RAMSEY COUNTY
History
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Geological Forces That Shaped St. Paul

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Last of Its Kind in Minnesota
The 1888–89 Wabasha Street Bridge

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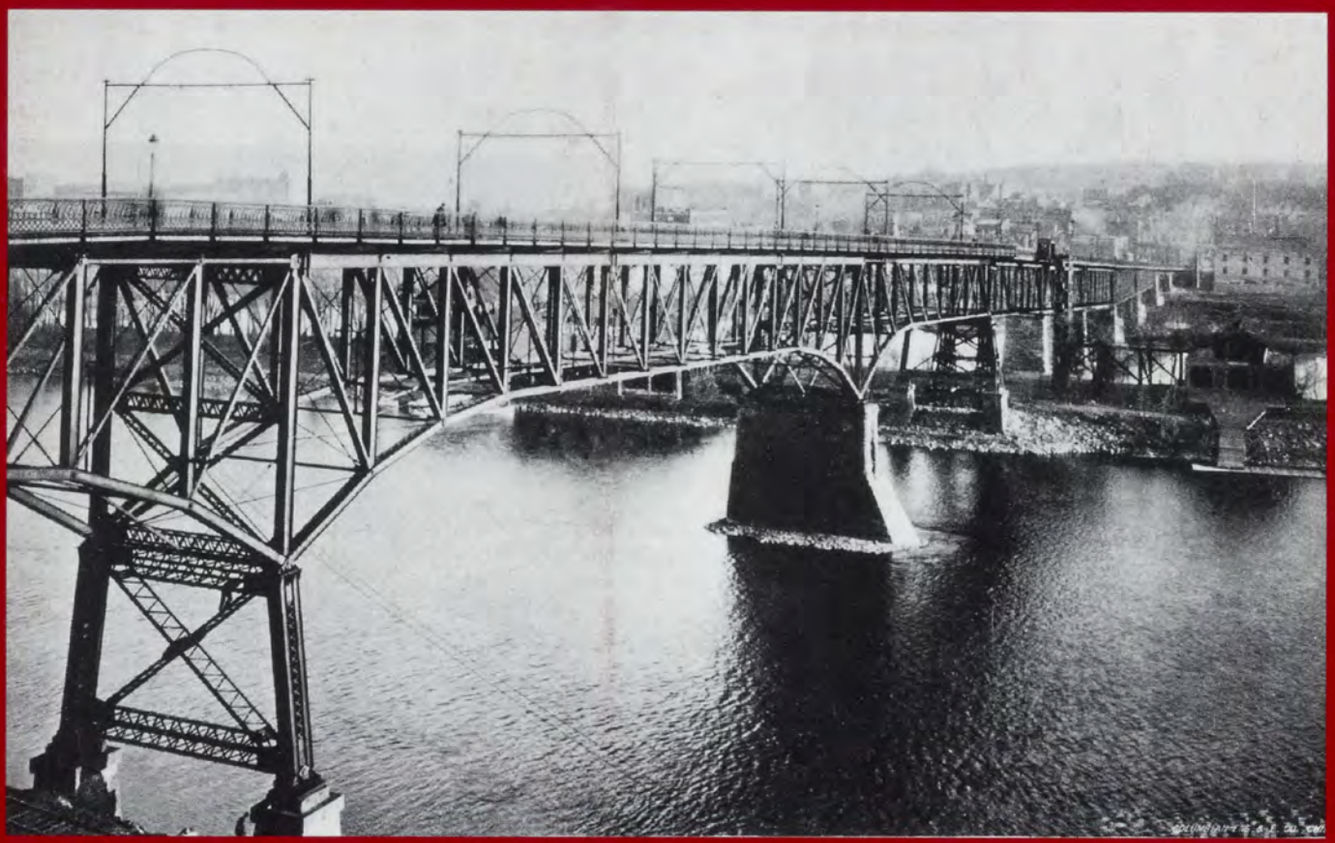

The Wabasha Street Bridge, constructed between 1888 and 1889. Minnesota Historical Society photo. See article beginning on page 4.

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History

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A Message from the Editorial Board

Ramsey County History returns to the area's beginnings in this summer issue. In his article on the Wabasha Street Bridge, author Demian J. Hess not only provides a detailed history of this well-known, now-vanished landmark, but also establishes its centrality to the growth of the city of St. Paul in the second half of the nineteenth century. A companion article by Edmund C. Bray tells the geological story of the mighty natural forces that created the Mississippi river, which the Wabasha Street Bridge eventually would span.

