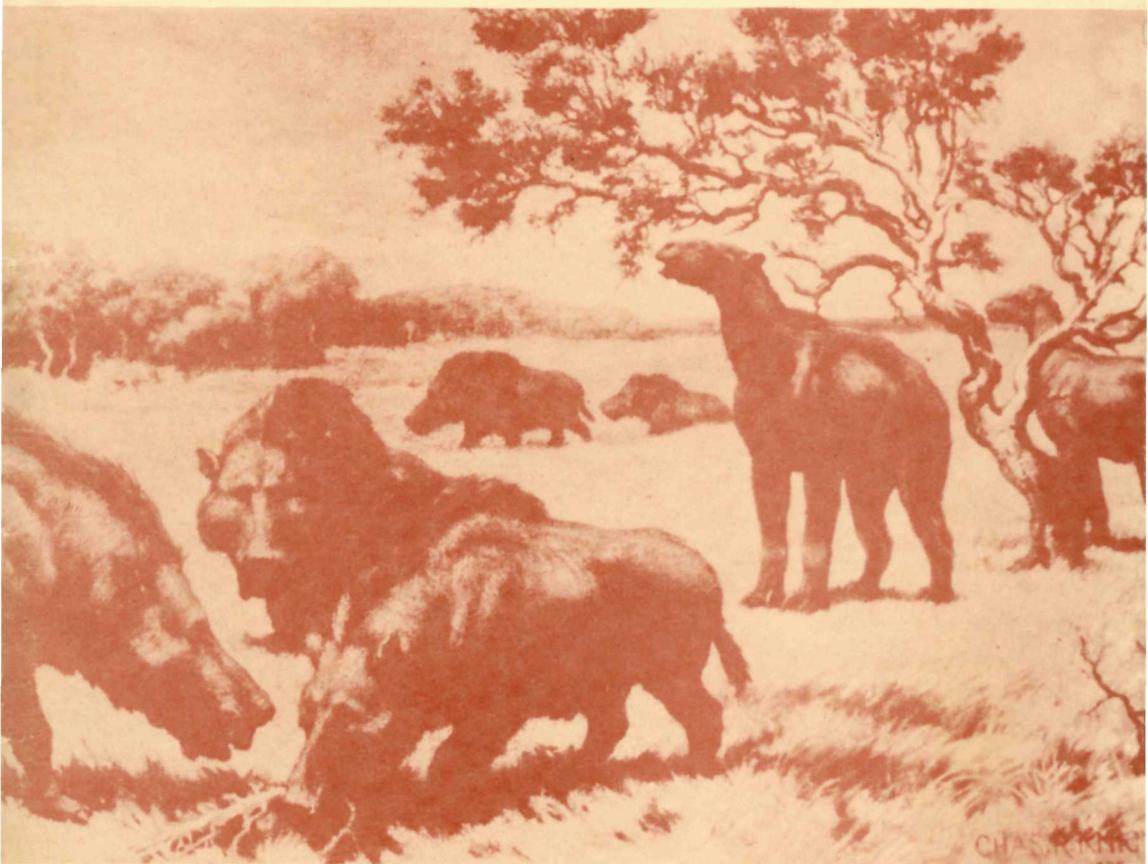


Agate Fossil Beds

National Monument



As proposed by the
Agate Fossil Beds National
Monument Association
Agate, Nebraska

Cover:

ANCIENT LIFE AT THE AGATE SITE

Illustration by Charles R. Knight

Courtesy Chicago Natural History Museum

PROPOSED
AGATE FOSSIL BEDS
NATIONAL MONUMENT
NEBRASKA



September 1964



Published in the Public Interest
by
THE AGATE FOSSIL BEDS NATIONAL MONUMENT ASSOCIATION
Agate, Nebraska

YOUR ASSOCIATION

THE AGATE FOSSIL BEDS NATIONAL MONUMENT ASSOCIATION was organized on April 17, 1964, when 28 persons met at the Agate Springs Ranch to offer their assistance to The National Park Service in efforts to obtain National Monument status for the site. Ten directors were elected by the group, representing most all the communities in Northwest Nebraska, and officers chosen to direct activities of the non-profit Association.

The first act was to get the association formally organized and incorporated under the statutes of the State of Nebraska. The purposes of the Association, as listed in the Articles of Incorporation, are:

1. To assist in the scientific, educational, historical and interpretive activities of the National Park Service in the administration of Agate Fossil Beds National Monument;

2. To handle, buy and sell such Government and private publications, illustrative materials, goods and merchandise as may be approved by the Government;

3. To assist in the development and maintenance of Agate Fossil Beds National Monument library facilities;

4. To assist in the preserving of objects or documents important to Agate Fossil Beds National Monument and the gathering and preservation of scientific and historical information pertaining thereto;

5. To exercise the powers conferred by the Nebraska Nonprofit Corporation Act.

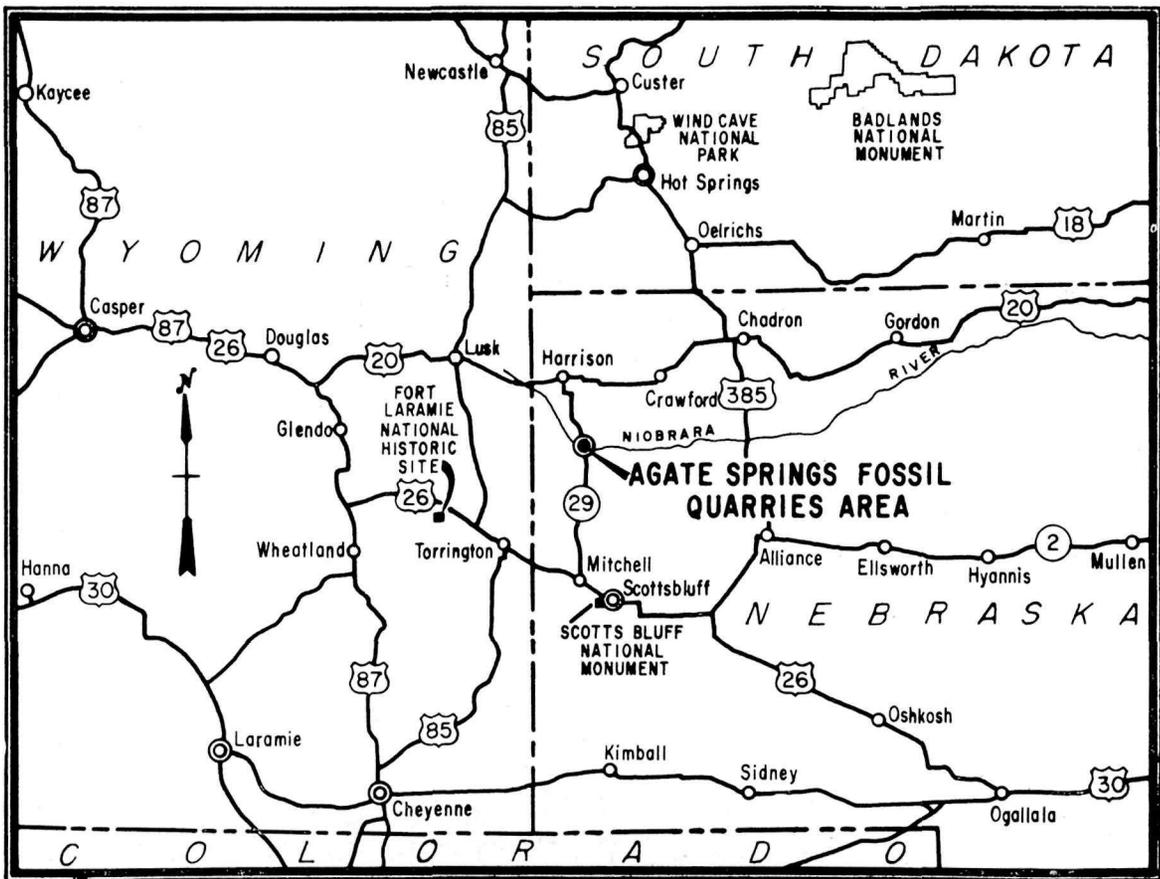
In order to finance the promotional purposes above outlined, the Association sells annual memberships to individuals for \$1; annual sustaining memberships to firms or corporations at a minimum of \$5; and life memberships for \$100.

These funds collected to date have made the publication of this book possible.

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An Area Asset



VICINITY MAP



A National Monument at Agate could add to many other historical locations in the Nebraska-Wyoming-Colorado-South Dakota Tourism Axis.

PREFACE

The Agate Springs Fossil Quarries site located in Sioux County, Nebraska, is world renowned for its rich concentrations of the fossil remains of mammals that lived fifteen million years ago.

A study of this site was made by the Midwest Region, National Park Service in the fall of 1960, and a preliminary report prepared. In May 1961, the Advisory Board on National Parks, Historic Sites, Buildings and Monuments recommended to the Secretary of the Interior establishment of the site as a National Monument. Subsequently, a more detailed study was made, the results of which are covered in this report.

