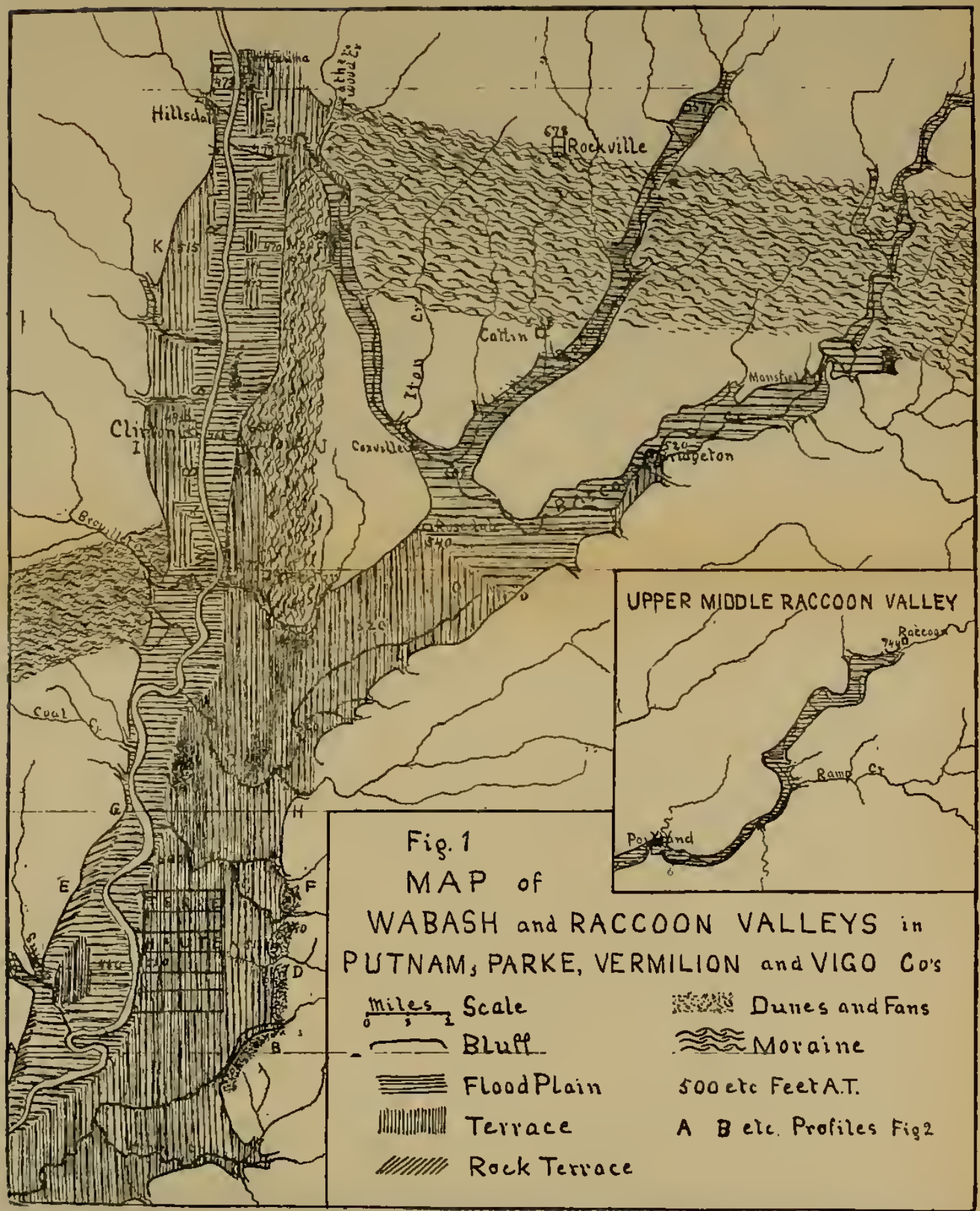

Hillsdale
Rockville
Clinton
Coxville
Carlin
Mansfield
Springerton
Brouillett
Coal Cr
Ramp Cr
UPPER MIDDLE RACCOON VALLEY
Raccoon
Fig. 1
MAP of
WABASH and RACCOON VALLEYS in
PUTNAM, PARKE, VERMILION and VIGO Co's
Miles Scale
Bluff
Flood Plain
Terrace
Rock Terrace
Dunes and Fans
Moraine
500 etc Feet A.T.
A B etc. Profiles Fig 2

Wabash Studies.

