of brachiopods, and these are in many places numerous in the accompanying clay strata; from these clay strata the shells weather out perfectly. This note concerns itself with two species of these brachiopods—Orthis biforata and Orthis occidentalis. The first of these has its hinge line sometimes greatly prolonged, as in Fig. (1). Every gradation in this respect is to be found as shown in Figs. (2), (3), (4) and (5). Specimens like Fig. (1) are to be found in the uppermost strata, and those with the hinge line less and less prolonged are found in lower and lower strata until finally in the lowest strata those without any prolongation—Fig. (5)—are to be found. The matter of interest is that the development of the hinge line went forward during the entire time of the formation of these rocks; its development is roughly in proportion to the altitude.

Forms like Figs. 4 and 5 continued to survive and are found at all horizons, but forms like Fig. 1 are not to be found at the lower horizons.

A similar change is to be noticed in Orthis occidentalis. Typical specimens of this species found at a low horizon have a channel along the middle line from the umbo to the anterior margin; see Fig. 6. But as one searches in higher and higher strata he finds the channel dying out and a ridge taking its place, until in the highest strata the typical species is displaced by its variety, Orthis sinuata, Fig. 7.

Notes on the Distribution of the Knobstone Group in Indiana.

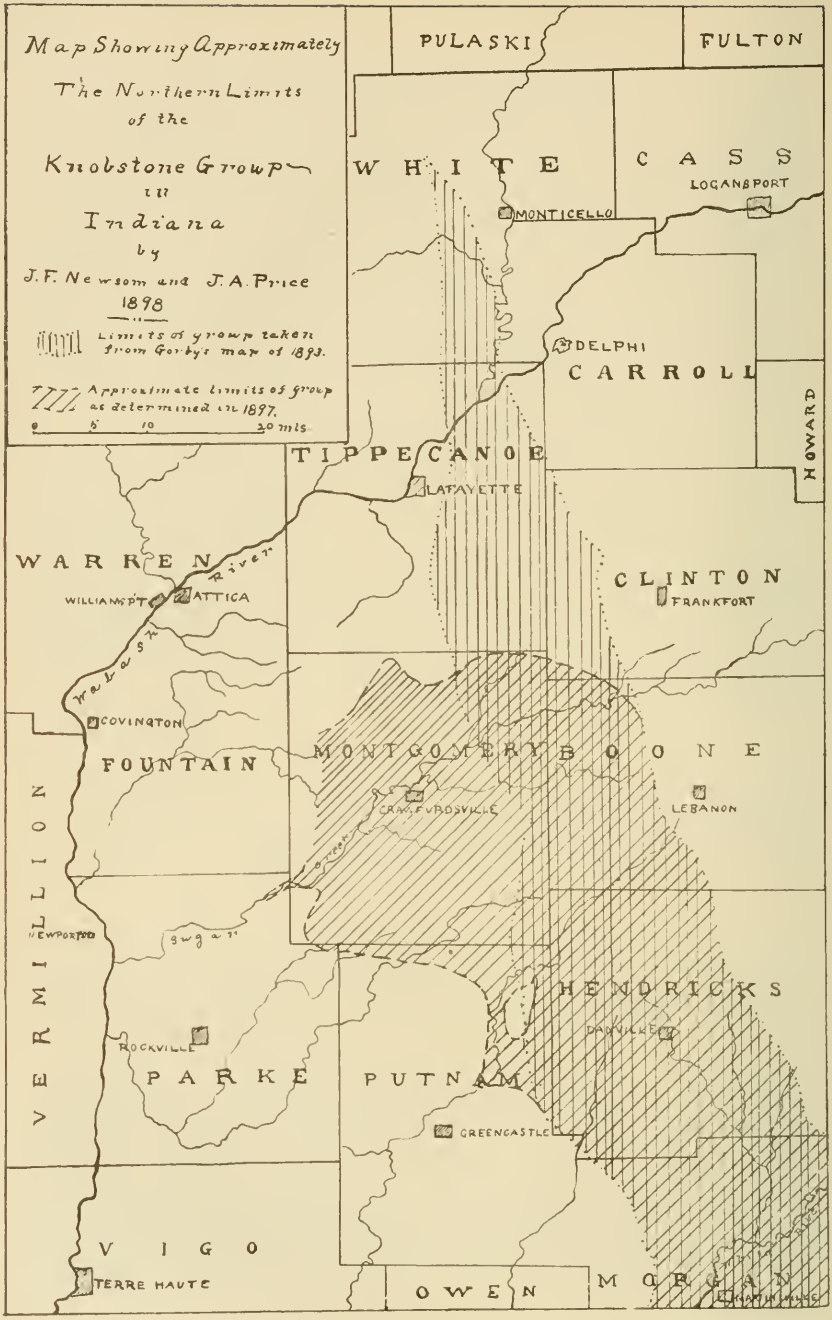
By J. F. Newsom and J. A. Price.

