DESCRIPTION OF THE BUCKHANNON QUADRANGLE.

GEOGRAPHY.

An account of the physical features of the Appalachian province and the relations of those of the Buckhannon quadrangle.

General relations.—The Buckhannon quadrangle is bounded by the parallels 33° 30' and 34° north and the meridians of longitude 80° 30' and 80° 30' west. It embraces one-quarter of a square degree, which measures in this instance about 34 miles from north to south and about 27 miles from east to west. The region adjoining the north has not been surveyed. The quadrangles contiguous to the Buckhannon are the Beverly on the east, the Hintserville on the south, and the Sutton on the west. The Buckhannon includes large portions of Braxton, Webster, and Lewis counties and smaller parts of Barbour and Braxton counties, all in West Virginia.

In its geologic and geographic relations this district forms a part of the Appalachian province which extends from Virginia to New York. All parts of the region thus defined have a related history, recorded in the rocks, geologic structures, and topographic features. Only a small portion of this history can be recorded from an area so small as a single quadrangle; hence it is necessary to consider the individual quadrangles in its own right, as a unit.

Subdivisions of the Appalachian province.—The Appalachian province has three well-marked physiographic divisions, throughout each of which certain forces have produced similar results in sedimentation, in geologic structure, and in topography. The three divisions are termed: (1) the Allegheny ridges, (2) the Allegheny Monadnocks, and (3) the piedmont. The Allegheny ridges are the directions in which the topographic elements of the Appalachian province are related to each other; the Allegheny Monadnocks are the areas in which the surfaces of erosion are sharply defined; the piedmont is the area adjacent to the Allegheny ridges. Each division of the province shows one or more of these culminating points.

The Allegheny ridges are the highest and the northernmost portion of the division. The Allegheny monadnocks are the rounded areas of the surface formed by the Allegheny ridges. The piedmont is the area on which the Allegheny ridges are lying.

The streams began active erosion, because of their greater steepness, and the process of planing down to sea-level was again revived. At this time stabilities of the streams increased, and the concentration of land and sea was maintained only long enough to permit of the leveling of the soft shales of the Buckhannon for a further elevation. The steeper slopes of the Allegheny ridge were reduced to a flat plain, and the rocks of the older beds were reduced. The plain on the Buckhannon has an elevation of about 1400 feet. This land mass, therefore, consists of a series of the Allegheny ridges, each of which is separated by a series of the Allegheny monadnocks.

The streams flow northward, in the direction of the general tilting, have the steepest gradients, and are the most rapidly cutting. Not only have they eroded their beds to relatively greater depth, but they have cut the heads of the Allegheny ridges and monadnocks more rapidly and have moved the divides between the river basins farther toward the east. In some cases they have diverted the drainage of the adjoining river basins. Instances of this capture of drainage may be observed in the headwaters of Stone Coal Creek, west of Buckhannon. Glady Fork and Spruce Fork flow toward the Buckhannon River to a low, wide divide in the source of Brushy Fork, where they turn abruptly backward in a deep gorge and empty into the West Fork of Potomac River. The drainage of Buckhannon River on the east side of the divide has nearly cut down to its bed level of erosion, while that of the West Fork, on the west, is cutting rapidly and deeply into the soft shale and sandstone, and if conditions of erosion remain as they are at present, it is probable that this phenomenon will be repeated throughout the eastern United States.
being laid down. Thus some of the beds of limestone were formed in part from the shells of various sea animals, and the beds of coal are the remains of a luxuriant vegetation which probably covered extensive swamps.

These rocks afford a record of almost uninterrupted sedimentation from middle Devonian to late Carboniferous time. Their composition and appearance indicate at what strata remain of a luxuriant vegetation which probably covered extensive swamps. According to the adjacent land is shown by the character of the sediments derived from its wastes. Course sandstones and conglomerates, such as are found in the Coal Measure strata, are the products of wave erosion, and are produced by the breaking up of rocks by waves and by the action of currents. In some localities the sediments are laid down as a fine conglomerate of pebbles, while in others they are laid down as a fine sandstone or conglomerate. The presence of the Pocono is usually determined by the character of the sandstone fragments on the surface of the rock, and by the color of the rock. Where the sandstone is red, the color of the rock indicates the presence of iron. Where the sandstone is yellow, the color of the rock indicates the presence of silica. The Pocono sandstone is usually a gritty sandstone, but it also occurs as a conglomerate. The conglomerate is usually a coarse sandstone, but it also occurs as a conglomerate. The conglomerate is usually a coarse sandstone, but it also occurs as a conglomerate. The conglomerate is usually a coarse sandstone, but it also occurs as a conglomerate. The conglomerate is usually a coarse sandstone, but it also occurs as a conglomerate.

Jennings formation—This formation rests on the red sandstone and shale of the Canaan formation, and many small farms are found in the vicinity of Montville, and seems to increase in thickness southward to Elk Mountain. It contains probably less conglomerate, but the sandstone and conglomerate are the products of wave erosion. The shales become finer-grained and are usually grayish or yellowish in color, and project from the hills in cliffs or is exposed in the face of the rock formation. It is usually a hard, clean sand, light-gray or white in color, and contains beds of red and yellow sandstone. Where the sandstone is red, the color of the rock indicates the presence of iron. Where the sandstone is yellow, the color of the rock indicates the presence of silica. The sandstone is usually a gritty sandstone, but it also occurs as a conglomerate. The conglomerate is usually a coarse sandstone, but it also occurs as a conglomerate. The conglomerate is usually a coarse sandstone, but it also occurs as a conglomerate. The conglomerate is usually a coarse sandstone, but it also occurs as a conglomerate. The conglomerate is usually a coarse sandstone, but it also occurs as a conglomerate.

