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## THE TEAYS RIVER

KARL VER STEEG,

College of Wooster, Wooster, Ohio

### ABSTRACT

The course of the Teays River, a large Tertiary stream, including the present Kanawha and New Rivers and their tributaries, has been traced from its source in the Piedmont region, westward to the Illinois River. This stream, more than 800 miles long, crossed the entire Appalachian region, passing through the abandoned valley, from a point near St. Albans to Huntington, West Virginia. From Chillicothe, Ohio, the buried valley of the Teays has been traced, by means of well records, in a westerly direction across Ohio, Indiana and Illinois to the Mississippi. The Teays River was a mature stream and drained a maturely dissected region. An early glacier, Kansan or pre-Kansan, dammed its westerly course in Ohio, ponding the waters, forming lake-like expanses in southeastern Ohio. In the ponded areas, slack-water deposits were laid down. The broad valley of the Teays (Kanawha-New) River was an avenue for the migration of plant life from the Piedmont region to southeastern Ohio.

### INTRODUCTION

W. C. Tight<sup>1</sup> was the first to discuss the drainage modifications of southeastern Ohio and to trace the course of the Kanawha River through the abandoned Teays valley in West Virginia to Chillicothe, Ohio, where it disappears beneath the glacial drift. The writer,<sup>2</sup> by means of well records, was able to trace the course of the buried Teays valley in a northwesterly direction from Chillicothe to St. Marys Reservoir in Mercer County, Ohio, and to the Indiana state line. The course, westward through Indiana was traced by Fidler,<sup>3</sup> by means of well records, and roughly follows the Wabash River to its outlet. Horberg,<sup>4</sup> of the Illinois State Geological Survey, established the existence of a large buried valley which he named, "Mahomet River," extending westward from the Illinois-Indiana state line, through central Illinois and entering the well known bedrock valley along Illinois River, formerly occupied by the ancient Mississippi.

Fidler<sup>3</sup> traces the preglacial Teays Valley through Fountain County, Indiana, some distance east of Wabash River, to join the present valley south of Covington.

Horberg<sup>4</sup> proposes an alternative hypotheses in which he suggests that the main valley turned west, near Lafayette, Indiana, through southern Benton County into Illinois, and as Mahomet Valley, continues westward to join the bedrock valley along the Illinois River. To support his view, he states that this valley

<sup>1</sup>Tight, W. G., Drainage Modifications in Southeastern Ohio and Adjacent Parts of West Virginia and Kentucky. Prof. Paper, No. 13, U. S. G. S., 1903.

<sup>2</sup>Ver Steeg, Karl, The Buried Topography of Western Ohio. Jour. of Geology, Vol. XLIV, No. 8, 1936, pp. 918-939.

\_\_\_\_\_, Thickness of the Glacial Drift in Western Ohio. Jour. of Geol., Vol. XLVI, No. 4, 1938, pp. 654-659.

<sup>3</sup>Fidler, M. M., The Preglacial Teays Valley in Indiana. Jour. of Geology, Vol. 51, 1943, pp. 411-413.

<sup>4</sup>Horberg, Leland, A Major Buried Valley in East-Central Illinois and its Regional Relationships. Manuscript read before Section E, Amer. Assoc. Advancement of Science, 1944.

