

# THE GEOLOGY OF THE PROPOSED GREAT SMOKY MOUNTAINS NATIONAL PARK

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The rocks of the region embraced within the proposed park are of very varied character and age. They include limestones, shales, slates, sandstones, quartzites, conglomerates, gneisses, schists, and perhaps some granites along their eastern border in North Carolina.

The youngest of them belong to the Mississippian, and yet are many million years in age. From these younger ones they range back through the Devonian, Silurian, Ordovician, and Cambrian to the Archean. The latter are many, many million years old—so old, in fact, that they are probably among the earliest formed rocks on the globe, and have had their age estimated at some hundreds of millions of years.

Along the northwestern edge of the park, just west of the Chilhowee Mountains, there is a long, narrow area of Newman limestone, of Mississippian age, extending through Montvale Springs. Like so many of the rocks of the region it has been crushed and folded and forms a very narrow trough with steeply pitching sides.

On either side of it is a belt of greenish to bluish-gray sandy Grainger shale and some black Chattanooga shale of Devonian age.

North of Little River there are some Silurian and Ordovician rocks along the west base of the Chilhowee Mountains, while in Miller, Cade, Tuckaleechee, and West Coves there are large areas of Knox dolomite of Cambrian and Ordovician age. This dolomite is less resistant to erosion—and especially to solution—than any of the surrounding rocks so that after long ages of weathering it forms depressed areas, known as coves. These coves have a much better soil than the rougher areas about them and contain the best farms of the region, in fact, they constitute almost the only good farming lands within the proposed park. The only other lands to be classed with them in this respect are the narrow flood plains found along some of the larger streams.

In the Chilhowee Mountains there is a complex assemblage of Cambrian shales, sandstones, slates and conglomerates. These have resisted erosion more than the previously described and stand up today as a rough mountain ridge.

The rocks east of Chilhowee Mountains, surrounding the coves above mentioned and extending to the crest of the Great Smokies

and beyond into North Carolina, have suffered more from mountain-building forces than any of the above, and are so highly metamorphosed that while the age of some of them is almost certainly Cambrian, the age of others is unknown. They may be Cambrian or may be older or younger.

They consist mostly of slates, quartzites and conglomerates that have been much crushed and folded. In this process any fossils that may have originally been contained in them have been destroyed so that their age is uncertain. Most of them were included by Safford in his Ocoee group and they have been considered by various geologists to belong all the way from Archean to Carboniferous.

The Ocoee rocks are now subdivided into a number of formations, one of which includes a great body of slates that in places are probably of commercial quality. Most of them are coarser, however, and consist of sandstones, or sandy shales, and conglomerates.

The conglomerates are especially resistant to erosion and form most of the great mountain mass along the North Carolina state line that has been so deeply carved by stream erosion that it gives the region its peculiar wild beauty and charm and makes it fitting for a national park. The steep, gorge-like headwater part of the Little River and Little Pigeon River on the west or northwest and of the many tributaries on the north side of Tuckaseegee and Little Tennessee rivers on the east or southeast side of the park has been carved out of these highly resistant silicious rocks.

Since erosion has been slow and slopes are generally steep, we find that the surfaces are rough and have poor, thin soils that are ill suited for clearing or farming. They are most useful when kept in forested condition. If cleared, the steep slopes soon erode to the bare rocks and great areas may fast become worthless. The eroded material sweeps down into the larger streams to fill their channels and increase the height, frequency and destructiveness of floods.

On the high crests along the State line, weathering has here and there produced great gently rounded ridges or domes that have accumulated a fairly good soil cover and that are practically, or quite, bare of trees. They are grass-covered and form attractive park-like areas known as balds.

As one goes eastward into the North Carolina part of the park, the rocks become more highly metamorphosed, as a rule, and schists and gneisses appear. The schists are often interbedded with the conglomerates and weather slowly and resist erosion much like them and make soils, that while they may be some deeper, are equally as poor and ill-suited to farming.

The gneisses are of several kinds. They are, perhaps, partly of sedimentary and partly of igneous origin. Some are closely

similar to granites in general appearance and mineralogical composition. Deep weathering has, in most places, rotted or decomposed these rocks until they are more rounded in outline and have a heavier mantle of disintegrated rock and a deeper soil cover. Their outlines are somewhat more rounded and along Tuckasegee River there are areas along the edge of the park of fairly good mountain farming lands.

Included in the gneisses are here and there areas of ancient igneous rocks that have been forced up into the overlying gneissose rocks, which may have themselves also been originally igneous. The metamorphism has been so intense that much of the original character of these rocks has been lost. We know that they are very, very old and group them together under the term Archean, the age that includes the oldest known rocks.

In the younger of the rocks in the park there are few minerals of economic importance, so far as known, and no known large deposits of ores. The slate above mentioned is probably the most valuable material among these younger rocks.

In the older rocks, on the North Carolina side of the park, there have been found small deposits of copper and a few other metals, but again there are probably no large deposits of such materials. There may be some clays and possibly some other non-metallic minerals, but the mineral wealth of the region to be included is probably not great and making a park of the area will probably not interfere with or prevent any important development of economic mineral resources.

The geology is such as to fit the country best for preservation for its scenic beauty in a great national park.



MOUNTAIN FLOWERS IN BLOOM AT RAINBOW FALLS, MILL CREEK  
TRAIL TO MT. LECONTE.