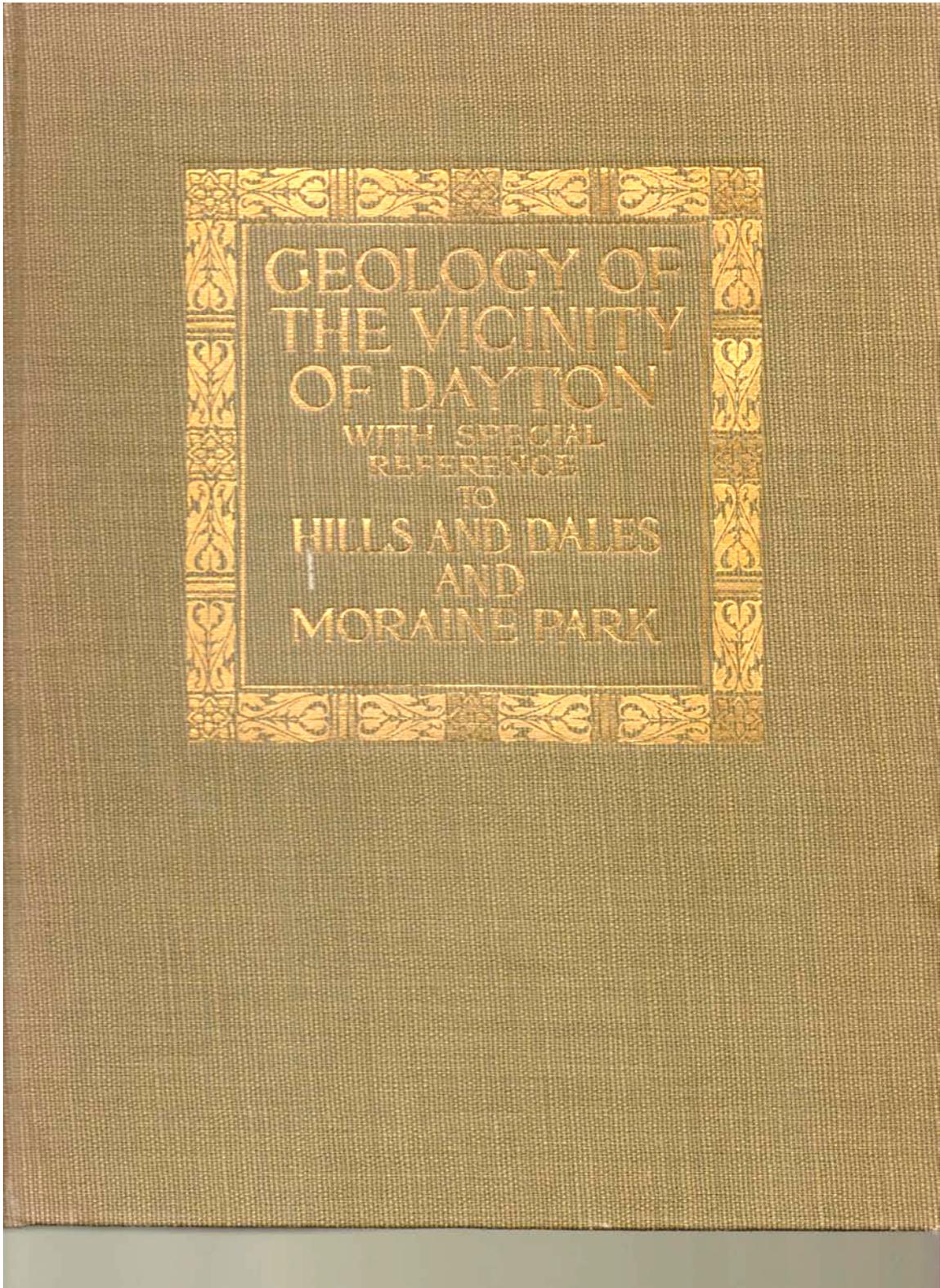


EXCERPTS FROM



EXCERPTS FROM
AN INTRODUCTION

TO THE

**GEOLOGY OF DAYTON
AND VICINITY**

**With Special Reference to the Gravel Ridge Area
South of the City, Including Hills and
Dales and Moraine Park**

By

AUG. F. FOERSTE

NINETEEN HUNDRED FIFTEEN
DAYTON, OHIO

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Biographical Sketch of August F. Foerste obtained from The Smithsonian Institution Archives: http://siarchives.si.edu/collections/siris_arc_217399

