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THE GEOLOGY AND MAMMALIAN FAUNA OF THE PLEISTOCENE OF NEBRASKA PART I OUTLINE OF PLEISTOCENE GEOLOGY OF NEBRASKA PART II THE PLEISTOCENE MAMMALS OF NEBRASKA

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PART I
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PART I
OUTLINE OF PLEISTOCENE GEOLOGY OF NEBRASKA

A. L. LUGN

INTRODUCTION

OBJECT OF THE PAPER

The object of the present paper is to provide a suitable brief statement of the present state of knowledge of the Pleistocene geology of Nebraska, for an adequate understanding of the Pleistocene Mammal list, by Mr. C. Bertrand Schultz, which forms Part II of this report. The "outline" is necessarily brief and does not contain many detailed sections, nor lengthy discussions of controversial points. It is lacking in adequate detailed descriptions of new formations and may not be entirely convincing to many readers. The only excuse which the writer can offer for the shortcomings of the following pages is the necessity for brevity, and so the presentation is little more than a statement of conclusions.

The present summary has been taken from a long and much more complete manuscript by the writer,[1] which is now

[1] Lugn, A. L. and Wenzel, L. K.—probable title of paper, "Geology and Ground Water Resources of South-Central Nebraska", to be published as a Water Supply Paper by the United States Geological Survey, Washington, D. C.

This "Outline of Pelistocene Geology of Nebraska" is published by permission of Doctor G. E. Condra, State Geologist of Nebraska. A much more complete treatise on this subject also is shortly to be published by the State Geological Survey.

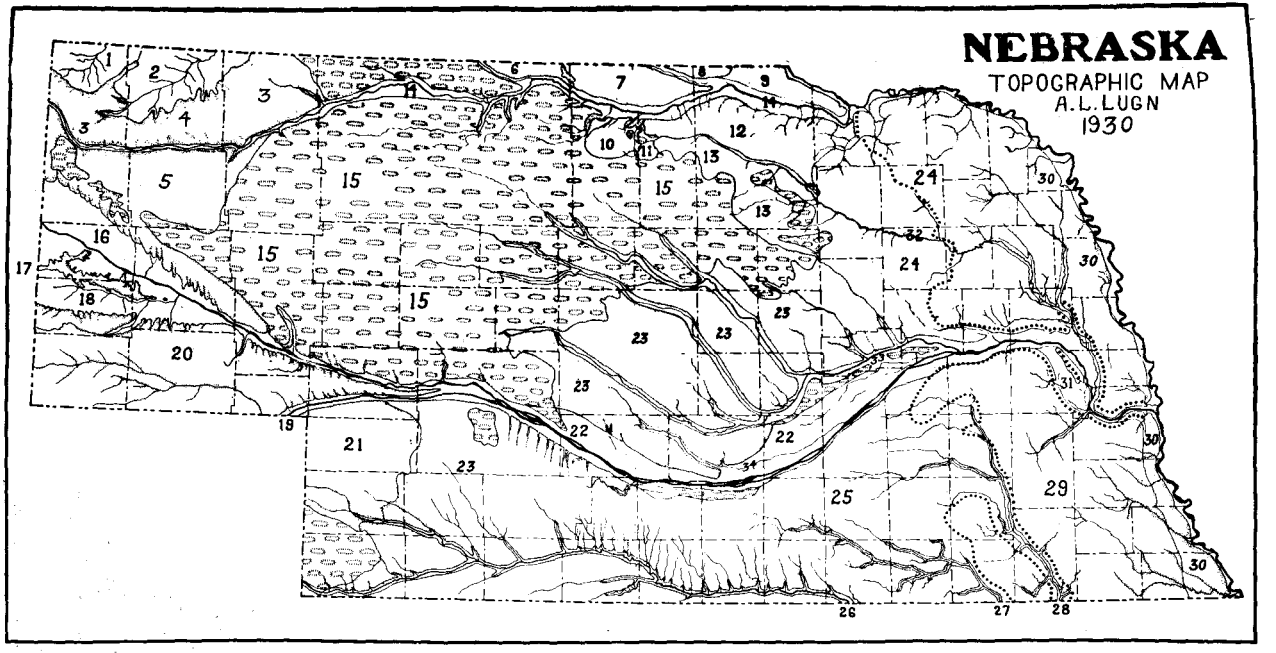
Editorial Note. The publication of this bulletin, as well as the collection of much of the Pleistocene material in the Nebraska State Museum, was made possible by funds donated for Palaeontological Research in Nebraska by the late Mr. Charles H. Morrill.

completed, and which contains a detailed and much more adequate presentation of the facts of the Pleistocene Geology of Nebraska. The facts and conclusions are based on detailed field investigations during the five summers of 1929 to 1933 inclusive.

LOCATION AND TOPOGRAPHY

The area covered briefly here is the entire state of Nebraska. The survey includes brief discussions of the strictly glacial and associated material of the eastern part of the state, and of the fluviatile Pleistocene material of other areas, and also the widely distributed loess formations. The total area of Nebraska is 77,300 square miles. The topography is somewhat diversified, but in general about half of the area is of the dissected plain type and the remainder is made up of constructional plains, as yet undissected by drainage. The surface, as a whole, slopes in a southeastern direction. The altitude ranges from about 840 feet above sea level in the southeastern corner of Richardson county to about 5,340 feet above sea level in western Banner county.

The topographic subdivisions, into which the surface of Nebraska is divided, are shown on the topographic map (Figure 184) with accompanying key. About 42,000 square miles of the surface are underlain by thick loess deposits. This large area is known as the Loess Region. Of this, about 14,000 square miles still remain undissected level upland plains. The largest single area of undissected plain is the Nebraska Plain of the south-central part of the state. About 1,000 square miles constitute the Missouri River bluffs and loess hills bordering the main drainages. This mature loess hill topography is especially well developed along the Missouri River and north of the Republican River. The eastern part of the state, which is underlain by loess covered deposits of at least two glacial till sheets, is quite maturely dissected, and south of the Platte River the main drainages have cut entirely through the surficial loess and drift deposits into the underlying bedrocks. This area is indicated in figure 184 east of the heavy dotted line and is about 13,000 square miles in areal extent. The remainder of the Loess Region (indicated on Figure 184 as 23) is made up of small remnant loess plains, small maturely eroded loess hill areas, and loess plains deeply incised by canyons. Such canyon areas are to be seen in parts of Lincoln, Dawson, Custer, Hayes, Frontier, Hitch-



KEY TO TOPOGRAPHIC MAP OF NEBRASKA

1. Hat Creek Basin.
2. White River Basin.
3. Pine Ridge.
4. Dawes Table.
5. Box Butte Table.
6. Crookston Table.
7. Spring View Table.
8. Naper Table.
9. Pierre Plains and Hills.
10. Ainsworth Table.
11. Long Pine Table.
12. Holt Table.
13. Prairie Plains.
14. Niobrara River Valley and Benches.
15. Sand Hill Region.
16. North Platte River Valley.
17. Wild Cat Ridge.
18. Pumpkin Creek Valley.
19. South Platte River Valley.
20. Cheyenne Table.
21. Perkins Table.
22. Platte River Valley Plain.
23. Small Loess Plains, Hills and Canyons.
24. Loess Hills.
25. Loess Plain (Nebraska Plain).
26. Republican River and Valley.
27. Little Blue River and Valley.
28. Big Blue River and Valley.
29. Glacial Drift Hills, loess mantled.
30. Missouri River Bluffs and Loess Hills.
31. Todd Valley.
32. Elkhorn River.
33. Loup River.
34. Wood River.

23, 24, 25, 29, 30, 31. The Loess Region.

Heavy dotted line indicates composite western margin of glacial till sheets.

Fig. 184.—Map and key to the topography of Nebraska.

cock and Gosper counties. In all, canyon areas occupy about 1,500 square miles.

The Sand Hill Region, located in the north-central and central-western part of the state, is the most clearly defined topographic subdivision and occupies about 20,000 square miles, which includes some small outlying areas of sandhills. The surface is a rolling plain of windblown sand and sand dunes, which are now largely stationary, as prairie grasses and some other kinds of vegetation have become firmly rooted and prevent the dunes from migrating. The western margin of the Sand Hill Region is quite clearly defined. In many places an abrupt eastward facing escarpment defines the margin of the high bedrock (Teritary) plains which rise to the westward. The eastern margin of the Sand Hills is not so clearly marked, as areas of low hills have been formed of windblown sand beyond the main area of sandhills and these dune-like hills rest on the loess. These areas of wind-formed hills are a borderland between the Sand Hill and Loess regions in some places.

The small isolated areas of sandhills on the Platte Valley Plain have probably come into existence recently by wind action re-working the upper part of the exposed Grand Island formation, and by the piling up of fine sands carried into the Platte Valley by the Loup Rivers. A similar explanation is thought to account for the sandy area south of the Platte River at Kearney and at some other places.

The remainder of the state, a little over 15,000 square miles, is made up of undissected high bedrock plains or tables, rough broken areas and valley plains and terraces.

EARLIER WORK

The glacial drift or till sheet deposits of eastern Nebraska were never very closely studied until comparatively recently, and there has been much difference of opinion as to what was drift and what was not drift, and also as to the amount of drift or till present. In 1880 Samuel Aughey [2] discussed the "Glacial Period" and gave especial attention to the loess deposits. He reported evidence of two till sheets and called attention to old soils, peaty material, and to a reddish-brown loess-like material (the present Loveland formation).

N. H. Darton [3] in discussing the "Earlier Pleistocene de-

[2] Aughey, Samuel, Physical Geography and Geology of Nebraska, Omaha (Daily Republican Book and Job Office), pp. 252-309, 1880.

[3] Darton, N. H., Underground Waters of a Portion of Southeastern Nebraska, U. S. G. S., Water Supply and Irrigation Papers, No. 12, pp. 21-23, 1898.

posits" states: "These deposits comprise a mass of glacial drift in Lancaster and eastern Seward counties, and a thin sheet of gravelly sand, which extends far westward under the Loess mantle of the plains region, and appears to be contemporaneous with the glacial drift."

The most extensive publication to date on the Pleistocene deposits of Nebraska was by J. E. Todd [4] in 1899. He reported and described a number of measured sections mainly in northeastern Nebraska north of the Platte River.

In 1903, Barbour [5] discussed the glacial drift of Nebraska in connection with his treatment of the general geology of the state. He regarded the till as belonging to the Kansan stage. Later in 1914 [6] he stated: "There may be recognized an older, bottom layer of a dark, or even black color (sub-Aftonian, Jerseyan, or Nebraskan), and a younger, top layer of a lighter color generally of a yellowish or reddish cast (Kansan), neglecting any Aftonian sands and gravels." It seems that until very recently the two drifts were not satisfactorily recognized and separated, either from each other or from the Loveland ("Red Drift") or the overlying loess.

In 1908, G. E. Condra [7] recognized the presence of at least one till sheet (Kansan) and "sand bodies, sand beds, and sand plains," within the till covered area. He also recognized a larger "glacio-fluvial sand plain" which, he stated, "extends westward under the loess an unknown distance. . . . This sheet of sand and gravel is 100 feet thick at some places." Condra also called attention to "An Old Platte Channel" [8] and the Todd Valley deposits.

Other geologists, including W. C. Alden and Frank Leverett of the U. S. Geological Survey, G. F. Kay and B. Shimek, of Iowa, have studied outcrops of the glacial formations in eastern Nebraska.

NEW PLEISTOCENE FORMATIONS

Five new Pleistocene formation names were proposed and presented by Doctor G. E. Condra, State Geologist, and the

[4] Todd, J. E., The Moraines of South Dakota and their Attendenat Deposits, U. S. G. S. ,Bull. 158, pp. 56-81, and on other pages of the bulletin, 1899.

[5] Barbour, E. H., Report of the State Geologist, Nebraska Geological Survey, Vol. 1, pp. 165-169, 1903.

[6] Barbour, E. H., A Phenomenon of the Kansan Drift in Nebraska, Journal of Geology, Vol. 22, No. 8, pp. 807-810, 1914.

[7] Condra, G. E.. The Sand and Gravel Resources and Industries of Nebraska, Nebraska Geological Survey (First Series), Vol. III, Part I, pp. 52-59, 1908.

[8] Condra, G. E., An Old Platte Channel, The American Geologist, Vol. 31, pp. 361-369, June, 1903.

writer [9] at the forty-fourth annual meeting of the Geological Society of America, December 29-31, 1931. These were as follows: David City formation, Holdrege formation, Fullerton formation, Grand Island formation and Upland formation. They are defined below and described later in this paper. All are believed to be significant and worthy of the rank and distinction given them. They are definite, recognizable, and extensive lithologic and stratigraphic units of the Pleistocene system in Nebraska.

The David City and Todd Valley [10] formations are fluvioglacial deposits or units of lithologic and stratigraphic importance in the Dissected Till Plains section of eastern Nebraska and are associated and classifiable with the till sheets. The Holdrege, Fullerton, Grand Island, and Upland formations are largely fluvial inwash-outwash deposits under the loess region west of the till border.

It is believed advisable to designate these several lithologic and stratigraphic units by precise proper names, as stated above, rather than to refer to them by the stage names in which they are at present correlated. Distinctive proper names permit revisions of correlation, if that is ever found necessary. If these deposits are referred to simply as Nebraskan gravel (Holdrege), Aftonian clay (Fullerton), Kansan gravel (Grand Island), Yarmouth clay (Upland), etc., this would make re-correlation of these beds very awkward if it should be found, for example, that the Yarmouth clay is not Yarmouth in age or that the Kansan gravel is not Kansan in age. Distinctive proper names then permit revisions of correlation without confusion and without the units losing their identity.

PLEISTOCENE CLASSIFICATION

The Pleistocene geology of eastern Nebraska, the Dissected Till Plains section, is much like that of western and southern Iowa. Nebraskan and Kansan tills and associated formations occur extensively in both Iowa and Nebraska. The later loess formations, Loveland, Peorian, and younger loess deposits, extensive over more than half of Nebraska, are identi-

[9] Lugn, A. L., Pleistocene Formations of Southern Nebraska (Abstract), Preliminary List of Titles and Abstracts, Geological Society of American (forty-fourth annual meeting), pp. 47-48, Dec. 29-31, 1931. Also Bull. G. S. A., Vol. 43, p. 190, 1932.

[10] The Todd Valley formation takes its name from its occurrence in Todd Valley, an old filled Platte River valley in Saunders county, described by Condra, G. E., An Old Platte Channel, The American Geologist, Vol. 31, pp. 316-369, June 1903.

cal and continuous with the same formations in Iowa and Missouri, and their relations to later glacial deposits can also be determined by tracing into the Iowan and Wisconsin till covered areas of Iowa, and to the Illinoian, Wisconsin, and associated formations in Illinois.

No extensive review of the Iowa Pleistocene is necessary in this paper as that has been given in great detail and most ably by Kay and Apfel.[11] However, a summary statement of the glacial and interglacial stages and of Pleistocene Classification is quoted below from the above writers' work.

In 1928 G. F. Kay,[12] after tracing in great detail the history of Pleistocene classification, concludes as follows:

"In Iowa the evidence justifies the interpretation that the Pleistocene included five glacial stages and four interglacial stages. In the course of the development of the classification of these glacial and interglacial deposits names were introduced one by one until finally the present classification was evolved. The classification now recognized by the Iowa Geological Survey is as follows:

GLACIAL STAGES	INTERGLACIAL STAGES
Wisconsin	
	Peorian
Iowan	
	Sangamon
Illinoian	
	Yarmouth
Kansan	
	Aftonian
Nebraskan"	

In 1931 Kay[13] modified his classification somewhat; he ranked the Pleistocene as a geologic period and introduced new series names (Grandian, Ottumwan, Centralian and Eldoran) into which are placed the commonly recognized glacial and interglacial stages. In December, 1931 (Forty-fourth annual meeting of the Geological Society of America at Tulsa, Oklahoma) Kay further asserted the advisability of including the Recent in the Pleistocene period, grouping it with the Wisconsin, Peorian, and Iowan stages in his Eldoran series. The following Pleistocene correlation chart (Figure 185) indicates graphically by columnar sections the stratigraphic relations of various Pleistocene formations in areas in Iowa and Nebraska.

[11] Kay, G. F., and Apfel, E. T., Pre-Illinoian Pleistocene of Iowa, Iowa Geological Survey, Vol. 34, pp. 1-304.
[12] Kay, G. F., and Apfel, E. T., op. cit., 132.
[13] Kay, G. F., Classification and Duration of the Pleistocene Period, Bull. G. S. A., Vol. 42, pp. 425-466, March 31, 1931.

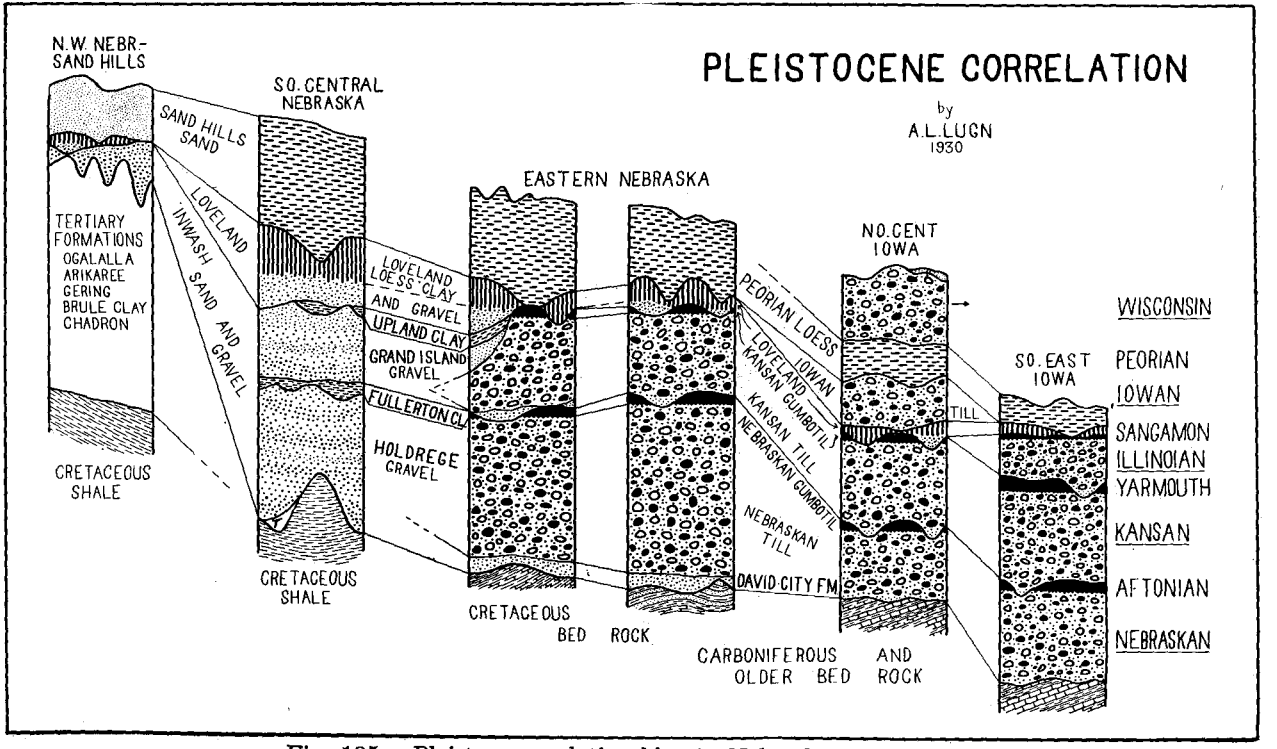


Fig. 185.—Pleistocene relationships in Nebraska and Iowa.

THE BEDROCK FLOOR

GENERAL BEDROCK GEOLOGY

The surficial geologic formations of Pleistocene and Recent age are underlain by bedrocks which outcrop in the state, that range in age from the uppermost Pleasanton of the Des Moines series of the Pennsylvania system to the Ogallala formation of the Pliocene series of the Tertiary system. The Tertiary groups of formations extend from the west and northwest, where they are thickest, covering the Cretaceous formations to their respective thin edged margins.

An essentially complete Paleozoic section is known to underlie the oldest outcropping Pennsylvania formations in this state.[14] The Pre-Cambrian is represented at greater depths by Sioux Quartzite at most places, but in some deep wells granite and schist have been encountered.

THE PRE-PLEISTOCENE SURFACE

The outcropping bedrocks were more or less peneplained during the late Pliocene and during the post-Pliocene pre-Pleistocene interval. This peneplain sloped from the west and northwest to the east and southeast, as it does today. However, it is believed to have experienced additional elevation in the west or at least differential tilting during late Pleistocene and recent times, giving it a considerable greater eastward slope now than it had at the opening of the Pleistocene period.

There is evidence, in a few places, of as much as nearly 200 feet of relief on the bedrock floor within an area of several townships or within horizontal distances of 10 to 15 miles. For the most part, the relief is much less than this, and in general the bedrock floor is comparatively smooth over large areas. Monadnock hills and bedrock ridges mark the locations of pre-Pleistocene drainage divides between shallow valleys or lowland plains as much as 40 to 50 or more miles wide. Other minor and smaller divides and probably isolated hills on the bedrock occur at numerous places within these lowland areas.

At least three fairly well defined wide lowland valleys or elongated basins are now known to occur under the loess

[14] Condra, G. E., Schramm, E. F., Lugn, A. L., Deep Wells of Nebraska, Nebr. Geol. Surv., Bull. 4 (Second Series), 1931.
Lugn, A. L., Pre-Pennsylvanian Stratigraphy of Nebraska, Bull, Amer. Assoc. Petrol. Geol., Vol. 18, No. 12, Dec. 1934 (in press).

plains of southern Nebraska. The easternmost of these trends from northwest to southeast under the town of Aurora, which is located nearly over the middle of it, and the Pleistocene deposits in this depression are from 200 to more than 250 feet thick. The northeastern side of this valley-like basin is the composite border or terminal moraine of the till sheets. High bedrock also occurs under the till in Saline county. On the southwest a fairly well defined divide of hills and ridges, trending more nearly north and south, divides the Aurora basin from the Hastings basin.

Shale bedrock has been encountered at a depth of only 85 feet at a point 6 miles southwest of Giltner; a similar high point has been found northeast of Clay Center, another near Edgar, and shallow Cretaceous shale is known between Angus and Nelson. The Niobrara formation outcrops at the depot in the town of Nelson.

The Hastings basin is about 40 miles wide in a northeast-southwest direction under the town of Hastings, where the Pleistocene deposits vary from 240 to 260 feet thick. The southwest bedrock wall of this basin trends northwesterly from Campbell, under Minden toward Kearney in the Platte Valley, where the Tertiary bedrock is at a depth of only 50 feet or less. Relatively high bedrock is also known under the south part of the town of Blue Hill, probably an isolated high point within the Hastings basin. There may be numerous other similar high points, not yet known, within this and also the other basins.

