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THE MUSK-OXEN OF NEBRASKA

Erwin Hinckley Barbour

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THE NEBRASKA STATE MUSEUM

ERWIN H. BARBOUR, *Director*

THE MUSK-OXEN OF NEBRASKA

BY ERWIN HINCKLEY BARBOUR

The remains of no less than eight fossil musk-oxen are already known in Nebraska, of which one is preserved in the Museum at Hastings, Nebraska, and seven in the State Museum at Lincoln. This is a large number to be recorded in any one state. As late as 1891 authors wrote that but two examples of musk-oxen were known in the United States, one from Kentucky, and one from Arkansas, if, indeed, they be valid species. Now that pioneer days are well behind this commonwealth, and that there is a growing sentiment for exploration and proper display of the State's resources, it is a safe assumption that many more will be found and recorded. That the remains of creatures so thoroughly boreal should be found far south of the arctic circle, their natural, barren, frigid, and rocky range, is ascribable to the great glacial age. These animals moved southward with the vast, invading ice sheet, and followed it northward in its grand retreat. They frequented the borders of the great ice fields and it is not mere coincidence, then, that their relics occur here, and further southward. In a like manner, during this age of frigidity, other mammals migrated far south of their natural habitat. The remains of walrus have been reported as far south as New Jersey and even Georgia, the caribou in New England, and Symbos, an extinct musk-ox, has been trailed from Alaska south to Arkansas, and in Europe to southern France.

The more notable animals inhabiting the arctic zone at present are the barren ground caribou, the musk-ox, both being typically boreal, arctic fox, wolf, wolverine, polar bear, arctic hare, wood-chuck, or marmot, and the lemming. The flora and fauna of the musk-ox habitat are counted sparse and impoverished. The musk-ox, *Ovibos*, is an immigrant of Eurasiatic origin, along with the moose, wapiti, caribou, rocky mountain "goat", and the black bear. All known musk-oxen are Pleistocene in age.

The work of assembling these specimens, and the publication of this bulletin, were made possibly by funds for Palaeontological Research in Nebraska donated by Mr. Hector Maiben.

Contemporaries of the fossil musk-oxen were mastodon, mammoth, horse, elk, Cervalces (the deer-moose), the Irish elk, several species of bison, reindeer, giant beaver, walrus, peccaries, and the strange South American immigrants, the giant sloths, such as Megatherium, Mylodon, Megalonyx, and the giant armadillo, Glyptodon.

The sub-family Ovibovinae, musk-oxen, is the connecting link between the Caprinae, sheep and goats, and the Bovinae, oxen. Ovinae, or sheep, are their closest living allies, a relationship properly expressed by the composite generic term Ovibos. The various appellatives, musk-ox, musk-sheep, and musk-buffalo, are based on the unexplained musky odor emitted alike by young and old, whether male or female, at any season, and present even in the tough flesh of the males. Musk-oxen cannot be traced back of the Pleistocene period, but during that time they ranged the glaciated regions of Europe, Siberia, Asia, and North America.

The position of the musk-oxen in the great family of bovines is shown in the following classification:

Order ARTIODACTLYA, the even-toed ungulates.

Family Bovidae, antelopes, sheep, goats, chamois, bovines, etc.

Sub-family, Ovibovinae, musk-oxen, comprising the following five genera:

- (1) Preptoceras, Pleistocene, North America, Pacific Coast only.
- (2) Euceratherium, Pleistocene of North America, Pacific Coast.
- (3) Symbolos, Pleistocene of North America.
- (4) Bootherium, Pleistocene of North America.
- (5) Ovibos, Musk-ox, Arctic Asia, Europe, and North America, Pleistocene to the present.

Of the five above mentioned genera, three are found in Nebraska; namely, Symbolos, Bootherium, and Ovibos. Preptoceras and Euceratherium are restricted to the Pacific Coast. Ovibos is the only surviving member of the group known as the musk-oxen, or Ovibovinae.

THE SUB-FAMILY, OVIBOVINAE, THE MUSK-OXEN THE GENUS PREPTOCERAS

Preptoceras, though undoubtedly a member of the Ovibovinae, or musk-oxen, bore a rather striking resemblance to common cattle, as may be seen in the accompanying illustra-

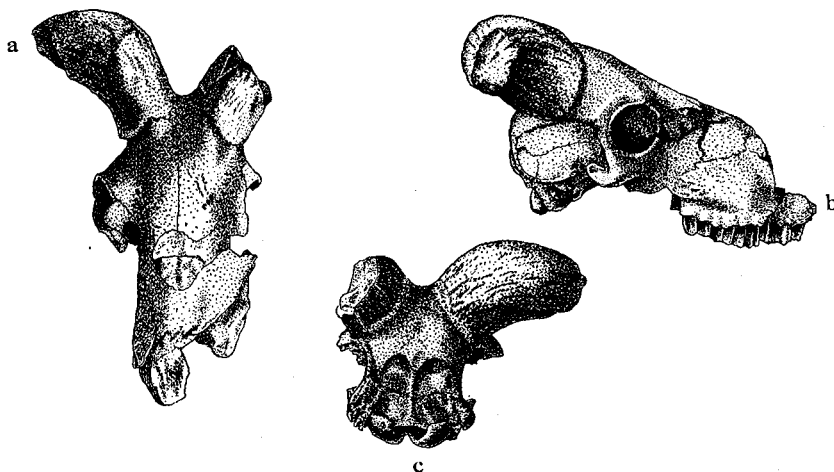


Fig. 135.—*Preptoceras* sp. an ovibovine, or musk-oxen, from the Pleistocene deposits of Samwel Cave, Shasta County, California. Three views of the skull. $\times 1/9$. a, front view, b, side view, c, back view. Modified after Stock and Furlong.

tion. The type specimen of *Preptoceras* was found in the Pleistocene deposits of Samwel Cave, Shasta County, California. In its relationships *Preptoceras*, like *Euceratherium*, is considered to be close to the modern musk-ox, *Ovibos*, but less so to the bovidae, such as antelope, sheep, goats, and cattle, even though outwardly resembling the latter.

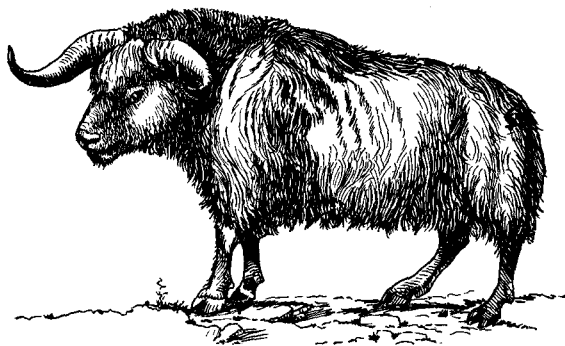


Fig. 136.—*Preptoceras* sp. one of the musk-oxen, restored. Pleistocene, California. Modified after Scott.

THE GENUS EUCERATHERIUM

The type specimen of *Euceratherium*, like that of *Preptoceras*, was found in the Pleistocene deposits of Samwel Cave, Shasta County, California. In its relationships *Euceratherium* seems to be allied closely to the musk-ox, *Ovibos*, and, rather remotely, to cattle, antelopes, goats, and sheep.