August F. Foerste (1862-1936) was born in Dayton, Ohio. Foerste studied geology at Denison University, B.A., 1887, and Harvard University, M.A., 1888, and Ph.D., 1890. While at Harvard, he also served as a part-time assistant with the United States Geological Survey studying the stratigraphy and petrography of New England. Following his attendance at Harvard, Foerste studied for two years at Heidelberg University and the College de France. In 1893, he returned to Dayton and became a science teacher at a high school where he remained until his retirement in 1932.

Foerste's summer vacations were spent participating in geological surveys in Indiana, 1896, 1897, and 1899; Ohio, 1908 and 1919; Kentucky, 1904-1912; and Canada, 1911-1912. In 1920, Foerste began research in invertebrate paleontology at the United States National Museum (USNM) and was appointed Associate in Paleontology at the USNM in 1932.

Foerste's study of fossils centered on three areas: Ohio Valley Silurian stratigraphy and paleontology; Ordovician fossils of the United States and Canada; and lower Paleozoic cephalopods, particularly those of the Ozarkian-Canadian system with Edward Oscar Ulrich of the USNM.

CHAPTER IX

THE EXISTENCE OF MAN DURING THE GLACIAL PERIOD

65. The Existence of Man in Europe During the Glacial Period

In Europe, the earlier fairly abundant evidences of the existence of man consist in the presence of rude chipped flint implements which occur in ancient river gravels. The implements consist chiefly of large, more or less flattened masses of flint, oval in outline, more or less pointed toward the top, and more or less angular along the sides. In length they frequently equalled 10 to 12 inches and show no evidence of ever having been attached to anything. They must have been wielded in the hand, and probably were used for every imaginable purpose for which a heavy cutting instrument might serve, from cutting down a tree, or digging in the ground, to killing an enemy. Other implements, such as scrapers, knife-flakes, or pointed instruments, were relatively rare. A moderately warm climate is suggested by the accompanying bones of two species of elephant, a rhinoceros, a cave-bear, a cave-hyena, and a hippopotamus. While none of these animals now live in Europe, it is probable that the three species last named have left descendents in the form of the brown bear of Europe, and the hyena and hippopotamus of Africa. The species of elephant and rhinoceros have left no descendants among living animals, the existing species belonging to different lines of descent. The climate appears to have been comparatively mild and the time appears to have been that of the second interglacial period. Man apparently lived chiefly in the open, in river valleys. Only implements occur; no parts of skeletons of human beings have been found in these gravels so far, unless a lower jaw found in the ancient sands near Heidelberg, in Germany, and part of a skull and lower jaw found in the gravels at Piltdown in Sussex, in England, be of the same age.

The lower jaw found near Heidelberg is remarkable for its massive appearance and the complete absence of a protruding chin; the teeth, however, are distinctly human and the canine teeth are no more prominent than the adjoining teeth. This jaw is sufficiently distinct from that of existing human beings to suggest its reference to a distinct species. The Heidelberg jaw was found associated with extinct species of elephant, rhinoceros, and cave-lion, and beneath beds containing blocks that had been transported by ice. Its age is regarded as somewhere in the earlier part of the Glacial period, suggesting that in Europe man may have made his appearance as early as the first interglacial period. In the Piltdown jaw,

on the contrary, the canine teeth are much more prominent than in existing races of man, and the jaw presents other animalistic characteristics.