A third basin trends from a northwesterly to southeasterly direction under Holdrege. Four miles west of Holdrege the Pleistocene deposits are 272 feet thick at the location of the Trees Deep Test Hole. Northward from this point the bedrock rises in elevation until in the Platte Valley near the town of Elm Creek the Pleistocene deposits are only 25 to 50 feet thick. Outcrops of Tertiary formations occur at the surface from Stockville northwestward to the North Platte vicinity. They mark the southwest escarpment of the Holdrege basin. The Pleistocene deposits are very thick east of this line, being over 350 feet thick at Elwood and west of this the Loveland and Peorian formations alone are over 300 feet thick.

Another interesting large feature of the bedrock surface is its general rise in elevation out of the basins under the Nebraska Plain, northward under the Loess Hills north of

the big bend in the Platte River. The bedrock surface rises 161 feet from Grand Island to Dannebrog. From Grand Island to Kearney, the Pleistocene deposits in the Platte Valley thin from 185 feet at Grand Island to even less than 50 feet in the Kearney vicinity, because of the greater elevation of the bedrock floor toward Kearney and northward. This condition continues westward at least as far as Elm Creek.

North of the Platte Valley the high bedrock area is dissected by many valleys and old drainage channels, mostly inherited from pre-Pleistocene erosion, that trend from northwest to southeast, and these are filled with deposits of sand and gravel. which merge into the larger sheet-like formations under the Nebraska Plain. These old filled valleys and channels are of varying depths, sometimes being over 300 feet deep, but all are obscured and buried under very thick loess deposits in the Loess Hill area and by eolian sand under the Sand Hills area. South of the Platte Valley the bedrock surface slopes southeastward and southward in places gently and at other points more abruptly, until under the Nebraska Plain it takes the configuration of basins and ridges of hills as described above.

Near the Republican Valley the large basins and the ridges lose their individual identity and the bedrock is more minutely dissected by many pre-Pleistocene small secondary valleys that are incised deeply and precipitously into the bedrock formations, mostly of Cretaceous age. These "outlet valleys" that were developed for the most part prior to the Pleistocene sedimentation are eroded headward into the bedrock plain only for comparatively short distances and have relatively steep gradients into the Republican Valley and are cut rather deeply, like the Republican Valley, below the general level of the old peneplain to the northward. These outlet valleys were filled and obscured by the deposition of sands and gravels, Loveland and later loess deposits during the ice age at the same time the larger basins were aggraded northward. If the configuration of the bedrock along the north side of the Republican Valley could be seen, it would present an intricately eroded and gullied valley wall alternating high bedrock hills and valleys of varying depths and sizes.

The pre-Pleistocene peneplain of eastern Nebraska (glaciated area) was much dissected before the advent of the Nebraskan glacier. Deep and intricate dissection, following more or less the earlier topography, took place again follow-

ing the retreat of the Nebraskan ice and also following the Kansan glaciation. This complicated erosional development has resulted in great irregularity of the bedrock and also in irregularity of the glacial and associated deposits. Many of these irregular bedrock "highs" occur well exposed in relation to both the glacial and to the fluvial materials in Cedar, Knox, and Holt counties.

The existence of the buried irregularities on the bedrock floor made the Pleistocene sedimentation complicated in detail. The older deposits are more limited in extent and less continuous, being more confined to the deeper parts of the basins and drainage channels. The younger formations are or were more extensive, more continuous, and in many places rest unconformably by overlap on the bedrock itself. This is especially true of the relationships of all of the Pleistocene formations to the larger high bedrock area in the Kearney vicinity. Unconformities and drainage changes during the Pleistocene itself still further complicate the present occurrence and distribution of the younger beds.

The location of the basins, ridges and "outlet valleys", as described in the paragraphs above, as well as the distribution of the Pleistocene sand and gravel under the loess west of the till border, is indicated on the map, figure 186.

THE GLACIAL PLEISTOCENE OF EASTERN NEBRASKA

The glacial and associated fluvio-glacial materials of the glaciated area of eastern Nebraska consist of the Nebraskan and Kansan till sheets, and associated bodies, sheets, and valley fills of sand and gravel. The sand and gravel deposits occur under the lower or Nebraskan till, between the tills, and a considerable accumulation of more or less locally reworked sand and gravel occurs on top of the upper or Kansan till sheet as the lower or valley phase of the Loveland formation. Topographic conditions and drainage during the Ice Age in this area were favorable for the accumulation of large amounts of fluvio-glacial materials intricately associated with the till sheets.

THE NEBRASKAN STAGE

The David City Formation. This formation of sand and gravel occurs under the Nebraskan till and is believed to be early Nebraskan in age. It is thought to have been the outwash fluvio-glacial material carried into pre-Pleistocene valleys and other depressions on the bedrock in front of the Nebraskan glacier, and the in-wash sediment carried by streams from other directions, whose valleys were dammed up by the ice itself or by débris washed from the melting ice sheet. The quantity of this material is large in eastern Nebraska, even though it is exposed at only a very few places and is known mainly from well logs. The David City formation is widespread but it is not a continuous sheet, because of the irregularities on the bedrock floor on which it was deposited. It fills old buried pre-Pleistocene valleys and varies from just a few feet to as much as 150 feet in thickness. It is said to be this thick east of David City where it has been penetrated in deep test wells.

The following log from a farm well 2 miles west and 2 miles south of Bellwood in the NW ¼, sec. 1, T. 15 N., R. 1 E., indicates the character and relationships of the David City formation. The portal elevation is 1,490 feet above sea level in a small creek in a deep gully in the bluff of the south side of the Platte River valley.

	Feet
1. Kansan till, yellowish boulder clay	60
2. Inter-till sand and gravel	22
3. Nebraskan till, blue-black boulder clay	85
4. Clay, white with some gravel	15
5. David City sand, coarse and water bearing	35

6. David City clay, white, hard 3
7. David City sand and gravel, loose and contains bits of cedar wood 69

Note: The lower sand and gravel was not penetrated, so it may be much thicker or the Cretaceous shale may be only a short distance below the bottom of the well.

Four feet more of Kansan till were exposed in the bank above the well portal, and quite thick loess formations occur over the Kansan till in the high banks of the gully.

The David City formation occurs exposed at a number of places near Hartington in Cedar county. Here it consists of fine to medium textured gray sand. It is from 5 to 20 feet thick under the lower or Nebraskan till. It is quite unlike the much more heterogeneous sand and gravel, which also occurs in this area, between the Nebraskan and Kansan tills. This lower or David City sand is quite conspicuous where it has washed out in the drainages, where the gullies have been eroded entirely through the lower or Nebraskan till.

The Nebraskan Till. This formation, named by Shimek [15] in 1909, is well developed in eastern Nebraska and extends into the state farther west of the Missouri River than the Kansan till. It is thicker than the Kansan till in most places and has been very appropriately named.

The lithologic character of the Nebraskan till is similar to its lithology in other areas, except that it may contain a greater admixture of Sioux Quartzite and naturally a large content of the local underlying bedrocks. This fact is well illustrated in the northeastern part of the state, where the lower till contains great quantities of Pierre and Niobrara shales and because of this relatively fewer boulders and pebbles than the higher and younger Kansan till. In general, it is made up of a heterogeneous mixture of granitic, metamorphic, and sedimentary rock materials of nearly all kinds, ranging in size from colloidal particles up to large boulders. Where it is preserved in its entirety, it has the Nebraskan gumbotil, a few feet thick, at the top, below which usually occurs several feet of oxidized and leached till, and below this a zone of oxidized but unleached boulder clay, and under this zone the unaltered dark gray to black till.

Late Aftonian erosion greatly dissected this till sheet, and because of the nearness of most places in the glaciated area of the state to the till margin, less gumbotil had time to form

[15] Shimek, B., Aftonian Sand and Gravels in Western Iowa, Bull. Geol. Soc. of America, Vol. 20, pp. 399-408, 1909.

here than over the wide Nebraskan till plain of Iowa. Because of this, the Nebraskan till is only poorly preserved and few complete sections are to be found where all of the above zones can be seen. The Kansan till or even younger formations may rest on the eroded Nebraskan till, in contact with any of its zones, from the uneroded gumbotil down to the fresh, unaltered Nebraskan boulder clay. It is often impossible, because of the lithologic similarity of the two tills, to distinguish Nebraskan from Kansan unless the Nebraskan gumbotil is still preserved in the section. Degree of leaching or oxidation may be of little value in differentiating the two till sheets where, in the absence of more or less of the upper part of the Nebraskan, the Kansan till may rest on the oxidized and unleached zone or even on the unaltered lower till. There are a few places where the two tills, lying in contact, can be differentiated in the absence of gumbotil.

Probably the best exposures of the two tills, where their relationships are clearly revealed, occur in the south bluff of the Platte River valley southwest of Fremont. A section measured near the middle of the south side of sec. 19, T. 17 N., R. 8 E. (2½ miles west and ¾ mile south of Fremont) is given below:

Top of section at edge of bluff is 1,330 feet above sea level, the general level of the upland plain in this vicinity.

	Feet
1. Peorian loess, yellow clay, mantling the slopes of tributary gullies as well as capping the bluff itself, lying on and in contact with every formation below	0 to 40
2. Loveland, red loess clay, only remnants of this formation exposed; sharply eroded at the edge of the bluff under the Peorian, uneven erosional contact with both the Kansan till below and the Peorian loess above	0 to 8
3. Kansan till, gray, unleached and, except for the upper few feet at some places, unoxidized typical boulder clay, basal contact is nearly horizontal on the gumbotil, but elsewhere it is uneven and plainly unconformable on the lower eroded till	0 to 37
4. Nebraskan gumbotil, dark brownish clay with quartz pebbles and quartz sand grains, leached of soluble original limestone, but contains some secondary calcium carbonate	0 to 3
5. Nebraskan till, 10 feet of dark gray till well exposed, 35 feet of till poorly exposed, mostly under covered slope to the water level in the Platte River at the base of the section	45

The entire Nebraskan of the above section is well exposed at other points nearby along the bluff above the water level.

The Nebraskan till probably extends 18 to 20 feet below the Platte River level at this point, as 18 feet of till were penetrated in a shallow well put down at the very base of the bluff at a point about one-half mile east of the above section. Coarse gravel of the David City formation was encountered below the till in this well. Its thickness at this point is unknown, but it is about 20 feet thick in water wells which reach it from the upland level south of the river. These Pleistocene formations lie on the Dakota sandstone and the Graneros shale in this part of the state.

The Nebraskan till is known from many other exposures, especially in the northeastern part of the state, and some occurrences have been noted in the southeastern counties. It is clearly present in the David City vicinity where it seems to have attained its maximum thickness of probably 80 to 100 feet (from well logs). It is as much as 75 feet thick in Cedar county near Hartington, but is generally quite thin or absent (by erosion) in the southeastern part of the state. It will be noted in some of the sections given in the following pages.

THE AFTONIAN STAGE

This interglacial stage is represented in eastern Nebraska by the Nebraskan gumbotil, probable vegetation deposits "forest beds", and possibly by silt beds, sands, and gravels, occurring between the Nebraskan and Kansan till sheets, and by erosion.

Gumbotil, as defined by Kay,[16] results from the almost ultimate weathering and leaching of glacial till or boulder clay after long exposure to weathering on a poorly drained till plain. It is always a tough, dark gray to black, impervious clay, containing usually only quartz or quartzite pebbles, and grades downward into oxidized and leached till, the parent material. All soluble mineral matter has been leached out and all granitic minerals and pebbles or boulders are usually thoroughly disintegrated by weathering.

Erosion and dissection of a till plain terminates gumbotil formation and removes much or all of the gumbotil previously formed. Only remnants of Nebraskan and also of Kansan gumbotil remain on the till sheets of eastern Nebraska. A

[16] Kay, G. F., Gumbotil, A New Term in Pleistocene Geology, Science, New Series, Vol. 44, pp. 637-638, Nov. 3, 1916.
Kay, G. F., and Pierce, J. N., The Origin of Gumbotil, Journal of Geology, Vol. 28, pp. 89-105, 1920.

small remnant of Nebraskan gumbotil, somewhat changed in color and altered by superficial weathering, has been noted in the section southwest of Fremont. Exposures of a number of other similar remnants, with till above and below, are known to occur in Saunders, Butler, Colfax, and also possibly in Dodge and Lancaster counties.

An old soil, six to eight inches thick, not a gumbotil, is also known to lie between layers of till in the vicinity of Valparaiso. Fine textured beds of dark clay and silt, with very little if any sand or pebbles, occur between deposits of typical boulder clay in northern Lancaster, southern Saunders, and northeastern Seward counties. This material may lie between the Nebraskan and Kansan tills and may be Aftonian in age. Doctor W. C. Alden,[17] of the United States Geological Survey, has suggested that this material may represent the local accumulation of silt and clay, which was reworked from the earlier deposit of till (Nebraskan) by relatively gentle erosive action during the Aftonian interglacial age.

Inter-till beds of sand and gravel are common throughout eastern Nebraska. The material seems more or less to fill old valleys, which were eroded into and in places through the Nebraskan till, prior to the deposition of the gravel but later than the formation and subsequent erosion of the Nebraskan gumbotil. The inter-till sand and gravel must then have been deposited quite late in Aftonian time or even in early Kansan time. It seems more probable that the inter-till materials were carried out in front of the advancing Kansan ice by the glacio-fluvial waters from the melting ice sheet, and fluvially transported by streams from the west and northwest, and that the material choked and filled the old pre-Kansan valleys that were then more or less dammed up by the ice itself. The deposits thus formed were subsequently overridden by the Kansan glacier, and the fluvial accumulation went on, during the remainder of the Kansan stage, west of the terminal moraine, to build up the Grand Island formation. This explanation is identical with the explanation previously mentioned for the early Nebraskan or David City sand and gravel.

One of the best exposures in southeastern Nebraska, containing both the Nebraskan and Kansan tills and inter-till beds, occurs about 8½ miles south of Tecumseh. The section is described below:

[17] By personal communication in the field.

Location: West side of NW. ¼, sec. 9, T. 3 N., R. 11 E.

	Feet
1. Soil and Peorian loess clay	2
2. Loveland, red sandy loess clay, contains some pebbles; thin, mantles slope over lower beds; the lower 3 to 4 feet consists of medium to fine sand where the Loveland rests directly on the eroded boulder clay	2 to 5
3. Kansan till, yellowish and gray boulder clay; lower part does not contain many pebbles but upper part is more typical with more pebbles and cobbles; the lower contact horizontal but contains small masses of the underlying brownish sand, probably small sand frigites; the till pinches out to a thin edge against the eroded slope to the north	0 to 15
4. Inter-till sand (Aftonian?), brownish and gray, medium to fine texture; lower 10 feet badly covered may be transitional to clay below	33
5. Clay, laminated, slightly sandy, grayish to dark buff and yellowish color	5 to 6
6. Sand, very fine, whitish, silty, with much secondary calcium carbonate concentrated in upper 2 feet	10
7. Nebraskan till, typical boulder clay, pebbles, cobbles, etc., grayish color, unoxidized and unleached; lower 8 feet is covered slope to drainage level; upper 10 feet exposed	18

Many other occurrences of the inter-till materials 10 to 40 or more feet thick, as noted in the above section, are known to occur in the southeastern part of the state. Some of the exposures are small and inconspicuous, others are larger, and many have remnants of Kansan till still in place over the sand and gravel. Some places are known where the formerly overlying Kansan till has been completely broken down and disintegrated, leaving only a heavy gravel and cobble and boulder residual concentrate over the somewhat cleaner and better sorted finer sand and gravel. Such residual concentrates can be traced into boulder clay at some places. Gravel pits of considerable local importance have been opened in the inter-till deposits in Johnson, Pawnee, Richardson, and Nemaha counties. Small remnants of Kansan till or accumulations of the residual débris occur over the gravel outcrops at most places. Remnants of Nebraskan till are known to occur under the inter-till sands and gravels at a few places. The inter-till deposits have yielded vertebrate fossil remains at a few places, usually dated as Aftonian or early Kansan age.

Almost identical occurrences to those noted above can be seen in the northeastern part of the state. The inter-till sands and gravels are both well developed and well exposed in Cedar, Knox, and Dixon counties, and many occurrences

in other counties are known. Some of the best exposures of the various Pleistocene formations in northeastern Nebraska are at or near Waterbury, Coleridge, Hartington, Randolph, Bloomfield, Crofton, Bazile Mills, Pierce, and Norfolk.

The thickness of Nebraskan till ranges from none at all at some places to 75 or more feet northeast of Hartington. It is more or less overlain by inter-till gravels that range in thickness from nothing up to 40 or more feet, and which are more or less confined to old Aftonian channels or valleys, as they are in the southeastern part of the state.

The Kansan till, except in a few places, occurs only as small, thin remnants of boulder clay over the inter-till deposits, or it may be represented only by a residual accumulation of gravel, cobbles, and boulders. This fact is well shown at the old gravel pit about one mile west of Bazile Mills. Nebraskan boulder clay also occurs a short distance southeast of Bazile Mills under thick gravel.

A fairly typical section for this part of the state is recorded below, from near Tiptop Schoolhouse, about 2½ miles north of Hartington, along west side of the SW. ¼, sec. 13, T. 31 N., R. 1 E.

	Feet
1. Loess, yellow silty clay under covered slope	4 to 10
2. Peorian yellow loess, exposed under soil in roadside bank	2
3. Kansan till, much disintegrated and weathered, but some small areas are typical oxidized boulder clay	0 to 2+
4. Inter-till sand and gravel, mostly brownish and gray sand, upper 6 to 8 feet oxidized to a brownish color normally contains no large cobbles or boulders here. Where the Kansan till has completely disintegrated over it a gravel and cobble concentrate has been let down on the inter-till sand	15 to 25
5. Nebraskan till, gray boulder clay with many quite small pebbles	10 to 12
Covered slope for about 30 feet. The Niobrara formation cannot be far below the base of the slope, and the lower or Nebraskan till may be as much as 30 to 40 feet thick at this point.	

The inter-till sands and gravels of this part of the state have also yielded some vertebrate fossil remains, usually dated as Aftonian or early Kansan age.

THE KANSAN STAGE

This glacial stage is represented in eastern Nebraska by only remnants of a once extensive sheet of till, unless the in-

ter-till deposits, discussed above, also belong to this stage. Its maximum thickness, so far as it is known, seems to be about 100 feet at some points in Butler county. It may be even thicker under western Saunders county and in eastern Seward county and possibly at other places.

The Kansan till is lithologically almost exactly like the Nebraskan boulder clay, except that it may contain a higher percentage of Sioux Quartzite fragments and certainly less of the underlying shale or limestone bedrocks. Because of its remnant character and thinness, and because it usually occurs relatively high topographically, it is very likely to be more highly oxidized and even discolored reddish from the overlying Loveland formation, than the lower and more protected Nebraskan boulder clay. This has led to a generally accepted misconception about the two till sheets in this state; namely, that the Kansan is "red" and that the Nebraskan is dark gray or black. Where enough Kansan till is present, it has the same weathering zones as the Nebraskan till, namely, gumbotil at the top, an oxidized and leached zone, next an oxidized but unleached zone, and at the bottom unaltered, unoxidized, and unleached gray or black boulder clay.

The distribution of the Kansan till is thought to have been almost coextensive and nearly coterminal with the Nebraskan, except that the earlier Nebraskan glacier is believed to have extended 15 to 20 miles farther west beyond the Kansan terminus in Butler and Polk counties. However, the Kansan ice is thought to have extended beyond the Nebraskan till and to have overridden Nebraskan fluvial materials in parts of Saline and Jefferson counties.

The Kansan till has been noted in the sections already mentioned. It is generally quite thick in the counties bordering the Platte River valley and southward into eastern Seward and Lancaster counties. It is thin in the southeastern part of the state, seldom more than 10 to 15 feet thick. It occurs topographically high, where it exists at all, in Johnson and Pawnee counties and usually has but a thin mantle of Loveland and Peorian loess over it.

The Kansan till is fairly well developed north of the Platte River valley and also occurs topographically high under the prairie plain in Stanton, Cuming, Wayne, Pierce, Cedar, and eastern Knox counties. It seems to attain its thickest development, for this part of the state, and rests unconformably

directly on the lower or Nebraskan boulder clay without any intervening inter-till gravel, at a point 6 to 7 miles west of Crofton near the intersection of the Crofton-Niobrara road and the Bloomfield road. The section is recorded below; it was well exposed by new grading in the summer of 1933.

	Feet
1. Peorian loess, yellowish silty clay	26
2. Kansan till, light gray fresh boulder clay; contains many limestone pebbles and some Niobrara boulders. The color of this material is in distinct contrast to the much more weathered and more brownish upper part of the lower till. The lower contact is quite uneven and is marked by a distinct ferruginous zone 3 to 4 inches thick, exposed for a few yards	60
3. Nebraskan till, typical boulder clay, brownish for the most part; contains fewer pebbles and boulders than the upper till; lower contact sharp	69 to 70
4. Niobrara chalk; a few feet exposed.	

Farther eastward, the Kansan usually occurs only as remnants on more or less thick inter-till deposits, and has been largely removed by erosion nearer the larger drainage courses especially near the Missouri River.

THE YARMOUTH STAGE

The only material in eastern Nebraska which represents this interglacial stage with certainty is the Kansan gumbotil. However, only a few occurrences of this material are known, mostly in western Saunders and eastern Butler counties, and a few doubtful outcrops in Lancaster and possibly eastern Seward counties.

The explanation for this general absence of Kansan gumbotil is simple. Late Yarmouth or pre-Loveland erosion so thoroughly and extensively dissected the Kansan gumbotil plain that nearly all of the gumbotil, and except in a few counties, most of the Kansan boulder clay were removed. The erosion and dissection at that time seems to have been much greater and more thorough than the late Aftonian or pre-Kansan erosion had been in the earlier age. Perhaps the region had been rejuvenated to a somewhat higher level. The relief developed before the inauguration of the Loveland deposition seems to have been nearly as great as at present. The Loveland, in general, mantles the slopes of the late Yarmouth surface, except along the Platte River valley, where it is known only to occur at a higher level than the Kansan till, and was sharply eroded at the edge of the bluff prior to Peorian deposition.

THE FLUVIATILE PLEISTOCENE FORMATIONS WEST OF THE TILL BORDER

GENERAL STATEMENT

The fluviatile Pleistocene formations west of the till border in Nebraska are made up of two sand and gravel formations and two sandy clay and silt formations. They are believed to be the equivalents of the glacial formations of eastern Nebraska, Iowa, and other areas, from the Nebraskan stage to the Yarmouth stage inclusive. The composite distribution of the two sand and gravel formations (Holdrege and Grand Island) is indicated in figure 186. In a general way, the closeness and the number of dots and their size on the map indicate the composite thickness and texture of the fluviatile sands and gravels. The lighter areas indicate the ridges and hills of high but buried bedrock. The "outlet valleys" along the Republican River valley are also conspicuously shown. The stratigraphic relations and correlation of these beds are shown graphically in figure 185, Pleistocene correlation.

