GEOGRAPHY.

General relations.—The Stevenson sheet is bounded by the parallels of latitude 34° 30' and 35° north, and the meridians of longitude 87° 30' and 88° 30' west. It embraces, therefore, a quarter of a square degree of the earth's surface. Its dimensions are 8.55 miles from north to south and 8.5 miles from east to west, and it contains 90.5 square miles. The adjacent atlas sheets are: on the north, Stevenson; on the south, Fort Payne; and on the west, Sedona.

The tract contains portions of the counties of Franklin, Calhoun, Cherokee, and Catoctin. It is subdivided into six towns, each of which is illustrated in the accompanying maps, and includes the townships of Wartrace, Cherokee, and Dennison in Alabama; and Edgefield, South Carolina.

In its geographic and geologic relations this area forms a part of the Appalachian province, which extends from the Atlantic coastal plain on the east to the Mississippi 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 that covered by a single atlas sheet; hence it is necessary to consider the individual sheet in its relations to the entire province.

Subdivisions of the Appalachian province.—The Appalachian province may be subdivided into three well-marked physiographic divisions, each of which has certain features that have produced similar results in sedimentation, in geologic structure, and in topography. These divisions extend across the length of the province, from northeast to southwest.

The central division is the Appalachian Valley. It is the broadest and constitutes most of the three. In the southern part it coincides with the belt of folded rocks which forms the Coosa Valley of Georgia and Alabama, and the Great Valley of East Tennessee and Virginia. Throughout the central and northern portions the eastern side only is marked by great valleys—such as the Alabama and Coosa valleys of Virginia, the Cumberland Valley of Maryland and Pennsylvania, and the Pennsylvania Valley of northeastern Pennsylvania—the western side being a succession of ridges alternating with narrow valleys. This division varies in width from 40 to 125 miles. It is sharply outlined on the southeast by the Appalachian Mountains and on the northwest by the Cumberland Plateau and Allegheny Mountains. Its rocks are almost wholly sedimentary and in large masses of the floor, while below are shales and limestones, which are broken into smaller fragments by the north-central portion of the province, where the surface is more nearly horizontal than in the ridges above or below the valleys of great length follow the narrow belts of the surface. The western portion of the division has been nearly horizontal, now intersected by narrow valley sections, the latter being located upon the westernmost of the sharp folds which characterize the central or valley division of the province. The position and character of both plateaus and valleys are closely connected with the character of the underlying rocks and with the geologic structure, or the relation of the strata to the surface.

The northwestern portion of the area is occupied by the Cumberland Plateau. This has been deeply dissected by streams flowing into the Tennessee River, leaving a number of maxima or isolated remnants of the plateau, with a uniform altitude of about 1,000 feet. The central portion of the province is occupied by the Cumberland Mountains, which is the southwestward continuation of the Allegheny Mountains, and is the southwesternmost division of the Appalachian province. This is a plateau-like tableland, its surface is not so deeply cut by streams, and there are many large areas almost perfectly level, on which stands a few thin patches of forest. Its surface is not so low as to prevent it from forming a tableland escarpment. The rocks of this division are more or less crystalline, being either igneous rocks, such as granite and diabase, which form the plateau, or sedimentary rocks, remaining about the same through Pennsylvania and Maryland. The surface differs with the outcrop of different kinds of rock, so that sharp ridges and narrow valleys extend the entire length of the province, from east to west, and it contains 980.5 square miles. The province forms the Delaware, Susquehanna, and Ohio rivers. The position and character of both plateaus and valleys are closely connected with the character of the underlying rocks and with the geologic structure, or the relation of the strata to the surface.

The southeastern portion of the province is occupied by the Tennessee Valley. This is a lowland region, much more or less completely dissected, or, elsewhere, of its surface, which is dependent on the character of the strata to the surface.

Each division of the province shows one or more longitudinal valleys which cut across the mountain ridges and form streams flowing into the Tennessee River. These valleys are the result of long continued denudation of the surface, which has been produced by streams flowing into the Tennessee Valley. These streams have cut through the mountains in a series of sections, each of which has been produced by a stream of a similar kind, but of greater size, and which has succeeded it in the course of the stream. The streams which have cut these valleys have been produced by the action of the waters of the Tennessee River, which flowed into the Mississippi River through the Ohio and Mississippi rivers.

The streams tributary to the Tennessee River are divided into two classes: those which drain into the plateau on either side, forming a number of small sandstone basins, and those which flow into the Mississippi River, which are in general the most satisfactory for the support of a large population. These basins are divided into two classes: those which extend from east to west, and those which extend from north to south. The eastern basin is subdivided into two parts: one, which extends from east to west, and the other, which extends from north to south. The western basin is subdivided into two parts: one, which extends from east to west, and the other, which extends from north to south.