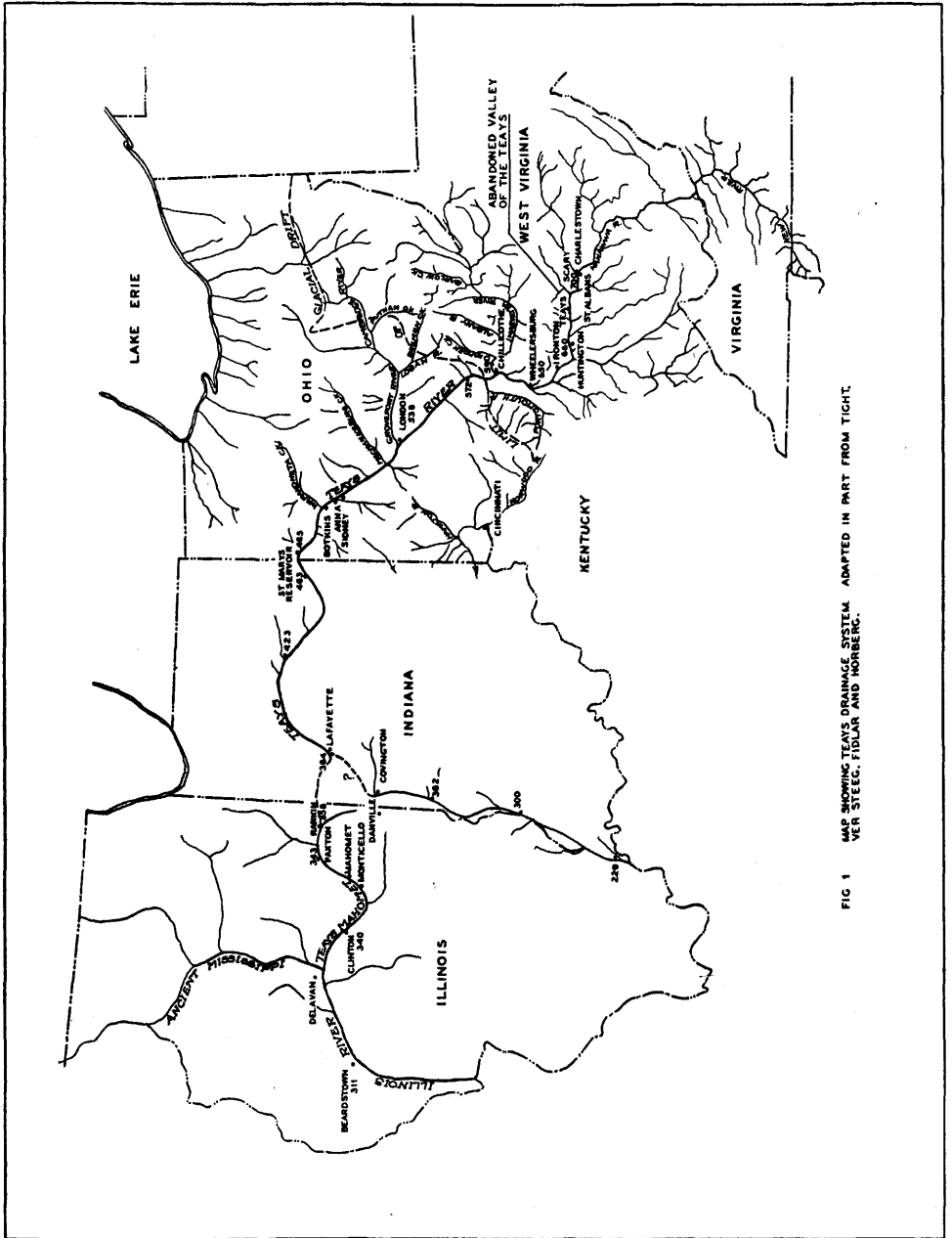


FIG 1 MAP SHOWING TEAYS DRAINAGE SYSTEM ADAPTED IN PART FROM TIGHT, VER STEEG, TIDAL AND NUMBERG.

in southern Benton County appears to be comparable in size to the one above Lafayette; bed rock elevations to the west are lower and more closely spaced than they are to the south, where there is an interval of about 90 miles before comparable low elevations are shown by Fidler; this interval is an area of high bedrock, as indicated by well records and bedrock exposures. Furthermore, Horberg believes that the published evidence supporting the buried valley through Fountain County is inconclusive, and points out that Leverett in a discussion of the wells of Fountain County, in Indiana, makes no reference to an important buried valley within the county. Although the details of the buried drainage lines in the Lafayette region are not clear, the existing evidence strongly indicates that the main preglacial valley of the Teays continued into Illinois.

#### THE COURSE OF THE TEAYS

The name "Teays" was applied by Tight<sup>5</sup> to the stream which occupied the broad depression known as the Teays Valley, in Cabell and Putnam counties, West Virginia. In a general sense, the term is used to indicate the period of erosion in Ohio, before glaciation. The term is applied not only to the great stream and its tributaries, but to the work of all the streams contemporary with it.<sup>6</sup> The immaturely developed erosion surface associated with the Teays system is known in Ohio as the Parker Strath. The Teays River, the master stream of the system, was a large preglacial river and had its source near the eastern escarpment of the Blue Ridge, at the edge of the Piedmont Plateau in North Carolina and Virginia. The New River, the southernmost tributary of the Teays River, rises in Wautauga County in the Blue Ridge area, northeast of Asheville. From thence it flows in a northeasterly direction for some distance and after making a right-angled bend, it trends northward to join the Gauley River to form Kanawha River, which continues in a northwesterly direction to Charleston. In West Virginia, the Teays received the waters of the Greenbriar River, Gauley River, Elk River and numerous minor tributaries, including a drainage area of the entire southern half of the state. In its course, the Teays River cut across the folded Appalachians, a remarkable feature which calls for an explanation as to the origin of its drainage. In addition to the waters of the New-Kanawha system, the Teays River received the major portion of the drainage from an area including one-half to two-thirds of Ohio and a large part of Indiana, Illinois and northern Kentucky. The Teays River, after passing through the abandoned valley, from a point near St. Albans to Huntington, West Virginia, extended across Ohio in a northwesterly direction; its valley buried beneath the glacial drift, continues from Chillicothe to the border of Indiana, near St. Marys Reservoir. From there, its course is westward<sup>7</sup> across northern Indiana to the eastern border of Illinois,<sup>8</sup> where it continues in a westerly direction across that state, into the bedrock valley of the Illinois River. This great stream, one of the largest of Tertiary time, was at least 800 miles long and probably longer, depending upon what evidence one accepts as to its course in Indiana and Illinois.