Charles R. Dryer.

I.

Terraces of the Wabash Valley in Parke, Vermillion and Vigo Counties.

The most conspicuous features of the lower Wabash Valley are the heavy gravel terraces, which are almost everywhere present on one side or

Figure 4. Bluff Slope from Island Terrace.

the other, and sometimes on both sides. During the last two years, with the help of my students, I have extended the study of the Terre Haute area up the river as far as Montezuma. The results are shown in the accompanying sketch map. (Fig. 1.)

The Montezuma Terrace has been studied only at its lower end from Montezuma to its southern termination. It is complex, rising by two or three steps to a height of 45-50 feet above the flood plain or about 525 feet A. T. At Montezuma its width is 1½ miles.

The Clinton Terrace has not been fully studied, but is known to extend from near Hillsdale to the mouth of Brouillet's creek, a distance of 12 miles. It is two miles or more in width and lies at two levels, the lower in the southern half about 30 feet above flood plain or 495 feet A. T. Near Summit Grove it rises by a distinct bench 20 feet higher.

Island Terraces. Between Clinton and Montezuma there is a line of mid-valley terraces divided by cross-depressions into five islands. They are generally flat-topped with a rather sharp border 20-30 feet high on the river side and a less definite boundary on the bluff side, where they slope gently to a depression lower than the river banks. (Fig. 4.) The southernmost member of the series is unique. Its surface presents a confused

Figure 5. Clinton Kame Terrace.

assemblage of hills and hollows, the highest point rising 40 feet above flood plain. (Fig. 5.) The surface is fine clean sand which may be a wind deposit, a conclusion which the topography alone would justify. The sand is underlaid at a depth of 8 to 12 feet by coarse gravel. If the topography is determined by gravel deposits they are not alluvial, but can be classified only as a kame with an eolian veneer. If the island is wholly eolian it is difficult to imagine why the wind should be so efficient there and without effect anywhere else. If it is glacio-fluvial, at core a kame, it means that when the ice sheet covered the valley bottom, this point was the mouth of a sub-glacial stream. In any case, it is one of the most interesting features

of the valley. Its peculiar sand dune flora intensifies its insular character and makes it as fine a field for the student of plant ecology as for the student of geology.

An island terrace at West Terre Haute originally occupied about one square mile, one-fourth of which has been removed by the railroad companies for ballast.

Rock Terraces. In the vicinity of Terre Haute the front of the west bluff is bordered for five or six miles by a rock terrace 10-20 feet high and in some places a quarter of a mile wide. This is due to a thin stratum of flinty limestone which has resisted erosion more effectually than the shales which lie above it.

The Terre Haute Terrace occupies the eastern part of the valley from

Figure 6. Atherton Island—West Bluff.

