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## Nebraska Fossils Which Excite Common Inquiry

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# NEBRASKA GEOLOGICAL SURVEY

ERWIN HINCKLEY BARBOUR, State Geologist

VOLUME 4

PART 22

NEBRASKA FOSSILS WHICH EXCITE COMMON  
INQUIRY

BY

ERWIN H. BARBOUR



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## NEBRASKA FOSSILS WHICH EXCITE COMMON INQUIRY

BY ERWIN H. BARBOUR

This paper must not be mistaken for a report on the fossils of Nebraska. It is merely a circular letter to correspondents describing and figuring those fossils only which occasion frequent comment. In two recent papers of the Survey consideration was given to the common minerals and rocks of Nebraska, and it seems opportune to briefly discuss our fossils in a like manner. Probably no other State can boast of such a well-preserved and varied fauna.

The Tertiary, the most recent of the great geologic ages, includes six subdivisions, and extends over a period of several million years, according to geologic reckoning. By reference to the list below one can readily associate the fossils mentioned in this report with the geologic age in which they occurred:

	6. Present	
	5. Pleistocene	Recent
	4. Pliocene	One-half million years ago
Tertiary	3. Miocene	One-half to one million years ago
	2. Oligocene	One to two million years ago Bad land formation
	1. Eocene	Two to three million years ago Wanting in Nebraska

### CHALK SHELLS, FORAMINIFERA.

Chalk is abundant at Superior, Niobrara, and at certain intermediate points. It is composed of minute shells, some of them whole,

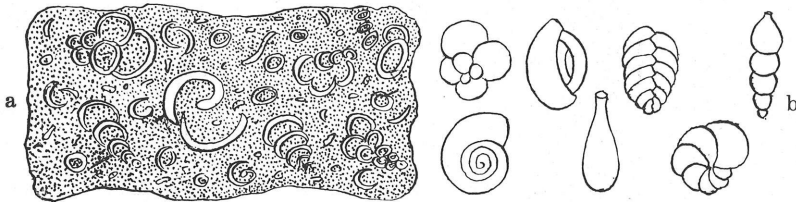


Fig. 1.—Chalk and chalk shells. a, section of chalk rock as seen under the microscope; b, chalk shells, greatly magnified.

some of them broken. They are seldom visible to the eye, although a few attain considerable size. Our chalk beds are of marine origin.

## "FOSSIL RICE," FORAMINIFERA.

The most abundant fossil in Nebraska is unquestionably the "rice shell," *Fusulina secalica*, which resembles a grain of rice in shape and size. Portions of the Nebraska Coal Measures are solid masses of these shells. Such rock is called "rice stone." The foundations of the old University buildings, the old Lincoln Post Office, and the Capitol are all built of rice stone.

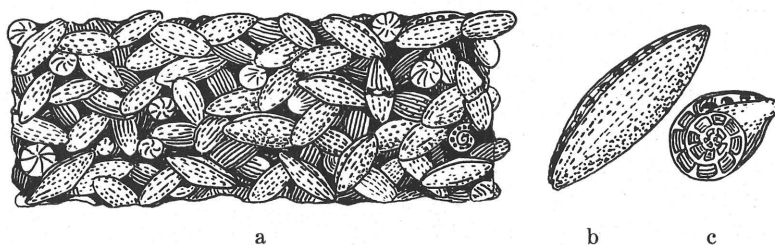


FIG. 2.—*Fusulina secalica*. a, "rice stone," characteristic of the Carboniferous formation, natural size; b, *Fusulina*, enlarged; c, cross section of the same, enlarged.

## SPONGES, AMBLYSIPHONELLA.

One kind of fossil sponge is abundant in the Carboniferous rocks and shales of the Weeping Water valley. It resembles coarsely jointed crinoid stems. In 1891, the State Museum secured several hundred specimens near Weeping Water. They are also found at Nehawka in considerable numbers.



Fig. 3.—*Amblysiphonella*, a Carboniferous sponge from the Weeping Water valley. Reduced.

## CORALS.

Corals in Nebraska are confined to the Carboniferous rocks. The most abundant forms are those called horn corals, or "petrified horns." One of the determining characters of a coral is the cup with its radiating lines. The large horn corals, so abundant in the Weeping Water valley, are known by the name *Campophyllum*. The small horn corals are called *Lophophyllum*. Occasional pieces of "organ pipe" coral are found. At Nehawka, certain limestone ledges are composed wholly of horn corals, and some of the stone fences are literally coral fences. Corals have always been important rock-building animals.

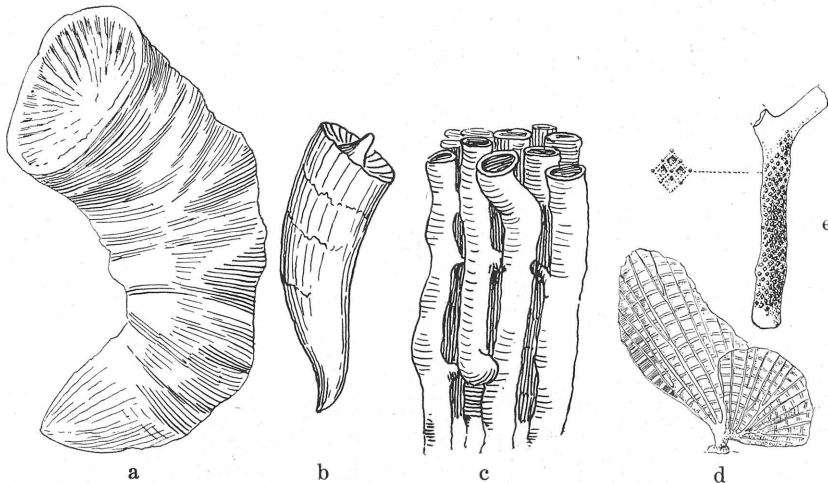


FIG. 4.—Carboniferous corals and corallines. a, *Campophyllum torquium*, horn coral, reduced; b, *Lophophyllum profundum*, a small horn coral; c, *Siringopora multattenuata*, organ-pipe coral; d, *Rhombopora lepidodendroides*, a branched coralline (bryozoan); e, *Septopora*, windowed coralline. b, c, d, and e are natural size.

## CORALLINES.

Many miniature corals, really Bryozoa, occur in our Carboniferous shales and limes. There are many species, but for the purpose of this paper, they may be divided into the branched or ramose, and the windowed or fenestrated corallines. In Nebraska, these corallines always signify the Carboniferous formation. They added materially to our great beds of limestone.

