The Glacial History of the Quincy, Illinois, Region

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Before the first ice-sheet invaded the Quincy region, the topography, drainage, and soils were quite different from those of today. The present valley of the Mississippi River was smaller and shallower and was not occupied by a master stream of the size of the present Mississippi. Most of the present tributaries of the Mississippi River in the Quincy region proper were not in evidence. The old valleys have been largely eradicated by the mantle of glacial drift and the present tributaries have chosen their courses with respect to the new surface, following the retreat of the ice-sheets. Limestone sinks probably dotted the upland surfaces where limestone was the surface bedrock. The soils of the region were those resulting from the weathering of the underlying bedrock formations. They consisted of two great groups: those which mantled the belt of limestone that extends from Quincy east nearly to Liberty, and those which mantled the "Coal Measures" formations from there on eastward.

The oncoming refrigeration of climate was world-wide in its effects. Great snowfields and ice-caps formed over the northern part of North America and northern Europe, and more and longer glaciers formed in the mountainous regions than exist now. Doubtless the same climatic factors operated in the southern hemisphere as in the northern hemisphere, but due to smaller land masses the glaciation of the southern hemisphere was much less pronounced. Four successive ice invasions occurred during the Glacial Period, separated by prolonged intervals of warm climate.

Three great centers of ice accumulation formed in Canada—one east of Hudson Bay, known as the Labradorean center, one west of Hudson Bay, known as the Keewatin center, and one in the Cordilleras of western Canada, known as the Cordilleran center. Only ice from the Keewatin center affected the present site of the city of Quincy, although a few miles to the eastward ice from the Labradorean center came to a halt in a later glacial age. The former is known as the Kansan ice invasion and the latter the Illinoian. Still older, or Nebraskan drift, is not definitely known to exist in the Quincy region but its presence is suspected. The Kansan ice radiated eastward well towards Peoria. The terminal moraine of the Illinoian drift trends in a northeast-southwest direction and approaches the eastern limits of the city.

At the time of the Kansan glaciation, there was probably a maximum amount of ice existing on the continents. It is estimated that in North America this amounted to 6,500,000 cubic miles, in Europe 1,700,-

000 cubic miles, Siberia 240,000 cubic miles, and other regions 1,700,000 cubic miles, or a total of 10,140,000 cubic miles. This water had been taken from the oceans and when the ice-sheets melted it was returned. The difference in ocean level between the maximum glaciation of the Kansan ice age and the warmer portion of the Yarmouth interglacial age was probably something like 300 feet. Streams were extended out onto the continental shelves during the ice age and the valleys which they cut were drowned during the following interglacial age. The drainage lines close to the ice-sheets were probably depositing streams, whereas farther downstream with the lowering of the ocean level they were erosive and cut their valleys deeper.

Due to the filling of the old valleys by the glacial drift, the subsequent streams became superimposed upon hidden bedrock divides and rock spurs in many places. As a result, the present valleys are narrow where they have become incised in the bedrock and are wide where they have been cut in glacial fill. Mill Creek, including South Fork, shows many narrows bordered by cliffs of bedrock and wider portions with gentle pastoral slopes.

The Yarmouth interglacial age of warmer climate which succeeded the Kansan glacial age is very definitely recorded by the old soil and weathered zones developed on the Kansan drift which passes eastward for many scores of miles beneath the Illinoian drift. The changes which took place were oxidation from a blue color to yellowish and brownish, the leaching of limestone pebbles and other calcareous constituents to a depth of several feet, decomposition of the silicates in the upper few feet to produce a gumbo substance or hardpan, known as gumbotil, and a soil at the top from which the finer clay constituents were eluviated downward into the gumbotil. The amount of such change is such as to imply the lapse of some two to three hundred thousand years.

Then came the effects of another climatic change, an ice-sheet, the Illinoian, which had its source in the Labradorean glacial center of eastern Canada. This ice-sheet radiated to a more southern limit than any other, reaching a point a few miles south of Carbondale, Illinois, its western limit in the Quincy area reaching almost to the eastern outskirts of Quincy. Limits of the glacial outwash made by the melt water from the ice field are found in protected recesses in the valleys that drained away from the ice. The ice-sheet remained for sufficient length of time for the forward moving ice to bring forward material in such quantities as to build a belt of terminal moraine, of high country, at and beneath the ice front which was held more or less stationary by the rate of melting equalling the forward advance of the ice.

