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TILL-LIKE DEPOSITS SOUTH OF KANSAS RIVER IN DOUGLAS COUNTY, KANSAS

WALTER H. SCHOEWE

The line marking the position of the maximum advance of the Kansan ice sheet in northeastern Kansas has been established by investigators at various places as lying either north or south of Kansas or Kaw river. The earlier maps,¹ figure 1, show the drift border as being south of the river and extending at least as far south as 38° 50' north latitude. Of the more recent work that done by Todd² not only represents the latest but also the most thorough. This investigator locates the edge of the Kansan ice sheet as lying north of the Kaw river valley from a point midway between Lecompton and Lawrence to Kansas City, Kansas. See heavy continuous line, figure 1. This line separating the glaciated from the unglaciated area in Kansas is essentially the one adopted by the Kansas Geological Survey and published on its more recent maps.³

The presence of erratics and exposures of what appeared to be till was first called to the writer's notice some time ago while he was passing hurriedly through the country in a car. The presence of the familiar red quartzites so numerous around Lawrence aroused no special surprise as these are indicated in the literature of the region. Not so, however, with the till-like exposures, especially as no typical till was known to exist at least within ten miles north of Lawrence. The nearest outcrop to Kansas river is in the vicinity of Linwood and Lenape.⁴ Opportunity presented itself later for a somewhat more detailed investigation of several of these deposits. The exposures, which are all in Douglas county

¹ Hay, Robert, Geological and Topographical Map of Kansas: Geology and Mineral Resources of Kansas, Eighth Biennial Report of the State Board of Agriculture, 1891-'92.

Chamberlin, T. C., and Salisbury, R. D., Preliminary Paper on the Upper Mississippi Valley, Plate XXI, Diagrammatic Map of Drift Currents Adjacent to the Driftless Area: U. S. Geol. Survey 6th Ann. Rept., 1885.

² Todd, J. E., Kansas During the Ice Age: Trans. Kansas Acad. Sci., Vol. 28, pp. 33-47, 1917.

³ Moore, R. C., Oil and Gas Resources of Kansas, Part II, Geology of Kansas, Outline Map showing distribution of the Quaternary deposits of Kansas, Plate XIII, p. 92: Bull. 6, Kansas Geological Survey, 1920.

⁴ Todd, J. E., Kansas During the Ice Age: Trans. Kansas Acad. Sci., Vol. 28, p. 35, 44, 1917.