Returning to the era before the bridge was built, Norma Sommerdorf chronicles the arrival of Harriet Bishop in St. Paul a century-and-a-half ago and describes Bishop's many contributions to the educational, moral and religious development of St. Paul's young people over a thirty-six year period. Finally, Emily Panushka Erickson recalls her years of growing up in St. Paul's West Seventh Street neighborhood. Although this issue of our magazine spans in time the Ice Ages to the present-day replacement of the Wabasha Street Bridge, its focus is squarely on how St. Paul and Ramsey County have grown and changed over time, whether measured in geological ages or human years.

John M. Lindley, chair, Editorial Board

Janet Erickson Remembers The Society in Her Will

Janet L. Erickson

Janet L. Erickson was born in St. Paul, went to school there and retired there, but a love of travel, an abiding interest in history and genealogy, and a fascination with exotic places and people, led her to live many of her years in Africa, East Asia, and India.

Born in 1920 into a family with Swedish and Norwegian ancestry, she graduated from the University of Minnesota's School of Nursing in 1941 on the brink of the United States' entry into World War II. For the next four years, she served with the army's 26th General Hospital through the North African campaigns, the landing at Anzio, and the fighting in Italy. She ended the war as a first lieutenant, then returned to the University of Minnesota to earn a master's degree in nursing in 1947. During the next few years, she taught at Syracuse University and the University of California at San Francisco, but far places beckoned.

In the mid-1960s, she joined the Agency for International Development and served in Sierra Leone for three years before joining the World Health Organizaton and a post first in Ahmedabad, India, and next in Bangkok, Thailand. In 1974, she was ordered to Delhi to fill a vacant Regional Nursing Advisor postion, an assignment that took her back to Thailand, but also to Burma, Bangladesh, Sri Lanka, and the Maldives. In her many letters to family and friends, she vividly described some of her experiences:

"...I saw the mountains which ring

Millions of Years in the Making

The Geological Forces That Shaped St. Paul

Edmund C. Bray

An Indian arrowhead found to the south of the Mississippi river in St. Paul has been dated at around 11,000 years before the present. If its maker, or the hunter who lost it, stood on what we know as Cherokee Heights, he would have seen a tremendous view. The entire space between him and what is now known as Mounds Park would have been filled by a deep, raging river, and to the north of him that great river would have created a spectacular waterfall. Before describing the scene in detail, we should go back in geological time to discuss what lay behind that scene.

About 460 to 455 million years ago, an epicontinental sea covered much of central North America, including what is now Minnesota. Erosion from surrounding land deposited on extended shores of that sea great quantities of quartz sand which later became compacted into a soft, white sandstone as much as 175 feet deep, covering much of the central United States, including southeastern Minnesota. Since this deposit is quite evident along the Minnesota river, it is known as St. Peter Sandstone for the St. Peter river, now the Minnesota.

About 455 million years ago, conditions had changed and a thick layer of clay was deposited in that sea. This sediment became compressed into five feet of shale known as the Glenwood formation. About 454 million years ago, further changes in the epicontinental sea in the region which now includes the Twin Cities caused a deposit which later became a hard, thirty-foot layer of limestone known as the Platteville Formation.

The seas remained over central North America until about 430 million years ago and some 300 feet of varied sediments had formed further rock layers over southeastern Minnesota. But, after depositing about thirty feet of Decorah Shale and Galena limestone, the sea withdrew slightly from the Twin Cities area. If it ever returned, any further deposits and most of the Decorah and Galena Formations in our area have been removed by hundreds of millions of years of erosion by water, ice and wind; thus the Platteville limestone is the major upper bedrock in the area, and thus the upper 200 feet of rock under St. Paul consists of a layer of Platteville limestone over Glenwood Shale above St. Peter sandstone.

Epicontinental sea during the Ordovician period. All illustrations with this article, except for the St. Anthony Falls drawing, are from the author's book, Billions of Years in Minnesota, *published in 1977 by the Science Museum of Minnesota.*

About two million years ago, conditions became such that more snow fell in the far north than melted during the summers. Reflection of the sun's rays from the snow reduced the temperature in the north, and the snows piled up until lower layers were compressed into ice. Additional snow increased the pressures until the lower ice was forced to flow out in continental glaciers.

At least four times, ice from two centers in what is now Canada, one to the east and one to the west, flowed south into what is now the United States, penetrating as far south as the present Ohio and Missouri rivers. Early ice invasions covered the Twin Cities area, but their effects have been completely removed by erosion, or hidden by the deposits of the most recent or late Wisconsin glaciation during the last 35,000 years. Each ice invasion into the Twin Cities area bulldozed the land surface and, when the ice melted back, left on the land great deposits of glacial drift, the material accumulated by the bulldozing. Meltwaters flowed in tremendous quantities from the melting ice, forming great streams which cut huge valleys through the glacial drift deposits and even deep into the underlying bedrocks.

