

REPORT UPON THE GEOLOGY OF WHITLEY COUNTY.

BY CHARLES R. DRYER, M. D.

Whitley County is bounded on the north by Noble, on the east by Allen, on the south by Huntington and on the west by Wabash and Kosciusko. Originally included in Allen County, it was organized independently in 1838, and named after Col. William Whitley, of Kentucky, who was killed at the battle of the Thames. At first it included townships 30, 31 and 32 north, in ranges 8, 9 and 10 east of 2d P. M., but a few years afterward, for some undiscoverable reason, sections 25 to 36, township 33, range 8, were taken from Noble County to form Etna Township, Whitley County. The county now comprises 228 square miles, and on account of the addition of Etna and a jog of a mile and a half between townships 31 and 32, it forms a slightly irregular square.

The civil townships are made up as follows:

	<i>Township.</i>	<i>Range.</i>	<i>Sections.</i>
Smith	32	10	1-36
Union	31	10	1-36
Jefferson	30	10	1-36
Washington	30	9	1-36
Columbia	31	9	1-36
Thorn Creek	32	9	1-36
Etna	33	8	25-36
Troy	32	8	1-24
Richland {	32	8	25-36
{	31	8	1-24
Cleveland {	31	8	25-36
{	30	8	1-36

Columbia City, the county seat, is situated in section 11. Columbia, Churubusco, section 13, Smith; Larwill, section 32, Richland; South Whitley, sections 3 and 4, township 30, range 8 (Cleveland) and Coesse, sections 21 and 22, Union, are important villages. The county is crossed by three railroads, the Pittsburgh, Fort Wayne & Chicago, passing through Coesse, Columbia City and Larwill, the Detroit division of the Wabash, passing through Churubusco, Columbia City and South Whitley, and the New York, Chicago & St. Louis, extending east and west

near the line between townships 30 and 31, and crossing the Wabash at South Whitley.

The Indian history of Whitley County is very interesting, the territory having been occupied by the Eel River Miamis, of which the most important town, next to Kekionga or Fort Wayne, was the Turtle village in the northeast corner of Union Township. Leek's village, near the site of Columbia City, and the Raccoon village, at the southeast corner of the county, the head of navigation on the Little Wabash River and the beginning of the portage to the Maumee, were also places of importance to the Indians and early white settlers. The Wabash and Erie Canal touched the southeast corner of the county.

Whitley County is entirely occupied by the great *Saginaw-Erie interlobate moraine*, two members of which are distinguishable within its limits, the outer or third and fourth Erie moraines.* The crest of this morainic system, forming the water-shed between the Tippecanoe and Eel Rivers, passes through Troy and Thorn Creek Townships, thus leaving the greater part of the county upon the Erie side. The borings at Columbia City and Larwill passed through 220 feet of drift, and its thickness can not be much less than that anywhere in the county, except near the southeast corner where it touches the Wabash-Erie channel.† Perhaps nowhere else within equal limits does the surface of the drift present aspects so strongly marked and contrasted in character; yet nowhere else in the State is it more difficult to differentiate and correlate the various members of the morainic system. There are at least five distinct topographical types which agree only in strong features, limited area, and confused arrangement. These will first be described, and afterward an attempt will be made to arrange them in accordance with the general plan of the morainic system of Northeastern Indiana.

In the townships of Jefferson and Washington, and the southern third of Union, the surface is best described by the word *flat*.

It forms a part of the great level plain of east central Indiana. While the slopes are sufficient for drainage, they are usually imperceptible to the eye, and can be determined only by the general course of the streams. The surface resembles that of a sheet of paper which has been wet and dried, the depressions and elevations having very slight relief and no definite boundaries. The concavities are perceptible only because the water stands in them like puddles on a flat tin roof. The only relief from unbroken monotony is afforded by the channels of the streams which have been eroded to a considerable depth, and which grow deeper as the stream descends toward its mouth. The marshes are like a platter having only an insignificant depth and no definite margins. The soil is a stiff clay, containing very few boulders, and requires understanding to realize its

* See Report upon the Geology of Steuben County, in this volume.

