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Post-Kansan Erosion

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POST-KANSAN EROSION.[1]

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Visitors to the Maquoketa river gorge below Monticello in Jones county have been impressed with its rocky walls of the Niagaran formation which rise in places 100 to 125 feet above the stream. Overlying this rock formation are drift and loess. Crags, turrets, and chimney rocks, similar to the rugged features of the valleys of the driftless area, appear here and there. In fact, the characteristics of this gorge are so nearly like those of the valleys of the driftless area that in the report of the Geology of Jones County the gorge is considered to be preglacial in age.

During the investigations of the Iowan Drift, Dr. Wm. C. Alden and the writer found that this valley is Pleistocene and probably post-Kansan in age rather than preglacial. Well records reveal that there is a deep preglacial or pre-Kansan valley underlying what is now the Langworthy ridge to the west and that this buried valley reaches depths considerably below those of the Maquoketa gorge. These well records also revealed the fact that the present Maquoketa gorge has been cut through what was formerly a high rock divide, as shown in figure 1.

It is thus clear that the gorge is Pleistocene in age. Is it post-Nebraskan or post-Kansan? Both the Nebraskan and Kansan drifts are known to extend to the southeast of this locality, as shown by their superposition in the Chicago, Milwaukee & St. Paul Railway cuts near Delmar Junction. In view of this and in view of the absence of any evidence that the gorge has been glaciated, it seems that the gorge is probably post-Kansan in age. In the bottom of the valley are the valley-train terraces of Iowan age, which indicate that the Maquoketa river had completed cutting this valley by Iowan times. At the close of the Kansan epoch this region was apparently a flattish plain, a new surface made by the heavy deposition of Kansan drift on the pre-Kansan topography, with the consequent filling of the former valleys and burying of the divides. On

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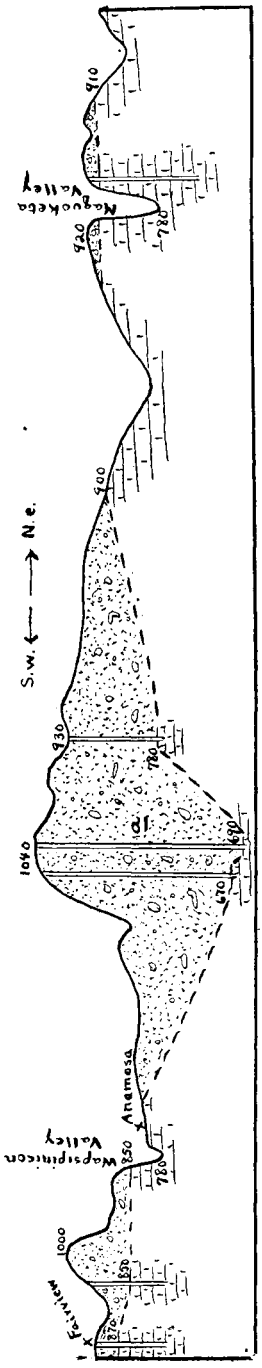

FIG. 1. Section southwest to northeast across Wapsipinicon and Maquoketa rivers and the intervening divide, beginning near Fairview, Jones county, and ending five miles east of Monticello. Total length represented, eighteen and one-half miles. Horizontal scale, one inch equals two miles. Vertical scale, one inch equals two hundred fifty feet.

this new surface the surplus drainage chose consequent courses along lines that crossed the old divides, and in cutting downward became superimposed upon the buried rock divides.

In the course of the investigations it was discovered that every one of the major drainage lines of eastern Iowa, south of the Volga river are superimposed at various places along their courses. These streams include, besides the Maquoketa, the Wapsipinicon and the Cedar and their important tributaries. Former studies by the writer have shown that the Iowa river at Iowa City is also a superimposed stream. All are apparently post-Kansan in age. Where they have cut in rock their valleys are relatively narrow; where they have cut in drift, they are strikingly broad.

In 1895, Gordon, in an article in Volume III of the Iowa Geological Survey on the buried river channels of southeastern Iowa, showed that the Des Moines river in Lee county has cut through a rock divide, while to the east is a buried channel deeper by one hundred feet than the present Des Moines or the Mississippi in that latitude. Clearly then the Des Moines is a superimposed stream and, judging from its features, is of the same age as those above mentioned.

It seems to the writer that the factor of superimposition of

these and possibly other streams must be taken into consideration in gaining the correct conception of the length of post-Kansan time. The well-known fact that the Kansan drift-plain has been quite thoroughly dissected to a mature stage of erosion is evidence in itself of the great age of the drift. But it would seem that if these valleys have been cut by streams which were superimposed here and there upon buried rock divides, the rate of erosion must have been considerably retarded, possibly giving sufficient time for considerable decomposition of the Kansan drift over the great featureless, low-gradient plain before any considerable areas had been dissected.

The writer has had in mind extending his studies to include the Missouri and other large tributaries of the Mississippi river in order to determine what factors were operative in affecting the rate of dissection of the older drifts, but his call to other fields makes this survey impossible. The Missouri field is an inviting one for if it is found that the Missouri river is superimposed at Glasgow, Missouri, as is suggested by the narrow width of the valley there as compared with that above, as shown on the topographic map, and as suggested by Todd's descriptions of the buried channel to the southwest in the vicinity of Salt Springs, and by his descriptions of the drift materials in the valley walls of the Missouri above Glasgow, and if it is found for example, to be post-Kansan, then obviously this would affect the rate of dissection of much of the area upstream, which would involve southern and southwestern Iowa. It is to be noted that the Chariton river joins the Missouri just above the rock channel at Glasgow, that the mouth of the Grand river is a little farther up, and the Platte a little farther still. If it is found that each one of these streams is superimposed at several places along its course on old rock divides this retarding factor would be still more important as applied to large areas. The results of such a study would promise to be of importance in gaining the proper conception of the erosional and weathering conditions existing during the Pleistocene. In so doing the exact dates of superimposition should be ascertained.

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