The significance of the abandoned Teays Valley from St. Albans, West Virginia, to Chillicothe, Ohio, and its relationship to the preglacial drainage in Ohio, was first determined by Tight.<sup>9</sup> This valley varies in width, from three-quarters to one and one-quarter miles, an average of a mile being about correct; its length is about 30 miles from St. Albans to Huntington. No doubt, a large stream once occupied this abandoned valley. Tight includes Flatwoods Valley, from Ashland

<sup>5</sup>*Idem.* 1.

<sup>6</sup>Stout, Ver Steeg and Lamb, Water in Ohio. Bulletin 44, Geol. Surv. Ohio, 1943, p. 51.

<sup>7</sup>*Idem.*, 3, pp. 411-418.

<sup>8</sup>*Idem.*, 4.

<sup>9</sup>*Idem.*, 1.

to Ironton, as an extension of the Teays Valley. From Huntington to Wheelersburg, the present Ohio River, which occupies this portion of the old Teays Valley, did not obliterate all traces of the former occupant, as the floor of the original valley is indicated by the extensive silted flats south of Ashland and the terraces between Franklin Furnace and Wheelersburg on the Ohio side.

At Wheelersburg, the Teays River flowed northward past Minford, Stockdale and Beaver, to Waverly, through a high-level, broad, well-defined open valley. The Scioto River has eroded and partially destroyed the Teays Valley from Waverly to Richmondale, but its floor exists as broad upland flats, near Omega and Higby. The Teays continued northward to Chillicothe, where the old valley disappears beneath a thick covering of Wisconsin drift.

From Chillicothe, the course of the buried Teays Valley, is based on well records plotted by the writer.<sup>10</sup> These are shown on the map (Fig. 2), and include the minimum, maximum and average depth to bedrock. Some of the wells do not reach bedrock and are indicated on the map by the letter "G." From Chillicothe, the Teays Valley can be traced in a northwesterly direction past Andersonville, crossing the southwestern part of Pickaway County, past Atlanta. From there, it crosses the extreme northeast corner of Fayette County near Waterloo, extending in a northwesterly direction past London in Madison County, to Vienna in Clark County, where the Teays was joined by a tributary, the Groveport River,<sup>11</sup> which drained a large area in central Ohio. From Vienna, the Teays River continues in a westerly direction, to a point near Springfield, in Clark County, and thence northward past Boulusville and St. Paris in Champaign County, and Sidney, Anna and Botkins, in Shelby County, to the southeastern part of Washington Township in Auglaize County, where it was joined from the north by a tributary, Wapakoneta Creek. The Teays continued its course westward past the village of Mercer to Rockford, and from there, westward to the Ohio-Indiana state line, in the northwestern part of Rock Creek Township, in Mercer County.

#### TRIBUTARIES OF THE TEAYS RIVER

The tributaries of the Teays, in the unglaciated area beyond the drift border in southern Ohio, exhibit the same characteristics shown by the master stream; the adjacent hills are considerably reduced, the tributaries have low gradients, broad valleys for the size of the streams which occupied them, and dendritic pattern, all features of maturity. The largest of the tributaries in Ohio<sup>12</sup> are the Marietta River, Hamden Creek, Albany River, Barlow Creek, Portsmouth River, Logan River, Bremen Creek, Putnam Creek, Cambridge River, Groveport River, Mechanicsburg Creek, and Wapakoneta Creek.

In his paper<sup>13</sup> on the Teays River in Indiana, Fidler mentions a number of tributaries which have been partially traced. From the size of these streams, it appears that the Teays River drained a large area in northern and central Indiana. Horberg,<sup>14</sup> who traced the Teays River across Illinois, shows a tributary from the north which entered the Mahomet Valley near Paxton, and important tributaries from the south, north of Danville, and in western Logan and Menard counties. Tight<sup>15</sup> shows a tributary, called the Cincinnati River, flowing northeastward from the southwest corner of Ohio, to Dayton, to join the Teays River. There is evidence<sup>16</sup> that the drainage in the Miami basin, just before the advent of the ice age,

<sup>10</sup>*Idem.*, 2.

<sup>11</sup>*Idem.*, 6, Map of Teays Drainage, p. 50.

<sup>12</sup>*Idem.*, 6, pp. 57-70.

<sup>13</sup>*Idem.*, 3, pp. 412, 413, 416, 417.

<sup>14</sup>*Idem.*, 4.

<sup>15</sup>*Idem.*, plate I.

<sup>16</sup>*Idem.*, 2, p. 927.

