Amphibians, Reptiles, and Mammals of the Meade County State Park

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In each of the last three summers (1936, '37, and '38) a field party from the University of Kansas Museum has spent quite a little time in the vicinity of the Meade County State Park in Meade county, Kansas. During the course of their work there, considerable information has been obtained concerning both the fossil and the recent vertebrate fauna of this area. C. W. Hibbard has recently published on the fossils, "Notes on Some Vertebrates from the Pleistocene of Kansas," Trans. Kan. Acad. Sci., 40:233-237, 1937; and "An Upper Pliocene Fauna from Meade County, Kansas," ibid., 40:239-265, but in this paper an account will be given of the recent amphibian, reptilian, and mammalian forms to be found in the park at the present time. It is hoped that in time the complete fauna of not only this park, but of all state parks in Kansas, will be thoroughly studied.

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Meade County State Park is an area of approximately twelve hundred acres, located in Meade county, Kansas, about thirteen miles southwest of Meade, the county seat, on highway K 98. The chief features and general form of the park can be seen on the accompanying map. Lake Larrabee, in the southeastern part of the park, covers an area of approximately one hundred acres. It is fed by the streams of the park area, and an outlet is provided by a spillway dam at the southeast end of the lake. Near the highway there is a bath house and sand beach, but for the most part the banks are covered with rather tall grass and herbs. In one or two spots, particularly a short distance west of the beach, there are a few trees.

The streams of the park are sandy and rather shallow. They are all fed by year-round springs which flow from the Tertiary sands. The spring near the picnic grounds flows at the rate of 280 gallons a minute, and one near the fish-breeding ponds at the rate of 180 gallons a minute. These brooder ponds are entirely spring fed, and it is from them that the stream running past them gets its chief supply of water.

The bulk of the park is typical high plains terrain, with occasional dry gulches running through it. This region belongs in the "Plains Border Section of the Great Plains Physiographic Province" of Fenneman. The geologic formations are Tertiary, consisting chiefly of sands and a few clays, but here and there are outcrops of a sand conglomerate forming rock ledges.

While the biotic areas of Kansas have not as yet been well plotted, this region probably forms a part of a northward extension of the "Short-grass Plains Biotic District" of Oklahoma, as described by Blair and Hubbell (The Biotic Districts of Oklahoma, Amer. Mid. Nat., 20:425-454. 1938). The elevation is about 2,500 to 2,600 feet; the mean annual temperature at nearby Liberal is 57.1°F (22-year record), well within the range given for points within the Oklahoma part of this biotic district. The average annual rainfall at the same station (19.02 inches, 22-year average) is, however, noticeably below the lowest record given by Blair and Hubbell for this district in Oklahoma, namely 22.39 inches at Boise City. Details concerning the flora of the park are not well known, but the principal associations given by Blair and Hubbell for this biotic district are also found here. Buffalo grass is one of the most important grasses; yucca and sagebrush are prominent in many areas; wild plum thickets are numerous on the bottom lands, and the trees to be found along the streams are chiefly cottonwoods with some willows.

For the purpose of convenience, we propose to divide the park area into three types of habitat.

**Aquatic and Subaquatic**

All the bodies of water in the park, and the areas immediately along their shore lines belong to this type of habitat. There are four kinds of water bodies, each with a somewhat different fauna. The lake and the brooder ponds contain the forms which prefer fairly deep water. The fauna of the streams differs from that of the lake and brooder ponds, chiefly in the almost total absence of certain forms to be found in the latter rather than in the presence of any characteristic stream-dwelling forms. In the marshy areas, which may be found near certain of the springs and in places around the edge of the lake, deep water forms are excluded and other forms enter in much greater numbers. Temporary rain ponds attract an amphibian fauna which is lacking from all other bodies of water.