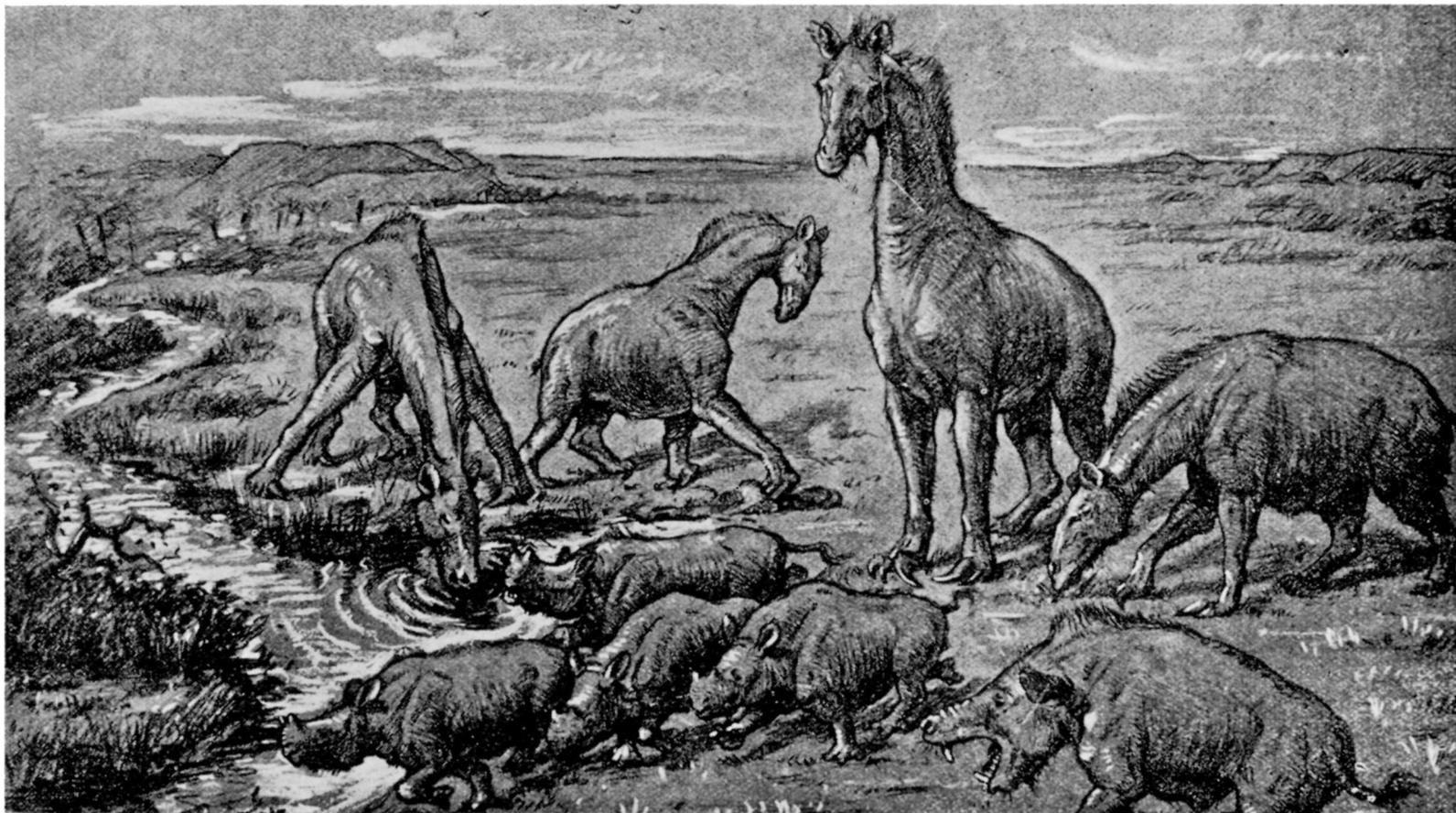
Studies such as this play an important part in the long-range efforts to identify areas of sufficient importance for inclusion in the National Park System. The eventual objective of these efforts is a well-rounded system of National Parks, Monuments, Historic Sites and related areas that will be truly representative of America's natural and cultural heritage.

On May 8, 1963, Senator Roman L. Hruska and Representative Dave Martin of Nebraska introduced identical bills in the First Session of the 88th Congress to provide for the establishment of the Agate Fossil Beds National Monument.

The bill successfully passed the Senate in early August, 1964.

The Agate Fossil Beds National Monument Association has arranged to reproduce part of the National Park Service Report which recommended establishment of the Agate Fossil Beds National Monument.

This publication is being printed by Agate Fossil Beds National Monument Association, a non-profit corporation, in the interest of preserving and interpreting the Agate site for its great value to the nation and the world.



Fifteen Million Years Ago in Western Nebraska

From an illustration by Erwin Christmas Courtesy Natural History Magazine

THE SETTING

The principal Agate Springs Fossil Quarries are located on two isolated grass-covered hills which overlook the upper reaches of the Niobrara River in a scenic portion of the Great Plains. The quarries were cut into the sides of these hills whose summit elevations are approximately 200 feet higher than the picturesque Niobrara River. Only six to ten feet wide, the Niobrara winds lazily back and forth across a one-half mile flood plain. Elevations range from 4,400 to 4,700 feet, and the annual rainfall is about 16-18 inches. About a mile and one-half to the southeast of the main quarries is another quarry called the **Stenomylus**, and three miles to the northwest are the "Devil's Corkscrew" formations—casts of ancient beaver burrows.

Nebraska State Highway 29 a connection between Harrison (23 miles to the north) and Mitchell (34 miles to the south), crosses the Niobrara three miles west of the quarries.

The land is carpeted predominantly with grasses such as needle-and-thread, Junegrass, Western wheatgrass, little bluestem, blue grama and buffalo grass, and with the blackroot sedge whose wiry roots hold the sandy soil together. Prairie flowers—lupine, prairie turnip, silverleaf psoralea, wild-alfalfa, Western wallflower, pentstemon and others—add color to the picturesque grass-land setting. The small soapweed, a yucca, growing on the hillsides is particularly



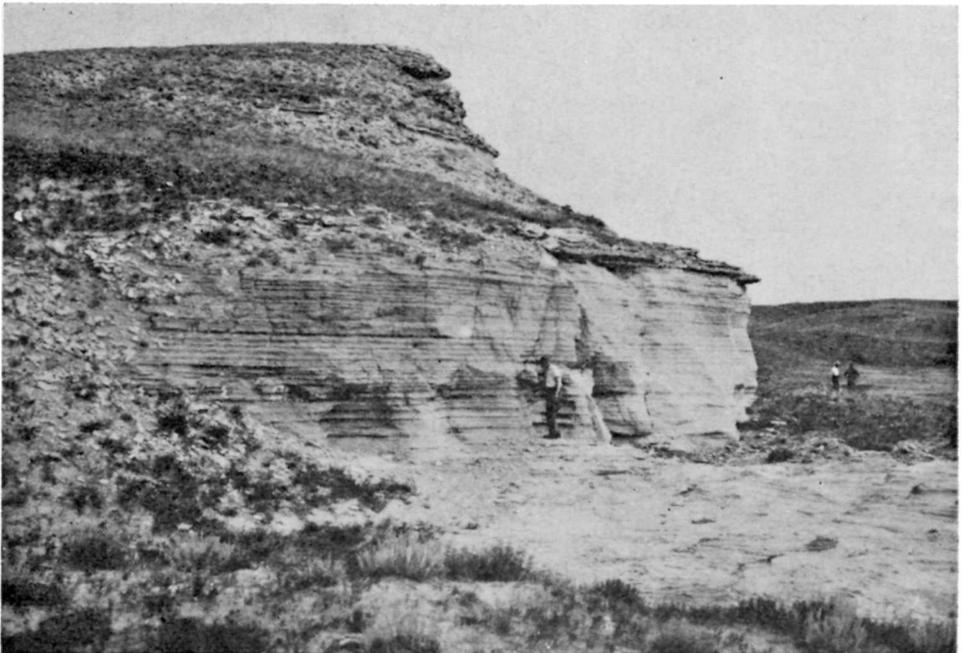
The Principal Agate Springs Fossil Quarries in 1950.
Carnegie Hill to Right, University Hill to Left.

Courtesy Dr. R. E. Lemley



Field Party from the Carnegie Museum in 1908

Courtesy University of Nebraska State Museum



The Stenomylus Quarry in 1961

attractive in the spring when its greenish-white flowers blossom on stalks that rise conspicuously above its sword-like leaves. Clumps of willow along portions of the river and a few isolated groupings of cottonwood and willow trees add to the attractiveness of the scene, and supply nesting places for birds and shelter for animal life.

