

THE MIOCENE FAUNAS FROM
THE WOUNDED KNEE
AREA OF WESTERN
SOUTH DAKOTA

JAMES REID MACDONALD

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INTRODUCTION

ACKNOWLEDGMENTS

THROUGH THE ENCOURAGEMENT of the late Dr. James D. Bump, Director of the Museum of Geology of the South Dakota School of Mines and Technology, the present study of the Wounded Knee faunas was begun by the writer in 1953. The purpose of the project was two-fold. First, it was hoped that the local boundary between the Oligocene and the Miocene could be established on the basis of stratigraphic collecting above the top of the *Leptauchenia nodular* layer in the Brule formation. Second, it was hoped that this collecting would expand our knowledge of the "Rosebud" faunas that were described by William D. Matthew in 1907.

I am especially and deeply indebted to Dr. Bump for his continued assistance and enthusiasm throughout the progress of this work. I also wish to acknowledge the assistance given me in the field by Dr. Mary R. Dawson, Mr. Burton Fedt, Dr. Morton Green, and Mr. Philo Macdonald. Permission to collect in the Pine Ridge Indian Reservation was given to us through the courtesy of the Oglalla Sioux Tribal Council. Mr. and Mrs. Joseph Horncloud of Pine Ridge assisted in many ways. Mr. and Mrs. Will Spindler of Day School Number Seven at Wounded Knee allowed us to use their facilities and assisted in public relations with the local residents.

Dr. Allen F. Agnew, Director of the South Dakota Geological Survey, aided in the stratigraphic work in the area. Mr. J. C. Harksen, assisted by Mr. D. G. Geiser, working jointly for Agnew and the writer, mapped three geological quadrangles as part of this project. Copies of these quadrangle maps,

which accompany this publication (map 2), were supplied by the South Dakota Geological Survey.

The American Museum of Natural History provided work space and access to its collections during the year that I spent working on this report. Dr. Edwin H. Colbert, Mrs. Rachel H. Nichols, and Dr. Bobb Schaeffer of the American Museum of Natural History and Dr. George Gaylord Simpson, then of the American Museum of Natural History and now of the Museum of Comparative Zoölogy at Harvard College, were of immeasurable assistance during this period. Dr. Max K. Hecht, also of the American Museum of Natural History, assisted in the identification of the reptile material. The late Mr. Charles H. Falkenbach of the Frick Laboratories aided in the identification of the oreodonts in the collection. Dr. Craig Black and Dr. A. E. Wood were consulted on the rodents. The collections in the Museum of Paleontology at the University of California, in the Chicago Natural History Museum, in the Museum of Comparative Zoölogy at Harvard College, and in the Yale Peabody Museum at Yale University were made available to me for comparison. The figures were drawn by Mrs. Florence D. Wood, and the typing of the manuscript and editorial assistance were supplied by my wife, Eileen D. Macdonald.

The final study of the faunas and the publication of this report were made possible through National Science Foundation Grants, Numbers G-6582 and GN-68, both administered by the American Museum of Natural History.

ABBREVIATIONS

The names of institutions in the collections of which the specimens used in this study belong are abbreviated as follows:

A.C.M., Amherst College Museum, Amherst, Massachusetts

A.M.N.H., the American Museum of Natural History

F:A.M., Frick Laboratory at the American Museum of Natural History

F.M.N.H., Field Museum of Natural History, Chicago. Although now the Chicago Natural History Museum, the specimens that were collected in the Wounded Knee area carry Field Museum numbers

M.C.Z., Museum of Comparative Zoölogy at Harvard College, Cambridge, Massachusetts
 N.S.M., Nebraska State Museum, Lincoln
 P.U., Princeton University, Princeton, New Jersey
 S.D.S.M., Museum of Geology at the South Dakota School of Mines and Technology, Rapid City
 U.C.M.P., University of California Museum of Paleontology, Berkeley

Y.P.M., Peabody Museum, Yale University, New Haven, Connecticut

The same initials are used to indicate the localities that have been designated by the field parties of the respective institutions or assigned by the present author; in such references the abbreviation "No." does not occur.

HISTORY OF EXPLORATION OF THE WOUNDED KNEE AREA

The Tertiary deposits in South Dakota that lie south of the White River and north of the Pine Ridge escarpment have been in the geologists' and paleontologists' backwater since work began in this area more than a hundred years ago. The abundant rewards that resulted from collecting in the White River Badlands caused the fossil hunters to ignore the less rewarding formations to the south. Below the border, in Nebraska, Agate Springs and Sioux County have attracted the attentions of paleontologists westward, to the virtual exclusion of the region between Chadron and Gordon, Nebraska.

In 1906, William D. Matthew, Albert Thomson, and William K. Gregory, of the American Museum of Natural History, spent a summer season collecting a mammalian fauna from the Miocene beds that are exposed along the Wounded Knee and Porcupine Creek drainages in Shannon County, South Dakota, a portion of the Pine Ridge Indian Reservation. The primary areas of interest were the Wounded Knee Creek drainage between Wounded Knee post office and Manderson and the Porcupine Creek drainage between Porcupine Butte and a point about 10 miles northwest of the Porcupine post office. The purpose of this expedition was to find a fauna that was post-Oligocene in age but older than the Miocene faunas from Nebraska and the John Day region of Oregon.

The history of this expedition is excellently summarized in Thomson's report (MS) to the Director of the American Museum of Natural History. As a point of historic interest, the pertinent portions of this report are quoted below:

REPORT OF THE EXPEDITION OF 1906 TO THE MIOCENE ON PINE RIDGE INDIAN RESERVA- TION, S. D., BY ALBERT THOMSON

This expedition was sent out by Professor Henry F. Osborn to explore the Miocene along the

southern tributaries of the White River on the Pine Ridge Indian Reservation.

Little was known of the fauna of this region as no systematic collecting had ever been done here aside from that which had been done by Mr. J. W. Gidley of this Museum in 1902-03 on the Rosebud Reservation.

The writer left New York June 4th, reaching Rapid City, South Dakota, June 9th, where a team, harness, tent, and provisions were purchased. On June 14th Dr. W. D. Matthew of the American Museum of Natural History joined the party, and June 16th we left Rapid City en route to Mr. Thomson's ranch on Springs Creek, S. D., where a part of an outfit used in 1904 had been stored. Here we spent nearly two days in getting our outfit into shape for traveling, also employing a Mr. Halisey as cook and teamster. Now being fully equipped for our purpose we proceeded to our field of operation, which was only a distance of about sixty miles to the southeast.

We traveled for one day through the famous Big Badlands of South Dakota, extending from the Cheyenne River on the north to White River to the south. Entering the Pine Ridge Reservation on the divide between Cheyenne and White Rivers, we crossed the White River and followed up Wounded Knee Creek for a distance of about twenty miles where we made our first camp in the Miocene beds.

Here our season's work began. Dr. Matthew and myself spent four days collecting with good results, finding in all eleven numbered specimens which from our field determinations are: *Merycochoerus*, *Rhinoceros*, *Archaeohippus*, *Steneofiber*, *Ticholeptis*, and *Leptauchenia*. Later I will quote geological observations from notes made by Dr. Matthew.

Having examined all exposures along Wounded Knee Creek, we moved camp to Porcupine Creek near Porcupine post office, where we remained until the close of the season. With a light team and wagon which [we] had in our outfit enabled us to work this country from our camp for a radius of twenty miles. For convenience in working these beds they had been divided and called the Upper and Lower Rosebud Beds. During the early part of the season good luck seemed to be with us as we

came across nearly all the rich pockets in both the upper and lower beds.

The fauna of the Upper beds is as follows: *Merychius*, *Merycochoerus*, *Rhinoceros*, *Camel*, *Peccary*, *Amphicyon*, and Rodents. Of these *Merychius* was the most common, fragments could be seen everywhere, but, strange to say, a good skull and jaws were hard to find though we were fortunate enough to discover one. Skeletal material was all more or less fragmentary.

The fauna of the Lower beds is similar to that of the Upper beds and runs as follows: *Merycochoerus*, Oreodonts, Camel, Rhinoceros, Elothere, Rodents, and Carnivora. *Merycochoerus* is the most common in these beds. We collected in all about 33 *Merycochoerus* skulls. Many have parts of skeletons associated, and one complete articulated skeleton of *Merycochoerus*. One large block containing many *Mesoreodon* skulls which will make a very good specimen for exhibition.

On July 26th Dr. Matthew returned to New York, which was a great loss to our party. Mr. W. K. Gregory of the American Museum of Natural History joined the party August 1st and remained until the close of the season. Mr. Gregory proved to be a valuable assistant and a very agreeable companion.

Professor Osborn visited our camp early in August. After three days stay Professor Osborn and myself took a delightful trip through the Big Badlands.

Taking everything into consideration, the small party and the disagreeable weather toward the end of the season, the expedition met with very good success. Mr. Gregory and I took a day's trip to the northeast for the purpose of looking up a locality for next season. Along American Horse Creek and Medicine Root Creek we saw some very promising looking exposures, and from information gathered from residents there are good Miocene exposures as far east as Eagles Nest Butte. . . .

For next season's work in this region I would suggest (1) a very strong party, (2) saddle horses in connection with our light driving outfit, because exposures of the Upper beds are all more or less scattered and for the best results this region must be worked systematically, that is to say, every little exposure should be prospected. . . .

Little can be said of the geology of these beds yet, as only a small territory has been examined. In order to come to any definite conclusion as to their formation they should be carefully examined from our camp on Porcupine Creek west and southwest as far as Agate Spring Quarry and east and northeast as far as they extend. The beds seem to be very irregular and inconstant, with numerous stream channels. The levels cannot be easily traced for any great distance except for

certain beds of volcanic ash and volcanic tuff, which may prove to be widespread and constant and have been provisionally used to separate horizons in the formations. Beginning the Upper Rosebud beds at a volcanic ash layer near the top of Porcupine Butte and running down to about the level of Porcupine post office. Here is a rather hard and nearly white, calcareous shaly limestone, which we called about the top of the Lower Rosebud section. The Lower Rosebud beds beginning at this calcareous layer and running down to a white bed at the top of the *Leptauchenia* clays, making the total thickness of the Rosebud beds about feet [*sic*].

About ten miles northwest of Porcupine post office on Porcupine Creek the *Leptauchenia* clays are shown and correspond in character to those capping Sheep Mountain and other prominent points in the Big Badlands. At this point we also discovered a contact between the Lower Rosebud and *Leptauchenia* clays and collected fossils from both beds.

I think when this year's collection from this region has been worked out that we will find we have a larger and probably different fauna from that of Peterson's Agate Spring Quarry in the Lower Nebraska beds, which are, I think, considerably higher than the Rosebud beds.

Mr. Dawson of Porcupine reported finding an elephant tusk in the lower Rosebud. We carefully examined the fragments of the so-called tusk and found them to be a rib probably of a rhinoceros. We also examined the prospect where this specimen was found and uncovered two more large ribs and several vertebrae of the same animal. Elephant remains have been found in this region but only fragmentary, and in gravel pits from the Pleistocene. . . .

SUMMARY OF EXPENSES

Traveling expenses from New York to Rapid City, S. D. and return	\$ 137.45
Team and harness, tent, canvas, and hardware	373.00
Provisions, feed, lumber, wood alcohol and hire of saddle horse	210.34
Cook and teamster at \$30. per month	99.00
	<hr/>
Total	\$ 819.79
Credit for sale of two horses	50.00
	<hr/>
	769.79
Salary of W. D. Matthew 2 months	200.00
Salary of Albert Thomson 4 months	360.00
	<hr/>
	\$1,329.79

Respectfully submitted,
Albert Thomson

In 1907, work was continued about 10 to 15 miles east of Porcupine Creek in the Kyle area, in the American Horse Creek drainage, and in the vicinity of Eagle's Nest Butte. The material collected by this expedition was considered as part of the 1906 fauna.