The most completely exposed section of these formations occurs at "Lovers' Leap", south bluff of Cedar Creek, about one mile northwest of Fullerton in Nance county. The section is described below:

	Feet
1. Peorian loess, yellowish clay, silty with a somewhat whitish and "ashy" appearance. Erosional unconformity at base, so that it attains a maximum of more than 100 feet	66 to 100
2. Loveland formation, zoned as follows:	0 to 37
a. Soil, mucky, dark gray to black, 1¼ feet,	
b. Clay, reddish loess clay, silty, 23¾ feet,	
c. Clay, reddish and sandy, 7 feet,	
d. Clay and laminated sand, less red, 5 feet.	
3. Upland (Yarmouth) formation, clay, fine sand and silt, greenish-gray color, uneven erosional surface at the top, varies in thickness	6 to 11
The Upland is zoned as follows:	
a. Tough gray clay, old soil in places, 2 feet,	
b. Sand, fine with some clay, greenish, 1½ feet,	
c. Clay and very fine sand, greenish, ½ foot,	
d. Clay, greenish, sandy, hard, 1½ feet,	
e. Sand, fine, some clay, gray and greenish color, 4 feet,	
f. Clay, grayish, 1 foot.	
4. Grand Island (Kansan) formation, sand and gravel, fine and coarse beds interlayered, mostly poorly sorted, cross-bedded, unconsolidated, typical fluvial sand and gravel	33

5. Fullerton (Aftonian) formation 20
   The Fullerton is zoned as follows:
   a. Silt, gray, soft fine and uniform in texture, minutely laminated, 3 feet,
   b. Clay, dark gray, hard, silty, some very fine sand; contains much secondary calcium carbonate, which takes the form of very hard concretionary chunks ("boulders") or masses as much as one foot in diameter, 17 feet.
   This is the base of the exposure at the flood plain level of Cedar Creek, 1616 feet above sea level.
6. Holdrege (Nebraskan) formation, sand and gravel similar to the Grand Island, known from wells but not exposed 40

Note: All of the beds in the above section are in place and fully exposed in one continuous outcrop, except the Holdrege formation. This is the type exposure of the Fullerton formation and is its only known outcrop, except in the northern part of the state; elsewhere it is generally recognized in wells.

A deep well was drilled from the upland level a few rods south of the edge of the bluff at the location of the above section. It penetrated the same beds as occur in the exposure. A brief log follows:

	Feet
1. Peorian loess, yellow clay	67
2. Loveland, red clay and sand	37
3. Upland and Grand Island, sand and gravel (first water sand, dry); the Upland was not differentiated by the driller	39
4. Fullerton, silt and clay, dark and hard	20
5. Holdrege, sand and gravel (second water sand) coarser than the upper sand	40
6. Niobrara shale, bluish gray and hard, drilled into but not penetrated	280

THE HOLDREGE FORMATION

This formation consists of sand and gravel, generally coarse near the base and finer toward the top. Quartz and other granitic and metamorphic crystalline minerals and rock fragments constitute the material of the formation. It is thought to have been transported by rivers, principally the Pleistocene North Platte River, from the west and northwest. It contains some outwash material from the Nebraskan glacier near the margin of that ice sheet. It is then an inwash-outwash fluvio-glacial deposit, which was built up, during the Nebraskan age, as an alluvial plain, mainly in south-central Nebraska. Part of the material was carried into the state by the Missouri-Niobrara drainage and deposited in front of the Nebraskan glacier. Other streams from the west and

northwest probably also contributed materials reworked from the high plains Tertiary formations. It is equivalent to the Nebraskan till and the David City formation of eastern Nebraska.

The Holdrege formation seems to be quite homogenous as a whole, but is certainly intricate in its detailed makeup. It is more or less of a continuous sheet-like alluvial plain deposit, but it is interrupted by ridges and hills of bedrock. It is naturally very irregular in thickness, since it was deposited on a somewhat irregular bedrock surface. The thickness ranges from nothing to possibly 120 feet or even more. Its average thickness is probably about 70 to 75 feet. The formation occurs more or less continuously under an area of about 15,000 square miles, and contemporaneous valley deposits, which were feeders from the west and northwest, also occur over an additional quite large area.

The formation is not known to outcrop at any point along the Platte River valley or in south-central Nebraska. However, it may be exposed at some points along the Republican valley and is certainly exposed at several places in the Niobrara valley. Because it is still so completely covered and most of its exposures are doubtful, it has not furnished many mammalian fossils. It is known almost entirely from well logs, and was named from the Trees deep test for oil and gas near Holdrege in Phelps county. A partial log of this hole is given below.

Location: near middle of southwest ¼, sec. 23, T. 6 N., R. 19 W., 2 miles north and 4 miles west of Holdrege. Curb elevation 2,345 feet above sea level.

	Feet
1. Peorian loess, yellowish clay and silt, lower 15 feet sandy..	50
2. Grand Island (Kansan) sand and gravel; most of the upper 100 feet are of clean fine to medium sand, crystalline minerals; lower 20 feet of mixed sand and gravel.....	120
3. Fullerton (Aftonian) formation, silt and clay; some fine sand, much fine rock flour, non-calcareous, yellowish gray color	30
4. Holdrege (Nebraskan) formation, sand and gravel, coarser and finer materials interlayered; finer layers contain some rock flour, non-calcareous.....	71
5. Tertiary series, gray, fine, compact silty sand, lower 30 feet, slightly coarser quartz sand, all somewhat calcareous (probably Ogallala)	129
6. Pierre shale	370
7. Niobrara shale, top at depth of 770 feet.	

THE FULLERTON FORMATION

The Fullerton formation has been noted and described in the type section at Fullerton. It is a widespread and more or less continuous sheet-like deposit of dark calcareous silt and clay, sometimes quite sandy, which ranges in thickness from nothing to a maximum of about 65 feet. The average thickness is between 20 and 35 feet. The discontinuity of the Fullerton bed is largely due to quite general erosion following its deposition. It occurs over about the same area as the Holdrege formation, and is known to be exposed only in the northern part of the state and at Fullerton.

The Fullerton formation is thought to have been formed during the Aftonian interglacial age, when sedimentation was limited to fine textured materials. It may be in part an old loess with some eolian sand. It separates the Holdrege gravel and sand from the upper or Grand Island gravel and sand. It evidently represents a time when the competency of the sediment carrying streams from the west and northwest was low, in decided contrast to the competency required for the transportation of the material of the Holdrege and Grand Island formations. It must represent the quiescent time interval between the two glaciations, when gumbotil was slowly and quietly forming over the Nebraskan till plain to the east. It is apparently conformable on the Holdrege formation, but is decidedly unconformable under the Grand Island formation.

The Fullerton formation and also the lower Holdrege sand and gravel and the overlying Grand Island formation have been shown to extend continuously under the Platte River valley and under the plains both to the north and south of the valley. The higher and better exposed formations, the Grand Island and the Upland, can actually be traced into the bluffs and followed along continuous outcrops, under the younger loess formations, along tributary drainages and in deep road cuts. This is significant, for it proves that the sand and gravel "in the Platte Valley" belongs to sheet-like Pliestocene formations in place ("in situ"). The true recent alluvium of the Platte River is limited to a few feet of recently reworked surface material.

The Fullerton bed is now known to have peat beds and forest growth on its upper surface at some places. Several red cedar trees and logs were found in a deep gravel pit a short distance east of Central City. Two of these red cedar

trees, one 23 feet tall and 3 feet 7 inches in circumference above the base, were found still standing vertically and rooted in the Fullerton clay, buried in more than 40 feet of Grand Island sand and gravel. The formations are believed to be in place with only a thin mantle of recent reworked alluvium over the gravel. A test drilling established the sequence of the formations, and the Holdrege gravels were encountered below the Fullerton clay.

THE GRAND ISLAND FORMATION

This upper sheet of alluvial sand and gravel is believed to have had exactly the same origin and mode of formation as the previously described Holdrege formation. It is the inwash-outwash equivalent of the Kansan till and the early Kansan inter-till sands and gravels of eastern Nebraska. It ranges in thickness from 30 to perhaps 150 feet, but averages about 75 feet. The upper 30 to 50 feet are usually of quite fine sand, and this part of the formation may even have had an eolian origin. The lower part of the formation contains coarser gravel and is clearly a fluvial deposit.

The Grand Island formation has about the same areal sheet-like distribution as the Holdrege but is more continuous. It extends apparently unbroken under the plains of southern Nebraska to the Platte River valley. The lower part of the formation extends continuously across and under the valley. There are hundreds of exposures along the Platte River valley, the Republican River valley, along other drainages, and in scores of gravel pits throughout the area of its distribution (See Figure 186). This wide distribution and occurrence directly under the loess formations and the many outcrops in sand and gravel pits, which do not penetrate to the lower Fullerton and Holdrege formations (except by test holes), account for the very large fauna reported from the Grand Island formation.

THE UPLAND FORMATION

This bed consists of greenish-gray clay and fine greenish sand. It is believed to have had almost exactly the same origin and mode of formation as the Fullerton formation. It came into existence during the quiescent interglacial interval following the Kansan glaciation. The Upland is believed to be Yarmouth in age and contemporaneous with the Kansan gumbotil. It ranges in thickness from nothing to prob-

THE POST-YARMOUTH PLEISTOCENE GEOLOGY OF NEBRASKA

THE LOVELAND FORMATION

The formation of the Upland (Yarmouth) clay was followed by extensive erosion and quite deep dissection apparently over the entire state. Many drainages, like the Republican River and perhaps the Blue rivers, which had been more or less choked and filled up, were again more or less opened up. The Loveland was then deposited on an unevenly eroded and somewhat dissected plain, and is found both in the old pre-Loveland valleys (as on the terraces in the valleys of the Republican River and the Blue rivers) and over the pre-Loveland tablelands.

At first the pre-Loveland valleys were partially filled and choked up with the pluvial and fluvial sediment of their own streams and locally derived from the valley slopes. This material may have been derived from exposed bedrock, glacial till, fluvial sand or gravel or Upland clay, etc. This constitutes the "valley phase" of the Loveland formation of sand, gravel, and clay. It represents an interval of greater erosive action and sedimentation than the immediately preceding Upland (Yarmouth) age, but not nearly as vigorous as the still earlier Grand Island (Kansan) age. When all of the more or less circumstantial evidence is considered, it suggests that the formation of this phase of the Loveland formation, including the pre-Loveland erosion, may be contemporaneous with the Illinoian glaciation.

The valley phase of the Loveland seems everywhere to grade imperceptibly upward into the loess or "upland" phase of the formation. The material grows less and less sandy until it is quite typical loess clay and silt in mechanical composition. The entire formation is quite red. The loess phase differs from the younger yellowish loess mainly in its reddish color, greater compactness, and greater impermeability.

The loess phase, and to a less extent the valley phase, of the Loveland is about as widely distributed over the state as the younger yellowish loess (about 42,000 square miles). It is also thought to have had about the same sources—river valleys, the Sand Hill area of Nebraska, and areas outside of the state. Its thickness and textural coarseness both increase westward across the state. The thickness of the forma-

tion in eastern Nebraska, where it is fully preserved, ranges from 6 to perhaps not more than 30 feet, except in a few places. It is from 15 to 40 or more feet thick under the plains of the south-central part of the state, and west of Kearney the loess phase is known to be 135 feet thick at one point. It is thought to have been at least 100 feet thick in the vicinity of Ord; it is more than 100 feet thick south of Gothenburg; and it may be more than 150 feet thick in the area north of the Loup River north of Palmer, in Nance county.

Volcanic ash or pumicite occurs at the base of the loess phase of the Loveland quite generally in Nebraska. At most places, it is seldom more than 5 to 8 feet thick, but southwest of Eustis in Frontier county, the ash is locally at least 50 feet thick and of singular purity.

A dark gray to black soil, with a mature soil profile (according to F. A. Hayes, U. S. Bureau of Chemistry and Soils), up to 4½ feet thick was developed on the Loveland loess, and this is still preserved intact over a large area in the state, espcially west of the glaciated area, and many remnants also occur where the formation has been maturely dissected.

Kay [18] has shown that the Loveland loess (loess or upland phase), or at least the upper part of it, is younger than the formation of the Illinoian gumbotil and definitely older than the Iowan till sheet. This is a very important fact, since the Loveland, because of its characteristic color, great thickness, and widespread continuity in this state, makes it the best datum horizon or time marker in the entire Pleistocene section of Nebraska. The Loveland soil has yielded quite a number of mammalian fossils.

THE POST-LOVELAND PRE-PEORIAN EROSION

The erosion which followed the formation of the thick Loveland soil seems to have been the most vigorous so far noted, and it is significant that the valleys formed at that time, with the exception of the Todd Valley, were not alluviated prior to the deposition of the yellow loess, as was the case prior to the deposition of the Loveland loess. It seems probable that general uplift had taken place, giving the developing streams

[18] Kay, G. F., The Relative Ages of the Iowan and Illinoian Drift Sheets, American Journal of Sciece, Vol. 16, pp. 497-518, Dec., 1928.
Kay, G. F., Loveland Loess: Post-Illinoian, Pre-Iowan in Age, Science, pp. 482-483, Nov. 16, 1928.

greater vigor and competency than were possible in the pre-Loveland erosion interval.

Conclusive evidence is in hand which demonstrates that the post-Loveland pre-Peorian (yellow-loess) erosion resulted in fully as mature a topography and as deep dissection with as great relief as now exists. Many post-Loveland valleys were reexcavated along pre-Loveland drainage lines, but there is no evidence at all to show that there had ever been a Platte River across the glacial till area, east of Columbus before post-Loveland time. Prior to this erosion interval, Platte River water from the west had drained away to the southeast through the Holdrege, or the Hastings, or even through the Aurora basin, all previously mentioned in this paper.

The Loveland formation is always found in place high in the Platte River Valley bluffs resting on glacial till, east of Columbus to the Missouri River. Its eroded edge is or has been covered with a thin mantle of Peorian loess which extends in most places from the upland level over the valley slope down to and on to the flood plain. There seems to be no other conclusion possible than that the lower part of the Platte River valley is post-Loveland but pre-Peorian in age.

The Platte River was dissected to different depths in this part of its course and is flowing on glacial till (probably Nebraskan) at some points (as south of Schuyler) or even on the David City gravel at others (as at Fremont). A considerable amount of post-Loveland and more recent alluvium also occurs in this part of the valley, so it becomes most difficult to assign any age to fossils from gravels in the lower course of the Platte River, between Columbus and Plattsmouth. They may come from gravel in place as old as David City, or from post-Loveland gravel or still more recent alluvial sand and gravel.

THE TODD VALLEY FORMATION

This formation is a valley fill of fine sand, for the most part, becoming coarser near the bottom. It varies greatly in thickness, but is reported to be as much as 120 to 190 feet in some places. It occurs in "An Old Platte Channel" [19] across Saunders county from near North Bend to Ashland. This deposit, while not so large or extensive as most formations,

[19] Condra, G. E., An Old Platte Channel, American Geologist, Vol. 31, pp. 361-369, June, 1903, see figure 184.

is a definite lithologic and stratigraphic unit of the Nebraska Pleistocene, and is deemed worthy of formational designation.

Todd Valley was eroded in post-Loveland pre-Peorian time, and it also became filled with silt, sand, and gravel prior to Peorian loess deposition. The present Platte River valley, past Fremont to Ashland, was also cut prior to Peorian loess deposition.

If the Loveland loess is Sangamon in age, according to Kay, and the lower Platte River valley erosion is post-Loveland but pre-Peorian in age, it seems logical to assume that the very important erosion, briefly described above, must have taken place during the Iowan glacial stage. Also, the Todd Valley formation probably was formed late in Iowan time. These facts also seem to warrant the conclusion that the Iowan stage was of considerable duration. Since the Iowan age is represented in Nebraska only by erosion, except in Todd Valley, so far no evidence of mammalian remains is available for this stage, except those which lived during this age and became bogged in the Loveland soil zone.

PEORIAN LOESS AND SAND HILLS FORMATION

The Peorian loess is so well known and so widely distributed over the upper Mississippi Valley states that it does not require a detailed description here. It occurs as an almost unbroken mantle of yellowish eolian silt and clay over about 42,000 square miles of Nebraska, see figure 184. It mantles the eroded Loveland and because of the irregularity and roughness of the pre-Peorian surface on which it was deposited, its thickness is quite variable. The thickness over upland areas in eastern Nebraska ranges from less than 10 feet to 30 or 40 feet in some places, and it is probably as much as 100 feet thick at some points along the Missouri River. It is from 30 to 50 or more feet thick under the plains of the south-central part of the state, and is more than 200 feet thick under the plains south of Gothenburg and in that part of the state. Its thickness ranges from 30 to 250 feet in the Loess Hills area north of the Platte River.

The Peorian or yellow loess becomes thicker, lighter in color, and coarser in texture from east to west, and in some areas can be seen to actually grade into the Sand Hills formation of the Sand Hills area, from which most of the Peorian or yellow loess is believed to have come. It also is believed to be the exact equivalent of the Sand Hills formation in age. However, streams have played a contributing part in

the origin of the loess, and some of it may have been transported from areas entirely outside the state.

The Sand Hills formation of eolian dune sand is believed to have been derived by wind action from the older Tertiary formations and the pre-Peorian Pleistocene materials of north-central Nebraska. It is the material left behind after the loess material had been sifted out by wind action and carried eastward to become the yellow loess.

Loess and Sand Hills formation is believed to have been more or less continuous from Peorian time down to the present day in Nebraska. At least one fairly thick dark soil is now known within the so-called Peorian loess, and a distinctly younger looser and grayer silty loess is also recognized over quite a large area around North Platte. It may be Wisconsin in age. Besides some loess accumulation, post-Peorian geologic acticity has been confined to erosion and soil formation. The writer is not in agreement with recent suggestions to eliminate the Peorian as a stage of the Pleistocene.[20]

[20] Leighton, M. M., The Peorian Loess and the Classification of the Glacial Drift Sheets of the Mississippi Valley, Journal of Geology, Vol. 39, No. 1, Jan.-Feb., 1931, pp. 45-53.
Leighton, M. M., The Naming of the Sub-divisions of the Wisconsin Glacial Age, Science, Feb. 10, 1933.
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PLEISTOCENE DEPOSITS, DOUBTFULLY CORRELATED

THE NIOBRARA RIVER VALLEY PLEISTOCENE

Sand and gravel, and silt and clay deposits of Pleistocene age occur quite high in the valley walls of the Niobrara River valley, and are also similarily situated in other valleys which existed during the early Pleistocene. The pre-Pleistocene or early Pleistocene Niobrara River seems to have been at grade in a valley that was two or three times as wide as the present valley, but only 30 to 50 percent as deep. This wide, relatively shallow Niobrara valley was aggraded and filled with sediment during the early Pleistocene. Much of the material was derived from locally exposed Tertiary formations.

The Pleistocene valley fill at most exposures is made up of a lower, poorly sorted river sand and gravel with much reworked Tertiary material, a silt and clay bed above, and at the top an upper fluvial sand and gravel. This upper sand and gravel formation usually completed the filling of the old valley and, at many places, was spread out thinly over the terrace or upland level adjoining the valley itself. A very typical exposure occurs near Long Pine where the lower gravel and sand is 40 feet thick and may be the equivalent of or may be the Holdrege (Nebraskan) formation. The overlying grayish yellow clay and silt bed is 24 feet thick and may be the Fullerton (Aftonian). The upper sand and gravel is exactly like the Grand Island (Kansan) formation and rests unconformably with a ferruginous contact on the clay bed below it. It is overlain with yellowish loess in some areas (for example in northern Brown county).

Sometime following the alluviation of the old valley, as described above, the Niobrara River, and also its major tributaries, dissected the early Pleistocene valley fill and has continued to deepen its valley in the bedrock until now the Niobrara River is flowing in a youthful valley at a level at most places more than 100 feet below the bottom of its pre-Pleistocene valley. Later Pleistocene or recent terrace development has taken place within this newer and deeper gorge.

The early (Nebraskan to Kansan inclusive) Pleistocene sediments described above have yielded some mammalian fossils.

THE NORTH PLATTE RIVER VALLEY PLEISTOCENE

Pleistocene deposits of sand and gravel and well defined terraces of Pleistocene age are well known in the North Platte River valley. Some of the larger tributary valleys contain deposits similar to those described along the Niobrara River. Only very recently have satisfactory criteria, at least satisfactory to the writer, been found on which to base an interpretation of the physiographic history and sedimentation of this area.

The higher terrace gravels have yielded some vertebrate fossil remains which are of the most primitive of early Pleistocene forms. In fact some authorities consider some of these forms to belong to the late Pliocene epoch. It would seem that such evidence indicates great antiquity and precludes any possibility that the terraces and their gravels can be late Pleistocene or Recent in age.

THE SCOTTSBLUFF BISON QUARRY

The deposit located near the base of Signal Butte and described by Barbour and Schultz [21] is difficult to date. Most geologists who have visited the site are agreed that it most certainly belongs to the Pleistocene epoch. Molluscs found in the deposit are quite similar to those found elsewhere in the Upland formation. When all of the somewhat inconclusive evidence is considered, the deposit seems to be not older than late Kansan, and it does not seem to be as late as Wisconsin. Apparently its age is late mid-Pleistocene, that is, post-Kansan pre-Wisconsin.

THE "LOUP RIVER" AND "SHERIDAN BEDS"

A pre-Pleistocene valley is now known to have extended from the vicinity of Alliance in Box Butte county eastward to the Middle Loup River valley in Hooper and Thomas counties. Its course from here may have followed the general trend southeastward of the present Middle Loup River to the Hastings or Aurora "basin". It is filled with Pleistocene sediments which are more or less buried under Sand Hills eolian sand in the Sand Hills and thick loess in the Loess Hills area.

The upper part of these deposits is exposed along the Middle Loup River in southern Cherry, Hooker, and Thomas counties, from northwest of Mullen to a few miles east of

[21] Barbour, E. H., and Schultz, C. Bertrand, The Scottsbluff Bison Quarry and Its Artifacts. Nebraska State Museum, Bull. 34, pp. 283-286, Dec., 1932.

Thedford. Similar exposures also occur along the Dismal River in southern Hooker and Thomas counties. These are the exposures to which the name "Loup River Beds" has been applied. A typical section is given below, location about 2 miles north of Mullen and ½ mile east of road, north side of Middle Loup River.

	Feet
1. Sand Hills (Peorian), pinkish eolian dune sand, unconsolidated and distinctly younger than the material below, unconformable lower contact	60 to 65
2. Sand Hills, this material is of very fine eolian sand with much clay and silt, hard, somewhat indurated, greenish-yellow to gray color, contains pinkish, fossilized bone fragments	35
3. Sand Hills, like material above, but less consolidated though quite hard, massive, greenish color	30 to 35
Note: beds 2 and 3 are distinctly older than bed 1, and were not seen in any other outcrop. It seems probable that this older Sand Hills material is the equivalent of the Loveland formation.	
4. Clay and silt, greenish-gray with some sandy streaks, has been called "diatomaceous earth", but it contains relatively little diatomaceous material. Contains an abundance of several kinds of small gastropods, some of which are the identical species found in the Upland (Yarmouth) formation at other places, near Grand Island and St. Paul. The bed resembles the Upland formation in every respect and is believed to be Yarmouth age	21
5. Sand and gravel, upper part mostly fine sand, massive and bedded, some silt, yellowish to gray color, lower 25 feet coarser with typical river gravel. This material looks like the Grand Island (Kansan) formation and is tentatively assigned that age	54

Beds 4 and 5 of the above section have yielded mammalian fossils in this vicinity. Bed 5 is reported by well drillers to be from 10 to 20 or more feet thicker than appears in the exposure. It is said to rest on a bed of clay about 40 feet thick, below which occurs another or "lower water gravel", coarser than bed 5 above, which is said to be also about 40 feet thick and rests on the Tertiary or "magnesia" bedrock. This lower gravel may be Holdrege (?), the lower clay may be Fullerton (?), bed 5 may be Grand Island, and bed 4 seems to be Upland or Yarmouth in age.

