DESCRIPTION OF THE BRICEVILLE QUADRANGLE.

GEOGRAPHY.

An account of the physical features of the Appalachian province and of the strata of the Briceville quadrangle.

General relations.—The Briceville quadrangle lies entirely in Tennessee, and is limited between the parallels 36° 20' and 36° 30' and the meridians 85° and 85° 30', and it contains 1,076 square miles, divided between Knox, Morgan, Anderson, Campbell, Greene, and Scott counties.

In its geologic and geologic relations this quadrangle forms a part of the Appalachian province, which extends from the Atlantic coastal plain northward through the Mississippian lowlands on the west, and from central Alabama to southern New York. All parts of the region thus defined have a common history, recorded in its rocks, its geologic structure, and its topographic features. Only a part of this history can be read from an area so small as a single quadrangle; hence it is necessary to consider the individual quadrangle in its relation to the entire province.

Subdivisions of the Appalachian province.
The Appalachian province may be subdivided into three well-defined divisions, each of which is composed of a series of three through each of which certain forces have produced similar results in sedimentation, in geologic structure, and in topography. These divisions extend the entire length of the province, from northeast to southwest.

1. The eastern division of the province embraces the Cumberland Valley of Tennessee, Kentucky, and Virginia, and the Ohio River, which forms the main stream flowing eastward to the sea, and is marked by a low, flat, broad surface of low ground. Such are all the formations which form the Coosa Valley of Georgia and Alabama and the Great Valley of Tennessee and Virginia. Throughout the central and northern portions the eastern side only is marked by great valleys—such as the Shenandoah, the New River, the Cumberland Valley of Maryland and Pennsylvania, and the Lebanon Valley of northeastern Pennsylvania—the western side forming a succession of ridges alternating with narrow valleys. This division varies in width from 40 to 135 miles. It is sharply outlined on the southeast by the Appala­chian Mountains and on the northwest by the Cumberland Plateau and the Allegheny Mountains. Its rocks are almost wholly sedimentary and in large measure calcareous. The strata, which must originally have been nearly horizontal, now intersect the surface at various angles and in narrow belts. The surface differs with the outcrop of different kinds of rocks, so sharp and narrow that valleys of great length follow the narrow belts of hard and soft rock. Owing to the large amount of calcareous matter the rocks form high or low ground. Calcium and magnesium, to a less extent bedrock, are the main river valleys, and the drainage of the division is therefore subject to decay by solution, which probably covered low, swampy shores. Soils and the record of sedimentation from early Cambrian through Carboniferous time.

2. The western division of the province embraces the Appalachian Mountains, a system which is made up of many minor ranges and which, under various local names and which, extends from southern New York to central Alabama. Some of its prominent parts are the South Mountain of Pennsylvania, the Blue Ridge and Catawba Mountains of Maryland and Virginia, the Great Smoky Mountains of Tennessee and North Carolina, and the Cumber­land Plateau, part of the Allegheny Mountains. The strata of this division are more or less crystal-like, bearing a more nearly horizontal, and its rocks form high or low ground. Calcium and magnesium, to a less extent bedrock, are the main river valleys, and the drainage of the division is therefore subject to decay by solution, which probably covered low, swampy shores. Soils and the record of sedimentation from early Cambrian through Carboniferous time.

3. The central division of the province embraces the Appalachian Valley, a region of low ground on which the rocks form high or low ground, starting from the valley of the Mississippi on the west, and from the valley of the Ohio on the east.
expanded and large areas of recently deposited sandstones were lifted above the sea, and silting up the first great cycle. Following this elevation came a second depression, during which the land was again worn down nearly to base level, affording conditions for the accumulation of the Devonian black shale. After this the Devonian shale were largely washed away, and the limestone was again worn down nearly to base level, affording conditions for the accumulation of the Carboniferous black shale. After this, the Devonian shale were largely washed away, and the limestone was again worn down nearly to base level, affording conditions for the accumulation of the Carboniferous black shale. After this, the Devonian shale were largely washed away, and the limestone was again worn down nearly to base level, affording conditions for the accumulation of the Carboniferous black shale. 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The structures of the Lee conglomerate and the lower sandstone are essentially similar. In other words, the conglomerate and the sandstone are nearly identical, except for the difference in grain size. The conglomerate is composed of pebbles, while the sandstone is made up of fine-grained particles. These two formations are separated by a thin layer of shale, which is known as the Bricemill shale.