**Moist Lowlands**

The moist lowland habitat occurs in the vicinity of the lake, the brooder ponds, and the streams of the park. It contains such plant features as trees, coarse herbs, tall grasses, and occasional plum thickets. To some extent around the ponds, and to a greater extent around the streams there is accumulated drift. This drift must be considered a salient feature of this habitat, because of the number of animals to which it affords shelter. In portions of this habitat, trees are fairly numerous; where this is true there is usually an abundance of drift and a scarcity of coarse herbs. Drift is also found in places where trees are absent but weeds are particularly coarse. Included also in this habitat are certain areas of tall grass, none of them of great extent, in which other types of vegetation are almost lacking. Certain mammalian forms are apparently to be found only in these grassy areas. The plum thickets of the lowlands offer shelter to a variety of forms, although there is no particular species which seems to concentrate here. Instead there are forms from all parts of the lowland area, excepting possibly one or two of the most typical tall grass forms, and in those thickets along the drier parts of the streams there are also a few of the high plains forms in comparatively large numbers.
HIGH PLAINS

By far the greater part of the park area belongs in the high plains type of habitat, although the fauna is not quite so varied as that of the lowlands. In the typical high plains area, vegetation is sparse, consisting chiefly of short grasses and prickly pear, with here and there, patches of sunflowers along the roads or in fields which were formerly under cultivation. The dry gulches which cut this region must be considered a part of this type of habitat despite the fact that they are topographically, to a certain extent, lowlands. Along the bottom of these gulches wild plum thickets and a few hackberries are frequently found. Above these is usually considerable sagebrush, which in turn often gives way to yucca at a higher level. In places the sage extends out onto the high plains to a considerable extent. These gulches, particularly those containing rock ledges or loose rocks, contain certain forms which are not found on the high plains away from them.

Between the lowlands area and the high plains is a very poorly defined transition zone. In it we find both typical lowland forms and typical plains forms, though there is usually a noticeable decrease in the number of each here as compared with the number in their usual habitat.

In an area as small as this park it is obviously impossible to place all forms exclusively in particular types of habitat. It is, however, equally obvious that various forms tend to concentrate in certain habitats, and it is with respect to this concentration of forms that the above division has been made.

There follows an annotated list of the amphibians, reptiles, and mammals which have been taken or observed within the park or in areas directly adjacent to it.

AMPHIBIANS

*Scaphiopus bombifrons* Cope. The spadefoot toad, although it occurs in this area in great numbers, is seldom seen. In dry periods it buries itself some distance under the surface of the ground and comes out, for the most part, only after rains. Except during breeding season, the normal type of habitat is that of the high plains; several of them have been dug out of the banks of the dry gulches of that habitat. During breeding season, however, they may be found in great numbers around the temporary upland rain ponds. In fact, the numbers of this form congregating around these places probably exceeds that of any other amphibian, with the possible exception of *Bufo cognatus*. On the night of June 17, 1938, after a heavy rainfall, many of them were observed calling from a large rain pond and two nearby smaller ones about a mile and a half east of the lake, and from this point an exceptionally large chorus could be heard some distance to the south. Upon investigation we found the source to be a large rain pond over two miles from the point at which we were when the chorus was first heard. The frogs in this pond appeared to be exclusively *Scaphiopus*, and we estimated that there were at least five hundred of them there. A number of these were calling from beneath the surface of the water. Several trips were made during the next two weeks to the ponds first mentioned for the purpose of collecting larvae, and it was interesting to note that the larvae in the two smaller ponds, which were drying up the fastest, showed a greater rate of development than those in the more permanent large pond. This was true not only of the *Scaphiopus* larvae, but, also, to a possibly even
greater extent, of those of Bufo cognatus, and to a certain extent with those of Bufo woodhousii and Rana pipiens.

Bufo cognatus Say. This toad is essentially a lowland form, but it is by no means uncommon in the high plains. During breeding seasons it is to be found in profusion around the temporary rain ponds, very often in association with Scaphiopus. It is somewhat secretive during dry times, but not nearly to the extent of the spadefoot, for it is often to be found feeding on insects in the evening.