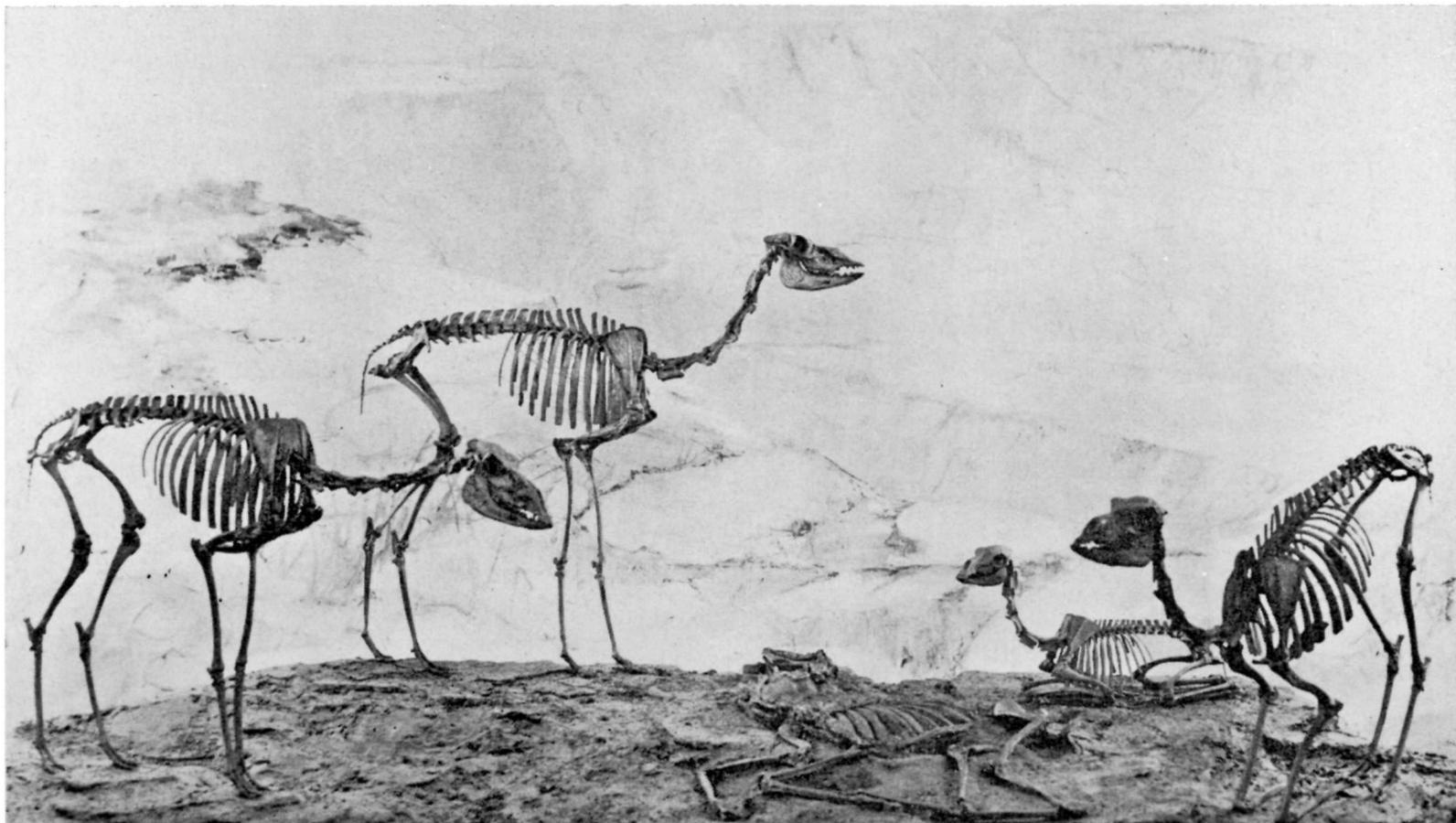
Just west of State Highway 29 along the Niobrara River is a lush oasis. It was here that Captain James H. Cook began operation of the Agate Springs Ranch in 1887. A system of irrigation ditches were developed and shade trees were planted. This is why such a lovely wooded spot now exists here in the middle of the short grass country of the Great Plains. Here flow natural springs near rock formations containing agates. From this combination of natural features the ranch acquired its name, "Agate Springs." This cattle ranch has been an important operation all these years and is presently owned by the heirs of the late Dr. Harold Cook.

Dr. Cook's widow, Mrs. Margaret C. Cook, who resides at the ranch, is continuing the Cook family tradition of hospitality for which the early West was famous.



Headquarters of the Agate Springs Ranch nestled among the trees to the left off State Highway 29

Courtesy Dr. R. E. Lemley



Stenomylus Group

Courtesy University of Nebraska State Museum

GEOLOGIC HISTORY

Origin

For millions of years during the late Cretaceous period (near the end of the Age of Dinosaurs) what is now Nebraska lay beneath the waters of a great sea. About sixty million years ago, this period ended. The seas retreated and the great Rocky Mountain system was formed to the west. Then, for several million years, these mountains were attacked by erosion. Rock debris worn from their flanks was carried eastward to the lowlands and deposited widely for hundreds of miles by streams—ancestors of today's North Platte, Niobrara and White Rivers. These early Tertiary deposits and later ones, now exposed in the Great Plains, make up the formations which are so well known for their richness in mammal fossils.

The Rockies were worn down to a gently rolling land. Then broad warping of the whole region in Oligocene times reelevated the mountains several thousand feet. Rock debris was again carried eastward covering the Great Plains with layer upon layer of gravelly, sandy deposits.

Before the Rockies were pushed up this second time, the climate of the Great Plains was fairly warm and moist, and much of the region was covered with deciduous forests. However, the uplifted mountains intercepted moisture-laden winds from the west, causing rain to fall mostly on their western slopes. Precipitation diminished to the east and over a period of many years the forests were gradually replaced by vast grasslands.

To survive, animal life had to adapt to the changing environment. Prairie grasses were an abrasive food which wore down the teeth of grazing animals, shortening their lives. One adaptation which counteracted this was the development of high-crowned teeth that continued growing in length during the lifespan of the creature. As the grinding part of each tooth wore down, new growth from the roots took its place.

The development of grasses was one of the greatest events in the history of life. Grasses played a tremendous part in the evolution of mammals, and it was primarily during the Miocene, sometimes referred to as "The Golden Age of Mammals," that the development of grazing animals reached its zenith both in variety of species and in numbers.

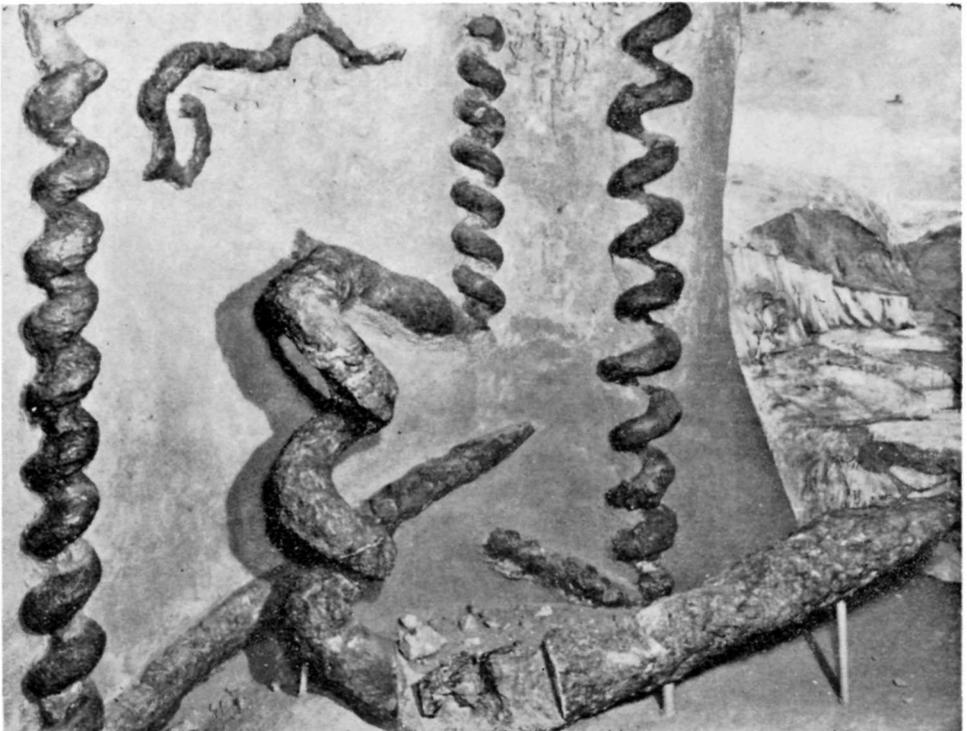
Weathering and erosion of the uplifted Rockies during the late Oligocene and early Miocene resulted in a rapid increase of sedimentary deposits upon the Great Plains. Because of increased gradient, the streams flowed swifter than before, and carried more and coarser sediments. Great floods took place, at which time many animals no doubt were trapped in rapidly rising waters and their carcasses swept downstream to be deposited at a bend of a river or other places where the waters were slackened. Then river sediments covered the remains. This process was repeated, in some cases several times at the same place, until layer

upon layer of animal remains were sealed beneath the earth's surface. As alternate layers of sediment covered these deposits and ground waters saturated or percolated through the beds, the sands were compressed and cemented into sandstone.

Over a long period of time, the skeletal remains of the entombed animals were fossilized as the porous bones were filled with mineral matter. Many geologists believe this to be the most likely explanation for the origin of the Agate Springs fossils. Others believe differently, one theory being that the animals became trapped in quicksand when coming to the river to drink and sank into an ancient quagmire. In any event, the conditions that brought about the large concentrations of animal remains within a relatively short period of time must have been unusual indeed.

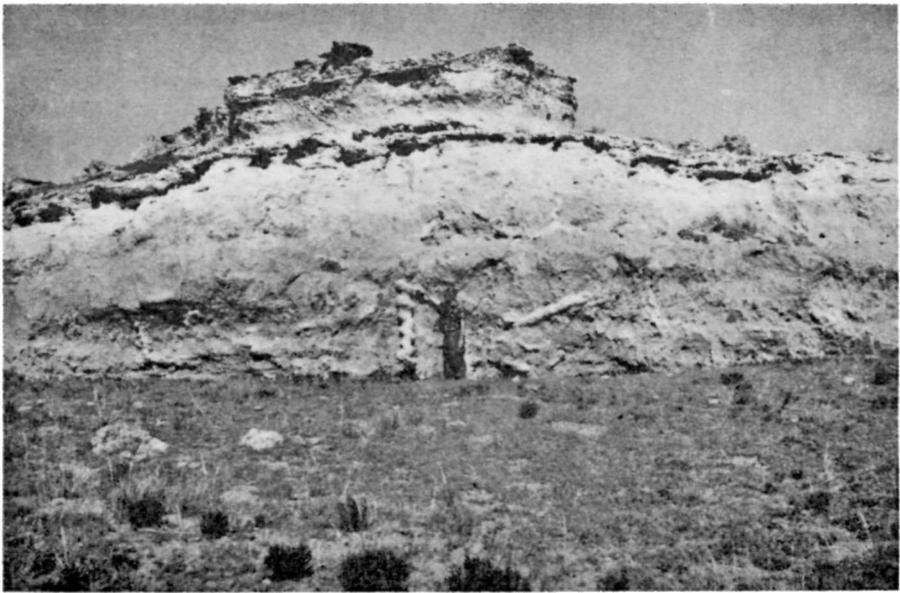
These deposits remained buried for approximately fifteen million years until exposed by the valley cutting of the present day Niobrara River and by abrasive weathering action of the elements.