The streams which flow into the Mississippi River are divided into two classes: those which flow into the Mississippi River, and those which flow into the Ohio River. The streams which flow into the Mississippi River are divided into two classes: those which flow into the Mississippi River, and those which flow into the Ohio River. The streams which flow into the Ohio River are divided into two classes: those which flow into the Ohio River, and those which flow into the Mississippi River.
which consists of the carbonates of lime and magnesia, being massively bedded and somewhat crystalline magnesium limestones. These limestones, or more properly dolomites, contain a large amount of silica in the form of nodules and layers of chert or flint. Upon weathering, that part of the rock which consists of the carbonates of lime and magnesia is dissolved, leaving behind the insoluble chert imbedded in red clay. This residual material in the form of clays is known as clay marl. The dolomite itself is seldom seen in the stream, except along the borders in recent times.

The dolomite comes to the surface in a couple of narrow parallel strips which occupy the center of the plateau. From Lookout Mountain and Wilson's Ridge the beds are fairly continuous, forming an arch in the center of the plateau and extending in a westerly direction. The formation is more continuous for a considerable distance in contact with Carboniferous rocks along a fault, the intervening area corresponding to one of the three geographic formations being entirely concealed.

Carboniferous rocks:

Fort Payne chert.—This formation consists of a yellowish limestone, consisting of chlorite, a greenish or grayish color, and underlying the red fossil iron-ore which it usually contains. These rocks are often found forming a series of arches and troughs. In describing these folded strata the term syncline is applied to the downward-bending troughs and anticline to the upward-bending arches.

A cyclical line is running lengthwise of the eastern side of the plateaus, between the black and the red, which is the lowest part, toward which the rocks dip on either side. An anticline is a line which occupies a nearly horizontal layer of rocks, and to which the beds are not usually horizontal, but are inclined at various angles. When any particular stratum is inclined, the corresponding stratum on the opposite side is concealed by the faulting. In Lookout Mountain and Wilson's Ridge, the beds above or below it are cut out by a fault for some distance on the western side. This formation is of economic importance in the Kingsport area only as a starting point in prospecting for silver and copper. Such exploitation, however, is not invariably present, being represented in some districts by the underlying Chattanooga sandstone, which is not economically important. Since the rock is oxidized, and hence covered by a deep residual matter, and, when freshly broken, it emits a strong odor resembling that of petroleum.

The formation occurs in a narrow strip on each side of Lookout and Wills valleys and forms a syncline along the line of the Deephead Cove. In Browns Valley the outcrops of the formation are continuous on the eastern side, while the corresponding strip along the western side is concealed by the faulting. With the underlying Chattanooga and Rockwood shales the Fort Payne chert forms the base of the Carboniferous limestone above, with no abrupt transition, so that the line separating the two formations is somewhat arbitrary. The Fort Payne chert is readily distinguished from that of the Knox dolomite by the great number of fossils which it contains. The rock is jet-black, from an abundance of carbonaceous material, and, when freshly broken, it emits a strong odor resembling that of petroleum. On weathering, the insoluble cement remains as a porous chalk filled with water. It is of economic importance in the Kingsport area only as a starting point in prospecting for silver and copper. Such exploitation, however, is not invariably present, being represented in some districts by the underlying Chattanooga sandstone, which is not economically important. Since the rock is oxidized, and hence covered by a deep residual matter, and, when freshly broken, it emits a strong odor resembling that of petroleum.

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beads in folding. Along these planes of fracture the rocks moved to distances sometimes as great as 6 or 8 miles. A progressive increase in degree of deformation from northeast to southwest, resulting in different types in different parts of the area. In northern Pennsylvania, the strata are folded nearly parallel to the strike, but on the Virginia side the folds are more or less broken by faults, until, half way through Tennessee, nearly every fold is broken and the strata form a belt, which, with only here and there small or minor breaks, all dipping eastward. This condition holds nearly the same in Pennsylvania, but the faults become fewer in number and the horizontal displacement much greater, while the folds are more open.