Bufo woodhousii woodhousii Girard. This large toad is confined somewhat more to the lowlands than B. cognatus. It is to be found in the evenings about as commonly as cognatus, but has never been found breeding in such great numbers. This may be due to the fact that we have done no collecting here in the early spring, but since this is not ordinarily a particularly early breeding form, it seems more likely that it is actually less numerous than the preceding forms, but not so secretive during dry periods.

Acris gryllus (Le Conte). The little cricket frog is common throughout the subaquatic areas of the park. It has never been observed in any temporary rain ponds here, though there is the possibility that it utilizes them for breeding places to some extent in the earlier spring. The most important breeding places, however, are more likely the certain permanent, rather marshy areas around the lake and the brooder ponds and above the picnic ground springs, for it is in these places that they are most frequently heard calling later in the year.

Rana catesbeiana Shaw. The bullfrog is confined exclusively to the subaquatic regions around the lake and the brooder ponds. While it is not rare, it is by no means as common as any of the amphibians previously mentioned.

Rana pipiens Schreber. The spotted frog is very abundant around the shores of the brooder ponds, is found to a lesser extent around the lake, and is not infrequent along the deeper parts of the streams. It has also been observed in connection with the temporary rain ponds, but not in large numbers. The chief breeding season for this frog here is probably in the middle to latter part of April, for in those portions of July the banks of the brooder ponds become literally alive with hundreds of newly metamorphosed frogs of this species. This frog is not confined to the subaquatic habitat as is the bullfrog, for many can be found in the coarse herbs and grasses of the lowlands a considerable distance from the water.

Microhyla olivacea (Hallowell). The narrow-mouthed frog is apparently rare in this area, for despite the fact that it seems to be a rather late breeder, we have heard only two specimens calling here. These were not heard in the park itself, but in the large rain pond east of the lake, previously mentioned in connection with Scaphiopus, and on the same date. We made attempts to secure both specimens, but could get only one, and this one only after about two hours of searching. It called only infrequently, and seemingly from a different spot each time; but it remained in the vicinity of a patch of sunflowers in nine to eighteen inches of water, using the leaves of these plants for concealment.
LIZARDS

*Crotaphytus collaris collaris* (Say). The collared lizard is very common in the dry gulches of the high plains region and is apparently confined to them. It is to be found chiefly in those gulches where rock ledges or loose rocks occur, but it is not rare in others free of rock, where it takes shelter in holes in the bank.

*Holbrookia maculata maculata* (Girard). The little sand lizard is a very common one in this area, being exceeded in number only by *Cnemidophorus sexlineatus*. It is chiefly a high plains form, but it is very common in the transition zone and extends down into the lowland area to some extent. Some of these little lizards exhibit the most amazing curiosity; it was a frequent occurrence for them to appear while we were working in the quarry and watch us for hours at a time. In the summer of 1936, for over a week, one in particular was an almost daily visitor. He would arrive in the morning soon after we put in our appearance and take up a position near us, placing his front feet on a clod so as to be sure not to miss anything. In the hotter part of the day he would seek out the shade of a particularly large clod, but would never leave us for any length of time.

*Sceloporus consobrinus consobrinus* (Baird and Girard). This lizard is found only in the moist lowland habitat in this area. It is most frequently found in the regions of heavy weeds, particularly in places where drift has accumulated among the weeds. It is also comparatively common in the territory immediately around the picnic grounds spring and the spring house. It is found occasionally in the drift of the wooded portions of the lowlands.

*Phrynosoma cornutum* (Harlan). The horned toad is almost as common in the high plains habitat as *Holbrookia*, but does not extend into the lowlands as the latter does, and comes into the transition zone in somewhat lesser numbers.

*Cnemidophorus sexlineatus* (Linne). The six-lined lizard easily outnumbers any other in the park area, due to the fact that it will live almost as readily in one type of habitat as another. It occurs somewhat more frequently in the slightly sandy areas of the high plains than any other place, and yet at the same time is much more common than *Sceloporus* in the moist lowlands.