While collecting and studying the stratigraphy of the Wounded Knee area, Matthew and Thomson (MS) made two basic assumptions: 1. The base of the Miocene is marked by the heavy white ash layer that is prominently exposed in the White River Badlands in South Dakota. (This ash is well developed on the top of Sheep Mountain Table to the north of the White River and may also be seen in the face of the northward-facing escarpment south of the White River near the mouth of Porcupine Creek.) 2. The Miocene beds in this area, above the white ash, were equivalent to the exposures of pink silt along the Little White River and its tributaries near Rosebud Agency in Todd County, South Dakota, about 90 miles to the east.

Gidley (1904) had named the pink silts in Todd County the "Rosebud beds" in a three-part paper in which he and Matthew described a suite of specimens collected in the Rosebud Agency area in 1903.

The original Rosebud Fauna as listed by Gidley (1904, p. 246) included:

"cf. *Cynodesmus*
Steneofiber pansus Cope
Meniscomys sp.
 ?*Eporeodon*
Merycochoerus vel *Promerycochoerus*
Merychius cf. *elegans*"

Various later reviews of this material indicate that the identifiable specimens represent:

Promylagaulus cf. *riggsi*
Capatanka brachyiceps (Matthew)
Merychius arenarum Cope

While collecting on Wounded Knee Creek, south of Manderson, Matthew and Thomson (MS) referred all their specimens to the "Rosebud beds," and state in their field notes:

The beds on Wounded Knee above Manderson do not show any break in sedimentation but are apparently continuous, changing gradually from a sandy clay full of small round concretions (*Leptauchenia* beds) to a soft clayey sand full of

irregular concretions in some layers, others soft layers, and in upper part harder limey layers.

In *Leptauchenia* beds occurred numerous *Leptauchenia* and an oreodont about the size of *Eporeodon*, and fragments of *Leptomeryx*, horse and carnivore and *Steneofiber*. The base of [the] Rosebud beds was determined by fauna only, as no break occurs, but *Leptauchenia* fauna disappears and *Ticholeptus* is found. Higher up occurred the *Merycochoerus* skulls, which are probably (some of them at least) *Promerycochoerus*. Upper levels of Rosebud beds are very barren. *Cosoryx* occurs, etc. Contact between Rosebud and Loup Fork not well shown on this creek.

Upon moving their activities to the Porcupine Creek drainage, Matthew and Thomson divided the fauna into two units. The part that came from above the level of their camp near Porcupine post office was called the "Upper Rosebud" fauna, and the material from below the level of their camp was designated as the "Lower Rosebud" fauna. This division is described as follows in their field notes:

'Upper Rosebud' includes beds from top or near top of Porcupine Butte down to creek bottom at camp $\frac{1}{2}$ mile above p.o.

'Lower Rosebud' includes beds from creek bottom at camp down to *Leptauchenia* beds which show at creek level ab't 8 miles below postoffice, at top of *Leptauchenia* Beds is a strong white layer which in Thomson's opinion is identical with that at top of Sheep Mountain.

The above description is accompanied by a sketch of a geologic section of the region which also indicates the levels from which some of the material was collected. This section accurately presents the over-all topographic expression of the formations along Porcupine Creek. Unfortunately, the levels indicated for many of the specimens are not acceptable, as they are geographically impossible.

The only publication on the area, other than brief notices of new species or revisions of known material, was a paper by Matthew (1907) in which he reported on the fauna collected for the American Museum of Natural History in 1906 and referred the post-Oligocene deposits in the area to the Upper and Lower Rosebud beds. In this report he wrote (pp. 169-171):

In 1902 and 1903 the American Museum parties collecting in the Loup Fork of South Dakota, south of White River, made a brief reconnaissance of the beds lying between the Loup Fork and White River formations, and found a few fossils sufficient to indicate their age as Lower Miocene, and the local term of Rosebud beds was proposed by Matthew and Gidley for this intermediate formation. In 1906, when the work in this region was resumed, Prof. Osborn authorized a thorough search of these rather barren and unpromising beds, in view of the probable importance and interest of whatever fossils might be found in them. The results of the first season's work have fully justified Osborn's decision, the fauna being almost entirely new, and supplying two intermediate stages of evolution between the Oligocene and later Miocene. Although probably nearly equivalent in age to the Agate Springs fauna [Harrison formation] it presents a very different facies, as far as comparisons have been made. Only a small part of the collection has yet been studied and compared in the museum; for the remainder the determinations are those made by the writer in the field, and are merely approximate and in no case specific. The results already attained, however, seem of sufficient interest to warrant their publication, especially desirable in connection with Prof. Osborn's forthcoming correlation of the mammal faunas of the American Tertiary and Quarternary.

The western part of the formation attains a thickness estimated at 500 feet on Porcupine Creek, a southern tributary of White River. The base is taken at a heavy white stratum which appears to be identical with the stratum capping the White River formation on Sheep Mountain in the Big Badlands. This stratum can be seen extending interruptedly across the river to Sheep Mountain about twenty miles distant, capping several intervening buttes and projecting points of the underlying formation. The Rosebud beds at the bottom approximate the rather hard clays of the upper Leptauchenia beds, but become progressively softer and sandier towards the top, and are capped at Porcupine Butte . . . by a layer of hard quartzitic sandstone. Several white flinty calcareous layers occur in the beds, one of which, about half-way up [slightly above the base of the Harrison formation], was used to divide them into Upper and Lower. The stratification is very variable and inconstant, lenses and beds of soft fine grained sandstone and harder and softer clayey layers alternating with frequent channels filled by sandstones and mud-conglomerates, all very irregular and of limited extent. The hard calcareous layers are more constant. A bed of volcanic ash [lower Ash Hollow] lies near the top of the forma-

tion and there may be a considerable percentage of volcanic material in some of the layers further down. These volcanic ash beds should in theory be of pretty wide extent, and may be of considerable use in the correlation of the scattered exposures on the heads of different creeks—a very difficult matter without their aid.

These beds form the upper part of the series of bluffs south of the White River on the Pine Ridge and Rosebud Reservations and are exposed in the upper part of the various tributary creeks. The name Arickaree . . . has been applied by Darton to these and various more or less similar formations overlying the White River in the Central Great Plains. In northeastern Colorado the Arickaree beds are known from their fauna to be middle or late Miocene; in the bluffs south of White River in South Dakota they are Lower Miocene—possibly in part Oligocene; for the most part their age is unknown. Hence the term Arickaree, if Darton's connotation of it be accepted, must be used in a broad way—somewhat as Loup Fork has been used by most writers—to signify deposits of similar lithologic character and stratigraphic position, but of quite different age in different parts of the Plains.

Between 1906 and 1953, some additional material was collected from this area by various museums, more species were described from the two "faunas," and the original collection was subjected to minor revisions as various groups of mammals were reviewed by later authors.

In 1953, the Museum of Geology of the South Dakota School of Mines and Technology began an extensive program of collecting in the Wounded Knee area. By this time it had become apparent that the "Rosebud faunas" were actually a complex of specimens from several different formations, and that the lumping together of this material into two "faunas" was an oversimplification.

In reviewing the Miocene of western Nebraska, Schultz (1938) recognized this fact when he suggested that the term "Arickaree Group" be confined to the Gering, Monroe Creek, and Harrison formations and further stated: "The term 'Rosebud' is a generalized, indefinite name for deposits in the vicinity of the Rosebud Agency in South Dakota. It appears to include deposits of more varied age than the Arickaree. The 'Rosebud' was divided into upper and lower and the use extended by Dr. W. D. Matthew."

In order to return the term "Rosebud" to its original usage, Macdonald (1957a) proposed that the term "Wounded Knee fauna (s)" be applied to the assemblages from the Porcupine Creek and Wounded Knee Creek drainages.

In the type area, the Rosebud formation is exposed above the Brule and below the Valentine formations. These beds, when traced westward, are found in scattered outcrops along most of the southern border of South Dakota. In the Porcupine Creek and Wounded Knee Creek area, the Rosebud formation overlies the Harrison formation and is the most widely exposed lithic unit in the southern part of the area. In recent years, these beds have been referred to the Marsland formation on the basis of the fossil fauna. Although partially equivalent in age, these beds are quite distinct, lithologically, from the Marsland or "Upper Harrison" of western Nebraska.

As collecting progressed, it became obvious that Matthew and Thomson were mistaken in their designation of some stratigraphic levels during the 1906 field season. The outcrops at Manderson and below (downstream as well as stratigraphically) are not Leptauchenia beds but are actually well up into the Miocene section. The cliff-forming sands and silts that form a conspicuous part of the topography at Manderson are part of the Monroe Creek formation. The beds just below the cliffs are also of Miocene age, being in part equivalent to the Gering formation of Nebraska, and are herein referred to the Sharps formation. Actually, the basal Miocene white ash, which Nichnisch and Macdonald (1962) named as the Rockyford member of the Sharps formation, disappears underground about 12 miles north of Manderson near the abandoned Wakan Store. On the Porcupine Creek side of the divide, the Rockyford member disappears on a tributary to Porcupine Creek on the Groom Ranch, about 5 miles north of the point indicated in the 1906 field notes.

The "strong white layer which in Thomson's opinion is identical with the top of Sheep Mountain" (Matthew and Thomson, MS) is actually near the top of the Sharps formation. This area is shown in Osborn's

monograph on the Equidae (1918, fig. 7). This error is very understandable, as this outcrop is in the zone of strong mineralization just below the base of the Monroe Creek formation. A large number of peculiar, cigar-shaped concretions in this mineralized zone are similar to those found in the ash on Sheep Mountain Table. Thus, the combination of the heavy, white, cemented zone and the distinctive concretions easily leads to a mistake in formational identification.

As the result of the discovery of these discrepancies, a project that was begun as an effort to re-collect and expand the original "Rosebud" faunas became a search for a new fauna that would close the gap between the fauna known from the latest Oligocene and the fauna from the "Lower Rosebud." The result of this collecting is described herein as the Wounded Knee-Sharps fauna.

It is now apparent that the section exposed on Porcupine Creek includes the Chadron formation, the Brule formation, a previously unnamed formation for which the name Sharps has been proposed, the Monroe Creek formation, the Rosebud formation, and the Ash Hollow formation which caps Porcupine Butte. The last-named was referred to by Matthew (1907, p. 170) as "a layer of hard quartzitic sandstone."

The 1906 collection came from the middle part of these beds. The "Lower Rosebud" came from the section that includes the top of the Sharps formation through the lower part of the Harrison formation. The "Upper Rosebud" came from the lower part of the Harrison formation through the Rosebud formation. It is doubtful if any of the 1906 collection came from above the Rosebud formation. However, it is quite certain that some of the material collected in 1907, and referred to the Upper Rosebud formation from the American Horse Creek, Kyle, and Eagle's Nest Butte region, is post-Rosebud in age and may even be as young as Ash Hollow.