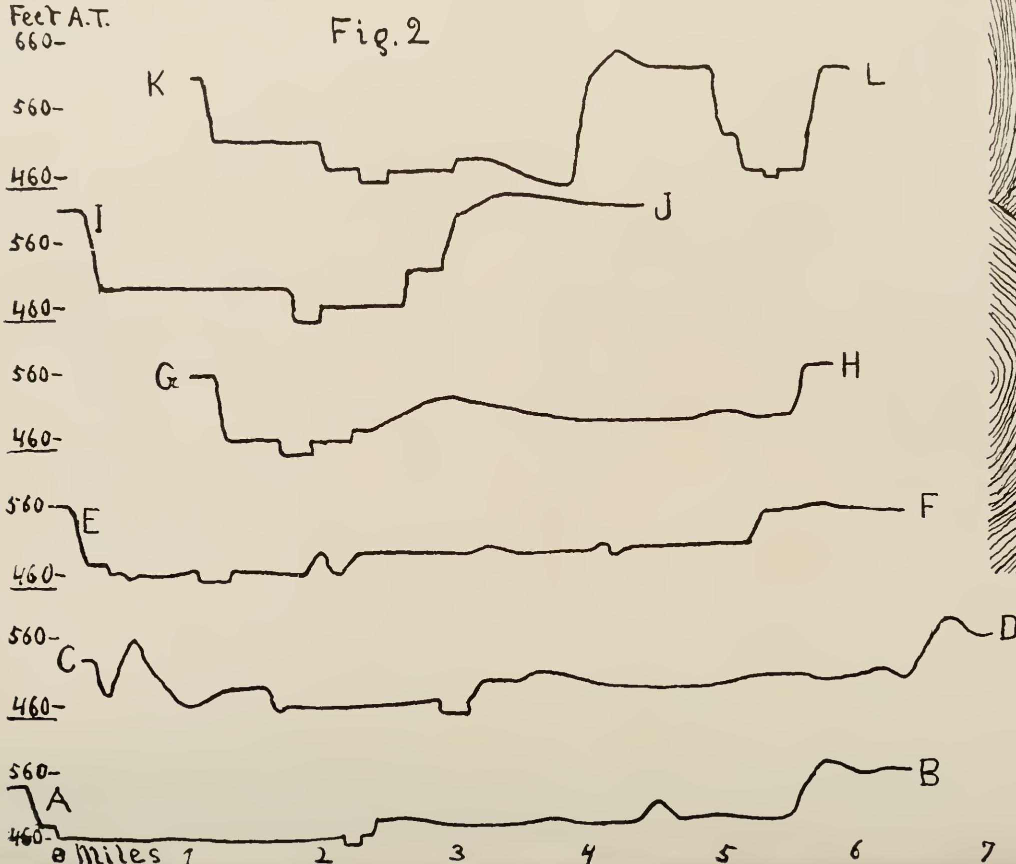
Lyford, opposite Clinton, to the southern boundary of Vigo County, a distance of about 27 miles. Its width is generally 3-4 miles, but near its northern end it is divided by the south end of a piece of highland which we call Atherton Island. (Fig. 6.) The eastern branch, 2½ miles wide, extends through a gap in the Wabash bluff 5 miles northeastward to Rosedale, where it becomes continuous with the floor of the valley of Big Raccoon Creek. The western branch, between the west side of Atherton Island and the river, tapers to a point opposite Clinton. At Terre Haute the surface of the terrace lies 500-510 feet A. T. or 40-50 feet above flood plain and is diversified by a series of longitudinal ridges 10-20 feet high which resemble sandbars. These are shown in the series of four transverse

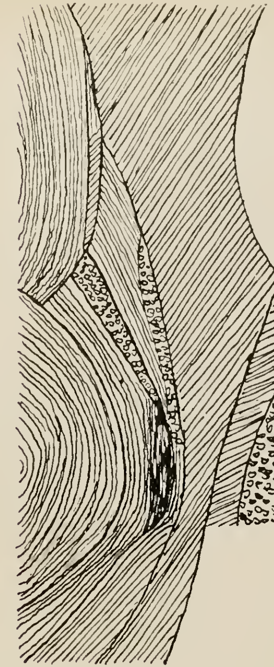
profiles, drawn at intervals of two miles. (Fig. 2.) They are in some places broad, flat and irregular, but have the habit of growing narrower and higher to the south, where they end abruptly. Their topography can be shown only by a closely contoured map, which is in process of con-

Figure 7

struction but not completed. In the northern part the river edge of the terrace rises 75-80 feet above flood plain, or to 535-540 feet A. T. A broad ridge extending southward from Atherton island reaches 550 feet A. T.