[Abstract.]

The series of shales and sandstones in Indiana known as the "Knobstone" has been grouped to itself principally because of its lithological characters. Because of its stratigraphical position with regard to the Lower Carboniferous limestones it has been regarded, in part at least, as the equivalent of the Kinderhook group of Illinois.

On Gorby's geological map of Indiana, of 1893, the Knobstone area is represented as extending as far northward as Honey Creek Township, in White County.

Field work done by the Indiana University Geological Survey in 1897 shows that the area underlain by the Knobstone does not extend so far north of Putnam County as has been hitherto suspected. It also seems


Map Showing Approximately
The Northern Limits
of the
Knobstone Group
in
Indiana
by
J. F. Newsom and J. A. Price
1898
Limits of group taken from Gorby's map of 1893.
Approximate limits of group as determined in 1897.
0 5 10 20 mls.
PULASKI
FULTON
WHITE
CASS
LOGANSPORT
MONTICELLO
DELPHI
CARROLL
HOWARD
TIPPECANOE
LAFAYETTE
WARREN
WILLIAMSPT
ATTICA
Wabash River
CLINTON
FRANKFORT
COVINGTON
FOUNTAIN
MONTGOMERY
BOONE
CRAWFORDSVILLE
LEBANON
VERMILLION
NEWPORTON
Sugar
HENDRICKS
DANVILLE
ROCKVILLE
PARKE
PUTNAM
GREENCASTLE
VIGO
TERRE HAUTE
OWEN
MORGAN

to show that the Crawfordsville crinoid beds, which have been regarded as belonging to the Keokuk, are the statigraphical equivalents of the Knobstone strata farther south.

The accompanying map shows the area covered by the Knobstone group, north of Morgan County, as that area is given on Gorby's geological map of 1893. It shows also (approximately) the area in and north of Putnam County as the field work of 1897 indicates it to be.

It will be noticed that (as worked out by the University Survey of 1897) no Knobstone is represented as occurring north of Montgomery County, while by far the larger part of that county is underlain by it.

Small isolated areas of the Knobstone may exist north of Montgomery County, but these will in all probability be found to be only outliers.

The limits of the area, as changed from Gorby's map of 1893, are only approximate. The whole region being covered over by glacial drift, except in the deepest creek valleys, makes it necessary to trace the contacts largely by well sections. It is consequently impossible to trace them more than approximately.

Some Indiana Mildews.* By M. A. Brannon.

Four years ago a paper on "Mildews of Indiana" was presented to you by Mr. J. N. Rose, of Wabash College. His was the first step toward determining the various species of Indiana mildews. The few species, and their hosts, named in this paper are the second attempt, I believe, in this State in the direction of determining these interesting parasites, which are everywhere abundant.

To Rose's list, containing the names of eleven species and twenty-nine hosts, are added several hosts for some of the species mentioned by him, also nine species and ten hosts not found in his list.

Bessey's "Erysiphe of the United States;" Cook's "Hand-Book of British Fungi;" Bull. of the Ill. State Laboratory of Nat. History, Vol. II., and Rose's "Mildews of Indiana" were the guides used in determining and describing the following species.

Sphærotheca Castagnei Lév.

*Paper read before the Indiana Academy of Science, 1889, and heretofore unpublished.