The new materials described herein were collected primarily from the Sharps formation. An examination of the Nebraska section in the Scotts Bluff and Redington Gap area suggests that the Sharps formation is, in part, lithologically equivalent to the beds that Darton (1898) mapped as the upper part

of the Brule formation. However, it is not lithologically equivalent to the Gering formation in that area. Further, a comparison of the available material indicates that the

fauna of the upper portion of the Brule formation in that area and the Gering formation of Darton is, in part, contemporaneous with the Wounded Knee-Sharps fauna.

GEOLOGY OF THE WOUNDED KNEE AREA

The Wounded Knee faunas were collected along the drainages of Wounded Knee and Porcupine creeks. These creeks and their tributaries have cut two essentially parallel valleys, about 6 miles apart, through an outlier of the high plains that extends north from Pine Ridge to the south side of White River. The collecting area covers slightly more than four townships. Between the Wounded Knee collecting area and the Pine Ridge escarpment is a wide plain which is traversed by U. S. Highway 18. Certain portions of this plain are covered with deposits of the Ogallala group (Green, 1956). Wounded Knee Creek and Porcupine Creek have their origins on this plain in a sand dune area at the eastern terminus of Pine Ridge. Flowing generally northwest, these streams have cut through the Miocene and Oligocene deposits between Pine Ridge and White River, so that the Chadron formation is exposed at their mouths on White River. East of the mouth of Porcupine Creek, White River and its tributaries have developed an escarpment some 350 feet high which forms the southern boundary of the White River Badlands and exposes the entire Brule section and 253 feet of the Sharps formation. It is on this escarpment, in the SW. $\frac{1}{4}$ of the SW. $\frac{1}{4}$ of sect. 25, T. 41 N., R. 43 W., that part of the type section of the Sharps formation is exposed.

The Sharps formation is of early Miocene age. It overlies the Brule formation in this area and underlies the Monroe Creek formation. The basal Rockyford member of the Sharps formation is composed of a prominent volcanic ash bed which ranges up to 55 feet in thickness in the White River Badlands and is 38.5 feet thick in the type section of the Sharps formation. This member was described by Nicknisch and Macdonald (1962) as the Rockyford member of the Sharps formation. The remainder of the Sharps formation attains a thickness of 346.5 feet in the Wounded Knee area. A detailed discussion of

the Sharps formation is given in the South Dakota Geological Survey map of the areal geology of the Sharps Corner, Malone, and Manderson quadrangles which accompany this report (map 2).

Between the mouth of Porcupine Creek and that of Wounded Knee Creek, the escarpment is not so prominent. The combined attack of the two streams and their tributaries has reduced the topography, and much of the area is covered by Quaternary dune sands. A thick section of channel deposits has replaced the top of the typical Brule beds and the Sharps silts and clays. Some of the lower portions of these channels are Protoceras channels, although they do not exhibit the characteristic (if channel deposits may be characterized) green hue that is seen in most exposures of Protoceras channels. In this area, channels of Miocene age are found to have cut 40 feet below the level of the Rockyford ash. Possibly these channel deposits are equivalent in age to the Gering of Darton, but insufficient fossil material is available for a definite age determination to be made.

One of the minor channels in this area, which is exposed between the Brule and the Quaternary sands, has produced an interesting microfauna which is listed in the locality data of this report as the Godsell Ranch Channel faunule. South of the channel area, the Sharps formation and the underlying Brule formation are heavily cemented. This cementation and its attending light color and cliff-forming characteristics have misled earlier investigators into believing that all this section was part of the Brule formation. This zone of cementation extends south for a distance of about 5 miles, where it becomes less prominent and is exposed only in patches for another 4 miles in a southeasterly direction. This zone of cementation is not seen on the east side of Porcupine Creek except for small local tongues and an area covering slightly more than 1 square mile just south of St.

John's Church (S.D.S.M. V5354). This large exposure is shown in Osborn (1918, fig. 7). It was this exposure that led Matthew and Thomson to believe that they had reached the level of the top of the Brule formation at that point.

The top of the cemented area between Chimney Butte and the Tibbets Ranch road is covered with the remnants of Quaternary sand dunes. Because of the headward cutting of tributary streams in this area, many of these dunes have assumed a pyramidal shape which presents a ragged skyline when viewed from the east or west. To the west of Wounded Knee Creek, the escarpment is entirely gone as the result of the combined work of Wounded Knee Creek, Grass Creek, and their tributaries.

Southward along the two streams a continuous succession of younger formations is exposed. Overlying the Sharps formation is the prominent cliff-forming Monroe Creek formation. This unit appears as a series of cliffs about 3 miles south of Sharps Corners on the east side of Porcupine Creek and about $\frac{1}{2}$ mile south of the Gooseneck Road on the

Wounded Knee-Porcupine Creek divide. North of these most northern exposures of the Monroe Creek formation, the Sharps formation forms the highest topographic features, with the exception of those areas that have perched remnants of sand dunes. West of Wounded Knee Creek the area has been more heavily eroded, so that the Monroe Creek formation does not appear north of a point about 2 miles south of the junction of the Gooseneck Road and the Manderson-Rockyford Road. Overlying the Monroe Creek formation is the Harrison formation which contains the heavily cemented layers that marked the division between Matthew's Upper and Lower Rosebud faunas. Southward, as the stream valleys become narrower, the Rosebud formation is exposed over most of the highlands. The top of Porcupine Butte, which is the highest topographic feature in the area, is capped with sands and tuffs that are a remnant of the formerly widespread Ash Hollow formation.

The geologic succession in the Wounded Knee area is diagrammatically shown in figure 1.

Horizon	Group	Formation	Thickness	Matthew (1907)
Lower Pliocene	Ogallala	Ash Hollow		
Middle Miocene		Rosebud	220'	Upper Rosebud
Lower Miocene	Arikaree	Harrison	128'	
		Monroe Creek	90'	Lower Rosebud
		Sharps	385'	Leptauchenia Beds
Middle & Upper Oligocene	White River	"Leptauchenia Beds" Brule "Oreodon Beds"		
Lower Oligocene		Chadron		

FIG. 1. Geologic units in the Wounded Knee area.

FAUNAL LIST AND STRATIGRAPHIC DISTRIBUTION OF THE
WOUNDED KNEE FAUNAS

The division of the Wounded Knee fossil vertebrates into four faunas is an arbitrary separation by recognized lithologic units.

Only through such a separation can these faunal complexes become useful in regional correlation.

TABLE 1
LIST OF THE WOUNDED KNEE FAUNAS AND THEIR STRATIGRAPHIC DISTRIBUTION

	Sharps Formation	Monroe Creek Formation	Harrison Formation	Rosebud Formation
Reptilia				
Squamata				
Iguanidae, indet.	x ^a	—	—	—
? <i>Peliosaurus</i> sp.	x	—	—	—
Anguidae, indet.	x	—	—	—
Amphisbaenidae, indet.	x	—	—	—
Mammalia				
Marsupialia				
<i>Peratherium spindleri</i>	x	—	—	—
Insectivora				
<i>Ocajila makpiyahe</i>	x	—	—	—
<i>Domnina greeni</i>	x	—	—	—
<i>Domninoidea evelynae</i>	x	—	—	—
<i>Proscalops</i> sp.	—	x	—	—
Talpidae, indet.	x	—	—	—
<i>Arctoryctes terrenus</i>	x	—	—	x
Primates				
<i>Ekgmowechashala philotau</i>	x	—	—	—
Lagomorpha				
<i>Palaeolagus hypsodus</i>	x	—	—	—
<i>Palaeolagus philoi</i>	x	—	—	—
<i>Megalagus primitivus</i>	x	—	—	—
? <i>Palaeolaginae</i> , indet.	x	—	—	—
<i>Archaeolagus primigenius</i>	—	—	—	x
<i>Archaeolagus macrocephalus</i>	—	—	—	x
Rodentia				
<i>Prosciurus dawsonae</i>	x	—	—	—
? <i>Prosciurus dawsonae</i>	x	—	—	—
<i>Allomys harkseni</i>	—	x	—	—
<i>Meniscomys hippodus</i>	x	—	—	—
<i>Meniscomys</i> sp.	—	x	—	—
<i>Promylagaulus riggsi</i>	—	—	—	?
<i>Promylagaulus</i> cf. <i>riggsi</i>	—	x	—	—
<i>Mylagaulodon</i> cf. <i>angulatus</i>	—	—	—	x
<i>Pleurolicus leptophrys</i>	x	—	—	x
<i>Pleurolicus dakotensis</i>	—	x	?	—
<i>Pleurolicus clasoni</i>	x	—	—	—
<i>Gregorymus formosus</i>	—	—	x	x
<i>Gregorymus curtus</i>	—	—	x	?
<i>Grangerimus oregonensis</i>	—	—	—	x
<i>Grangerimus dakotensis</i>	x	—	—	—
<i>Heliscomys</i> sp.	x	—	—	—
<i>Proheteromys fedti</i>	x	—	—	—

TABLE 1—(Continued)

	Sharps Formation	Monroe Creek Formation	Harrison Formation	Rosebud Formation
<i>Proheteromys gremmelsi</i>	x	—	—	—
<i>Proheteromys bumpi</i>	x	—	—	—
<i>Proheteromys matthewi</i>	—	—	—	x
<i>Hionkala andersontau</i>	x	—	—	—
<i>Florentiamys agnewi</i>	x	—	—	—
<i>Tamias</i> sp.	x	—	—	—
<i>Palaeocastor nebrascensis</i>	x	—	—	—
<i>Palaeocastor simplicidens</i>	—	?————?	—	—
<i>Capatanka cankpeopi</i>	x	—	—	—
<i>Capatanka brachyceph</i>	—	?————?	—	—
<i>Capacikala gradatus</i>	x	—	—	—
? <i>Capacikala sciurooides</i>	—	—	x	—
<i>Eumys blacki</i>	x	—	—	—
<i>Eumys woodi</i>	x	—	—	—
<i>Scottimus</i> sp.	x	—	—	—
Carnivora				
<i>Hesperocyon leptodus</i>	x	—	—	—
<i>Hesperocyon gregorii</i>	—	—	x	—
<i>Nothocyon roii</i>	x	—	—	—
<i>Nothocyon geismarianus</i>	x	x	—	—
<i>Nothocyon lemur</i>	x	—	—	—
<i>Nothocyon near latidens</i>	—	?————?	—	—
<i>Tomarctus thomsoni</i>	—	—	—	x
<i>Cynodesmus cooki</i>	x	—	—	—
<i>Cynodesmus vulpinus</i>	—	—	x	—
<i>Cynodesmus minor</i>	—	—	—	x
<i>Neocynodesmus delicatus</i>	—	?————?	—	—
<i>Mesocyon robustus</i>	x	—	x	—
<i>Sunkahetanka geringensis</i>	x	—	—	—
<i>Sunkahetanka pahinsintewakpa</i>	x	—	—	—
<i>Enhydrocyon crassidens</i>	x	?————x	—	—
<i>Mammacyon obtusidens</i>	—	?————?	—	—
<i>Palaeogale doroithiae</i>	x	—	—	—
<i>Promartes lepidus</i>	—	—	—	x
<i>Promartes gemmarosae</i>	—	?————?	—	—
<i>Megalictis ferrox</i>	—	—	—	x
<i>Nimravus sectator</i>	—	?————?	—	—
<i>Ekgmoiteptecela olsontau</i>	x	—	—	—
Perissodactyla				
<i>Miohippus equinanus</i>	—	?————x	—	—
<i>Miohippus</i> near <i>equinanus</i>	x	—	—	—
<i>Miohippus</i> cf. <i>gemmarosae</i>	—	—	x	—
<i>Miohippus equiceps</i>	x	—	—	—
<i>Parahippus pristinus</i>	—	?————x	—	—
<i>Parahippus coloradensis praecurrens</i>	—	—	—	x
<i>Parahippus texanus</i>	—	—	—	x
<i>Hyracodon apertus</i>	x	—	—	—
<i>Hyracodon</i> sp.	x	—	—	—
<i>Diceratherium gregorii</i>	x	—	—	x
<i>Diceratherium</i> cf. <i>gregorii</i>	x	—	—	—
<i>Diceratherium armatum</i>	x	—	—	—

