama’s agricultural economy since the earliest days of settlement.

The Fall Line has a special geological significance in that it marks the approximate point where ancient continental rocks are overlapped by much younger sedimentary strata deposited along the northern edge of the Gulf of Mexico during more recent times. The age difference between rocks on either side of the Fall Line is enormous—well over two hundred million years!

## **The Piedmont Province**

Each part of Alabama has been shaped by the geology beneath it. The area of the state with the oldest surface rocks is a region known as the Piedmont, a term which in French means “foot of the mountains.” Many of the rocks in this east-central part of the state are crystalline rocks—igneous and metamorphic types that contain larger crystals that form at great depths and under higher temperatures. The rocks beneath this region have been so highly altered that they are much more difficult to use as a source of information on geologic history. However, the Piedmont’s rocks do contain a wealth of clues related to one extremely significant event in the state’s geologic history—the building of the great Appalachian mountain chain.

The Piedmont’s rocks contain information on not one, but several ancient mountain-building events that took place in this part of Alabama through time. Some minerals in Piedmont rocks can be radiometrically dated to the time when they were altered or recrystallized, thereby providing a time frame for the mountain-building events that have shaped the eastern margin of North America. Geologists studying Alabama’s Piedmont rocks have uncovered many unexpected facts about how the southern section of the continent has evolved and changed over the last billion years.

The Piedmont is home to the highest mountains in the state, with Cheaha Mountain at 2,407 feet the State’s highest point. However, the properties of certain minerals found in Piedmont rocks suggest that these mountains were far more spectacular in the distant past than they are today. Some geologists believe that this southern stretch of the Appalachians might have rivaled the Himalayas of southern Asia in size when they were at their peak. Alabama’s Piedmont today displays only the bare roots of this once-great Appalachian mountain range uplifted by geologic forces long before the first dinosaurs walked the Earth.

Many of the Piedmont’s metamorphic rocks were formed from sedimentary rocks that were squeezed and “cooked” during the Appalachian mountain-building episodes. Geologists use the term metasedimentary rocks to distinguish these types from altered igneous and metamorphic rocks with which they might be confused. Slate, one of the most common metasedimentary rocks of the Piedmont, is formed through metamorphism of shale-type rocks. If slate becomes even more highly altered it may

become phyllite or mica schist. Sandstone may become metamorphosed into a dense, very durable rock known as quartzite, and conglomerate may be altered into a rock known as metaconglomerate. Limestone and dolostone are transformed through metamorphism into marble. Marble from Alabama's Piedmont has been used as decorative stone throughout the United States, including in the nation's capitol. Because of its natural beauty and economic value marble has been designated as the official "state rock" of Alabama by the State Legislature.

There have been surprising discoveries made from the study of Piedmont rocks over the last few years about how the land of Alabama developed to reach its present form. Perhaps the strangest of these discoveries is that this part of the state is composed of several distinctly different pieces of the Earth's crust. These fragments, known as terranes, were shoved here from many miles away by immense geological forces long ago. Several of these terranes did not even begin as part of North America. Most of the rest of Alabama has been "built" through the vertical deposition of new sedimentary layers, but here the land was formed largely by lateral accretion, the addition of pre-existing fragments of crust onto the edge of the continent.