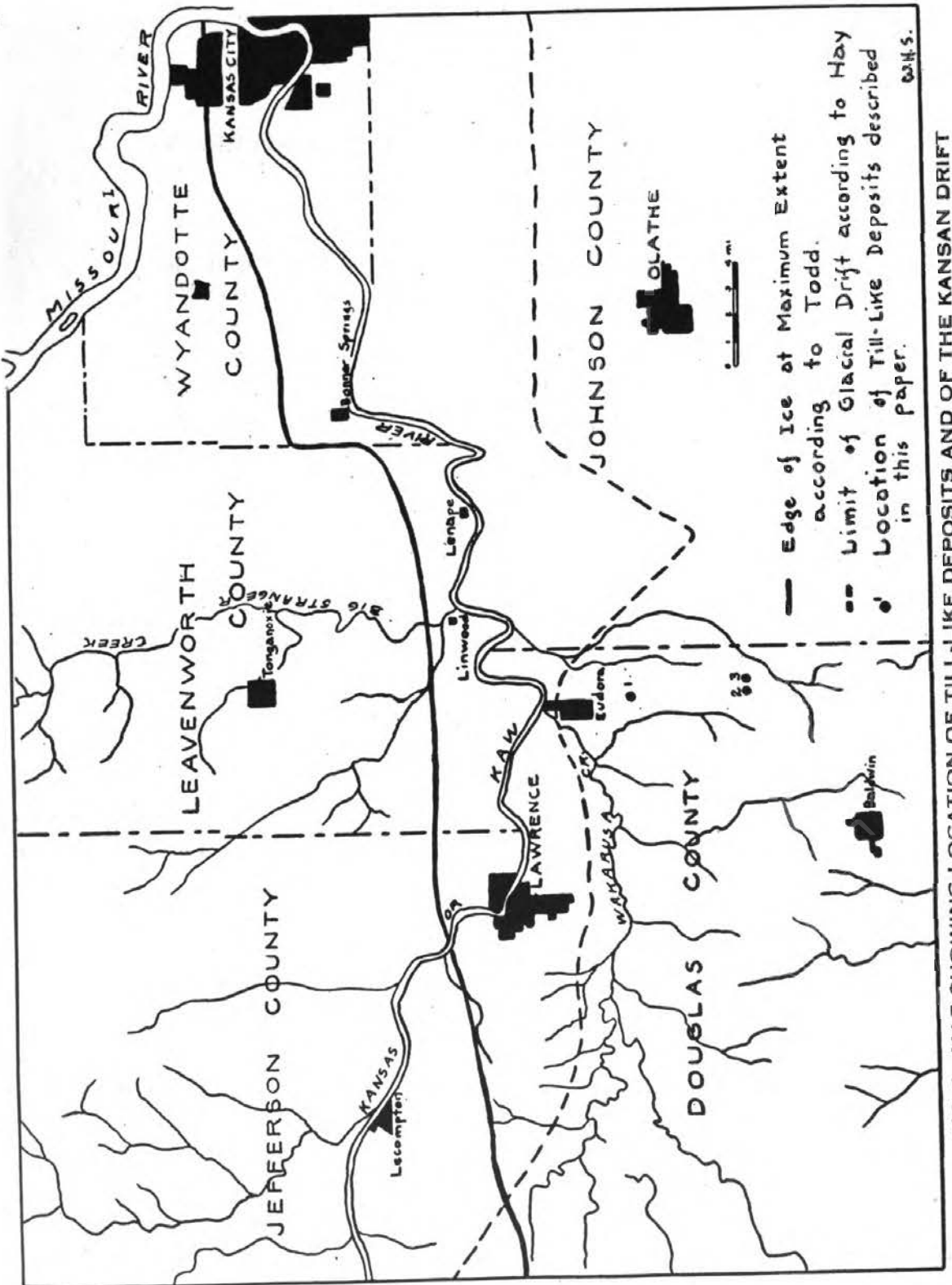


FIG. 1. MAP SHOWING LOCATION OF TILL-LIKE DEPOSITS AND OF THE KANSAN DRIFT

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and from three to seven miles south of Eudora, are interpreted by the writer as being till.

The three chief outcrops, all of which are in road cuts, are located as follows:

1. SW. cor. NW. $\frac{1}{4}$ sec. 21. R. 21 E., T. 13 S.
2. SW. cor. sec. 9. R. 21. E., T. 14 S.
3. $\frac{1}{2}$ mile east of exposure 2.

The material at these places is exposed in road cuts from 100 to 200 feet long and three feet deep. In all cases the drift is composed of a brown more or less sandy to sticky clayey material thoroughly leached and containing numerous pebbles and boulders. Some stratification is at places in evidence. The coarser materials consist chiefly of red quartzites, well decayed granites, brown to white cherts, gneisses, schists and sandstones. In size, the pebbles average less than one-half inch in diameter. The larger boulders, which are more numerous at exposure 2, measure over one foot in diameter and consist for the most part of red Sioux quartzites.

In all cases the till is exposed on gentle slopes leading down to young valleys. A loesslike silt covers the till-like materials in most places and in some instances small pebbles of quartzite, chert and quartz are included in the overlying cover. The immediate country is relatively flat with few shallow valleys cut in it. Because of this topography exposures are very few and in most cases nothing but the siltlike material appears at the surface.

INTERPRETATIONS OF THE DEPOSITS

To account for the presence of these deposits several interpretations may be presented:

1. The material is in situ having been deposited by the Kansan ice sheet which advanced farther south than is indicated by the position of the mapped glacial border according to Todd.
2. The material is in situ having been deposited by a tongue of the main ice mass rather than by the ice sheet itself.
3. The material is not in situ having been brought to its present position by debris-laden icebergs floating on a lake or in the current of a stream, or having been deposited as outwash.