SNAKES

*Leptotyphlops myopica* (Garman). The only specimen of this rare burrowing snake from this area is one which was found on June 18, 1936, by Mr. Kline, who was a foreman in the CCC camp there at the time. It was collected from a rocky hillside during the quarrying of rock, but due to the lack of a sufficient number of specimens we cannot say to what extent it occurs in this habitat as compared with the other types of habitat.

*Heterodon nasicus* (Baird and Girard). The hog-nosed snake is rather common in this area. It is fairly well confined to the high plains, but comes well down into the transition zone and infrequently even into the lowlands.

*Coluber constrictor flaviventris* (Say). The blue racer is one of the most common snakes of the park area, and is found in the high plains, through the transition zone, and into the moist lowlands. Unlike any of the previously named forms, it seems to have its greatest concentration of numbers within
the transition zone. It is, however, somewhat more of a plains type than a lowland type, and is to be found a little more commonly in those areas within the transition zone which tend slightly more towards the plains habitat than in those which tend more towards the lowlands type of habitat.

_Masticophis flagellum flavigularis_ (Hallowell). The whip-snake seems to occupy a habitat very similar to that of the blue racer, but is by no means as numerous.

_Arizona elegans elegans_ (Kennicott). This is another form of which only one specimen has been taken. This specimen was dug from a small cavity extending back for about a yard into the bank of a dry gulch running through the deer park on July 1, 1937.

_Pituophis sayi sayi_ (Schlegel). The bullsnake is very common throughout the park area, and is to be found in almost any type of habitat, possibly slightly favoring the high plains. It is, of course, excluded from the purely aquatic habitat, but has been found immediately along the banks of streams.

_Lampropeltis calligaster_ (Harlan). Only one specimen of the common king-snake has ever been found in this area, so it is impossible to say definitely just what type of habitat it prefers. The one taken, however, was picked up crossing the highway in the high plains west of the beach on July 17, 1937.

_Lampropeltis getulus holbrooki_ (Stejneger). The “salt and pepper” king-snake is represented by two specimens. One was found in the afternoon of July 20, 1937, near a rock pile by the edge of the beach, and the other one was taken on August 6, 1937, near the spillway at the south end of the lake. This would indicate a preference for the lowland type of habitat.

_Rhinocheilus lecontei_ Baird and Girard. This snake has not yet been taken within the park area, but has been found only a few miles east of it, in Meade county.

_Natrix erythrogaster transversa_ (Hallowell). The yellow-bellied water snake is fairly common in the subaquatic regions of the park area, particularly around the brooder ponds and the lake. It is not confined to the subaquatic areas, however, for it frequently ventures out into the lowland areas near the water where there is sufficient protection, such as particularly coarse herbs or grasses or piles of drift.

_Natrix sipedon sipedon_ (Linné). The red-bellied water snake is much less common than the preceding form. It is found in practically the same type of habitat, but is more prone to stay close to the edge of the water. This form and the preceding one are both very deleterious to the young fish, and the park superintendent makes every effort to keep their number down, particularly around the brooder ponds.

_Thamnophis marcianus_ (Baird and Girard). Marcy’s garter snake has been taken in Meade county, but not as yet within the park area, though it almost certainly occurs here.

_Thamnophis radix_ (Baird and Girard). The plains garter snake is one of the commonest snakes in the park. It is very abundant in the subaquatic areas and the regions of moist lowlands near the water, but is not confined to them. It is not as a rule commonly seen on the high plains, but it will be found around the edges of almost any temporary rain pond in which a large number of frogs and toads are congregated, no matter how far this pond may be from any permanent water.
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Thamnophis sauritus proximus (Say). This form is not nearly so common as T. radix, and seems to be confined to regions very near permanent bodies of water.

Thamnophis sirtalis parietalis (Say). The red-barred garter snake is not common in the park. Due to the lack of very many specimens, we cannot say definitely what its habitat preferences here are, but it appears to stay rather close to permanent bodies of water.

According to the reports of Mr. Carlton and other inhabitants of this region, a number of rattlesnakes have been killed in this vicinity, but we have not as yet been able to procure any specimens. From the descriptions given us, it would appear that two species of rattlesnakes occur here, most probably Crotalus viridis viridis (Rafinesque) and Sistrurus catenatus tergeminus (Say).