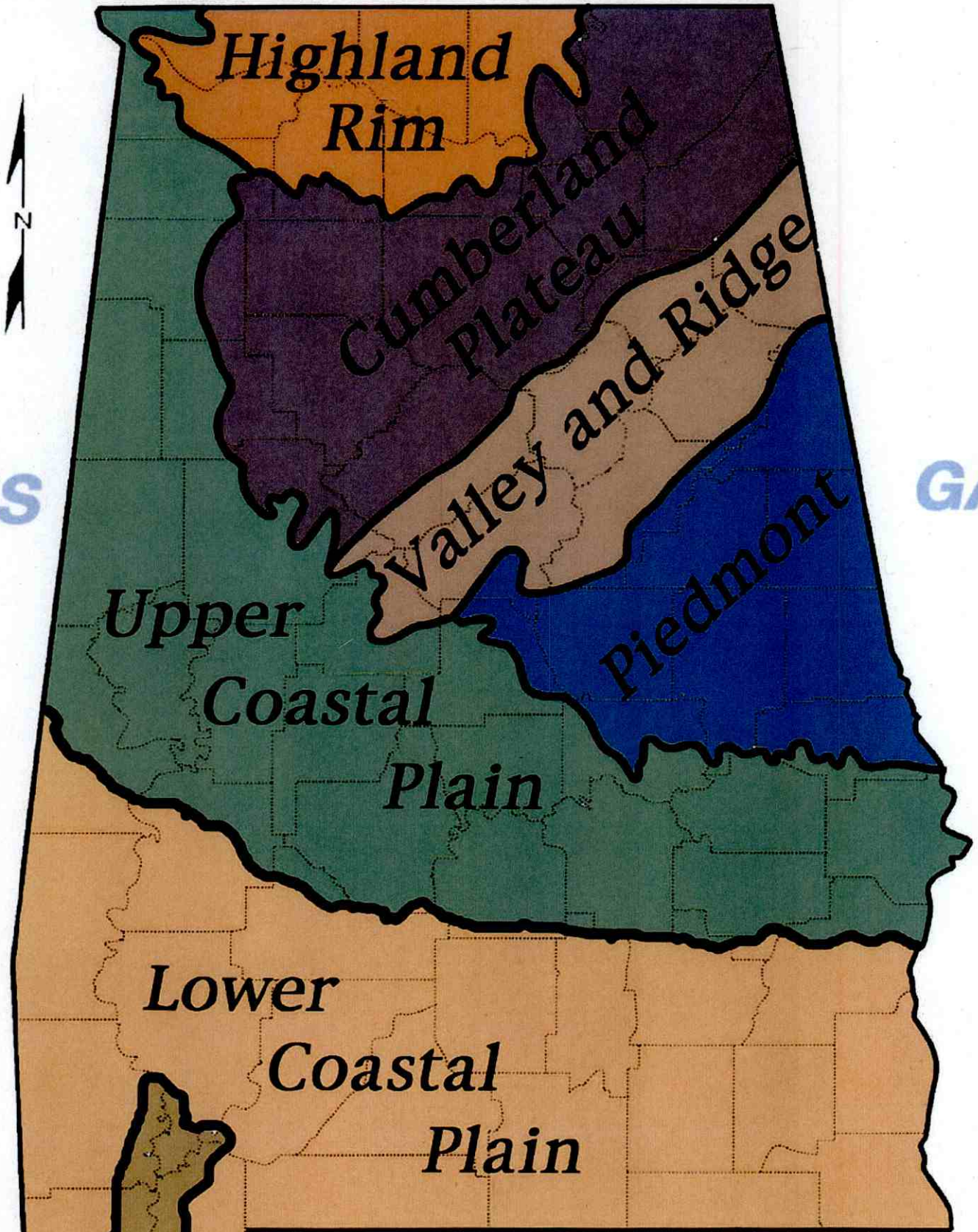
These huge bodies of out-of-place rock were first identified through the use of a special geological technique known as seismic profiling. Sound waves sent into the crust shows that the land is composed of a series of dissimilar crustal fragments wedged onto and over North American rocks. The boundaries between these terranes extends many miles beneath the surface. Because of deep surface weathering taking place over many millions of years, when traveling across the Piedmont the only visible sign of passing from one of these terranes onto another one might be to notice a slight difference in the color of the exposed soil seen in plowed fields and highway cuts.

During Alabama's early period of industrial development the Piedmont was the center of the state's booming textile industry. Where streams crossed outcrops of the region's resistant rocks the energy of the falling water provided the power to drive factory looms and spindles. Thriving mill towns developed at these locations, and many of these manufacturing communities prospered well into the middle part of the 20<sup>th</sup> century, when overseas competition with lower labor costs drove most of the textile factories out of business. Today the ghostly remains of abandoned textile mills can still be seen at Fall Line towns such as Tallassee and Phenix City.

(Note: See following page for pictorial representation of Alabama's Major Landscape Regions.)

**Source:** Reprinted with permission from educator and club member, Elliott A. Whitton, who researched and prepared (July 2013) this condensed version of material presented in Jim Lacefield's publication, Lost Worlds in Alabama Rocks.

**Editor's Note:** This article has been divided into three parts due to limited newsletter space. This is Part 1. Parts 2 and 3 will be printed in the October 2013 and November 2013 newsletters, respectively.



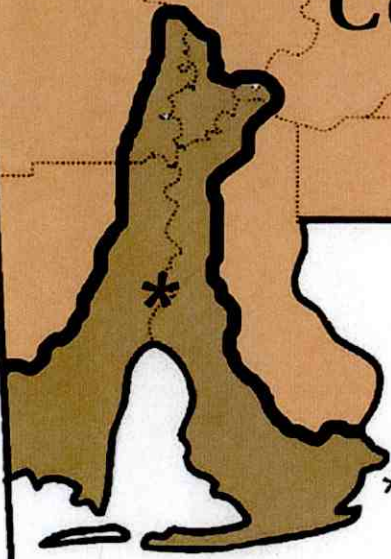
MS

GA

Upper  
Coastal  
Plain

Piedmont

Lower  
Coastal  
Plain



\* delta and coastal area

## Major Landscape Regions

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