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at every point the highest portion of the anticlinal arch, and away from which the rocks dip on either side. The axis may be horizontal or inclined. Its development is usually called the "fold," and is usually but a few degrees. In addition to the folding, and as a result of the continued action of the forces which have produced it, the strata along certain lines have been broken by faults, and to some extent altered in their original composition. In the Great Valley the rocks have been steeply folded, bent into folds, broken by faults, and to some extent altered in their original composition. The mountain district east of the Great Valley, faults and folds are prominent features of the structure, but in the form of the rocks has been changed to a greater extent by the minute breaks of cleavage and by the growth of new minerals. In the valley region the strata dip at all angles, and frequently the sides of the fold are compressed and often closed, while the surface dips, and their horizontal dimensions being measured by miles, but they also occur on a very small, even a microscopic, scale.

**Structure of the Appalachian province.**—Each subdivision of the province is characterized by a distinctive type of structure. In the plateau region and westward the rocks are generally horizontal and retain their original composition. In the Great Valley the strata are greatly inclined, and in some places overturned, with the beds dipping at all angles, and frequently the sides of the fold are compressed and often closed, while the surface dips, and their horizontal dimensions being measured by miles, but they also occur on a very small, even a microscopic, scale.

The western limb of this anticline dips into the east end of Whitman Flats, near the border of the quadrangle. The rocks are not appreciable as they may be in future.

The Braxton formation covers an area of about 170 square miles and contains two workable coal seams. The lower, largely underlaid by a clay, locally containing a little coal, has been found 50 feet above the base of the formation. This coal is not constant in either thickness or quality, nor is it mined more extensively than any of these. Besides mines for private use, several are opened in the hills east of the river.

The Braxton formation is divided into three beds from top to bottom: the lowest, a sandy shale containing a little coal, has been found 50 feet above the base of the formation. This coal is not constant in either thickness or quality, nor is it mined more extensively than any of these.
are evenly bedded, may be easily worked, and will produce a fair grade of building stone. The color of the rock is usually buff or light-brown near the surface. The durability of this stone has not been tested. The white conglomerate, grit, and sandstone in the lower part of the Upshur and in the Pickens sandstones are almost pure quartz, usually very refractory, and could be worked only with much cost and difficulty.

Stone for road material is everywhere abundant. The limestone, when crushed and properly laid, cements firmly and makes durable roads. Clay.—Fire-clay, as in other coal regions, occurs associated with, usually beneath, many of the coal beds. This clay, however, is rarely exposed, and will require testing to determine its quality for the production of firebrick. Clay-shales occur in both the Upshur sandstone and the Braxton formation, but they are not developed.

Soils.—The soils of the Buckhannon quadrangle are for the most part the product of the decay and disintegration of the rocks which immediately underlie them, and are called residuary soils. The exceptions to this are the alluvial soils forming bottom lands along some of the rivers, and also soils found on the steepest slopes. As each different kind of rock yields a corresponding soil, the geological map showing the distribution of the various rocks can also be regarded as a soil map. The rocks exposed within the Buckhannon quadrangle are not much diversified, and consequently the soils of the different formations are often much alike. Disintegration of sandstone gives a sandy soil, while clay-shales yield a clay soil. Sandy clay soil results from the decay of rocks intermediate in character between the two. Siliceous cement is nearly insoluble, and rocks in which it is present, such as quartzite and some sandstones, are extremely durable and produce but scanty soil. Calcareous cement, on the other hand, is readily dissolved by water containing carbonic acid, and the particles which it held together in the rock crumble down and form a deep soil. In a limestone, as the calcarious material forms the greater part of the rock, the insoluble portions collect on the surface as a mantle of soil, varying in thickness with the character of the limestone, being generally quite thin where the latter is pure, but often quite thick where it contains much insoluble matter. Usually clay largely predominates in soils derived from limestones, but some limestones contain considerable sand. Besides the residuary soils, whose distribution corresponds in a general way with the coloring of the areal map, there occur also the alluvial and overwash soils, which are not indicated on the map. The alluvial soils are confined to bottom lands. The overwashed soils are found on steep slopes, where they have migrated from rocks lying at a higher level. Clay soils.—To this class belong the more productive soils of the district. Most of the clay soils contain more or less sand. The Greenbrier limestone yields a good clay soil, and, where surface conditions permit, affords good farming land. The Canaan formation produces a sandy clay soil, which is for the most part not available for agricultural purposes because it is exposed chiefly on steep hill-slopes. Portions of the Pugh and Pickens formations contain clay-shale beds of considerable thickness, which afford very good soils. Of the Coal Measures series the Braxton formation yields the best soil. It is a sandy clay soil, and is in part calcarious. It bears but little surface debris, and is productive. The region covered by the Braxton formation has been largely reclaimed, and even the small outlying patches are eagerly sought and cultivated.

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