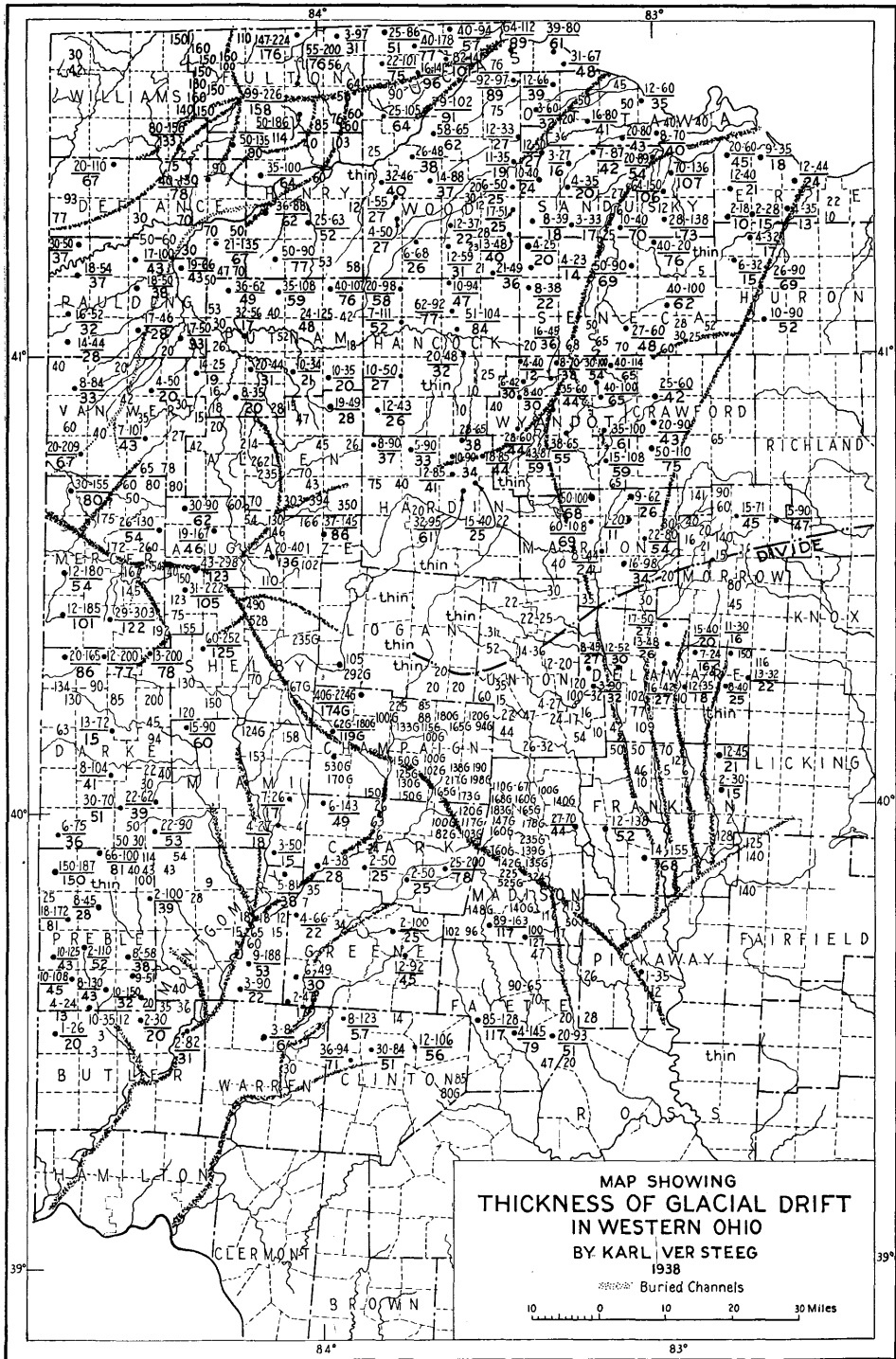


Fig. 2. Map showing the buried valley of the Teays River and other streams in Ohio. Figures above the line indicate minimum and maximum thicknesses. Figure below the line represents the average thickness. The letter "G" indicates that bedrock was not reached.

was southward as it is today. This evidence is based on the general slope of the bedrock surface in the Miami basin. It appears that a divide existed between the preglacial Teays and the Miami watershed. Well records do not indicate a broad depression which widens northward and is of sufficient size to have accommodated so large a stream as the Cincinnati River.

#### STAGE OF DEVELOPMENT IN THE CYCLE OF EROSION

The Kanawha Valley at St. Albans, West Virginia, is about the same size as the Teays Valley; an average width of about a mile. The stream that occupied the Teays Valley from St. Albans to Wheelersburg, Ohio, was nearly the same size as the Kanawha River near St. Albans and Charleston, which is smaller than the present Ohio River. The buried Teays Valley in Ohio may have a width of as much as five miles, in places.

Fidlar<sup>17</sup> does not give the width of the Teays Valley in Indiana but indicates that it is a broad depression.

Homberg<sup>18</sup> states that the inner portion of the buried Teays (Mahomet) River valley lying below elevations of 450 feet, is about four miles wide near the east state line, five miles in central Piatt County and about fifteen miles in DeWitt County; although the valley walls cannot be sharply drawn in most places because of the lack of detailed data, a notable widening is indicated for the downstream portion of the valley. He also indicates<sup>19</sup> that the valley of the Teays (Mahomet) River in Illinois was mature and cites the relative width and depth and the wide distribution of low elevations in DeWitt County, which suggest the presence of a floodplain.

