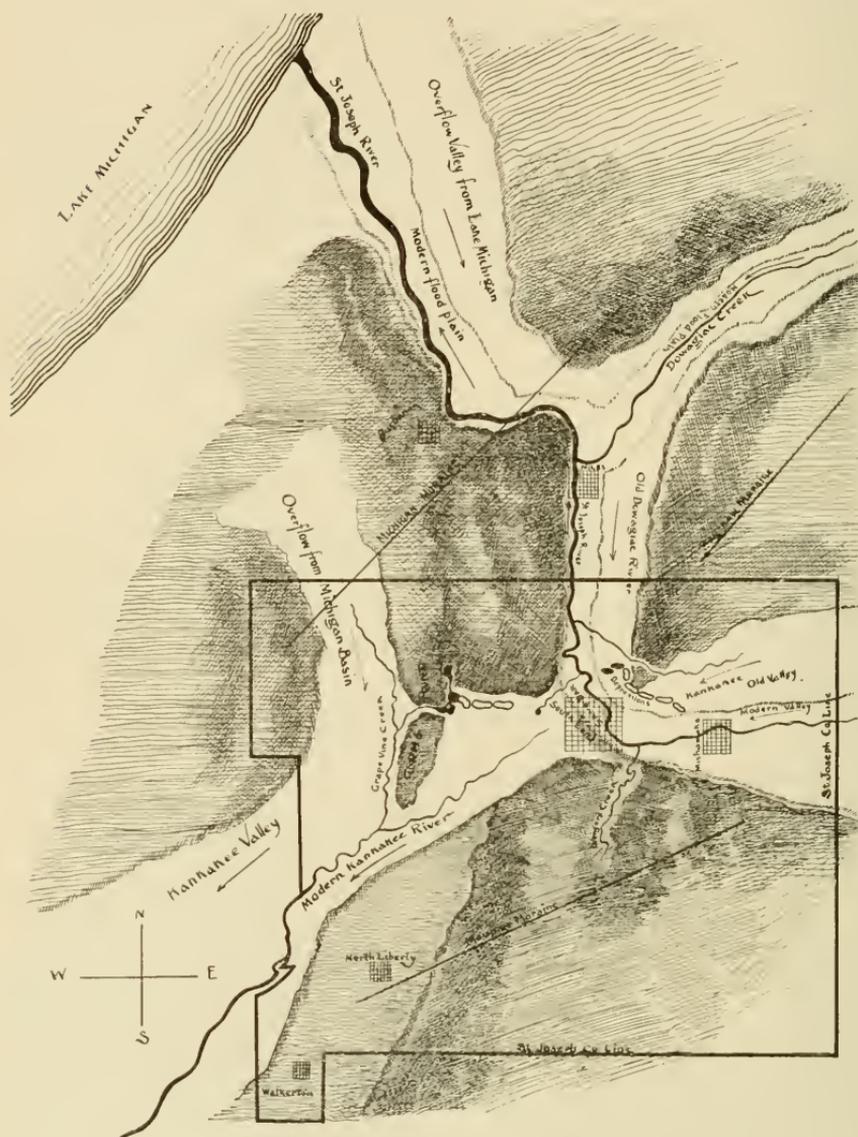


A low, broad ridge is shown upon the terrace, but in general its surface is quite uniform. This terrace descends gently toward the south so that at York, six miles south, it has an elevation of scant 30 feet above low water, while at Hutsonville, five miles below York, it has an elevation of only about 25 feet, just about on a level with the high floods, and only about 80 rods wide. Just north of Hutsonville there is a great hill of sand and gravel that rises about 45 feet above low water, but the greater part of the terrace is low. Thus the gravel terrace, so massive, so prominent a feature in Vigo County, almost disappears within 40 miles. It seems probable that the old valley was once filled with sand and gravel, at least to the elevation of the higher points of the present time. The present features of the valley are apparently due to extensive erosion. Meander lines run in 1816 show that the present river has not eroded its gravel banks to any appreciable extent during the past 80 years. The work of erosion signifies much stronger currents than prevail in the present river, even when in flood.

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THE KANKAKEE VALLEY. BY H. T. MONTGOMERY, M. D.

