

14. Coal vein, Gart. No. 5 Mine, Clay county.

Figure 11 of plate I and figures 5, 11 and 12 of plate II are from sketches by Mr. E. M. Kindle, assistant on coal survey. With the exception of figures 1-4, 6-8, 10, 14, of plate I, and figures 13 and 14 of plate II, all the figures are in the scale of 1 inch=10 feet.

As it was the writer's purpose in this paper merely to call attention to one of many interesting geological features of the coal regions which appear to have escaped notice, no descriptions of individual faults are given here, as they will be included in the monograph on the coal of Indiana, in preparation.

NOTES ON THE GEOLOGY OF MAMMOTH CAVE. BY R. E. CALL.

A GEOLOGICAL SECTION ACROSS SOUTHERN INDIANA FROM HANOVER TO
VINCENNES. BY J. F. NEWSOM.

[Abstract.]

During the field season of 1896 a geological section was run through the center of the row of townships numbered 3 N. from Hanover on the Ohio River to Vincennes on the Wabash.

The profile was run by means of the vertical arc and aneroid barometer. The dips of strata and elevations as shown may be depended upon within the limits of these methods.

The geological formations and the topography crossed by this section are typical of almost the entire southern portion of Indiana.

The lowest rocks to be found in the section are the soft beds of the Cincinnati group along the Ohio River. These beds are about 250 feet thick in the region near Hanover.

Overlying the Cincinnati beds are the hard limestones of the Clinton, Niagara, and Corniferous. It is this combination of limestones overlying the soft Cincinnati beds that causes the bluffs along the Ohio River, and the waterfalls that are so common in that region.

THE EASTERN PLATEAU.

Overlying the limestones is the Devonian black shale. The region underlain by the limestones, and the easternmost edge of the Devonian black shale is a high gently rolling plateau, sloping very gently to the west. This may very properly be called the eastern plateau region of southern Indiana. The dip of the rocks is westward, and varies from 20 to 46 feet per mile.

The Devonian limestone (corniferous) passes beneath the drainage near the west line of township 3 north, 8 east.

The Devonian black shale outcrops over a strip of country some twelve miles wide and forms for the most part low hills and flat plains. Its thickness at Scottsburg is 120 feet.

THE EASTERN LOWLAND.

The Knobstone Group, with the Goniatile limestone overlies the Devonian black shale. The base of this group is easily eroded. These easily eroded strata, combined with the easily eroded black shale, have been largely worn away, leaving the low, comparatively level country to be found through southern Indiana, immediately east of the Knobs and hills of Floyd, Clarke, Washington, Scott, Jackson, Bartholomew, and Brown counties. This region may properly be called the eastern lowland.

From the eastern edge of the eastern plateau (800 feet above tide), to the center of the eastern lowland (570 feet above tide at Scottsburg) the country slopes gently to the west, the slope corresponding almost exactly with the dip of the rocks.

THE MIDDLE PLATEAU.

The top of the Knobstone group is made up of sandstones. These are overlain by the Lower Carboniferous limestones. These strata resist the action of the weather, and consequently are directly responsible for the "Knobs," which are not a range of hills, but the more or less abrupt eastward face of a gently westward dipping plateau, which may be styled the central plateau. This plateau has been deeply cut by its streams.

THE SINK-HOLE REGION.

Overlying the Knobstone group are the thick beds of Lower Carboniferous limestones, in which are found the caverns of southern Indiana. This limestone region is completely pitted with sink-holes, and practically the whole of its drainage is by underground channels. This region has a gradual westward slope. It is the sink-hole region of Indiana. There is a noticeable increase in the size of the sink-holes in going from east to west as the limestone beds become thicker.

THE WESTERN PLATEAU.

West of the sink-hole region formed by the limestones, is the very rugged region to be found immediately east of the Coal Measures. The hills of this region are capped by the Mansfield sandstone or Mill-stone grit, to which formation they are in large part due. The region in which the Mansfield sandstone is the controlling formation may be termed the western plateau. This plateau has been very much dissected by its streams.

THE WESTERN LOWLAND.

Overlying the Mansfield sandstone are the soft and easily eroded beds of the Coal Measures. These beds have been already worn down very near to their base level of erosion, if indeed they have ever been much above that level.

CONCLUSION.

(a.) In passing from east to west across southern Indiana, three prominent topographic features are crossed, and these features are the results of combinations of strata as follows: (1) the high eastward escarpment along the Ohio River caused by a thick series of easily-eroded calcareous shales overlain by thick and resisting limestones; (2) the high eastward facing escarpment with its outliers to the east, known as the "Knobs;" this escarpment is the result of a thick series of soft clay and sandy shales, protected by sandstones and resisting limestones. Along the line under discussion this escarpment is 28 miles west of the escarpment along the Ohio; (3) the high hills of Martin County, which are the result of a series of limestones and sandstones capped by more resisting sandstones and which do not rise as an escarpment from the east, but become

gradually higher, owing to the resisting nature of their lowest beds. The distance from the Knobstone escarpment to the highest hills capped with the Mansfield sandstone is about thirty miles.

(b.) The structure of each of these topographic features where crossed by the section is essentially the same in different stages of development; i. e., that of a dissected plateau, sloping gently to the west. In the eastern, or Devonian limestone plateau, in the region of the Ohio, dissection has scarcely begun, as none except the streams flowing directly into the Ohio have deep gorges, and these are only from one-half to one and a half miles long; in the middle, or Knobstone plateau, dissection has progressed much further than in the eastern one, while the western or Mansfield sandstone plateau has been completely dissected by its streams.

It is possible that this peculiarity in the amount of erosion that has taken place in these different plateaus is the result of the character and former upward extension of the overlying formations in each case.

(c.) The top of the eastern plateau where crossed by the section is 800 feet above the sea, that of the middle is 820 feet, and that of the western 880 feet above tide, while but a short distance to the north or south the topographic sheets show the elevations of these plateaus to correspond even more closely.

These closely corresponding elevations point strongly to the conclusion that the present topography of southern Indiana has developed from an old base-level. The present topography, however, might have been developed from a plain of deposition, or a combination of the two.

THE KNOBSTONE GROUP IN THE REGION OF NEW ALBANY. BY J. F. NEWSOM.

During the field season of 1897 the Indiana University Geological Survey undertook the delineation of the upper and lower limits of the Knobstone group, and working up of the general geology of that particular formation. Work was begun in the extreme southern part of the State. It is with only a few of the points of interest that were developed in that region that this paper deals.