Tight<sup>20</sup> believed that beginning with the old Tertiary peneplain as a base, a very long cycle of erosion produced the topographic features of the Teays Valley and its well-graded floor, which must have stood near base-level for a considerable length of time. Although there is little evidence for the stage in the erosion cycle of the buried Teays Valley in Ohio, it is assumed, from the appearance of the abandoned valley from St. Albans to Chillicothe, and from the width of the buried valley as determined by well records, that it was in the mature stage. Fidlar<sup>21</sup> states that the Teays Valley had reached the stage of maturity before the advent of the Pleistocene ice sheets.

The bed rock of the Teays Valley has an altitude of about 700 feet at Scary on the Kanawha River; 660 feet at Huntington, West Virginia; 650 feet on Dogwood Ridge near Wheelersburg, Scioto County, Ohio; 645 feet near Glade, Jackson County; 640 feet near Givins, and 630 feet at Omega, Pike County; 610 feet near Vigo, 592 feet at Schooleys, and 590 feet at Chillicothe, Ross County; 572 feet near Atlanta, Pickaway County; 530 feet near London, Madison County; and 465 feet under St. Marys Reservoir in Mercer County. The gradients and floor levels of the tributary streams conform quite well, indicating that the elevations along the floor of the buried Teays Valley are approximately correct.<sup>22</sup>

From Huntington, West Virginia, to Schooleys, near Chillicothe in Ross County, a distance of about 90 miles, the rock floor of the Teays Valley descends about 9 inches to the mile. From Schooleys to the St. Marys Reservoir, the distance is about 133 miles and the fall of the rock floor is 132 feet, or nearly one foot per mile. From Huntington to the St. Marys Reservoir, a distance of 233 miles, the gradient is 10.76 inches per mile.

<sup>17</sup>*Idem.*, 3.

<sup>18</sup>*Idem.*, 4.

<sup>19</sup>*Idem.*, 4.

<sup>20</sup>*Idem.*, 1, p. 56.

<sup>21</sup>*Idem.*, 3, p. 412.

<sup>22</sup>*Idem.*, 6, p. 53.

The bedrock elevations along the Teays Valley in Indiana, according to Fidler,<sup>23</sup> are as follows: Jay County, 463 feet; Miami County, 423 feet; Lafayette, Indiana, 384 feet; Oxford, Benton County, 300 feet. According to Fidler,<sup>24</sup> the Teays Valley in Indiana, had a gradient of approximately 8 inches per mile; the bedrock floor drops from an altitude of 463 feet in northwestern Jay County, to an altitude of 229 feet in southwestern Posey County.

In Illinois, the elevations along the floor of Teays (Mahomet) Valley, according to Horberg,<sup>25</sup> are as follows: Rankin, Vermilion County, 358 feet; Paxton, Ford County, 343 feet; Clinton, DeWitt County, 340 feet; Beardstown, Cass County, 311 feet. This is a fall of 47 feet. A gradient of 7 inches per mile is indicated for that portion of the Teays above Beardstown, Illinois.

From all the evidence, such as the great width and low gradient of the Teays Valley, and the bordering hills, which are well-rounded and graded, one would assume that it was in the mature stage of the cycle of erosion. Everywhere, in West Virginia, central and southern Ohio, the adjacent hills were reduced and the land highly dissected in dendritic pattern. In preglacial time, in western Ohio, on the easily eroded shales and limestones which were peneplaned, the valleys in the Teays stage were broad, such as would exist in a region worn down to an advanced stage of erosion. From North Carolina to Chillicothe, Ohio, the New-Kanawha River is entrenched below an extensive erosion surface which is known as the Harrisburg peneplane. The erosion level, known as the Parker Strath and also as the Teays surface, is younger and does not appear to be developed to any great extent in the Allegheny Plateau province in Pennsylvania and West Virginia. What surface it is correlated with, in the folded Appalachians, is not determined. The Parker Strath represents the immature peneplane or partially developed base-level evolved in Teays time. This erosion surface should be more extensively developed in western Ohio on the widespread, weaker limestones and shales of Silurian and Devonian time. Furthermore, the vertical distance the streams had to cut down to reach grade or base-level, was less than farther east in the Allegheny Plateau area, where harder Mississippian and Pennsylvanian sandstones and conglomerates stand higher and offer more resistance to erosion. The original slope of the Appalachian Plateau was toward the east as it is today, and the first streams probably worked headward from the west and northwest.

In Ohio, the buried Teays Valley is entrenched below an upland surface. At the London Prison Farm, located northwest of London, in Madison County, Ohio, one well record shows that the drill penetrated 525 feet into glacial material and did not reach bedrock. A short distance to the east, another well record shows a depth of only 324 feet to bedrock. Here, the wall of the buried valley is steep and makes a sharp break with the old surface. A study of the well records indicates a deep valley (Fig. 2), comparatively narrow in places, with rather steep sides. In Shelby County, near the town of Anna, a deep, narrow valley is indicated by well records, showing more than 500 feet of glacial drift. To the east and west of this channel, the elevation of the bedrock is about 800-900 feet. A deep, and comparatively narrow valley is indicated by the well records in Mercer County at St. Marys Reservoir, the surface bordering the trough standing at 700-800 feet.