TURTLES

Kinosternon flavescens (Agassiz). The so-called “stink-pot” is very common in all the waters of the park area.

Chelydra serpentina (Linné). The snapper is common in the deeper waters of the park, that is, the lake and the brooder ponds, and is to be found occasionally in the shallow streams. Due to its size and speed, it is one of the most important enemies of the fish here.

Terrapene ornata (Agassiz). The common terrapin is abundant throughout the high plains regions of the park, and is only slightly less numerous in the lowlands. It is probably the most commonly seen reptile here, with the possible exception of Cnemidophorus.

Chrysemys picta bellii (Gray). This turtle is very common in the lake and in the brooder ponds. It also is an important enemy of the fish, and certainly a great nuisance to fishermen.

Pseudemys troostii (Holbrook). This form is found in the same type of habitat as the above, but it appears to be somewhat less numerous, as judged from the number killed by Mr. Carlton in attempts to protect the young fish in the brooder ponds.

Platypeltis spinifera (Le Sueur). The soft-shelled turtle is found chiefly in the deeper waters of the park, coming infrequently into the streams. It has not been observed as commonly as the other forms, but this may be due partially to its greater ability to remain out of the way of enemies. The generic name Platypeltis must be used in place of Amyda for the American soft-shelled turtles, as shown by Dr. H. M. Smith in his “Notes on Mexican Reptiles and Amphibians,” ZoöI. Ser. Field Mus. Nat. Hist., 24:15-35. 1939.

MAMMALS

Since the Meade County Park is a state game refuge the specimens of species taken in traps were obtained outside of the park boundaries. The habitat groups, referred to previously, are not limited to the park area, but are continuous into the surrounding country, and the mammals known only from specimens taken just outside of the park, are logically assumed to range also within its boundaries.

Didelphis virginiana virginiana Kerr; Virginia opossum. The opossum is a common inhabitant of the lowland area, occasionally invading the transitional or even the high plains areas. The range of the opossum is limited chiefly to
the belt of trees or to a protective cover of undergrowth found near the water-courses.

*Scalopus aquaticus intermedius* (Elliot); Southern plains mole. Moles are common in the woodlands and meadows of the lowlands near the brooder ponds and Lake Larabee. During wet weather they range up into the transitional, only to retreat when the soil of the latter region becomes too hard, and food becomes scarce.

*Cryptotis parva* (Say); Little short-tailed shrew. This shrew, the smallest mammal found in the park area, is known only from skulls obtained from owl pellets, picked up near the east end of Lake Larabee. The short-tailed shrew is a rare inhabitant of the tree belt of the lowland area.

Bats. At least two unidentified species of bats were observed flying over the brooder ponds in the late evening.

*Procyon lotor hirtus* Nelson and Goldman. The racoon is a common inhabitant of the lowland area, its tracks being a frequent find along the water-courses near the brooder ponds.

*Mephitis mesomelas varians* (Gray); Long-tailed skunk. Skunks were common throughout the lowland and transitional areas. One family was observed to be denning under a deserted cabin located within the latter area. Skunks were frequently observed at dusk feeding on grasshoppers in the lowland meadows adjacent to the brooder ponds. Many half-grown skunks were observed during the month of July, and a lactating female was taken on July 28.

*Vulpes velox velox* (Say); Swift fox. The only records of this rare fox are two. One animal was flushed by Mr. C. W. Hibbard just south of the park area. Another swift fox was killed on Big Springs Ranch, north of the park, and although the specimen was not seen by the authors, the source of information is reliable. This handsome fox is limited to the high plains area, and unfortunately, is near extinction in the state.

*Canis nebrascensis subsp?* The familiar prairie coyote is common throughout the high plains and transitional areas of the park.