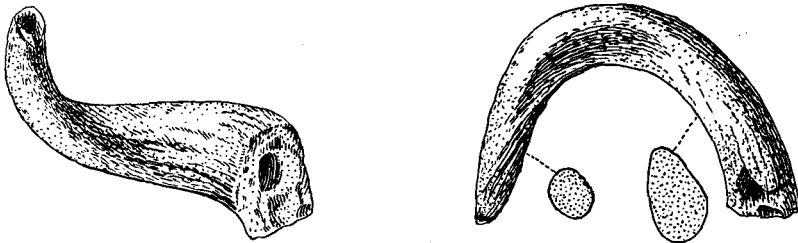


Fig. 137.—*Euceratherium* sp. Right horn core, two views with cross-sections. $\times \frac{1}{8}$. Specimen in the Museum of the University of California. Modified after Stock and Furlong.

THE GENUS SYMBOS

The genus *Symbos* is characterized by a skull having an elongated facial portion and a rough, massive, cranial part, bearing broad, powerful horn cores. The horn cores, which are noticeably flattened above, but growing rounder toward the tips, dip downward and forward. Between their bases is a broad fossa, or concavity, extending up and down the forehead. Covering the forehead is a rough, thick, pitted, bony growth called the exostosis. In the case of *Symbos*, the exostosis of either horn meets, and coalesces completely, with that of the other. This is unlike the case in *Ovibos*, in which the two exostoses are always separated directly upon the median line of the skull, as shown in figures 147, 148, 149. The exostosis in *Symbos* extends from the occipital crest to, or beyond, the orbits. The orbits in *Symbos* are not so protruding as those of *Ovibos*, which are veritable tube-eyes. The mandible and the lower dentition of *Symbos* are unknown as yet.

SYMBOS IN NEBRASKA

The following musk-oxen, representing three genera, have been found in Nebraska, and are arranged according to the counties where found. The known teeth of the fossil musk-ox are similar to those of the living musk-ox, *Ovibos moschat-us*, but are somewhat longer.

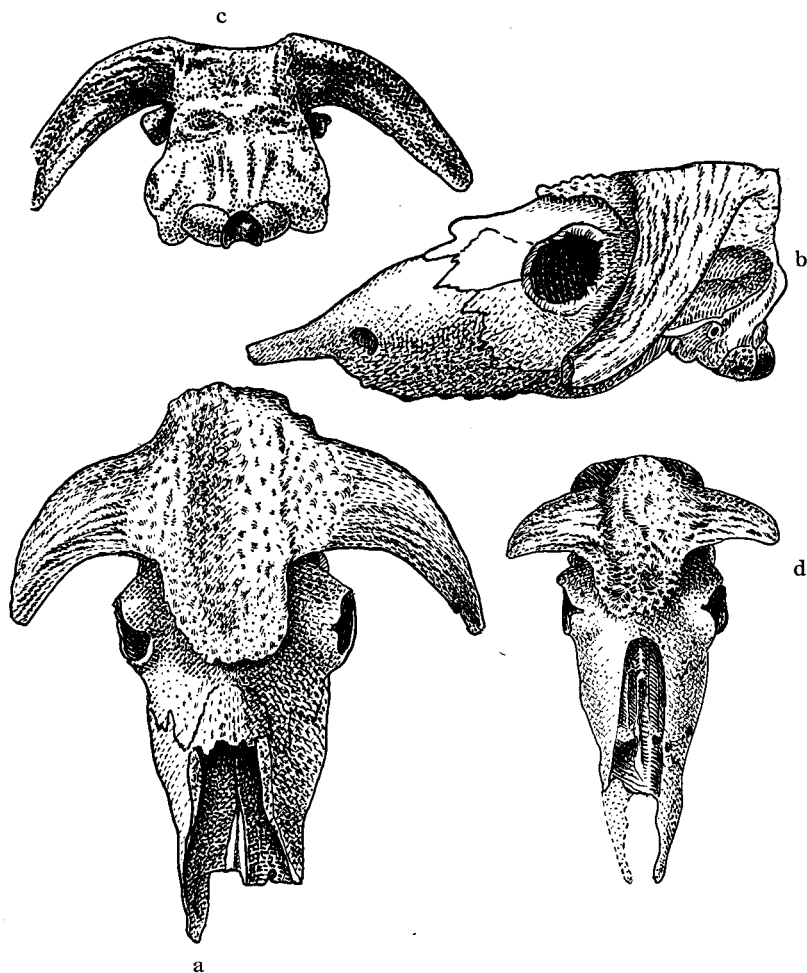


Fig. 138.—*Symbos cavifrons* and *Symbos tyrrelli*.

- a. *Symbos cavifrons*, male, from Porter County Indiana. Skull, with strong, flattened horns and heavy, pitted exostosis covering the forehead. This is the best-known and best-preserved specimen of the genus. Preserved in the American Museum of Natural History. Introduced for comparison with local forms. $\times \frac{1}{8}$.
- b. Same, side view.
- c. Same, occipital view.
- d. *Symbos* (*Scaphoceros*) *tyrrelli*, crown view of the skull of a long, slim-faced musk-ox, possibly a distinct species. The skull may be that of a female. Figures are redrawn and modified after Hay.

The finest skull of *Symbos cavifrons* discovered, as yet, is that found in 1904, at Hebron, Porter County, Indiana, and preserved in the American Museum of Natural History, New York City. The habitat of this species was the edge, or foot, of the Wisconsin glacier, which it followed as the ice lobe retreated northward. See figure 138, a, b, c. This specimen is valuable for purposes of comparison with Nebraska examples of this genus. *Symbos*, (*Scaphoceros*) *tyrrelli*, a very long, slim-faced form from the Yukon region, may be the female of *Symbos cavifrons*, as suggested by Hay. See figure 138d.

MEASUREMENTS OF THE SKULL OF THE SYMBOS FROM
PORTER COUNTY, INDIANA

From occipital condyles to hinder end of maxillo-premaxillary articulation, 478 mm.
From occipital protuberance to front of maxilla, 557 mm.
From hinder border of exostosis to fronto-nasal suture, 275 mm.
From rear of occipital condyles to front of hinder nares, 263 mm.
Width at mastoid region, 200 mm.
Width at hinder end of temporal fossae, 134 mm.
Width at rear of orbits, 252 mm.
Width across occipital condyles, 118 mm.
Width across the zygomatic arches, 211 mm.
Width of hinder end of basi-occipital, 72 mm.
Height of skull from bottom of condyles to hinder border of exostosis, at midline, 223 mm.
Height of occipital crest above bottom of condyles, 180 mm.
Height of front of exostosis above alveolar border, 228 mm.
Height of hinder end of nasals above alveolar border, 195 mm.
Length of exostosis, on midline, 267 mm.
Width of concavity of exostosis taken at middle of base of horn-cores, 125 mm.
Depth of concavity of exostosis, taken as above, 36 mm.
Fore-and-aft diameter of base of horn-cores, 118 mm.
From tip to tip of horn-cores, as preserved, 525 mm.
Length of horn-cores, as preserved, 225 mm.
Diameter of orbit, 63 mm.
Length of tooth series, as shown by alveoli, 182 mm.

