



MONUMENTAL BRIDGING OF THE OLDEST AND YOUNGEST GLACIAL DEPOSITS OF IOWA

SPAN OF THE GREAT ICE AGE

BY CHARLES KEYES

When about half a century ago deep road cuttings were made on Capitol Hill there were unearthed some geological features that have since become famous the world over. While the excavations were fresh the walls displayed with diagrammatic clearness some of the most noteworthy glacial drift phenomena ever uncovered on the American continent. At the time the record was preserved in one of our leading scientific magazines. Were it not for this circumstance a great scientific discovery might soon have passed into oblivion. Long since the mural faces succumbed to the effacing effects of rain and frost, until they were worn down to gentle hill-side slopes, grass-covered and tree-dotted.

In the extensive grading operations on the new Capitol grounds a few months ago, the celebrated glacial sections are again laid open to sky. They are now preserved for the ages to come. They are marked by a permanent monument erected by the State of Iowa. A beautiful and substantial bridge spans the sunken speedway where they were best exposed.

This monumental site, on the brow of Capitol Hill, is really one of the scientific wonders of our state. Geologically its interest is indeed global. Bearings of our local sections upon the broader aspects of the basic problems concerning the great Ice Age seem worthy of brief relation. For many years after Louis Agassiz first gave to the world his theory of glaciation—one of the most brilliant generalizations of modern science—earth students in the field were occupied mainly in gathering facts and details. With the accumulation of these records came new generalizations. Gradually it came to be realized that the original notion was not nearly so complete as was in the beginning supposed.

Finally it began to develop that instead of a single glacial epoch there were probably several successive Ice Ages.

In the great world-wide controversy which was warmly waged on this subject for more than a generation Iowa chanced to bear a conspicuous part. Not the least interesting feature was that in this state were found the first undoubted evidences of the existence of more than one drift-sheet separated by a thick deposit of fine wind-deposited loam. In after years this observation proved to be the most critical criterion in the argument for a multiple rather than a unal character of the Ice Age. Moreover, Iowa men made this important discovery. In our state were finally differentiated five great glacial mantles. At the present day the Iowa Classification of the great Ice Age deposits is recognized the world over.

This spot on Capitol Hill where first were obtained the depositional proofs of the complexity of the Glacial Period is for several reasons exceptionally instructive. It seems to be the first locality ever recorded in which the stratigraphical relations of two drift sheets were unmistakable. It is also this section which later gave first intimation of the eolian origin of American loess loams. It is here that was disclosed first clue to that wonderful interlocking of the continuous southwestern loess and adobe deposits with the northeastern glacial tills. This site bids fair long to remain one of the classic geological localities of the continent.

At this time and at this distance there are few of us who can have any adequate appreciation of the almost unsurmountable difficulties which this novel problem once presented, albeit now it seems all so simple. Still fewer of us there are who can gather directly from experience what it really means actively and determinedly to contend on the skirmish-line of the unknown. By our distinguished fellow citizen, the late W J McGee, than whom no one was in better position to know intimately the marvelous intricacies of the attempt to decipher the glacial puzzles of that day, the procedure, so far as it concerns Iowa, is thus graphically portrayed: * * * "In the solution of the problem it is necessary to do more than assume the existence and action of a great sheet of ice hundreds or thousands of feet in thickness and hundreds or thousands of miles in extent. In order to

explain the sum of the phenomena it is necessary to picture the great ice sheet not only in its general form and extent, but in its local features, its thickness, its direction, and its rate of movement over each square league, the inclination of its surface both at top and bottom, and the relations of these slopes to the subjacent surface of earth and rock; and all this without a single glacial stria or inch of ice polish, save in one small spot, in the whole tract of 16,500 square miles. It is necessary to conceive not only the mode of melting of the ice at each league of its retreat, but also every considerable brook, every river, and every lake or pond formed by the melting both at its under surface and on its upper surface; it is necessary not only to restore not only the margin of the *mer de glace* under each minute of latitude, it occupied, but as well, the canyons by which it was cleft, the floe-bearing lakes and mud-charged marshes with which it was fringed, each island of ice, and each ice-bound lake formed within its limits. And it is not only necessary to reconstruct the geography of a dozen episodes, as does the anatomist the skeleton from a few bones, but to develop a geography such as civilized eye has never seen, and which could exist only under conditions such as utterly transcend the experience of civilized men. All this has been done. The trail of the ice monster has been traced, his magnitude measured, his form and even his features figured forth, and all from the slime of his body alone, where even his characteristic tracks fail.”