Fidler<sup>26</sup> states, that in Indiana the well records show that the bedrock surface slopes gradually toward the Teays Valley, and that this slope becomes abrupt at the site of the rock trough. He points out, that near central Blackford County, the bedrock surface drops more than 250 feet in less than one-fourth of a mile. The bedrock upland in this vicinity has an altitude of approximately 800 feet above

<sup>23</sup>*Idem.*, 3.

<sup>24</sup>*Idem.*, 3, Abstract, p. 411.

<sup>25</sup>*Idem.*, 4.

<sup>26</sup>*Idem.*, 3, p. 415.

sea-level and the valley floor is at least 350 feet lower. Fidler's figures on the depth of the Teays Valley do not indicate that it is shallow with gently sloping sides. In Illinois,<sup>27</sup> the bedrock elevations along the buried valley are less than 400 feet above sea-level, or 200 to 300 feet lower than the elevations on the adjoining bedrock uplands. Its average depth is given as about 200 feet. According to Horberg,<sup>28</sup> there is a suggestion that the Teays Valley, in Illinois, may have been eroded during two cycles, as the inner valley is entrenched below a broad, outer valley. This is indicated by the pronounced break in slope below the 550-500 foot contours and by the absence of comparable low elevations outside the inner valley. The Teays Valley becomes broader to the west, which is as one would expect. It appears that the buried preglacial bedrock surface on the uplands along the Teays in Ohio and Indiana, is the equivalent of the same buried surface in western Ohio, which is believed by some geologists to be the same as the Parker Strath. This surface was developed in late Tertiary time and has been called the Teays erosion surface,<sup>29</sup> since it was developed along that preglacial stream and its larger tributaries, just before the advent of the Pleistocene ice-sheets.

The most striking features of the topography of the area drained by the Teays River, from its source and across the folded Appalachians, through the Allegheny Plateau and southeastern and central Ohio, are the upland peneplane, the mature valleys of the old cycle, the deeply cut trenches of the present drainage, and the terrace fillings in the bottoms of those trenches. A summary of the events which took place in southeastern Ohio are: (1) the reduction of the region to the base-level of the early Tertiary peneplane (Harrisburg); (2) the elevation of the early Tertiary peneplane and the rejuvenation of the mature drainage, with the entrenchment of the streams in deep valleys, which retain the meanders of the ancestral streams; (3) the gradation of the drainage, with the development of mature topographic features and the reduction of the upland peneplane (Harrisburg), with the development of dendritic drainage; (4) slack-water conditions, produced by the Kansan or pre-Kansan ice-sheet, with the widespread deposition of silts up to the present elevation of 860 feet and to a depth of as much as 80 feet or more in places, and many deflections of drainage from the old lines; (5) rejuvenation and deep erosion of the new lines of drainage below the level of the old system. This period of erosion is known as the Deep Stage<sup>30</sup> and is interglacial, beginning with the Kansan or pre-Kansan ice-sheet and closing with the advent of the Illinoian glacier; (6) interruption of the Deep Stage and the filling of the valleys with Illinoian till, glacial gravel trains and silts; (7) the erosion of the valley fillings and the cutting of the intermediate terraces to the depths of the present streams; (8) Wisconsin glaciation and filling of the valleys with till and outwash; (9) the reduction of the volume of the streams and continued stream action to the present time under existing conditions. From the inauguration of the Kansan or pre-Kansan ice-sheet, the Teays drainage system in Ohio was tremendously changed, during the advance and retreat of the Illinoian and Wisconsin glaciers.

#### CORRELATION OF EROSION SURFACES IN ILLINOIS

According to Horberg,<sup>31</sup> a preliminary study of the erosion surfaces in Illinois suggests that the Teays (Mahomet) Valley is entrenched below the level of a surface which is probably younger than the Dodgeville or southwestern Wisconsin. In the Havana region, the inner valley of the buried Teays (Mahomet) River appears to be eroded below the level of a still younger strath, which is about 500

<sup>27</sup>*Idem.*, 4.

<sup>28</sup>*Idem.*, 4.

<sup>29</sup>*Idem.*, 6, p. 51.

<sup>30</sup>*Idem.*, 6, p. 78.

<sup>31</sup>Horberg, Leland, Communication by letter.



feet above sea-level. Similar straths are present in the Kaskaskie and Wabash basins. Horberg finds no evidence of important bedrock erosions during the Yarmouth interglacial epoch, which would correlate with the Deep Stage in Ohio. He believes Mahomet Valley was eroded to its maximum depth in pre-Kansan and probably pre-Nebraskan time. He points out that the strath in central Illinois occupies a position similar to the Parker in Ohio. He suggests that perhaps the pre-Kansan entrenchment did not reach headward as far as Ohio.