Conditions that existed when the little **Stenomylus** camel perished were somewhat different. Most of the remains found at the **Stenomylus** Quarry were of complete articulated skeletons entombed in the sandstone just as they lay in death. For some unknown reason practically all of those quarried had their heads



Daimonelices or "Devil's Corkscrews"

Courtesy University of Nebraska State Museum

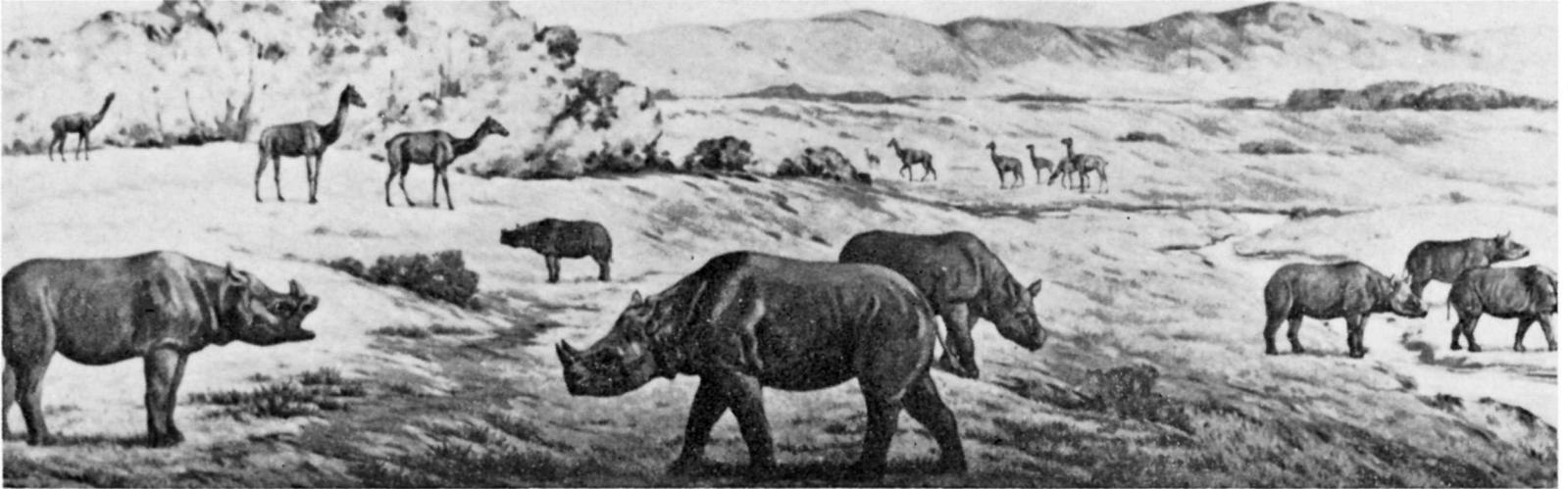


Daimonelices or "Devil's Corkscrews"

and necks arched back grotesquely toward their backs as if death were caused in some agonizing manner. Most of the little creatures were no doubt quickly covered by windblown sands because there is but little evidence of the carcasses being torn apart by carnivora. Later they too were buried under river debris like the other Agate Springs fossil deposits.

In Miocene times large areas of the grassy plains were inhabited by beaver-like animals that lived in colonies similar to the prairie dog towns of today. Casts of the burrows made by these animals are found extensively north of the Niobrara River. These casts are called **Daimonelices** or "Devil's Corkscrews," so named because of their similarity to immense corkscrews that might have been used by demons. Measuring six to eight feet in height and from three to eight inches in diameter, each of these strange formations has a basal extension approximately four feet in length leading off from the vertical burrow at a slightly rising angle. This extension appears to have been the animal's nesting chamber. These ancient creatures packed the insides of their burrow walls much as prairie dogs do now. Abandoned burrows were penetrated by a mesh of roots which filled them, much as present day roots often clog a tile drain or sewer line. These **Daimonelices** therefore actually consist of a combination of earth materials and the fossilized remains of vegetable tissue. Different levels of the earth's surface during the Miocene can easily be seen in places where the tops of the "Corkscrews" are roughly level. Remains of these small prehistoric beaver have been found encased in some of the fossil burrows.

All of the Agate Springs fossil deposits are found in what geologists have named the Arikaree group of the Miocene epoch. A more detailed classification of this group shows three divisions: The Gering, Monroe Creek, and Harrison forma.



Diceratherium — Remains of this Two-horned Rhinoceros
are the most abundant found at the Agate Site

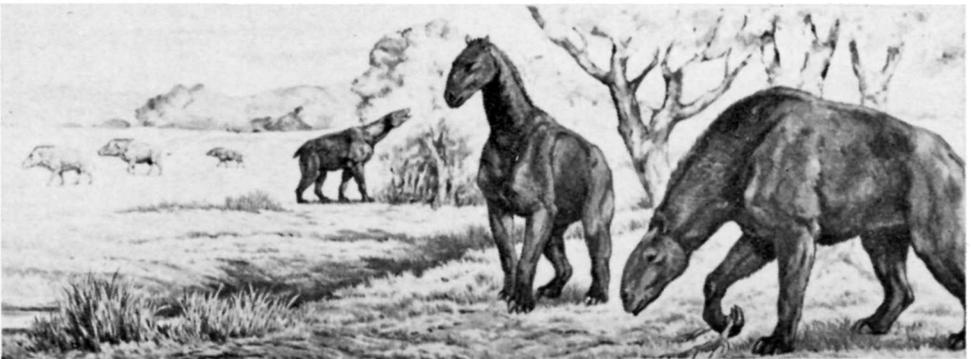
Courtesy Denver Museum of Natural History

tions. It is the Harrison formation which contains practically all of the known fossils just described at the Agate site. The sediments of this group are principally sandstone. The quarries are in the lower portion of the Harrison, and the "Devil's Corkscrews" are thought to be in the upper portion, which was laid down perhaps a million or more years after the lower part of the formation.

By late Harrison time, valleys here had been well filled with rock debris from the west, and the landscape was probably one of numerous shallow marshes and lakes, drained by sluggish rivers. Within the bottoms of these shallow lakes, beds of limy mud accumulated. Such beds are widespread in the Nebraska panhandle, and many contain agate deposits. The agates were produced by slowly percolating ground waters which carried a high concentration of silica. Each nodule—in some cases these are well banded agates—represent points where silica in solution in ground water was deposited. First accumulating around small nuclei, each center of deposition gradually enlarged as more ground water slowly seeped through the enclosing earths, depositing silica in thin layer after thin layer. Some of the agates contain dendritic deposits of manganese oxide which resemble minute fossil ferns. These are the "moss agates" of the rock collector. Today agates can be found lying on top of the ground along the Niobrara River bluffs, particularly in the vicinity of the "Devil's Corkscrews."

Ancient Life

The Miocene epoch which endured for some twelve million years, has been called the "Golden Age of Mammals" because of the tremendous increase both as to species and numbers of mammal creatures that roamed the earth. The presence of a new environment of grass-covered plains resulted in great changes by the animals, especially grazers, to adapt themselves to these new conditions. The Agate site is an outstanding example of this important chapter of evolution and many evidences of interesting mammal life have been found here.



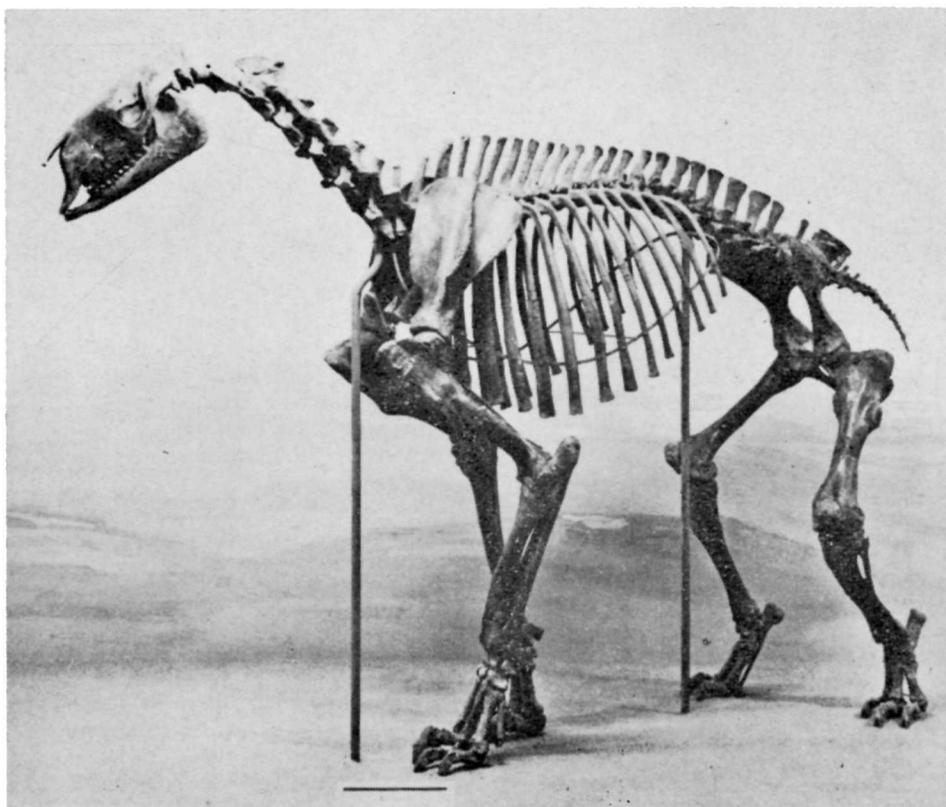
The Moropus — a strange looking animal
about as large as a present-day camel

Courtesy Denver Museum of Natural History

By far the most common mammal was a two-horned rhinoceros named **Diceratherium**. This small, swift creature was about the size of a Shetland pony and roamed the plains in great numbers. It possibly was as numerous then as the buffalo was in the 1700's.