One of the great waterways during the ice period seems to have been entirely overlooked by our local and State geologists. I refer to the great Kankakee Valley, whose stream had its origin at the foot of the Saginaw glacier, and received tributary streams from the Maumee and Michigan glaciers, and became in time the outlet for the waters flowing south from Lake Huron through Saginaw Bay before they secured an outlet through the Niagara River. This great valley served as a waterway for the waters during the withdrawal of the first ice sheet, from the fact that its channel was silted up like all other great stream valleys during the Champlain epoch or age of depression, and was never re-excavated to any extent, and remains to-day a filled valley. It probably conveyed the waters during the advance of the last ice sheet, but soon after the sheet began to withdraw the waters found an outlet into Lake Michigan, leaving the Kankakee Valley at the point where South Bend now lies, through the bed of its largest tributary, which will be described later on. The Kankakee Valley extends from a point in Illinois where the present Kankakee River and the Desplaines unite, taking a northeasterly course through Illinois, Indiana and Michigan, to the watershed between the streams

flowing into Saginaw Bay and the head-waters of the St. Joseph River, which flows southwest through the Kankakee channel to South Bend, where it abruptly turns north and reaches Lake Michigan at St. Joseph.



ST. JOSEPH COUNTY.—SHOWING ANCIENT AND MODERN DRAINAGE.

This valley was the great outlet to Lake Huron, as the Wabash Valley was the outlet to Lake Erie during glacial times. This great valley, with its flood plain, varies from three miles at its narrowest point, which is one mile below South Bend, to about twenty at its broadest part, which is between Porter and Lake on the north and Newton and Jasper counties on the south. The south bank of the valley from about six miles below South Bend to near its source is from fifty to one hundred feet high, while the north bank from South Bend to its source is generally low and shelving. From South Bend to the Illinois line, or from the point where the valley emerges from between the Maumee and Michigan moraines to its confluence with the Desplaines, the banks are low, generally not exceeding fifteen or twenty feet in height. On the south side of the old channel will be found quite an extensive sandy flood plain, extending from the border of the Maumee moraine southwestward, covering almost the entire surface of Starke County, the northern part of Pulaski, Jasper and Newton counties. On the north the main channel largely borders the Michigan moraine.

The great width of the stream from South Bend to the eastern part of Illinois was owing to three causes—first, the surface of the country through which this part of the stream flowed was destitute of rugged features, being a comparatively level, smooth surface; second, the stream crossed the arched condition of the bed rock which extends in a northwesterly course across Indiana into Illinois; this rocky ridge probably produced well-marked rapids, similar to those of the Ohio River near Louisville, and also had a marked tendency to dam the waters and cause them to overflow a wide territory above, giving to this region the general appearances of a great lake having occupied its territory; third, at South Bend, a tributary one-third its size was added to its volume; also the overflow from the Michigan basin through the Grapevine Valley.

The principal tributaries of the great Kankakee were the Elkhart and Yellow rivers, draining from the Maumee glacier, and probably the Tippecanoe River at a point where it enters the southeast corner of Starke County; this I have not carefully investigated, but which I think will probably be found to be a fact, also what I am pleased to call the great Dowagiac River, now represented by the Dowagiac Creek, which heads south of Kalamazoo, Mich., but the waters of whose ancient stream probably accumulated far north of that point, gathering all the glacial waters from the eastern slope of the eastern lateral moraine of the Michigan

glacial lobe, forming a mighty glacial river, flowing south to a point three miles north of Niles, Mich., where it received a large tributary which had opened a way through the lateral Michigan moraine, and was discharging its waters from the Michigan basin, which had not yet found an opening to the south, between the Michigan ice lobe and its moraine. The Dowagiac River, after receiving the overflow waters from the Michigan basin, continued south and emptied its waters into the Kankakee at the present site of the city of South Bend.

The old channel where it emptied into the Kankakee is three miles wide, with well-defined banks rising from fifty to seventy-five feet above the bed of the valley, the valley having been cut to bed rock and silted up about 120 feet, leaving the above-mentioned banks yet remaining.

These great streams existed for long periods of time. The Kankakee and the Dowagiac conveying the glacial waters during the advance of the ice sheet, also during the period that it stood at its most advanced point, and during its withdrawal, until the Michigan ice lobe had sufficiently receded to allow the waters along its eastern border to escape through the Desplaines opening. This promoted a rapid lowering of the waters between the ice lobe and its terminal lateral moraine, and terminated the flow of waters from the Michigan basin into the Dowagiac River, leaving a broad water-worn plain leading from the Dowagiac River back north-westward to the Michigan basin.