TABLE 1—(Continued)

	Sharps Formation	Monroe Creek Formation	Harrison Formation	Rosebud Formation
Artiodactyla				
<i>Leptochoerus</i> sp.	x	—	—	—
<i>Agriochoerus</i> sp.	x	—	—	—
<i>Mesoreodon megalodon</i> cf. <i>sweeti</i>	x	—	—	—
<i>Phenacocoelus stouli</i>	—	—	—	x
<i>Promerycochoerus carrikeri</i>	—	—	x	—
<i>Promerycochoerus barbouri</i>	—	—	x	—
<i>Promerycochoerus minor pygmyus</i>	—	—	x	x
<i>Promerycochoerus montanus pinensis</i>	—	?———	x	—
<i>Desmatochoerus curvidens gregorii</i>	—	—	x	—
<i>Desmatochoerus hatcheri geringensis</i>	x	—	—	—
<i>Desmatochoerus wyomingensis</i>	x	—	—	—
<i>Merycochoerus matthewi</i>	—	—	—	x
<i>Merychys minimus</i>	—	—	—	x
<i>Cyclopidius schucherti</i>	x	—	—	—
<i>Cyclopidius simus</i>	x	—	—	—
<i>Desmathys pinensis</i>	—	—	x	—
<i>Arretotherium leptodus</i>	—	—	x	—
<i>Arretotherium</i> sp.	x	—	—	—
<i>Oxydactylus</i> cf. <i>wyomingensis</i>	x	—	—	—
<i>Oxydactylus exilis</i>	—	—	—	x
<i>Oxydactylus lacota</i>	—	—	—	x
? <i>Oxydactylus</i> sp.	x	—	—	—
<i>Nanotragulus</i> cf. <i>loomisi</i>	x	—	—	—
<i>Nanotragulus ordinatus</i>	—	?———	x	—
<i>Nanotragulus intermedius</i>	x	—	—	—
<i>Leptomeryx</i> sp.	x	—	—	—
<i>Blastomeryx primus</i>	—	—	—	x
<i>Blastomeryx advena</i>	—	—	—	x
<i>Blastomeryx</i> sp.	—	—	—	x

* x, Those elements that can be definitely placed; ?———x or x———?, those that are known to occur in one formation and may have been found in the adjacent formation; ?———?, those for which the data are unsatisfactory.

MIOCENE FOSSIL LOCALITIES IN THE WOUNDED KNEE AREA

The following pages contain a list of the fossil localities from which the Wounded Knee faunas were collected. After each locality description, a summary of the material collected from that site is given. The locality given is the type locality for those species that are marked with an asterisk (*).

The American Museum of Natural History localities were gleaned from the 1906 field notes of Matthew and Thomson (MS); in the following list these are designated as "Field notes, 1906." Arbitrary locality numbers have been assigned by me for ease of reference. The localities are numbered in the order of description in the Matthew and Thomson field

notes, without regard to geographic or stratigraphic position. The horizons are shown as originally named, with parenthetical additions made wherever possible.

Stratigraphic comments are based on either the oreodont monographs of Schultz and Falkenbach, or the "1906 field notes in hand" survey that I performed in the summer of 1959 (identified as "J.R.M."). Some specimens in the American Museum that are indeterminate, have not been prepared, or are in the process of being studied by others (i.e., the oreodonts) either have been omitted from the list or are listed in quotation marks.

Most of the localities are shown on map 1.

A.M.N.H. "ROSEBUD" 1

"Wounded Knee Cr'k, 5 m. above [south of] Manderson . . . Rosebud beds": Field notes, 1906. (Harrison formation: Schultz and Falkenbach, 1949, p. 183. Probably Harrison formation, possibly Monroe Creek formation: J.R.M.)

Enhydrocyon crassidens Matthew
 **Miohippus equinanus* Osborn
Promerycochoerus montanus pinensis Schultz and Falkenbach
Desmatochoerus curvidens gregorii (Loomis)

A.M.N.H. "ROSEBUD" 2

"Wounded Knee Cr'k, 4 m. above [south of] Manderson . . . Rosebud beds": Field notes, 1906. (Harrison formation: Schultz and Falkenbach, 1949, pp. 102, 129-130. Probably Harrison formation, possibly Monroe Creek formation: J.R.M.)

Diceratherium sp.
Promerycochoerus montanus pinensis Schultz and Falkenbach
Promerycochoerus carrikeri Peterson

A.M.N.H. "ROSEBUD" 3

"Wounded Knee Cr'k, 3 m. above [south of] Manderson . . . Rosebud beds . . . base of Rosebud beds": Field notes, 1906. (Harrison formation: Schultz and Falkenbach, 1949, p. 130. Harrison formation: J.R.M.)

Promerycochoerus montanus pinensis Schultz and Falkenbach

A.M.N.H. "ROSEBUD" 4

"Wounded Knee Cr'k, 2 m. above [south of] Manderson . . . transition beds bet. Rosebud & Leptauch. . . upper Leptauchenia beds": Field notes, 1906. (Monroe Creek formation or Sharps formation: J.R.M.)

"*Leptauchenia*"

A.M.N.H. "ROSEBUD" 5

"E. of Porcupine Butte, 'Bird head' of Porcupine Creek . . . upper Rosebud beds": Field notes, 1906. (Lower Marsland formation: Schultz and Falkenbach, 1947, pp. 221-222. Rosebud formation: J.R.M.)

Gregorymus formosus (Matthew)
Cynodesmus minor Matthew
 **Promartes lepidus* (Matthew)
Megalictis ferox Matthew

Diceratherium sp.

Merychys minimus Peterson
 **Oxydactylus exilis* Mathew
 **Oxydactylus lacota* Matthew
Problastomeryx primus (Matthew)

A.M.N.H. "ROSEBUD" 6

"Porcupine Butte . . . uppermost Rosebud beds": Field notes, 1906. (Rosebud formation or Ash Hollow formation: J.R.M.)

"*Entoptychus*," exchanged to Calcutta Museum, 1912

A.M.N.H. "ROSEBUD" 7

"Porcupine Cr'k 4 miles below [Porcupine] postoffice . . . lower Rosebud beds": Field notes, 1906. (Harrison formation: Schultz and Falkenbach, 1954, p. 184. By inference from the description of A.M.N.H. "Rosebud" 8, this is in the Harrison formation which outcrops at this point at the top of the bluffs between $\frac{1}{2}$ and 1 mile east of Porcupine Creek: J.R.M.)

Gregorymus curtus (Matthew)
 **Capatanka brachyceps* (Matthew)
 **Cynodesmus vulpinus* (Matthew)
 **Mesocyon robustus* Matthew
Miohippus equinanus Osborn
Miohippus gemmarosae Osborn
 **Parahippus pristinus* Osborn
Diceratherium sp.
 **Promerycochoerus montanus pinensis* Schultz and Falkenbach
Promerycochoerus barbouri Schultz and Falkenbach
Promerycochoerus carrikeri Peterson
Desmatochoerus curvidens gregorii (Loomis)

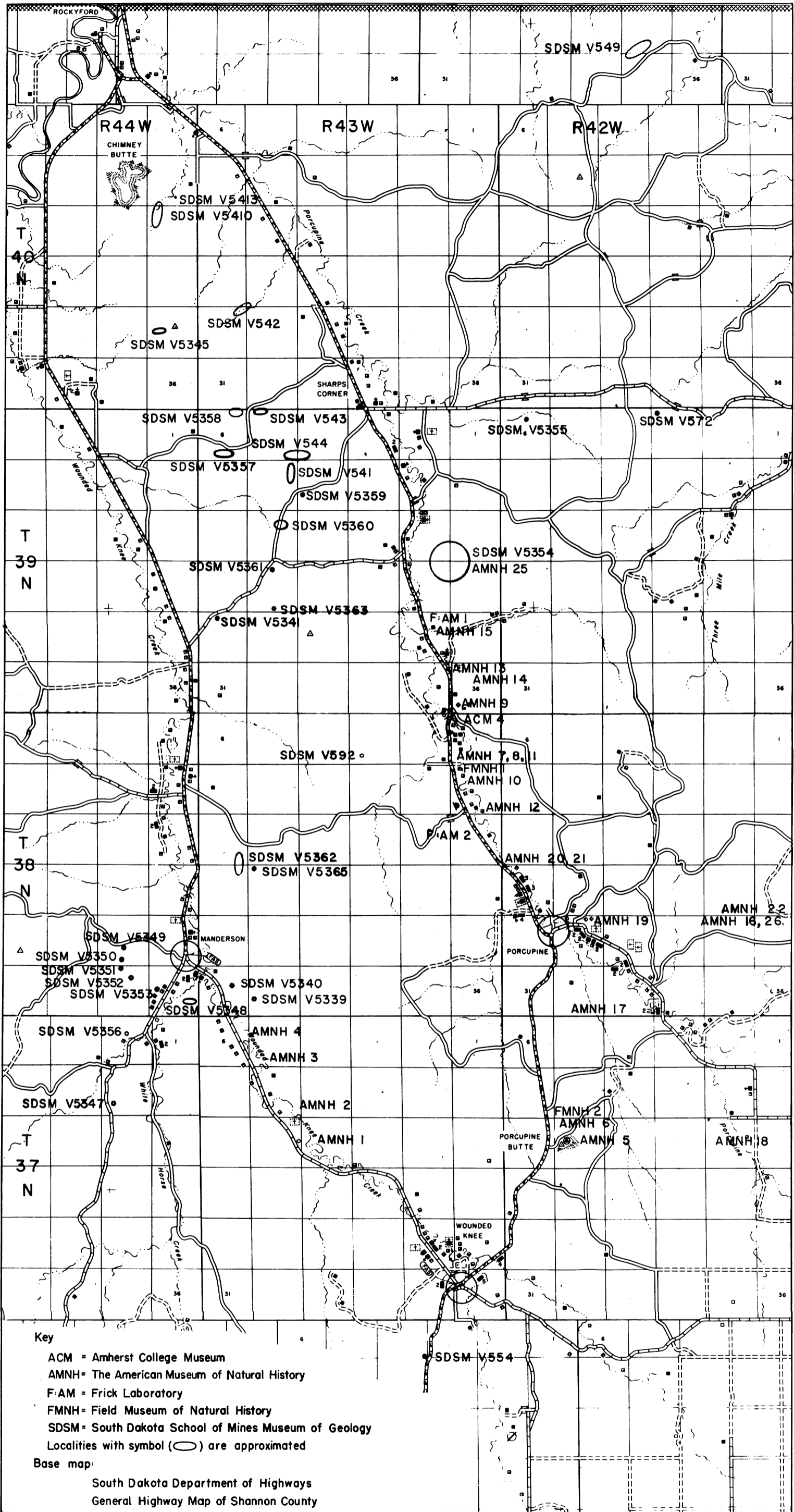
A.M.N.H. "ROSEBUD" 8

Described in 1906 field notes (Matthew and Thomson, MS) as the same area as A.M.N.H. "Rosebud" 7, but qualified as "lower level" and "lowest Rosebud." (Harrison formation: Schultz and Falkenbach, 1949, p. 130. Monroe Creek formation: J.R.M.)

