

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.

HEIGHT AND CHARACTER OF KNOBS.

The knobs of the extreme southern part of Indiana do not form a range of hills, strictly speaking, but are the irregular eastern escarpment of a plateau, ranging in height from 200 to 400 feet. From the top of this escarpment the slope to the west is very gradual, while to the east there are often numerous sharp outlying hills, almost as high as the main plateau.

The general course of the eastern face of the Knobstone escarpment from where it is cut through by the Ohio River, in township 6 S., is but little east of due north for about 30 miles, where, in township 1 S. 6 E., it turns to the west around the headwaters of Muddy Fork of Silver Creek.

In the region immediately west of New Albany there are many high eastern outliers, which make the country very broken and rugged. A short distance northwest of New Albany there is a noticeable decrease in the number of outliers. The escarpment in this region is typical, with a high plateau to the west, an abrupt eastward slope with a descent of 200 to 400 feet, and a comparatively low level country to the east.

GENERAL CHARACTER OF THE KNOBSTONE GROUP.

The Knobstone group in Southern Indiana is made up of a thick series of clay shales, sandy shales and sandstones. The shales predominate at the base of the group, while the sandstones predominate at the top. The series of rocks was originally called the Knobstone by Owen because of their peculiar "knobs," or, as their name implies, knob-like hills that are often left by its erosion at a greater or less distance east of the main escarpment.

Overlying the upper sandstone layers of the group are the Lower Carboniferous limestones, which, with the sandstones below, form a protecting cap for the thick underlying shales. When the streams cut through this overlying cap of limestone and sandstone they quickly cut down through the underlying soft shales and form deep gorges. Because of the slight westward dip of the strata the eastward flowing streams always cut through these shale beds.

DIP.

The knobstones and overlying limestones dip gently to the west or southwest. The westward dip, in sections 1 and 2, township 3 S. 5 E., was found to be 41 feet per mile. This dip is very gentle, but it is suf-

ficient to entirely control the drainage. Thus it is noticeable that the water-shed between waters flowing east directly into the Ohio and those flowing southwest and reaching that stream after many miles is at the very eastern face of the plateau. In Floyd and Harrison counties it is often no more than one or two miles from the Ohio. The streams flowing to the west have a gentle fall, following in the main the dip of the strata. The resulting topography is of the gentle rolling type common in many limestone regions. The streams flowing to the east, on the contrary, are short, and flow through deep, narrow gorges that have been cut down through the soft knob shales. These valleys are often from 250 to 300 feet deep.

THE UPPER LIMIT.

The parting between the top of the Knobstone group and the overlying Carboniferous limestones crosses the Ohio River near the east side of township 6 south, 4 east. The line of parting in the extreme south is low in the hills and is covered by cliff debris and alluvium, consequently it cannot be continuously traced in going northward until township 4 south, 5 east, is reached.

From the point where it enters Indiana the upper limit of the group runs northward along the eastern face of the escarpment on the west side of the Ohio, seldom extending more than two miles back from that stream. On account of its dip it is carried successively higher in the hills, reaching their very tops in township 2 south, 6 east. From here northward the base of the limestone is found at the tops of the hills.

The line of parting from its southernmost exposure, runs northward in a very sinuous line through townships 6, 5, 4, 3 and 2 south, 5 and 6 east, until it reaches section 31, township 2 south, 6 east. At this point, which is four miles west of New Albany, the outcrop turns westward and follows along the south side of Indian Creek until it is carried beneath the drainage level and crosses to the north of that stream in section 20, township 2 south, 5 east. There are low dips showing a very low anticlinal fold in the southeastern part of 2 south, 4 east, and the southwestern part of 2 south, 5 east, and it may be to some extent due to this structural feature that Indian Creek and its tributaries have cut through the limestones, exposing the underlying Knobstone, through these townships.

After crossing to the north side of Indian Creek the upper parting between the Knobstone and limestone turns again and runs to the northeast in a very sinuous line. It gets higher in the hills until it again

reaches their tops in section 17, township 1 south, 6 east. Here it turns to the west and passes west of Borden and on across Blue River.

A glance at the accompanying map will show that the continuous line of outcrop as here described makes a bend to the west and then to the northeast, causing the knobstone to form the principal rocks in the valleys, at least nine miles from the true eastern face of the knobs in township 2, south.