## CRINOIDS.

Crinoids are close relatives of the starfish and sea urchins. They grow on stems, much like a lily, and are spoken of as "sea lilies," "stone lilies," and the like. Crinoid stems are mostly round and composed of a number of stony drums set one above the other. Rock layers composed of crinoid stems and heads are called "crinoidal limestone." In some cases, it is fine enough for ornamental purposes, and is polished and sold as crinoidal marble. Some of our great masses of limestone are composed essentially of disjointed crinoids.

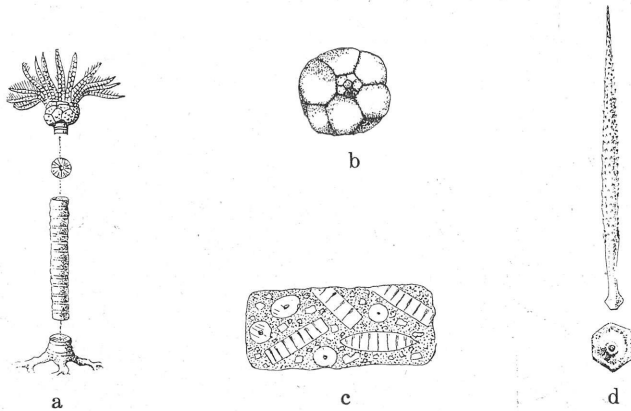


Fig. 5.—Crinoids and sea urchins. a, crinoid stump, stem, and head, *Erisocrinus*; b, base of crinoid head, *Barycrinus*; c, crinoidal limestone; d, spine and plate of sea urchin, *Echinocrinus*. All reduced.

## SEA URCHINS.

Sea urchins, like crinoids, are closely related to the starfishes. Fossil sea urchins, like their survivors, have rounded bodies composed of bony plates carrying spines of various sizes and shapes. So far no Nebraska sea urchin has been found intact, although the scattered plates and spines are numerous.

## FOSSIL WORM TUBES.

Our Carboniferous worm tubes are small and rather inconspicuous, yet they have attracted considerable notice because they look like small spiral shells, generally attached to some larger shell. They belong to the genus *Spirorbis*. A much larger worm tube, *Serpula tenuicarinata*, is found in the Cretaceous of northeastern Nebraska, commonly attached to some large shell like the *Ammonite*.

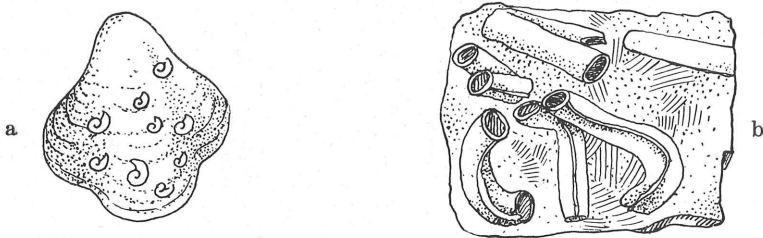


Fig. 6.—Worm tubes. a, *Spirorbis* growing on a lamp shell, Carboniferous; b, *Serpula tenuicarinata*, Cretaceous. Both natural size.

#### MOLLUSCOID SHELLS.

As the name implies, molluscoids are similar to mollusks, but are generally smaller, and have one valve differing more or less from the other, and ordinarily have a hole or opening in the beak. These shells are called Brachiopods, or popularly "lamp shells." They are so abundant in certain strata that they constitute the entire rock mass from which it is evident they were important rock-builders.

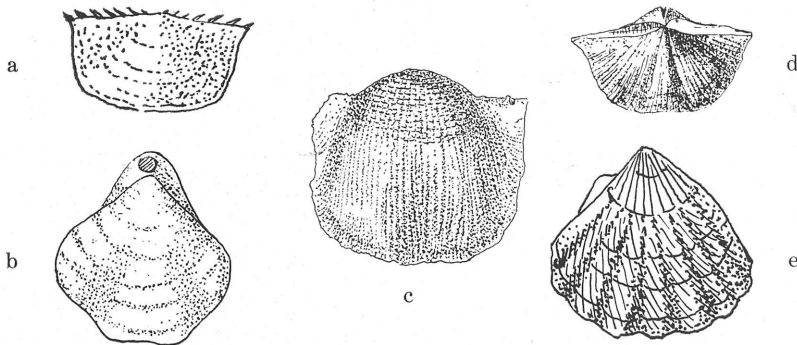


Fig. 7.—Carboniferous brachiopod shells. a, *Chonetes granulifer*, natural size, abundant; b, *Composita subtilita*, natural size, very abundant; c, *Productus semireticulatus*, abundant at Roca, reduced; d, *Spirifer cameratus*, butterfly shell, reduced; e, *Meekella striatocostata*, natural size.

#### MOLLUSK SHELLS.

The best known mollusk shells are bivalves such as clams and oysters, and univalves such as snails. Bivalve shells are abundant in the Carboniferous of southeastern Nebraska. The largest of these is called the Pinna, or wing shell, which closely resembles living forms in shape and size. The clam shell in the Carboniferous which at-



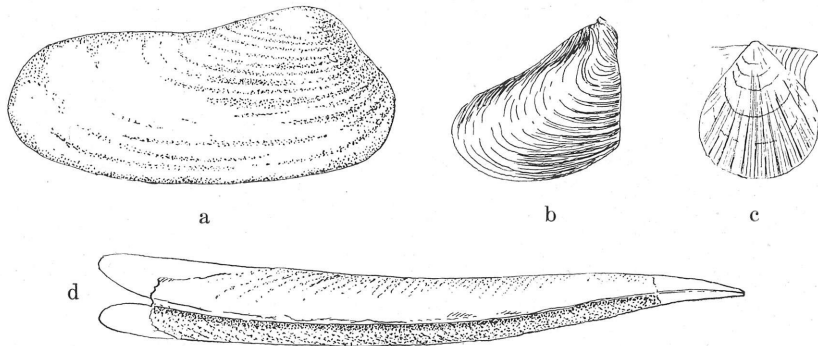


Fig. 8.—Carboniferous bivalves. a, *Allorisma subcuneatum*; b, *Myalina recurvirostris*; c, *Aviculopecten occidentalis*; d, *Pinna peracuta*. All reduced.

tracts most attention is called *Allorisma*. There are deposits of "oyster shells" in our Cretaceous limestones which are so extensive and continuous that they are called "oyster beds." These shells occur in great numbers at Hebron, Milford, Wynot, and intermediate points, wherever the thick overlying soil is removed and the Greenhorn limestone exposed. They belong to the genus *Inoceramus*. The miniature oyster, called *Ostrea congesta*, grows closely together in large clusters. Their resemblance to oysters is such that their identification is easy.

