Souvenir Program
Dedication of the Historical Marker
"CACTUS HILLS"

FIRST ICE AGE MAP
In 1894, only 110 years ago, Professor T. C. Chamberlin prepared the very first map that depicted the North American continent during the last Ice Age.
Credit: ICE AGES: SOLVING THE MYSTERY by John & Katherine Imbrie.

Sioux Empire Gem and Mineral Society
Sioux Falls, South Dakota
March 12, 2004

MINNEHAHA COUNTY HISTORICAL SOCIETY
LOUIS AGASSIZ

Louis Agassiz is shown delivering a lecture on the revolutionary “Ice Age Theory” in the United States in 1871. He became intrigued by glaciers as a young professor and spent many years trying to prove to other scientists that glaciers once covered the Earth’s surface. At that time, the established scientific theory had been that “erratics,” such as the large boulders that were scattered across the landscape in Northern Europe, had been transported there by the huge currents of water and mud from the biblical deluge of Noah's time. One very well known English geologist even argued that the boulders had been carried by icebergs and ice rafts that drifted about in the great flood. Credit: GLACIER by Ronald H. Bailey.

COTEAU DES PRAIRIES

Of the 12 different physical divisions of South Dakota, the Coteau des Prairies is the most conspicuous single topographic feature of the eastern half of the state. It is an ancient flat-iron shaped highland that points to the north and is some 200 miles long. The highland proved to be a barrier that divided the late Wisconsin glaciation stage into two lobes which then flowed south along the western and eastern sides of the highland.

Credit: PLEISTOCENE GEOLOGY OF EASTERN SOUTH DAKOTA by Richard F. Flint.
Today there are only two large ice sheets on land: in Greenland and in Antarctica. During maximum glaciation, 18,000 years ago, there were extensive ice sheets, one to two miles thick, covering much of northern North America, northern Europe, Scandinavia, Finland, and northern Siberia.

SIMPLE MODEL OF A GLACIER

When glaciers grow, they eventually become too large for their collecting grounds, and the glacier-ice begins to flow downhill. Sooner or later the lower parts of glaciers enter an area which is warmer and the ice begins to melt away. The upper parts of glacier surfaces are still in the areas of greatest snow addition or accumulation, while the lower parts of the glacier are the main areas of ice-loss or ablation. These labels are used to describe the two main parts of a glacier, namely the accumulation zone and the ablation zone. Note that it is only in the ablation zone that crevasses and the glacier’s snout appear.
CACTUS HILLS

Early geologic research into glacial deposits indicated that during the Ice Age there were only four periods of glaciation in North America. Today fourteen episodes of glaciation are recognized. Deposits from five of these episodes are found in Minnehaha County. From the most recent to the earlier episodes they are named: late Wisconsin, Illinoian, and pre-Illinoian 1, 2, and 3.

The Cactus Hills are composed of sand and gravel deposits left more than 300,000 years ago by streams flowing from a receding pre-Illinoian glacier. They mark the point where the ice front stalled before continuing its retreat.

Originally the outwash deposits were more extensive, but subsequent erosion by late Wisconsin meltwater removed much of the original deposit. Remnants of the deposit, of which the Cactus Hills are a part, are found at higher elevations on both sides of the Big Sioux River valley.

Geologically the Cactus Hills are part of a series of kames and terraces extending to the north-east toward Garretson, SD.

DEDICATED IN 2004 BY THE MINNEHAHA COUNTY HISTORICAL SOCIETY AND THE CITY OF SIOUX FALLS
SIOUX EMPIRE GEM AND MINERAL SOCIETY

SEGAMS is a nonprofit, educational organization, chartered by the state of South Dakota, to share knowledge about Earth Sciences and Lapidary through field trips and programs. SEGAMS meets in Room 101 in the Gilbert Science Center at Augustana College and meetings are held on the second Friday of each month from September through June (except December).

Annual dues are: Adults, $10, Juniors (12-17), $3, children, free. Janine Heifner is the club president.

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DIAGRAM SHOWING SNOW CRYSTALS GRADUALLY CONVERTING TO CRYSTALS OF GLACIER-ICE.

As soon as snow crystals are buried beneath the glacier surface, the conversion to glacier-ice begins. First the snow crystals and air spaces are compacted, the crystals melt, and most of the air is expelled up to the surface. The snowpack is gradually transformed into firm which is comprised of individual granules with very little trapped air. Then the firm changes into true glacier-ice in which ice crystals are welded together. Glacier-ice crystals continue to grow for some time and occasionally reach the size of a football.
PROGRAM
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Emcee
Emma Abbott

About the MCHS Historical Marker Program
Bruce Blake

Principal Remarks
Dennis Tomhave

Dedication
Unveiling

MINNEHAHA COUNTY HISTORICAL SOCIETY
REGISTERED HISTORICAL MARKERS NOW TOTAL 105.

Four marker stories involve Earth history:
1) THE SIOUX QUARTZITE
   Falls Park, Sioux Falls
2) 1938 EARTHQUAKE
   Northern Links Golf Course, Renner
3) INLAND SEAS
   Falls Park, Sioux Falls
4) CACTUS HILLS
   Great Bear Recreation Park, Sioux Falls

Dennis W. Tomhave of Vermillion, SD, is a geologist with the Department of Environment and Natural Resources, Geological Survey Program, University of South Dakota. Dennis has previously been the presenter at two other Earth history historical marker dedications: the 1938 EARTHQUAKE and INLAND SEAS. Thanks, Dennis!