View 1. Country south of Kansas river glaciated.—According to this hypothesis, the Kansan ice sheet crossed the valley of Kansas river and advanced southward at least as far as the two southernmost outcrops. The deposits, therefore, represent till in situ. Whether the entire ice mass crossed the valley,

it is difficult to determine with the knowledge at hand. Insufficient exposures and lack of thorough investigation up to the present time make it impossible to come to definite conclusions. To the writer it seems not at all unlikely that the region south of the Kaw valley has been glaciated. The topography is flat, the slopes are gentle, hence exposures are few. What lies below the general siltlike covering has not been determined. Like the Iowan ice sheet, the edge of the Kansan undoubtedly was thin and more or less sluggish as the till where it is known north of Kaw river is relatively thin and patchy, having been made more attenuated by post-Kansan erosion.⁵ According to Todd "Only scattered boulders can now be found, where till patches may have once been a few feet in thickness."⁶

In view of the fact that the till in Kansas is in general thin and patchy, the topography is flat and the exposures are few, it is not unreasonable to believe that very careful and detailed research may favor the hypothesis that the Kansan ice sheet extended farther south than the Kaw valley.

View 2. Lobate extension of the Kansan ice sheet south of Linwood and Lenape. — The outcrops of till do not necessarily imply that the entire glacier invaded the region south of the Kaw valley. The deposits can readily be accounted for by the deposition of a glacier lobe which pushed its way farther to the south than did the main mass of ice. As indicated by Todd "There is some evidence that the ice sheet in Kansas was more or less lobular in form, at least after it passed over the divide into the Kansas valley. One lobe passed down . . . the Big Stranger to Linwood and Lenape."⁷ It is apparent from the map, figure 1, that the exposures of the glacial materials are in almost direct north and south alignment with Big Stranger creek and the town of Linwood. May it not be that the lobe referred to above extended farther to the south than suggested by Todd? The position of the outcrops in relation to Big Stranger creek and Linwood certainly is very suggestive.

Before finally accepting the view set forth, more detailed search would be necessary as the apparent alignment of the outcrops with the Linwood-Lenape lobe may be due to accidental discovery of the exposures of the deposits rather than to actual conditions. Further research may reveal other till-like deposits south of the Kaw.

⁵ Loc. cit. p. 35.

⁶ Loc. cit. p. 35.

⁷ Loc. cit. p. 44.

View 3. Debris-laden ice bergs and outwash.—The finding of erratics still farther south than the described till-like exposures and the recording of erratic pebbles as far south as 38° north latitude⁸ may be suggestive of glacio-fluvial or marginal lake conditions. Todd has located, mapped and described several marginal glacial lakes and several drift-filled channels, one of which is southeast of Lawrence.⁹

The till-like character of the deposits tends to argue against their being outwash materials. It is possible, although not probable, that the deposits owe their position to the melting and depositing of debris-laden ice bergs which floated either on a marginal lake or else in the current of a glacial stream. That ice rafted boulders are common is known to all glacial geologists. Till-like deposits having a similar mode of origin are questionable or at least none are on record as far as the writer's knowledge is concerned.

CONCLUSIONS

Although no definite conclusions regarding the origin of the described deposits can be made at the present time, the writer is inclined to favor equally views 1 and 2. It is obvious that in such a region as this, located in the zone of maximum extension of an ice sheet, invaded by the next to the oldest ice invasion, the Kansan, subjected to a very long period of weathering and erosion, and cut up at its most critical places by a wide valley, evidences of past glaciation must necessarily be greatly obscured. Only by the most detailed investigation can the exact position of the Kansan ice sheet and the history of the region be worked out. It is to the endless zeal and scientific spirit of the pioneer explorer, Professor Todd of the State University of Kansas, that we owe much of our present knowledge of the Pleistocene of Northeastern Kansas.

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⁸ Mudge, B. F., *Geology of Kansas: Kansas State Board of Agriculture. Fourth Agricultural Report and Census*, p. 109, 1875.

Chamberlin, T. C., and Salisbury, R. D., *Preliminary Paper on the Upper Mississippi Valley: U. S. G. S., 6th Ann. Rep't.*, p. 314, 1885.

⁹ *Loc. cit.* p. 41, and map 1.