It is seen, also, that by no means all of the rocks of this immediate locality belong to the Knobstone, but that there are, included within the main line of outcrop, some large outlying limestone areas. These outlying limestones are, of course, only the remnants of the beds that at one time covered the entire region. As the process of erosion continues these limestone areas will gradually disappear. It will be noticed that to the south of the area of exposed Knobstones (in township 1 south) just described, there is a smaller area where the limestone has been cut through, but where it still completely encloses the exposed underlying sandstones. To the north, in the region of Borden, there is also a large area in which the overlying limestones have been almost completely removed, leaving but one small limestone area to the east of the main outcrop. These three areas illustrate very well three different stages in the process of the dissection and removal of the topmost strata of a plateau.

In conclusion, attention should be called to the distribution of springs.

Since the rocks composing the Knobstone group are of such a nature as to prevent the free circulation of water, springs are by no means common in that formation. At the top of the formation, however, the line of parting between the limestones, which do permit the free circulation of water, and the underlying impervious sandstones, is a natural spring horizon. Along this line of parting springs are very common, and except at the extreme eastern edge of the Knobstone escarpment, where the limestone has been eroded to a very thin edge, they are to be found in almost every small side ravine.

4 E

5 E

6 E

7 E

8 E

2 N

1 N

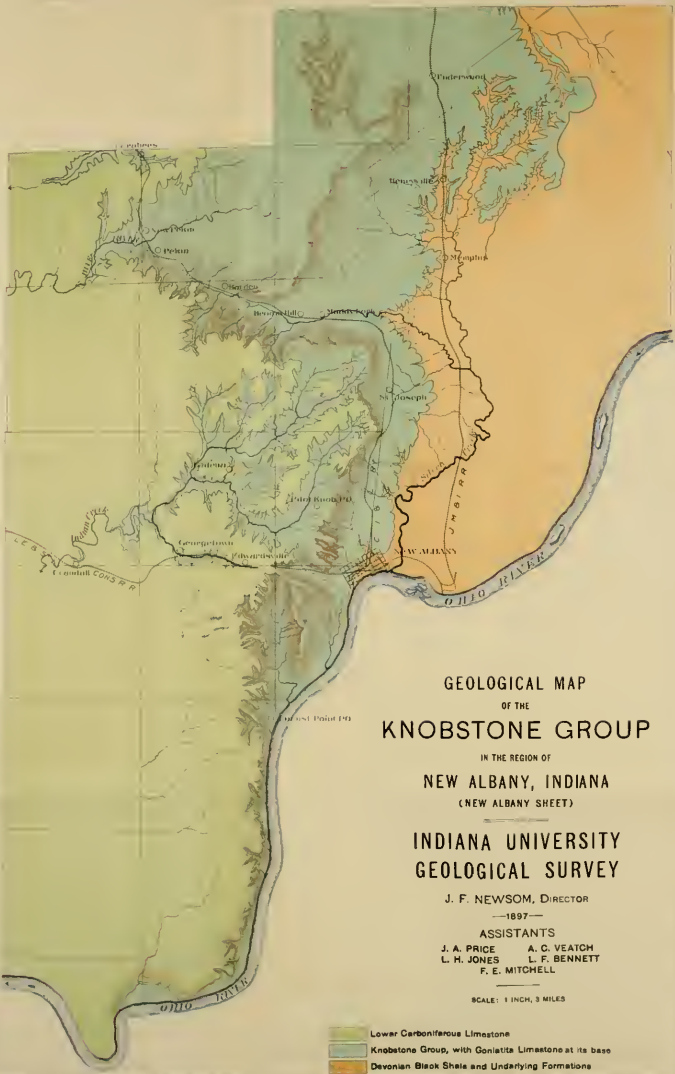
1 S

2 S

3 S

4 S

5 S



GEOLOGICAL MAP
OF THE
KNOBSTONE GROUP

IN THE REGION OF
NEW ALBANY, INDIANA
(NEW ALBANY SHEET)

**INDIANA UNIVERSITY
GEOLOGICAL SURVEY**

J. F. NEWSOM, DIRECTOR

—1897—

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SCALE: 1 INCH, 3 MILES

- Lower Carboniferous Limestone
- Knobstone Group, with Goniatite Limestone at its base
- Devonian Black Shale and Underlying Formations