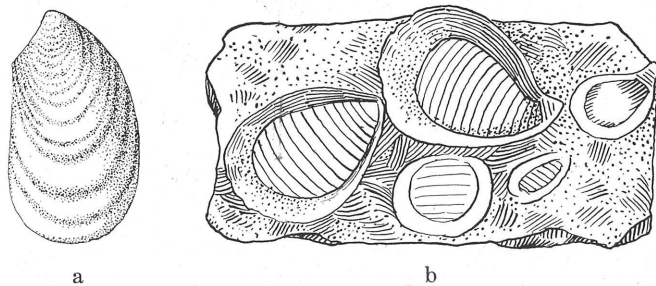


Fig. 9.—Cretaceous bivalves. a, *Inoceramus labiatus*,  $\times\frac{1}{4}$ , Greenhorn limestone; b, *Ostrea congesta*, a small oyster, natural size.

#### UNIVALVE SHELLS, GASTROPODS.

In addition to the common bivalve shells, there are certain univalve shells of attractive outline, and of varying sizes and shapes. Many of these may be likened in general appearance to the shells of snails and periwinkles. *Euomphalus* is abundant at Roca, while *Beleroophon* is frequently found in southeastern Nebraska.

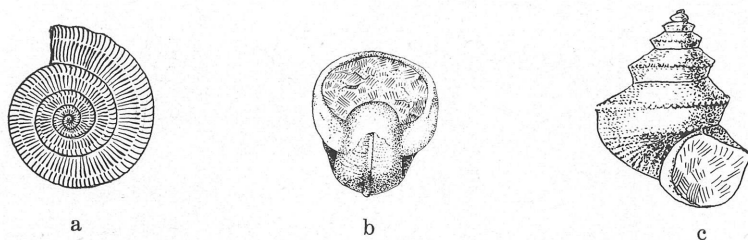


FIG. 10.—Carboniferous univalves. a, *Euomphalus*; b, *Bellerophon*, view of aperture; c, *Worthenia*. All about natural size.

#### NAUTILOID SHELLS.

The commonest nautiloid shell in Nebraska is *Orthoceros*, the “straight-horn” shell. The name suggests the form, and its identification is easy. A closely related shell is coiled, and is known as *Nautilus*. Nautiloids, though similar to ammonoids, have much simpler suture lines.

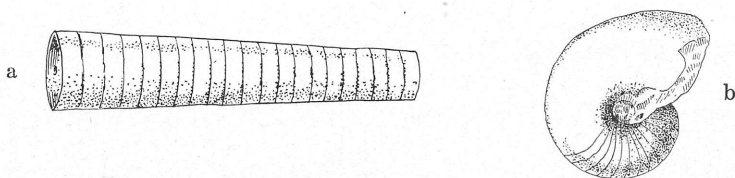


FIG. 11.—Carboniferous Nautiloid shells. a, *Orthoceros*, the “straight horn” shell,  $\times \frac{1}{2}$ ; b, *Nautilus*, greatly reduced.

#### AMMONOID SHELLS.

Shells belonging to the Ammonite group have highly sinuous, dove-tailed suture lines. Ammonites occur abundantly in the Pierre shale. The following illustrations give a good idea of the commonest members of this remarkable group, which are specialized mollusks. Ammonites were closely coiled shells of great beauty, and from a few inches to two to three feet or more in diameter. Scaphites or boat shells are common.

The Baculite or cane shell has occasioned more correspondence than all the other shells together, partly because it occurs in such numbers, and partly because it is so generally mistaken for a fish. It is popularly called “petrified fish” because of its fish-like form, and the beautiful pearly or nacreous lustre resembling the play of colors seen on the scales of fish. Inspection will show that it is really a shell.

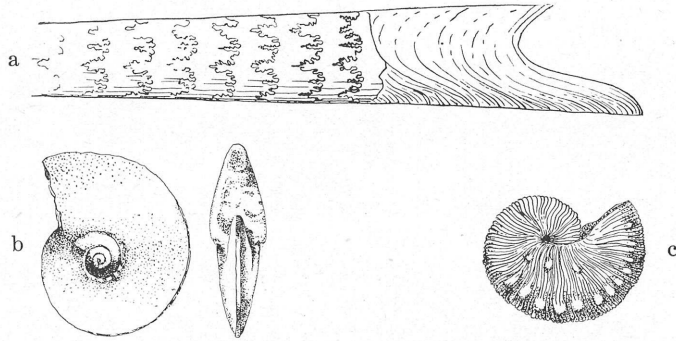


FIG. 12.—Characteristic Cretaceous shells, Pierre Shale. a, cane shell, *Bacculites compressus*, known locally as “petrified fish,” very abundant; b, Ammonite, *Placenticeras placenta*; c, boat-shell, *Scaphites nodosus*. All greatly reduced.

#### FOSSIL FISH.

In our oldest formation, the Carboniferous, the fishes are essentially sharks, although recently a few bony fishes have been found near Nemaha. The skeletons of sharks were more or less cartilaginous and perished, while their teeth were hard and enduring, which may explain why so many sharks' teeth and so few of their bones are found. In the Niobrara formation, in addition to many sharks, there were numerous bony fish. Accordingly, scales and bones, as well as teeth, are common.

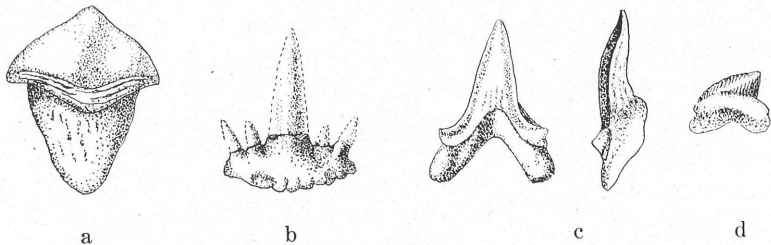


Fig. 13.—Shark teeth. Carboniferous forms: a, *Petalodus alleghaniensis*, reduced; b, *Cladodus occidentalis*, reduced; Cretaceous forms: c, *Lamna sulcata*, front and side, x  $\frac{1}{2}$ ; d, *Corax falcatus*, x  $\frac{1}{2}$ .