A good exposure also occurs east of Senaca where about 70 feet of bed 5 are exposed, and the younger Sand Hills, bed 1, rests directly on bed 4, with the older Sand Hills, beds 2 and 3, entirely absent.

The so-called "Sheridan Beds" of Sheridan county, which rest unconformably on Miocene and Pliocene materials, seem to be almost exactly equivalent to the "Loup River Beds", the exposed section above. The Yarmouth (?) clay is quite certainly present and the older (Loveland ?) Sand Hills may be represented. There is some doubt that any of the "Sheridan Beds" is as old as Aftonian or Nebraskan.

OTHER PLEISTOCENE FORMATIONS

The "McPherson Equus Beds" of Kansas [22] consist of materials similar to the fluviatile formations of south central Nebraska, which range in age from Nebraskan to Yarmouth inclusive.

The "Belleville Formation" [23] of northern Republic county, Kansas, described as sand, gravel, and clay and assigned to the Tertiary on the basis of two questionably identified mastodon teeth, is the extension of the fluviatile Pleistocene sand and gravel formations of Nebraska. The formation is continuous with the Pleistocene deposits in Nuckolls and Thayer counties. Equus and other Pleistocene mammalian remains have been gotten from the same deposits at the same locations described by Mr. Wing. The "Belleville Formation" name should be discarded.

The "Sanborn formation", described by M. K. Elias [24] from western Kansas, is a composite of sand and gravel and loess, ranging in age from early Pleistocene (Kansan or perhaps older) to Peorian or younger (the "yellow dirt"). The separate parts of the "Sanborn formation", especially the loess, are differentiated in Nebraska and should not have been grouped together as one formation; at least a new formation name should not have been assigned.

[22] Haworth, Erasmus, and Beede, J. W., The McPherson Equus Beds, The University Geological Survey of Kansas, Vol. II, pp. 285-308, 1897.
[23] Wing, Monta E., The Geology of Cloud and Republic Counties, Kansas, Kansas Geol. Survey, Bull. 15, pp. 19-21.
[24] Elias, M. K., The Geology of Wallace County, Kansas. Kansas Geol. Survey, Bull. 18, pp. 163-180, 1931.

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PART II

THE PLEISTOCENE MAMMALS OF NEBRASKA [1]

By C. BERTRAND SCHULTZ

INTRODUCTION

The fossil remains of Pleistocene mammals from Nebraska have attracted the attention of scientists for the past seventy-five years.

In 1858, Dr. Joseph Leidy described the species of *Equus excelsus*, *Mastodon mirificus* and *Elephas imperator* from the Nebraska Pleistocene. These types were collected from Dr. F. V. Hayden's so-called "Loup River" formation on the Pawnee Loup Branch of the Platte River by an expedition under the command of Lieut. G. K. Warren, Topographical Engineer of the United States War Department. This location was probably along what is now known as the Middle Loup River.

Prof. O. C. Marsh of Yale University, in 1873, outfitted a rather large expedition from the East at North Platte, Nebraska. The party covered the region between the Platte and Niobrara rivers and obtained a few Pleistocene fossils.

Mr. John Bell Hatcher made a large collection of fossil vertebrates near Hay Springs in 1886 for the United States National Museum.

Since 1891, Dr. Erwin H. Barbour, Director of the Nebraska State Museum, has brought together by far the largest collection of Nebraska Pleistocene fossils. Besides the fossils collected by various field parties from the museum, this collection has been greatly enriched by the contributions of interested persons throughout the state.

During April and May, 1893, Mr. John Bell Hatcher collected for Princeton University a small amount of material from the "Equus beds" southwest of Hay Springs, Sheridan County. Later in the same season Mr. Hatcher, Dr. J. L. Wortman, and Dr. J. W. Gidley procured a larger collection from the same locality for the American Museum of Natural History, New York City. To this was added the material collected by the American Museum Expedition of 1897. The Hay Springs quarries are mainly within the area of sec. 28, 29 and 33, T. 29 N., R. 45 W.

[1] The author's thesis for the degree of Master of Science, University of Nebraska, June, 1933, forms the basis for this report. Recent acquisitions of the Nebraska State Museum and additional data concerning the Pleistocene geology of Nebraska have necessitated many changes from the original form of the thesis.

Dr. W. D. Matthew and Mr. Albert Thomson of the American Museum of Natural History made a small Pleistocene collection from the Middle Loup River west of Seneca in 1916.

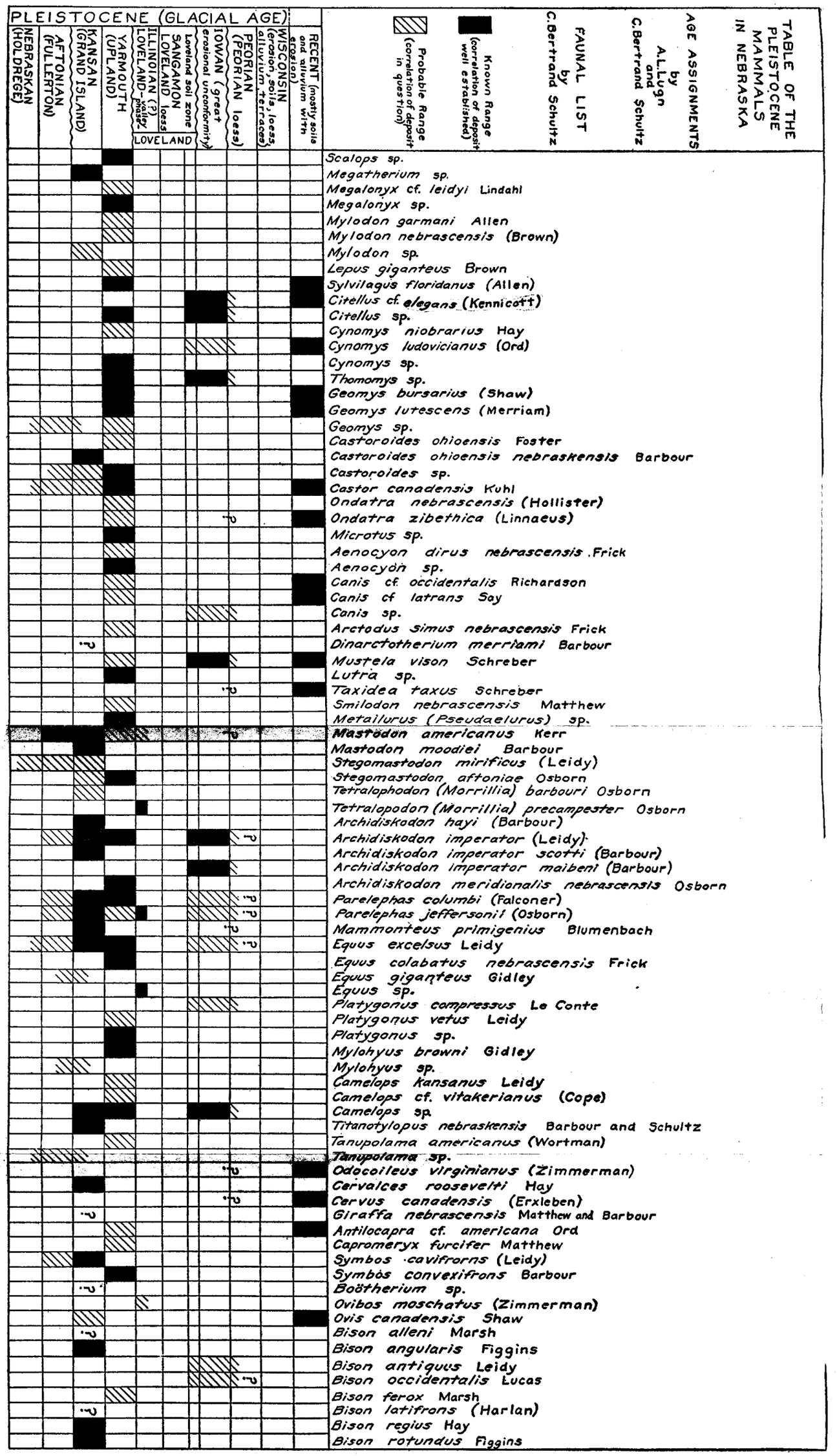
The Hay Springs area was again visited in the years 1928, 1929, and 1930, by Mr. Chas. Falkenbach in order to obtain material for Mr. Childs Frick's extensive fossil collection in the American Museum of Natural History.

Other noteworthy collections from Nebraska Pleistocene deposits are to be found in the Colorado Museum of Natural History, Denver, Colorado; the Hastings Museum, Hastings, Nebraska; the Yale Peabody Museum, New Haven, Conn.; and the Museum of Comparative Zoology, Harvard College, Cambridge, Mass.

The collection in the Nebraska State Museum has provided the basis for this paper. The writer is exceedingly grateful to Dr. Erwin H. Barbour for helpful advice and privileges granted in studying the collection. Thanks are due to Mr. Childs Frick of the American Museum of Natural History for his valuable suggestions and for making it possible for the writer to study his collection from the Pleistocene of Nebraska. The writer is also deeply grateful to Dr. A. L. Lugn of the Department of Geology, University of Nebraska, for advice and assistance in determining the age of the various Pleistocene deposits. Fossil material and information furnished by Mr. J. D. Figgins, Director of the Colorado Museum of Natural History, and Mr. A. M. Brooking, of the Hastings Museum, are very much appreciated. Mr. Edwin H. Colbert, of the American Museum of Natural History, has been very kind in supplying information concerning the Proboscidea. Prof. E. F. Schramm, Department of Geology, and Dr. Otis Wade, Department of Zoology, University of Nebraska, have provided aid and helpful suggestions. The members of the Nebraska Museum staff, especially Mr. Thompson M. Stout and Mr. F. W. Johnson, have liberally cooperated with the writer.

The writer has spent the past seven collecting seasons in the field for the Nebraska State Museum, and much of the time was spent working in Pleistocene deposits. Dr. Erwin H. Barbour, Director of the Nebraska State Museum, plans to have the field parties continue this work on an even larger scale than heretofore. Much additional information concerning the Pleistocene mammals in Nebraska will be made known through these explorations.

TABLE A



Note: *Homo sapiens* Linnaeus in the Pleistocene, see pages 353 and 393.

EXPLANATION OF TABLE "A"

The table accompanying this report is almost self-explanatory and represents a concise synopsis of the whole paper. It will be noted that fossils are not abundant in all stages. The Nebraskan (Holdrege) and the Aftonian (Fullerton) are not exposed in many places and, in general, are deeply buried beneath later Pleistocene deposits. It can not be expected that large collections will ever be gathered from these beds.

The deposits of the Kansan (Grand Island) and the Yarmouth (Upland) seem to furnish most of the fossils in the various collections. Conditions were evidently such as to favor life as well as the fossilization and preservation of the bones. The apparent abundance of fossils may be due to the accessibility of these formations and their numerous outcrops.

The lower or valley phase of the Loveland is made up mostly of red, sandy clays, sands, and gravels and some volcanic ash. Only a few specimens have come from this phase of the Loveland.

It is more or less an open question whether the fossil remains from the upper part of the Loveland have simply not been preserved, or whether the climate was so inimical as to have driven the mammalian population elsewhere. Further exploration of the red Loveland loess may produce fossils, but this is doubtful.

The Loveland and Peorian loesses are well distributed throughout most of Nebraska. In southeastern Lincoln County, the Loveland and Peorian reach a thickness of 120 and 200 feet or more, respectively. A soil zone, varying in thickness from a few inches to four feet, occurs at the top of the Loveland loess. Its absence in places is due to post-Loveland and pre-Peorian erosion.

During July of the 1934 collecting season, Mr. Thompson M. Stout and the writer visited all of the sites in southeastern Lincoln County from which Pleistocene fossils have been collected. The results of this survey show that all specimens under consideration from this area are either from the soil zone which rests upon the Loveland loess, or from the lower four feet of the Peorian loess directly above the soil zone. There does not seem to be a sharp division between the upper part of the soil zone and the basal part of the Peorian. The soil zone and the Peorian gradational layer are here grouped

together and called the *Citellus* faunal zone because of the abundance of fossil remains of the ground squirrel *Citellus* found in this zone. The importance of this faunal zone lies in the fact that it furnishes a definitely dated late Pleistocene fauna. The *Citellus* faunal zone is post-Loveland and pre-Peorian or early Peorian. This zone, insofar as it has been investigated, has definitely yielded the remains of

Citellus cf. *elegans* (Kennicott)
Thomomys talpoides (Richardson)
Mustela vison Schreber
Archidiskodon imperator (Leidy)
Archidiskodon imperator maibeni (Barbour)—Type
Parelephas columbi (Falconer)
Platygonus sp.
Camelops sp.
Bison sp.

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THE FAUNAL LIST [2]

FAUNAL LIST	LOCATION	FORMATION
Family [3]: **Talpidae** (Moles)		
Genus: *Scalops*		
1. *S.* sp., (determined, Matthew, 1918) — jaw in Am. Mus.	Hooker Co., Middle Loup River, west of Seneca, collected by field party from Am. Mus., 1916.	Middle Pleistocene, Upland (Yarmouth)= upper "Loup River" [4]
Family: Megatheriidae (Ground-Sloths)		
Genus: *Megatherium*		
1. *M.* sp., (determined, Cook, 1931)—femur No. 2821 in H. Mus.	Clay Co., from sand and gravel pit 1½ mi. west of Deweese, collected by A. M. Brooking, H. Mus., 1918.	Grand Island (Kansan)
2. *M.* sp., referred—femur No. 15-3-29 in N. Mus.	Dundy Co., found at Benkelman, collected by Jerry Rossmith, Benkelman, 1929.	Probably Early Pleistocene
Family: Megalonychidae (Ground-Sloths)		
Genus: *Megalonyx*		
1. *M.* cf. *leidyi* Lindahl, (determined, Matthew, 1918)—misc. bones No. 17352 in Am. Mus.	Sheridan Co., mouth of Box Butte Creek, collected by field parties from Am. Mus.	Middle Pleistocene (?), Upland (Yarmouth)= "Sheridan" [5]= "Equus beds" [6]
2. *M.* sp., referred—skeletal parts in N. Mus. ungual phalange No. 2-16-7-30; femur No. 2-29-8-31	Cherry Co., North Prong of Middle Loup River, collected by Chas. Osborne and Louis Lukert, N. Mus., 1930; collected by Chas. Osborne and F. W. Johnson, N. Mus., 1931.	Middle Pleistocene, Upland (Yarmouth)= upper "Loup River"
3. *M.* sp., (determined, Matthew, 1918)—misc. bones in Am. Mus.	Sheridan Co., Hay Springs quarry, collected by field parties from Am. Mus., 1893 and 1897.	Middle Pleistocene (?), Upland (Yarmouth)= "Sheridan"= "Equus Beds"

[2] Am. Mus. refers to American Museum of Natural History, N. Y. City.
C. M. N. H., Colorado Museum of Natural History, Denver, Colorado.
F. A. M., Childs Frick's collections in American Museum of Natural History.
H. Mus., Hastings Museum, Hastings, Nebraska.
N. Mus., Nebraska State Museum, Morrill Hall, Lincoln, Nebraska.
South Party, refers to Nebraska State Museum field party consisting of E. L. Blue, Eugene Vanderpool, Frank Crabill and C. Bertrand Schultz.

[3] George Gaylord Simpson's "New Classification of Mammals", published in 1931, is used in arranging the families in this paper.

[4] The "Loup River" formation, described by F. V. Hayden in 1858, must not be confused with the Loup Fork beds of Teritary age. "Loup River" is a conflicting name and for many years was considered the same age as certain Tertiary deposits along the Niobrara River. The "Loup River" formation appears to be Yarmouth (middle Pleistocene) in age and seems to be about the same age as the Pleistocene deposits south of Hay Springs, Nebraska. Perhaps it would be better to dispense with the use of the name "Loup River" altogether.

[5] The name "Sheridan" has been used to refer to the Pleistocene deposits south of Hay Springs, Sheridan Co., Nebraska. It seems better to avoid using the term "Sheridan" because it is merely a local name and is worthless in a broader sense, hence confusing.

[6] "Equus beds" has been used to denote certain early to middle Pleistocene deposits which contain an abundance of the bones of *Equus*. "Equus beds" as well as "Loup River" and "Sheridan" were used in this paper only to preserve the historical continuity and it is not the aim of the writer to sanction the use of these names.

FAUNAL LIST	LOCATION	FORMATION
Family: **Mylodontidae** (Ground-Sloths)		
Genus: *Mylodon*		
1. *M. garmani* Allen. Type.—skull and misc. skeletal parts in Harvard Museum of Comparative Zoology.	Sheridan Co., Hay Springs region, collected by Samuel Garman, Harvard University, 1880.	Middle Pleistocene (? Upland (Yarmouth)= "Sheridan"= "Equus beds"
2. *M. nebrascensis* (Brown). Type—skull, jaws and portion of skeleton No. 2780 in Am. Mus.	Sheridan Co., Hay Springs quarry, collected by field party from Am. Mus., 1897.	Middle Pleistocene (?) Upland (Yarmouth)= "Sheridan"= "Equus beds"
3. *M.* sp., (determined, Hay, 1924)—ungual phlange No. 1-8-00 in N. Mus.	Johnson Co., from gravel deposit along Nemaha River near Tecumseh, collected by W. L. Dunlap, Tecumseh, 1900.	Early Pleistocene (?)
4. *M.* sp., (determined, Hay, 1924)—left humerus No. 14-2-14 in N. Mus.	Webster Co., 3 mi. east and 1 mi. north of Red Cloud, collected by F. S. Frisbie, Red Cloud, 1914.	Grand Island (Kansan) ?
Family: **Leporidae** (Hares and Rabbits)		
Genus: *Lepus*		
1. *L. giganteus* Brown, referred—jaw No. 2-5-7-15 in N. Mus.	Thomas Co., 11 mi. east of junction of North and South forks of the Dismal River, collected by J. B. Burnett, N. Mus., 1915.	Middle Pleistocene (? Upland (Yarmouth)
Genus: *Sylvilagus*		
1. *S. floridanus* (Allen), referred—jaw No. 24-31-8-31 in N. Mus.	Cherry Co., North Prong of Middle Loup River, collected by F. W. Johnson and Chas. Osborne, N. Mus., 1931.	Middle Pleistocene, Upland (Yarmouth)= upper "Loup River"
Family: **Sciuridae** (Squirrels, Prairie Dogs, etc.)		
Genus: *Citellus*		
1. *C.* cf. *elegans* (Kennicott)—large collection of skulls, jaws and skeletal parts No. 1-11-8-30, No. 3-11-8-30 and No. 2-13-6-33 in N. Mus.	Lincoln Co., 12 mi. S. E. of Maxwell, collected by South Party, N. Mus., 1930, 1933.	Late Pleistocene, *Citellus* zone
2. *C.* cf. *elegans*—skull No. 3-13-6-33 and jaws No. 1-15-7-34 in N. Mus.	Lincoln Co., south of Maxwell, collected by South Party, 1933, 1934.	Late Pleistocene, *Citellus* zone
3. *C.* sp., referred—jaw No. 23-31-8-31 in N. Mus.	Cherry Co., North Prong of Middle Loup, collected by F. W. Johnson and Chas. Osborne, N. Mus., 1931.	Middle Pleistocene, Upland (Yarmouth)= upper "Loup River"
Genus: *Cynomys*		
1. *C. niobrarius* Hay, Type—palate No. 2715 in Am. Mus.	Sheridan Co., Hay Springs quarry, collected by field party from Am. Mus., 1897.	Middle Pleistocene (?), Upland (Yarmouth)= "Sheridan"= "Equus beds"

FAUNAL LIST	LOCATION	FORMATION
2. *C. niobrarius*, referred—left and right jaws No. 16-15-7-32 in N. Mus.	Sheridan Co., Hay Springs quarries, collected by F. W. Johnson and Chas. Osborne, N. Mus., 1932.	Middle Pleistocene (?), Upland (Yarmouth)= "Sheridan"= "Equus beds"
3. *C. ludovicianus* (Ord), referred—skull and jaws No. 1-12-6-33 in N. Mus.	Harlan Co., 5 mi west of Orleans, collected by Thompson M. Stout and C. Bertrand Schultz, N. Mus., 1933.	Soil zone between Loveland loess and Peorian loess (?)
4. *C.* sp., referred—lower incisor and skeletal parts No. 57b-20-12-28 in N. Mus.	Custer Co., 16 mi. north of Miller, collected by J. D. LeMar, Frank Crabill, and C. Bertrand Schultz, N. Mus., 1929.	Pre-Peorian, probably Middle Pleistocene
5. *C.* sp., (determined, Matthew, 1918)—jaw in Am. Mus.	Hooker Co., Middle Loup River, west of Seneca, collected by field party from Am. Mus., 1916.	Middle Pleistocene, Upland (Yarmouth)= upper "Loup River"
Family: **Geomyidae** (Pocket Gophers)		
Genus: *Thomomys*		
1. *T.* sp.—jaw No. 26a-31-8-31 and misc. teeth in N. Mus.	Cherry Co., North Prong of Middle Loup River, collected by F. W. Johnson and Chas. Osborne, N. Mus., 1931.	Middle Pleistocene, Upland (Yarmouth)= upper "Loup River"
2. *T.* sp., (determined, Matthew, 1918)—jaws in Am. Mus.	Hooker Co., Middle Loup River, west of Seneca, collected by field party from Am. Mus., 1916.	Middle Pleistocene, Upland (Yarmouth)= upper "Loup River"
3. *T. talpoides* (Richardson), referred—jaws No. 4-11-8-30 and skull No. 1-13-6-33 in N. Mus. and No. 1-11-8-30 in N. Mus.	Lincoln Co., 12 mi. S. E. of Maxwell, collected by South Party, N. Mus., 1930, 1933.	Late Pleistocene, *Citellus* zone
4. *T.* sp., (determined, Matthew, 1918)—jaws in Am. Mus.	Sheridan Co., Hay Springs quarry, collected by field parties from Am. Mus., 1893 and 1897.	Middle Pleistocene (?), Upland (Yarmouth)= "Sheridan"= "Equus beds"
Genus: *Geomys*		
1. *G. bursarius* (Shaw), referred—jaw and misc. upper and lower incisors No. 27-31-8-31 in N. Mus.	Cherry Co., North Prong of Middle Loup river, collected by F. W. Johnson and Chas. Osborne, N. Mus., 1931.	Middle Pleistocene, Upland (Yarmouth)= upper "Loup River"
2. *G. bursarius*, referred—misc. teeth No. 4-13-33 C. O. in collection of Chas. Osborne, Cherry, Nebraska.	Hooker Co., Middle Loup River, 2 mi. north of Mullen, collected by Chas. Osborne, 1933.	Middle Pleistocene, Upland (Yarmouth)= upper "Loup River"
3. *G. lutescens* (Merriam)—skull with left and right jaws No. 13-8-7-30 in N. Mus., misc. jaws, teeth and skeletal parts. No. 26-31-8-31, No. 28-31-8-31, No. 29-31-8-31 in N. Mus.	Cherry Co., North Prong of Middle Loup River, collected by Chas. Osborne and Louis Lukert, N. Mus., 1930; collected by F. W. Johnson and Chas. Osborne, N. Mus., 1931.	Middle Pleistocene, Upland (Yarmouth)= upper "Loup River"
4. *G. lutescens*, referred—jaws and upper incisor No. 57a-20-12-28 in N. Mus.	Custer Co., 16 mi. north of Miller, collected by J. D. LeMar, Frank Crabill and C. Bertrand Schultz, N. Mus., 1929.	Pre-Peorian, probably Middle Pleistocene
5. *G. lutescens*, referred—jaw No. 5-4-13-33 C. O. in collection of Chas. Osborne, Cherry, Nebraska.	Hooker Co., Middle Loup River, 2 mi. north of Mullen, collected by Chas. Osborne, 1933.	Middle Pleistocene, Upland (Yarmouth)= upper "Loup River"