Again, after several scores of thousands of years of glacial conditions, the climate ameliorated and ushered in the Sangamon interglacial epoch. This epoch was warm, like that of the Yarmouth, and a soil and weathered zone was produced on the Illinoian drift similar to that on the Kansan drift, but the alteration did not take place to such

a degree or to such a depth as on the Kansan drift. In other words, the Sangamon interglacial epoch was something like 150,000 years in duration as compared to two or three hundred thousand years for the Yarmouth.

At the close of the Sangamon interglacial age, dust storms resulted in a thin mantling of the uplands and slopes with a brownish silt of a few inches to a few feet in depth. Upon this silt, a soil was formed before the Wisconsin glacial age began.

With another change to glacial climate, the Wisconsin glacial age arrived. This region, however, did not suffer actual glaciation during this time for the Iowan glacial lobe in Iowa fell short of this area by some 80 or 90 miles and the Tazewell glacial lobe in Illinois reached only as far west as Peoria, some 120 miles to the northeast. However, there were, no doubt, changes affecting this region as a result of the refrigeration. Enormous floods came down the Mississippi, and thick loess deposits were blown from the Mississippi River flats onto the adjacent uplands, burying the old soil of the late Sangamon loess and giving rise to new soil-making materials. It should be borne in mind that the constituents of loess are the constituents of glacial flour which were deposited by the glacial waters of the Mississippi in river bars, and the barrenness of these bars and the great width of the Mississippi valley gave the westerly winds just the conditions needed for dust storms of great magnitude over a considerable period of time, far greater than the dust storms of the present. This mantle of loess was a fortunate gift of nature to this area for the deposits are open-textured and are highly fertile. The deposits are thickest along the east side of the Mississippi River valley, reaching thicknesses of 30 feet or more, and thin eastward. Because they were blown by the westerly winds, the west side of the Mississippi River valley in Missouri contains thinner deposits and their agricultural productivity is considerably less.

When the Wisconsin ice-sheet was melting away from the Great Lakes area, the west end of Lake Superior discharged southward through the St. Croix River down the Mississippi River in large volume. This was a time of high floods, which ceased only when the Wisconsin ice had melted back sufficiently far for Lake Superior to become connected with Lake Michigan and Lake Huron. The water level then fell to the level of the Chicago outlet and later to the level of the St. Clair River near Detroit and Niagara Falls.

Another flood stage came when the retreating Wisconsin ice blocked the drainage of the Lake Winnepeg region in Canada and gave rise to an enormous glacial lake, Lake Agassiz, which drained south through the Minnesota and Mississippi River valleys. These floods had strong erosive powers and they swept away much of the glacial valley trains that had previously been deposited in the Mississippi River valley during the earlier portion of the Wisconsin ice age. However, when the floods subsided and the Mississippi River assumed smaller proportions

like those of the present stream, there was some refill. Today the Mississippi valley at Quincy has a fill of nearly 135 feet of silt, sand, and gravel resting on its bedrock bottom.

With the climatic change from cold to warm, the Recent age was ushered in.

The life of the glacial period.—Our records of the life of the glacial period are very fragmentary. They consist mainly of those fossil remains which are found here and there in the glacial deposits. Like all of the fossil record, it can be but a minute representation of the entire flora and fauna that lived during the glacial period. A student of life history, working in the Quincy area, notes the profound changes which had taken place in the life of the earth from the time that the Mississippian limestones underlying the glacial drift were laid down to the time that the glacial deposits were formed. The highest types of life found in the Mississippian strata are fishes and amphibians. Between that time and the beginning of the glacial period nearly two hundred million years elapsed and there was a great evolution of life forms, including the reptiles and birds of the Mesozoic and the generalized and more specialized mammaliam forms of the Cenozoic. The plant kingdom likewise was greatly changed. The tree-ferns and gymnosperms of the Mississippian and "Coal Measures" strata were augmented during the Mesozoic by the great angiosperm group of plants. The coming of these sweet-flowered and fruited forms, including the grasses, was probably responsible in large measure for the evolution of the great mammalian group.