The most unusual looking animal was the **Moropus**. It appears to have had some characteristics of several present day mammals and some which cannot be associated with anything living today. The **Moropus** was large and heavily built, about seven feet tall at the shoulders. Its head was horselike, the neck suggested faintly the giraffe, its torso the tapir, the front legs a rhinoceros, and the hind legs a bear. Most unusual were the feet which were armed with large claws, used no doubt for defense and for digging up underground succulents such as roots and bulbs. Not at all suited for a grasslands environment, the **Moropus** probably became extinct later in the Miocene.

Perhaps the most ferocious and meanest dweller of the Nebraska scene in Miocene times was the **Dinohyus** or "Terrible Pig," a monstrous beast over seven feet tall at the shoulders and about ten feet long. It had a massive head with large tusks, a small brain and was no doubt very stupid. For a pig, its legs were quite long and slender. Many specimens with broken bones have been found, thus indicating the **Dinohyus** must have been a most aggressive creature which was wounded in battle frequently.



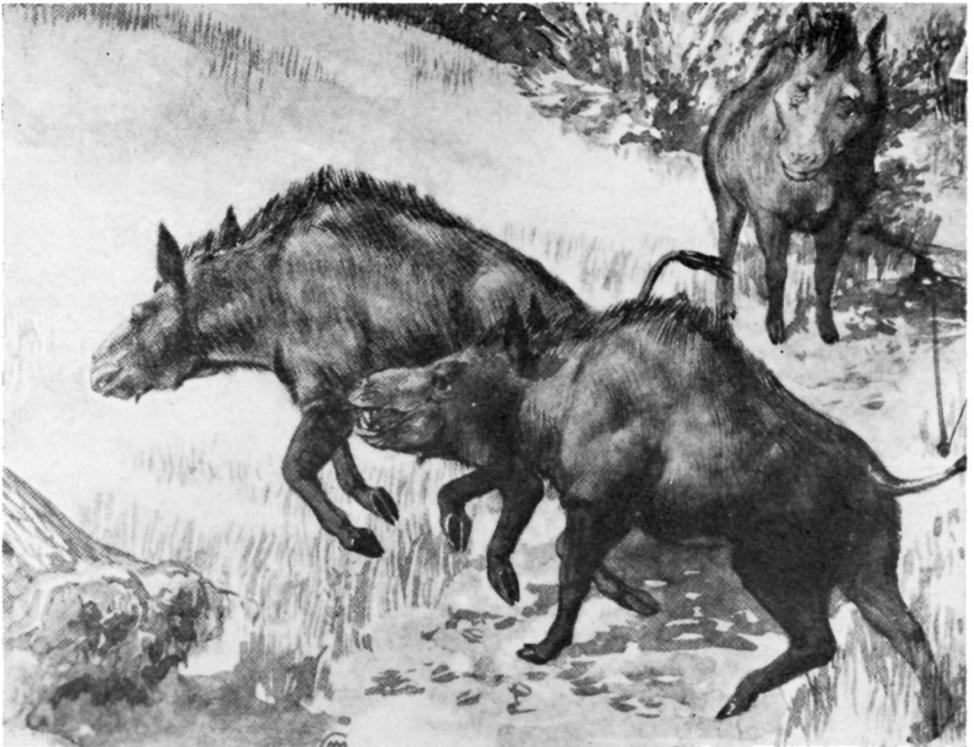
Remains of these animals, the **Diceratherium**, **Mopus**, and **Dinohyus** have been excavated at the Carnegie and University Hill Quarries. Here parts of approximately 800 individuals of the first, 25 of the second and 2 of the third have been quarried.

Large herds of gazelle-like camel roamed the Miocene plains. This delicate and graceful little animal—the **Stenomylus**—was slightly over two feet tall had long, slender legs and deer-like hoofs—not like the present day camel at all, but more like the guanaco of South America. Fossil skeletons of over 100 of these creatures have been removed from the **Stenomylus** Quarry.

Colonies of little beaver named **Palaeocastor**, somewhat similar to the prairie dog of today, dug spiral burrows down into the ancient plains. Casts of these burrows called **Daimonelices** have been described previously.

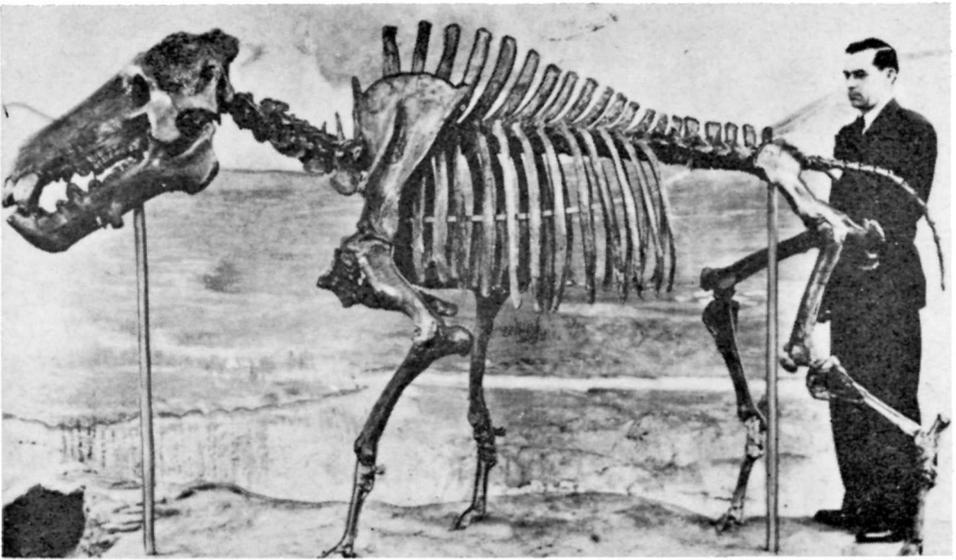
Fragments of the fossil remains of other animals have been found in the Agate area from the Harrison or later formations. Some of these are described briefly as follows:

The **Syndyoceras** was an antelope-like mammal about the size of a very small deer. It had two pairs of horns; one grew out of the middle of its face and



A battle between two Dinohyus boars

Courtesy Natural History Magazine



Dinohyus on display in Lincoln, Nebraska

Courtesy University of Nebraska State Museum

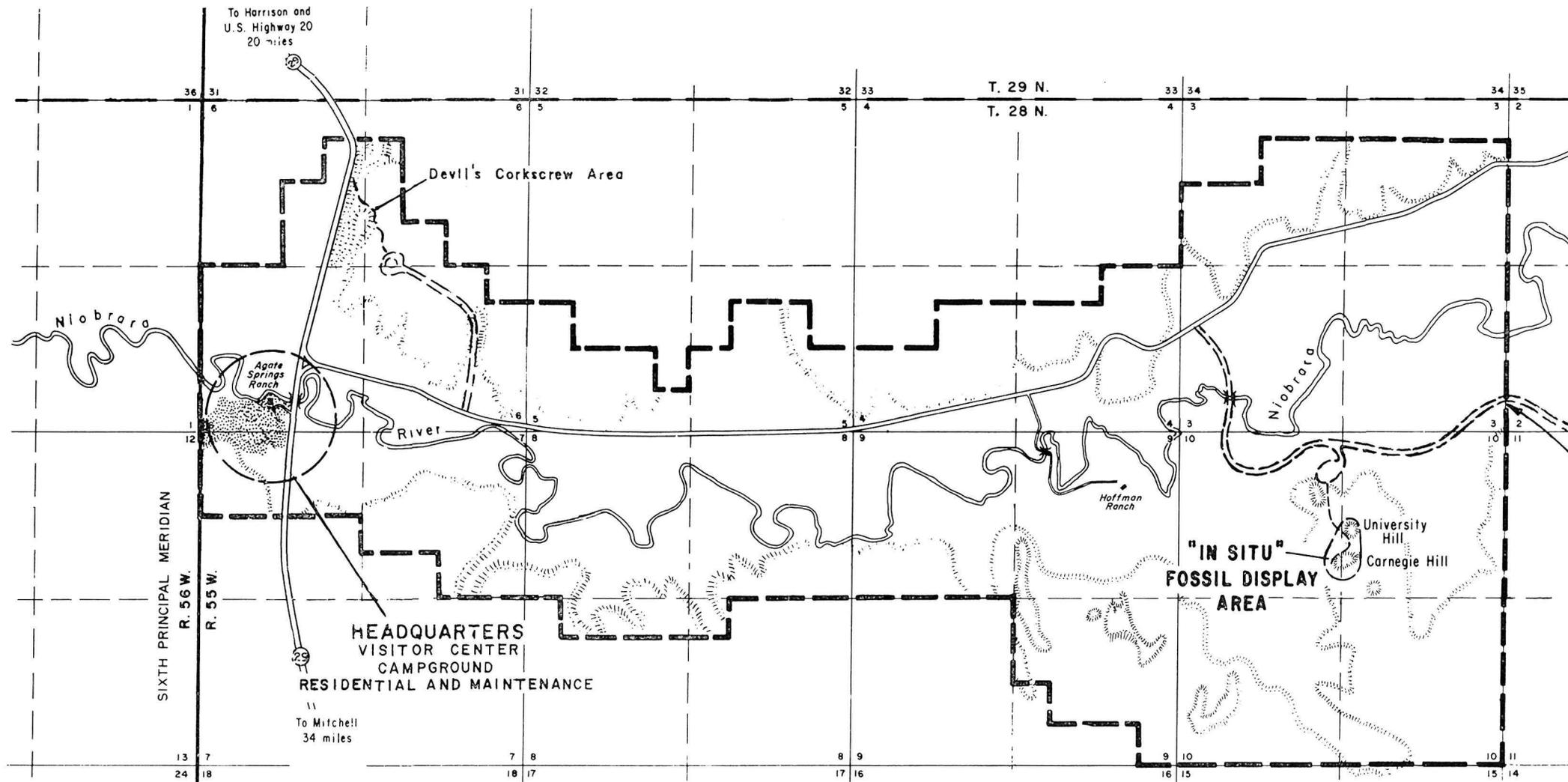
curved outwardly, and one pair grew out of the top of its skull and curved inward like that of a cow. Fossil remains of this animal have been found in the Marsland formation which is immediately above the Harrison.