FAUNAL LIST	LOCATION	FORMATION
6. *G.* sp.—misc. jaws, teeth and skeletal parts in F. A. M.	Brown Co., from lower sands on Sand Creek, 7 mi. N. E. of Ainsworth, collected by Morris F. Skinner for F. A. M., 1932.	Early Pleistocene
7. *G.* sp.—misc. jaws and teeth in Am. Mus.	Sheridan Co., Hay Springs quarry, collected by field parties from Am. Mus., 1893 and 1897 also by Chas. Falkenbach for F. A. M., 1928-1930.	Middle Pleistocene (?) Upland (Yarmouth)= "Sheridan"= "Equus beds"
Family: **Castoroidae** (Beavers)		
Genus: *Castoroides*		
1. *C. ohioensis* Foster, (determined, Barbour, 1931)—incisor No. 15-3-01 in N. Mus.	Sheridan Co., Hay Springs quarry, collected by J. A. Sandoz, Grayson, 1901.	Middle Pleistocene (?) Upland (Yarmouth)= "Sheridan"= "Equus beds"
2. *C. ohioensis*, referred —5 teeth No. 95-1-7-32 in N. Mus.; misc. teeth and skeletal parts in Am. Mus.; teeth and skeletal parts in F. A. M.	Sheridan Co., Hay Springs quarries, collected by F. W. Johnson and Chas. Osborne, N. Mus., 1932; collected by field parties from Am. Mus., 1893 and 1897; collected by Chas. Falkenbach for F. A. M., 1928-1930.	Middle Pleistocene (?) Upland (Yarmouth)= "Sheridan"= "Equus beds"
3. *C. ohioensis nebraskensis* Barbour. Type. —jaw No. 20-9-30 in in N. Mus.	Saline Co., 6 mi. S. W. of Dorchester, collected by Otto Chab, Dorchester, 1930.	Grand Island (Kansa
4. *C.* sp., (determined, Barbour, 1931)—incisor in H. Mus.	Clay Co., near Spring Ranch, collected by A. M. Brooking, H. Mus.	Grand Island (Kansa
5. *C.* sp., (determined, Barbour, 1931)—tooth No. 2-19-2-10 in N. Mus.	Gage Co., from gravels near Wymore, collected by F. W. Baber, Wymore, 1910.	Aftonian or Early Kansan
6. *C.* sp. indet.—tooth and astragalus No. 3-5-18-33 C. O. in collection of Chas. Osborne, Cherry, Nebraska.	Hooker Co., Middle Loup River, 2 mi. north of Mullen, collected by Chas. Osborne, 1933.	Middle Pleistocene, Upland (Yarmouth)= upper "Loup River"
Genus: *Castor*		
1. *C. canadensis* Kuhl, referred—complete lower jaw with teeth in F. A. M.	Brown Co., from lower sands on Sand Creek, 7 mi. N. E. of Ainsworth, collected by Morris F. Skinner for F. A. M., 1932.	Early Pleistocene
2. *C. canadensis.* (determined, Barbour, 1931)—jaw No. 19-2-10 in N. Mus.	Gage Co., from gravels near Wymore, collected by F. W. Baber, Wymore, 1910.	Aftonian or Early Kansan
3. *C. canadensis*, referred—left, upper and lower dentitions with portions of incisors in C. M. N. H.	Nuckolls Co., from clays 1½ mi. S. W. of Angus, 1932.	Upland (Yarmouth)
4. *C. canadensis*, (determined, Barbour, 1931)—jaw No. 24-11-25 in N. Mus.	Jefferson Co., from gravels at Endicott, collected by Fairchild Brothers, Endicott, 1925.	Kansan or Aftonian (?)
5. *C. canadensis*, referred—skull No. 12-8-33 in N. Mus.	Stanton Co., found in gravels along Elkhorn River at Pilger, collected by Chas. E. Barth, Pilger, 1933.	Probably Early Pleistocene

FAUNAL LIST	LOCATION	FORMATION
Family: **Muridae** (Rats and Mice)		
Genus: *Ondatra* (*Fiber*)		
1. *O. nebrascensis* (Hollister). Type.—skull and jaws in Am. Mus.	Sheridan Co., Hay Springs quarry, collected by field parties from Am. Mus., 1893 and 1897.	Middle Pleistocene (?), Upland (Yarmouth)= "Sheridan"= "Equus beds"
2. *O. zibethica* (Linnaeus), referred—jaw No. 23-7-17 in N. Mus.	Sarpy Co., from sand and gravel pit at Meadow, collected by Howard Taylor, Louisville. 1917.	(See footnote 7 for age of these Platte Valley gravels)
3. *O. cf. zibethica*—skull No. 94-1-7-32 and jaws No. 93-1-7-32 in N. Mus.; also misc. skulls and jaws in Am. Mus.	Sheridan Co., Hay Springs quarry, collected by F. W. Johnson and Chas. Osborne, N. Mus., 1932; collected by field parties from Am. Mus., 1893 and 1897.	Middle Pleistocene (?), Upland (Yarmouth)= "Sheridan"= "Equus beds"
4. *O.* sp. referred—teeth No. 23-31-8-31 in N. Mus.	Cherry Co., North Prong of Middle Loup River, collected by F. W. Johnson and Chas. Osborne, N. Mus., 1931.	Middle Pleistocene, Upland (Yarmouth)= upper "Loup River"
Genus: *Microtus*		
1. *M.* sp., (determined, Matthew, 1918)—jaws in Am. Mus.	Sheridan Co., Hay Springs quarry, collected by field parties from Am. Mus., 1893 and 1897.	Middle Pleistocene (?). Upland (Yarmouth)= "Sheridan"= "Equus beds"
Family: **Canidae** (Wolves, Coyotes, and Foxes)		
Genus: *Aenocyon* (*Canis*)		
1. *A. dirus nebrascensis* Frick. Type—specimens in F. A. M.	Sheridan Co., Hay Springs quarries, collected by Chas. Falkenbach for F. A. M., 1928-1930.	Middle Pleistocene (?). Upland (Yarmouth)= "Sheridan"= "Equus beds"
2. *A.* sp., referred—complete left femur No. 6-31-8-31 also misc. toe bones in N. Mus.	Cherry Co., North Prong of Middle Loup River, collected by F. W. Johnson and Chas. Osborne, N. Mus., 1931.	Middle Pleistocene, Upland (Yarmouth)= upper "Loup River"
Genus: *Canis*		
1. *C.* cf. *occidentalis* Richardson, (determined, Matthew, 1918)—jaw fragments in Am. Mus.	Sheridan Co., Hay Springs quarry, collected by field parties from Am. Mus., 1893 and 1897.	Middle Pleistocene (?). Upland (Yarmouth)= "Sheridan"= "Equus beds"
2. *C.* cf. *latrans* Say, (determined, Matthew, 1918)—jaws etc., in Am. Mus.	Sheridan Co., Hay Springs quarry, collected by field parties from Am. Mus., 1893 and 1897.	Middle Pleistocene (?), Upland (Yarmouth)= "Sheridan"= "Equus beds"

[7] The gravel pits in this part of the Platte Valley may be either early or late Pleistocene in age. In many cases it is impossible to date definitely these gravels other than to say that they are Pleistocene. However, most of the fossils obtained represent late Pleistocene forms. See page 349.

FAUNAL LIST	LOCATION	FORMATION
3. *C.* sp.—skull, jaws, and skeletal parts No. 1-16-8-32 in N. Mus.	Scottsbluff Co., 16 mi. west and 3 mi. south of Scottsbluff (150 yds. north of bison quarry), collected by South Party, N. Mus., accompanied by A. L. Lugn, U. of N., and Bob Long, N. Mus., 1932.	Pre-Wisconsin (?), probably Lower Peoria
Family: **Ursidae** (Bears)		
Genus: *Arctodus*		
1. *A. simus nebrascensis* Frick. Type—misc. skeletal parts, etc. in in F. A. M. also misc. bones in Am. Mus.	Sheridan Co., Hay Springs quarries, callected by Chas. Falkenbach for F. A. M., 1928-1930: collected by field parties from Am. Mus., 1893 and 1897.	Middle Pleistocene (?) Upland (Yarmouth)= "Sheridan"= "Equus beds"
Genus: *Dinarctotherium*		
1. *D. merriami* Barbour. Type.—humerus No. 5-15-6-05 in N. Mus.	Cass Co., collected in 1905.	Probably Early Pleistocene (?)
Family: **Mustelidae** (Weasels, Martens, Minks, Badgers, Skunks, etc.)		
Genus: *Mustela*		
1. *M. vison* Schreber, referred—skull and jaw No. 1-16-8-30 in N. Mus.	Lincoln Co., 10 mi. S. W. of Maxwell, collected by South Party, N. Mus., 1930.	Late Pleistocene, *Citellus* zone
2. *M. vison*—jaw No. 6-7-8-33 in N. Mus.	Sheridan Co., 17 mi. south of Rushville on Pine Creek, collected by F. W. Johnson, N. Mus., 1933.	Early Pleistocene (?) Upland (Yarmouth)= "Sheridan"= "Equus beds"
Genus: *Lutra*		
1. *L.* sp., (determined, Matthew, 1918)—jaw fragments in Am. Mus.	Hooker Co., Middle Loup River west of Seneca, collected by field party from Am. Mus., 1916.	Middle Pleistocene, Upland (Yarmouth)= upper "Loup River"
Genus: *Taxidea*		
1. *T. taxus* Schreber, referred—upper and lower dentition No. 2-21-5-17 in N Mus.	Saline Co.	(?)
Family: **Felidae** (Cats)		
Genus: *Smilodon*		
1. *S. nebrascensis* Matthew. Type.—jaw in Am. Mus.	Sheridan Co., Hay Springs quarry, collected by field parties from Am. Mus., 1895 or 1897.	Middle Pleistocene (?) Upland (Yarmouth)= "Sheridan"= "Equus beds"
Genus: *Metailurus*		
1. *M.* (*Pseudaelurus*) sp.—portion of jaw, canine and two premolars present, No. 22-30-6-30 in N. Mus.	Cherry Co., North Prong of Middle Loup River, collected by Chas. Osborne and Louis Lukert, N. Mus., 1930.	Middle Pleistocene (?) Upland (Yarmouth)= upper "Loup River".

FAUNAL LIST	LOCATION	FORMATION
Family: **Mastodontidae** (Mastodonts)		
Genus: *Mastodon*		
1. *M. americanus* Kerr, referred—skull and misc. skeletal parts No. 8-8-23 in N. Mus.	Boyd Co., near Lynch, collected by Wm. T. Hall, N. Mus., 1923.	Early Pleistocene
2. *M. americanus*—tooth No. 22-6-32 in N. Mus.	Cass Co., from gravel pits between Louisville and Oreapolis, collected by W. M. Stoner of Western Sand and Gravel Co., 1932.	(See page 369 for age of these Platte Valley gravels)
3. *M. americanus*—tooth No. 16-8-15 in N. Mus.	Cedar Co., 3 mi. south of Wynot, collected by Franz C. Radke, U. of N., 1915.	Early Pleistocene (Aftonian)
4. *M. americanus*—jaw No. 1-11-08 in N. Mus.	Clay Co., from gravel pits at Sutton, collected by Brown brothers, Sutton, 1908.	Grand Island (Kansan)
5. *M. americanus*—teeth No. 26-5-24 in N. Mus.	Cuming Co., 4 mi. S. E. of Westpoint, collected by Fritz H. Wiese, Westpoint, 1924.	Early Pleistocene (Kansan or Aftonian?)
6. *M. americanus*—two teeth No. 1-10-10-31 in N. Mus.	Cuming Co., from gravel pit 1 mi. west of Wisner, collected by A. L. Melcher. U. of N., 1931.	Early Kansan or Aftonian
7. *M. americanus*—teeth No. 1-14-10-25; and No. 21-7-31 in N. Mus.	Dodge Co., from sand and gravel pits near Fremont, collected by V. M. Haddon, Valley, 1925; collected by H. F. Ireton, Fremont, 1931.	(See page 369 for age of these Platte Valley gravels)
8. *M. americanus*—tooth No. 18-12-91 in N. Mus.	Douglas Co., south of Omaha, collected by Geo. L. Miller, Omaha, 1931.	(?)
9. *M. americanus*—jaw No. 28-7-32 in N. Mus.	Gage Co., 7½ mi. N. W. of Beatrice, collected by C. A. Traver, Beatrice, 1932.	Middle Pleistocene, probably lower Loveland
10. *M. americanus*—tooth No.2-2-20 in N. Mus.	Jefferson Co., 9 mi. north and 5 mi. west of Fairbury, collected by Florence B. Traux, Lincoln, 1920.	Grand Island (Kansan) ?
11. *M. americanus*—tooth No. 20-3-33 in N. Mus.	Jefferson Co., from gravel pits at Endicott, collected by A. L. Lugn, U. of N., 1933.	Kansan or Aftonian (?)
12. *M. americanus*—tooth No. 94-11-7-30 in N. Mus.	Lincoln Co., from sand pits near North Platte, collected by W. Ferris, Lincoln, 1930.	Probably Early Pleistocene
13. *M. americanus*, referred—tooth No. 3-8-12-32 in N. Mus.	Morrill Co., from gravels 2 mi. east of Angora, collected by S. R. Sweet, Bridgeport, 1932.	Early Pleistocene
14. *M. americanus*, referred—tooth No. 2-22-9-16 in N. Mus.	Richardson Co., 2 mi. east of Dawson, original collected by J. R. Harrah, Dawson, 1916.	Early Pleistocene (?)
15. *M. americanus*—tooth No. 5-9-27 in N. Mus.	Sarpy Co., from gravel pits at Meadow collected by V. W. Finity, State Gravel Inspector, 1927.	(See page 369 for age of these Paltte Valley gravels)
16. *M. americanus*—tooth No. 29-9-26 in N. Mus.	Saunders Co., probably from north of Cedar Bluffs, collected by A. E. Stuart, Cedar Bluffs, 1926.	(See page 369 for age of these Platte Valley gravels)
17. *M. americanus*—jaw No. 7-11-25 in N. Mus.	Seward Co., from gravel pit at Seward, collected by H. C. Turner, Seward, 1925.	Grand Island (Kansan)

FAUNAL LIST	LOCATION	FORMATION
18. *M. americanus*, (referred, Frick, 1930)—misc. specimens in Am. Mus.	Sheridan Co., Hay Springs quarry, collected by field parties from Am. Mus., 1893 and 1897.	Middle Pleistocene (,), Upland (Yarmouth)= "Sheridan"= "Equus beds"
19. *M. grangeri* Barbour. Type.—skull and tusks No. 8-9-00 in N. Mus.	Thurston Co., from gravels near Pender, collected by E. H. Barbour, N. Mus., 1900.	Probably Early Kansan or Aftonian
20. *M. moodiei* Barbour. Type.—skull, jaws, and skeletal parts No. 21-3-31 in N. Mus.	Seward Co., from gravels 7 mi. S. W. of Milford, collected by South Party, accompanied by L. C. Eiseley, N. Mus., 1931.	Grand Island (Kansan)
Family: **Bunomastodontidae**		
Genus: *Stegomastodon*		
1. *S. mirificus* (Leidy). Type.—remains in Philadelphia Academy of Sciences and National Museum.	Pawnee Loup Branch of Platte River, Middle Loup, probably Hooker Co., 1858.	Early or Middle Pleistocene
2. *S. mirificus*—jaws No. F. A. M. 25752 and No. F. A. M. 25722 and misc. teeth. (referred to *S. nebrascensis* Osborn by Frick, 1933.)	Brown Co., from gravel pits ½ mi. west of Long Pine, collected by Morris F. Skinner for F. A. M., 1932.	Early Pleistocene
3. *S. mirificus*, referred —tooth No. 2-10-10-31 in N. Mus.	Cuming Co., from gravel pit 1 mi. west of Wisner, collected by A. L. Melcher, U. of N., 1931.	Early Kansan or Aftonian
4. *S. mirificus*, referred —complete jaws No. 1-19-4-33 in N. Mus.	Garden Co., from gravels 17 mi. N. W. of Lewellen on west side of Blue Creek, collected by Howard Pickard, Lewellen, and Thompson M. Stout, N. Mus., 1933.	Early Pleistocene (?), probably Nebraskan
5. *S. mirificus*, referred —portion of skull with dentition, in collection of Thompson M. Stout, Lewellen.	Garden Co., from gravels on east side of Blue Creek, 2½ mi. south of head springs, collected by Thompson M. Stout, N. Mus., 1932.	Early Pleistocene (?), probably Nebraskan
6. *S. mirificus*, referred —tooth No. 6-2-17 in N. Mus.	Jefferson Co., from gravel pits at Endicott, collected by Fairchild Bros., Endicott, 1917.	Kansan or Aftonian (?)
7. *S. mirificus*, referred —jaw No. 2-12-33 in N. Mus.	Thomas Co., from gravel deposit on Middle Loup River, ½ mi. east of Seneca, collected by Clark Smith, Seneca, 1933.	Lower "Loup River", probably Grand Island (Kansan)
8. *S. aftoniae* Osborn, referred, (identified, Colbert, 1933)—tooth No. 1-23-3-23 in N. Mus.	Chase Co., from sand pits at Wauneta, collected by Geo. S. Metcalf, Champion, 1923.	Pre-Loveland (Early Pleistocene)
9. *S. aftoniae*, referred —portion of jaw with tooth No. 3-8-7-30, also tooth No. 1-8-7-30 in N. Mus.	Cherry Co., North Prong of Middle Loup River, collected by Chas. Osborne and Louis Lukert, N. Mus., 1930.	Middle Pleistocene, Upland (Yarmouth)= upper "Loup River"

FAUNAL LIST	LOCATION	FORMATION
10. *S. aftoniae*, referred —(identified, Colbert, 1933)—palate No. 18-10-30 in N. Mus.	Franklin Co., from sand and gravel pits 1 mi. south of Bloomington, collected by Chas. Gardner, Bloomington, and C. Bertrand Schultz, N. Mus., 1930.	Early Pleistocene, probably Grand Island (Kansan)
11. *S. aftoniae*, referred —incomplete tooth No. 1-20-6-30 in N. Mus.	Harlan Co., from gravel pit east of Huntley, collected by South Party, N. Mus., 1930.	Early Pleistocene, probably Grand Island (Kansan)
12. *S. aftoniae*, referred —tooth No. 2-22-8-13 in N. Mus.	Nance Co., from gravels below dam at Fullerton, collected by C. N. Philbrick, Fullerton, 1913.	Early Pleistocene
13. *S. aftoniae*, referred —tooth No. 18-6-25 in N. Mus.	Thayer Co., from sand pit near Hebron, collected by Earl Smith, Lincoln, 1925.	Early Pleistocene, probably Grand Island (Kansan)
14. *S. aftoniae*, referred —tooth No. 2-30-3-27 in N. Mus.	Webster Co., from sand and gravel pits 1 mi. south of Cowles, collected by P. C. Orr, N. Mus., 1927.	Early Pleistocene, probably Grand Island (Kansan)
15. *S. aftoniae*, referred —tooth No. 2-1-33 in N. Mus.	Webster Co., from gravel deposit near Inavale, collected by W. A. Smith, North Platte, Nebr., 1933.	Early Pleistocene
16. *S. aftoniae*, referred —immature jaw No. 11-2-07 in N. Mus.	Webster Co., from gravel bed on Indian Creek, 7 mi. N. W. of Red Cloud, collected by J. M. Bates, Red Cloud, 1907.	Early Pleistocene, probably Grand Island (Kansan)
17. *S. aftoniae*—tooth, No. 5 R. V. M. in Republican Valley Museum, Red Cloud, Nebraska.	Webster Co., from gravel pit 4 mi. N. W. of Red Cloud, collected by Joe Perry, Red Cloud, 1928.	Early Pleistocene, probably Grand Island (Kansan)
Genus: *Tetralophodon*		
1. *T. (Morrillia) barbouri* Osborn. Type. —tooth, 1.M^3, No. 4-22-6-16 in N. Mus.	Furnas Co., from gravel pit near Cambridge, collected by W. Enslow, Cambridge, 1916.	Early Pleistocene, probably Grand Island (Kansan)
2. *T. (Morrillia) precampester* Osborn. Type.—tooth, r. M^3, No. 10-11-7-10 in N. Mus.	Harlan Co., from top of volcanic ash layer 5 mi. west of Orleans, collected by E. H. Barbour, N. Mus., 1910.	Middle Pleistocene, Lower Loveland
Family: **Elephantidae** (Mammoths)		
Genus: *Archidiskodon (Elephas)*		
1. *A. hayi* (Barbour). Type.—jaw No. 23-6-14 and fragment of tusk in N. Mus.	Saline Co., from sand pit in Crete, collected by C. Harold Eaton, N. Mus., 1914.	Grand Island (Kansan)
2. *A. imperator* (Leidy). Type.—tooth No. 185 in National Museum.	Pawnee Loup Branch of Platte River =Middle Loup, probably Hooker Co., 1858.	Early or Middle Pleistocene
3. *A. imperator*, referred—skull No. 11-3-13 and tooth, r. M^3, No. 11-3-13 in N. Mus.	Adams Co., from gravel pits 2 mi. north of Brickton, collected by E. A. English, Brickton, 1913.	Grand Island (Kansan)