#### FOSSIL REPTILES

The remains of certain large swimming saurians, especially Mososaurs, are not uncommon in our Cretaceous deposits. Ancient crocodiles range from our Oligocene to the Pliocene, and small lizards are

found in our bad lands. However, the only reptile occurring in sufficient numbers to attract general notice is the turtle. There are thousands of them in the Oligocene bad lands, and many in the Miocene and Pliocene. Some of the land tortoises were of large size. Concretions are also very common, and some of them closely simulate turtle shells. However, inspection will show symmetrical arrangement in the case of the turtle shell, and lack of it in the imitative concretion.

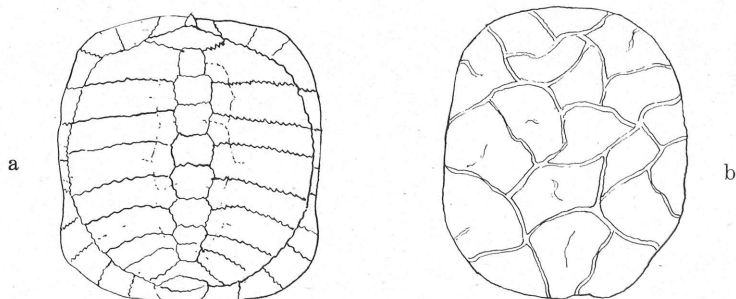


Fig. 14.—Fossil turtle and imitative concretion. a, *Styemys nebrascensis*, the commonest turtle of our bad lands, x 1/6, modified after Hay; b, concretion often mistaken for a fossil turtle, note differences.

#### FOSSIL MAMMALS

The bone beds of Nebraska are among the richest in the world, and have attracted collectors from the greatest institutions of America and Europe. Some of these institutions keep collectors here the year around. However, only a few mammalian fossils attract general attention, such as titanotheres, oreodons, rhinoceroses, horses, hogs, bovines, mastodons, mammoths, camels, deer, and carnivores.

#### OREODONS.

The Oreodon is the commonest fossil mammal in our bad lands, their skulls and bones being found in great numbers. The Oreodons were herbivorous animals about the size of the domestic sheep. They are most easily identified by their teeth, which have no spaces between and are characterized by sharp, double crests. Eight or ten skulls have frequently been found in a space no larger than the floor of an ordinary room.

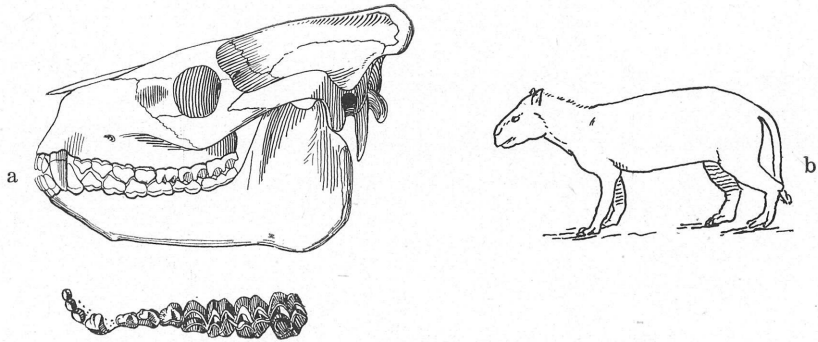


Fig. 15.—*Oreodon culbertsoni*. a, skull, jaw, and teeth,  $\times \frac{1}{3}$ . This is the commonest skull in our bad lands; b, restoration modified after Osborn.

#### TITANOTHERIUM

The Titanotherium, or giant beast, was the largest animal of the bad lands. The teeth of these creatures are angular and cutting, and very large. They were herbivorous animals of elephantine size. Their skull, teeth, and skeletons have been sought by all museums and universities.

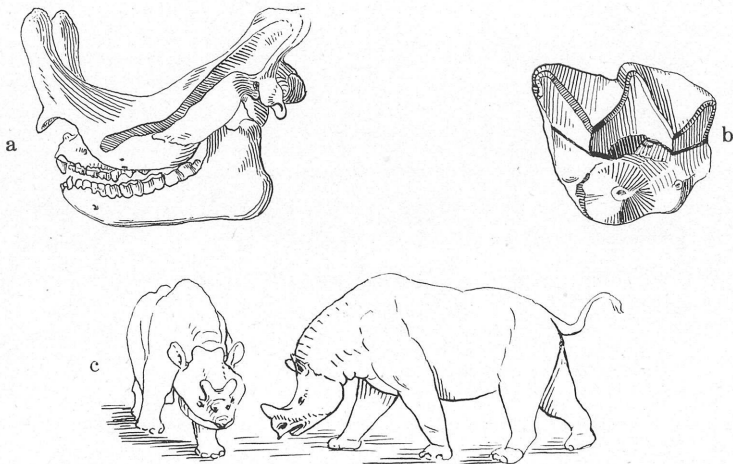


Fig. 16.—Titanotherium, a gigantic two-horned mammal found in the Nebraska bad lands. a, skull and jaw; b, tooth; c, *Titanotherium robustum* fighting, modified after Scott. All greatly reduced.

## CAMEL.

America is the home of the camel, as well as that of the horse and rhinoceros. The camels of Oligocene time, *Poebrotherium*, were small creatures about the size of the deer. In the Miocene, there were many kinds and sizes from the small gazelle camel, *Stenomylus*, to the larger *Procamelus*, and the sharp-toed camel, *Oxydactylus*. The maximum size was reached in *Alticamelus*, the giraffe camel of the Pliocene and Pleistocene, which stood about fifteen feet high.

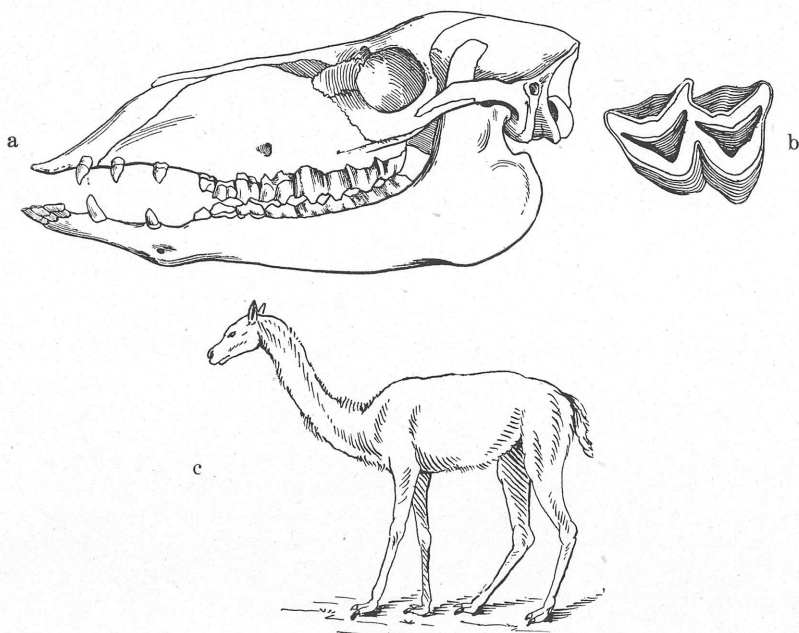


Fig. 17.—*Procamelus gracilus*, a fossil camel from the Upper Miocene of Nebraska. a, skull; b, molar tooth, crown view, modified after Cope, greatly reduced; c, conjectural restoration.