A large dog—**Daphaenodon**—about the size of today's wolf, no doubt preyed upon many species of Miocene animals. Its head resembled that of a wolf but the rest of the body was cat-like. The tail was long and heavy, the claws were sharp and somewhat retractable. As this animal depended upon surprise to capture its prey, it was not built for long pursuits.

A little three-toed horse—**Merychippus**—about the size of a domestic sheep inhabited the region, but probably long after the Agate Springs Fossil deposits of the lower part of the Harrison were laid down.

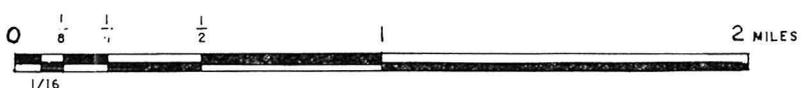
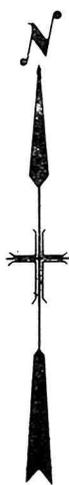
Herd of **Desmathyus**, a small pig-like creature similar in size and appearance to today's javalina were plentiful. Many animals probably respectfully kept their distance when these mean-tempered, fleet-footed mammals appeared on the scene.

The **Promerycochoerus** was the largest known genus of the Oredonts, about the size of a large pig, and in appearance like a small hippopotamus. Although this was one of the most abundant creatures of Miocene times, it was not common at Agate.



LEGEND

- | | | |
|----------|----------|------------------------|
| EXISTING | PROPOSED | |
| | | Monument Boundary |
| | | Developed Area |
| | | Roads |
| | | Trail |
| | | Trees |
| | | River breaks and hills |



SCALE IN MILES

A PROPOSED
AGATE FOSSIL BEDS NATIONAL MONUMENT
NEBRASKA

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE MIDWEST REGION

FOSSIL COLLECTING HISTORY

About 1878 James H. Cook discovered fossils eroding from the outcrop on what is now known as Carnegie Hill. He showed the out-crop to Professor Bailey, Territorial Geologist for the State of Wyoming, in the early 1880's. In 1891, students from the University of Nebraska, under Professor E. H. Barbour, first visited the fossil hills.

In the summer of 1904, Mr. O. A. Peterson from the Carnegie Museum at Pittsburgh came to Agate and with the able assistance of James Cook's young son, Harold, then 17, conducted the first scientific excavation at this site. They discovered a rich quarry, containing a type of rhinoceros that was new to science. Peterson was one of the best collectors of fossils in the country at that time. He collected at the Agate Springs Fossil Quarries for many years and it was he who opened the quarry in the big hill which E. H. Barbour later named Carnegie Hill.

In 1905, Barbour and four students came to Agate and opened a quarry in the side of a hill about one hundred yards north of Carnegie Hill. Barbour named this hill University Hill. Both institutions worked their respective quarries for a number of collecting seasons.

Yale University collected at the Agate Springs Fossil Quarries also at about the same time. The head of the Department of Paleontology, Professor R. S. Lull,



Three Famous Scientists at Carnegie Hill about 1908. Left to Right — Dr. E. H. Barbour, Head of the Geology Department, University of Nebraska; Albert Thompson, American Museum Preparator; and Dr. H. F. Osborn, President of the American Museum.

Courtesy Mrs. Margaret C. Cook



Stenomylus Quarry in Early 1900's Showing Location of Quarries worked by the American Museum, Yale University, and Amherst College.

Courtesy Carnegie Museum

came with his chief assistant, Hugh Gibb, and they made a fine collection for the University.

In 1906, Professor F. B. Loomis of Amherst College, an early, able and active paleontologist, joined the collectors with a good-sized party of advanced students. They collected in a small hill which turned out to be a comparatively minor deposit, which Loomis called Amherst Point. However, during the summer of 1907, the Amherst College field party found fragments of a **Stenomylus** about two miles east of Carnegie Hill. During that season a few shattered fragments were collected; but, on returning the next season the same levels were further excavated, and a fine deposit of these skeletons was discovered. No less than eighteen skulls together with enough disarticulated remains to complete the skeletons were found. Following this, Yale University collected three skeletons, the American Museum five or six skeletons and the Carnegie Museum the same number. During the season of 1909, the Carnegie Museum again collected in this quarry. Remains of other animals are very scarce in these sandstones, but a few isolated bones of **Diceratherium**, a small double-horned rhinoceros, and the major part of a skeleton of **Daphaenodon superbus** Peterson, a large dog, and a few bird bones have been found.

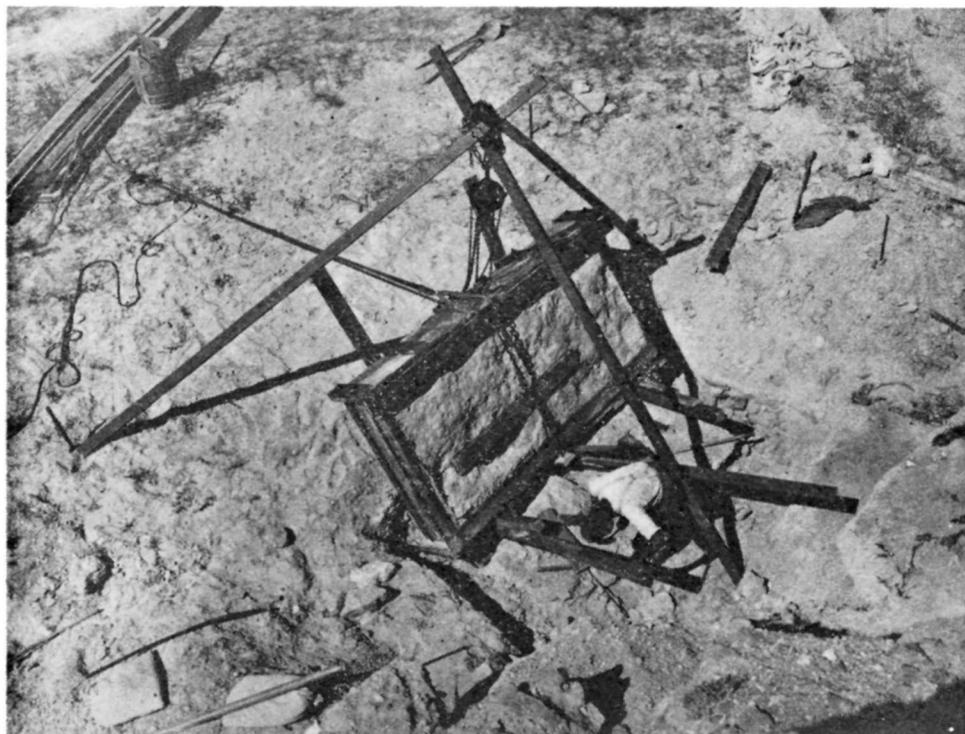
Professor Henry Fairfield Osborn, President of the American Museum of Natural History in New York, conducted many research projects at Agate beginning in 1910. That summer several of the American Museum's top technicians and scientific men were there. The chief collector was Albert Thompson. He collected at Agate for about twenty years.

The Field Museum of Natural History (now the Chicago Natural History Museum) collected at the quarries. Other institutions who sent collecting parties in later years include: Chicago University, Harvard University, Princeton University, the Colorado Museum of Natural History, the U. S. National Museum under Dr. J. W. Gidley, the South Dakota School of Mines and Technology, the Royal Ontario Museum and many others.



Excavating at the Stenomylus Quarry in 1909

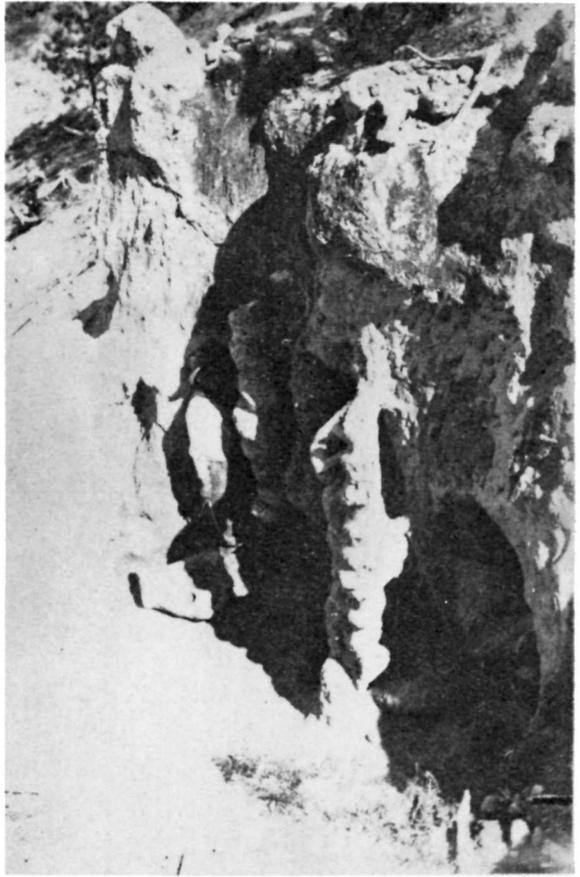
Courtesy Carnegie Museum



Removal of Diceratherium slab from Carnegie Hill for shipment in the early 1900's

Courtesy American Museum

Taking out Daimonelix
specimens (Devil's Cork-
screws) in the Early 1900's
Courtesy Carnegie Museum



University Hill in 1908 named for the
University of Nebraska which worked the site

Courtesy University of Nebraska State Museum



Captain James H. Cook in 1918

Courtesy Mrs. Margaret C. Cook

THE COOK FAMILY — EARLY PIONEERS OF THE WEST

Captain James H. Cook (1857-1942) acquired the Agate Springs Ranch in 1887, from his father-in-law, Dr. E. B. Graham, who had established it a few years earlier as the O-4 Ranch. Prior to this, Captain Cook had for 20 years been a pioneer of the wild West in the truest sense.