As originally described in the *American Journal of Science*, this now famous exposure on the brow of Capitol Hill presents the following succession of beds:

	Feet
6.—Soil	2
5.—Till; light reddish buff clay, with pebbles.....	7
4.—Till, contorted and interstratified with loess.....	5
3.—Loess, with numerous fossils.....	15
2.—Till; dark red clay, with abundant pebbles.....	6
1.—Shale, Carbonic, exposed.....	10

The salient features to be especially noted are that: First, the lower till sheet (No. 2) represents what is now called the Kansas Drift, which was formed when the great continental glacier, reaching southward to St. Louis and Kansas

City, attained its greatest extent and thickness; second, the loess members (Nos. 3 and 4) composed of fine loams, constitute the soil formations during long interglacial epochs when the climate was not so very different from what it is at the present time; and third, the upper till (No. 5) represents what is now known as the great Wisconsin Drift-sheet.

At the time when these observations were made (1882), as already indicated, the possible complexity of the Glacial Period was not yet even faintly surmised. Chances of the existence of a second Glacial Epoch were only vaguely being suggested. The prolix and bitter controversy over the duality versus the unity of the great Ice Period was just beginning. Under these circumstances it is not at all surprising that some of the Iowa facts were misinterpreted and that their true significance was for a time overlooked. Then, too, the prevailing notion concerning the origin of the loess tended to obscure a proper understanding of data accurately recorded.

Notwithstanding the fact that Doctor McGee was inclined at the time to attach rather slight importance to his really monumental observations and to regard the phenomena which he had noted as indicating mere local advance of the ice-sheet it soon became manifest that the two till deposits separated by a thick loess bed was impeachable testimony in support of two distinct and great ice movements within the period of what was regarded previously as a single one. So far as is known this appears to be the first and most important recorded evidence proving conclusively the complex character of the Ice Age.

Of similar import was the somewhat later description of a great drift section several miles farther south on the Des Moines River. In a paper read before the Iowa Academy of Sciences in 1890, it was shown that there was still another thick member to be reckoned with beneath the till underlying the loess. In recent years officers of the State Geological Survey were inclined to regard it as representing the pre-Kansan Aftonian beds.

The Capitol Hill drift section is now one of the notable glacial localities in America. During the past thirty years the place and the vicinity have been visited by many of the

most eminent scientists of the world. As it is, our fellow Iowan and distinguished pioneer in the field of glaciology narrowly escaped making one of the half dozen great geological discoveries of the Nineteenth century—the establishment of the fact of the complexity of the Glacial Period.

It so happens that the two thick drift sheets which cover Capitol Hill are the youngest and the oldest but one of a succession of five great glacial mantles, the intermediary sheets being absent. Now, the bridge, of which a view is given in the accompanying plate, joins two unrivaled sections on opposite sides of the Court Avenue speedway. The south abutment rests on the more remote drift sheet and the deposits beneath; while the north end of the span abuts the more recent drift deposit.

The arch not only spans a fine boulevard but it connects the two glacier-dropped beds which in point of time are separated by thousands upon thousands of years. Geologically this noble structure spans, as it were, the Glacial Period as does the rainbow the heavens. It is fitting that a majestic monument should mark the positions of the famous McGee Drift sections, which first gave definite clue to the conception of a multiple Ice Age. It is especially appropriate that Iowa should in so artistic a manner and in so permanent a form commemorate such unique event.

MILITARY NOTICE.

The signers of the article of agreement to form a rifle company in Jackson county, are requested to meet at the store of A. G. Clark in Andrew, November 9, 1844, at 2.00 p. m. for the purpose of choosing officers, to agree upon a uniform, and the transaction of such other business as may be deemed necessary. A punctual attendance is earnestly requested by

MANY SOLDIERS.

Andrew, Oct. 24, 1844.—Dubuque, *Iowa Transcript*, November 1, 1844. (In the newspaper collection of the Historical Department of Iowa.)

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