† See 16th Report of the State Geologist, p. 113.

full fertility. It is a part of that enormous mass of fine mud which, as the ice melted, settled quietly to the bottom of the glacier, and is known as *ground moraine*. From this region several streams flow east and south toward the Wabash-Erie channel. Indian Creek and Big Indian Creek flow in parallel courses eastward to join the Aboit, just above its mouth, in Allen County. Where they enter the Aboit Valley they are bordered by bluffs forty to fifty feet high. Along the southern border are the headwaters of Calf Creek and Clear Creek, which flow south, through Huntington County, to the Little Wabash. Out of the marshes of northern Jefferson and Washington, Sugar Creek and Stony Creek wind sluggishly westward to join the Eel river. The whole region seems characterized chiefly by its want of character. A slight but perceptible ridge along the east tier of sections, in Washington, forms the water-shed between the Indian and Calf creeks on the east, and Clear Creek and the tributaries of Eel River on the west. In summing up the results of the survey, this ridge will be found to possess more importance than its appearance seems to warrant.

In passing westward into the southern part of Cleveland Township a marked change is discernable. Here the surface is no longer flat, but *corrugated* with gently sloping ridges which are elevated above the general level and extend northeast and southwest. These ridges grow successively higher to a summit two to four miles east of the county line, whence they fall away more rapidly to the Eel River Valley, in Wabash County. Hurricane Creek, and other small streams, cut across them almost at right angles, and flow westward through deep channels. These ridges are also pitted with frequent kettle holes.

At the west line of the county the sandy and gently undulating valley of Eel River is encountered, here about one mile wide, the slopes on either side being gradual and without bluffs. In the four or five miles of its course, east of South Whitley, the river flows at the bottom of a much deeper and narrower valley. The hills upon either side rise to a greater height and have more abrupt slopes. In section 1, township 30, range 8, two very curious depressions extend back from the river into the hills. One is narrow and over half a mile long, the other smaller, but separated from the first by a narrow ridge like a canal tow-path. They are now occupied by swamps, but were originally lakes exactly similar to some of those in the northern part of the county. They are the southernmost specimens of morainic or kettle-hole lakes to be found upon the Erie side of the Saginaw-Erie system. The ridges of Cleveland Township form a part of the Mississinewa or fourth Erie moraine, through which Eel River, following the example of so many other streams in this region, here cuts transversely.*

*See Sixteenth Report of the State Geologist, pp. 123-4; also, Report on the Geology of Steuben County in this volume.

In the northwest half of Columbia and the east half of Richland townships the fourth moraine assumes a character which words are powerless to picture. The country is entirely occupied by deep irregular, elongated valleys, with narrow, sharp, winding ridges between, all in inextricable, indescribable and almost unmappable confusion. In a somewhat extensive study of the great morainic belts of North America, both by personal observation and from numerous published reports, the writer has never seen or found described anything closely resembling this area. It covers in all scarcely more than forty square miles, and the greatest differences of level probably do not exceed one hundred feet; yet this little patch seems to be unique. The roads through it are very crooked in order to avoid the marshes; yet in whatever direction one travels it is nothing but a succession of steep descents and ascents. The ridges are composed of rather barren clay and the valleys occupied by marshes and tamarack swamps. The relief might be imitated by taking a block of plastic clay and gouging it with some blunt instrument in the most irregular manner possible, somewhat as the ancient Babalonians did their bricks. It is one of nature's cuneiform inscriptions, and as difficult of interpretation as those of the Euphrates Valley. This type of topography may be called *chased*. It is now impossible to imagine with any definiteness of detail the process by which this little bit of the face of the earth was put into its present shape. Another strange peculiarity is that a country which so abounds in depressions is almost devoid of lakes.

Black's Lake, section 27, and Wilson's Lake, section 35, township 32, range 8, lie upon the northwestern border of this region. The former covers about forty acres, is nearly free from vegetation, and evidently shallow. An unusually high and precipitous ridge separates the two. From these lakes Spring Creek flows southward through the chasms to Eel River.