During the third advance of the glacial ice sheet in Europe, the two southern species of elephant, the southern rhinoceros and the hippopotamus disappeared. A type of elephant called the hairy mammoth, on the contrary, became common, and the woolly rhinoceros and musk-ox, two cold-loving animals, were added to the list. The hairy mammoth and woolly rhinoceros possessed thick coats of hair, adapted to cold climates. The descendents of the men who made the implements found in the river gravels apparently were driven by increased cold and dampness to seek shelter under overhanging cliffs and within caves. Apparently the use of clothing, cooked food, and household management of a very primitive type began. The heavy, oval-shaped flint implements were displaced by large flakes with a sharper cutting edge. Flint scrapers, and lance points occur. The long bones of the horse, bison, and deer were used for implements.

More interesting, however, than the implements made by man, during this period of increasing cold, are the more or less well preserved skeletons, indicating his actual structure and size. So many of these skeletons have been found in the rock shelters and caves that man of this age may be said to be well known. The forehead was low and retreating. The eyebrow ridges were very prominent. The chin was undeveloped, sloping backward. Possibly this cave-inhabiting type of man was a descendent of the type found in the gravel southeast of Heidelberg, but he certainly was very distinct from the types of men now living. In fact, there is no reason for believing that living European races are descendents of these ancient cave dwellers. The origin of the living races is still a mystery, and may well have been some Asiatic source.

With the advent of the fourth advance of the glacial ice sheet, the reindeer, horse, cave-lion, and Irish elk make their appearance. The hairy mammoth, woolly rhinoceros, and cave-bear still flourished. Judging from his associates, the cave-lion must have been adapted to cold climates. The chief interest in this period of glacial advance, however, consists in the presence of skeletal remains of man evidently belonging to modern types. All of these possess a distinct chin. The most prevalent type, with narrow but high skulls, might have belonged to a modern European, but skeletons of the Eskimo type and those of negroid character also occur. These human remains occur chiefly in deposits representing the closing stages of the glacial ice age. During the retreat of the ice sheet, the climate became less cold and wet. The woolly rhinoceros disappeared. Reindeer and

horses became common and were used for food. The more modern animals, still living, became numerous. Flints were retained chiefly for knives, spear heads and slingstones. Bones were used for chisels, awls, pins, and spear tips. Later, bone needles came into use. Implements occasionally were carved or engraved, and sufficient of these remain to indicate the prevalence of considerable artistic instinct, of a primitive type. Later, drawings in black, red, and brown, with charcoal, red-ochre, and the oxide of manganese, made their appearance.

There is no evidence that man learned the use of the bow and arrow until after the close of the glacial epoch. In the course of time the Arctic animals disappeared from central Europe. Under the ameliorating conditions of climate man made enormous advances in civilization. The use of clay in the making of pottery was learned. Agriculture made its appearance. Modern man is the final result.

66. The Existence of Man in America During Glacial Times

Since the North American continent was connected with Asia by way of Alaska during the glacial ice age, the advent of man in America during this time was possible. As a matter of fact, however, no remains have been discovered in till or under undisturbed till deposits, unequivocally determining the existence of man in America during the ice age, nor have the remains of man been found associated with the bones of extinct animals, as in Europe. Hence it is probable that man made his appearance in America not earlier than the closing stages of the Ice age. In Ohio, Doctor Metz found a chipped pebble of some black rock of Canadian origin under 8 feet of loess, at Madisonville, 8 miles northeast of the center of Cincinnati, and a second chipped implement, 30 feet below the surface, on the western side of the Miami river, at Loveland, 10 miles northeast of Madisonville. To Frank Leverett, an experienced student of glacial phenomena, the evidence did not appear conclusive in either case, and the same may be said with reference to other supposed evidences of the existence of man on the American continent during the Ice age. This, however, does not prevent the possibility of such evidence appearing at any time with reference to other discoveries of prehistoric implements in America. It is desired here merely to bring out the fact that certain students of glacial phenomena are still skeptics regarding the value of the evidence presented so far.

66A. Climate During Glacial and Interglacial Times

It has been estimated that a lowering of the average annual temperature

less than ten degrees would be sufficient to account for the former widespread glacial conditions. This brings up the question of climate.

This question has been attacked recently by Sinnott and Bailey from a peculiar angle, quoted with some modifications in the following lines.