## HOGS.

Very interesting precursors of the hogs occur in the Oligocene and Miocene. The smallest of these was much like the American peccary. The giant hogs, *Entelodon* and *Dinohyus*, were by far the most interesting, for they equalled or exceeded the ox in size and weight. Their long snouts and the bony prominence on each cheek, as well as those on the lower jaw, are unmistakably characteristic. *Dinohyus* was the

largest of the group. A fine skeleton was secured at Agate by the Morrill Geological Expedition of 1904. In life it stood nearly seven feet in height.

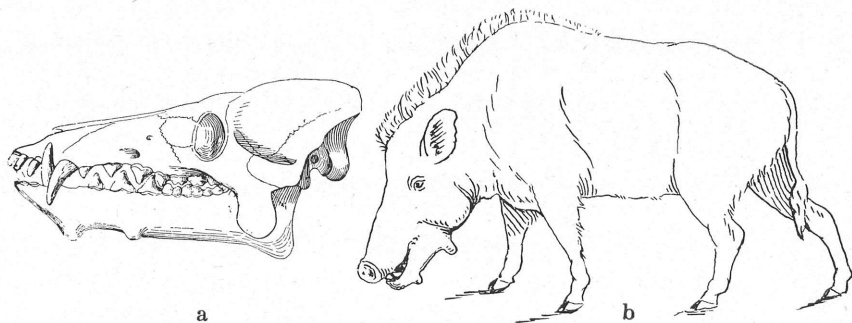


FIG. 18.—Fossil hog, *Entelodon*, of our bad lands. a, skull and jaw, x 1/6; b, restoration, modified after Scott.

#### RHINOCEROS.

Nebraska is the home of the rhinoceroses, and their wanderings led them into other parts of the world. They flourished here in numbers and kinds passing comprehension. In places, for example Agate, their bones and skulls occur in heaps. The early forms, *Cænopus*,

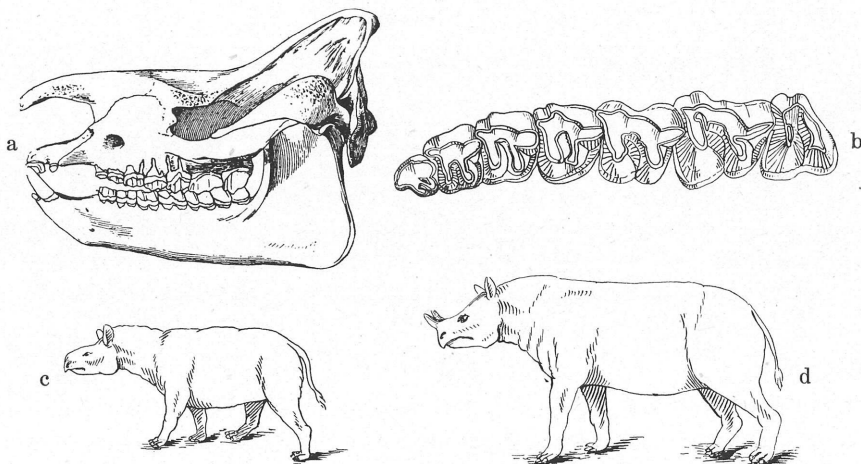


FIG. 19.—Two forms of Nebraska rhinoceros. a, skull of *Cænopus*, bad lands, after Osborn, x 1/9; b, teeth of *Cænopus*; c, restoration of *Cænopus*, the hornless rhinoceros; d, restoration of *Diceratherium*, the two-horned rhinoceros from the Miocene. All greatly reduced.

from the Oligocene were hornless; in the Miocene, some, such as *Diceratherium*, had paired horns; and in the Pliocene, some had a median horn much like the modern rhinoceros. Some had heavy bodies and short limbs, and were semi-aquatic; others having relatively lighter bodies and long limbs were suited to the plains, and were cursorial. There was every gradation from the earlier to the later forms. They became extinct in Nebraska at the close of the Pliocene.

## MUSK OX.

The fossil musk ox, *Symbos*, is occasionally found in our Pleistocene deposits. It is readily distinguished from bovines by its heavy head and massive drooping horn cores. The broadly expanded bases of the horn cores unite across the forehead, and in life the horny sheaths undoubtedly extended entirely across. Four fragmentary skulls of the fossil musk ox are preserved in the State Museum, and a new species, of the genus *Bootherium*, has just been secured from the Pliocene of Sioux County, and remains to be described.

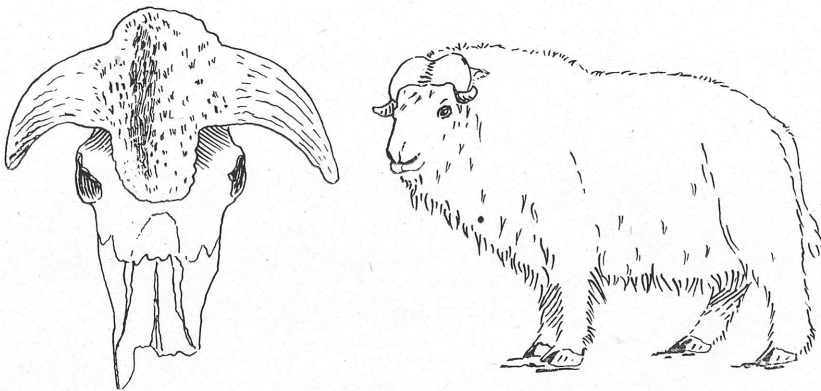


FIG. 20.—Skull of musk ox, *Symbos cavifrons*, about 1/6 natural size, and a conjectural restoration.