The sandstone is divided into several formations, each of which is named after a particular locality. These formations are:

1. The lower sandstone formation, which is found in the lower part of the Lee conglomerate.
2. The middle sandstone formation, which is found in the middle part of the Lee conglomerate.
3. The upper sandstone formation, which is found in the upper part of the Lee conglomerate.

The lower sandstone formation is the thickest and is composed of massive sandstone, which is hard enough to cause ledges and small knobs. The middle sandstone formation is thinner and is composed of sandy shales and siltstones. The upper sandstone formation is the thinnest and is composed of fine-grained sandstone.

The sandstone beds in the Lee conglomerate are cross-bedded, with the cross-beds dipping to the southeast. This indicates that the Lee conglomerate was deposited in a shallow marine environment, with the cross-beds formed as waves from the southeast swept across the area.

The sandstone beds in the Lee conglomerate are also inclined, with the dips varying from 5 to 20 degrees. This indicates that the Lee conglomerate was deposited in a region of gentle slopes, with the cross-beds formed as waves from the southeast swept across the area.
northeastward, the basin of the plateau is slightly to the north, both of which features are quite folds and faults which appear have some features pressed in a northeast-southwest direction, as well as in the valley, but structures - beds on the southeast side of the folds; so that, there if anywhere. The fault passing through strata at a considerable angle, and its plane dips to the southwestern side of the anticline fault. The latter fault usually crosses the valley belt, only one limited area shows turned; in section D, running completely across the valley districts so far that the folds are almost universally overturned. The arch and Walden Ridge, occupying more than 8000 feet. The small sections given with the strata in this district illustrate the only open fold of the region are used for coking, steam, and household material. These are nearly coincident with the topographic and geologic tural areas. Two structural sections A and C illustrate the closed folds. Complete overturned folds appear in section G, near Coal Creek, and in section E. Associated with the anticlinal uplifts are the faults, fifteen in number. The broken arches from which they are formed are long and straight. They are situated on the northwestern side of the anticline; at that point the horizontal pressure is supreme, because it is there that the least able to resist it, and break the horizontal resistance. The Coal Creek and Pioneer lie on the northeastern side of the anticline, owing to the position of this anticline, its displacement is from 1 to 3 miles. The arch and corresponding basin north and south of Jacks bong are structures to demonstrate the formation of a fault from a dip, by the overturning and final breaking of the northern beds. The second structural section B of this district lies northwest of a line along Cunningham Moun tain and Walden Ridge, containing more than half of the quadrangle. In this section the rocks have somewhat been deformed by folds and faults, as in the valley, but have merely changed their attitudes by a very slight tilting toward the southeast. The slight tilt of Elk Creek contains several faults which are of the type of the Great Valley structur es rather than of the plateau structures. The sharp upward of the plateau rim is accentuated more closely with the valley structures. At a few other points the amount of tilting is noticeable. Along the troughs of the valleys and the streams, which less Washes Ridge and Logo Creek, located in the southern counties of the state, the former raising the strata 350 feet above adjoining regions. A third slight anticline passes along the southeast side of Scott County, in a northeast course. Besides these structures and a slight tendency along the main valleys to anticlinal dips of 2° to 3°, the strata of the plateau have been very little deformed. The latest form in which yielding to pressure is displayed in this region is vertical uplift or deposition of the pre-existing strata without any of such movements at various intervals during the deposition of the sediments, as at debut and end of the Upper Carboniferous, of the Knox dolomite, and following the deposition of the Newman limestones. After the period of great horizontal displacement, both the Upper Carboniferous and older strata took place again, and are recorded in our face forms. While the land stood at one point the western side, but it has since been tilted down nearly to a level surface, or peneplain. One such surface was developed over all of the valley district, and its more or less worn remnants are now seen in the ridges and hills, at elevations of 1500 to 1700 feet. Still later uplift has started from the valley district, and its more or less worn remnants are now seen in the area. This is similar to the diminution in thick ness of the coal bed in the same direction. Along the western edge of the basin, represented on the Wartburg sheet and appearing near Huntsville, the coal beds are thinner again and attain an average thickness of 4 feet. In the Cumberland Mountain Basin, where the Briscoe Sons of the formation, the greatest depth of coal appears, and seven seams occur of 15 inches or more. As shown in the structure sections, the rocks which include the coal beds are very nearly horizontal. Around the border of the basin slight folded are near the outcrop, while the steep decrease of the underlying Coal conglomeration, a feature which is well shown in the northward rise of the coal beds. The Wartburg and its immediate section C illustrate the folding of the anticline of this interval, its displacement is from 1 to 3 miles. The arch and Walden Ridge, occupying more than 8000 feet. 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