SYMBOS CAVIFRONS, No. 31-12-91.

The first specimen of the extinct genus of musk-ox, *Symbos cavifrons*, secured by the Nebraska State Museum, is from an old collection of scattered mammalian fossils of the State, but from what county it comes, or by whom found and donated, is unknown. The base of the skull and both horns are intact, but the facial portion and the dentition are missing, as is commonly the case. The skull is from a large individual, as the accompanying measurements will show.

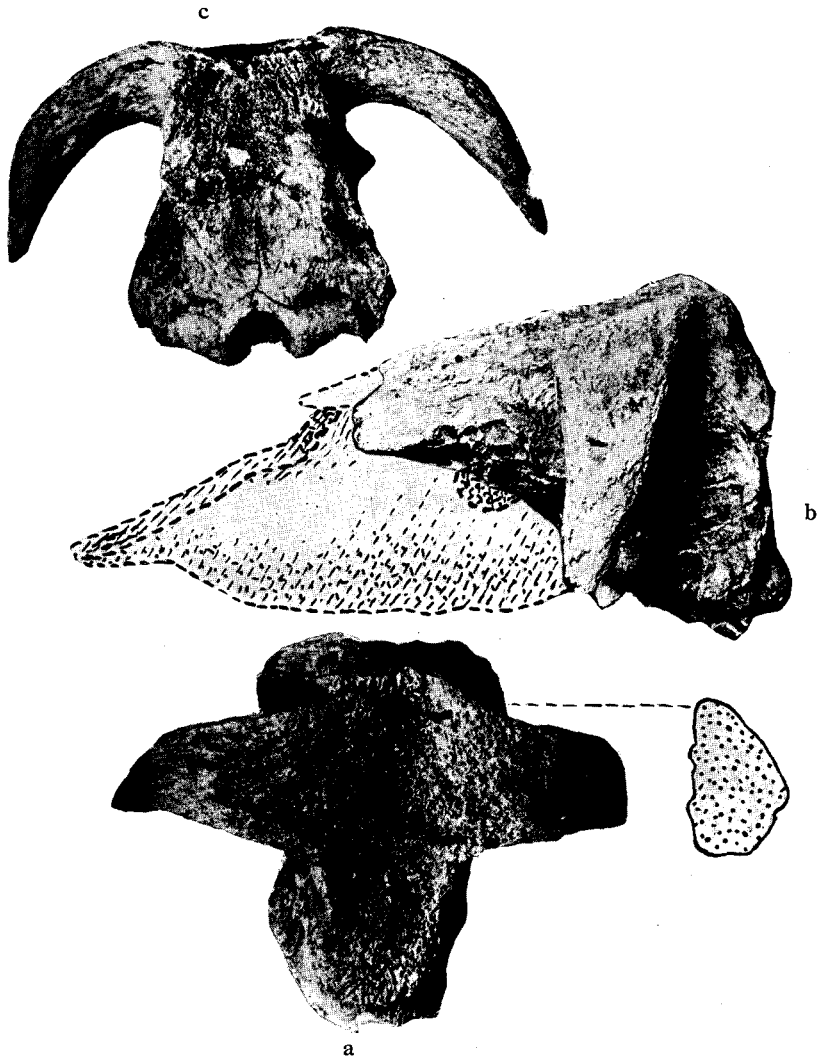


Fig. 139.—*Symbolos cavifrons*. No. 31-12-91. The Nebraska State Museum. One-sixth natural size.
a. Crown, view, with section at base of horn core.
b. Side view.
c. Occipital view.

MEASUREMENTS of the above specimen No. 31-12-91.

- Length from condyle to fronto-nasal suture, $13\frac{3}{8}$ in. (350 mm.).
 Length from middle of occipital crest to fronto-nasal suture, $11\frac{1}{2}$ in. (292 mm.).
 Height from bottom of condyles to top of exostosis, 9 inches (229 mm.).
 Height from bottom of condyles to crest, 6 in. (153 mm.).
 Width at level of occipital crest, $5\frac{1}{8}$ in. (130 mm.).
 Width at constriction near orbits, 4 in. (100 mm.).
 Diameter at base of horn core, fore and aft, 5 in. (125 mm.).
 Diameter of base of horn core, vertical, 2 in. (51 mm.).
 Length of horn core along hinder border, $11\frac{1}{2}$ in. (292 mm.).
 Distance between tips, $16\frac{1}{2}$ in. (420 mm.).
 Across condyles, $4\frac{3}{4}$ in. (121 mm.).
 Foramen magnum, vertical, $1\frac{1}{2}$ in. (40 mm.).
 Foramen magnum, horizontal, $1\frac{3}{4}$ in. (44 mm.).

THE FURNAS COUNTY, OR CAMBRIDGE MUSK-OX

SYMBOS CAVIFRONS, No. 4-10-95

This specimen of fossil musk-ox, *Symbos cavifrons*, was found in an excavation on the line of the Burlington Railroad, two miles east of Cambridge, Furnas County, in 1882. It was presented in 1895 to the Nebraska State Museum by Dr. G. A. Hobson of Cambridge, University of Nebraska, Class of 1884, and is the first skull with a complete record. Unfortunately the horns were broken off by boys, but they have been restored. The cranial portion, that of a large individual, is well preserved.

MEASUREMENTS OF THE FURNAS COUNTY SYMBOS

No. 4-10-95

- Height from bottom of condyles to top of exostosis, 9 in. (228 mm.)
 Height from bottom of condyles to occipital crest, 7 in. (177 mm.)
 Width at level of occipital crest, $5\frac{1}{8}$ in. (130 mm.)
 Width at mastoid region, $8\frac{1}{2}$ in. (130 mm.)
 Diameter of base of horn core, fore and aft, $5\frac{1}{8}$ in. (130 mm.)
 Foramen magnum, vertical, $1\frac{1}{2}$ in. (38 mm.)
 Foramen magnum, horizontal, $1\frac{3}{4}$ in. (46 mm.).

THE JEFFERSON COUNTY, OR ENDICOTT MUSK-OX,

SYMBOS CAVIFRONS No. 15-11-00

This specimen was found near Endicott, Jefferson County, Nebraska, and was donated by M. H. Spangler, November, 1900. It is badly damaged, and but a few measurements are possible. The exostosis is unusually rough, and the animal must have been an old and large individual. The foramen magnum and the basicranial elements are missing, and the roof of the brain case is exposed. The depression of the fore-head is very oblique.