Fig. 2





Section in Gravel Pit at Lyford

Borings at Terre Haute pass through 130-150 feet of gravel and at Lyford 160 feet. The structure as exposed in excavations is coarse sand and fine gravel, poorly stratified and exhibiting a great variety of cross-bedding in which the dip is nearly everywhere down stream. At Terre Haute the principal bedding is nearly regular, the average thickness of each bed seldom being more than one foot. (Fig. 7.) At Lyford the material is distinctly coarser and gives evidence of having been laid down by turbulent and rapidly changing streams, as shown in the section. (Fig. 3.) Imbedded in the gravel are crystalline boulders up to 2 or 3 feet in diameter and many rounded masses of boulder clay up to 10 feet in diameter. Here also are found numerous fragments of hard limestone, Mansfield sandstone, bituminous shale and coal which are absent or rare in the vicinity of Terre Haute.

Surface drainage on the terrace is wanting or very imperfect. Small streams which come down through the bluff are unable to make their way across the terrace and are lost in the shallow depressions between the ridges. Stronger streams, like Otter Creek and Spring Creek, have cut deep valleys through the terrace and maintain a perennial flow.

The Terre Haute terrace is only one among many similar features, but in many respects belongs to a class by itself. It alone is moraine-headed, holding the relation of a valley train to the Shelbyville moraine. It possesses some, but not all, of the characteristics of a typical valley train. It thins out from 160 feet in depth at Lyford to nothing at its lower end, which gives it a longitudinal slope from 550 feet A. T. to about 450 feet, or a fall of 100 feet in 27 miles. It is composed of somewhat coarser material at its head than at Terre Haute, and near the moraine its surface is pitted with a few small pond basins where detached ice blocks may have melted away. Its longitudinal sand bars are evidence that its surface topography is due to a broad stream which once entirely covered it, standing above 520 feet A. T. This greater Wabash was fed not only by the main Wabash stream, but also by a tributary half as large from the present Raccoon Valley to be described in another paper. These two streams came together at the south end of Atherton Island and built up between them a bar 5 miles long and a mile wide with characteristic mounds and undrained saucer shaped hollows. The old Raccoon channel between this bar and the east bluff is a depression a mile wide and 30 feet deep, now occupied by a nameless tributary of Otter Creek.