*Felis domestica* Linné. Domestic cats, abandoned by picnickers or run feral from ranchers’ homes, are numerous, and constitute a menace to wild game birds and poultry alike. Many cats were living under deserted cabins of the CCC camp near the picnic grounds, and signs of their depredations on song birds and quail were frequent. This vicious little feline should be brought under some practical control, and it is suggested that the practice of humanely killing unwanted cats is far better conservation than is that of turning them out to prey on the already diminished wild game birds.

*Citellus spilosoma major* (Merriam); Large spotted ground squirrel. This mammal, ranging into Kansas from the southwest, is a rare inhabitant of the high plains. Two individuals have been observed close to the park boundary.

*Citellus tridecemlineatus arenicola* Howell; Sandhill striped ground squirrel. This animal was seldom seen and apparently is not a common mammal of the park. Its burrows are limited to the high plains.

*Cynomys ludovicianus ludovicianus* (Ord); Black-tailed prairie dog. The only protected colony of prairie dogs in Kansas is found in Meade County State Park west of Lake Larabee. While certain charges against the destructive activities of this rodent are justified, the animal certainly should not be slated for speedy extinction in the state. The prairie dog forms a very colorful
and interesting part of our native wild life, and should be protected and pre-

Cynomys is a form living in colonies and towns scattered over the high plains area. The animal, once everywhere abundant, has now become rare or extinct over many portions of the state, due to thorough and oftentimes needless shooting and poisoning. With the protection of a few towns in areas not otherwise utilized, Cynomys may remain a permanent member of our native fauna.

Sciurus niger rufiventris (Geoffroy); Western fox squirrel. This squirrel is a common inhabitant along the wooded streams of the lowland area.

Geomys breviceps llanensis Bailey; Mesquite plains pocket gopher. Gopher colonies are numerous in the lowland and transitional areas, but chiefly in the lowland meadows where the softer, richer soil makes a more desirable habitat.

Perognathus flavus flavus Baird; Baird pocket mouse. Only one specimen was taken of this little mouse, and that just outside of the park area. Although such evidence cannot be taken as an absolute criterion of its abundance, it cannot be considered common. It is limited to the high plains, its burrows being found along the shallow sand washes of the latter region.

Perognathus hispidus paradoxus (Merriam); Kansas pocket mouse. Growths of weeds or high grasses on the high plains furnish cover for this sparsely distributed pocket mouse.

Dipodomys ordii richardsonii (Allen); Richardson kangaroo rat. The kangaroo rat is an inhabitant of the gulches and sand washes of the high plains, in which localities it is one of the most common mammals. Here it is found associated with Neotoma m. micropus, Perognathus f. flavus, Onychomys leucogaster articeps and Sylvilagus audubonii neomexicanus. The kangaroo rat is a wide ranger; the tracks of a single individual may be traced for a quarter of a mile along a sandy stream bed. The burrows are frequently changed, an individual usually remaining in one burrow for only a few days, then deserting it and digging a new one. Those burrows in use are tightly plugged with sand during the day, and are surrounded by a maze of footprints and marks made by the long tail which it frequently drags along the ground. The kangaroo rats proved difficult to trap, neither oats nor oats-bacon-raisin bait proving especially attractive to them.

Onychomys leucogaster articeps (Rhoads); Great plains grasshopper mouse. This mouse is limited to the high plains area, over which it is very common. The grasshopper mouse is a wide-ranging form, and traps set with dry oats or, preferably, an oats-bacon-raisin bait would catch them in even the most exposed stations. Two color phases of brown and slate-gray were found, the latter being much more common. The grasshopper mouse in Kansas has at least two litters a season, for females bearing full term fetuses were taken June 18 and 30, and July 20, while a female bearing fetuses approximately one-fifth grown was taken July 16. Four to five young is the common number.

Reithrodontomys albescens albescens Cary; Pallid harvest mouse. An owl roost located in a ravine in the high plains yielded the only remains of this harvest mouse. Its range seems to be limited to such ravines, in which the herbs, grass and undergrowth are abundant, and judging from the skulls found beneath the roost, it is not uncommon in these localities.

