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## The Loveland and Peorian Loesses of Iowa

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THE CENOZOIC HISTORY OF THE UPPER  
MISSISSIPPI RIVER

A. C. TROWBRIDGE

Changes in the course of the Mississippi River caused by successive glacial invasions are described. Recently discovered evidence is presented bearing on the establishment of the general course of the River between Iowa and Wisconsin and Iowa and Illinois in Nebraskan time. There are also some rock terraces believed to indicate the approximate depth to which the valley had been cut by Kansan time. The Illinoian history of the river and of Lake Calvin are reviewed. The details of the present course of the river involve the definition and partial subsequent removal of Wisconsin glacio-fluvial material.

STATE UNIVERSITY OF IOWA,  
IOWA CITY, IOWA.

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NEW EXPOSURES OF UPLAND NEBRASKAN DRIFT  
IN NORTHEASTERN IOWA

A. C. TROWBRIDGE

Remnants of Nebraskan drift, as recently exposed capping a high Mississippi River bluff in the city of Dubuque and occupying caverns and sinks in the Mississippi River bluff near Guttenberg, are described and interpreted.

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THE LOVELAND AND PEORIAN LOESSES OF IOWA

GEO. F. KAY AND PAUL T. MILLER

Two Pleistocene eolian deposits, the Loveland loess and the Peorian loess, have wide distribution in Iowa. The Loveland loess, the older, was deposited, wholly or in large part, in an interglacial age — in late Sangamon time; the Peorian loess, the younger, was deposited in a glacial age — in the Iowan phase of the Wisconsin Age.

The Loveland loess is thin, except in western Iowa adjacent to the Missouri River Valley. Here it is in places more than twenty feet thick; elsewhere in the state this loess is in most places less than two feet thick; in places it is absent. The thickness of this loess, if spread uniformly over the state, probably would not exceed three feet. The Peorian loess is an immense deposit compared with the Loveland. This loess, too, is thickest close to the Missouri River Valley. Here in places its thickness exceeds one hundred feet. In other parts of Iowa, especially near the Iowan drift border in eastern Iowa and along certain valleys, the loess is more than fifty feet thick. But in some parts of the state, as for example in places within the Iowan drift areas, the Peorian loess is less than two feet thick. If this loess were spread uniformly over the state, its thickness probably would be nearly ten feet.

Mechanical analyses of more than two hundred samples of the two loesses taken from different parts of the state show variations in textures in each of the two loesses. The percentages of the different grade sizes in each of the two loesses are much alike, whether samples are taken at different depths in the same section, from sections close together, or widely separated. The textures of the Peorian loess become somewhat finer with increased distance from the Iowan drift borders in eastern Iowa, and from valley flats which were sources of the loess.

Mineral analyses of many samples of the two loesses show similarities in mineral content and in percentages of the minerals. The minerals of the loesses are similar to the minerals in the smallest size-grade material of the Iowan and Kansan tills.

Several chemical analyses of Peorian loess taken from different localities in the state show close similarities in composition.

Thousands of fossil mollusks collected from unleached Peorian loess are predominantly of species of terrestrial habitat. Fossils taken from the Loveland loess are also land forms.

When each of the loesses was being deposited the prevailing winds were from the west, as at present.

Field and laboratory studies warrant the judgment that the Peorian loess was developed chiefly from the Iowan drift and from Iowan outwash silts deposited in valleys which lead from the areas invaded by the Iowan ice. The Loveland loess probably came in considerable part from silts which were deposited in valleys developed in Kansan and Nebraskan drifts. The silts were sorted during erosion of the old drifts. Some of the Loveland no doubt was carried into the state by westerly winds from areas west of Iowa.

The probable climatic conditions during loess deposition are discussed.

The Loveland and Peorian loesses are the only Pleistocene eolian deposits definitely differentiated in Iowa.

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### RATE OF ICE WITHDRAWAL DURING THE LAST GLACIAL EPOCH IN IOWA

CHARLES KEYES

Calculated upon the basis of Bruckner climatological cycle of 33 years, the retreat of the Des Moines lobe from its tip to its Keewatin center of dispersion, in Canada, west of Hudson Bay, seems to be reflected in the recessional moraines. The past winter's excessive snows, below-normal temperatures, and long stormy season, displays something of the conditions which would naturally retard for a few years glacier waning, and throw up terminal moraines at the time of the pauses. Only such unusual conditions would be greatly intensified in front of a great ice margin.

DES MOINES, IOWA.

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### GREATER DES MOINES RIVER DURING WANING GLACIATION

CHARLES KEYES

With the lower Minnesota valley blocked with ice, drainage from the waning Keewatin glacier, in southern Minnesota, would naturally be released into the Des Moines River, as indicated by the deep, gorge-like valley of the present stream above Des Moines City. Some recent observations on this phase of Iowa drainage are explained and charts presented. A now filled ancient channel is to be sought along the line of former long prairie lakes and the Blue Earth River, which in pioneer days formed part of the canoe-route of the trappers, from the head-waters of the Saskatchewan, in the Canadian Rockies, to the market in St. Louis.

DES MOINES, IOWA.