At the early age of 16, James left his home in Michigan and became a cowboy, riding herd on the unpredictable Texas longhorns on the long cattle drives from Mexico to Montana. In 1878, he was a big game hunter and guide in Wyoming and later a ranch manager in New Mexico.

Captain Cook served with distinction as a scout attached to the Eighth U. S. Cavalry in New Mexico during the Geronimo campaign of 1885-86 against this famous Apache chieftain.

It was soon after this campaign that he married Kate Graham and settled down for the rest of his life at Agate Springs Ranch in western Nebraska in what had been the heart of the Sioux Indian country.

During his trailing and scouting days he had made friends with Professors E. D. Cope and O. C. Marsh who in their time were two of the world's most renowned paleontologists. Because of his associations with these two and other prominent scientists, Captain Cook developed a keen interest in paleontology.

Also, he was very interested in Indian affairs, and was considered a friend by many Indians, including leaders of the Sioux and Cheyenne tribes. From the late 1890's until his death in 1942, his Indian friends visited him at his ranch and presented him with many valuable and historic Indian artifacts as tokens of their friendship. Most famous of his Indian friends was Red Cloud, the daring chieftain of the Sioux. Some of the most interesting gifts presented by the Indians were a ceremonial jacket of Chief Red Cloud, a gun used by Dull Knife's band in their daring escape from Fort Robinson in 1879, and a cowhide pictograph of Custer's Last Stand painted during the summer of 1909 at the Agate Springs Ranch by two warriors.

Captain Cook's book **Fifty Years on the Old Frontier** is a most interesting personal account of his life which vividly captures the atmosphere of the times. It is recommended reading for anyone desiring more information about the Agate Springs area and the early West.

Captain Cook passed on to his son, Harold J. Cook (1887-1962) an interest in and an awareness of science; also the family tradition of exploration and discovery started by Harold's great great grandfather James Cook, the famous Eng-



Dr. Harold J. Cook in 1950

Courtesy Dr. R. E. Lemley



The original Cook home which is still the hospitable headquarters for the Agate Springs Ranch

lish explorer and navigator who circumnavigated the globe just before the American Revolution.

The Agate Springs Ranch was Harold Cook's home all his life. Harold won an international reputation in the field of paleontology, and throughout his life contributed a great deal to this science by writing scholarly technical papers and by awakening public interest in this field—especially among school children—by leading tours to the Agate quarries.

When Harold died recently, a part of the flavor, history and hospitality of the old West was lost. Those who had the pleasure of visiting him and listening to his accounts of the early days were indeed privileged.



A lovely scene today at the Agate Springs
Ranch resulting from Captain Cook's hard
labors near the turn of the century



" . . . the most remarkable deposit of mammalian remains of Tertiary Age that have ever been found in any part of the world." — Henry Fairfield Osborn

Courtesy University of Nebraska State Museum

SIGNIFICANCE

This is a classic paleontological site well known for its wealth of Miocene fossil mammal bones. The great paleontologist, the late Henry Fairfield Osborn, has been quoted as calling it the most remarkable deposit of mammalian remains of Tertiary Age that have ever been found in any part of the world. The fossil remains are not only extremely abundant and comprise a wide variety of different species, but they are remarkably well preserved with abundant, complete skeletons, a notable characteristic. The area has been the scene of scientific research since 1891.

The Agate area is also significant because it was here that early pioneers of scientific research in the West centered many of their activities. The late Captain James H. Cook, in about 1878, was the first white man to discover fossil bones here. Since then scientists from the Carnegie Institute, the American Museum of Natural History, the Chicago Natural History Museum, the Smithsonian Institution, the Colorado Museum of Natural History, Amherst College, Universities of Nebraska, Yale, Princeton, Chicago, Michigan, and Kansas and many others have worked at this site. Fossils taken from here are on exhibit throughout the world. Captain Cook, and after him his son Harold, made the Agate Springs Ranch a headquarters for paleontologists and acquired an excellent fossil collection.

In addition there are historic values associated with the site which, although not of national significance, are of much interest and appeal, such as the story of Captain Cook who was a noted western frontiersman. He was a friend of the Sioux and Cheyenne Indians, who presented him with many valuable and historic artifacts at the Agate Springs Ranch. This ranch is a living link with the Old West.

Captain Cook in his book **Fifty Years on the Old Frontier**, written in the early 1920's, focused attention on the significance of the contributions early scientists of the West made to our national heritage.

The frontiersmen of the type who used the flintlock and percussion-cap rifles, carrying bullets that ran from sixty to one hundred and twenty to the pound, and whose headgear and clothing were made almost entirely of the skin of animals, have practically all journeyed ahead with the innumerable caravan. The ox team and stage drivers, also the cowboys of yesterday, are following closely after them. Were not the early pioneers of scientific research in the West also worthy of suitable monuments erected in their honor somewhere in or about the center of their activities? If so, is not the erection of such monuments a thing worth our doing at this time? Have we no people of wealth and culture who would take pleasure in doing something of this sort—something which would not only be a credit to the donors, but which would also give pleasure and comfort to the generations to come as the centuries pass?

The fossil beds and the early scientific research associated with them are of primary importance and justify the classification of this site as nationally significant.



University and Carnegie Hills at the Upper Left
Overlook the Scenic Valley of the Niobrara

SUITABILITY

The Agate site and its surroundings are highly suitable for National Monument purposes. Although the quarries have been worked periodically by scientists for many years, numerous representative remains could be found within the large untouched portions of the hills containing the fossils. It is estimated that at least 75 percent of the fossil-bearing portions of these hills are undisturbed. One slab quarried here with an area of 44 square feet, contained 4,300 separate bones and skulls. W. D. Matthew of the American Museum, in 1923, when most of the quarrying was completed, estimated there remained skeletons of approximately 16,000 **Diceratherium**, 500 **Moropus**, and 100 **Dinohyus** in Carnegie Hill.

The **Stenomylus** Quarry had given up more than 100 fossil skeletons of the little camel by 1929, and an undetermined number have since been removed as late as 1950. This site probably contains many more fossils. The "Devil's Corkscrews" are quite numerous in an area north of the Niobrara River near State Highway 29.

The area is highly suitable and adaptable for interpretation. The bones, when exposed, are easily seen and are of sufficient size to be readily recognizable as remains of sizeable animals. The sandstone encasing the bones is strong enough to support relieved fossils for in-place exhibits, but is soft enough to make their relieving comparatively easy.

Skillful interpretation and exhibition of excavated fossils could provide visitors with an understanding of some of the creatures which roamed the earth millions of years ago. It is not easy to recreate the feeling of such long-vanished times, since contemporary human life has no obvious connection with these events. The possibility of successfully achieving this is greater at this area, however, than at most fossil sites because of the abundance of material concentrated in a small area, the completeness of skeletal remains, and the resemblance of the present terrain to that of the period when Miocene mammals were living.

The scenic grass-covered hills which dip into the comparatively flat, open valley of the Niobrara River are relatively undisturbed by the works of man, except for livestock grazing.

The Agate site is readily accessible and can be reached by car within an easy hour's drive via State Highway 29 from U. S. Highway 20 at Harrison (23 miles to the north) or from U. S. Highway 26 at Mitchell (34 miles to the south). Frontier Airlines has flights to Scottsbluff, Alliance and Chadron, Nebraska, all within a two hour drive. The Burlington Railroad serves Alliance, Chadron and Scottsbluff and the Union Pacific serves Gering.

FEASIBILITY

All of the area within the proposed boundary is privately owned and comprises portions of seven ownerships. Two of these include ranch headquarters; the remainder consist primarily of open rangeland. Cattle ranching and hay production are the primary uses of this region. Early in 1963, the possibility of a National Monument was discussed with the owners who all indicated interest in the proposal and a willingness to discuss negotiations with the National Park Service concerning their property.