**Palaeocastor simplicidens* (Matthew)
Nothocyon cf. *geismarianus*
 **Nimravus sectator* Matthew
 "*Leptauchenia*"
Promerycochoerus montanus pinensis Schultz and Falkenbach

A.M.N.H. "ROSEBUD" 9

"Porcupine Cr'k 5 m. below [Porcupine]



MAP 1. Vertebrate fossil localities in the Wounded Knee area, Shannon County, South Dakota.

postoffice . . . lower Rosebud": Field notes, 1906. (Monroe Creek formation in bluffs, Sharps formation in creek bottom: J.R.M.)

"*Leptauchenia*"

A.M.N.H. "ROSEBUD" 10

"Porcupine Cr'k 3½ m. below [Porcupine] p.o. . . . lower Rosebud": Field notes, 1906. (Monroe Creek formation: J.R.M.)

Castoridae, indet.

?*Nothocyon* sp.

Miohippus gemmarosae Osborn

A.M.N.H. "ROSEBUD" 11

"Porcupine Cr'k 4 m. below [Porcupine] p.o. . . . lower Rosebud": Field notes, 1906. (Monroe Creek formation: J.R.M.)

?*Eporeodon* sp.

A.M.N.H. "ROSEBUD" 12

"Porcupine Cr'k 3 m. below [Porcupine] p.o. . . . lower Rosebud": Field notes, 1906. (Harrison formation: Schultz and Falkenbach, 1949, p. 130. The geologic section in Matthew's field notes indicates that this locality is in the Monroe Creek formation. As outcrops in the area are present in both formations, it must be presumed that the field notes are correct: J.R.M.)

**Capatanka brachyiceps* (Matthew)

**Enhydrocyon crassidens* Matthew

"*Leptauchenia*"

Promerycochoerus montanus pinensis Schultz and Falkenbach

A.M.N.H. "ROSEBUD" 13

"E. of Porcupine Cr'k 6 m. below [Porcupine] p.o. . . . lower Rosebud": Field notes, 1906. (Monroe Creek formation: J.R.M.)

"*Entelodon*"

A.M.N.H. "ROSEBUD" 14

"Divide E. of Porcupine Cr'k, 6 m. below [Porcupine] p.o. . . . lower Rosebud": Field notes, 1906. (Shown in Monroe Creek formation in geologic section in field notes. The reference to the "divide" suggests Harrison formation rather than Monroe Creek formation. Harrison formation: J.R.M.)

**Nanotrágulus ordinatus* (Matthew)

A.M.N.H. "ROSEBUD" 15

"Divide E. of Porcupine Cr'k 7 m. below

[Porcupine] p.o. . . . lower Rosebud": Field notes, 1906. (Harrison formation: Schultz and Falkenbach, 1949, p. 128; 1955, p. 183. Harrison formation: J.R.M.)

*?*Capacikala sciuroides* (Matthew)

Enhydrocyon crassidens Matthew

Promerycochoerus montanus pinensis Schultz and Falkenbach

Promerycochoerus barbouri Schultz and Falkenbach

Promerycochoerus carrikeri Peterson

**Desmatochoerus curvidens gregorii* (Loomis)

A.M.N.H. "ROSEBUD" 16

"3 miles East of Porcupine p.o. . . . upper Rosebud": Field notes, 1906. (Harrison formation unless specimens came from highest exposures on hills: J.R.M.)

Gregorymus curtus (Matthew)

**Parahippus coloradensis praecurrens* Osborn

**Desmathyus pinensis* Matthew

"*Merychys*"

Camelidae, indet.

Pseudoblastomeryx advena (Matthew)

A.M.N.H. "ROSEBUD" 17

"W. of Porcupine Cr'k about 3 m. N.E. of Porcupine Butte . . . upper Rosebud": Field notes, 1906. (Lower Marsland formation: Schultz and Falkenbach, 1947, p. 222. Early Hemingfordian: Dawson, 1958, p. 44. Probably Rosebud formation, although some specimens may have come from the Harrison formation: J.R.M.)

**Archaeolagus macrocephalus* (Matthew)

Tomarctus thomsoni (Matthew)

Promartes lepidus (Matthew)

Parahippus coloradensis praecurrens Osborn

Parahippus texanus Leidy

Desmathyus pinensis Matthew

Phenacocoelus stouti Schultz and Falkenbach

Merychys minimus Peterson

A.M.N.H. "ROSEBUD" 18

"3 m. E. of Porcupine Butte . . . upper Rosebud": Field notes, 1906. (Marsland formation: Schultz and Falkenbach, 1940, p. 289. Rosebud formation: J.R.M.)

Pleurolicus leptophrys Cope

**Proheteromys matthewi* Wood

**Parahippus coloradensis praecurrens* Osborn

Parahippus sp.

**Merycochoerus matthewi* Loomis

Pseudoblastomeryx sp.

A.M.N.H. "ROSEBUD" 19

"1 m. E. of Porcupine P.O. . . . lower Rosebud": Field notes, 1906. (Harrison formation: J.R.M.)

**Hesperocyon gregorii* (Matthew)

A.M.N.H. "ROSEBUD" 20

"2 m. N.W. of Porcupine p.o. E. of Porcupine Cr'k . . . lower Rosebud": Field notes, 1906. (Harrison formation: Schultz and Falkenbach, 1949, p. 124. Harrison formation, although there are some small exposures of the Monroe Creek formation in the area: J.R.M.)

**Gregorymus formosus* (Matthew)

**Promerycochoerus minor pygmyus* Loomis

A.M.N.H. "ROSEBUD" 21

"E of Porcupine Cr'k. 2 m. N.W. of Porcupine P.O. . . . lower Rosebud": Field notes, 1906. (Harrison formation: Schultz and Falkenbach, 1949, p. 126. Harrison formation: J.R.M.)

Capatanka brachyceps (Matthew)

**Diceratherium gregorii* Peterson

**Arretotherium leptodus* (Matthew)

Promerycochoerus minor pygmyus Loomis

A.M.N.H. "ROSEBUD" 22

"4 m. E. of Porcupine P.O. . . . E. of Porcupine Cr'k . . . upper Rosebud": Field notes, 1906. (Lower Marsland formation: Schultz and Falkenbach, 1947, p. 222. Rosebud formation: J.R.M.)

**Megalictis ferox* Matthew

**Cynodesmus minor* Matthew
Camelidae, indet.

A.M.N.H. "ROSEBUD" 23

"About 6 m. E. of Porcupine p.o. E. of Porcupine Cr'k . . . upper Rosebud": Field notes, 1906. (Harrison formation: Schultz and Falkenbach, 1949, p. 126. Probably Rosebud formation, possibly Harrison formation: J.R.M.)

**Gregorymus curtus* (Matthew)

Promerycochoerus minor pygmyus Loomis

A.M.N.H. "ROSEBUD" 24

"8 m. E. of Porcupine P.O. . . . N. of Porcupine Cr'k . . . upper Rosebud": Field notes, 1906. (Probably Rosebud formation: J.R.M.)

**Tomarctus thomsoni* (Matthew)

?*Merycochoerus* sp.

A.M.N.H. "ROSEBUD" 25

"10 m. N.W. of Porcupine P.O. . . . Lep-
tauchenia Beds": Field notes, 1906. (Sharps
formation: J.R.M.)

"*Leptauchenia*"

"*Oreodon*"

A.M.N.H. "ROSEBUD" 26

Three miles east of Porcupine post office. Upper Rosebud. (Lower Marsland formation: Schultz and Falkenbach, 1947, p. 222. Rosebud formation: J.R.M. This locality is not shown in the 1906 field book, but the above information was taken from the catalogue card.)

Merychys minimus Peterson

The following specimens were collected by the 1906 expedition without specimen field numbers. The localities are given in such broad terms that levels can be determined only by faunal content, based on the assumption that all the material listed from one "locality" was actually collected from the same level. Under each locality number, the first statement is not a direct quotation but represents the present writer's interpretation of the 1906 field notes (Matthew and Thomson, MS) and the locality cards.

A.M.N.H. "ROSEBUD" 27

East of Porcupine Creek, upper Rosebud. (Lower Marsland formation: Schultz and Falkenbach, 1947, p. 222. Early Hemingfordian: Dawson, 1958, p. 42. Probably Rosebud formation: J.R.M.)

**Archaeolagus primigenius* (Matthew)

Promartes lepidus (Matthew)

Merychys minimus Peterson

A.M.N.H. "ROSEBUD" 28

West of Porcupine Creek, upper Rosebud. (Lower Marsland formation: Schultz and Falkenbach, 1947, p. 222. Probably Rosebud formation: J.R.M.)

**Arctoryctes terrenus* Matthew

Merychys minimus Peterson

A.M.N.H. "ROSEBUD" 29

Porcupine Creek, upper Rosebud. (Lower Marsland formation: Schultz and Falken-

bach, 1947, p. 222. Probably Rosebud formation: J.R.M.)

Gregorymus formosus (Matthew)

Grangerimus cf. oregonensis

Promartes sp.

Merychys minimus Peterson

**Pseudoblastomeryx advena* (Matthew)

A.M.N.H. "ROSEBUD" 30

Northwest of Porcupine post office, lower Rosebud. (Monroe Creek formation or Harrison formation: J.R.M.)

Heteromyidae, indet.

Miohippus equinanus Osborn

A.M.N.H. "ROSEBUD" 31

Porcupine Creek, lower Rosebud. (Monroe Creek formation or Harrison formation: J.R.M.)

Castoridae, indet.

**Pleurolicus dakotensis* Wood

Miohippus equinanus Osborn

Nanotragulus ordinatus (Matthew)

A.M.N.H. "ROSEBUD" 32

East of Porcupine Creek, lower Rosebud. (Harrison formation or Monroe Creek formation: J.R.M.)

Nothocyon near *latidens*

Parahippus pristinus Osborn

Parties from the Amherst College Museum collected in the localities that are listed below in 1931 and 1934. These localities have been arbitrarily numbered by the writer for identification purposes.

A.C.M. "ROSEBUD" 1

"Porcupine Creek, six miles west of Post Office in Lower Rosebud beds of South Dakota": Loomis (1932, p. 317). (Six miles west of Porcupine post office places one high in the Harrison formation above the Monroe Creek formation cliffs overlooking Manderson. I believe that the locality should be recorded as 6 miles northwest of the Porcupine post office, which would place it in either the Monroe Creek formation or the Harrison formation: J.R.M.)

**Promartes gemmarosae* (Loomis)

A.C.M. "ROSEBUD" 2

" . . . in the lower Miocene Rosebud for-

mation on Porcupine Creek, South Dakota, just above the concretionary layer, or about 100 feet above the base of the beds": Loomis (1936, p. 44). (Monroe Creek formation or Harrison formation: J.R.M.)

**Mammacyon obtusidens* Loomis

A.C.M. "ROSEBUD" 3

" . . . from Porcupine Creek, So. Dakota, in the Lower Rosebud beds": Loomis (1932, p. 325). (Monroe Creek formation or Harrison formation: J.R.M.)

**Neocynodesmus delicatus* (Loomis)

A.C.M. "ROSEBUD" 4

"From Porcupine Creek, 5 mi. N.N.W. of Porcupine Post Office": Schultz and Falkenbach (1949, p. 130). (Harrison formation: Schultz and Falkenbach, 1949, p. 128. Harrison formation: J.R.M.)