It is well known that the percentage of woody plants in Europe, north of the Alps, is considerably less than in the corresponding parts of North America. In North America the vegetation could migrate easily southward at the advance of the ice and return northward at its retreat. In northern Europe, on the other hand, the southward escape of the vegetation was blocked, and it was crowded against the Alps, the Pyrenees, and the Mediterranean, thus suffering heavily by extinction. The extermination must have been more pronounced among woody plants than among herbs, since the latter are more able to withstand cold and otherwise adverse conditions owing to the presence of underground rootstocks and the abundant production of seed. The vegetation of northern Europe to-day seems, therefore, to be descended directly from that remnant which was able to survive in those parts of France, Germany, and England which the glaciers never reached. If the flora of northern Europe is indeed typically representative of that which flourished near the ice front during glacial times, the proportion of woody forms within it affords a valuable index as to climatic conditions during the height of the ice age. The facts seem to indicate that when the ice sheet had reached its greatest extent the country in its immediate front was neither a barren arctic tundra, as has sometimes been supposed, nor covered with a luxuriant temperate vegetation; but that the climate in general resembled that of the lower portion of the Alps or the Rockies to-day, being cold enough in winter to kill off all but the hardiest trees and shrubs, but not sufficiently cold to reduce the whole vegetation to the few perennial herbs and stunted shrubs which are characteristic of arctic regions to-day.

Of course, during the interglacial periods the climate presumably was warmer. Our knowledge of life of the glaciated areas during the ice age is very largely confined to such life as existed during interglacial epochs, and here the existence of large animals, such as the elephant, mastodon, megalonyx, and various types of deer suggest considerable vegetation, and no extremes of cold even in winter. In fact, it is probable that during interglacial times the climate in areas as far south as Dayton may have been fully as warm as at present.

Indian Fort Structure at Calvary Cemetery

In 1877... the various ridges characterizing the area west of the Cincinnati Pike could be traced through the cemetery ground as far as the Bluffs overlooking the canal, and the cemetery had made very little change in the general appearance of the land. Practically no regrading had been done. Each year a sugar camp was started in early spring in the hollow west of the Chapel ridge at the western end of the Nollman farm.

CHAPTER II

THE MOUND-BUILDER FORT IN CALVARY CEMETERY

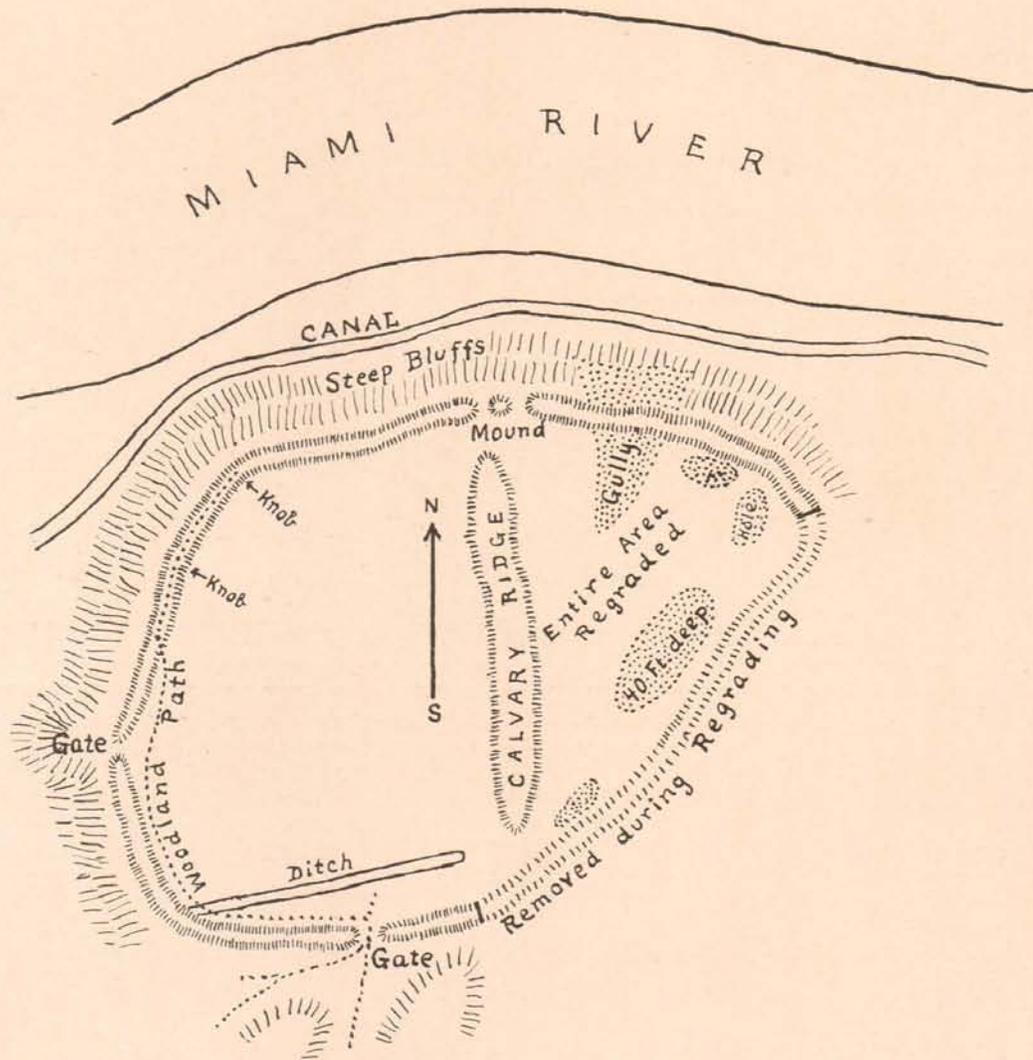
11. The Mound-Builder Fort in Calvary Cemetery