When we come to the glacial deposits, we find that there are mastodons, mammoths, hairy rhinoceroses, bison, horses, sloths, glyptodents, saber-toothed tigers, deer, and many other forms roaming the continent in their respective prairie and forest habitats.

The late Dr. O. P. Hay of Carnegie Institute in Washington, has published a large volume listing and mapping the localities of the central region of North America where finds of these fossil forms have been made.

In Europe, the remains and crude artifacts of primitive man are found in strata of early glacial age. There we derive the most complete history of man. At the present time archeological researches in the great plains region and in the southwest are revealing evidences of probably late glacial man. Along the Mississippi River valley are mounds of prehistoric age in North America, but which are contemporary with historic man in Europe, Asia, and Africa. Finally, the Caucasian race arrived as a late comer to this continent and as we all know, his record is but a few hundreds of years in length. His arrival took place after all other forms of animal and plant life reached their present distribution and adjustment to the changes of the glacial period, and as a result of his coming all plant and animal life is being initiated into another period of rapid change.

In closing, it may be well to pause and orient ourselves with respect to geologic time. The paleontologist's time scale is given in the upper part of the illustration (Fig. 1) for the last two hundred million years of earth history. This dates back only to the Paleozoic era or the beginning of the Mesozoic era. You will note that the last one million years, during which man has lived upon the earth and which embraces the length of the glacial period, is but a minute fraction of this time.

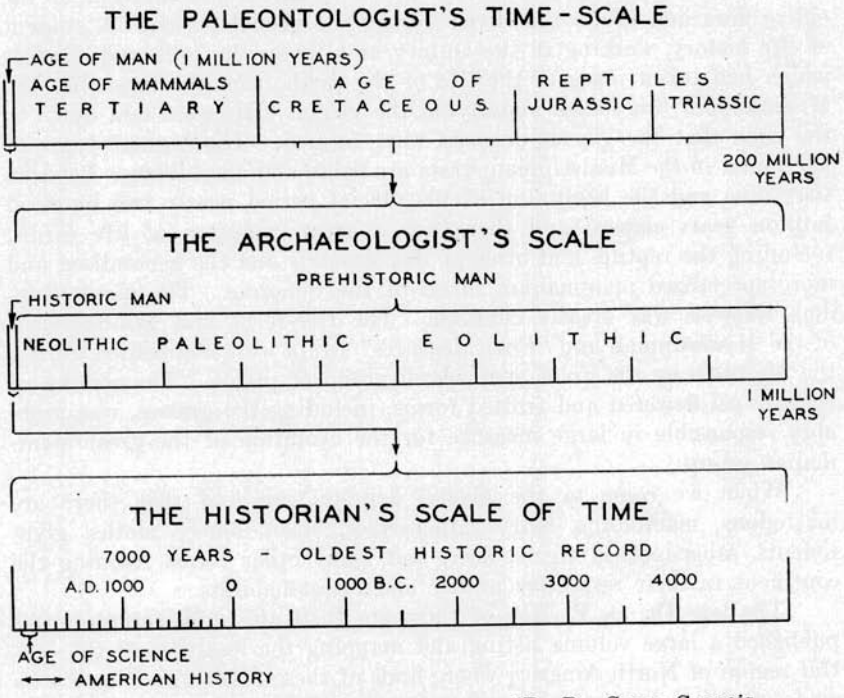

Fig. 1.—CHART SHOWING TIME SCALES. (By Dr. Carey Croneis, University of Chicago.)

The archeologist's scale is a magnification of this period of earth history to cover both prehistoric man and historic man. Prehistoric man extends over the entire period of the glacial age to about 5000 B.C. The close of the glacial period was about 25,000 years ago.

The time unit for historic man is enlarged to the historian's scale of time, where it is shown that American history comprises but a minute portion of historic time and the age of science an even smaller portion. Another approach to the question of time ratios may be made by considering all geologic time to be compressed into the Christian Era. Then the Great Ice Age would have begun one year ago, the Recent Period nine days ago, the Historical Period day before yesterday, and the settlement of the Quincy region about one hour ago.