West of the middle of Richland Township the country smoothes out decidedly retaining similar features in a much milder form, and may be called *gently sloping*. This comparatively smooth interval extends westward to and beyond the county line, and to the north occupies the greater part of Troy and Etna Townships. Although the contrast between the precipitous chasms on the east and the gentle undulations on the west is very strong, it is impossible to draw more than an approximate boundary line. The village of Larwill is situated upon this boundary, which extends thence southward and toward the northeast, passing between Loon and Crooked Lakes. On the west side of the interval, in Kosciusko County, the surface becomes again tumbled and broken, assuming the usual characters of a moraine. This type of topography, which may be fitly designated as *crumpled*, touches Whitley County near Robinson's Lake, section 18, Troy. This lake, with an area of about one hundred

and fifty acres, has an average depth of thirty feet, and a maximum of fifty-two feet near the southwest end. It is drained northwestward into the Tippecanoe. Etna Township and the northern part of Troy have the appearance of an elevated tableland, a smooth plain, not level, but slightly inclined to the west. Ridges and gorges are wholly absent. It is a country of long, gentle slopes and wide vistas, from which woods beyond fields may be seen stretching away to a horizon dim in the distance. It is remarkable that this comparatively level interval should be found upon the very crest of the Saginaw-Erie interlobate moraine,* the slopes on either side being much more rough and irregular. Like the valley of Upper Pigeon Creek in Steuben County, and a portion of Northwestern Dekalb County, it looks as though it once might have been a wide and deep valley, subsequently filled by overflow from either side.

This impression is made stronger by the fact that in both cases the interval is found to contain extensive sand streams. The one described as lying south of Fremont, Steuben County, † is matched by the deposits of sand south and west of Loon Lake. sections 1 and 2, Troy.

In Whitley County the interval contains several lakes. Cedar Lake, sections 10 and 11, Troy, originally of about 150 acres, has been lowered ten feet by a ditch, and has a sand beach nearly all around it, in some places ten rods wide. The deepest place found was forty-five feet. Goose Lake, in section 12, resembles Cedar, but is only about half as large. In this region also is Loon Lake, one of the largest in the county. It occupies parts of sections 36, Etna, 1, Troy, and 6, Thorn Creek, and about one-half of its area is comprised in Noble County. It is broadly bottle-shaped, with a short neck to the north, one mile and a quarter long by half a mile wide. The shores are low but clean, without marsh except at the north and south ends. The water is so clear that the bottom can be distinctly seen at depths of thirty or forty feet. Between the south shore and a small island depths of thirty-five and forty feet were found. From the island a gravel bar covered with small bowlders extends westward. The main body of the lake has a depth varying but little from seventy feet. One sounding northwest of the island reached the very unusual figure of one hundred and two feet, thus placing Loon Lake among the list of the deepest lakes in the State.

Tributary to Loon Lake are Old Lake and New Lake, each of about eighty acres, the latter interesting from the fact that within a year it had been drained and diminished to one-half its size. The wide beach of sand and shells was almost bare of vegetation, but the little *lobelia Kalmii* was rapidly taking possession, with only *Lysiwachia ciliata* and

*See 16th report of the State Geologist, p. 99, where for Saginaw Lake read *lobe*, and p. 100, where for Erie Lake read *lobe*.

† See Report upon the Geology of Steuben County in this volume.

Cassia Marilandica for competitors. The country around these lakes is moderately uneven, but its irregularity is not at all comparable with that of the regions on the east and west of it. The lake basins are great depressions in a surface otherwise comparatively smooth.

The remainder of Whitley County, including the townships of Thorn Creek and Smith, and the portions of Columbia and Union present the usual features of crumpled moraine topography in moderate strength and great variety. It is divided diagonally from northeast to southwest by the valley of Blue River, which here serves to separate the third and fourth Erie moraines. The latter contains a group of lakes which for beauty and general attractiveness may challenge comparison with any of their Indiana rivals. Shriner's and Cedar, in sections 2, 11 and 12, Thorn Creek, are as pretty a pair of twin lakes as one can wish to see. They occupy two narrow parallel valleys, separated by a ridge scarcely a quarter of a mile wide. Shriner's, the smaller and prettier of the two, is a mile and a quarter long by a quarter of a mile wide. Its level was lowered several feet about forty years ago by a ditch cut through the ridge between it and Round Lake. The beach thus left dry is several rods wide and covered with grass. The present shores are remarkably clean, bordered by only a thin belt of sedges and rushes. Outside of that the water deepens rapidly, and varies from forty-five feet to over seventy at the upper end. The water is very clear and furnishes excellent fishing grounds. Moderately high bluffs on either side, covered to a large extent with open forest of magnificent beeches, maples and lindens, form a fit setting for this charming picture.