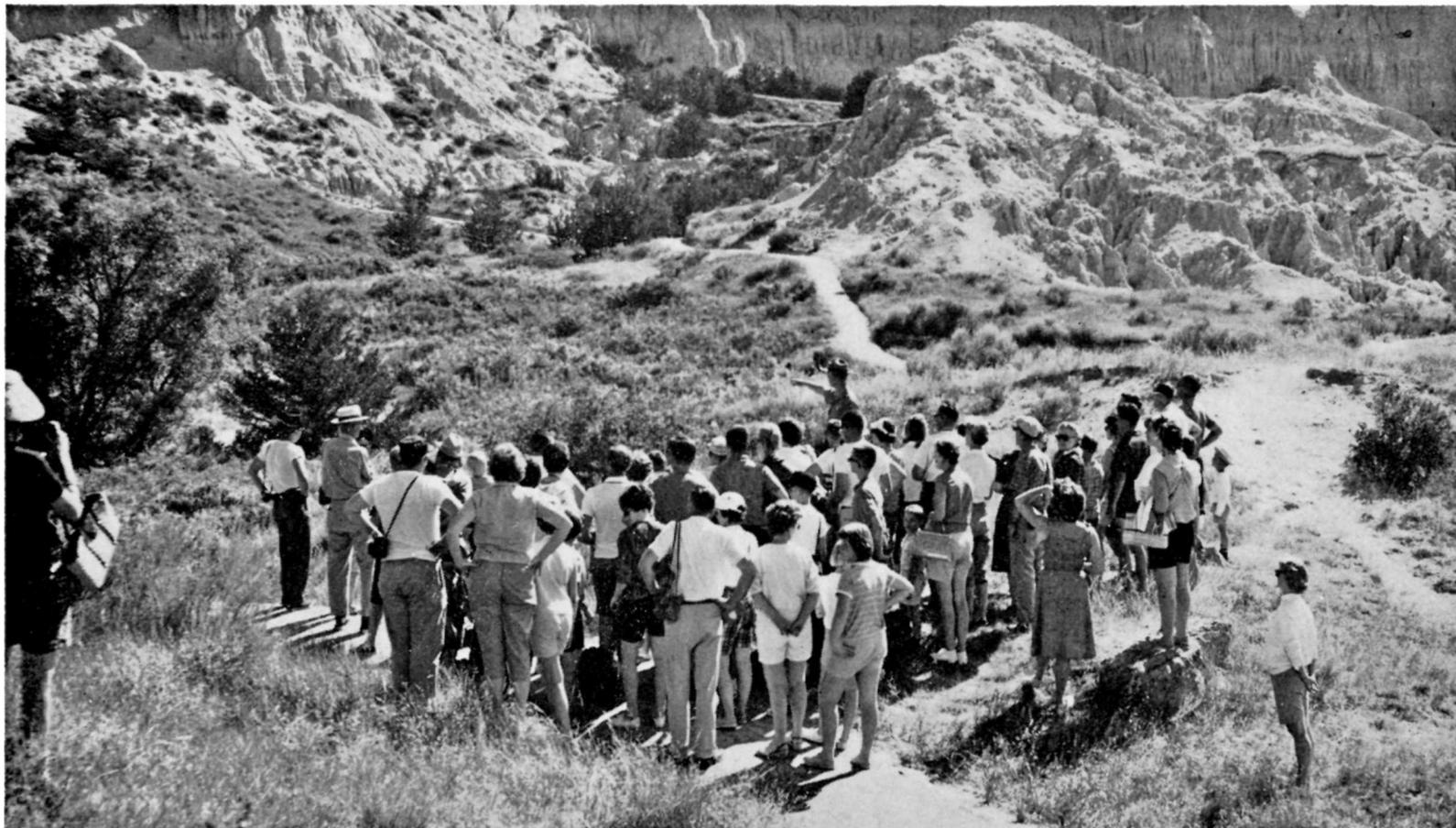
Mrs. Margaret C. Cook, widow of the late Dr. Harold J. Cook, owner of the Agate Springs Ranch, has agreed to donate the famous collection of Indian artifacts, wearing apparel and western guns, and her late husband's excellent paleontological library to the National Park Service provided the establishment of the Agate Fossil Beds National Monument is assured by January 1, 1967, the year of Nebraska's centennial.

Doctor Cook also had expressed a desire to donate sufficient land in the vicinity of the Agate Springs Ranch quarters for the Monument headquarters, and to donate quarrying rights at the principal Agate Springs Fossil Quarries (an area including Carnegie and University Hills). These rights include provisions for exploration and development of the quarries for scientific and educational purposes and for road access. The surface rights of this area belong to Mr. George Hoffman.

The National Monument proposed has met enthusiastic support in Nebraska and has received a great deal of publicity in the press and on television and radio.

Strategically located between Scotts Bluff National Monument and Fort Robinson State Park, the Agate Fossil Beds National Monument would encourage tourists to stay longer and see more of this most interesting and colorful part of our West noted for its scenic, historic and paleontological resources.

The establishment, development and management of such a National Monument would be economically helpful to nearby communities in western Nebraska and eastern Wyoming, and to a lesser degree to northeastern Colorado and southwestern South Dakota. Its most important values, however, would



Conducted walks, similar to this at Badlands National Monument, would be programmed

unquestionably be in the intangible benefits to the visitor who would receive a ready understanding of the meaning and significance of the life of the geologic past portrayed here, and of the contributions made to science as a result of early scientific exploration and research at this site. Intangibles such as these cannot reasonably be measured in terms of economics.

CONCLUSIONS AND RECOMMENDATIONS

The Agate Fossil Beds are nationally significant because of their numerous, concentrated, well-preserved Miocene mammal fossils, which represent an important chapter in the history of life, one that is not now adequately represented in the National Park System. This site is significant too because of the important contributions made here by the early pioneers of scientific research in the West. The area also meets suitability and feasibility requirements for a National Monument.

Based on these conclusions it is recommended that the area described in this report be established as the Agate Fossil Beds National Monument, and that the necessary steps be taken as soon as possible to achieve the establishment of this area as a unit of the National Park System.

PROPOSED DEVELOPMENT AND USE

This area with its wealth of impressive and easily exposed fossil remains has unusual and interesting development opportunities to facilitate its public use, understanding, and enjoyment. The important story here would be presented through various interpretive methods.

The major interpretive story would be planned in the vicinity of Carnegie and University Hills, the sites of the principal quarries. The National Park Service would expose representative fossil remains at these sites by tunneling into the hills and removing the overburden of sediments above the two to three feet thick horizontal fossil beds. A visitor could then see the fossil skeletons of many creatures just as they were left fifteen million years ago when quieted by the stillness of death. Through certain interpretive display techniques, visitors could feel themselves closely associated with life of this now vanished scene. Also, they would have the opportunity to observe scientists exposing the deposits, reconstructing some of the skeletons and relieving certain fossils in place. To complement the in-place exhibits in telling the story of life represented here, a series of museum exhibits also would be prepared.

The exposure of some fossils for in-place exhibits and the removal of others for laboratory use or museum exhibition would necessitate careful and meticulous excavation, relieving and preservation techniques. Paleontological laboratory facilities would be required throughout the many years excavation and relieving work would be carried on. The site would be maintained as a research center

with facilities not only for field work on fossil remains, but would be provided with reference material, including an adequate library and reference collection of fossils.

An adequate structure would be built at the selected quarry site to provide for these activities. In-place exhibits would be provided at the **Stenomylus** Quarry and "Devil's Corkscrew" sites.

The National Monument headquarters would be developed in the vicinity of the Agate Springs Ranch and would consist of a visitor center, employee housing and maintenance buildings. In addition, a campground would be developed nearby.

The visitor center would be the initial contact station for Monument visitors. It would be comprised principally of an exhibit room and administrative offices. Here would be exhibited the Indian artifacts and historical materials making up the famous collection which Mrs. Cook intends to donate. Through these and additional exhibit materials would be portrayed the contribution of early scientists who worked here, the story of the Cook family and its contribution to early ranching, and Captain Cook's association with the Indians. Only enough paleontological information to stimulate the visitor's interest would be provided at the headquarters visitor center. The major paleontological story would be presented at the quarries as previously described.

A system of roads and trails would be developed for easy access to the many points of interest.

The rich natural history of this area would be interpreted by park naturalists through the medium of conducted walks, museum talks and evening lecture programs. Interpretive markers, self-guiding trails and wayside exhibits would provide interesting details of the scientific story for the benefit of those exploring on their own.

THE PROPOSED AREA AND ITS ADMINISTRATION

The proposed Agate Fossil Beds National Monument consists of approximately 3,150 acres. The principal area is irregular in shape, four miles long from east to west, and varies in width from three-fourths to almost two miles. A small detached area of 60 acres containing the **Stenompluss** Quarry is included in the total acreage. Also included is a connecting road right-of-way approximately 1.5 miles long and 200 feet wide. This area would preserve the famous Agate Springs Fossil Quarries at Carnegie and University Hills and their immediate surroundings; a representative portion of excellent "Devil's Corkscrew" formations; the **Stenomylus** Quarry; and a scenic stretch of the Niobrara River bluffs which today is somewhat indicative of the ancient scene here in Miocene times. It would also protect from unsightly developments the unspoiled scene along the existing roads; preserve the locale at the Agate Springs Ranch where scientific groups based their



Visitors at Dinosaur National Monument listen to an interpretive talk while observing Dinosaur bones relieved on the quarry face. A similar experience could be provided at the Agate Quarry sites



Fossils in place would be protected and interpreted as along this self-guiding trail in Badlands National Monument

early historic operations; and provide space for the necessary public and administrative facilities.

The Agate Fossil Beds National Monument is proposed as a unit of the National Park System to be administered under the provisions of the 1916 Act which established the National Park Service. Preservation for public enjoyment would be the basic guiding principle.

ACKNOWLEDGEMENTS

The Agate Fossil Beds National Monument Association is most grateful to the National Park Service for providing much of the content for this book—and to the individuals who helped Park Service personnel in its preparation.

Mrs. Margaret C. Cook and her late husband, Harold J. Cook, were much devoted to the proposal and gave willingly of their time in assisting the several representatives of the National Park Service who visited the Agate Spring Ranch during the past three years. Mrs. Cook prepared the section of this report on fossil collecting history, submitted information for the bibliography and made available significant photographs.

Mr. George Hoffman, on whose land the principal quarries are located, was particularly hospitable, and on one occasion guided National Park Service representatives to the **Stenomylus** Quarry.

Dr. C. Bertrand Schultz, Director of the University of Nebraska State Museum, and members of his staff, especially Mr. Lloyd Tanner, contributed information for the bibliography, reviewed the accuracy of scientific statements and furnished several photographs.

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