at that time have been discovered, but it is not unlikely that
deep borings, especially in the southeastern portion of the area,
may reveal the existence of such. The Quaternary History—it is
agreed by all students of the subject that the ice which occupied
this region came from the north and northeast. The ice was in­
dependent in its movements from the ice lobe which occupied the
upper Mississippi region. This is true at least in the latter part
of the history, which left its impression most distinctly on the
present surface of the country. The great lobe of ice which oc­
cupied the Red River Valley, it will be remembered, moved south­
ward and was divided by the eastern coteau in to the western lobe,
which crept down the James River Valley, and the eastern lobe,
which passed down part of Minnesota Valley into central Iowa.”

“In its recession, we suppose that it had periods of halting
and possibly advancing for shorts distances, which has, as before
explained, resulted in the accumulation of moraines. Between
the Red River lobe, as we may call it, and the Lake Superior
lobe, which occupied the upper Mississippi region, there was at
one time no distinct separation upon the surface of the ice sheet,
but as they melted away their margins would very naturally be
more and more separated along the height of land or ridge form­
ing the divide between the Mississippi basin and that of the Red
River.”

While it is probably irrelevant for this report to delve further
into the geologic history of the area as reported by Todd, Upham
and others, yet Todd’s description of the origin of the Wild Rice
moraine in Norman County, the Hill River moraine extending into
Chester Township, Polk County, and deltas formed by the Sand
Hill and Buffalo rivers, are items of interest to the geologist.

In tracing the shore lines or beaches of glacial Lake Agassiz,
Upham found that the elevation of the highest crest of the Herman
beach in Polk County was 1,173 feet above sea level, which would
indicate that water to a depth of 300 feet stood over what is now
Crookston, and that area from Mallory west was covered with
more than 300 feet of water. The most comprehensive report of
the beaches of Lake Agassiz in Minnesota and North Dakota is
given by Warren Upham Monograph XXV, U. S. Geological Sur­
vey, 1895. For the purposes of this historical review, quotations
and summarizations from Uphams report in the 1916 History and
Biography of Polk County will suffice. Upham states:

“Several successive levels of Lake Agassiz are recorded by
distinct and approximately parallel beaches of sand and gravel
due to the gradual lowering of the outlet by the erosion of the
channel at Brown’s Valley and these are named in their descend­
ing order, Herman, Norcross, Tintah, Campbell and McCauliville
beaches, because they pass through or near these towns.”

Summarizing briefly Warren Uphams descriptions of the vari­
ous beaches we note the following: Herman, the highest beach,
with elevations of 1,178 to 1,185 feet, crossed the south line of
the county in Garfield Township near its midpoint; thence north