patrick or 776 feet at New Richmond. The recession of the ice from the present line of the Wabash removed the back wall from this arrangement of features and the gradual cutting down of the valley of the Wabash eventually drained the larger and several succeeding smaller lakes and permitted the establishment of the present drainage of southeastern Tippecanoe County.

It may now be said that an extension of the same process further north and the disappearance of the ice along the line of the Tippecanoe to its great bend, and along the upper Kankakee, while the ice still occupied the country to the west, would make quite simple the problem of Lake Kankakee and other temporary glacial lakes.

The arrangement of moraines along the north bank of the three forks of Wild Cat Creek together with the pirating of the heads of several southern tributaries of the Wabash indicates a comparatively rapid northward recession of the southern edge of the Erie lobe.

The region embraced in the Wabash basin still doubtless presents in almost every county interesting problems for the intelligent investigator who may care to look for them, and the facts and opinions here set forth are intended as suggestions to be verified or rejected by others or myself, after further investigation.

Note: In No. 3 and No. 4 of maps illustrating the development of the Wabash drainage system I have indicated the probable line of interlobate melting. I have suggested the name Tippecanoe Gulf for this reentrant area.

A Theory to Explain the Western Indiana Bowlder Belts.

By W. A. McBeth.

The proximity of the bowlder belt southeast of Independence, Warren County, to the moraine which parallels it a little distance to the west, is a marked relationship. The bowlders lie on and along the foot of the eastward slope of the moraine. Where the slopes are gentle the belt widens out, and on the abrupt slopes the width decreases and the bowlders are more numerous. There are also patches of them on the ridges and knolls that lie to the east at levels lower than the main divide. Bowlders are not infrequent anywhere in the whole of western Indiana, but are

considerably more numerous in the belt than elsewhere. They are also more numerous about the eastern ends of the sags or low valleys through the Independence-Darlington moraine. They are very numerous in the valley of the Wabash at Independence where the belt crosses the river. Here in the lowest part of the valley, and on the terrace north of the river, they lie so thick over the surface that a man might cross a field stepping from one to another. The belt is not continuous, but there are gaps both south and north of Independence.

A number of theories to explain these bowlder belts has been proposed. The theory which was in some way suggested to Mr. T. C. Chamberlin, that they are beach lines, was dismissed by him with scant notice. His objections to the theory were that the slopes are all to the southwest and that there could be no ponding of great extent in front of the ice sheet. The general slope indeed is to the west, but the slopes on which the bowlder belts lie are eastward slopes. Further, the belts lie at the western side of areas that have been for considerable periods of time covered with water.

The belt southeast of Independence is conspicuously related to the western border of such a lake area. The belt northwest of the Wabash follows quite closely the western curve of the border of the south arm of Lake Kankakee, as mapped by Mr. Leverett.*

This belt is not necessarily or probably a continuation of the belt south of the Wabash River. Nor are the bowlders lying across the valley at Independence certainly to be correlated with the belts to the north and south. All the bowlders were probably deposited by floating ice, at the western shallow edges of the lakes, where bergs and floe ice would strand and drop their loads. They were deposited in the river valley at Independence while the river was at that point the outlet of an extensive lake held in the deep preglacial valley extending upstream to the mouth of the Tippecanoe River and of unknown width and extent. This lake has since been filled by gravel deposits, but bergs stranding about the outlet may have deposited the bowlders at the top of the terrace, and they have since dropped to lower levels as the valley was cut deeper. Reasons for believing that the ice sheet disappeared from the region to the east of the present southward flowing course of the Wabash and along the Tippecanoe River are stated in the article on "The Development

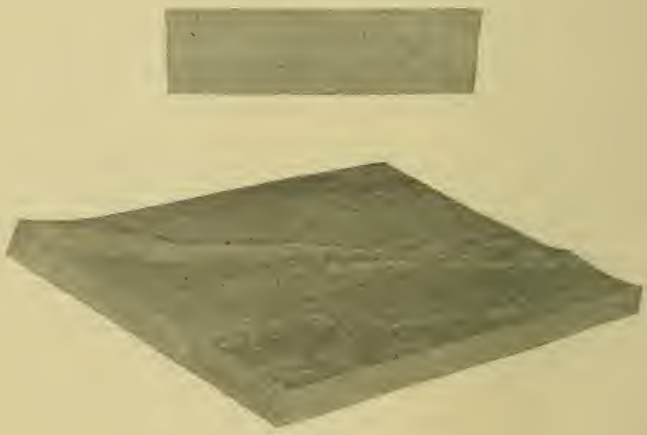
* In his Monograph on the Illinois Lobe, pages between 24 and 25.

of the Wabash Drainage System," in this volume. The westward wall of ice along this Tippecanoe Gulf helps to explain the laking which was due to the obstruction of drainage toward the west.

Commenting on the theory proposed, Dr. C. R. Dryer mentioned that the Iroquois Beach in New York is thickly strewn with bowlders in much the same way as the Indiana belts mentioned.

Aids in Teaching Physical Geography.

By V. F. Marsters.



Harper's Ferry Sheet.

The past decade has witnessed a growing interest in and a corresponding advancement along rational lines in geography, now justly regarded as a technical science. One of the pertinent reasons for this is that the seeker after knowledge, long before the college is reached, is becoming cognizant of the fact that the mere accumulation of geographical facts does not constitute geographical knowledge in the scientific sense. To know *where* the Blue Ridge is, is simply memorizing a *fact;* to know *what* it is, and, still further, to find out for one's self something about the sequential history of this topographic feature, constitutes *real geographic knowledge.* The former calls for observation and the sole exer-