Cedar Lake is much like Shriner's, but more irregular. The lower fourth is separated from the main body by narrows and an island. Its level was raised by a dam at the same time that Shriner's was lowered, and the shallow space thus gained is entirely occupied by aquatic vegetation, chiefly *Nuphar*. These two lakes furnish an illustration of the law that lowering a lake leaves clean shores and raising it results in the formation of a marshy border. The depth of Cedar Lake varies from forty-five to seventy-nine feet in the center of the upper basin. Round Lake, 160 acres, lies at the same level as Cedar, with which it is connected by a strait, scarcely navigable on account of vegetation. Its axis is at right angles with that of Cedar, and its depth from thirty-five to sixty feet. These lakes are drained through Thorn Creek into Blue River.

Separated from the west end of Cedar by a divide a quarter of a mile across and twenty-five or thirty feet high is Crooked Lake, which empties westward into the Tippecanoe River. Its axis continues the general direction of Shriner's and Cedar, southeast and northwest, but it is nearly as large as the other two and much more irregular in outline and bottom. The upper basin is small and partially separated from the central by a narrow gravel ridge. The central basin is half a mile in diameter, and

near its center was found the deepest sounding ever made by the writer in an Indiana lake, 107 feet. The approach of night prevented its complete examination, and the lower end, which extends into Noble County, was not visited. The shores are clean and gravelly and the hills on either side probably form the highest ground in Whitley County. The group of lakes comprising Shriner's, Round, Cedar and Crooked furnish five or six miles of boating and offer attractions for the camper, sportsman, fisherman and artist, such as are equaled by few places in the State.

Blue River Valley contains one lake which is distinguished as being inter-morainic rather than intra-morainic. Blue River Lake, in sections 9, 10, 15 and 16, Smith, has a basin one-half mile by a mile and a half, with low shores and a very uniform depth of forty to fifty-five feet. Aquatic vegetation in great variety and profusion furnishes a botanist's paradise. The shores are nearly surrounded by a broad belt of plants arranged in distinct zones, according to the depth of the water. On approaching the shore the first zone appears at depths between eight and six feet, and consists of *Brasenia*, *Potamogeton*, species with filiform leaves being very abundant, *Utricularia* and *Myriophyllum*. At a depth of four feet *Nuphar* covers the water with its leaves, the spaces between being filled with a dense mass of *Chara* covered with a mantle of *Lemna*. Here navigation becomes difficult. At a depth of three feet *Pontederia* appears with *Polygonum Amphibium*. At two feet the water passes gradually into a jungle of *Decodon*, *Typha*, *Polygonum nodosum*, *Phragmites* and *Salix*, passable only by birds and reptiles. This lake is the only locality known to the writer in Northeastern Indiana where the splendid *Nelumbo lutea* occurs, and here it is as abundant as *Nymphaea*. Flowers are difficult to procure because they are gathered by numerous visitors as fast as they open, but the leaves, rolled up and rocking like a boat, or expanded into an orbicular shield twenty to thirty inches in diameter and flapping in the wind, present an interesting and attractive sight. The water in mid-summer has the appearance of muddy coffee, and through the whole season teems with plant and animal life. Such a lake as this would repay a thorough and prolonged biological examination, and would furnish the naturalist with material enough for several years' study. Here also the artist would find a rich and unworked field. He would transfer to his sketch book the dark, glossy green triangular leaves and showy purple spikes of the pickerel weed, the symmetrical oval crimson shields of *Brasenia*, the boat-bell shaped saucers of the *Nelumbo*, the *Victoria regia* of the North, the graceful dignity of the reed grass, the swaying stems and densely whorled capillary leaves of the water milfoil, and numberless forms of *Chara*, pond weed, and bladderwort which would be new to decorative art, and in place of the conventional cat-tail and pond lily, would astonish and delight not only the natives but the world.

The lakes of Whitley County are not numerous, but they include some

of the brightest gems of their class. Easily accessible from Columbia City and Cherubusco, they will prove equally delightful to the sportsman, the naturalist, the artist, and the lover of nature in her most charming aspects.