Promerycochoerus montanus pinensis Schultz and Falkenbach

A.C.M. "ROSEBUD" 5

"Porcupine Creek, South Dakota": Loomis (1933, p. 723). (From Miocene deposits equal to the Harrison formation: Schultz and Falkenbach, 1947, p. 253. Probably Harrison formation: J.R.M.)

?*Oreodontoides curtus* (Loomis)

The following localities are those of the Frick Laboratory as reported by Schultz and Falkenbach, 1949 and 1954. The assignment of locality numbers was made by the present writer for purposes of identification.

F:A.M. "ROSEBUD" 1

"1½ mi. S. of the large exposures at the mouth of Porcupine Creek Canyon, were found in a pink clay with small nodules that underlies the high exposures": Schultz and Falkenbach (1954, p. 189). (Gering formation: Schultz and Falkenbach, 1954, p. 180. Sharps formation: J.R.M.)

Desmatochoerus hatcheri geringensis Schultz and Falkenbach

Desmatochoerus wyomingensis Schultz and Falkenbach

F:A.M. "ROSEBUD" 2

"2 mi. N.N.W. of Porcupine Post Office, W. side of Porcupine Creek": Schultz and Falken-

bach (1949, p. 130). (Harrison formation: Schultz and Falkenbach, 1949, p. 128. Harrison formation: J.R.M.)

Promerycochoerus montanus pinensis Schultz and Falkenbach

The following localities are those of the Field Museum of Natural History (now the Chicago Natural History Museum) which have appeared in published reports. Arbitrary numbers have been assigned to these localities by the present writer for the convenience of later reference.

F.M.N.H. "ROSEBUD" 1

"Lower Rosebud beds, lower Miocene. Four miles northeast of Porcupine, South Dakota": McGrew (1941a, p. 55). (Monroe Creek formation or Harrison formation: J.R.M.)

**Heliscomys woodi* McGrew

F.M.N.H. "ROSEBUD" 2

"Four miles south of Porcupine, South Dakota; top of lower Rosebud beds": McGrew (1941b, p. 6). (If the locality data are correct, the specimen is certainly from the Rosebud formation: J.R.M.)

**Promylagaulus riggsi* McGrew

F.M.N.H. "ROSEBUD" 3

"In the upper Rosebud beds of South Dakota, near Porcupine Butte": McGrew (1941b, p. 9). (Rosebud formation: J.R.M.)

Mylagaulodon cf. angulatus

Following are the vertebrate localities of the Museum of Geology of the South Dakota School of Mines and Technology; all are in Shannon County, South Dakota. They are listed in numerical order without regard to their relative stratigraphic levels. The first two digits of the locality number indicate the year in which the locality was first worked.

S.D.S.M. V5339

Two hundred yards southeast of the quarter-section post on the boundary of sect. 31 and sect. 32, T. 38 N., R. 43 W., in nodular zone at base of cliffs at top of Sharps formation.

Palaeocaster nebrascensis (Leidy)

S.D.S.M. V5340

East of the Wooden Ranch house, in the NE. $\frac{1}{4}$ sect. 31, T. 38 N., R. 43 W., at top of Sharps formation just below the cliffs of the Monroe Creek formation.

Arctoryctes terrenus Matthew
Palaeocaster nebrascensis (Leidy)

S.D.S.M. V5341

On the southeast side of the Gooseneck Road in the NE. $\frac{1}{4}$ of the NW. $\frac{1}{4}$ of sect. 30, T. 39 N., R. 43 W., in nodules near the middle of the Sharps formation.

Palaeolagus philoi Dawson
Palaeocaster nebrascensis (Leidy)
Nanotragulus intermedius Schlaikjer

S.D.S.M. V5345

At base of hills about 2 miles east of the abandoned Wakan Store in the W. $\frac{1}{2}$ of sect. 25, T. 40 N., R. 44 W., in the lower one-quarter of the Sharps formation.

Palaeocaster nebrascensis (Leidy)

S.D.S.M. V5347

On the southeast side of the Manderson-Pine Ridge road, 3.6 miles southwest of Manderson in the SW. $\frac{1}{4}$ of sect. 11, T. 37 N., R. 44 W., near the top of the Sharps formation.

Megalagus primitivus (Schlaikjer)
Pleurolicus leptophrys Cope
Miohippus equiceps (Cope)
Nanotragulus intermedius Schlaikjer

S.D.S.M. V5348

At the top of the Sharps formation in the SE. $\frac{1}{2}$ of the SE. $\frac{1}{4}$ of sect. 36, T. 38 N., R. 44 W.

Cyclopidius schucherti Thorpe
Oxydactylus cf. wyomingensis

S.D.S.M. V5349

Twenty-five feet from the south side of road in the pass in the NW. $\frac{1}{4}$ of the SE. $\frac{1}{4}$ of sect. 26, T. 38 N., R. 44 W., in the very top of the Sharps formation.

Palaeocaster nebrascensis (Leidy)

S.D.S.M. V5350

At the top of the Sharps formation in the

SE. $\frac{1}{4}$ of the SW. $\frac{1}{4}$ of sect. 26, T. 38 N., R. 44 W.

Palaeolagus hypsodus Schlaikjer
Pleurolicus clasoni, new species
Palaeocastor nebrascensis (Leidy)
Capacikala gradatus (Cope)
Nothocyon roii, new species
Miohippus near *equinanus*
Miohippus equiceps (Cope)
Diceratherium armatum Marsh

S.D.S.M. V5351

Near the top of the Sharps formation in the NE. $\frac{1}{4}$ of the NW. $\frac{1}{4}$ of sect. 35, T. 38 N., R. 44 W.

?*Prosciurus dawsonae*, new species
Palaeocastor nebrascensis (Leidy)
Capacikala gradatus (Cope)
Nothocyon geismarianus (Cope)
Miohippus equiceps (Cope)

S.D.S.M. V5352

Near the top of the Sharps formation in the NW. $\frac{1}{4}$ of the NE. $\frac{1}{4}$ of sect. 35, T. 38 N., R. 44 W.

Palaeocastor nebrascensis (Leidy)

S.D.S.M. V5353

Two hundred yards northwest of the Manderson-Pine Ridge road, 0.9 mile southwest of Manderson in the NW. $\frac{1}{4}$ of the SW. $\frac{1}{4}$ of sect. 36, T. 38 N., R. 44 W., in the middle of the Sharps formation.

Palaeolagus philoi Dawson
Palaeocastor nebrascensis (Leidy)
Hesperocyon leptodus (Schlaikjer)
Leptomeryx sp.
Nanotragulus intermedius Schlaikjer

S.D.S.M. V5354

In the badlands centering around the common corner of sects. 13, 14, 23, and 24, T. 39 N., R. 42 W., near the top of the Sharps formation. This is the area shown in Osborn (1918, fig. 7).

**Peratherium spindleri*, new species
 **Domninoidea evelynae*, new species
Arctoryctes terrenus Matthew
Palaeolagus hypsodus Schlaikjer
Palaeolagus philoi Dawson
Megalagus primitivus (Schlaikjer)
Prosciurus dawsonae, new species
Meniscomys hippodus Cope
 **Proheteromys fedti*, new species

**Hitonkala andersontau*, new species
Palaeocastor nebrascensis (Leidy)
 **Capatanka cankpeopi*, new species
Capacikala gradatus (Cope)
 **Nothocyon roii*, new species
Mesocyon robustus Matthew
Sunkahetanka geringensis (Barbour and Schultz)
Miohippus near *equinanus*
Diceratherium gregorii Peterson
Leptochoerus sp.
Cyclopidius schucherti Thorpe
Arretotherium sp.
Nanotragulus intermedius Schlaikjer
Nanotragulus cf. *loomisi*

S.D.S.M. V5355

On the south side of the Sharps Corners-Kyle road in the NE. $\frac{1}{4}$ of the NW. $\frac{1}{4}$ of sect. 6, T. 39 N., R. 42 W., near the middle of the Sharps formation.

Capatanka cankpeopi, new species
Capacikala gradatus (Cope)

S.D.S.M. V5356

On the north side of the Manderson-Pine Ridge road, 1.9 miles southwest of Manderson in the SE. $\frac{1}{4}$ of the NW. $\frac{1}{4}$ of sect. 2, T. 37 N., R. 44 W., in the middle of the Sharps formation.

Capacikala gradatus (Cope)

S.D.S.M. V5357

On the south side of the Tibbets Ranch road in the SE. $\frac{1}{4}$ of sect. 6, T. 39 N., R. 43 W., in the middle of the Sharps formation.

Palaeolagus philoi Dawson
Grangerimus dakotensis, new species
Palaeocastor nebrascensis (Leidy)
 **Palaeogale dorotheiae*, new species
Nanotragulus intermedius Schlaikjer

S.D.S.M. V5358

On the west side of the Tibbets Ranch road in the SE. $\frac{1}{4}$ of sect. 31, T. 40 N., R. 43 W., and the NE. $\frac{1}{4}$ of sect. 6, T. 39 N., R. 43 W., near the middle of the Sharps formation.

Ekgmowechashala philotau, new species
Palaeolagus hypsodus Schlaikjer
 **Palaeolagus philoi* Dawson
Megalagus primitivus (Schlaikjer)
Palaeocastor nebrascensis (Leidy)
Capacikala gradatus (Cope)
Nothocyon roii, new species
Mesocyon robustus Matthew

Sunkahetanka geringensis (Barbour and Schultz)
Miohippus equiceps (Cope)
Diceratherium cf. *gregorii*
Mesoreodon megalodon cf. *sweeti*
Nanotragulus intermedius Schlaikjer

S.D.S.M. 5359

In gully on south side of Sharps Cutoff road in the SW. $\frac{1}{4}$ of sect. 9, T. 39 N., R. 43 W., near the middle of the Sharps formation.

Arctoryctes terrenus Matthew
Palaeolagus philoi Dawson
Proheteromys bumpi, new species
Palaeocastor nebrascensis (Leidy)
Capatanka cankpeopi, new species
Capacikala gradatus (Cope)
Hesperocyon leptodus (Schlaikjer)
Nothocyon lemur (Cope)
 **Cynodesmus cooki*, new species
Mesocyon robustus Matthew
Miohippus equiceps (Cope)
Leptomeryx sp.
Nanotragulus intermedius Schlaikjer

S.D.S.M. V5360

In the gullies on both sides of the Sharps Cutoff road in the N. $\frac{1}{2}$ of sect. 17, T. 39 N., R. 43 W., in the middle of the Sharps formation.

Peratherium spindleri, new species
 **Ocajila makpiyahe*, new species
Arctoryctes terrenus Matthew
Palaeolagus hypsodus Schlaikjer
Palaeolagus philoi Dawson
 ?*Palaeolaginae*
Prosciurus dawsonae, new species
 **Florentiamys agnewi*, new species
Palaeocastor nebrascensis (Leidy)
Capatanka cankpeopi, new species
Capacikala gradatus (Cope)
Nothocyon roii, new species
Sunkahetanka geringensis (Barbour and Schultz)
Enhydrocyon crassidens Matthew
Miohippus near *equinanus*
Miohippus equiceps (Cope)
Diceratherium cf. *gregorii*
Leptomeryx sp.
Nanotragulus intermedius Schlaikjer

S.D.S.M. V5361

On the south side of the Gooseneck road near the junction with the Sharps Cutoff road in the NE. $\frac{1}{4}$ of the NW. $\frac{1}{4}$ of sect. 20, T. 39 N., R. 43 W., near the top of the Sharps formation.

