

SOME NORTH AND SOUTH STREAM VALLEYS IN ILLINOIS AND THEIR VEGETATION

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A considerable portion of Illinois is characterized by a relative level upland in which streams have cut channels and developed valleys of varying depth and width. This upland has its surface covered with rich dark colored soils described by Hopkins and his associates (1) as upland prairie soils under the designations "brown silt loam" and "black silt loam". These soils, consisting of loam formed principally from wind-blown material, have a depth of 3 to 5 feet and are covered with a grassland that has been well described by Sampson (2). In contrast, the stream valleys display soils characterized as timber soils by the Department of Soil Survey of the State Agricultural Experiment Station and by them called "yellow-gray silt loam", or "upland timber soil".

The distribution of these soils and the character of their vegetation in LaSalle County has been discussed previously by Fuller and Strausbaugh (3). In this county the prairie soils cover about 80 per cent of the surface, while the timber soils are limited to 12 per cent and are distributed irregularly along the streams. It has also been pointed out (4) that it seems to be certain that all these timber soils were covered originally with forests and that no forests have ever developed upon the prairie soils. In a further attempt to explain the distribution of vegetation, which here seems to be limited by soil conditions, Fuller (5) has emphasized the peculiarities of the distribution of such timber soil along north and south streams, and has shown that the strip on the east side of the stream is almost always the wider and that it often reaches twice the extent of that on the west bank. Such uneven distribution of timber soils and forest is well illustrated along Big Indian Creek, a tributary of the Fox River.

The explanation usually current for the narrower strip on the west side of the stream is that prairie fires in

their advance, driven by the prevailing westerly winds, make greater inroads upon the western edge of the forest than upon the eastern. Such destruction of trees and tree seedlings has been supposed to account for contraction of woodland areas along their western margins. In order to test the truth of this hypothesis and to discover whether the limits of the woodlands coincided with those of the slopes of the stream valley, through the courtesy of the State Forester, the junior author of this article ran a number of sectional lines or transects from west to east across the valleys of Little Indian Creek and Big Indian Creek in groups of two or three at intervals of from one-half mile to one mile. The position and extent of one group of three of these lines are shown in Fig. 1.

Along these lines the slope was determined accurately by levels and the results have been reduced to uniform scale, and a series of cross sections of the stream valleys have resulted that exhibit graphically the relative width and slope of the stream (Figs. 2, 3, 4). Each group of sections may be considered independently.

The sections A, B, and C across the valley of Little Indian Creek (Fig. 2) show that the valley is about 40 feet deep and that an average of the three sections gives a strip of timber soil (formerly covered with forest) 1000 yards wide on the west slope and a corresponding strip 2300 yards wide on the east slope. Further, the limits of the timber soil coincide exactly with the edge of the stream valley.

Another series of cross sections, D and E, from the upper part of Big Indian Creek (Fig. 3) show a valley 30 to 35 feet deep with slopes 600 yards wide on the west and 1600 yards wide on the east. Here, too, the angle of the western slope is decidedly greater than that of the eastern and the coincidence of the edge of the stream valley and the extent of the timber soil decidedly marked.

A third series, F, G, and H, come lower down the stream where Big Indian Creek has been augmented by the influx of the waters of the tributary, Little Indian Creek, and the waters have cut into the underlying rock (Fig. 4). Here the valley is about 80 feet deep, and the

average width is 1100 yards west of the stream and 2200 yards east, while again the coincidence of the soil and the timber is very close.

From these examinations of the contours of the stream valleys it is evident that the timber soil varies in its distribution with the varying slopes of the valleys. Indeed, a close examination of such timber soils makes it entirely clear that they are but the subsoils of the prairie silt loams where the latter have been removed by stream erosion. The comparative youth of the stream valleys has permitted little modification of the soil upon their slopes. It is therefore clear that if, as has been shown, the edge of the slope of the valleys marks the limit of the timber soil, and hence that of the original distribution of forest associations, prairie fires cannot be accepted as an adequate explanation of the narrowness of the wooded strip on the western slope of the stream. The cause must rather be sought in some factor that affects the slope of the stream valley and thus indirectly the distribution of timber soils and their forest cover.

Two such explanations seem possible, either one of which is more satisfactory than the fire theory. Geologists have found that on account of the rotation of the earth the waters of the north and south streams have been deflected somewhat to the west and have thus eroded the western bank more rapidly and given rise to valleys of unequal slope. It seems rather doubtful, however, if the volume of water in these small streams is sufficient to account for the very decided difference here seen in the slopes of the two sides of the valley. Examining somewhat similar small north and south streams on Long Island, Jennings (6) is inclined to reject such an explanation.

The other, and in the opinion of the writers, the more logical explanation is that the wind-borne soil material transported by the prevailing westerlies has been continually sifting in upon the western slopes and tending to fill up the western half of the stream valleys. This has at one and the same time checked erosion and caused the grassland to tend to invade the woodland. This explanation has been accepted by Jennings as the most

reasonable for similar erosion phenomena on Long Island, and it seems to apply with even greater force in a region where the upland soil consists, according to authorities quoted, of wind-blown loessial material. We may, therefore, conclude that the prevailing westerly winds are the factor limiting the westerly extent of the forest strips bordering north and south streams in Illinois, but they are effective through the transportation of soil material rather than through their influence on the advance of prairie fires.