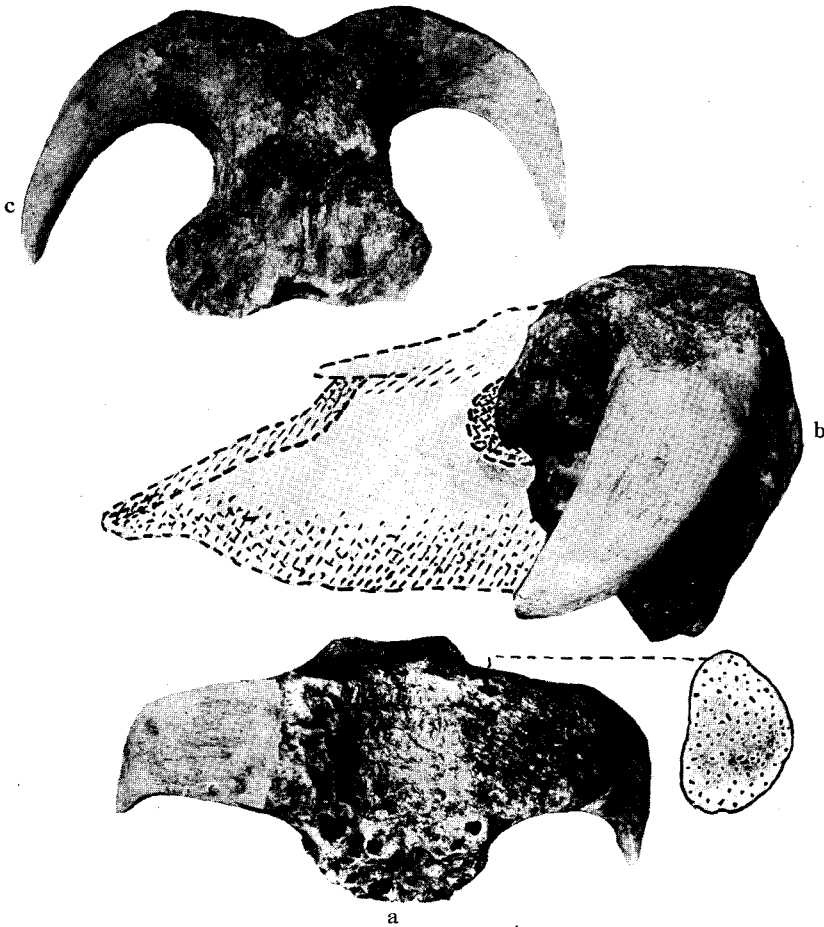


Fig. 140.—*Symbos cavifrons*, Cambridge, Furnas County, Nebraska.
Specimen No. 4-10-95, The Nebraska State Museum.
a. Crown view, $\times 1/6$. Horn cores largely restored.
b. Same, side view, showing section at the base of the horn core.
c. Same occipital view $\times 1/6$.

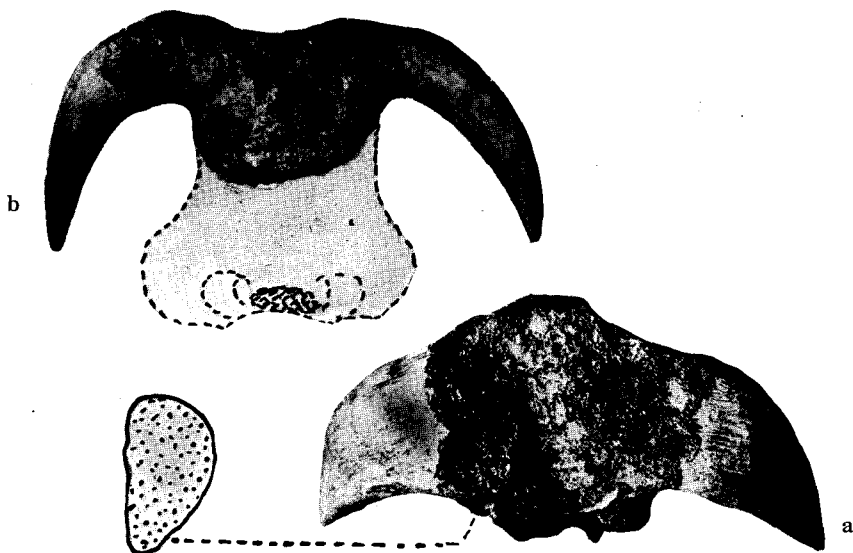


Fig. 141.—Skull of *Symbolos cavifrons*, from near Endicott, Jefferson County, Nebraska. Specimen No. 15-11-00. The Nebraska State Museum. $\times 1/6$.

a. Same, crown view, with section of horn core.

b. Same, occipital view.

MEASUREMENTS OF THE JEFFERSON COUNTY SYMBOLOS,
No. 15-11-00

Width at level of occipital crest, $5\frac{1}{2}$ in. (140 mm.)
Diameter at base of horn core, fore and aft. $4\frac{3}{4}$ in. (122 mm.)
Diameter at base of horn core, vertical 3 in. (75 mm.)
Maximum depression of forehead, $1\frac{1}{4}$ in. (32 mm.)

THE OTOE COUNTY, OR NEHAWKA MUSK-OX

SYMBOLS CAVIFRONS No. 20-10-04

This specimen of *Symbolos* was found fifteen miles north-west of Nebraska City, in Otoe County, or five miles south of Nehawka. It was secured from a depth of thirty-two feet below the surface, in a well on the farm of Eugene Munn, donor of the specimen. It consists of the cranial portion of the skull, with horns attached. It is firm, hard, and well-preserved, and all features of the occiput and the basi-cranial region are perfect.

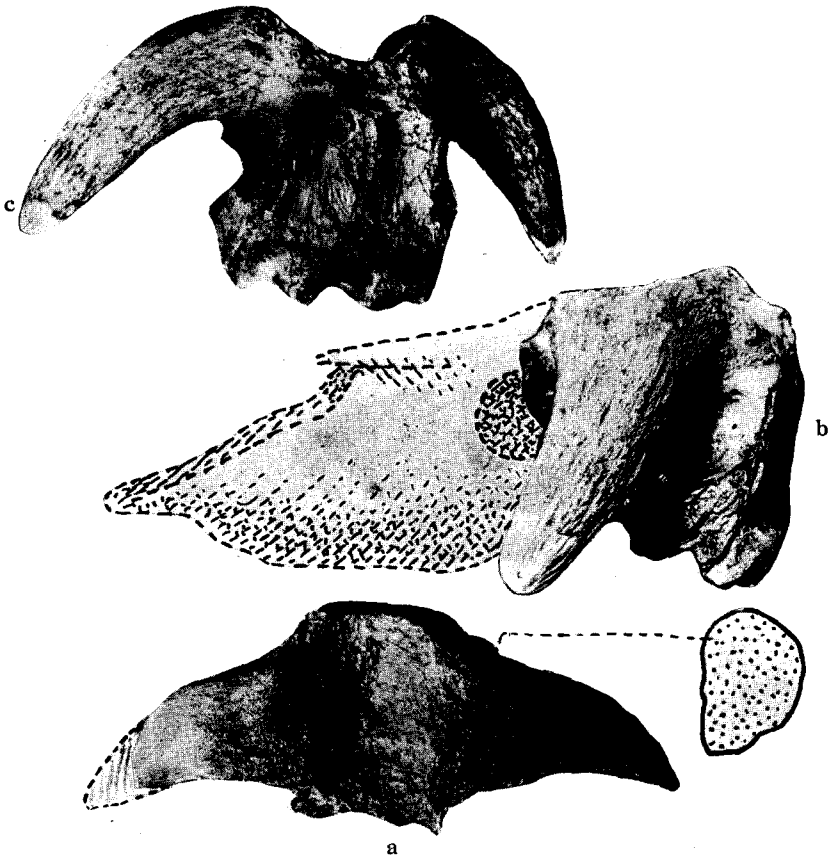


Fig. 142.—*Symbos cavifrons*, the Otoe County musk-ox No. 20-10-04, The Nebraska State Museum. $\times 1/6$.