Ekgmowechashala philotau, new species
Palaeolagus philoi Dawson
Megalagus primitivus (Schlaikjer)
Palaeocastor nebrascensis (Leidy)
Capacikala gradatus (Cope)
Nothocyon geismarianus (Cope)
 **Sunkahetanka pahinsintewakpa*, new species
Cyclopidius simus Cope
Nanotragulus intermedius Schlaikjer

S.D.S.M. V5362

Near the Needle in the SE. $\frac{1}{4}$ of sect. 18 and NE. $\frac{1}{4}$ of sect. 19, T. 38 N., R. 43 W., at the very top of the Sharps formation.

Arctoryctes terrenus Matthew
Palaeolagus philoi Dawson
 **Proheteromys gremmelsi*, new species
Palaeocastor nebrascensis (Leidy)
Capatanka cankpeopi, new species
Capacikala gradatus (Cope)
Enhydrocyon crassidens Matthew
Miohippus equiceps (Cope)
Oxydactylus cf. *wyomingensis*
 ?*Oxydactylus* sp.
Nanotragulus intermedius Schlaikjer
Nanotragulus cf. *loomisi*

S.D.S.M. V5363

About 50 feet north of the quarter-section marker at the base of the cliffs, 0.75 mile south of the junction of the Gooseneck road and the Sharps Cutoff road in the SW. $\frac{1}{4}$ of the SE. $\frac{1}{4}$ of sect. 20, T. 39 N., R. 43 W., at the top of the Sharps formation.

?*Oxydactylus* sp.

S.D.S.M. V5365

East of the Needle in the NW. $\frac{1}{4}$ of the NW. $\frac{1}{4}$ of sect. 20, T. 38 N., R. 43 W., near the top of the Sharps formation.

Palaeocastor nebrascensis (Leidy)

S.D.S.M. V541

In the middle of the Sharps formation in the NW. $\frac{1}{4}$ of sect. 8, T. 39 N., R. 43 W.

Domninoides evelynae, new species
 **Ekgmowechashala philotau*, new species
Palaeolagus philoi Dawson
 **Prosciurus dawsonae*, new species
 **Grangerimus dakotensis*, new species
 **Proheteromys bumpi*, new species
Palaeocastor nebrascensis (Leidy)
Capacikala gradatus (Cope)
Eumys woodi, new species
Hesperocyon leptodus (Schlaikjer)

- Nothocyon geismarianus* (Cope)
- Mesocyon robustus* Matthew
- Sunkahetanka geringensis* (Barbour and Schultz)
- Miohippus equiceps* (Cope)
- Cyclopidius schucherti* Thorpe
- Cyclopidius simus* Cope
- Oxydactylus cf. wyomingensis*
- Nanotragulus intermedius* Schlaikjer

S.D.S.M. V542

Along the course of unnamed canyon on the Groom Ranch in the N. ½ of sect. 30, T. 40 N., R. 43 W., in the lower part of the Sharps formation.

- Palaeolagus hypsodus* Schlaikjer
- Palaeolagus philoi* Dawson
- Palaeocastor nebrascensis* (Leidy)
- Capatanka cankpeopi*, new species
- **Eumys woodi*, new species
- Mesocyon robustus* Matthew
- Diceratherium gregorii* Peterson
- Agriochoerus* sp.

S.D.S.M. V543

On the south and east sides of the Tibbets Ranch road in the S. ½ of the SW. ¼ of sect. 32, T. 40 N., R. 43 W. and the NW. ¼ of sect. 5, T. 39 N., R. 43 W., near the middle of the Sharps formation.

- Palaeocastor nebrascensis* (Leidy)
- Capacikala gradatus* (Cope)
- Diceratherium gregorii* Peterson
- Diceratherium armatum* Marsh

S.D.S.M. V544

Along bottom of canyon extending through the N. ½ of sects. 7 and 8, T. 39 N., R. 43 W., near the middle of the Sharps formation.

- Palaeolagus hypsodus* Schlaikjer
- Palaeocastor nebrascensis* (Leidy)
- Arretotherium* sp.

S.D.S.M. V545

On the border of the Grass Creek badlands in sect. 23, T. 39 N., R. 45 W., at the base of the Sharps formation.

- Hyracodon apertus* Sinclair

S.D.S.M. V549

At the edge of the White River bluffs in the NW. ¼ of sect. 35 and the S. ½ of sect. 26, T. 41 N., R. 43 W., in the Rockyford member of the Sharps formation.

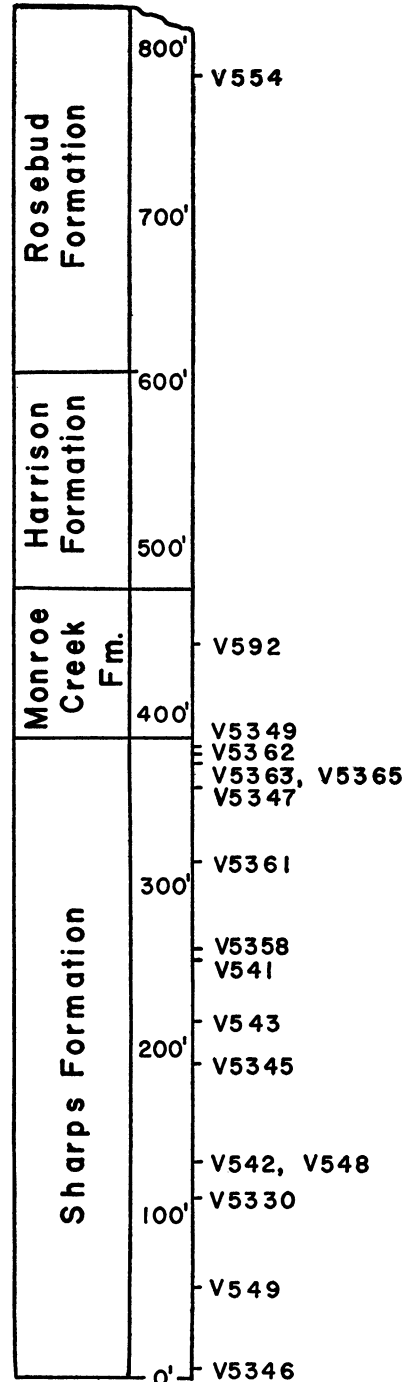


FIG. 2. Stratigraphic levels of selected fossil localities, in the Wounded Knee area, of the South Dakota School of Mines and Technology.

- Palaeolagus hypsodus* Schlaikjer
- **Ekmoiteptecela olsontau*, new species

Hyracodon sp.
Nanotragulus intermedius Schlaikjer

S.D.S.M. V5410

In heavy Miocene channel deposits at the Godsell Ranch in the S. $\frac{1}{2}$ of sects. 11 and 12, the E. $\frac{1}{2}$ of sect. 14, and the W. $\frac{1}{2}$ of sect. 13, T. 40 N., R. 44 W.

Palaeocastor nebrascensis (Leidy)
Capacikala gradatus (Cope)
 **Eumys blacki*, new species
Hesperocyon leptodus (Schlaikjer)
Cynodesmus cooki, new species
Nothocyon lemur (Cope)
Oxydactylus cf. *wyomingensis*
Leptomeryx sp.
Nanotragulus intermedius Schlaikjer

S.D.S.M. V5413

(GODESELL RANCH CHANNEL FAUNULE)

In a small, fossiliferous, stream-channel deposit lying between the Brule formation and the Quaternary alluvium on the Godsell Ranch. The fauna indicates that this channel is referable to the Sharps formation. On the east side of the canyon in the NW. $\frac{1}{4}$ of the SE. $\frac{1}{4}$ of sect. 12, T. 40 N., R. 44 W.

Iguanidae, indet.
 ?*Peltosaurus* sp.
 Anguidae, indet.
 Amphisbaenidae, indet.
Peratherium spindleri, new species
 **Domnina greeni*, new species

Talpidae, indet.
Heliscomys sp.
Proheteromys bumpi, new species
Hitonkala andersontau, new species
Tamias sp.
Scottimus sp.

S.D.S.M. V554

Near the top of the Rosebud formation on the west side of the Wounded Knee-Highway 18 road in the SE. $\frac{1}{4}$ of the SE. $\frac{1}{4}$ of sect. 4 and NE. $\frac{1}{4}$ of the NE. $\frac{1}{4}$ of sect. 9, T. 36 N., R. 43 W.

Tomarctus thomsoni (Matthew)

S.D.S.M. V572

In the Sharps formation on the south side of the Sharps Corner-Kyle road in the NW. $\frac{1}{4}$ of the NW. $\frac{1}{4}$ of sect. 3, T. 39 N., R. 42 W.

Cyclopidius schucherti Thorpe
 ?*Oxydactylus* sp.

S.D.S.M. V592

In anthills near the middle of the Monroe Creek formation in the SW. $\frac{1}{4}$ of sect. 3, T. 38 N., R. 43 W.

Proscalops sp.
 **Allomys harkseni*, new species
Meniscomys sp.
Promylagaulus cf. *riggsi*
Pleurolicus dakotensis Wood

CORRELATION OF THE WOUNDED KNEE FAUNAS

Because the Wounded Knee faunas occur in an apparently continuous sequence of deposits, a fairly complete picture of the early Miocene faunal sequence can be expected. At the present time, the Wounded Knee-Sharps fauna is the largest assemblage known, with four reptiles and 62 mammals recorded. Twenty-one mammals are recorded from the Wounded Knee-Rosebud fauna; 19 mammals, from the Wounded Knee-Harrison fauna; and six mammals, from the Wounded Knee-Monroe Creek fauna. In addition, there are several forms for which there is no accurate stratigraphic control, so they may have been collected from the Monroe Creek formation, the Harrison formation, or the Rosebud formation.

Of the mammals occurring in the Wounded Knee-Sharps fauna, seven species are also found in the "Lower Harrison fauna" from

Goshen Hole, Wyoming; seven species are found in the John Day fauna of Oregon; and four have been recorded from the Gering formation of Nebraska and Wyoming.

The Wounded Knee-Monroe Creek fauna has so far produced only six mammalian species. Of these, one (*Nothocyon geismarianus*) is known from the John Day of Oregon, and another (*Promylagaulus* cf. *riggsi*) is known from the Rosebud-Rosebud fauna.

The Wounded Knee-Harrison fauna has one species (*Pleurolicus leptophrys*) that is also known from the Wounded Knee-Sharps fauna and from the John Day fauna. Four other species (three oreodonts and a rhinoceros) are found in the Harrison formation of Nebraska and Wyoming.