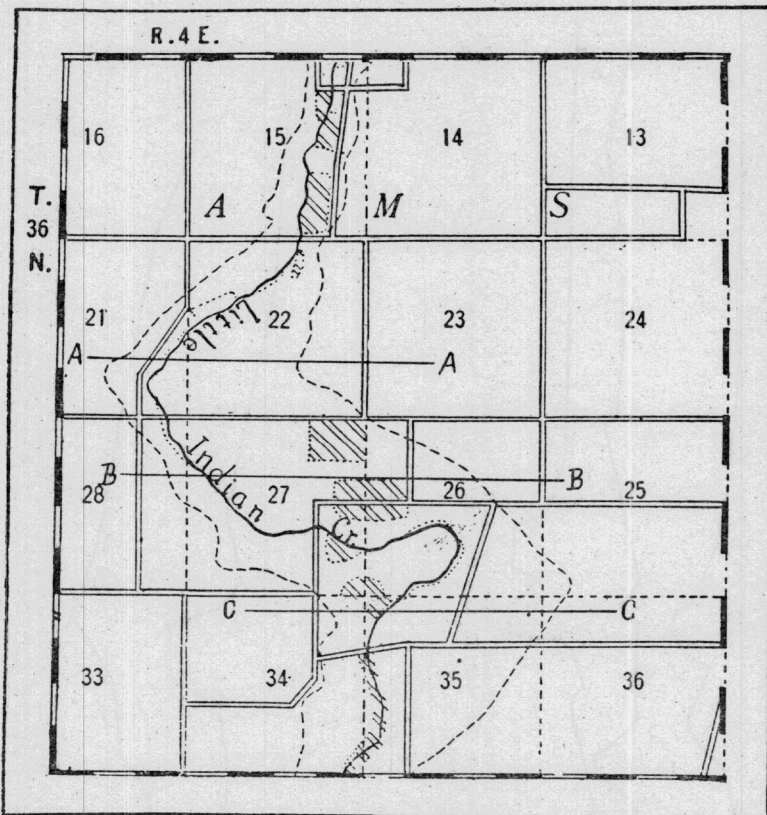


Fig. 1. Map of a portion of Little Indian Creek in Adams Township, LaSalle County, Ill., showing the original extent of the forests on the "upland timber soil," indicated by broken lines. On either side of the stream, the remnants of the forest, indicated by oblique hatchings and the transects A, B, and C, run from west to east across the stream valley.

LITERATURE CITED.

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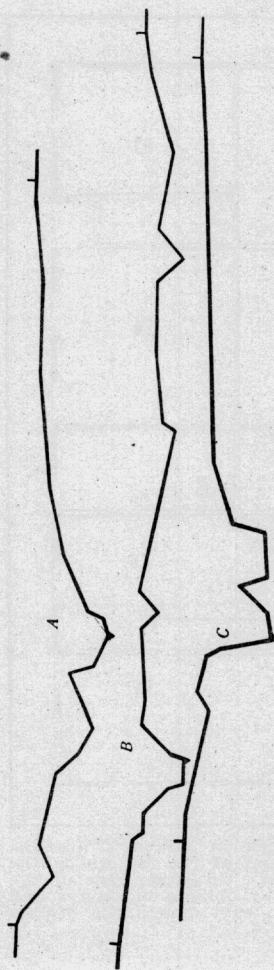


Fig. 2. Sections of the stream valley made by transects A, B, and C. The vertical scale is about 25 times the horizontal, and the limits of the "upland timber soil" are shown by short vertical lines.

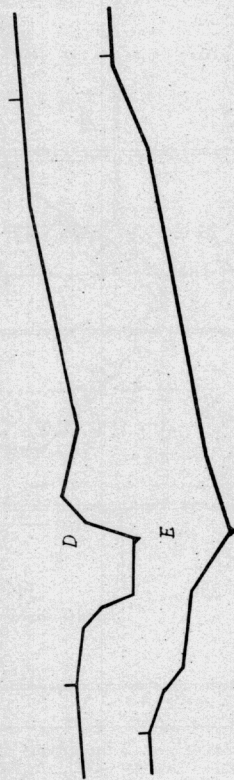


Fig. 3. Sections of the stream valley made by transects D and E. The vertical scale is about 25 times the horizontal, and the limits of the "upland timber soil" are shown by short vertical lines.

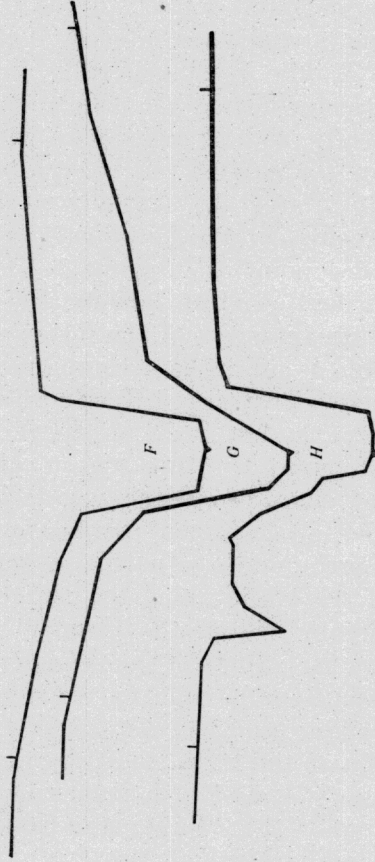


Fig. 4. Sections of the stream valley made by transects F, G, and H. The vertical scale is about 25 times the horizontal, and the limits of the "upland timber soil" are shown by short vertical lines.