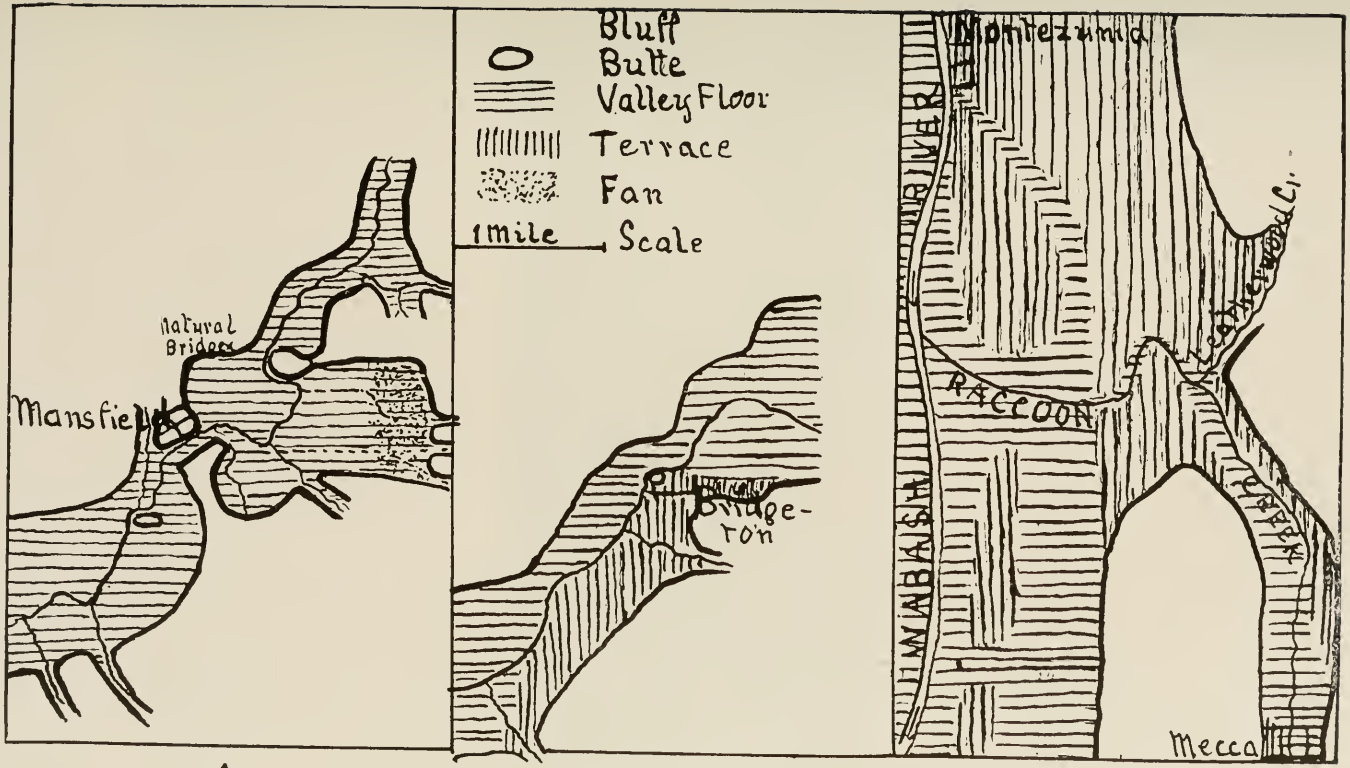

Bluff
Butte
Valley Floor
Terrace
Fan
1 mile
Scale
Natural Bridges
Mansfield
Bridge-ton
Montezuma
WABASH RIVER
RACCOON
Mecca
A
B
C

Fig. 3

Summary. In Parke, Vermillion and Vigo counties the Wabash Valley is bordered by massive alluvial terraces, which alternate from one side to the other, but overlap. They were deposited by a loaded, shifting, braided stream, (Fig. 8) changing rapidly in volume and speed, and represent the outwash from the waning Wisconsin ice sheet. They are remnants of a once more extensive deposit which filled the valley from bluff to bluff to the height of the terrace tops. The present flood plain is the valley cut out of this deposit by a stream of larger volume, smaller load and possibly

Figure 8. A Temporary Loaded and Braided Stream in a Gravel Pit.

greater fall and speed than the glacial Wabash. The outlet of glacial lake Maumee would fairly meet these requirements.

II.

THE RACCOON VALLEY, PARKE COUNTY, IND.

Big Raccoon Creek rises in Boone County and flows southwest across Montgomery, Putnam and Parke counties to Rosedale, a distance in a straight line of about 45 miles. Near Rosedale it turns to a little west of north and flows 12 miles to its junction with the Wabash. Its upper course

for 20 miles is in the Knobstone, its middle course for an equal distance is through the Mansfield sandstone, and its lower course for 17 miles is in the shales and sandstones of the coal measures. Its upper course has not been studied. The middle course from Raccoon village to near Mansfield is interesting but not abnormal. (Fig. 1.) The valley is about a quarter of a mile wide, expanding at the mouths of tributaries and bounded by steep bluffs 50-80 feet high. The corn-covered bottom lands, enclosed by forested bluffs, and the frequent changes in the curve of the stream and in the width of the valley combine to give this part a picturesque charm unsur-

Figure 9. Middle Racoon Valley.

passed in Indiana. It is unfortunate that no artist has yet found it. (Fig. 9.)