The surface of Smith Township, and the greater part of Union, is gently undulating, of a subdued morainic type. The long slopes, large fields, and open forests give to many portions of it the appearance of an English park. Around Coesse it is more irregular, with sharper ridges and numerous tamarack swamps. Southern Union, northern Jefferson and northeastern Washington are very flat and marshy. Mud Creek is very nearly the dividing line between the flat and the crumpled country. One feature of this region, not in itself obtrusive, is of special significance to the geologist. A mild boulder belt can be traced from section 34, Smith, in a southwest direction, to section 32, Union, beyond which it is lost in the thickly wooded swamps. So far as traced, it is about seven miles long, and from one-half to one mile wide, with well defined edges, and as unmistakable as a highway. The boulders are chiefly granite, rounded and subangular, averaging two to three feet in diameter, and the largest twice that size. This belt bears directly toward the divide in sections 35 and 36, Washington, where, also, boulders were noticed as being unusually large and numerous. This line, extended southward, would pass near Huntington City, where the immense accumulation of boulders has long been a puzzle to geologists. Whether a distinct boulder belt exists in northern Huntington County has not yet been determined, but the writer believes that the portion above described is the superficial representative of the Salamonie or third Erie moraine, with which the morainic features of Huntington County, whatever they may be, must be correlated.

The drainage system of Whitley County does not conform, except in the most general way, to the chief topographical features. The great divide between the tributaries of Eel River and the Tippecanoe, in the northwestern part of the county, is a comparatively level table-land; in fact, an interval between the Saginaw moraine, in Kosciusko County, and the fourth or outer Erie moraine. Through the valleys and gorges of the latter flow the northwestern tributaries of Blue and Eel rivers. The principal drainage line of the region is Blue River, which rises near Avilla, in Noble County, and passes through a tortuous and varied course to its junction with the Eel, in section 23, Columbia. Most of the way it occupies a channel much too big for it, and is bordered by marsh a quarter of a mile wide, but in some portions, as at Columbia City, the valley is no wider than the stream. The wide parts are undoubtedly fragments of a once continuous glacial drainage channel, or system of channels, from one to another of which the present river has cut its way in past glacial times. In doing so it has left, here and there, an old bayou at one side, the largest

of which now forms a great marsh, extending from the bend of the river, in section 17, Smith, southward two miles. The valley of Blue River marks the interval between the third and fourth Erie moraines.

The Eel River rises in the interval between the second and third Erie moraines in northwestern Allen County, and flows across the third moraine to the mouth of the Blue. Thus far it is geologically a younger and less important stream than the latter. Three miles below their junction, in section 32, Columbia, the united streams turn westward and cut directly through the fourth moraine, after passing which they resume their original southwesterly direction.

The first and second Erie moraines have already been described in a previous report* under the name of the St. Mary's and St. Joseph and Wabash-Aboit moraines. Since that report was submitted two more morainic lines have been distinguished north of the Wabash River, as belonging to the Erie system and corresponding to similar lines south of the Wabash. The existence of these moraines and the general plan of the system was indicated and outlined in the previous report (Sixteenth Report, p. 123-4). A private letter from Mr. Frank Leverett, of the United States Geological Survey, who is engaged upon an extensive examination of the drift of Illinois, Indiana and Ohio, confirms and supplements the predictions there made in a very gratifying manner. The third or Salamonie moraine follows the right bank of the Salamonie River through the counties of Jay, Blackford and Wells into the southeastern part of Huntington County. According to Leverett, its features are weak, irregular and discontinuous. The fourth or Mississinewa moraine follows the right bank of the Mississinewa River through the counties of Jay, Delaware, Blackford and Grant into the eastern part of Wabash, where, according to the same authority, it is very strong, crossing the Wabash River at Lagro, and passing northward to the southeast corner of Whitley County. The counties of Steuben, Lagrange, Noble, Dekalb, Whitley and Kosciusko have long been known to be occupied by a broad and strong-featured mass of drift, the joint product of a tongue of ice proceeding from Saginaw Bay and another thrust forward from Lake Erie, and known as the *Saginaw-Erie interlobate moraine*. From this great mass it has been the privilege of the writer to distinguish and separate two morainic lines, forming continuations of the Salamonie and Mississinewa ridges. While the work of differentiation and correlation has been in some places difficult, in others it has been so easy as to leave no doubt in regard to the general conclusions. South of the Wabash River the Erie moraines are separated by intervals of ten to fifteen miles, while north of that river, owing to the obstruction offered by the Saginaw glacier, they are so crowded together