- a. Same, crown view, showing section at the base of the horn core.
- b. Same, side view.
- c. Same, occipital view.

MEASUREMENTS OF THE OTOE COUNTY SYMBOS, No. 20-10-04.

Height from bottom of condyles to top of exostosis, $7\frac{3}{8}$ in. (185 mm.)

Height from bottom of condyles to occipital crest, $6\frac{1}{2}$ in. (165 mm.)

Width at level of occipital crest, $4\frac{7}{8}$ in. (123 mm.)

Width at mastoid region, 7 in. ? (176 mm.)

Diameter of base of horn cores, fore and aft, 5 in. (127 mm.)

Diameter of base of horn core, vertical, 3 in. (77 mm.)

Length of horn-core along hinder border, $10\frac{3}{4}$ in. (274 mm.) approximately.

Distance between tips of horn cores, $17\frac{1}{2}$ in. (445 mm.)

Depth of concavity $2\frac{1}{4}$ in. (58 mm.)

Width of concavity, 4 in. (102 mm.)

Foramen magnum, vertical, $1\frac{3}{8}$ in. (36 mm.)

Foramen magnum, horizontal, $1\frac{1}{2}$ in. (38 mm.)

Across condyles, $5\frac{1}{4}$ in. (134 mm.)

THE GAGE COUNTY, OR BEATRICE, MUSK-OX,

SYMBOS CAVIFRONS No. 22-11-30

The Gage County skull of *Symbos cavifrons* was found in coarse gravel twelve feet below the surface on the farm of Mr. G. O. McClung, four miles east and two miles south of Beatrice. It is a medium sized skull with parts of the eye orbits and the base of the nasals preserved. The tips of the horn cores are missing.

MEASUREMENTS OF THE GAGE COUNTY SYMBOS No. 22-11-30.

Length from condyle to fronto-nasal suture, 12 in. (302 mm.)

Length from middle of occipital crest to fronto-nasal suture, $10\frac{3}{4}$ in. (263 mm.)

Height from bottom of condyles to occipital crest, $5\frac{1}{2}$ in. (140 mm.)

Width at level of occipital crest, $4\frac{7}{8}$ in. (123 mm.)

Width at mastoid region, $8\frac{1}{8}$ in. (207 mm.)

Width at rear of orbits, $3\frac{1}{2}$ in. (89 mm.)

Width at front of orbits, 4 in. (100 mm.)

Diameter at base of horn core, fore and aft, 4 in. (100 mm.)

Diameter of base of horn core, vertical, $2\frac{3}{4}$ in. (66 mm.)

Across condyles, $4\frac{1}{2}$ in. (115 mm.)

Foramen magnum, vertical, $1\frac{3}{8}$ in. (34 mm.)

Foramen magnum, horizontal, $1\frac{3}{8}$ in. (34 mm.)

THE SPRING RANCH, OR CLAY COUNTY MUSK-OX

SYMBOS CAVIFRONS, No. 4-10-30

This specimen, loaned for study by Mr. A. M. Brookings, Director of the Hastings Museum, was found by Levi Whitcomb in a sand pit at Spring Ranch, Clay County, Nebraska, and was consigned by him to the Hastings Museum. The cranial parts of this skull are well preserved, including the

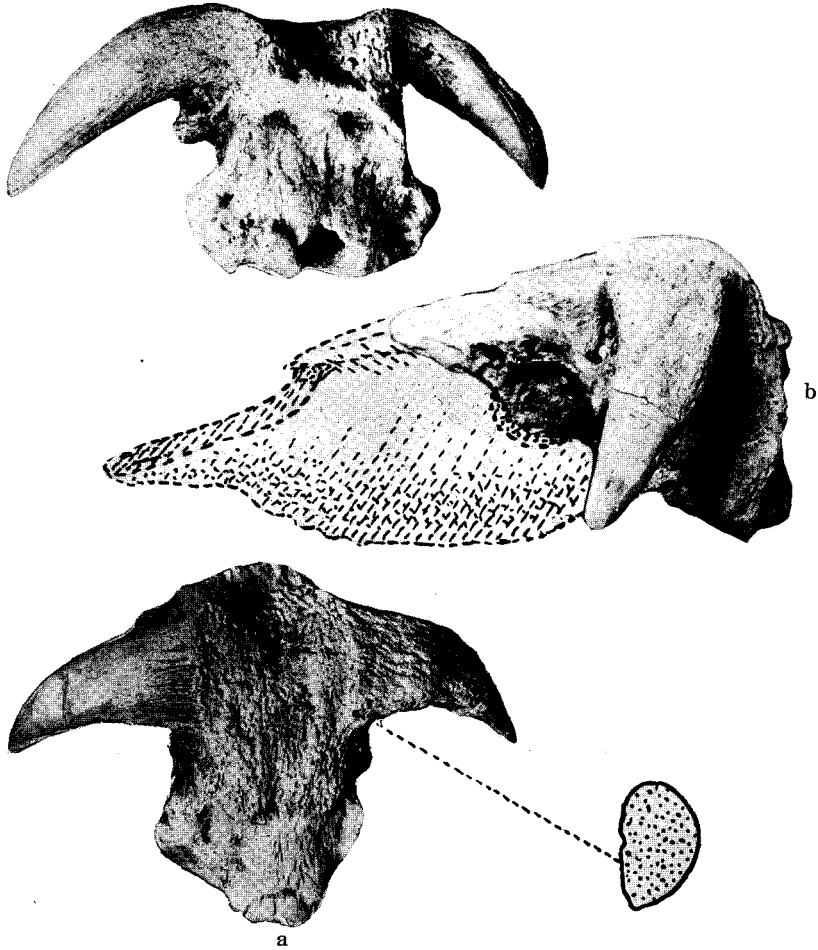


Fig. 143.—*Symbolos cavifrons*, three views of the Gage County skull, No. 22-11-30, The Nebraska State Museum. $\times 1/6$.
a. Same, crown view, showing section at the base of the horn core.
b. Same, side view.
Palaeontological collections of Hector Maiben, the Nebraska State Museum.

eye orbits and horns. It is not as large and coarse as some specimens, but the concavity of the forehead is noticeably deep, $1\frac{1}{4}$ inches (31 mm.). The horn cores incline downward and but slightly forward.

MEASUREMENTS OF THE CLAY COUNTY SYMBOS.