At various times after the epicontinental sea withdrew from what is now Minnesota, drainage from the west was in streams which united to cut a huge, deep valley in the bedrock from near Savage across Dakota County to what is now Spring Lake, near Pine Band. Another valley is indicated by a well for a creamery at St. Bonifacius in western Hennepin county, which penetrated 400 feet of surface deposits before reaching bedrock. This huge valley, which was cut by drainage from the north, joined the drainage from the west in the valley across Dakota County.

At some later time, another valley was cut in what is now western Minneapolis, a valley which also has been completely filled by glacial deposits except where Cedar Lake, Lake of the Isles, Lake Calhoun, Lake Harriet, Richfield Lake and

Earliest known view of St. Anthony Falls, reproduced from Jonathan Carver's Travels, *published in 1778.*

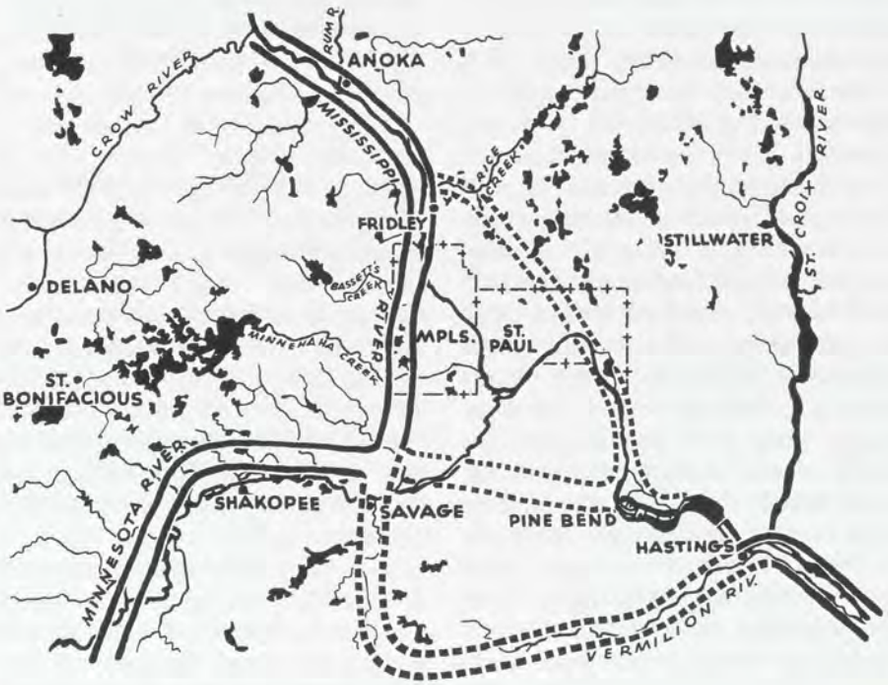
Wood Lake have formed in depressions left when ice blocks, buried in the valley, melted. It is not completely clear when these valleys were created. Probably they were formed by a combination of preglacial erosion, glacial meltwaters and interglacial erosion. During some glacial period, or even before the glacial age, drainage from the north flowed from Fridley southeastward to cut a wide, deep valley to the east of downtown St. Paul. This valley, which is crossed by the Kellogg Boulevard viaduct, extends on to join other drainage at Pine Bend. It was completely filled by deposits of later glaciation, but it plays an important part in our story.

At the end of the third major ice invasion, there was a long warm period which ended about 75,000 years ago. Glaciation was then renewed from the northern centers and, in the period after 35,000 years ago, a number of lobes penetrated the Twin Cities area. Lobes from the eastern center crossed the Lake Superior basin to leave great deposits around the Twin Cities. Then a big lobe from the western center advanced over what is now the eastern Dakotas and western Minnesota, and then eastward across southern Minnesota to Des Moines, Iowa. A sublobe extended northeastward across the Twin Cities to Grantsburg, Wisconsin.

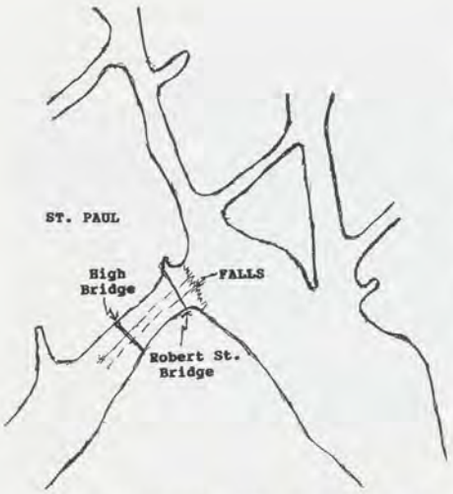
This invasion disrupted the drainage of central Minnesota and, as the Des Moines-Grantsburg lobe melted back some 11,000 years ago, meltwaters flowed down the Des Moines lobe trough until they found the old Dakota county valley to Pine Bend filled with glacial drift. These meltwaters then found a new route by the Fort Snelling area along the present Mississippi river path to St. Paul, flowing *on top* of the Platteville Formation and beginning to cut the valley in which the Mississippi now flows. When these meltwaters reached the preglacial north-south valley now marked by the Trout Brook valley under the Kellogg viaduct, they began to remove the glacial deposits that filled that valley and reopen the channel south to the old valley at Pine Bend.