FAUNAL LIST	LOCATION	FORMATION
4. *A. imperator*, re-refred—tooth No. 19-10-25 in N. Mus.	Antelope Co., from gravel pit at Oakdale, collected by Frank Dvorak, Oakdale, 1925.	Probably Kansan
5. *A. imperator*, (referred, Frick, 1933)—misc. limb and foot bones in F. A. M.	Brown Co., vicinity of Ainsworth, collected by Morris F. Skinner for F. A. M., 1928-1932.	Early Pleistocene
6. *A. imperator*, referred—incomplete tooth, r. M_3, No. 5-11-20 in N. Mus.[8]	Butler Co., from gravel pits 4 mi. N. W. of Bellwood, collected by Jerry Wagner, Bellwood, 1920.	Probably Kansan or earlier
7. *A. imperator*—tooth, tooth, l. M_3, No. 14-2-98 in N. Mus.	Chase Co., from sand pit at Wauneta, collected by T. E. Calvert, Burlington R. R., 1898.	Pre-Loveland (Early Pleistocene)
8. *A. imperator*—tooth, r. M_3, No. 3-3-7-30 and tooth, r. M^3, No. 6-3-7-30 in N. Mus.	Cherry Co., North Prong of Middle Loup River, collected by Chas. Osborne and Louis Lukert, 1930.	Middle Pleistocene, Upland (Yarmouth)= upper "Loup River"
9. *A. imperator*—tooth No. 4612 in H. Mus.	Clay Co., from sand pit at Edgar, collected by A. M. Brooking, H. Mus.	Grand Island (Kansan) ?
10. *A. imperator*—tooth No. 4786 in H. Mus.	Clay Co., near Spring Ranch, collected by A. M. Brooking, H. Mus.	Upland (Yarmouth)
11. *A. imperator*—tooth No. 6847 ln H. Mus.	Clay Co., from sand pit on Pawnee Creek between Spring Ranch and Glenville, collected by A. M. Brooking, H. Mus.	Grand Island (Kansan)
12. *A. imperator*—jaw No. 29-1-10; tooth, r. M^2, No. 4-10-18 in N. Mus.	Clay Co., from sand pits 3 mi. N. E. of Sutton, collected by Edwin Davis, Sutton, 1910; collected by G. H. Matteson, Sutton, 1918.	Grand Island (Kansan)
13. *A. imperator*—jaw No. 16-6-16 and misc. skeletal parts in N. Mus.	Custer Co., 6 mi. south of Callaway, collected by E. H. Barbour, N. Mus., 1916.	Late Pleistocene
14. *A. imperator*—tooth, l. M^3, No. 2-14-10-25 in N. Mus.	Douglas Co., from gravel pit 1½ mi. south of Valley, collected by V. M. Haddon, Valley, 1925.	(See page 369 for age of these Platte Valley gravels)
15. *A. imperator*—tooth, r. M_2, No. 14-1-11 in N. Mus.	Fillmore Co., from sand pit 4 mi. N. E. of Grafton, collected by R. F. Gilder, Omaha, 1911.	Grand Island (Kansan)
16. *A. imperator*—tooth in collection of H. H. McClellen, Minden, Nebraska.	Franklin Co., from clay above gravel deposit 1 mi. N. E. of Franklin, collected by H. H. McClellen, Minden, 1932.	Middle Pleistocene probably Upland (Yarmouth)
17. *A. imperator*, referred—tooth, r. M_3, in collection of John Howe, Stockville, Nebraska.	Frontier Co., from gravel pit ½ mi. east of Stockville, collected by John Howe, Stockville.	Early Pleistocene
18. *A. imperator*—tooth, r. M^3, No. 3-22-6-16 in N. Mus.	Furnas Co., from gravel pit near Cambridge, collected by W. Enslow, Cambridge, 1916.	Early Pleistocene

[8] This specimen is by far the most massive tooth in the collection at the Nebraska State Museum. Seven plates are present with possibly three missing. The enamel is extremely heavy. There are 3 plates to 10 cm. on the inside of the tooth and 3 plates to 10 cm. on the outside. Dr. Erwin H. Barbour plans to publish more details on this tooth in the near future.

FAUNAL LIST	LOCATION	FORMATION
19. *A. imperator*—tooth, r. M_2, No. 6-10-15 in N. Mus.	Furnas Co., from sand pit 4 mi. N. W. of Oxford, collected by Gottlieb Kurz, Oxford, 1915.	Early Pleistocene
20. *A. imperator*—tooth, r. M^2, No. 2-22-11-30 in N. Mus.	Gage Co., from coarse sand deposit 6 mi. S. E. of Beatrice, collected by C. G. McClung, Homesville, 1930.	Aftonian or Early Kansan
21. *A. imperator*—incomplete tooth No. 17-7-03 in N. Mus.	Gage Co., near Holmesville, collected by L. L. Noble, Homesville, 1903.	Probably Early Pleistocene
22. *A. imperator*—incomplete tooth No. 3-5-3-26 in N. Mus.	Gage Co., from Indian Creek near Pickrell, collected by Laura F. Cornelius, Pickrell, 1926.	Probably Early Pleistocene
23. *A. imperator*—jaw No. 15-4-31 in N. Mus.	Gosper Co., 9 mi. N. E. of Edison, collected by C. F. Kennon, Maxwell, Nebr., 1931.	Late Pleistocene
24. *A. imperator*—incomplete tooth No. 2-2-8-19 in N. Mus.	Harlan Co., at Republican City, collected by J. B. Souther, N. Mus., 1919.	Probably Early Pleistocene, Grand Island (Kansan) ?
25. *A. imperator*, referred—tooth, l. M_3, No. 6-8-13 in N. Mus. also incomplete tooth No. 23-8-32 in N. Mus.	Jefferson Co., near Fairbury, collected by Chas. Kinnamon and Chas. Dawson, Fairbury, 1913; collected by Ellis Strum, Fairbury, 1932.	Probably Kansan or Aftonian (?)
26. *A. imperator*, referred—tooth, r. M^3, No. 23-1-30 in N. Mus.	Jefferson Co., from gravel pits near Fairbury, collected by Chas. Kasporek, Fairbury, 1930.	Early Pleistocene (?)
27. *A. imperator*—incomplete tooth No. 4-12-13 and portion of skeleton in N. Mus.	Jefferson Co., 4½ mi. east of Reynolds, collected by E. H. Barbour, A. C. Whitford, and J. B. Burnett, N. Mus., 1913.	Kansan
28. *A. imperator*—tooth in General Land Office, Washington, D. C.	Johnson Co., 1869.	(?)
29. *A. imperator*—jaw No. 21-7-30 in N. Mus.	Lincoln Co., 3 mi. south of Bignell, collected by South Party, N. Mus., 1930.	Late Pleistocene, *Citellus* zone
30. *A. imperator*—tooth, r. M_3, No. 23-12-31 in N. Mus.	Redwillow Co., from sand pit at McCook, collected by W. B. Hall, Stratton, 1931.	Probably Early Pleistocene
31. *A. imperator*—tooth, l. M_3, No. 21-11-19 in N. Mus.	Saline Co., from gravel pit at Friend, collected by H. A. Whitcomb, Friend, 1919.	Grand Island (Kansan)
32. *A. imperator*, referred —incomplete teeth No. 13-6-11-26 and No. 14-6-11-26 in N. Mus.	Sarpy Co., from gravel pits at Meadow, collected by John Koop, Louisville, 1926.	(See page 369 for age of these Platte Valley gravels)
33. *A. imperator*—teeth, r. M^3, l. M^3, and tusk No. 10-1-31 in N. Mus.	Seward Co., from sand pit 1½ mi. south of Beaver Crossing, collected by E. L. Blue, L. C. Eiseley, F. W. Johnson, and C. Bertrand Schultz, N. Mus., 1931.	Grand Island (Kansan)
34. *A. imperator*, (referred, Frick, 1933) —teeth in Am. Mus. also misc. teeth in F. A. M.	Sheridan Co., Hay Springs quarries, collected by field parties from Am. Mus., 1893 and 1897; collected by Chas. Falkenbach for F. A. M., 1928-1930.	Middle Pleistocene (?), Upland (Yarmouth)= "Sheridan"= "Equus beds"

FAUNAL LIST	LOCATION	FORMATION
35. *A. imperator*—skull No. 1-11-8-17 in N. Mus.	Sheridan Co., Hay Springs quarry, collected by R. W. Ellis, N. Mus., 1917.	Middle Pleistocene (?) Upland (Yarmouth)= "Sheridan"= "Equus beds"
36. *A. imperator*—tooth r. M^3, No. 14-3-14 in N. Mus.	Thayer Co., from gravel pit near Alexandria, collected by Stephen Sajdow, Alexandria, 1914.	Grand Island (Kansan)
37. *A. imperator*, (determined, Hay, 1924) —tooth in collection of Dr. W. G. Classen, Hebron, Nebraska.	Thayer Co., from gravel pit near Hebron, collected by W. G. Classen, Hebron, 1923.	Early Pleistocene, probably Grand Island (Kansan)
38. *A. imperator*—tooth No. 9796 in H. Mus.	Webster Co., south of Republican River at Guide Rock, collected by A. M. Brooking, H. Mus.	(?)
39. *A. imperator scotti* (Barbour). Type.—jaw No. 18-2-22 in N. Mus.	Seward Co., 5 mi. south of Staplehurst, collected by E. T. Engle, Wesleyan University, 1922.	Grand Island (Kansan)
40. *A. imperator maibeni* (Barbour). Type.—mounted skeleton No. 5-9-22 in N. Mus.	Lincoln Co., 16 mi. north of Curtis, collected by E. H. Barbour and W. T. Hall, N. Mus. and H. S. Karriger, Curtis, 1922.	Late Pleistocene, *Citellus* zone
41. *A. meridionalis nebrascensis* Osborn. Type.—mounted skeleton No. 1359 in C. M. N. H.	Nuckolls Co., 1 mi. N. W. of Angus, collected by field party from C. M. N. H. and A. M. Brooking, H. Mus., 1931.	Upland (Yarmouth)
Genus: *Parelephas* (Elephas)		
1. *P. columbi* (Falconer)—tooth No. 7903 in H. Mus.	Adams Co., from sand pits at Brickton, collected by A. M. Brooking, H. Mus.	Grand Island (Kansan)
2. *P. columbi*, referred —incomplete tooth No. 6-17-11-31 in N. Mus.	Adams Co., from sand pits at Holstein, collected by A. M. Brooking, H. Mus., 1931.	Grand Island (Kansan)
3. *P. columbi*, referred —incomplete tooth No. 4-7-31 in N. Mus.	Adams Co., from clay pits south of Hastings, collected by A. M. Brooking, H. Mus., 1931.	Probably Late Pleistocene,
4. *P. columbi*—tooth, l. M^2, No. 1-12-1-27 in N. Mus.	Buffalo Co., near Kearney, collected by David Beynon, Kearney, 1927.	Grand Island (?) (Kansan)
5. *P. columbi*—incomplete tooth No. 4-2-15; tooth, r. M_2, No. 4-4-15; and tooth, l. M^3, No. 21-7-30 in N. Mus.	Chase Co., from gravel pit at Wauneta, collected by J. P. Ryan, Wauneta, 1915, 1930.	Early Pleistocene (Pre-Loveland)
6. *P. columbi*, referred —tooth, l. M_3, No. 13-11-19 in N. Mus.	Chase Co., from gravel pit 1½ mi. east of Wauneta, collected by R. M. Hollingsworth, Wauneta, 1919.	Early Pleistocene (Pre-Loveland)
7. *P. columbi*, referred —tooth, l. M^3, No. 1-27-6-30 and incomplete tooth No. 3-5-7-30 in N. Mus.	Cherry Co., North Prong of Middle Loup River, collected by Chas. Osborne, and Louis Lukert, N. Mus., 1930.	Middle Pleistocene, Upland (Yarmouth) upper "Loup River"

FAUNAL LIST	LOCATION	FORMATION
8. *P. columbi*, referred —portion of jaw with one molar tooth, No. 15-11-33 in N. Mus.	Cherry Co., 12 mi. east of Valentine, collected by Albert Potter, Valentine, 1933.	(?)
9. *P. columbi*—tooth, r. M_3, No. 28-9-27 in N. Mus.	Clay Co., from sand pit south of Clay Center, collected by Chas. Garvin, Clay Center, 1927.	Grand Island (Kansan)
10. *P. columbi*, referred —tooth, l. M^3, No. 20-1-17 in N. Mus.	Clay Co., from sand pit north of Edgar, collected by C. C. Cartney, Edgar, 1917.	Grand Island (Kansan)
11. *P. columbi*, referred —tooth, r. M^3, No. 2-17-11-31 in N. Mus.	Clay Co., from sand pits at Fairfield, collected by A. M. Brooking, H. Mus., 1931.	Grand Island (Kansan)
12. *P. columbi*, referred —incomplete tooth No. 1-17-11-31 in N. Mus.	Clay Co., from sand pit at Glenville, collected by A. M. Brooking, H. Mus., 1931.	Grand Island (Kansan)
13. *P. columbi*—incomplete tooth No. 2-16-8-30 in N. Mus.	Colfax Co., from gravel pits at Schuyler, collected by J. D. LeMar and F. W. Johnson, N. Mus., 1930.	(See page 369 for age of these Platte Valley gravels)
14. *P. columbi*—incomplete tooth No. 3-12-30 in N. Mus.	Custer Co., 12 m. N. E. of Broken Bow, collected by Alvin Kleeb, Broken Bow, 1930.	Probably Late Pleistocene
15. *P. columbi*—tooth, r. M^3, No. 1-8-9-33 in N. Mus.	Dawes Co., from gravel deposit 13 mi. east and 2 mi. south of Crawford, collected by C. L. Richardson and Karl Spence of Crawford, and Thompson M. Stout and C. Bertrand Schultz, N. Mus., 1933.	Late Pleistocene
16. *P. columbi*—tooth, r. M^3, No. 3-14-10-25 in N. Mus.	Douglas Co., from gravels 9 mi. S. E. of Valley, collected by V. M. Haddon, Valley, 1925.	Early Pleistocene
17. *P. columbi*, referred —jaw No. 8-7-08 in N. Mus.	Dundy Co., from sand pit near Benkleman, collected by D. A. Meese, Benkleman, 1908.	Probably Early Pleistocene
18. *P. columbi*, referred —incomplete tooth No. 22-7-32 in N. Mus.	Franklin Co., 6 mi. south of Bloomington, collected by R. C. Kirkbride, Bloomington, 1932.	Late Pleistocene
19. *P. columbi*, referred —tooth No. 7795 in H. Mus.	Franklin Co., S. E. of Franklin, collected by A. M. Brooking, H. Mus.	Late Pleistocene,
20. *P. columbi* (determined, Hay, 1924)—jaw No. 11719 in Yale Peabody Mus.	Frontier Co., from Medicine Creek, collected by field party from Yale University.	(?)
21. *P. columbi*, referred —tooth, r. M^2, in collection of John Howe, Stockville, Nebraska.	Frontier Co., 2½ mi. S. E. of Stockville, collected by John Howe, Stockville.	(?)
22. *P. columbi*—tooth, l. M_3, No. 10-12-6-33 in N. Mus.	Furnas Co., from gravel pit 1½ mi. N. E. of Cambridge, collected by J. M. Hollingsworth of Cambridge, Thompson M. Stout and C. Bertrand Schultz, N. Mus., 1933.	Early Pleistocene, probably Grand Island (Kansan)
23. *P. columbi*, referred —tooth, l. M^3, No. 24-4-16 in N. Mus.	Furnas Co., from gravel deposit on Medicine Creek near Cambridge, collected by V. R. Schober, Cambridge, 1916.	Early Pleistocene

FAUNAL LIST	LOCATION	FORMATION
24. *P. columbi*—tooth, r. M^2, No. 3-5-9-16 in N. Mus.	Furnas Co., from gravel pit near Cambridge, collected by J. F. Cordeal, Cambridge, 1916.	Early Pleistocene, probably Grand Island (Kansan)
25. *P. columbi*,—tooth, r. M_3, No.7-8-33 in N. Mus.	Gage Co., from gravel deposit on Blue River at Barneston, collected by Mrs. A. J. Grapes, Lincoln, Nebraska, 1933.	(?)
26. *P. columbi*, referred —incomplete tooth No. 3-22-11-30 in N. Mus.	Gage Co., from sand deposit 6 mi. S. E. of Beatrice, collected by G. O. McClung, Homesville, 1930.	Aftonian or Early Kansan
27. *P. columbi*—tooth, l. M^3, No. 2-5-3-26 in N. Mus.	Gage Co., on Indian Creek near Pickrell, collected by Laura F. Cornelius, Pickrell, 1926.	(?)
28. *P. columbi*, referred —tooth, r. M_2, No. 1-27-5-28 in N. Mus.	Hamilton Co., near Giltner, collected by C. E. Dawson, Giltner, 1928.	Grand Island (Kansan)
29. *P. columbi*, referred —incomplete tooth No. 2-20-6-30 and associated tusks No. 20-6-30 in N. Mus.	Harlan Co., 2½ mi. S. E. of Ragan, collected by South Party, N. Mus., 1930.	Late Pleistocene
30. *P. columbi*, referred —incomplete tooth No.3-3-9-28 in N. Mus.	Harlan Co., from Republican City, collected by J. D. LeMar and C. Bertrand Schultz, N. Mus., 1928.	(?)
31. *P. columbi*, referred —incomplete tooth No. 24-3-31 in N. Mus.	Hitchcock Co., from gravel pit at Beverly, collected by Elmer Brehm, Beverly, 1931.	Early Pleistocene
32. *P. columbi*, referred —incomplete teeth No. 5-17-11-31 and No. 8-17-11-31 in N. Mus.	Howard Co., from sand pits at Cushing, collected by A. M. Brooking, H. Mus., 1931.	Early Pleistocene
33. *P. columbi*, referred —teeth, r. M_3, r. M_3, No. 17-5-20; tooth, r. M^2, No. 13-3-33 in N. Mus.	Jefferson Co., from sand pits at Endicott, collected by Fairchild Bros., Endicott, 1920, 1933.	Kansan or Aftonian (?)
34. *P. columbi*, referred —incomplete tooth No. 19-12-04 in N. Mus.	Jefferson Co., from sand pit 3 mi. west of Fairbury, collected by J. M. Rohrbaugh, Lincoln, 1904.	Probably Kansan
35. *P. columbi*, referred jaw No. 19-9-17 in N. Mus.	Jefferson Co., 1½ mi. east of Powell, collected by J. W. Miller, Powell, 1917.	(?)
36. *P. columbi*, referred —tooth, l. M^2, No. 1-7-10-31 and incomplete tooth No. 2-7-10-31 in N. Mus.	Kearney Co., from gravel pit 14 mi. south of Kearney, collected by L. A. Larson, Curtis, 1931.	Grand Island (Kansan)
37. *P. columbi*, referred —incomplete tooth No. 31-10-27 in N. Mus.	Keith Co., from gravel pits on So. Platte River, collected by J. C. Watt, U. of N., 1927.	(?)
38. *P. columbi*, referred —incomplete tooth No. 11-5-22 in N. Mus.	Knox Co., from Bloomfield, collected by Carl Frahm, Bloomfield, 1922.	Probably Aftonian or Early Kansan

FAUNAL LIST	LOCATION	FORMATION
39. *P. columbi*, referred —incomplete tooth No. 9-7-21 in N. Mus.	Lancaster Co., from Salt Creek, N. E. of Havelock, collected by Guy E. Smith, Lincoln, 1931.	Early Pleistocene (?)
40. *P. columbi*, referred —tooth, l. M^3, No. 9-21-7-30 and tooth, r. M^3, No. 10-21-7-30 also 4 associated tusks and misc. skeletal parts in N. Mus.	Lincoln Co., 2 mi. S. W. of Bignell, collected by South Party, N. Mus., 1930.	Late Pleistocene, *Citellus* zone
41. *P. columbi*, referred —incomplete tooth No. 10-27-8-17 in N. Mus.	Morrill Co., 1 mi. east of Broadwater, collected by J. R. Minshall, Broadwater, 1917.	(?)
42. *P. columbi*—jaw No. 1-15-9-32 in N. Mus.	Morrill Co., 5 mi. east of Broadwater, collected by Bob Long and C. Bertrand Schultz, N. Mus., accompanied by S. R. Sweet, Bridgeport, 1932.	Late Pleistocene
43. *P. columbi*, referred —incomplete tooth No. 6-28-3-31 in N. Mus.	Pawnee Co., from Table Rock, collected by L. C. Eiseley and C. Bertrand Schultz, N. Mus., 1931.	(?)
44. *P. columbi*, referred —tooth, l. M_3, No. 27-10-33 in N. Mus.	Platte Co., from gravel pit 14 mi. S. E. of Genoa, collected by Fred Sluckman, Tobias, Nebr., 1933.	(?)
45. *P. columbi*—tooth, r. M^3, No. 9-13-6-33 in N. Mus.	Red Willow Co., from gravel pit 1 mi. west of Bartley, collected by E. Walkington of Bartley, Thompson M. Stout and C. Bertrand Schultz, N. Mus., 1933.	(?)
46. *P. columbi*, referred incomplete tooth No. 8-13-6-33 in N. Mus.	Red Willow Co., from gravel pit 1 mi. west of Indianola, collected by A. L. Davidson of Indianola, Thompson M. Stout and C. Bertrand Schultz, N. Mus., 1933.	(?)
47. *P. columbi*—cast of incomplete tooth No. 2-22-9-16 in N. Mus.	Richardson Co., 2 mi. east of Dawson, collected by J. R. Harrah, Dawson, 1916.	(?)
48. *P. columbi*—skull No. 1-16-8-30 in N. Mus.	Saline Co., 3 mi. north of Western, collected by J. D. LeMar and F. W. Johnson, N. Mus., 1930.	Post-Kansan
49. *P. columbi*, referred —incomplete tooth No. 18-3-09 in N. Mus.	Saline Co., 4 mi. S. E. of Wilber, collected by Rudolph Chab, Wilber, 1909.	(?)
50. *P .columbi*—teeth in N. Mus. incomplete tooth No. 13-3-18; tooth, r. M_2, No. 2-13-1-25; tooth, r. M^2, No. 4-14-10-25; incomplete tooth No. 3-24-5-26; incomplete tooth No. 10-6-11-26.	Sarpy Co., from sand and gravel pits at Meadow; collected by H. A. Koop, Louisville, 1918; collected by H. A. Koop, 1925; collected by V. M. Haddon, 1925; collected by Howard Taylor and Henry Yonquist, Louisville, 1926; collected by John Koop, Louisville, 1926.	(See page 369 for age of these Platte Valley gravels)
51. *P. columbi*, referred —4 teeth, l. M^1, l. M^2, r. M^1, r. M^2, No. 11-9-32 in N. Mus.	Seward Co., from sand pit near Beaver Crossing, collected by Henry Reider, N. Mus., and Stanford Stutzman, Beaver Crossing, 1932.	Grand Island (Kansan)