- Anterior-posterior diameter eye orbit, 3 in. (76 mm.)
- Across condyle, $4\frac{1}{4}$ in. (109 mm.)
- Foramen magnum, vertical, $1\frac{1}{4}$ in. (31 mm.)
- Foramen magnum, horizontal, $1\frac{1}{2}$ in. (39 mm.)
- Length from condyle to fronto-nasal suture, $11\frac{1}{2}$ in. (291 mm.)
- Length from middle of occipital crest to fronto-nasal suture, $10\frac{1}{8}$ in. (258 mm.)
- Height from bottom of condyles to top of exostosis, $6\frac{7}{8}$ in. (174 mm.)
- Height from bottom of condyles to occipital crest, $5\frac{3}{8}$ in. (136 mm.)
- Width at level of occipital crest, $4\frac{1}{8}$ in. (105 mm.)
- Width at mastoid region, $7\frac{7}{8}$ in. (194 mm.)
- Width at constriction rear of orbits, $3\frac{7}{8}$ in. (98 mm.)
- Width at front of orbits, $3\frac{7}{8}$ in. (98 mm.)
- Diameter of base of horn core, fore and aft, $x/3\frac{5}{8}$ in. (92 mm.)
- Diameter at base of horn core, vertical, $2\frac{1}{2}$ in. (64 mm.)
- Length of horn core hinder border, 10 in. Estimated. (255 mm.)
- Concavity of forehead, $1\frac{1}{2}$ in. (37 mm.)
- Width, $3\frac{1}{4}$ in. (83 mm.)
- Length, $7\frac{1}{2}$ in. (91 mm.)
- Extreme width across eye orbits, 9 in. (230 mm.)
- Occipital crest to top of exostosis, $1\frac{7}{8}$ in. (46 mm.)
- Diameter of skull at constriction back of orbits, 4 in. (100 mm.)
- Diameter of skull below horn cores, $5\frac{5}{8}$ in. (119 mm.)
- Diameter of eye orbit, 3 in. (76 mm.)
- Condyle to front of orbit, 10 in. (255 mm.)
- Exostosis, very thick, $1\frac{1}{4}$ in. (31 mm.)
- Tip of horn cores broken off.

THE GENUS BOOTHERIUM

This very rare musk-ox, *Bootherium bombifrons*, was discovered at Big Bone Lick, Kentucky and has been known, hitherto, by a single damaged skull shown in figure 145. The skull is smaller and much more trim than either *Symbos* or *Ovibos*, and was mistaken for a female, presumably of *Symbos*. It is now known, however, to be a different genus; the horns were smaller and were round in section; they were not broadened at their bases to cover the forehead, and there were no bony growths, or exostoses, covering the latter. The affinities of *Bootherium* seem to be with the sheep and goats. Two views of the type specimen are introduced for comparison with the *Bootherium* from Nebraska.

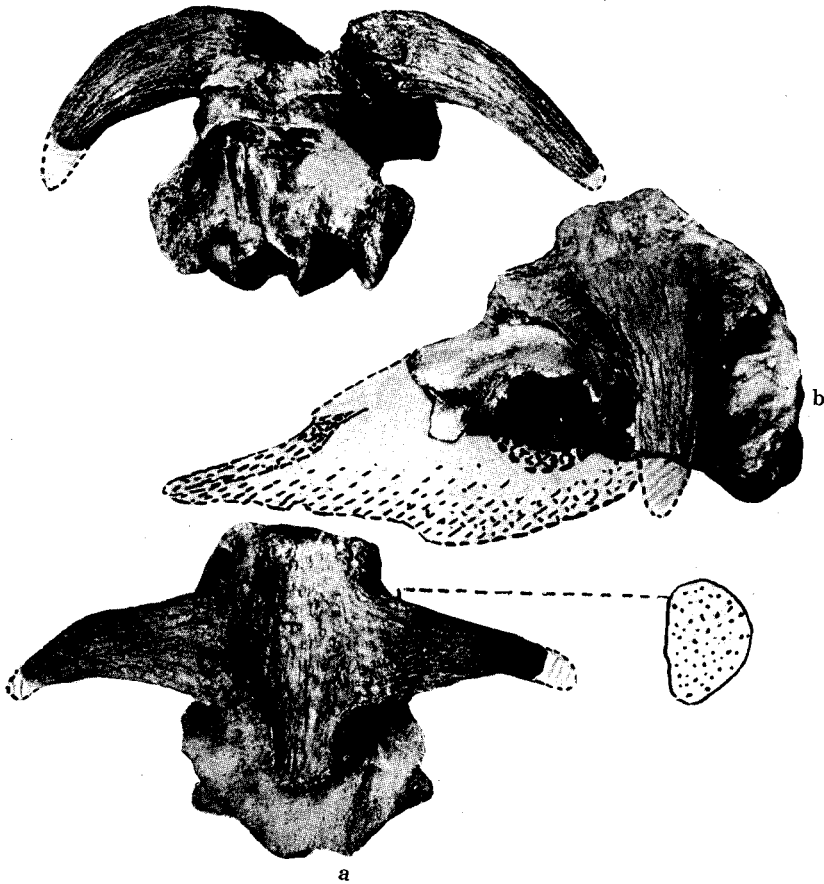


Fig. 144.—*Symbolos cavifrons*, Spring Ranch, Clay County, Nebraska No. 4-10-30. From a cast in the collections of Hector Maiben, the Nebraska State Museum. The original is preserved in the Hastings Museum, Hastings, Nebraska. x 1/6.
 a. Crown view, showing section at the base of horn core.
 b. Side view.
 c. Same, occipital view.

MEASUREMENTS OF SKULL OF BOOTHERIUM BOMBIFRONS

By O. P. Hay

- Length from occipital condyles to notch for the nasals, 263 mm.
 Length from occipital crest to notch for the nasals, 240 mm.
 Height of the occipital crest above lower border of the occipital condyles, 137 mm.
 Width of skull at the occipital crest, 117 mm.
 Width of skull at the ear-opening, 170 mm.
 Width of face at rear of the orbits, 180 mm.
 Diameter of the orbit, fore and aft, 80 mm.
 Circumference of base of horn-core, 225 mm.
 Diameter of base of horn-core on plane of face, 70 mm.
 Diameter of base of horn-core at right angle to preceding, 67 mm.
 Length of horn-core along the upper curve, 225 mm.
 Distance between tips of horn-cores, 440 mm.
 Distance between bases of horn-cores, 150 mm|

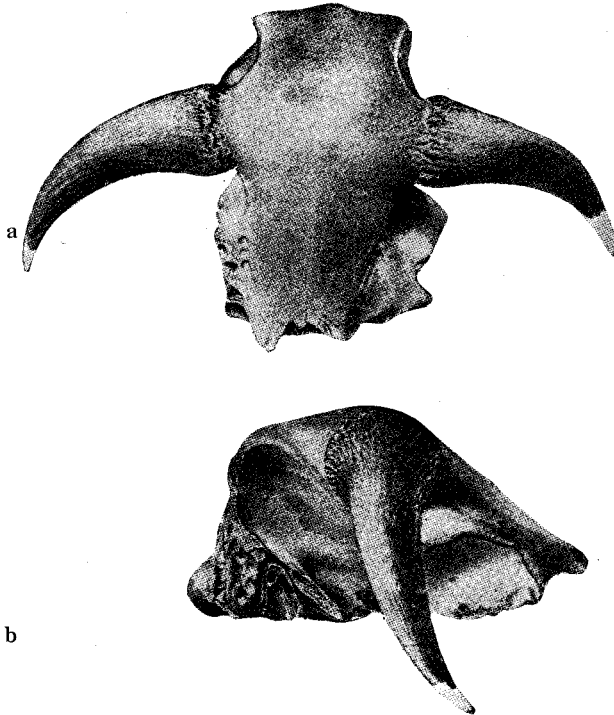


Fig. 145.—Skull of *Bootherium bombifrons*. Smooth and with no exostosis. Unlike *Symbos* and *Ovibos*, the horns are circular in section. Academy of Natural Science, Philadelphia.
 a. Crown view.
 b. Side view.