A mile above Mansfield the stream enters an east and west valley three-quarters of a mile wide and is joined by Rocky Fork, a large tributary from the south. (Fig. 3A.) The locality presents several peculiar features. The wide valley extends a mile east from the mouth of Rocky Fork and ends in a square cul-de-sac, bounded on three sides by high, smooth bluffs. It is traversed by two insignificant wet weather streams whose tributaries have built a fan across the end. There is no sign, and apparently no possibility, that it ever contained meander curves of the Raccoon. Directly in the course of the Raccoon at its entrance to this

expansion, stands a hill or butte 100 feet high, of oval outline with diameters of one-quarter and three-eights of a mile. (Fig. 10.) It is of sandstone up to 80 feet and the eastern half is capped with 20 feet of boulder clay. The whole arrangement is very suggestive of the ileo-caecal junction of the intestine, in which the butte plays the part of the valve. On the west the expanded valley is bounded by a curved ridge, through which the Raccoon passes by a gorge 1,000 feet wide between sandstone bluffs 40 feet high. (Fig. 11.) At the village of Mansfield the gorge ends and the valley expands abruptly to one mile. In its midst, just below Mansfield, stands a

Figure 10. Upper Mansfield Butte.

second butte somewhat smaller than the one previously described, 60 feet high, its lower half of sandstone, its upper of glacial clay full of large boulders. (Fig. 12.)

The mile-wide valley floor continues five miles to Bridgeton, (Fig. 3B), where it narrows to less than a quarter of a mile, being pinched by a terrace on the south side, half a mile wide and two miles long. In the stream bed and base of the terrace up to 35 feet a soft gray micaceous sandstone is exposed in thin beds dipping to the south. On the edge of the terrace an isolated mound of alluvial sand and gravel rises to 50 feet.

Figure 12. Lower Butte at Mansfield, 60 ft. high.

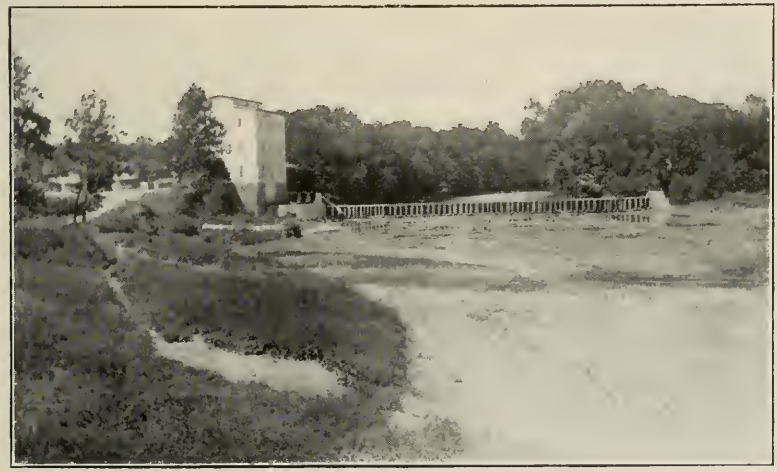


Figure 11. Mouth of Mansfield Gorge.

The surface of the terrace at the village of Bridgeton stands at 554 feet A. T., but slopes gently upward toward the bluff, where it reaches within 25-30 feet of the top. Below Bridgeton the valley widens to 1½ miles and is bounded by bluffs 75 feet high, with many blunt salient and re-entrant angles. (Fig. 13.) In this part of its course the Raccoon has cut in the valley floor a flood plain 5-15 feet below the general level. It is heavily loaded and at low water wanders through a wide belt of sand bars and islands. (Fig. 14). At Rosedale the valley widens to three miles and, continuing to the southwest, opens into the Wabash Valley, as described in another paper. But the stream, turning abruptly to the northwest, leaves this valley and enters another which narrows at Coxville to less than one-quarter of a mile. Thence it maintains a width of about a half mile to its emergence through the Wabash bluff at Armiesburg. The lower Raccoon Valley is bounded by bluffs 140-150 feet high. At Mecca a narrow alluvial terrace on the west side is 40 feet high and one mile long. A little below Mecca a similar terrace begins on the east side and continues to the mouth of Leatherwood Creek. The gap in the Wabash bluff through which the Raccoon-Leatherwood stream passes is 1½ miles wide and blocked by the Montezuma terrace 50 feet high. The cut through the terrace is only 750 feet wide. (Fig. 3C.)