#### PONDING OF THE TEAYS RIVER

From Franklin Furnace, in Scioto County, to Chillicothe, in Ross County, Ohio, parts of the old Teays Valley show good exposures of silts; sandy silts near bedrock and very finely laminated Minford silts at the higher levels. The materials that may be present in the deposits are coarse matter, fine-grained sand, siliceous and ferruginous silts, very fine-grained laminated silts and heterogeneous outwash from side streams. A study of the deposits in the Teays Valley and its tributaries indicates that some material must have come from the metamorphic and igneous rocks as far east as the Piedmont Plateau. These deposits also occur in the abandoned valley of the Teays from Scary to Huntington, West Virginia.<sup>32</sup> It is believed<sup>33</sup> that the advance of the Kansan or pre-Kansan ice-sheet to central Ohio blocked the westward course of the Teays River and other streams flowing northward, causing them to seek new outlets south of the edge of the ice. The drainage was considerably modified and long, marginal finger lakes were formed in which were deposited the slack-water Minford silts. They were deposited in rather deep quiet waters which were ponded to lake-like conditions throughout the valleys. The ponded water must have existed for a long time, sufficient for at least 80 feet of silt and sand to accumulate. This silt filled the valleys to a level not far from 900 feet. The ponded area was of great size and although its southern and south-western boundaries at the time of its maximum depth are not clear, it probably extended as far west as the Licking Valley of Kentucky, as far east as the present Kanawha River in West Virginia, as far north as northern Ross and Athens counties, and 40 to 50 miles south of the present Ohio River. In Kentucky, a number of glacial boulders of large size and Canadian origin have been discovered by geologists above an altitude of 900 feet, and more than 50 miles south of the known glacial boundary. One glacial boulder, estimated to weigh about 16 tons<sup>34</sup> lies at an elevation of 1009.3 feet. Because this altitude is well above the 900-foot level, which is believed to be the approximate elevation of the ponded water, geologists have been puzzled as to how this huge erratic could have been laid down at its present level, even though it was rafted by an iceberg. It might be assumed that the level of the water may have fluctuated in elevation, and under certain conditions an iceberg or mass of floating ice may have reached that altitude. All the silt deposits are at, or below, a level of 860 feet. The waters which fed the ponded area was drainage from the plateau and melt-water from the Kansan or pre-Kansan ice-sheet, located to the north. Such a marginal lake must have been subject to fluctuations in water level, because of the floods due to heavy rainfall and melting snows on the plateau, as well as rapid melting of the ice-sheet. The great accumulation of slack-water deposits, to a level of 860 feet, buried the old preglacial valleys and underlying topography. When the lake was drained, many of the streams did not return to their former courses. New outlets were opened to the Ohio River. These streams followed old drainage lines where they still

<sup>32</sup>Stout, Wilber, and Schaaf, Downs; Bulletin Geological Society of America, Vol. 42, pp. 665-666, 1931.

<sup>33</sup>*Idem.*, 6, p. 78.

<sup>34</sup>Jillson, W. R., The Early Pleistocene Glaciation in Northeastern Kentucky. Bulletin Geological Society of America, 50, 1931.

existed, and cut new channels at many places. The ponding of the valleys in front of the Kansan or pre-Kansan ice-sheet caused considerable disarrangement of the preglacial drainage lines. Through obliteration of the lower courses of the Teays streams by glacial action and through flooding of the remaining parts of the courses, new drainage lines were established by the ponded waters seeking new outlets to the sea. These new streams are known as the Deep Stage drainage of post-Kansan or post pre-Kansan age. They cut youthful valleys below the Teays drainage level.

The major events in the drainage changes as put forth in part by Tight<sup>35</sup> and later, with modifications by Stout, Ver Steeg, and Lamb,<sup>36</sup> are as follows: The first event was the advent of the Kansan or pre-Kansan ice-sheet, which blocked the streams which flowed in a northwesterly and northward direction. This resulted in the formation of a large stretch of ponded water in the valleys of the Teays River and its tributaries, in Ohio and West Virginia, and the Licking River system in Kentucky. Thick accumulations of slack-water silts were deposited in this lake-like body of water. This resulted in the development of new outlets, modification and reversal of drainage. Later events include the advances of the Illinoian and Wisconsin ice-sheets and the modification of the silts, sands and clays. In pre-Illinoian time, during the interglacial epoch, known as the Deep Stage, the Ohio River and its tributaries cut their valleys to greater depth. Subsequently, interglacial and present day streams produced terraces by erosion of the slack-water filling in the valleys.

#### THE TEAYS VALLEY AS AN AVENUE FOR PLANT MIGRATION

Transeau<sup>37</sup> points out that the ponding in southern Ohio would have a profound effect on the vegetation of the area covered by the silts. The submerged vegetation would be destroyed and there was a complete change in the soils, to which plants that survived on islands and peninsulas may have subsequently migrated. When the streams flowed northward, in preglacial time, the soils of the submerged area were derived from the sandstones and shales of the plateau. When the ponding took place, the streams from the glaciers carried calcium and magnesium carbonates from the limestone area of central and northern Ohio. It was not until the silts were removed by erosion, that many of the plant habitats were removed and developed their present characteristics. Transeau believed that there are many localities in southern Ohio where, for example, the rhododendron might be expected to grow but in which it is absent. According to Wolfe,<sup>38</sup> southern plants reached Ohio along the hilltops and ridges of the Cumberland Plateau, across the route of the present Ohio River, and by way of the flood plains and adjacent bluffs of the preglacial Teays River system, the headwaters of which reached far to the southeast into western North Carolina. It is believed that the Teays and other rivers with headwaters in the Appalachians have been effective agencies of migration and it is probable that many southeastern species of plants were living in the plateau section of Ohio before the advent of the ice in Pleistocene time. Wolfe<sup>39</sup> points out that a large number of isolated Appalachian and southern species of plants are known in the southern Ohio area. Their arrival, isolation in well-defined areas, and their persistence, are doubtless associated with the succession of events in the physiographic history of the region.

