The largest State Park in southern Minnesota —

The Geology of Flandrau State Park

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Flandrau State Park, established in 1937, was called the Cottonwood River State Park until 1945. It adjoins the city of New Ulm, Brown County, on the south. Its present name is derived from the fact that Judge Flandrau went from St. Peter to New Ulm during the Indian uprising of 1862 to lead volunteers in the defense of that city.

The park consists of about 836 acres of beautifully wooded land on both sides and in the valley of the Cottonwood River. It is the largest state park in southern Minnesota. The timber is composed largely of cottonwoods, willows, hackberries, box elders, burr oaks, black walnuts, basswoods and two or three varieties of elms. A dam has been built across the Cottonwood River near the east boundary of the park. Water is ponded upstream to the west end of the park thus creating a lake of about 210 acres including three islands.

The portion of the Cottonwood River around which the park is centered is of geologic interest partly because it is entrenched 150–200 feet below the general level of the surrounding plain. The plain is the surface of an undulating blanket of material laid down by glaciers many thousand years ago over most of Minnesota and surrounding states. This type of glacial deposit is called a ground moraine and represents the soil and rock debris dropped by a glacier, over all the ground it covers, as it melts. Glaciers acquire their loads from the regions they override, much as a bulldozer does.

Although the several glaciers that overrode Minnesota originated in Canada, they alternately scooped up and dropped soil and loose rocks all along the way in a seemingly haphazard manner. Thus when these glaciers became stagnant and melted, their deposits in a particular place represent whatever kind and amount of debris they currently held there. Thus some of the rock material found high on the banks of the river in Flandrau State Park has come all the way from Canada, some is from northern Minnesota, but much of it is comparatively local in origin. The thickness of the ground moraine in Brown County varies from a few feet to more than 200 feet.

The course of the Cottonwood River, which is generally west to east across Brown County, is believed to have been determined by the southern margin of the last glacier at a certain stage in its retreat. The general preglacial slope in the region now drained by the Cottonwood River was evidently toward the northeast. However, the glacier apparently blocked any northward flow and diverted the water essentially eastward along the ice front until it

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joined the Minnesota River about a mile and a half east of the park. The evidence for this interpretation is more obvious west of Brown County where tributaries of the Cottonwood are numerous on the south side but practically nonexistent on the north side.

The entrenchment of the Cottonwood River is to be explained by the essentially equal entrenchment of the Minnesota River into which it flows. Tributary streams have a tendency to cut their channels low enough to match the level of the master stream at the point of juncture. We are thus led to inquire why the Minnesota River is so entrenched. Not only is the river deeply entrenched, but it is also enormously (one to three miles) wide for such a small stream as we see today.

The explanation for both of these characteristics was given by General G. K. Warren nearly a hundred years ago. He visualized an earlier stage in the history of the Minnesota River, as glaciers were on the retreat in North America, during which time it was the only outlet of Glacial Lake Agassiz.

This enormous lake, with its southern tip at Lake Traverse near Brown's Valley, covered not only the Red River Valley of Minnesota and North Dakota, but an even larger area in Canada — in a greater area of water than all of the present Great Lakes combined.

The waning glaciers in Canada furnished most of the water, and it was all drained away by the Minnesota River. Such a large amount of water was sufficient to carve out the wide and deeply entrenched valley we see today. When the glaciers had melted enough to uncover lower outlets toward the north, the lake began to subside, and its level fell below the overflow point at Browns Valley. Thus deprived of most of its supply, the Minnesota River was soon reduced to about its present volume.

This subsidence in level of the master stream in turn produced waterfalls or rapids on all of its tributaries — the Cottonwood River being one. As on the other tributaries, the rapids on the Cottonwood migrated slowly upstream due to the increased erosive power at the rapids, leaving an entrenched channel below them. By now the entrenched portion extends considerably beyond (west of) Flandrau State Park and provides the setting for it as described.

The reader may feel that he has been led rather far afield in the foregoing explanation; however, this is but another illustration of the fact that geologic features in a given locality generally do not take on their full meaning apart from a larger context.

The entrenchment of the Cottonwood River has not only cut through the full thickness of the glacial deposits in some places in the park, but has exposed a few feet of the underlying bedrock as well. The bedrock just beneath the glacial drift here consists of rather inconspicuous layers of shale, sandstone and conglomerate. These rocks were deposited as sediments in a lake or lagoon which covered most of Brown Co. about 100 million years ago.

This lagoon probably lay just inland from a sea that was advancing slowly from the west and which eventually covered most of Minnesota during the latter part of the Cretaceous period of geologic time. The deposits laid down in this sea containing marine fossils are found elsewhere in Minnesota, but they were apparently all eroded from the Brown County region before the coming of the glaciers.

The sandstone found in the park is rather fine-grained and nearly white except for some layers which are somewhat iron stained. The conglomerate often contains pebbles of granite similar to the kinds found outcropping elsewhere in the Minnesota River Valley beneath the Cretaceous rocks.

The granites are very much older than the Cretaceous sandstone; in fact, some of them are representative of the very earliest geologic era known — from 2500 to 3000 million years ago. Fragments of these granites were doubtless carried to the shallow beaches of the Cretaceous lagoon and deposited as gravel, later to be cemented into conglomerates. These sandstones and conglomerates are to be seen in the park in only a comparatively few places.

Nearly white sandstone may be seen at the west end of the park on the north bank of the Cottonwood River, west of State Highway No. 3. Conglomerate may be found a few feet above water level just north of the dam near the east boundary of the park. Doubtless other outcrops, now flooded, were visible prior to the building of the dam. Numerous springs, just a little above the level of the river-lake, probably mark the approximate contact between the gravelly lower portion of the glacial drift and the top of the sandstone.

A well drilled in the park, not far above the river level, to a depth of 227 feet encountered 110 feet of glacial drift, 100 feet of Cretaceous shale and sandstone and finally 17 feet of decomposed granite. These thicknesses are not necessarily to be thought of as typical, however, since the upper surface of the granite is very irregular.

While bathing, boating, camping, and fishing may be the most popular and immediate attractions at Flandrau State Park, those so inclined may see, in perspective, a rugged granite and quartzite terrain, 2 or 3 billion years old which was flooded first by a lagoon and later by a shallow sea about 100 million years ago.

In these waters sand and gravel derived from the granite and quartzite landmass, accumulated, later to form the sandstones and conglomerates seen here and there on the valley floor. From vegetal remains contained in these layers, in Flandrau State Park and elsewhere, it is believed that the climate of that period was a mild one.

But the mild climate of Cretaceous times gave way to the rugged cold one of glacial times. This period, interspersed with warm interglacial intervals, may have begun as much as a million years ago (although the most recent estimates are somewhat less), and almost certainly continued until about 10,000 years ago.

What the events may have been between the time of the formation of the granite and the flooding of it by the Cretaceous sea, on the one hand, and between the subsidence of this sea and the coming of the glaciers, on the other, are areas of speculation in which the layman may join the geologist — for no one knows.