## BOVINES.

With the exception of teeth and occasional horn cores, the remains of bovines are rare. Many examples of the last lower molar of fossil bisons have been found and submitted for determination. They resemble the same tooth in the living bison, but are generally darker and harder because fossilized, that is, mineralized. Several fossil bison, such as *alleni*, *occidentalis*, and *latifrons*, are known in Ne-



braska, but their remains aside from scattered teeth are rare. It is therefore desirable that all fossil horn cores, skulls, teeth, and bones be carefully preserved and reported to the State Museum. Fine examples of the fossil bison have been found in Kansas and may be seen in their State Museum. It is hoped that complete skeletons may yet be found in Nebraska. If citizens show their interest by sending in such fossil remains as they may find, it may yet be possible to exhibit an entire mounted skeleton in our State Museum for the pleasure and instruction of the public.

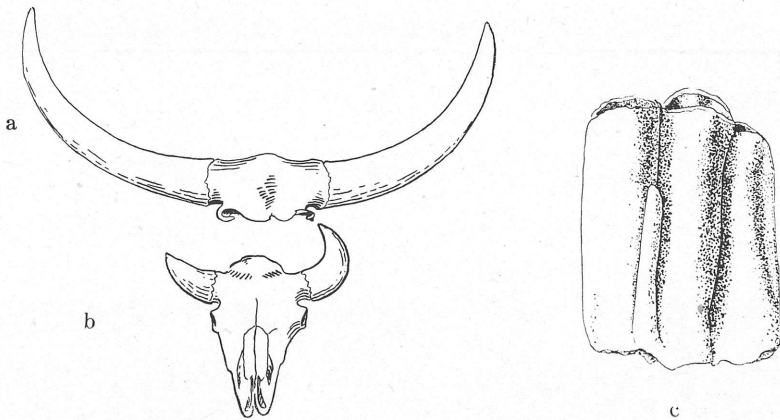


Fig. 21.—Fossil bison. a, horn cores of *Bison latifrons*, 6 feet from tip to tip,  $8\frac{1}{2}$  feet measured on the curve. b, skull and horn cores of a modern bison for comparison. c, last lower molar of a fossil bison, common in our Pleistocene,  $\times \frac{1}{2}$ .

#### THE HORSE.

The birthplace of the horse is the Great Plains, and their remains are found in all of our Tertiary strata from the Oligocene to the Pleistocene. The earlier forms occur in great abundance in the bad lands. The later ones roved over the entire State. Our bad land horses, *Mesohippus*, were all three-toed creatures about the size of a shepherd dog. They were browsers, so their teeth were short and weak. In the course of their development, the horses finally became distinctly grazing animals with long, strong teeth, and now no creature has a finer dental battery than the horse.

In our Pliocene beds near Mitchell, the teeth of the horse are found by thousands, and there is a strange intermingling of ancient and modern types. Pleistocene horse teeth were long and reinforced by

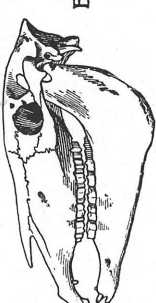









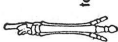











Formations in Western United States and Characteristic Type of Horse in Each		Fore Foot	Hind Foot	Teeth
Recent	 <b>Equus</b>	 One Toe Splints of 2 <sup>nd</sup> and 4 <sup>th</sup> digits	 One Toe Splints of 2 <sup>nd</sup> and 4 <sup>th</sup> digits	 Long- Crowned, Cement- covered
Pleistocene	 <b>Prototippus</b>	 Three Toes Side toes not touching the ground	 Three Toes Side toes not touching the ground	 Short- Crowned without Cement
Pliocene	 <b>Mesotippus</b>	 Three Toes Side toes touching the ground; splint of 5 <sup>th</sup> digit	 Three Toes Side toes touching the ground	 Short- Crowned without Cement
Miocene	 <b>Hyracotherium (Eohippus)</b>	 Four Toes Splint of 1 <sup>st</sup> digit	 Four Toes Splint of 1 <sup>st</sup> digit	 Short- Crowned without Cement
Oligocene	 <b>Prototippus</b>	 Four Toes		
Eocene	 <b>Hyracotherium (Eohippus)</b>	 Four Toes Splint of 1 <sup>st</sup> digit	 Four Toes Splint of 1 <sup>st</sup> digit	 Short- Crowned without Cement

Fig. 22.—A few of the many progressive changes known in the development of the horse. Modified after Matthew. In Nebraska, horses continue from the Oligocene through the Pleistocene.

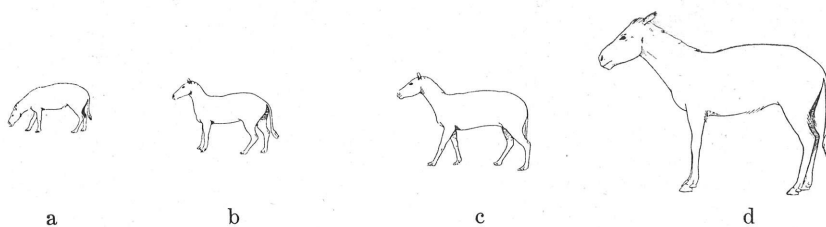


Fig. 23.—Evolution of the horse, modified after Lull, drawn to scale. a, Eohippus, ancestral four-toed horse; Lower Eocene; b, Orohippus, four-toed horse, Middle Eocene; c, Mesohippus, three-toed horse, Oligocene bad lands; d, Merychippus, three-toed horse, Miocene.

a substance called cement, and were so crowded together that a cross section is squarish. Their crowns were labyrinthine as in living horses, and to the casual observer would pass as such. The geologic history of the horse is better known than that of any other domesticated animal. After migrating to other continents, the horse became extinct in America, and the present stock has a European ancestry.

Modern horse bones are often found deeply buried in sands, clays, and soils, and for this reason are easily mistaken for fossil remains. Examination will show that the pattern of the teeth is modern, and that the teeth and bones are not mineralized. The teeth of fossil horses are generally heavier than modern, and many of them are dark or black when mineralized.

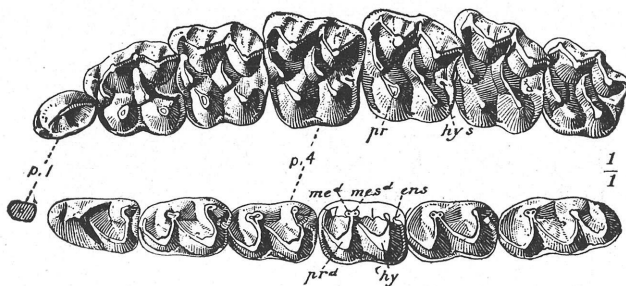


Fig. 24.—Upper and lower teeth of *Mesohippus bairdi*, from the bad lands of northwestern Nebraska, Oligocene, natural size.

