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## The Humboldt Stages of the Wisconsin Glaciation in Iowa

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years ago by Dr. S. W. Beyer, Dr. T. H. MacBride and others in the reports of the Iowa Geological Survey. As mapped at present it extends through a part of western Worth county, across a small part of southeastern Winnebago county, through eastern Hancock and Wright counties, along the boundary between Hamilton and Hardin counties, westward through Story and Boone counties, westward and northwestward through Greene county, northward through western Calhoun, Pocahontas and Palo Alto counties and into Emmet county.

This moraine exhibits about all of the variations described for major recessional features. It is high, rough and sandy or gravelly in some places and low and broad or nearly wanting in other localities. In its northern extremities in Iowa, it is not well segregated in some places from the other moraines near it. Other moraines mapped are described elsewhere in this volume.

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## THE HUMBOLDT STAGES OF THE WISCONSIN GLACIATION IN IOWA

JOHN E. SMITH

The Humboldt stages, like the Algona stages consist of a series of recessional moraines some of which are smaller than others, and some of which are poorly defined and irregular or missing in places. They are somewhat concentrically parallel to each other and are disposed at distances varying from two to eight miles apart along a main axial direction which extends southward near the east branch of the Des Moines river from southern Kossuth county to Humboldt, and along the Des Moines river south of Humboldt to Fort Dodge. Toward the places of union with the Gary moraine both eastward and westward the several moraines of this group converge to some extent.

The moraines of these stages are best developed a few miles west of Fort Dodge but are well defined along Lizard creek and its branches in Webster, Humboldt and Pocahontas counties. Most of them join the Gary moraine westward between Pocahontas and Emmetsburg. In some parts of southeastern Pocahontas county they are represented by a series of broad, low, gentle swells whose axes lie in a northwest-southwest direction. A part of one of these moraines extends eastward north of Rutland toward Hardy in Humboldt county, and another group extends from Medium Lake near Emmetsburg toward West Bend and eastward passing north of Livermore and just south of Luverne.

East of the Des Moines river these moraines are poorly defined in many places. In Webster county they are low gravelly or sandy hills or knolls having a general trend from southwest to northeast. This trend continues in Wright and Hancock counties to the places where they respectively join the Gary moraine. In many localities in these counties the moraines occur as broad, low swells. The Humboldt stages correlate with the Antelope moraines described and mapped by Professor J. E. Todd in the Aberdeen-Redfield area in South Dakota.

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### THE ALGONA RECESSIONAL STAGES OF THE WISCONSIN TILL IN IOWA

JOHN E. SMITH

The principal moraine of this Wisconsin group in Iowa extends from the northeastern corner of Winnebago County in a southwesterly direction, passing just west of Forest City into Kossuth County, in a large rounding curve whose margin is near Irvington south of Algona. This margin swings northwestward from the Des Moines River, crosses into Palo Alto County just north of Whittemore and passes a mile or more north of Medium Lake reaching the west fork of the Des Moines River about a mile north of Osgood. This moraine is much larger in Kossuth and Hancock counties than in the other counties through which it extends.

Other moraines of this group lie north of the principal one and are arranged somewhat concentrically parallel to it. Typical ones are to be seen just east of Thompson, one east and one west of Buffalo Center, near Lakota, Burt, Swea City and Armstrong. In all of these moraines the material and structure is typical of that which characterizes deposits along the margin of a retreating glacier. In some localities the till of the moraines is somewhat irregularly distributed.

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### A FOSSIL PINE CONE FROM DRIFT OF NORTHERN IOWA

A. O. THOMAS

A cast of a pine cone composed of limonite was recently found in a gravel pit near Britt. Its composition and appearance sug-