<sup>35</sup>*Idem.*, 1.

<sup>36</sup>*Idem.*, 6, pp. 51-106.

<sup>37</sup>Transeau, Edgar Allen, Prehistoric Factors in the Development of the Vegetation of Ohio. *Ohio Journal of Science*, Vol. XLI, No. 3, May, 1941, pp. 207-211.

<sup>38</sup>Wolfe, John N., Species Isolation and a Preglacial Lake in Southern Ohio. *Ohio Journal of Science*, Vol. XLII, No. 1, Jan. 1942, pp. 2-12.

<sup>39</sup>*Idem.*, 38.

## ORIGIN OF THE TEAYS (KANAWHA-NEW) RIVER

The upper section of the Kanawha is known as the New River and its headwaters may be said to be almost on the Atlantic slope, for they lie on the southeastern side of the Blue Ridge Mountains in North Carolina. Tight<sup>40</sup> mentions the Kanawha River as being antecedent to the Appalachian uplift. The slope of the ridges and hilltops in the Appalachian province, toward the Kanawha-New River, indicates that the Schooley and Harrisburg surfaces had a marked inclination toward the trunk stream and its major tributaries. The broad sags on the ridge crests throughout the Appalachians, below which the major streams have cut their gaps, represent the old valleys on the Schooley surface. It is evident that the courses of the major streams in the Appalachians, including the Kanawha-New, were established during or before the Schooley cycle. It appears to be impossible for the streams in the folded Appalachians to have been superposed on the Schooley peneplane, a surface of considerable relief.<sup>41</sup> The Delaware, Susquehanna, Schuylkill, Lehigh and Potomac rivers cross hardrock ridges in their course eastward to the Atlantic. One of the theories for the origin of the courses of these streams has been explained by regional superposition on an extended coastal plain cover<sup>42</sup> over a peneplane earlier than the Schooley.

The Kanawha-New River, a major stream, crosses the entire folded Appalachian belt. Its course is one of the most remarkable in the Appalachian region. In all the discussions concerning superposition in the Appalachians, little has been written as to the origin of the Kanawha-New drainage across the ridges. For one to explain the courses of the major eastward-flowing rivers in the Appalachians as inherited from a superposed cover, and attempt to use another explanation for the Kanawha-New drainage, violates all principles of logical reasoning. One must be consistent and admit that if the eastward-flowing streams in the folded Appalachians were superposed, the Kanawha-New River, in the same general area, doubtless had the same physiographic history. Johnson<sup>43</sup> suggests that southeast-flowing master streams of the Appalachian slope, inherited their courses from a coastal plain cover which reposed upon a peneplaned surface of pre-Schooley age and which formerly extended, in some places at least, from 125 to 200 miles northwest of the present innermargin of the coastal plain deposits.

The depth and width of the buried Teays valley in Illinois, Indiana and Ohio appear to indicate a large and old stream. Its lower course must date back far into pre-Tertiary time. Since the Teays (Kanawha-New) River is entrenched below the Schooley and Harrisburg surfaces in the folded Appalachians and Appalachians and Allegheny Plateau, one would assume that an enormous amount of erosion had taken place since its original course was established. The broad sags on the ridge crests below which the stream has cut its gaps, would appear to indicate that the Teays (Kanawha-New) River existed in the Schooley cycle and perhaps earlier. Wright<sup>44</sup> calls attention to the fact that it is difficult to explain the westward course of the Teays (Kanawha-New) River on the Piedmont Plateau, beveled by the Harrisburg peneplane, which apparently sloped eastward. There are many unsolved problems concerning the origin of the drainage in the Appalachian region and any general consideration of such drainage problems should include the history of the Teays River, one of the largest and longest streams in the Appalachians. The course of the Tennessee across the Appalachian ridges and Cumberland Plateau also merits the same consideration. Undoubtedly, the history of all the streams in the folded Appalachians is closely related to the same general causes.

<sup>40</sup>*Idem.*, i, p. 15.

<sup>41</sup>Ver Steeg, Karl, *Annals New York Academy of Science*, Vol. XXXII, pp. 87-220.

<sup>42</sup>Johnson, Douglas, *Stream Sculpture on the Atlantic Slope*. Col. Univ. Press.

<sup>43</sup>*Idem.*, 42, p. 133.

<sup>44</sup>Wright, Frank, *Communication*.