Here commenced a system of river robbing. The Dowagiac River doubled upon itself at an angle of 45 degrees, followed the abandoned channel of its former tributary and discharged its waters into Lake Michigan, leaving in turn a well-worn channel from three to four miles wide and thirteen miles long, leading to the great Trunk Stream or Kankakee. The distance from the point where the Dowagiac emptied its waters into the Kankakee to St. Joseph, Mich., is thirty-eight miles, with a fall of 141 feet; from the same point to Momeuce, Ill., the distance is 92 miles, with a fall of 93 feet. It can be readily understood that, with the first annual flood, a part of the waters of the Kankakee would follow the abandoned Dowagiac channel, mingling with the Dowagiac, and onward into Lake Michigan at St. Joseph. The fall over the new route being three and a half times greater than that over the old route, the new channel rapidly cut through the old river deposit, finally claiming all of the waters of the once mighty Kankakee, leaving its valley from South Bend to the Desplaines a geological monument to tell of its eternal past.

The physical force which most likely turned the current of the Kankakee into the channel of the Dowagiac was an ice gorge, forming seven miles below South Bend, where a jutting point from the Michigan moraine extends out into the valley proper, two miles and a half, in an almost transverse direction, and known as Crum's Point. Just below this point we find an ancient flood plain two miles wide, which was supplied with overflow water from the Michigan basin, and which entirely subsided when the Michigan waters receded from the rim of its basin. This valley is drained by a small meandering stream, known as Grapevine Creek, the rudiment of a mighty glacial stream. Strong and well-pronounced evidences of an ice gorge or dam having formed at Crum's Point, and extending up the river to the mouth of the Dowagiac, are yet plainly visible, from the scouring, leveling and erosion of the morainic hills on the south, and a chain of lakes, and lake beds on the north, which are connected by a gorge through the point with the glacial stream mentioned above. And also at the head of the ice dam which passed well up above the mouth of the Dowagiac, where the waters pouring around it into the Dowagiac Valley excavated an interrupted channel, or chain of depression. These depressions are linear, extending from northwest to southeast, being from one-fourth to three-fourths of a mile long, twenty to forty feet deep, and from two hundred to six hundred yards wide, with sharp and well-defined banks. They all show evidences of having been filled with water for a long period of time. All have become dry except the lower two, which contain from twenty to thirty feet of water at present. This channel or chain of depressions extends from one mile north of South Bend southeasterly to within one mile of Mishawaka, a distance of four miles and a half, as shown on the accompanying diagram. When the ice dam gave way, the waters abandoned their circuitous routes and resumed their old channels, a part of them at this time taking the route down the Kankakee, and a part of them up the Dowagiac Valley, the fall the latter way being three and a half times greater than the former, a channel was soon eroded sufficiently to carry the entire volume of water. A bluff twelve to fourteen feet high, which commenced in the form of a sandbar, the sediment for which was supplied by what is known as Wenger's Creek, extending in a diagonal direction across the Kankakee bed, and parallel to the new current, until it reached the opposite bank, when the Kankakee Valley was sealed forever.

The Kankakee River, from its source to its mouth, took a south-westerly course. When the waters left the old channel they took an almost due northerly course, forming a great bend in the river, with its sharp convexity to the south, which gave our city its name—South Bend.

The two rivers since changing their course have eroded their valleys from fifty to seventy-five feet into the old river deposits, and have not yet attained their base level. The Kankakee Valley at South Bend, where it escapes from between the Maumee and the Michigan moraines, is narrowed down to three miles, with high rugged banks and no flood plain. Five miles east, and up the valley from South Bend, it attains a width of six miles, which width it holds with slight variation until it reaches the rim of the Saginaw basin. This end of the valley is thoroughly drained by the channel of the present St. Joseph River, which has eroded through the old river drift to the extent of from forty to fifty feet. There are a few peat bogs and marshes lying back from the river, where the valley is broad, and the modern channel well to one side. Otherwise the old valley above South Bend is one vast level sand plain. Below South Bend, where the old valley remains silted up, and there is no modern channel for drainage purposes, the spring waters escaping from beneath the Michigan moraine, and from the foot of the Maumee, also bubbling up from the bed of the old stream itself, as I am informed by Mr. William Whitten, in charge of rock excavations at Momence, has been productive of a vast growth of peat or muck over the entire valley proper, from South Bend to Momence. Beneath this peat bed, which ranges from six to ten feet in depth, is found fine sand and river gravel, as shown by excavations made in the construction of a large ditch made with the view of straightening the river. This ditch commences at South Bend, is twenty feet wide, ten feet deep, and twenty miles long, which gives us a comprehensive idea of the materials underlying the bog. If the stream had not changed its course at South Bend and continued down its original valley, eroding a channel or partially cleaning the old silted valley to a depth of from fifty to sixty feet, as the waters have done through their new course, rendering to the Kankakee Valley thereby proper drainage, there would never have been known a "Kankakee Marsh," but all that portion of Indiana would have been a vast sandy plain, covered with oak or barrens timber, and in general appearances the same as that part of the valley above South Bend.