

ing material and subsequently fell to the floor of the cave. Some of these blocks were removed later by erosion.

Weathering of some of the minerals has stained many of the rocks shades of red, brown, and various other colors—making some beautiful abstract patterns. Weathering and erosion along bedding planes also has intensified the stratification. In many places a series of steps has formed along individual strata, making for an easy climb toward the top of the bluff. The top of the bluff is a wooded area with many large boulders and, at the edge of the large slump blocks, a spectacular view of the valley to the southeast.

Origin of Rocks

Rocks are classified as sedimentary (formed from the accumulation of sediments, either above or below sea level), igneous (formed from the cooling and solidification of molten material), or metamorphic (formed by alterations in the solid state of pre-existing rock in response to changes in heat and (or) pressure below the zones of weathering or cementation). In Oklahoma, almost 99 percent of the outcropping rocks are sedimentary in origin; the rest are mainly igneous rocks in the Wichita and Arbuckle Mountains, with a small area of mildly metamorphosed rocks in the Ouachita Mountains southeast of Robbers Cave State Park.

At various times in the geologic past, parts of continents were flooded by shallow inland seas. Rivers flowing into these seas transported sand, silt, and dissolved mineral matter, which waves and currents then spread out in layers that are called strata or beds. Rocks formed in this manner from sediments are sedimentary rocks, and their most characteristic feature is the stratification. The tops and bottoms of strata are bedding planes. As originally deposited, the strata are essentially horizontal, and the first one deposited is at the bottom and is the oldest. Successive overlying strata are younger than the ones below. A unit of rock of the same rock type is called a formation, and within a formation there may be several strata. Formations are generally named for localities where they were first studied and described.

Sedimentary rocks are classified on the basis of texture (size of the mineral grains) and (or) mineral composition and are either clastic or nonclastic rocks. Clastic rocks consist of fragments derived from preexisting rocks that were broken down by

weathering and subsequently transported and deposited in another environment. A sandstone is a sedimentary deposit composed of sand-sized (1/16 to 2 mm) quartz grains that have been lithified (made into a rock) by cementation of a secondary mineral (commonly calcite, chemical composition calcium carbonate or CaCO_3). Siltstone is a cemented sedimentary deposit composed of silt-sized (1/256 to 1/16 mm) quartz grains, and it generally contains impurities of clay minerals. Shale is a laminated sedimentary deposit containing clay-sized particles (less than 1/256 mm) that have been lithified, or changed to rock, most commonly by compaction. The sandstones and shales of Latimer County are primarily buff and brown colored because the mineral grains are coated with a thin covering of iron oxide; however, some rocks are gray because of a coating of organic matter.

Nonclastic sedimentary rocks form when dissolved mineral matter is precipitated on the sea floor. Limestone, composed of the mineral calcite, is the most abundant nonclastic sedimentary rock. Limestone is still being formed—in places such as in the seas around the Bahama Islands—by both physiochemical precipitation (direct precipitation from sea water) and biochemical precipitation (removal by marine organisms of dissolved mineral matter from sea water). Limestone formed in this manner can later be broken down by weathering and (or) erosion, then transported by rivers back to the sea, where it is redeposited by waves and currents. Since the material has been broken up and transported from its place of origin, it becomes a clastic limestone. When the loss of water by evaporation from the sea is greater than the amount of water brought to it by rivers, the dissolved mineral matter is precipitated on the sea floor. These deposits are called evaporites, and include gypsum and salt (the mineral halite). Although there are no evaporites in Latimer County, they are abundant in western Oklahoma. In fact, Alabaster Caverns State Park in Woodward County has a cave that is formed in gypsum. In Latimer County, only one thin limestone is in the Robbers Cave area, although a thick limestone bed forms a ridge south of Wilburton.

Coal is another type of sedimentary rock in Latimer County. It consists of compressed carbonaceous matter derived from the partial decomposition of plant life. Plant remains accumulated in swampy waters and were partially preserved in the stagnant waters of large fresh-water swamps. Subsequent burial by more sediments resulted in increased pressure and a rise in temperature that caused the organic plant remains to be transformed into bituminous coal. Coal beds in the park area are thin and low in