FAUNAL LIST	LOCATION	FORMATIC
52. *P. columbi*, referred —tooth r. M^2, No. 31-8-22 in N. Mus.	Sioux Co., from gravel pit 7 mi. S. W. of Harrison, collected by E. F. Schramm, U. of N., 1922.	(?)
53. *P. columbi*, (referred, Cook, 1914)—tooth No. H. C. 132 in collection of H. J. Cook, Agate.	Sioux Co., from gravels which underlie the surface deposits at Agate, collected by H. J. Cook, Agate.	(?)
54. *P. columbi*, referred —tooth, l. M^3, No. 2-9-11-33 in N. Mus.	Thayer Co., found in gravel pit near Davenport, collected by Fred Harms, Davenport, 1933.	Probably Grand Island (Kansan)
55. *P. columbi*, referred —incomplete tooth No. 3-20-7-30 and misc. fragments of teeth No. 20-7-30 in Mus.	Thomas Co., from gravel pits west of Halsey, collected by Chas. Osborne and Louis Lukert, N. Mus., 1930.	Early Pleistocene
56. *P. columbi*—tooth, r. M^2, No. 27-7-18 in N. Mus.	Valley Co., from sand deposit 4 mi. S. W. of Arcadia, collected by J. M. Meyers, Arcadia, 1918.	Early Pleistocene
57. *P. columbi*, referred —immature tooth No. 3-10-11 in N. Mus.	York Co., near York, collected by W L. Green, York, 1911.	(?)
58. *P. jeffersonii* (Osborn)—tooth, l. M^3, No. 7-17-11-31 in N. Mus.	Adams Co., from clay pits south of Hastings, collected by A. M. Brooking, H. Mus., 1931.	Late Pleistocene,
59. *P. jeffersonii*— tooth, r. M_3, No. 24-9-07 in N. Mus.	Buffalo Co., from sand pits near Ravenna, collected by C. B. Cass, Ravenna, 1907.	Early Pleistocene
60. *P. jeffersonii*,— referred, incomplete tooth No. 1-28-1-32 in N. Mus.	Buffalo Co., from sand pits at Shelton, collected by E. L. Templin, Shelton, 1932.	(?)
61. *P. jeffersonii*, referred—incomplete tooth, No. 7-11-33 in N. Mus.	Butler Co., from sand pit near Bellwood, collected by Claud Bull, David City, 1933.	Probably Grand Island (Kansan)
62. *P. jeffersonii*, —referred, tooth, r. M^3, No. 14-6-21 in N. Mus.	Chase Co., from gravel pit at Wauneta, collected by Ralph Grosback, Wauneta, 1921.	Pre-Loveland (Early Pleistocen
63. *P.* cf. *jeffersonii*— tooth No. 2937 in H. Mus.	Clay Co., 2 mi. north of Inland, collected by A. M. Brooking, H. Mus.	Late Pleistocene
64. *P.* cf. *jeffersonii*— tooth No. 7120 in H. Mus.	Clay Co., from sand pits 10 mi. north of Nelson, collected by A. M. Brooking, H. Mus.	Grand Island (Kansan)
65. *P. jeffersonii*—tooth No. 4686 in H. Mus.	Clay Co., from sand pits 2 mi. north of Sutton, collected by A. M. Brooking, H. Mus.	Grand Island (Kansan)
66. *P. jeffersonii*, referred—2 immature teeth No. 4627 and No. 4632 in H. Mus.	Clay Co., from sand pits 2 mi. north of Sutton, collected by A. M. Brooking, H. Mus.	Grand Island (Kansan)
67. *P. jeffersonii*, referred—tooth, l. M^3, No. 12-10-21 in N. Mus.	Clay Co., from Brown's sand pit at Sutton, collected by J. J. Grainger, Jr., Sutton, 1921.	Late Grand Islan (Kansan)

FAUNAL LIST	LOCATION	FORMATION
68. *P. jeffersonii*—3 teeth, r. M_3, l. M_3, r. M^3, tusks, partial skeleton No. 20-12-28 in N. Mus.	Custer Co., 16 mi. north of Miller, collected by J. D. LeMar, Frank Crabill, and C.. Bertrand Schultz, N. Mus., 1928-1929.	Pre-Peorian, Probably Upland (Yarmouth)
69. *P. jeffersonii*—tooth, l. M_3, No. 4-10-22 in N. Mus.	Dawes Co., 1922.	(?)
70. *J. jeffersonii*—tooth l. M^3, No. 3-1-29 in N. Mus.	Dawson Co., collected by R. Richards, Overton, 1929.	(?)
71. *P. jeffersonii*—tooth, r. M_3, No. 23-3-31 in N. Mus.	Dixon Co., 1931.	(?)
72. *P. jeffersonii*—tooth, l. M^3, No. 15-9-18 in N. Mus.	Dundy Co., near Benkleman, collected by Ray Magrani, Benkleman, 1918.	Probably Early Pleistocene
73. *P. jeffersonii*—skull, tusks, jaw, and misc. skeletal parts No. 1-4-15 in N. Mus.	Franklin Co., within city limits of Campbell, collected by E. H. Barbour and J. B. Burnett, N. Mus. 1915.	Late Pleistocene
75. *P. jeffersonii*, referred—tooth No. 4643 in H. Mus.	Franklin Co., S. E. of Bloomington, near mouth of Lost Creek, collected by A. M. Brooking, H. Mus.	(?)
75. *P. jeffersonii*, referred—tooth, No. l. M^3, in collection of John Howe, Stockville, Nebraska.	Frontier Co., from gravel pit ½ mi. east of Stockville, collected by John Howe, Stockville.	Early Pleistocene
76. *P. jeffersonii*, referred—incomplete tooth in collection of John Howe, Stockville, Nebraska.	Frontier Co., from loess deposits 6 mi. N. W. of Stockville, collected by John Howe, Stockville.	Late Pleistocene
77. *P. jeffersonii*, referred—tooth, r. M_3, in collection of John Howe, Stockville, Nebraska.	Frontier Co., from gravel deposit on Lime Creek, 16 mi. S. E. of Stockville, collected by John Howe, Stockville.	Probably Early Pleistocene
78. *P. jeffersonii*, referred—tooth, r. M^2, in collection of John Howe, Stockville, Nebraska.	Frontier Co., from gravel deposits on Coon Creek, 12 mi. south of Stockville, collected by John Howe, Stockville.	Probably Early Pleistocene
79. *P. jeffersonii*, referred—tooth, l. M^3, No. 25-2-24 in N. Mus. tooth, r. M^3, No. 2-20-10-26 in N. Mus.	Furnas Co., from gravel pit 2 mi. N. W. of Arapahoe, collected by J. M. Schneider, Arapahoe, 1924; collected by E. H. Barbour, N. Mus. and E. F. Schramm, U. of N., 1926.	Grand Island (Kansan)
80. *P. jeffersonii*—incomplete tooth No. 2-26-6-16 in N. Mus.; tooth No. 6225 in H. Mus.	Furnas Co., from gravel pits near Cambridge, collected by W. Enslow, Cambridge, 1916; collected by A. M. Brooking, H. Mus.	Early Pleistocene
81. *P. jeffersonii*, referred—tooth, r. M_3, No. 9-12-6-33 in N. Mus.	Furnas Co., from gravel pit 1½ mi. N. E. of Cambridge, collected by J. M. Hollingsworth of Cambridge, Thompson M. Stout and C. Bertrand Schultz, N. Mus., 1933.	Early Pleistocene, probably Kansan

FAUNAL LIST	LOCATION	FORMATION
82. *P. jeffersonii*—tooth, l. M^3, No. 1-26-6-31, with tusk No. 2-26-6-31 in N. Mus.	Greeley Co., 10 mi. west of Spalding, collected by H. P. Reider and Frank Bell, N. Mus. accompanied by M. J. Gilroy, Spalding, 1931.	Probably Upland (Yarmouth)
83. *P. jeffersonii*, referred—incomplete tooth No. 10-13-6-33 in N. Mus.	Hayes Co., from gravel pit 4 mi. north of Hamlet, collected by J. Rutherford and John Beezley, Hamlet, 1933.	Early Pleistocene
84. *P. jeffersonii*, referred—4 teeth, r. M^1, l. M^1, r. M^2, l. M^2, No. 24-9-31 in N. Mus.	Hitchcock Co., from sand pits at Palisade, collected by Dean Krotter, Palisade, 1931.	Early Pleistocer
85. *P. jeffersonii*, referred—incomplete tooth, No. 24-10-33 in N. Mus.	Holt Co., found at mouth of Phelps Creek, collected by Uneola Adams and Mabel J. Adams, Dustin, Nebraska, 1933.	(?)
86. *P. jeffersonii*—tooth, l. M^3, No. 12-12-12 in N. Mus. tooth, r. M^3, No. 8-9-30 in N. Mus.	Howard Co., from gravel bed on Loup River S. W. of St. Paul, collected by F. J. Schaufelberger, Hastings, 1912; collected by H. G. Salter, Norfolk, 1930.	Early Pleistocene
87. *P. jeffersonii*, referred—skull, jaws, and skeletal parts No. 2-7-17 in N. Mus.	Howard Co., from Oak Creek near Dannebrog, collected by E. H. Barbour, N. Mus., 1917.	Probably Upland (Yarmouth)
88. *P. jeffersonii*, referred—tooth, r. M^3, No. 15-7-17 in N. Mus.	Jefferson Co., from sand pits at Endicott, collected by Fairchild Bros., Endicott, 1917.	Kansan or Aftonian (?)
89. *P. jeffersonii*—right jaw with r. M_3, palate with r. M^3, and l. M^3, misc. skeletal parts No. 24-11-33 in N. Mus.	Jefferson Co., from gravel deposit 4 mi. S. W. of Fairbury, collected by Frank Bell, H. P. Reider, F. W. Johnson and C. Bertrand Schultz, N. Mus., and S. R. Sweet, Bridgeport, Nebraska, 1933.	Middle Pleistocen Lower Loveland
90. *P. jeffersonii*, referred—incomplete tooth No. 28-24-10-14 in N. Mus.	Jefferson Co., from near Reynolds, collected by A. C. Whitford, N. Mus., 1917.	Grand Island (Kansan)?
91. *P. jeffersonii*—tooth, l. M^3, No. 6-6-29 in N. Mus.	Knox Co., from sand pit 5 mi. N. W. of Venus, collected by Elmer Grim, Venus, 1929.	Early Pleistocene
92. *P. jeffersonii*—tooth, l. M^3, in Lincoln County Historical Museum, North Platte, Nebraska.	Lincoln Co., from gravel pit at Maxwell, collected by Ed. Walker, Maxwell, 1932.	(?)
93. *P. jeffersonii*, referred—incomplete tooth No. 25-10-24 in N. Mus.	Platte Co., from gravel pit south of Duncan, collected by A. J. Lindley, Duncan, 1924.	(See page 369 for these Platte Valle gravels)
94. *P. jeffersonii* referred—incomplete tooth No. 31-1-30 in N. Mus.	Saunders Co., from gravel pit 3 mi. N. E. of Cedar Bluffs, collected by M. E. Carstensen, Cedar Bluffs, 1930.	(See page 369 for these Platte Valle gravels)
95. *P. jeffersonii*—tooth, r. M^3, No. 1-9-11-33 in N. Mus.	Thayer Co., found in gravel pit near Davenport, collected by Fred Harms, Davenport, 1933.	Probably Grand Island (Kansan)

FAUNAL LIST	LOCATION	FORMATION
96. *P. jeffersonii*, referred—tooth, r. M^2, No. 3-24-10-27 in N. Mus.	Webster Co., from gravel pit on Indian Creek, 3 mi. west of Red Cloud, collected by H. F. Haden, Red Cloud, and C. Bertrand Schultz, N. Mus. 1927.	Early Pleistocene probably Grand Island (Kansan)
Genus: *Mammonteus* (*Elephas*)		
1. *M. primigenius* (Blumenbach), referred—incomplete tooth No. 9-17-11-31 in N. Mus.	Adams Co., from sand pits at Holstein, collected by A. M. Brooking, H. Mus., 1931.	Grand Island (Kansan)
2. *M. primigenius*—incomplete tooth No. 2-11-22 in N. Mus.	Dawson Co., from sand pit between Gothenburg and Platte River, collected by John Heidebrink, Gothenburg, 1922.	Early Pleistocene (?), probably Grand Island (Kansan)
3. *M. primigenius*—incomplete tooth No. 18-11-30 in N. Mus.	Douglas Co., from sand pit 1½ mi. S. E. of Valley, collected by A. Parsons, Valley, 1930.	(See page 369 for age of these Platte Valley gravels)
4. *M. primigenius*, referred—tooth in C. M. N. H.	Franklin Co., 8 mi. north of Bloomington, 1932.	Probably Early or Middle Pleistocene
5. *M. primigenius*, referred—tooth, l. M^3. No. 16-9-32 in N. Mus.	Gage Co., from gravel deposits at Barnston, collected by James Fulton, Lincoln, 1932.	Early Pleistocene (?)
6. *M. primigenius*—teeth No. 1 P. C. M. and No. 2 P. C. M. in Platte County Historical Museum, Columbus, Nebraska.	Platte Co., from gravel pit 1 mi. south of Columbus, collected by Harold Kramer, Columbus.	(See page 369 for age of these Platte Valley gravels)
7. *M. primigenius*—tooth, r. M^3, No. 3-13-1-25 in N. Mus.	Sarpy Co., from sand and gravel pit at Meadow, collected by Harold Koop, Louisville, 1925.	(See page 369 for age of these Platte Valley gravels)
8. *M. primigenius*—3 teeth, r. M_3, l. M^3, r.M^3, No. 15-9-31 in N. Mus.	Webster Co., from sand and gravel pits at Guide Rock, collected by A. M. Brooking, H. Mus., 1931.	Early Pleistocene, probably Grand Island (Kansan)
9. *M. primigenius*, referred—tooth No. 7137 in H. Mus.	Webster Co., from Republican River at Red Cloud, collected by A. M. Brooking, H. Mus., 1931.	(?)
10. *M.* cf. *primigenius*, (referred, Cook, 1931)—jaws and portion of skeleton in H. Mus.	Clay Co., near Spring Ranch, collected by A. M. Brooking, H. Mus.	Grand Island (Kansan)
Family: Equidae (Horses)		
Genus: *Equus*		
. *E. excelsus* Leidy. Type.—fragment of skull with teeth in National Museum.	Pawnee Loup Branch of Platte River, Middle Loup, probably Hooker Co., 1858.	Early or Middle Pleistocene
E. excelsus, referred—teeth No. 19-10-25 in N. Mus.	Antelope Co., from gravel pit at Oakdale, collected by Frank Dvorak, Oakdale, 1925.	Early Pleistocene

FAUNAL LIST	LOCATION	FORMATION
3. *E. excelsus*, referred— teeth No. 2-7-4-21 in N. Mus.	Boyd Co., near Spencer, collected by F. Pokorny, Spencer, 1921.	(?)
4. *E. excelsus*, referred —misc. skulls, jaws, teeth and skeletal parts in F. A. M.	Brown Co., from lower sands on Sand Creek, 7 mi. N. E. of Ainsworth, collected by Morris F. Skinner for F. A. M., 1928-1932.	Early Pleistocene
5. *E. excelsus*, referred —5 misc. teeth in F. A. M.	Brown Co., from gravel pits ½ mi. west of Long Pine, collected by Morris F. Skinner for F. A. M., 1932.	Early Pleistocene
6. *E. excelsus*, referred —misc. teeth in N. Mus.	Chase Co., from sand pits at Wauneta;	Early Pleistocene
10 teeth No. 2-14-2-98	collected by T. E. Calvert, Burlington R.R., 1898;	
7 teeth No. 2-22-4-16	collected by J. P. Ryan, Wauneta, 1916;	
tooth No. 2-14-6-21	collected by Ralph Grosback, Wauneta, 1921:	
tooth No. 2-5-10-22	collected by Frank Ryan, Wauneta, 1922;	
tooth No. 3-23-3-23	collected by G. S. Metcalf, Wauneta, 1923:	
tooth No. 2-21-7-30	collected by J. P. Ryan, Wauneta, 1930.	
7. *E. excelsus*, referred —incomplete jaw No. 8-30-6-30, also misc. skeletal parts. No. 21-6-30, No. 26-6-30, No. 30-6-30, No. 8-7-30, etc., in N. Mus.;	Cherry Co., North Prong of Middle Loup River, collected by Chas. Osborne and Louis Lukert, N. Mus., 1930;	Middle Pleistocene Upland (Yarmouth upper "Loup River'
portion of upper dentition No. 5-13-8-31 in N. Mus.	collected by F. W. Johnson and Chas. Osborne, N. Mus., 1931.	
8. *E. excelsus*, referred —tooth No. 28-10-15 in N. Mus.	Clay Co., from gravel pit 3 mi. N. E. of Sutton, collected by G. H. Matteson, Sutton, 1915.	Grand Island (Kansan)
9. *E. excelsus*, referred —palate with complete dentition No. 11-5-33 in N. Mus. (loan from Mrs. Eleanor Barbour Cook, Chadron).	Dawes Co., 4 mi. south of Whitney, collected by Harold J. Cook, Agate, Nebraska, 1922.	Late Pleistocene
10. *E. excelsus*, referred —skull, jaw, and partial skeleton No. 13-10-17 in N. Mus.	Furnas Co., from sand desopit 1 mi. west of Arapahoe, collected by E. H. Barbour, N. Mus., 1917.	Early Pleistocene, Grand Island (Kansan)
11. *E. excelsus*, referred —misc. teeth No. 2-11-25 in N. Mus.	Furnas Co., from gravel pit at Arapahoe, collected by F. E. Bowers, Arapahoe, 1925.	(?)
12. *E. excelsus*, referred —7 teeth No. 12-12-6-33 in N. Mus.	Furnas Co., from gravel pit 1½ mi. N. E. of Cambridge, collected by Thompson M. Stout and C. Bertrand Schultz, N. Mus., 1933.	Early Pleistocene, probably Grand Island (Kansan)
13. *E. excelsus*, referred —misc. teeth in collection of Thompson M. Stout, Lewellen.	Garden Co., from gravels 2½ mi., south of head springs of Blue Creek, collected by Thompson M. Stout, N. Mus., 1932.	Early Pleistocene (? probably Nebraskan

FAUNAL LIST	LOCATION	FORMATION
14. *E. excelsus*, referred—misc. teeth in collection of Thompson M. Stout, Lewellen.	Garden Co., from gravels on east side of Blue Creek, 10 mi. from mouth, collected by Thompson M. Stout, N. Mus., 1932.	Early Pleistocene (?), probably Nebraskan
15. *E. excelsus*, referred —tooth No. 1-11-7-28 in N. Mus.	Harlan Co., from gravel deposit 5 mi. N. E. of Oxford, collected by J. D. LeMar and C. Bertrand Schultz, N. Mus., 1928.	Early Pleistocene, probably Grand Island (Kansan)
16. *E. excelsus*, referred —incomplete jaw No.1-5-9-28 in N. Mus.	Harlan Co., from gravel deposit 6 mi. S. W. of Republican City, collected by J. D. LeMar and C. Bertrand Schultz, N. Mus., 1928.	Early Pleistocene
17. *E. excelsus*, referred —misc. teeth and portion of jaw No. 2-19-33 C. O., also tooth No. 1-4-13-33 C. O. in collection of Chas. Osborne, Cherry, Nebraska.	Hooker Co., Middle Loup River, 2 mi. north of Mullen, collected by Chas. Osborne, 1933.	Middle Pleistocene, Upland (Yarmouth)= upper "Loup River"
18. *E. excelsus*, referred —tooth No. 3-7-27 in N. Mus.	Jefferson Co., from gravel pit near Fairbury, collected by Henry Kuck, Fairbury, 1927.	Early Pleistocene
19. *E. excelsus*, referred —tooth No. 1-8-14 in N. Mus.	Lancaster Co., from gravel pit 3 mi. west of Davey, collected by G. K. Hawthorne, Lincoln, 1914.	Early Pleistocene, probably Kansan
20. *E. excelsus*, referred —incomplete jaw No. 2-1-6-19 in N. Mus.	Lancaster Co., at Princeton, collected by Philip Matthews, Princeton, 1919.	Early Pleistocene (?)
21. *E. excelsus*, referred tooth No. 21-11-24 in N. Mus.	Madison Co., from gravel pit 9½ mi. N. W. of Battle Creek, collected by H. F. Barnes, Battle Creek, 1924.	Early Pleistocene, Kansan or Aftonian
22. *E. excelsus*, referred —portion of jaw and misc. teeth, etc., in C. M. N. H.	Nuckolls Co., 1½ mi. S. W. and also 1 mi. S. W. of Angus, in greenish colored sands and clays, 1932.	Upland (Yarmouth)
23. *E. excelsus*, referred —tooth No. 1-7-22 in N. Mus.	Otoe Co., near Talmage, collected by E. A. Markwalder, Talmage, 1922.	(?)
24. *E. excelsus*, referred —teeth No. 27-9-24 in N. Mus.	Red Willow Co., from gravel bed in well at McCook, collected by C. W. Kelley, McCook, 1924.	Early Pleistocene
25. *E. excelsus*, referred —misc. teeth No. 10-10-15 and No. 10-10-25 in N. Mus.	Red Willow Co., from sand pit at McCook, collected by J. F. Cordeal, McCook, 1925.	(?)
26. *E. excelsus*, referred —incomplete jaw No. 16-12-13 in N. Mus.	Saline Co., from sand pit in Crete, collected by C. J. Bowlby, Crete, 1913.	Grand Island (Kansan)
27. *E. excelsus*, referred —skull No. 2-11-9-27 and misc. jaws No. 1-11-9-27 in N. Mus.	Sarpy Co., from sand and gravel pits at Meadow, collected by Chas. Knutsen, Louisville, 1927.	(See page 369 for age of these Platte Valley gravels)
28. *E. excelsus* (referred, Frick, 1930)—skulls, jaws, skeletal parts in Am. Mus., F. A. M., National Mus., N. Mus., etc.	Sheridan Co., Hay Springs quarries, collected by field parties for Am. Mus., F. A. M., National Mus., N. Mus., etc., 1893-1932.	Middle Pleistocene (?), Upland (Yarmouth)= "Sheridan"= "Equus beds"