When the Des Moines lobe melted back over the rise of land at what is now Browns Valley in west central Minnesota, the meltwaters were trapped behind that rise of land to start forming what has been named Glacial Lake Agassiz on the land which slopes to the north. As the ice which blocked flow to the north melted back, the glacial lake ultimately became huge, covering the eastern Dakotas, northwestern and northern Minnesota, and a great deal of central Canada.

As the ice melted back, drainage in the west could no longer reach the Missouri river, so all the drainage from the area between what is now the Red River of the North and the Rocky Mountains to the west flowed into and then overflowed south from Glacial Lake Agassiz. At first this overflow would have been hardly more than a trickle, but it quite soon became a tremendous torrent which, during hundreds of years, flowed as Glacial



Interglacial valleys of the Mississippi near the Twin Cities.



Drawing by the author indicating the location of the great waterfall created by Glacial River Warren below the present-day Robert Street bridge

River Warren, cutting the huge valley in which the Minnesota river now wanders.

When these torrents reached the old north-south valley at St. Paul, they quickly completed the removal of the deposits in that valley and began to enlarge the valley south to Pine Bend. Where they fell into that valley, they formed a great waterfall comparable, at least, to modern Niagara.

Until recently, evidence indicated that the waterfall originated just to the east of the present Robert Street bridge, and that it was more than a mile wide and nearly 200 feet high. However, when the High Bridge was rebuilt a few years ago, evidence in the cores from drillings there indicated that there are deposits of early glacial material in the river valley. These are interpreted to mean that there may have been a small valley, tributary to the north-south preglacial valley, extending to the High Bridge area. If so, the dimension and shape of the glacial-age falls are hard to estimate. They probably were about a mile wide, nearly 200 feet high, and quite likely concave in form.

Niagara Falls consists of two portions: American Falls, 1,000 feet wide, and Canadian Falls, 2,500 feet wide. Each is about 135 feet high. Their combined flow is about 200,000 cubic feet per second, while that of the glacial falls has been estimated as reaching as much as 1 million cubic feet per second!

As this tremendous flood of water cascaded over the edge of the Platteville limestone lip, it tore away the soft St. Peter sandstone beneath, causing big chunks of the Platteville and Glenwood Formations to fall off. Until recent years, some of these chunks could still be seen imbedded in the north wall of the Mississippi valley near the Robert Street bridge, and such a chunk was located on James Avenue near the river. This chunk is no longer in the same location as when it was photographed, but a similar chunk is imbedded in a pile of deposits on the south side of James Avenue a few hundred feet east of Erie.

Due to this erosion at the falls, the lip gradually moved upstream, leaving the deep valley in which the Mississippi now flows on top of some 100 feet of recent deposits. When the waterfall eventually reached the Fort Snelling area, it divided, and one portion began to ascend the stream flowing from what is now Minneapolis. Ultimately this portion cut back to that area and became St. Anthony

Limestone block, a remnant of the River Warren waterfall, near James Avenue and the Omaha Railroad shops in St. Paul.

Falls. The other portion continued to erode back up the route of the present Minnesota river until it reached the old valley across Dakota county to Pine Bend, when it disappeared.

Just where the great glacial falls first

Glacial lakes in Minnesota as the most recent ice sheet melted from the state.

were located and their exact shape are not really important. What is impressive is the comparison with the spectacular present-day Niagara—at least half again as wide and high and, at times, carrying about five times the flow.

What a spectacular view that early Native American would have had from Cherokee Heights 11,000 years ago! To the east, the entire valley between Cherokee Heights and Mounds Park would have been a bank-to-bank raging river. What are now Holman Field and Warner Road would later be formed from alluvial terraces in the post-glacial Mississippi. To the north or northwest, he would have seen the tremendous great falls of the Glacial River Warren. And below the falls, the bed of that river would have been strewn with huge chunks of the undercut hard layers of the lip of the falls.

Edmund C. Bray taught science at the St. Paul Academy until he retired in 1972. He is the author of several books, including Billions of Years in Minnesota *and* Ancient Valleys-Modern Rivers. *He notes that he is grateful to Howard Hobbs and Gary Meyers of the Minnesota Geological Survey for their helpful suggestions in reviewing this manuscript.*

Another view of the 1888–89 Wabasha street bridge. Minnesota Historical Sciety photo. See article starting on page 4.

R.C.H.S.
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