One of the 21 species of mammals of the Wounded Knee-Rosebud fauna (*Grangerimus oregonensis*) is also found in the John Day

TABLE 2

GEOGRAPHIC AND STRATIGRAPHIC DISTRIBUTION OF CERTAIN WOUNDED KNEE FAUNAL ELEMENTS

	South Dakota, Rosebud- Rosebud Fauna	Wyoming (Goshen Hole), "Lower Harrison" Formation	Oregon, John Day Fauna	Nebraska and Wyoming, Gering Forma- tion	Nebraska and Wyoming, Harrison Forma- tion	Nebraska and Wyoming, Marsland Forma- tion
Wounded Knee-Rosebud fauna						
<i>Archaeolagus primigenius</i>	—	—	—	—	—	x
<i>Archaeolagus macrocephalus</i>	—	—	—	—	—	x
<i>Grangerimus oregonensis</i>	—	—	x	—	—	—
<i>Promartes lepidus</i>	—	—	—	—	—	x
<i>Megalictis ferox</i>	—	—	—	—	—	x
<i>Merycochoerus matthewi</i>	—	—	—	—	—	x
<i>Merycochoerus minimus</i>	—	—	—	—	—	x
Wounded Knee-Harrison fauna						
<i>Pleurolicus leptophrys</i>	—	—	x	—	—	—
<i>Promerycochoerus carrikeri</i>	—	—	—	—	x	—
<i>Promerycochoerus barbouri</i>	—	—	—	—	x	—
<i>Promerycochoerus pygmyus</i>	—	—	—	—	x	—
<i>Desmatochoerus gregorii</i>	—	—	—	—	x	—
Wounded Knee-Monroe Creek fauna						
<i>Promylagaulus cf. riggsi</i>	x	—	—	—	—	—
<i>Nothocyon geismarianus</i>	—	—	x	—	—	—
Wounded Knee-Sharps fauna						
<i>Palaeolagus hypsodus</i>	—	x	—	—	—	—
<i>Palaeolagus philoi</i>	—	x	—	—	—	—
<i>Megalagus primitivus</i>	—	x	—	—	—	—
<i>Menicomys hippodus</i>	—	—	x	—	—	—
<i>Pleurolicus leptophrys</i>	—	—	x	—	—	—
<i>Capatanka gradatus</i>	—	—	x	—	—	—
<i>Hesperocyon leptodus</i>	—	x	—	—	—	—
<i>Nothocyon geismarianus</i>	—	—	x	—	—	—
<i>Nothocyon lemur</i>	—	—	x	—	—	—
<i>Mesocyon robustus</i>	—	x	—	—	—	—
<i>Sunkahetanka geringensis</i>	—	—	—	x	—	—
<i>Diceratherium armatum</i>	—	—	x	—	—	—
<i>Miohippus equiceps</i>	—	x	—	—	—	—
<i>Desmatochoerus geringensis</i>	—	—	—	x	—	—
<i>Desmatochoerus wyomingensis</i>	—	—	—	x	—	—
<i>Mesoreodon megalodon cf. sweeti</i>	—	—	—	x	—	—
<i>Cyclopidius simus</i>	—	x	—	—	—	—
<i>Nanotragulus intermedius</i>	—	x	—	—	—	—

fauna, and six species (two lagomorphs, two carnivores, and two oreodonts) are known from the Marsland formation of Wyoming and Nebraska.

The lack of significant depositional breaks within this stratigraphic sequence from the top of the Brule formation through the Rosebud formation suggests that future collecting in the Wounded Knee area should produce a fairly complete phylogenetic series within many of the mammalian groups of the early

Miocene in the Great Plains. With further work in the upper part of the Brule formation in the extensive badlands south of White River and east of Porcupine Creek and in the badlands of the Grass Creek drainage, ancestral species should be found for many of the forms that appear in the Sharps formation.

The Wounded Knee area may well have the potential of becoming an early Miocene standard of correlation in the western United States.

from different localities and different levels. The type probably came from the Harrison formation and the paratype from the Rosebud formation. These localities are presumably about 3 miles apart, if their designations are correct. If the measurement of distance from various landmarks was very crude, it is possible that these localities may be identical. There is no indication of such a possibility in the 1906 field notes, so the localities must be assumed to be separate.

Parahippus texanus Leidy, 1868

Parahippus texanus LEIDY, 1868, p. 231. OSBORN, 1918, p. 84, pl. 8, fig. 3, pl. 9, fig. 10.

REFERRED SPECIMEN: From the Wounded Knee-Rosebud fauna, A.M.N.H. No. 12924, partial skull, from A.M.N.H. "Rosebud" 17.

DISCUSSION: Osborn (1918, p. 84) referred this specimen to *P. texanus* Leidy. It should be noted that he indicated (*ibid.*, p. 79) that, in 1913, Matthew referred this material to *Parahippus nebrascensis* Peterson. I can find no citation to this specimen in Matthew's short paper on the "Evolution of the Horse" which was published in 1913.

HYRACODONTIDAE COPE, 1879

HYRACODON LEIDY, 1856

Hyracodon LEIDY, 1856b, p. 91.

Hyracodon apertus Sinclair, 1922

Hyracodon apertus SINCLAIR, 1922, p. 73.

?*Hyracodon apertus* Sinclair GREEN, 1958, pp. 587-588, fig. 1.

REFERRED SPECIMEN: From the Wounded Knee-Sharps fauna, S.D.S.M. 54141, partial skull, with complete dentition, from S.D.S.M. V545.

DISCUSSION: Green (1958, pp. 587-588, fig. 1) described and figured this specimen. The locality is in an extensive basin of badlands at the headwaters of the West Fork of Grass Creek which is the next drainage west of Wounded Knee Creek. Most of the exposures in these badlands are in the upper part of the Brule formation, but a thick rim of Sharps formation surrounds most of the basin. Although the lithology of the two formations is similar in this area, and the basal Rockyford member of the Sharps formation is quite thick, there is no reason to doubt that this

specimen was found in the lower portion of the Sharps formation.

?**Hyracodon**, species indeterminate

Cf. *Hyracodon*, GREEN, 1958, p. 588.

REFERRED SPECIMEN: From the Wounded Knee-Sharps fauna, S.D.S.M. No. 54183, partial mandible, with broken P₄-M₃, from S.D.S.M. V549.

DISCUSSION: S.D.S.M. V549 is in a thick section of the Rockyford member of the Sharps formation. The specimen is either contemporaneous with, or very slightly younger than, the skull of *Hyracodon apertus* Sinclair from the Grass Creek locality, S.D.S.M. V545.

RHINOCEROTIDAE OWEN, 1845

DICERATHERIUM MARSH, 1875

Diceratherium MARSH, 1875, p. 242.

Diceratherium gregorii Peterson, 1920

Diceratherium gregorii PETERSON, 1920, pp. 402, 421, fig. 12, pl. 59. GREEN, 1958, pp. 588-590, figs. 2-6.

Metacaenopus gregorii (Peterson) TROXELL, 1921, p. 208.

TYPE: A.M.N.H. No. 12933, skull.

TYPE LOCALITY: A.M.N.H. "Rosebud" 21.

HORIZON: Probably Rosebud formation, middle Miocene.

REFERRED SPECIMENS: From the Wounded Knee-Sharps fauna, as listed below:

S.D.S.M. LOCALITY NUMBERS	S.D.S.M. SPECIMEN NUMBERS
V5354	54339, fragment of maxillary, with P ² -M ¹
V542	54165, isolated M ²
V542	54188, fragment of mandible, with roots of P ₂₋₄ and worn M ₁₋₂
V542	54198, fragment of mandible, with unerupted M ₁
V543	54144, partial skull

DISCUSSION: Green (1958, pp. 588-560) discussed this suite of specimens and was satisfied that they were referable to the Wounded Knee-Rosebud species. The lowest stratigraphic occurrence of these specimens is at S.D.S.M. V542 in the lower half of the Sharps formation, which gives *Diceratherium gregorii* a range that extends throughout most of the

early Miocene and into the earliest part of the middle Miocene.

Diceratherium cf. gregorii

Diceratherium gregorii PETERSON, 1920, p. 402.

Diceratherium ?gregorii GREEN, 1958, pp. 590-591.

REFERRED SPECIMENS: From the Wounded Knee-Sharps fauna: S.D.S.M. No. 53418, fragment of maxillary, with P^1 and dP^{2-3} , from S.D.S.M. V5358; S.D.S.M. No. 53419, fragment of mandible, with dP_{2-3} , from S.D.S.M. V5360.

DISCUSSION: Green (1958, pp. 590-591) questionably referred these specimens to *D. gregorii* Peterson (1920), as they were not referable to *D. cooki* Peterson (1906b). Although there is some resemblance to *D. annectens* (Marsh, 1873), there is no other evidence of that John Day species in the collection.

Diceratherium armatum Marsh, 1875

Diceratherium armatum MARSH, 1875, p. 242. GREEN, 1958, pp. 591-593, figs. 7-9.

REFERRED SPECIMENS: From the Wounded Knee-Sharps fauna: S.D.S.M. No. 53584, fragmentary skull, from S.D.S.M. V5350; S.D.S.M. No. 54150, isolated M_2 , from S.D.S.M. V543.

DISCUSSION: These specimens are from the middle part of the Sharps formation and from its very top near the contact with the Monroe Creek formation. The occurrence of this species in these beds is still another tie with the John Day fauna of Oregon. As sound stratigraphic data of the John Day collection are yet to be published, precise correlations with the elements of that fauna cannot be made.

ARTIODACTYLA OWEN, 1848

LEPTOCHOERIDAE MARSH, 1894

LEPTOCHOERUS LEIDY, 1856

Leptochoerus LEIDY, 1856a, p. 88.

Leptochoerus, species indeterminate

Leptochoerus sp. MACDONALD, 1957b, p. 673.

REFERRED SPECIMEN: From the Wounded Knee-Sharps fauna, S.D.S.M. No. 56101, fragment of ramus, with $?M_2$, from S.D.S.M. V5354.

DISCUSSION: This specimen extends the known range of *Leptochoerus* into the early Miocene.

AGRIOCHOERIDAE LEIDY, 1869

AGRIOCHOERUS LEIDY, 1850

Agriochoerus LEIDY, 1850, p. 121.

Agriochoerus, species indeterminate

REFERRED SPECIMENS: From the Wounded Knee-Sharps fauna, S.D.S.M. No. 54161, maxillary fragments and lower jaws, from S.D.S.M. V542.

DESCRIPTION AND DISCUSSION: These fragments represent a medium-sized species of *Agriochoerus*. In common with several other species, it has a well-developed, triangular hypocone on P^4 , with a cingulum extending from the posterior edge of the protocone across the posterior face of the hypocone. A similar situation is found in the smaller *A. antiquus* Leidy (1850) from the lower Brule formation, and in some specimens of *A. guyotianus* Cope (1879b) and *A. ferox* (Cope, 1879c) from the John Day beds. *Agriochoerus latifrons* Leidy (1869) also has the well-developed hypocone, but the cingulum completely surrounds the protocone.

MEASUREMENTS OF S.D.S.M. No. 54161: P^4-M^3 , 53.5 mm.; M^1-M^3 , 48.3 mm.; P_4-M_3 , 61.0 mm.; M_1-M_3 , 48.5 mm.

MERYCOIDODONTIDAE THORPE, 1923

MESOREODON SCOTT, 1893

Mesoreodon SCOTT, 1893, p. 661.

Mesoreodon megalodon cf. sweeti

Mesoreodon megalodon sweeti SCHULTZ AND FALKENBACH, 1949, p. 147.

REFERRED SPECIMEN: From the Wounded Knee-Sharps fauna, S.D.S.M. No. 54220, partial cranium, with canine, dP^{3-4} , and M^{1-2} , from S.D.S.M. V5358.

DISCUSSION: This specimen was identified by Charles Falkenbach of the Frick Laboratory. Because of the immaturity of the individual represented by this specimen, a positive identification was not possible.

PHENACOCOELUS PETERSON, 1906

Phenacocoelus PETERSON, 1906a, p. 29.

Phenacocoelus stouti Schultz and Falkenbach, 1950

Phenacocoelus stouti SCHULTZ AND FALKENBACH, 1950, p. 111.

REFERRED SPECIMEN: From the Wounded Knee-Rosebud fauna, A.M.N.H. No. 12969, cranium, from A.M.N.H. "Rosebud" 17.

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