BOOTHERIUM IN NEBRASKA
 THE DOUGLAS COUNTY (?) BOOTHERIUM
 No. 193-25-5-27

The skull of *Bootherium* sp. indt. was discovered unexpectedly in a collection of Nebraska fossils made years ago by Mr. Lininger of Omaha, and was procured of his estate. Being a man of influence and affluence Mr. Lininger built a large private art gallery by his home, and

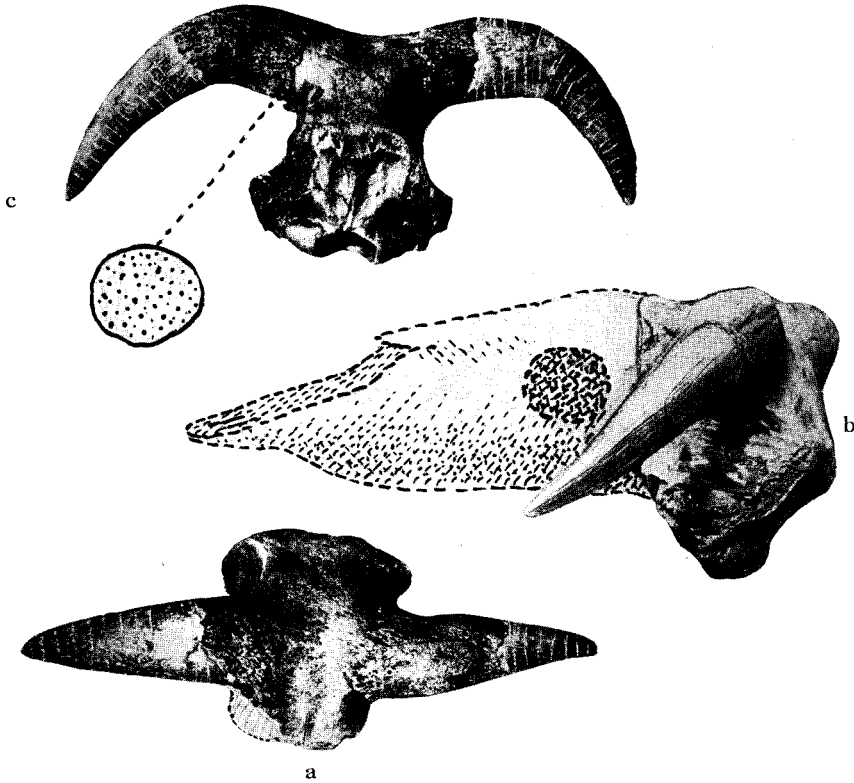


Fig. 146.—*Bootherium* sp. indt. No. 193-25-5-27. The Nebraska State Museum, x 1/6.

a. Crown view.

b. Side view, parietals not steeply inclined to the frontals, as in *Bootherium bombifrons*.

c. Occipital view, showing a section at the base of the horn core.

provided rooms for a private museum. For many years this private art gallery and museum, which was of much more than local importance, attracted people for miles around, and his friends in Douglas County contributed specimens freely to his museum. It may be that this important specimen was found in the vicinity of Omaha. The cranial portion of the skull is finely preserved. The horns, unfortunately, were damaged, but have been restored. In section the horn cores are circular, being deeply corrugated on the under side. See figure 146.

MEASUREMENTS OF THE DOUGLAS COUNTY (?) BOOTHERIUM
No. 193-25-5-27.

Foramen magnum, vertical diameter, $1\frac{1}{2}$ in. (46 mm.)
 Transverse diameter, $1\frac{3}{4}$ in. (32 mm.)
 Across condyles, $4\frac{7}{8}$ in. (105 mm.)
 Length from condyle to fronto-nasal suture, $8\frac{1}{2}$ in. (215 mm.)
 Length from middle of occipital crest to fronto-nasal suture, $6\frac{3}{4}$ in. (178 mm.)
 Height from bottom of condyles to occipital crest, $4\frac{3}{4}$ in. (120 mm.)
 Width at level of occipital crest, $3\frac{1}{2}$ in. (89 mm.)
 Width at mastoid region, $6\frac{1}{2}$ in. (165 mm.)
 Width at rear of orbits, $3\frac{3}{8}$ in. (87 mm.)
 Diameter of base of horn cores, fore and aft, $2\frac{7}{8}$ in. (78 mm.)
 Diameter of base of horn core, vertical, $2\frac{3}{4}$ in. (70 mm.)
 Across condyles, $4\frac{1}{8}$ in. (104 mm.)

THE GENUS OVIBOS

OVIBOS MOSCHATUS, THE LIVING MUSK-OX

The outstanding feature of the living musk-ox, *Ovibos moschatus*, is its long, strong, upturned horns, with their bases immoderately developed so as to cover the entire forehead, excepting a long, deep, narrow groove along the middle line. This is a distinguishing characteristic in the fossil forms, as well as in the living. *Symbos* lacks the median groove of *Ovibos*. The horns present a coarse, fibrous, even prismatic structure, especially at the bases in old males, while the horns of the young males, and the females, are less coarse and much smaller. The hoofs are unsymmetrical, the outer one being rounded, the inner one somewhat pointed. In point of size musk-oxen are about as large as yearling-cows, though very stocky, heavy bodied, and short-legged. The total length of males varies from six to eight feet. The height at the withers varies from four to five feet, so they are creatures of good size, weighing eight hundred to nine hundred pounds, the average being about six hundred pounds. They present



Fig. 147.—*Ovibus moschatus*, the modern musk-ox, showing heavy fore-quarters; strong up-turned horns, broadened at the base and covering the forehead, but never confluent; heavy coat of wool and coarse, long hair, with a fringe of long hair on the sides reaching well to the ground, and with a light colored saddle near the rump. Male.

Photographed from a specimen in the Nebraska State Museum.
No. 4-20-8-29.

a shaggy appearance, for the body is covered with a dense coat of long, matted wool, which is well overlaid by a thatch of long, coarse, straight hair adapting them for their rough life and the severe climate they endure. A long, flowing fringe of hair sometimes hangs down a foot or more on their sides. They are gregarious, and herd together in flocks of twenty or thirty, and in their actions are described as sheep-like. The living musk-ox feeds upon grass, which it prefers, along with moss, lichens, and the shoots of pines and willows. Its precursors presumably had similar life habits. Of the various musk-oxen recorded, *Ovibus moschatus* is the sole survivor, and its fossil forms seem identical with the living. Both bear the same name.