*See Reports upon the Geology of Allen and Dekalb Counties, in the Sixteenth Report of the State Geologist.

as to be almost contiguous. While it is thus rendered impossible to fix their exact dividing lines throughout their whole extent, certain features here and there are so obvious and suggestive as to be unmistakable. The third moraine extends from the northeastern corner of the State through eastern Steuben, northwestern Dekalb, the southeastern corner of Noble, the northwestern corner of Allen and the eastern part of Whitley counties. In the southeastern part of the latter county it ceases to be a prominent topographical feature, but is represented by a mild boulder belt. The interval between the third and fourth moraines is, in Steuben County, from three to six miles wide, but in Dekalb County the two moraines are contiguous and undistinguishable. In Noble and Whitley counties they are very close together, but separated by the valley of Blue River. The fourth moraine is very strong in north central Steuben and the line of demarkation between the Erie and Saginaw drift is very distinct. In southwestern Steuben and in Noble County this line, if it exist, has not been determined. In Whitley County a level interval of three or four miles bounds the outer Erie moraine on the west. The present divide between the basins of Lake Erie and Lake Michigan lies, in Steuben County, between the third and fourth moraines, in Dekalb and Noble counties, along the crest of the fourth; while in Whitley County the divide between the Eel River and the Tippecanoe lies in the interval outside of the fourth. The following tables, gleaned from various sources, give a general idea of the elevations of these moraines:

ELEVATIONS ON THE SALAMONIE, OR THIRD ERIE MORAINE.

	<i>Altitude.</i>
One mile north of Reading, Hillsdale County, Mich.	1,220
Ray (Michigan and Indiana line)	1,073
Fish Lake, Steuben County, Indiana	887
Summit Station, Dekalb County, Indiana	1,001
Summit west of Corunna, Dekalb County, Indiana	991
Swan, Noble County, Indiana	905
Potter's, Noble and Allen Counties, Indiana	881
Churubusco, Whitley County, Indiana	899
Summit near Coesse, Whitley County, Indiana	877
Huntington, Huntington County, Indiana	741
Plateau south of Huntington	813
Keystone, Wells County, Indiana	895
Summit west of Portland, Jay County, Indiana	955
New Bremen, Mercer County, Ohio	1,038
St. John's, Auglaize County, Ohio	1,063

ELEVATIONS ON THE MISSISSINEWA, OR FOURTH ERIE MORAINÉ.

	<i>Altitude.</i>
Fremont Station, U. S. Lake Survey, Steuben County, Indiana	1,142
Angola, Steuben County, Indiana	1,052
Summit 3 miles south of Kendallville, Noble County, Indiana	1,017
Columbia City, Whitley County, Indiana	837
South Whitley, Whitley County, Indiana	805
Divide between Eel and Wabash Rivers, Wabash County, Indiana	829
Lagro, Wabash County, Indiana	698
Summit south of Hartford City, Blackford County, Indiana	955
Summit north of Ridgeville, Jay County, Indiana	1,053

A confusion of these elevations with those of the first and second Erie moraines given in the Sixteenth Report of the State Geologist, pp. 115 and 122, shows the same general descent in each from the extremities toward the apex, and a progressive elevation of the extremities and a depression of the apices from the first to the fourth. The first and second are composed of the same material as the general ground moraine of the region, a stiff, gravelly clay; kettle-holes, lakes, domes, peaks and the usual features of moraine topography being almost wholly absent. The third and fourth north of the Wabash River contain large masses of sand and gravel, and present all the peculiar morainic characters in strong development. In Northeastern Indiana the story of the advance, the struggle and the retreat of the glaciers is written in characters so plain that he who runs may read.

Two borings for gas have been made in Whitley County, one at Columbia City, and one at Larwill, sections of which are given as follows:

	<i>Drift.</i>	<i>Niagara.</i>	<i>Hudson.</i>	<i>Utica.</i>	<i>Trenton.</i>
Columbia City	224	526	400	217	40
*Larwill	220	565	512		

No gas was found in either; but at Larwill a little oil, and at Columbia City a strong flow of excellent water, with a temperature of 45° F.

*The data for Larwill are very uncertain.