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THE GEOLOGY OF THE PERE MARQUETTE STATE PARK REGION

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In Pere Marquette State Park and vicinity, rocks hundreds of millions of years old are exposed. The oldest rock exposed in the park is the Kinswick formation, which is of historical interest because it is the equivalent of the formation in which occurred the galena lead ore that at one time made northwestern Illinois the world's greatest lead-producing region. However, rock formations still much older than the Kinswick are exposed along Mississippi River on the west side of Calhoun County.

Most of the bedrock formations in the park are limestone or dolomite formations scores of feet thick, but there are also thick shale and sandstone formations. The youngest bedrock formations in the region belong to the Pennsylvanian or "Coal Measures" system, and although they consist mainly of sandstone and shale beds, they contain some of the coal beds that contribute so greatly to the mineral wealth of the State.

When the bedrock formations were made, they were deposited as soft muds and ooze in the bottom of oceans that covered the region. As time went on, these soft deposits became hardened into the rock that we see. Also as time went on, they were occasionally raised out of the sea and exposed as land areas. While thus exposed they were subjected to weathering and erosion just as they are today. Streams flowed across them and cut valleys which were later filled with younger deposits when the region was again submerged beneath the sea. The successive irregular land surfaces were preserved and form what are known as unconformities between the formations. From the succession and character of the formations and from the unconformities between them is derived some notion of the events that occurred during geologic history.

When the deposits that later became rock formations were made in the oceans, they must have been essentially flat-lying. Now it may be seen that at some places they lie at an appreciable slope or dip. In fact, in the park the rock formations may be observed to dip both northward and southward, thus revealing an arch or upfold or anticline. This anticline, which is known as the Lincoln fold, runs northwest from near Grafton, across the park, across Calhoun County, across Mississippi River, and far into Missouri.

The Lincoln fold shows the result of compressive forces acting on rock formations near the earth's surface. Its existence is responsible for much of the interesting geology in the park and vicinity, because it raised different rock formations to the same elevation on its sides. It is on the top or crest of this fold where it crosses Mississippi River that the oldest rocks in this region are exposed. This oldest formation underlies the St. Peter sandstone, which forms the cliff along Mississippi River that the early French

explorers called Cap-au-Cres-"head of sand". Above the St. Peter sandstone lie successively all the younger bedrock formations that are found in the area - the Joachim, Platin, and Kimmswick limestones, the Maquoketa shale, the limestones of the Silurian and Devonian systems, the Grassy Creek shale, the Louisiana limestone, the Hannibal shale, the Chouteau, Burlington, and Keokuk limestones, the Warsaw and Salem formations, the St. Louis and Ste. Genevieve limestones, and finally all the "Coal Measures" formations. After the deposition of the "Coal Measures" the Lincoln fold was formed.

So far as is now known, this region as well as the rest of the central Mississippi Valley has remained a land area ever since the "Coal Measures" formations were laid down and the Lincoln fold was made. That is still hundreds of millions of years ago. During that time deposits thousands of feet thick were laid down in other parts of the country and elsewhere on the earth, and great mountain chains like the Rock Mountains and the Sierra Nevada Mountains of western North America, the Andes of South America, the Alps of Europe, and the Himalayas of Asia were uplifted. Yet during this long time about the only thing that happened in this local region was the deposition of some gravel and sandy clay along the rivers and streams that flowed across the region.

Then about a million or so years ago the monotony of the region was interrupted. Down from Canada moved the first of the four huge glaciers or ice-sheets that covered northern North America during what is known as the Pleistocene period or "Great Ice Age". None of these glaciers actually invaded Pere Marquette Park, but the second, or Kansan, coming from the northwest, advanced as far as the west side of Calhoun County, and the third, or Illinoian, advanced from the northeast almost to the park. The advance of these glaciers changed climatic conditions radically, and they also changed the courses of the streams. Large amounts of gravel, derived from the soil and rock material that the glaciers had picked up as they advanced, were carried out and deposited by the streams of melt-water from the ice.

The Illinoian glacier crossed and dammed Mississippi River at St. Louis, so that a lake formed in the valleys above. The outlet of this lake was in the west part of St. Louis. Deposits made in the lake filled it up to the level of the ground on which the Lodge in the Park is built. Later, when the ice melted away and Mississippi River resumed its former course, much of this filling was eroded and only terrace remnants are left along the Mississippi and Illinois valleys.

Similar terrace remnants at a lower level along the valleys are related to the fourth and last, or Wisconsin, glacier, which occupied only northeastern Illinois and other northern areas. However, its melt-water flowed down the Mississippi and Illinois valleys and carried sand and silt which partially refilled the valleys. Remnants of this refilling form the lower terraces.

Finally, over all the area was deposited a wind-blown silt or dust known as loess. Most of it was apparently derived from the silt deposited by the glacial streams. It is the real source of the relatively fertile soils in the region and provides particularly the soils which are so well suited for the famous apple orchards of Calhoun County.