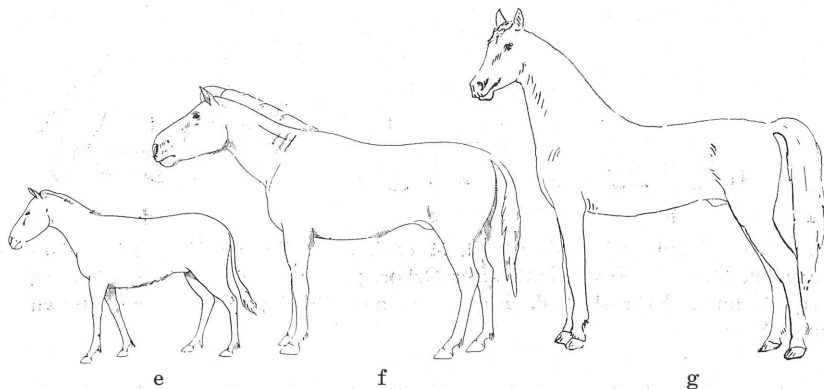


FIG. 23. (continued)—e, *Plihippus*, one-toed horse, Pliocene; f, *Equus scotti*, the last of the native American horses, Pleistocene; g, *Equus caballus*, the highest type of thoroughbred domestic horse.

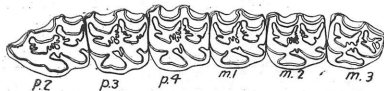


FIG. 25.—Upper teeth of the fossil horse, *Equus scotti*,  $\times \frac{1}{4}$ . Very similar to the modern horse. Modified after Gidley.

#### MASTODONS AND MAMMOTHS.

It is not intended to discuss fossil elephants, but instead to offer hints for the assistance of correspondents who wish to recognize fossil elephant bones and teeth and to distinguish between mastodons and mammoths, and to encourage people to save all tusks, teeth, and bones which they find.

Egypt is the birthplace of the elephants. Thence they migrated to all of the continents. Millions of them flourished in Nebraska during Pliocene time. All of the early elephants were long-jawed mastodons, called four-tuskers because they possessed a pair of tusks in the lower as well as in the upper jaw. The lower jaw of these grotesque elephants often equalled the length of the outstretched arms. In stature they measured 6 to 7 feet, or about one-half the height of the great Nebraska mammoths. Their teeth, as a rule, were characterized by 3, or at most 4, broad crushing ridges, and their tusks by a broad, longitudinal band of enamel. The tusks of the lower jaw went into disuse and gradually disappeared, whereupon the excessively long

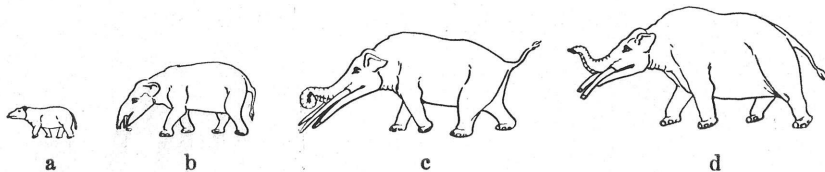


FIG. 26.—Fossil proboscideans. a, *Moeritherium*, Eocene, Egypt; b, *Palaeomastodon*, Miocene, Egypt, both after Osborn; c, *Tetrabelodon lulli*, Pliocene, Cherry County, Nebraska; d, *Eubelodon morrilli*, Upper Pliocene, Brown County, Nebraska.

jaws shortened a little at a time until the short-jawed mastodons, such as *Mastodon americanus* were derived.

*Mastodon americanus* was a two-tusker of great size, rivalling the mammoths themselves. It is found in the Pleistocene deposits, and is readily recognized by its teeth, which have very coarse grinding ridges not exceeding 5 in number. The American mastodon lived well to the present epoch and was contemporaneous with the mammoths.

The mammoths, of which four kinds are known in the State, were very short-jawed true elephants having ponderous bodies and heads, and elegantly scrolled tusks. The chief distinguishing features of the mammoths were the teeth which consisted of many cross ridges or plates heavily covered and bound together by cement.

It is always instructive and interesting to note progressive changes in animals. The ancestral elephants of Egypt had 2 and later 3 ridges to each tooth. The Nebraska mastodons had 4, the later ones 5 or 6, the intermediate or *Stegodont* elephants of Europe 6 to 8, and the mammoths of Nebraska, 11, 16, 24, 26, and even 28.

Tusks are overgrown front teeth having persistent pulps. In our earliest Nebraska mastodons the tusks were seldom 3 feet long, were

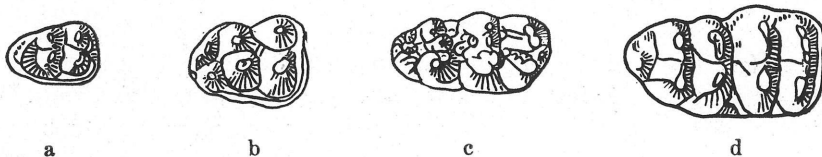


FIG. 27.—The last lower molars of proboscideans, showing progressive changes. a, *Moeritherium*; b, *Palaeomastodon*; c, *Tetrabelodon*; d, *Mastodon americanus*.

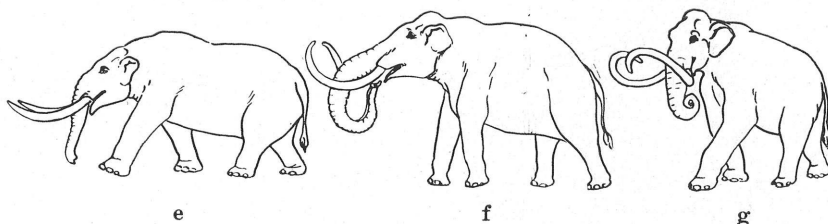


FIG. 26. (continued)—e, *Mastodon americanus*, Pleistocene, Thurston County, Nebraska, modified after Osborn; f, *Elephas hayi*, long-jawed mammoth, Pleistocene, Saline County, Nebraska; g, *Elephas columbi*, short-jawed mammoth, Pleistocene, Custer County, Nebraska, modified after Osborn.

2 inches in diameter, and curved downward. A little later they became successively 4, 5 and 6 feet long, about 4 inches in diameter, and curved downwards but slightly. In the American mastodon, they were 9 to 10 feet long, about 5 inches in diameter, and curved upwards more or less, and in our mammoths, 12 feet long and almost 10 inches in diameter, and beautifully scrolled.

An unusual number of mastodon and mammoth skeletons have been found in the State in excavations, clay pits, and railroad cuts, but as yet no complete skull or skeleton has been saved. However, during the past two or three years several of the long-jawed mastodons have been secured.