In the Appalachian Mountains the structure is the same as that which marks the Great Valley; there are the eastward dips, the close folds, the thrust faults, etc. But in addition to these changes of form, which took place mainly by motion on the bedding planes, there had developed a series of minute breaks across the strata, producing a creas, or a tendency to split readily along these new planes. These planes of fractures, or faults, are often indistinguishable from one another. Rocks containing the most feldspar were most thoroughly altered, and those with most quartz were least altered. The strata dip at a low angle toward the south in Sand Mountain and will be easily traced through the Antler the gentlest dips on the western side. As the Appalachian folds. Also the eastern of the two anticlines the strata are broken by a fault, and the upper rocks have not been entirely removed by erosion, but remain arched across from side to side. On the southeastern side of the outcrop the rocks dip at low angles, from 8° to 12°, while on the northwestern side they are much more steeply inclined, being in some places vertical or overturned. Also upon the northwestern side of the Antler the strata are broken by a fault, and the younger rocks are thrust up across the broken edges of the younger. By reason of this fault the Knox dolomite comes in contact for a long distance with the Buckhorn limestone, and the intervening formations are entirely removed. This explains the absence of the western side of the Antler from the list of formations from the southeastern flank of the West of the Seagull fault the strata are almost perfectly horizontal, dipping eastward about 35° feet to the mile.

Between the broad synclines forming Band Lookout mountains are two overlapping anticlines, one of which is the Lookout anticline, the other the continuous. Along the eastern side of the strata the anticline is continuous on both sides of the valley and around the crone which it holds together in the rock. West of the Seagull fault the strata are almost perfectly horizontal, dipping eastward about 35° feet to the mile. It is not of sufficient thickness to make mining profitable.

The outcrop of the Rockwood shales, which carry the iron ore, occur in narrow stripes in the valleys parallel with the base of the escarpments. In the two antithetic valleys on the eastern side of the area the ore is continuous on both sides of the valley and around the crone which it holds together in the rock. West of the Seagull fault the strata are almost perfectly horizontal, dipping eastward about 35° feet to the mile. It is not of sufficient thickness to make mining profitable.

When derived in this way from the dissection of the underlying rock, soils are called erosional. If the rock is a sandstone or sandy shale the soil is sandy, and if it is a clay-shale or limestones the soil is clay. There are abrupt changes in the character of the rocks, sandstones and shales alternating with limestones, so there are abrupt transitions in the character of the soil, and soils differing widely in condition and agricultural qualities often occur side by side. Knowing the character of the soils derived from the underlying rock, the distribution of the soils may be roughly divided into three principal classes. The soil covered by the Stevenson atlas sheet, these upper coals are extensively worked. At Etowah two beds of coal are found within 100 feet above the top of the Lookout conglomerate, 8 miles from the point of the sheet, these upper coals are extensively worked. At Etowah two beds of coal are found within 100 feet above the top of the Lookout conglomerate, 8 miles from the point of the sheet, these upper coals are extensively worked.
Clay soils.—The many valleys and coves among
the mesas west of Brownsville Valley are underlain
by limestone, whose surface is covered by a
mantle of clay soil, composed of its imedible por­
tions. The soil is sometimes red, but more gener­
ally bluish-gray or black, especially where it
forms only a thin layer upon the rocks. The
steep limestone slopes of the mesas have a scanty
black clay soil, but support a dense growth of
red cedar. The soils covering the outliers of
Bangor and Chickamauga limestones in Brownsville
Wills, and Lookout valleys have a greater depth
and a brightened color. In the narrow valleys
along the base of the plateau scarps, there is
often a considerable admixture of sand with the
clay.

Cherty soils.—The soil derived from the Knox
conglomerate and Fort Payne chert consists of clay in
which the chert is imbedded. The proportion of
chert to clay is variable; in some places only
occasional fragments occur, while in others the
residual material is made up almost wholly of
chert. The soil is deep-seated where the clay
predominates, but becomes lighter with the increase
in amount of chert, and in extreme cases is light­
grey or white. Even where the proportion of
chert is very large this is a strong productive soil.
In Brownsville Valley the dolomite either originally
contained less chert than elsewhere or it has very
largely disintegrated, leaving a deep-seated clay,
locally called “mulatto soil.”

Alluvial soils.—These are confined principally
to the flood-plains or bottoms of the Tennessee
River, which are from half a mile to 1 miles
broad in Brownsville Valley. The soil is a rich, sandy
loam containing a considerable proportion of fine
mica scales, derived from the crystalline rocks far
to the eastward. Narrow strips of bottom-land
occur along the creeks emptying into the Tennes­
see River, but their alluvial soils have been trans­
ported only a short distance, and hence are an
admixture of the local sedentary soils, and gen­
erally contain a larger proportion of clay than
does the alluvium of the river.

CHARLES WILLARD HAYES,
Geologist.
July, 1895.