The flesh of well-conditioned young animals is reported to be more tender, and of better flavor than beef, and is naturally nutritious. That of old males is declined even by Indians and

Eskimos because of its rank, musky flavor and odor. Musk-oxen are a hardy race, and subsist easily upon the natural herbage of the Arctic. Domestication is counted easy and practicable and as far south as New York City they have been kept successfully in roomy zoological gardens for a decade or more. According to all reports, however, they do not breed in captivity, and in their native state breed slowly, some say in alternate years. They are further characterized by their ox-like form, short neck, small ears, and rudimentary tail, but three and one-half to four inches long. The head is as large, practically, as that of the domestic cow. In the case of domesticated cattle the end of the muzzle is bare, while that of the musk-ox is covered with hair to the very margins of the mouth and nostrils.

In point of numbers the musk-ox never flourished as did the bison, with which they were contemporaneous. Nevertheless, it is known to have been abundant and to have roved practically all the northern half of North America. These widely distributed herds are estimated to have comprised over a million individuals. They are now restricted to a strip of arctic territory extending westward from Hudson Bay to the McKenzie River, within several hundred miles of Alaska, and their present estimated number is between 10,000 and 15,000. Herds still live in eastern Greenland where they were first discovered in 1869. When the Eskimos began to lay down the primitive bow and arrow for the gun, rapid dissipation of the surviving herds was greatly feared. Musk-oxen fall an easy prey to the long range rifle, for they are not migratory or roving in habit, but graze quietly in a given area, like domesticated cattle, and are easily approached. When driven to extremity and forced to make a stand, the weaker and more defenseless members of the herd, such as the cows and the calves, crowd together, while about them is thrown a defensive barricade of strong-horned bulls facing outward. They hold this position, according to reports, until the last creature falls, and the slaughter is complete. The Canadian government stands opposed to the extermination of all such herds, and has legislated for their protection and conservation, so the race is likely to be saved.

Since 1917 the musk-ox has enjoyed the full protection of the Canadian Government under the Northwest Game Act. Hunting permits are not granted at any season, not even for scientific purposes, and poaching is prevented as far as possible. Strict enforcement of such protective measures



Fig. 148.—Skull of *Ovibus moschatus*, the living musk-ox, from the photograph of a specimen No. 1-1-31. The Nebraska State Museum.

- a. Same, crown view, showing the great protruding eye orbits, and the powerful horns, greatly expanded at the base and showing rough prismatic structure at their bases.
- b. Same, side view.
- c. Same, occipital view.

Photographs by U. G. Cornell.

can scarcely fail to show a favorable reaction in these herds. Photographs of musk-ox herds confirm the reports of Arctic explorers that the number of young is unaccountably small, due, perhaps, to the numerous packs of wolves, and to wolverines, or to the inclemencies of the weather suffered by the young calves. Musk-oxen are avowedly a remarkable race, and naturalists, on humanitarian, and sentimental grounds as well, shudder at its extermination.

Economically, they are considered a potential source of meat, hides, tallow, and wool, and the rehabilitation of herds so well adapted to boreal conditions means that broad, barren and rocky Arctic wastes may be reclaimed and utilized.

MEASUREMENTS OF THE SKULL OF OVIBOS MOSCHATUS,

No. 1-1-31.

- Length from condyle to fronto-nasal suture, 10 $\frac{3}{8}$ in. (264 mm.)
 Length from middle of occipital crest to fronto-nasal suture, 9 $\frac{3}{8}$ in.
 (225 mm.)
 Height from bottom of condyles to top of exostosis, 6 $\frac{1}{2}$ in? (165
 mm.)
 Height from bottom of condyles to top of exostosis, 5 $\frac{1}{2}$ in? (140
 mm.)
 Width at level of occipital crest, 5 in. (127 mm.)
 Width at mastoid region, 7 $\frac{1}{8}$ in. (180 mm.)
 Width at constriction rear of orbits, 5 $\frac{1}{4}$ in. (133 mm.)
 Width at front of orbits, 6 in. (151 mm.)
 Horns tip to tip, 25 inches. (660 mm.)
 Total expansion of horn, fore and aft, 9 in. (228 mm.)
 Base of horn, 6 in. (152 mm.)
 Across condyles, 4 $\frac{1}{4}$ in. (107 mm.)
 Width across eye orbits, 10 in. (254 mm.)
 Eye orbit diameter, 2 $\frac{1}{4}$ in. (57 mm.)
 Total length of skull, 20 in. (508 mm.)

THE MUSK-OX, OVIBOS IN NEBRASKA

OVIBOS MOSCHATUS, THE SIOUX COUNTY MUSK-OX

No. 27-1-15

Of the genus *Ovibos* but one example is recorded in the faunal list of the State. It was found in a bed of volcanic dust, pumicite, at a depth of eight feet, during the digging of an irrigation ditch seven and one-half miles northeast of Morrill, Sioux County, Nebraska, on the ranch of Fred L. Young, University of Nebraska, Class of Ex.-'05.

The base of the skull is well preserved, including occiput, basicranial elements, and the right and left exostoses, which are deeply separated on the middle line. Both horn cores are broken off close to the skull, but admit of measurement.

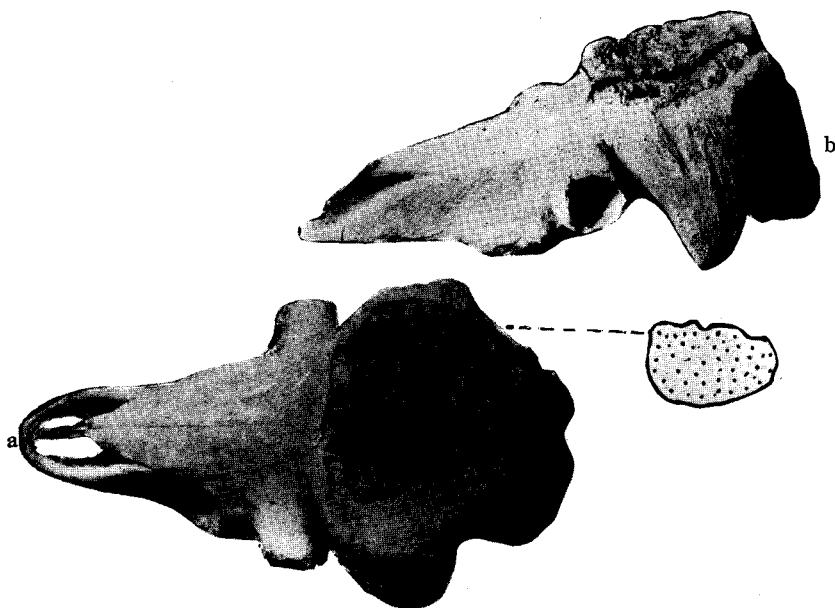


Fig. 149.—*Oribus moschatus*. Fragmentary skull, found in a bed of pumicite, 7 miles south of Morrill, Sioux County, Nebraska.
a. Crown view with a section at the base of the horn core.
b. Same, side view.
Specimen No. 27-1-15. x 1/6.

The University of Nebraska,
Lincoln, Nebraska, December, 1931.