#### LEAVES.

Leaves and stems of the lower order of plants, chiefly ferns, reeds, and rushes, are extremely abundant in the shales and sands of our Coal Measures. Leaves of higher orders of plants are beautifully preserved, and very common in the Dakota formation. The trees of this age are almost modern comprising such well-known varieties as the poplar, tulip poplar, willow, sassafras, birch, oak, and others.

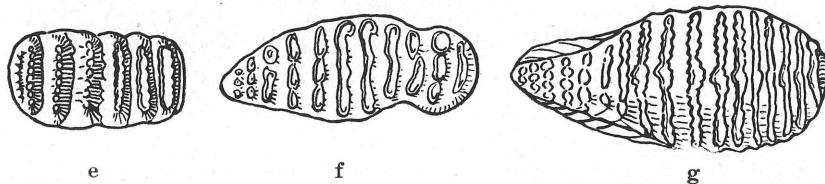


FIG. 27. (continued)—e, *Stegodon*; f, *Elephas hayi*; g, *Elephas imperator*.

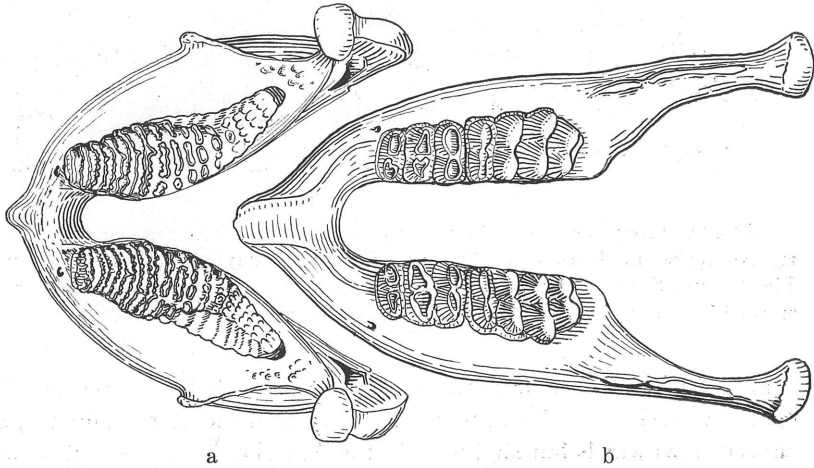


FIG. 28.—Jaws of mammoth and mastodon. a, jaw of mammoth, *Elephas imperator*, showing typical teeth,  $\times 1/10$ ; b, jaw of *Mastodon americanus*, showing typical teeth,  $\times 1/10$ .

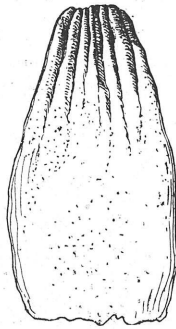


FIG. 29.—One from a series of plates which go to make up a mammoth tooth. The "fingers" are at the crown of the tooth. Scattered plates are very common,  $\times 1/4$ .

#### COLLECTING AND PREPARING FOSSILS.

The only obtainable history of the ancient animals of Nebraska must come from their fossil remains. Accordingly, it is best to save all fossils, for they throw light on the succession of animal life in the State, and may introduce new and wholly unknown forms. Fossil corals, shells, and teeth are generally hard and well-preserved, and need little or no special treatment, but skulls, jaws, and skeletal parts

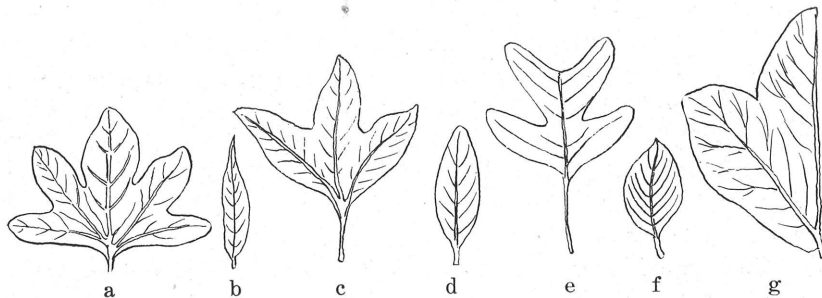


Fig. 30.—Fossil leaves common in our Dakota formation. a, *Aspidiophyllum trilobatum*; b, Willow, *Salix proteæfolia*; c, Sassafras, *Sassafras cretaceum*; d, *Magnolia boulayanna*; e, Yellow Poplar, *Liriodendron giganteum*; f, Poplar, *Populus kansaseana*; g, Sweet Gum, *Liquidamber integrifolius*.  
*Erratum*—a and g transposed.

are apt to be perishable. Bones, when buried, soon lose the organic matter which imparted elasticity and strength. If buried long enough they may become mineralized and enduring.

The bones of camels, rhinoceroses, mastodons, and mammoths, which lived almost to historic time, tend to be soft and brittle. All large skulls and bones are objects of great interest and should be handled carefully. They should on no account be dug out. Not one of many fine mastodon and mammoth skulls have been saved by amateur collectors who have tried to dig them out. It is not an easy task, it requires special training. Remember a good skull may have commercial as well as educational value.

The best plan is to notify the State Museum, The University of Nebraska, or some one who has had experience. Let us repeat, never touch mastodon or mammoth skulls, jaws, or tusks, but leave them in the ground until some experienced collector has been consulted.

If amateur collectors proceed in the following manner, needless waste of valuable fossils may be prevented. Work thoughtfully and deliberately. Remove the dirt, clay, or sand so as to expose but a few square inches of the bone at a time. Brush the surface of the bone repeatedly with very thin shellac. This soaks in deeply, dries quickly, and restores much of the original strength.

In the case of the larger bones, more time is necessary for the shellac to dry, but it is better to let a good specimen stand a day or two than to lose it by impatience or haste. Small bones may be handled with safety as soon as the shellac is quite dry, but not so the large ones. They must be covered with strips of paper dipped in raw or cooked



flour paste, and rubbed into close contact with the bone. Strips of cloth are better still, and bands of gunny sack dipped in plaster of Paris make a perfect encasement. Pieces of wood for reinforcement may be bound in to advantage. Instead of paper and paste, the professional collector prefers to substitute tissue or rice paper and shellac. The alcohol evaporates quickly, and the dry shellacked paper makes a thin strong casing which is very tough, and can readily be removed when the bones are unpacked.

The State Museum bespeaks the friendly interest and cooperation of everyone who finds good mammal bones of any kind, and hopes to be notified of discoveries.

University of Nebraska  
Lincoln, May, 1915

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