The early races inhabiting this country before the arrival of the white man must have found the deep hollows, surrounded on all sides by ridges, convenient natural refuges when attacked by their enemies. There is abundant evidence that a part of the high land bordering the bluffs, along the northwestern part of the Calvary cemetery, was used for such a purpose. In fact, several hollows here were enclosed by the same earthwork, the low earth embankment forming the walls of the fort taking advantage, as far as possible, of the ridges already present.

At the time of the advent of the white man, the Indians, then inhabiting the country, did not make use of the fort on the bluffs. In fact, they did not use any of the forts found in this part of Ohio, nor did they retain any memory of their use as forts. Moreover, the great age of the trees growing on the earth-walls, indicates their neglect for several centuries. Under these circumstances it was natural to ascribe the construction of the earthwork forts to another race – the “mound-builders.” However, it is readily possible that the so-called mound builders were merely early tribes of Indians, with very different customs and with a very different stage of civilization from that attained by the Indians who were in actual possession when this country was first visited by Europeans.

In 1877 the walls of the Calvary cemetery fort could be traced along their entire course. Parts are still preserved. From the mound at the northern end of the Calvary ridge the earth-wall descends the deep gully eastward and ascends the steep hillside on the other side of the gully, but this part of the wall is almost obliterated. Farther eastward, where the wall crosses the head of a much smaller gully, the earth-wall may be distinguished even

GEOLOGY OF DAYTON AND VICINITY



Ancient earthwork or fort in Calvary cemetery. Map based on survey. Only the western part, from the southern gate to the northern knob, is well preserved. The northern part can scarcely be traced, and the eastern part has been removed entirely by regrading. All of the eastern half of the enclosure, including the Calvary ridge, has been regraded. The depressions noted by the surveyor probably were natural hollows among the network of ridges. Large hollows still exist in their natural condition in the western part of the enclosure and also south of the same. Twenty-four acres of land are estimated to have been included in this fort. Toward the lower part of the gully there formerly was a spring.

from a distance. East of this second gully the earth-wall formerly turned rather abruptly southwestward, along the crest of the East Fort ridge, now occupied by the Zitter, Weingartner, Pflaum and Stomps monuments, to a point about 100 feet south of the Calvary monument. Beyond this point it extended in a somewhat more westerly direction as far as the southern gateway to the fort. Only the last 200 feet of this part of the wall is still preserved. All of the east wall has been removed in regrading the cemetery.