The abnormalities of the Raccoon present many interesting problems. Obviously, the middle Raccoon Valley once transmitted a stream as large as White River directly to the Wabash below Atherton Island. The course of its tributaries, Little Raccoon, Iron Creek and lesser streams are wholly abnormal to the present course of the lower Raccoon and accordant only with a trunk stream flowing southwest to the Wabash. Where did a river of such magnitude come from? The present upper Raccoon was only a modest tributary to it. The cul-de-sac above Mansfield points to a possible and I think probable answer. The preglacial Raccoon was a large river with a course of hundreds of miles and a basin second in extent to no other tributary of the Wabash. What is left of its valley begins two miles above Mansfield, where it is filled and obliterated by the Shelbyville moraine which lies across it, and by the Wisconsin drift sheet which stretches away to Canada. No effort to trace the valley east of the Mansfield cul-de-sac has been made. Such an effort would probably be fruitless for lack of well borings.

The ridge across the valley at Mansfield seems at one point to be

Figure 13. Raccoon Valley below Bridgeton.

Figure 14. Low Water in Raccoon below Bridgeton.

wholly composed of drift, and is probably a remnant of the moraine which dammed the valley and compelled the stream to cut the gorge through sandstone, perhaps by the retreat of a waterfall.

The Bridgeton terrace is about 30 feet above the present divide between the Raccoon and the Wabash at Rosedale and demands some kind of a dam of corresponding height at that point. Such a dam would also account for the turning of the Raccoon over a col at Coxville into the valley of a northward flowing tributary of Leatherwood, and solve the problem of the lower Raccoon and its reversed tributaries. Such a dam once existed and does not now exist. Very large dams which vanish at a convenient time are usually made of ice. I therefore postulate an ice dam across the space between Atherton Island and the east bluff of the Wabash. The lake held up by such a dam found its lowest outlet to the north near Coxville. The dam lasted long enough to permit the aggradation of the valley to the height of the Bridgeton terrace and the subsequent cutting down of the outlet to its present level or lower. The whole valley is filled with sand and gravel to depths which borings alone can reveal. Wells on the valley floor are usually very shallow. One is reported near Bridgeton to have passed through 150 feet of gravel, which is not improbable. The ice dam may have been a part of the Illinoisan ice sheet and the valley cutting of the lower Raccoon may have proceeded during the long interglacial interval. Among all the changes and chances of two glacial periods and one interglacial, a part of the Wabash water may have followed that valley, making Atherton Island truly insular. The present fall from Rosedale to the mouth of Raccoon is 75 feet, which could be easily reversed by removal of filling.

During the climax and retreat of the Wisconsin ice sheet, the valleys of the Wabash and its tributaries were aggraded to the present terrace levels. For a time the present mouth of the Raccoon was blocked by ice and the stream flowed over the terrace directly to the Wabash. By the final withdrawal of the ice margin from the Shelbyville moraine the northern outlet was left a little lower than the Rosedale divide, and the present conditions came into existence.

III.

A NATURAL BRIDGE IN PARKE COUNTY, IND.

About two miles northeast of Mansfield, Parke County, there is a natural bridge of sufficient interest to be noticed. A small tributary of Rac-

coon Creek has cut a ravine in the Mansfield sandstone bluff and originally fell over a ledge about six feet high. A joint plain 20 feet back from the brink of the fall permitted the stream to descend and work its way under the stratum. The result is a natural bridge 60 feet long, 20 feet wide, 2 feet thick in the middle, with a span of 30 feet and a clear height of 6 feet underneath. (Fig. 15.)

Figure 15. Natural Bridge, Mansfield, Ind.