FAUNAL LIST	LOCATION	FORMATION
29. *E. excelsus*, referred —misc. teeth and skeletal parts No. 5-7-19, No. 6-7-15, No. 7-7-15, No. 8-7-15 in N. Mus.	Thomas Co., 14 to 18 mi. east of junction of North and South forks of Dismal River, collected by J. B. Burnett, N. Mus., 1915.	Middle Pleistocene Upland (Yarmouth
30. *E. excelsus*, referred —misc. teeth No. 3-30-3-27 in N. Mus.	Webster Co., from sand and gravel pits south of Cowles, collected by P. C. Orr, N. Mus., 1927.	Grand Island (Kansan)
31. *E. excelsus*, referred —misc. teeth No. 64 R. V. M., in Republican Valley Museum, Red Cloud, Nebraska.	Webster Co., from gravel pit 4½ mi. west of Red Cloud, collected by Maxine and Mildred Hunsicker, Red Cloud, 1933.	Grand Island (Kansan)
32. *E. colabatus nebrascensis* Frick. Type.—misc. specimens in Am. Mus. and F. A. M.	Sheridan Co., Hay Springs quarries, collected by field parties for Am. Mus., 1893 and 1897; and by Chas. Falkenbach for F. A. M., 1928-1930.	Middle Pleistocene Upland (Yarmouth): "Sheridan"= "Equus beds"
33. *E.*, sp. indt.—tooth No. 8-3-29 in N. Mus.	Cass Co., from gravel pit north of Plattsmouth, collected by J. J. Law, Plattsmouth, 1929.	(See page 369 for ag these Platte Valley gravels)
34. *E.*, sp. indet.—metapodial (very narrow and light, cf. *E. colabatus*) No. 13-30-6-30 in N. Mus.	Cherry Co., North Prong of Middle Loup River, collected by Chas. Osborne and Louis Lukert, N. Mus., 1930.	Middle Pleistocene, Upland (Yarmouth): upper "Loup River"
35. *E.*, sp. indet.—phalange No. 17-4-31 and teeth No. 5-5-33 in N. Mus.	Cuming Co., from gravel pit 2½ mi. N. W. of Wisner, collected by G. W. Howe, Wisner, 1933.	Early Pleistocene
36. *E.*, sp. indet.—tooth No. 2-5-9-16 in N. Mus.	Furnas Co., from gravel pit at Cambridge, collected by J. F. Cordeal, Cambridge, 1916.	Early Pleistocene
37. *E.*, sp. indet.—tooth No. 4-5-3-26 in N. Mus.	Gage Co., from gravel deposit along Indian Creek, near Pickrell, collected by Laura F. Cornelius, 1926.	Probably Early Pleistocene
38. *E.*, sp. indet.—tooth, metapodial, femur No. 12 to No. 14-11-7-10 in N. Mus.	Harlan Co., from top of volcanic ash layer 5 mi. west of Orleans, collected by E. H. Barbour, N. Mus., 1910.	Lower Loveland
39. *E.*, sp. indet.—tooth and portion of jaw No. 7-13-6-33 in N. Mus.	Red Willow Co., from gravel pit 1 mi. west of Indianola, collected by A. L. Davidson of Indianola, Thompson M. Stout and C. Bertrand Schultz, N. Mus., 1933.	(?)
40. *E.*, sp. indet.—misc. teeth No. 3-9-11-33 in N. Mus.	Thayer Co., found in gravel pit near Davenport, collected by Fred Harms, Davenport, 1933.	(?)
41. *E. giganteus* Gidley—an unusually large femur No. 1-27-11-33 in N. Mus.	Jefferson Co., from gravel pit 6½ mi. S. E. of Fairbury, collected by F. W. Johnson and C. Bertrand Schultz, N. Mus., 1933.	Probably Early Pleistocene
Family: **Tayassuidae** (Peccaries)		
Genus: *Platygonus*		
1. *P. compressus* Le Conte, referred—3 partial skeletons No. 14-11-28 in N. Mus.	Franklin Co., 1 mi. south of Franklin, collected by J. D. LeMar, Frank Crabill and C. Bertrand Schultz, N. Mus., accompanied by Karl Spence, Franklin, 1928-1929.	Late Pleistocene

FAUNAL LIST	LOCATION	FORMATION
2. *P. vetus* Leidy, referred—left and right jaws No. 90-1-7-32 and misc. teeth in N. Mus.	Sheridan Co., Hay Springs quarry, collected by F. W. Johnson and Chas. Osborne, N. Mus., 1932.	Middle Pleistocene (?), Upland (Yarmouth)= "Sheridan"= "Equus beds"
3. *P.* sp., (determined, Matthew, 1918)—jaw fragments in Am. Mus.	Hooker Co., Middle Loup River west of Seneca, collected by field party from Am. Mus., 1916.	Middle Pleistocene (?), Upland (Yarmouth)= upper "Loup River"
4. *P.* sp., (determined, Matthew, 1918)—palate, jaws, etc. in Am. Mus.	Sheridan Co., Hay Springs quarry, collected by field parties from Am. Mus., 1893 and 1897.	Middle Pleistocene (?), Upland (Yarmouth)= "Sheridan"= "Equus beds"
Genus: *Mylohyus*		
1. *M. browni* Gidley, referred—jaw No. 4140 in H. Mus.	Adams Co., from clays above gravel pits 1 mi. south of Hastings, collected by A. M. Brooking, H. Mus., 1928.	Upland (Yarmouth)
2. *M.* sp., (determined, Hay, 1927)—molar sent to National Museum.	Cedar Co., from gravelly clays near Hartington, collected by Anton Wortmann, Hartington, 1925.	Aftonian or Early Kansan
Family: **Camelidae** (Camels and Llamas)		
Genus: *Camelops*		
1. *C. kansanus* Leidy—tooth No. 1-5-9-16 in N. Mus.	Furnas Co., from gravel pit at Cambridge, collected by J. F. Cordeal, Cambrige, 1916.	Early Pleistocene
2. *C. kansanus*, referred—tooth No. 3-8-05 in N. Mus.	Harlan Co., from gravel pit at Alma, collected by J. I. Wilkins, Alma, 1905.	Early Pleistocene
3. *C. kansanus* (determined Matthew, 1918)—jaws, teeth, and misc. bones in Am. Mus., F. A. M., and N. Mus.	Sheridan Co., Hay Springs quarries, collected by field parties for Am. Mus., F. A. M., and N. Mus., 1893-1932.	Middle Pleistocene (?), Upland (Yarmouth)= "Sheridan"= "Equus beds"
4. *C. kansanus*, referred—tooth No. 1-20-7-30 in N. Mus.	Thomas Co., from sand deposit at Halsey, collected by Chas. Osborne and Louis Lukert, N. Mus., 1930.	(?)
5. *C.* cf. *vitakerianus* (Cope), (determined, Matthew, 1918)—jaws, etc. in Am. Mus.	Sheridan Co., Hay Springs quarry, collected by field parties from Am. Mus., 1893 and 1897.	Middle Pleistocene (?), Upland (Yarmouth)= "Sheridan"= "Equus beds"
6. *C.* sp., referred—an unusually large phalanx No. 29-7-33 in N. Mus.	Cedar Co., from gravel pit 1 mi. S. W. of Hartington, collected by E. H. Bell and W. Van Royen, U. of N., 1933.	Aftonian or Early Kansan
7. *C.* sp., referred—misc. skeletal parts No. 26-6-30 and No. 30-6-30 in N. Mus.	Cherry Co., North Prong of Middle Loup River, collected by Chas. Osborne and Louis Lukert, 1930.	Middle Pleistocene, Upland (Yarmouth)= upper "Loup River"
8. *C.* sp., referred—2 skull teeth in collection of Thompson M. Stout, Lewellen.	Garden Co., from gravels on west side of Blue Creek, 12 mi. from mouth, collected by Thompson M. Stout, N. Mus., 1932.	Early Pleistocene (?), probably Nebraskan

FAUNAL LIST	LOCATION	FORMATION
9. *C.* sp., referred—metapodial No. 24-10-14 in N. Mus.	Jefferson Co., 4½ mi. east of Reynolds, collected by E. H. Barbour and J. B. Burnett, N. Mus., 1914.	Kansan
10. *C.* sp., referred—portion of jaw No. 1-14-8-30 in N. Mus.	Lincoln Co., 12 mi. S. E. of Maxwell, collected by South Party, N. Mus., 1930.	Late Pleistocene, *Citellus* zone
11. *C.* sp., referred—misc. bones in C. M. N. H.	Nuckolls Co., from greenish colored sands and clays 1 mi. S. W. of Angus, 1932.	Upland (Yarmouth)
12. *C.* sp., referred—metapodial No. 23-3-31 in N. Mus.	Thurston Co., from gravels 3 mi. N. W. of Walthill, collected by Walthill High School, 1931.	Early Pleistocene
Genus: *Titanotylopus*		
1. *T. nebraskensis* Barbour and Schultz. Type.—an unusually large jaw No. 1-6-9-33 in N. Mus.	Webster Co., from gravel pit 8 mi. N. W. of Red Cloud, collected by S. E. Jensen, Red Cloud, and Frank Crabill, N. Mus., 1933.	Grand Island (Kansan)
Genus: *Tanupolama* (*Camelus*)		
1. *T. americanus* (Wortman), (determined Frick, 1930)—misc. jaws, teeth, etc. in Am. Mus. and F. A. M.	Sheridan Co., Hay Springs quarry, collected by field parties from Am. Mus., 1893 and 1897 and by Chas. Falkenback for F. A. M., 1928-1930.	Middle Pleistocene (Upland (Yarmouth)= "Sheridan"= "Equus beds"
2. *T.* sp., referred—phalange and premolar in F. A. M.	Brown Co., from lower sands on Sand Creek, 7 mi. N. E. of Ainsworth, collected by Morris F. Skinner for F. A. M., 1932.	Early Pleistocene
Family: **Cervidae** (Deer)		
Genus: *Odocoileus*		
1. *O. virginianus* (Zimmermann), referred—incomplete skull with antlers No. 1-11-27 in N. Mus.	Sarpy Co., from gravel pits at Meadow, collected by Howard Taylor, Louisville, 1927.	(See page 369 for age these Platte Valley gravels)
Genus: *Cervalces*		
1. *C. roosevelti* Hay, (determined, Cook, 1931)—portion of skull, collection of Mrs. Mary Jackett, Giltner.	Hamilton Co., from sand and gravel deposit near Giltner, collected by Mary Jackett, Giltner, 1912.	Grand Island (Kansan)
Genus: *Cervus*		
1. *C. canadensis* (Erxleben), referred—antler No. 28-3-31 in N. Mus.	Pawnee Co., from sand deposit in bank of Nemaha River, collected by Frank Werner, Table Rock, 1931.	(?)
2. *C. canadensis*, referred — misc, portions of antlers in N. Mus., No. 5-24-5-26; No. 8-6-11-26	Sarpy Co., from gravel pits at Meadow, collected by Howard Taylor and Henry Yongquist, Louisville, 1926; collected by John Koop, Louisville, 1926.	(See page 369 for a these Platte Valley gravels)

FAUNAL LIST	LOCATION	FORMATION
Family: **Giraffidae** (Giraffs)		
Genus: *Giraffa*		
1. *G. nebrascensis* Matthew and Barbour. Type.—jaw fragment No. 7-7-18 in N. Mus.	York Co., Bradshaw, collected by C. B. Palmer, Bradshaw, 1918.	(?)
Family: **Antilocapridae** (Pronghorns)		
Genus: *Antilocapra*		
1. *A.* cf. *americana* Ord, (determined, Matthew, 1918)—teeth, misc. bones in Am. Mus.	Sheridan Co., Hay Springs quarry, collected by field parties from Am. Mus., 1893 and 1897.	Middle Pleistocene (?), Upland (Yarmouth)= "Sheridan"= "Equus beds"
Genus: *Capromeryx*		
1. *C. furcifer* Matthew. Type.—jaw in Am. Mus.	Sheridan Co., Hay Springs quarry, collected by field party from Am. Mus., 1897.	Middle Pleistocene (?), Upland (Yarmouth)= "Sheridan"= "Equus beds"
2. *C. furcifer*—jaw No. 1-7-8-33 in N. Mus.	Sheridan Co., 17 mi. south of Rushville on Pine Creek, collected by F. W. Johnson and Chas. Osborne, N. Mus., 1933.	Middle Pleistocene (?), Upland (Yarmouth)= "Sheridan"= "Equus beds"
Family: **Bovidae** (Cattle, Sheep and Goats)		
Genus: *Symbos*		
1. *S. cavifrons* (Leidy), (determined, Barbour, 1931)—skull in H. Mus.	Clay Co., from sand pit at Spring Ranch, collected by A. M. Brooking, H. Mus.	Grand Island (Kansan)
2. *S. cavifrons*, (determined (Barbour 1931)—skull No. 4-10-95 in N. Mus.	Furnas Co., 2 mi. east of Cambridge, collected by G. A. Hobson, Cambridge, 1882.	Probably Early Pleistocene
3. *S. cavifrons*, (determined, Barbour, 1931)—skull No. 22-11-30 in N. Mus.	Gage Co., from coarse sand 6 mi. S. E. of Beatrice, collected by G. O. McClung, Homesville, 1930.	Aftonian or Early Kansan
4. *S. cavifrons*, (determined, Barbour, 1931)—skull No. 15-11-00 in N. Mus.	Jefferson Co., near Endicott, collected by M. H. Spangler, Endicott, 1900.	Kansan or Aftonian (?)
5. *S. cavifrons*, (determined, Barbour, 1931)—skull No. 20-10-04 in N. Mus.	Otoe Co., 5 mi. south of Nehawka, collected by A. M. Munn, Kansas City, Mo., 1904.	Early Pleistocene, probably Aftonian
6. *S. convexifrons* Barbour. Type.—skull No. 1-2-34 in N. Mus.	Cherry Co., North Prong of Middle Loup River, collected by Walter Jones and Verne Briggs, Mullen, 1933.	Middle Pleistocene, Upland (Yarmouth)= upper "Loup River"

FAUNAL LIST	LOCATION	FORMATION
Genus: *Bootherium*		
1. *B.* sp., (determined, Barbour, 1931)—skull No. 193-25-5-27 in N. Mus.	? Douglas Co., or near vicinity, from Lininger Art Gallery collection, 1927.	(?)
Genus: *Ovibos*		
1. *O. moschatus* (Zimmerman), (determined, Barbour, 1931)—skull 27-1-15 in N. Mus.	Sioux Co., from volcanic ash bed 7 mi. N. E. of Morrill, collected by Fred Shimbur, Morrill, 1915.	Probably Middle Pleistocene
Genus: *Ovis*		
1. *O. canadensis* Shaw, referred—incomplete skull No. 25-4-27 in N. Mus.	Chase Co., from gravel pit at Wauneta, collected by Geo. S. Metcalf, Wauneta, 1927.	Pre-Loveland, probably Grand Island (Kansan)
2. *O. canadensis*, referred—incomplete skull No. 2-2-32 in N. Mus.	Hitchcock Co., from gravel pit ½ mi. south of Culbertson, collected by G. C. Paine, Culbertson, 1932.	Early Pleistocene (?)
3. *O. canadensis*, referred—incomplete skull No. 6-12-32 in N. Mus.	Scottsbluff Co., from gravel pit between Scottsbluff and Gering, collected by O. W. Finley and W. L. Simmons, Scottsbluff, 1932.	(?)
Genus: *Bison*		
1. *B. alleni* Marsh, referred—portion of horncore No. 26-10-25 in N. Mus.	Dodge Co., from gravel pit north of Fremont, in Elkhorn River valley, collected by L. B. Lyman, Lincoln, 1925.	Probably Early Pleistocene
2. *B. angularis* Figgins. Type. incomplete skull with horncores No. 4710 in H. Mus.	Clay Co., from sand pit 3 mi. N. E. of Sutton, collected by A. M. Brooking, H. Mus. 1928.	Grand Island (Kansan)
3. *B. antiquus* Leidy—horncore in Lincoln County Historical Museum, North Platte, Nebraska.	Lincoln Co., found near Ingham, collected by Wayne Craig, Ingham, 1932.	Late Pleistocene
4. *B. antiquus*, referred—2 incomplete skulls with horncores in N. Mus. No. 3-4-5-26; No. 25-10-30.	Sarpy Co., from gravel pit at Meadow, collected by E. F. Schramm, U. of N., 1926; collected by Howard Taylor, Louisville, 1930.	(See page 369 for age of these Platte Valley gravels)
5. *B. occidentalis* Lucas, referred—incomplete skull with horncores No. 22-5-07 in N. Mus.	Custer Co., found near Broken Bow, collected by W. E. Talbot, Broken Bow, 1907.	(?)
6. *B. occidentalis*, referred—complete skull No. 1-16-7-29 in N. Mus.	Custer Co., from blue clay-marl, 24 mi. S. E. of Broken Bow, collected by Frank Crabill and C. Bertrand Schultz, N. Mus., 1929.	Probably Middle Pleistocene
7. *B. occidentalis* (determined, Barbour and Schultz, 1932)—mounted skeleton No. 1-21-11-31 in N. Mus.	Hall Co., 8 mi. S. E. of Grand Island, collected by F. G. Meserve, Northwestern University, 1922 and South Party, N. Mus., 1931.	Late Pleistocene (?)

FAUNAL LIST	LOCATION	FORMATION
8. *B. occidentalis,* referred—portion of skull with horncore No. 1-24-5-26 in N. Mus.	Sarpy Co., from gravel pits at Meadow, collected by Howard Taylor and Henry Yonquist, Louisville, 1926.	(See page 369 for age of these Platte Valley gravels)
9. *B. occidentalis,* referred —incomplete skull with horncores No. 1-4-8-25 in N. Mus.	Saunders Co., from gravel pits at Ashland, collected by E. E. Quinn and R. F. Gilder, Omaha, 1925.	(See page 369 for age of these Platte Valley gravels)
10. *B. occidentalis,* referred—collection of some thirty partial skeletons No. 10-6-32 in N. Mus. (referred to *B. oliverhayi* Figgins by Figgins, 1933).	Scottsbluff Co., from gravel and sand deposit, 16 mi. west and 3 mi. south of Scottsbluff, collected by South Party, accompanied by L. C. Eiseley, and Bob Long, N. Mus.; and R. C. Swanson, N. J. Sisty, and Gordon Graham, Scottsbluff, 1932.	Late Pleistocene
11. *B. ferox* Marsh. Type.—horncore in Yale Peabody Mus.	Region of Middle Loup River, probably Hooker or Cherry Co., collected by O. C. Marsh, 1873.	Early or Middle Pleistocene, probably Upland (Yarmouth)= upper "Loup River"
12. *B. ferox,* (referred, Frick, 1930) —skeletal parts in Am. Mus. and F. A. M.	Sheridan Co., Hay Springs quarries, collected by field parties for Am. Mus. and F. A. M., 1893-1930.	Middle Pleistocene (?), Upland (Yarmouth)= "Sheridan"= "Equus beds"
13. *B. latifrons* (Harlan), referred (determined. Hay 1927)—horncore No. 19-30-12-92 in N. Mus.	Hitchcock Co., collected by R. W. Furnas, Lincoln, 1892.	Probably Early Pleistocene
14. *B. regius* Hay, referred—portion of horncore No. 7-27-5-28 in N. Mus.	Hamilton Co., from gravel pit near Giltner, collected by C. E. Dawson, Giltner, 1928.	Grand Island (Kansan)
15. *B. rotundus* Figgins. Type.—incomplete skull with horncores No. 1187 in C. M. N. H.	Saline Co., from gravel pit S. W. of Dorchester, collected by Ottoe Chab, Dorchester, 1929.	Grand Island (Kansan)
16. *B.* sp., indet.—tooth No. 2-28-1-32 in N. Mus.	Buffalo Co., from gravel pit at Shelton, collected by E. L. Templin, Shelton, 1932.	(?)
17. *B.*, sp. indet. —teeth No. 2-28-8-22 in N. Mus.	Cass Co., from gravel pit at South Bend, collected by F. E. Hays, Lincoln, 1922.	(See page 369 for age of these Platte Valley gravels)
18. *B.* sp., indet—dorsal vertebra No. 31-12-92 in N. Mus.	Cass Co., from gravel pit on Elkhorn River at West Point, collected by Lawrence Bruner, U. of N., 1892.	Probably Early Pleistocene
19. *B.*, sp. indet.— tooth No. 1-9-5-33 in N. Mus.	Custer Co., from gravel pit 3 mi. east of Arnold, collected by D. M. Fowler, Gandy, 1933.	(?)
20. *B.*, sp. indet.— teeth No. 1-13-12-24 in N. Mus.	Dodge Co., from gravel pit at Fremont, collected by J. D. Gavenmann, Fremont, 1924.	(See page 369 for age of these Platte Valley gravels)
21. *B.*, sp. indet.— teeth No. 27-9-16 in N. Mus.	Gage Co., from sand deposit at Fisk's Lake 2½ mi. west of Wymore, collected by A. B. Coleman, U. of N., 1916.	(?)

FAUNAL LIST	LOCATION	FORMATION
22. *B.*, sp. indet.—misc. teeth, No. 10-11-33 in N. Mus.	Gosper Co., 7 mi. south of Lexington, collected by A. B. Sheldon, Lexington, 1933.	Soil zone between Loveland loess and Peorian loess (?)
23. *B.*, sp. indet.—teeth No. 2-25-11-19 and No. 3-25-11-19 in N. Mus.	Hall Co., from gravel pit south of Grand Island, collected by Carl Haphold, Grand Island, 1919.	(?)
24. *B.*, sp. indet.—incomplete jaw No. 3-1-6-19 in N. Mus.	Lancaster Co., found near Princeton, collected by Phillip Matthews, Princeton, 1919.	Probably Early Pleistocene
25. *B.*, sp. indet.—misc. teeth No. 1-30-10-33 in N. Mus.	Lincoln Co., from gravel pit 2 mi. S. W. of North Platte, collected by Russell Langford, North Platte and C. Bertrand Schultz, N. Mus., 1933.	(?)
26. *B.*, sp. indet.—jaw No. 2-8-4-25 and portion of skull with teeth No. 3-8-4-25 in N. Mus.	Red Willow Co., from gravel pit 5 mi. west of McCook, collected by J. F. Cordeal, McCook, 1925.	(?)
27. *B.*, sp. indet.—4 teeth No. 5-13-6-33 in N. Mus.	Red Willow Co., from gravel pit 1 mi. west of Indianola, collected by A. L. Davidson of Indianola, Thompson M. Stout and C. Bertrand Schultz, N. Mus., 1933.	(?)
28. *B.*, sp. indet.—jaws No. 1-6-11-26, No. 2-6-11-26, No. 17-11-26 in N. Mus.	Sarpy Co., from gravel pits at Meadow, collected by John Koop, Louisville, 1926.	(See page 369 for age of these Platte Valley gravels)
29. *B.*, sp. indet.—tooth No. 11-1-25 in N. Mus.	Saunders Co., from gravel pit at Ashland, collected by A. W. Jacobs, Ashland, 1925.	(See page 369 for age of these Platte Valley gravels)
30. *B.*, sp. indet.—misc. teeth and skeletal parts No. 1-18-8-33 in N. Mus.	Sioux Co., 18 mi. N. W. of Crawford, collected by South Party, accompanied by Thompson M. Stout, Bob Long and Loren Eiseley, N. Mus., 1933.	Probably Late Pleistocene

MUSEUM NOTES

CONCERNING HUMAN PALEONTOLOGY

A discussion of the problem of "Pleistocene Man" in Nebraska was omitted in this paper. The results of six years' work upon this problem will be reported upon in a forthcoming bulletin by Erwin H. Barbour and C. Bertrand Schultz. This report will consider over three hundred "Folsom-Yuma" artifacts (dart-points and tools) from some twenty-five counties in Nebraska. This study of the artifacts has been made with three purposes in mind: (1), to acquire any paleontological or geological evidence which might aid in a definite dating of the deposits in which the artifacts were found; (2), to determine the geographic distribution of these artifacts in Nebraska and adjacent territory; and (3), to determine the materials of which these artifacts were made and the possible source areas of the materials.