The southwestern and western part of the earth-wall surrounding the fort, on the contrary, is very well preserved (as of 1915). From the southern gateway the wall extends as far as the bluffs on the western margin of the cemetery grounds. A woodland road follows the northern side of this part of the wall. The southwestern part of the fort was its most vulnerable portions since here several ridges reach the wall, from the south, at about the same level as the wall. One of these ridges leads directly into the fort at its southern gateway, and is used at present by a woodland road. Another ridge lies farther westward, and is reached by the road diverging southwestward from the gateway. There is also high land at the southwestern angle of the fort. Therefore, the entire southwestern line of the fort was still further protected by a long ditch, originally about two or three feet in depth, which still may be traced from a point 120 feet north of the gateway westward to the southwestern angle of the fort. Formerly it extended also eastward, almost as far as the crest of the Calvary ridge.



View of the western part of the southern earth wall of the fort in the Calvary cemetery, looking eastward toward the southern gateway, which is at the edge of the woods.

From the western end of the ditch, at the southwestern angle of the fort, the earth-wall extends northward along the upper edge of the bluffs. At one point it is interrupted by a second gap or gateway, where a small spur projects westward from the margin of the bluff. From this point the earth-work takes a more northeasterly course, as far as the high knob several hundred feet directly west of the northern termination of the Gravel Pit ridge. Along most of this western part of the fort the woodland road follows the eastern margin of the earth-wall, but several hundred feet north of the western gateway the road ascends the wall, and from this point northward it follows the crest of the wall.

The present height of the earth-wall, along the southern and western margin of the fort, rarely exceeds five feet, and frequently equals only three feet. The original height evidently exceeded five feet, but probably only to a moderate extent.

From the knob at the northwestern edge of the fort the wall followed the northern edge of the bluffs as far as the mound already mentioned, but this part of the wall is but poorly preserved at present.

The entire space included within this earthwork is estimated at 24 acres. It included about eight hollows, of which several were fairly deep. Only those hollows which occurred in the western half of the fort have not been disturbed by regrading.

That this earthwork, notwithstanding its apparently poor adaptability for purposes of defense, was of great value is indicated by the existence of numerous similar earthworks or forts scattered over a wide range of territory in Ohio and neighboring states. It is inconceivable that such laborious work should have been undertaken, unless forts of this type were known to be effective. It is much more probable that, in our ignorance of the type of warfare then prevailing, we fail to realize how well these forts fulfilled their purpose.

It is interesting to note that the earth used in the construction of the Cemetery fort consists of clay, while the surrounding land consists chiefly of gravel with a very thin surface of soil. Apparently the clay used for the fort walls was brought from a distance of at least several hundred yards in baskets. The walls were built up directly on the existing land slopes, there being no evidence of any alteration of the previously existing topography beyond the addition of the earth-walls.

CHAPTER X

THE EARTHWORKS OF THE MOUND BUILDERS

68. The Irregular Earthwork at the Calvary Cemetery

The irregular earthworks found on the tops of hills appear to have been made by a very different race of Indians than those who constructed the geometrical earthworks in the plains. In the vicinity of Dayton the old fort within the grounds of the Calvary cemetery was an excellent example of such an irregular earthwork. In the case of these forts there rarely is any evidence of any attempt to change the general topography of the land included within the fort. The earth-walls merely follow the existing sinuosities of the land surface. They usually skirt the margins of the hill tops and where crossing a gully plunge directly downward and ascend on the opposite side without any evidence of filling in any part of the land. If the earth-wall is accompanied by any ditching, the latter appears to have been comparatively shallow and always is located along the inner side of the wall instead of following the exterior. The ditch evidently was not expected to prove difficult of crossing to the enemy, but offered additional protection to the defending force

In a preceding chapter the original outline of this fort is indicated. It is rapidly disappearing in the regrading operations of the cemetery authorities.

(In 1877... the walls of the mound-builders' fort in the Calvary cemetery could be followed with ease. The mound at the northern end of the fort had been opened and we heard of the find of a few "Indian relics"). The mound at the northern end of the fort contained not only several skeletons of the mound builders, but also some of their trinkets. Some of the latter were exhibited for a long time at the Public Library museum.