Peromyscus maniculatus nebrascensis (Coues); Nebraska deer mouse. This mouse is one of the most common mammals in the park area. Although it is
limited chiefly to the high plains and the transitional areas, I have taken specimens of *nebrascensis* in *Sigmodon* sets placed in the tall grass of the upper border of the lowland region. Over much of the high plains, *P. m. nebrascensis* ranges coincident with *Onychomys leucogaster articeps*, and *Perognathus hispidus paradoxus*; with *Reithrodontomys albescens albescens* in the high ravines; and with *Perognathus flavus flavus* and *Dipodomys ordii richardsonii* along the dry sand washes of the high plains area. *Peromyscus maniculatus nebrascensis* begins its foraging soon after dark, for specimens are not infrequently seen by lantern-light between 9 and 10 p.m. Dry oats, oatmeal paste, and oats-bacon-raisin baits were all successful in trapping for *Peromyscus*. A female carrying fetuses one-fifth full term was taken June 19.

_Sigmodon hispidus texianus* (Aud. & Bach.); Texas cotton rat. The cotton rat is present in small numbers in the high grass patches in the lowland and transitional areas. *Sigmodon* is apparently limited to these localized areas.

_Neotoma micropus micropus* Baird; Baird wood rat. The familiar packrat is one of the most common mammals of the park area. The rat population, however, is localized and concentrated chiefly in the rocky gulches and clay washes of the high plains. *Neotoma m. micropus* is a wide-ranging form, being found in the transitional area as well as the high plains, but is entirely lacking from the lowlands. *Neotoma m. micropus* shows a decided preference for rocky shelter rather than clay banks, where the former is available. One female carrying fetuses approximately one-fourth full term was taken June 28; a female with young one-third full term was taken June 29. Three fetuses were present in each case. Two young rats, about one-third grown were taken July 14. This would indicate that at least two litters a season were raised in this region.

_Ondatra zibethica cinnamonina* (Hollister); Great plains muskrat. The muskrat is an abundant inhabitant of the semiaquatic borders of the brooder ponds and Lake Larrabee. Their burrows were dug in the bank, no houses being in evidence.

_Mus musculus musculus* Linnaeus; House mouse. This familiar mammal is found about habitation in all types of habitat, and is frequently trapped in the long grass, weeds, or brush heaps of the lowlands and transitional areas.

_Erethizon epixanthum bruneri* Swenk; Nebraska yellow-haired porcupine. The porcupine is an occasional inhabitant of the wooded section of the lowland area. Porcupines are rare throughout Kansas, and unfortunately, being a curiosity to most people, this harmless and interesting animal is killed on sight.

_Lepus californicus melanotis* (Mearns). The great plains jack rabbit is one of the most common mammals of the park area. Its distribution is limited to the high plains, where it ranges coincident with *Sylvilagus audubonii neomexicanus*. The jack rabbit does not take to burrows as does the cottontail, but hides during the heat of the day in shallow forms dug under some yucca, sage, or cactus plant.

_Sylvilagus audubonii neomexicanus* Nelson; New Mexico cottontail. Two species of cottontails are found in the park area. The first, the New Mexico cottontail, is the smaller of the two, and is distributed chiefly in the rocky canyons and sand washes of the high plains, but it also ranges down into the transitional area where shelter is available. In the transitional, *neomexicanus*
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lives side by side with the larger, darker *Sylvilagus floridanus alacer*. In the canyons of the high plains, where *neomexicanus* is most abundant, its burrows are found adjacent to those of *Neotoma m. micropus* and *Dipodomys ordii richardsoni*. *Sylvilagus a. neomexicanus* is frequently parasitized with bots (*Cuterebra*), and appears to be more susceptible to the parasites than *S. f. alacer*. A lactating female, carrying three fetuses approximately one-tenth full term was taken June 18. She was apparently suckling a previous brood at the time.

*Sylvilagus floridanus alacer* (Bangs); The Oklahoma cottontail is limited to the windings of the more or less permanent water courses which traverse the country. It is found chiefly in the lowland area, but also ranges into the transitional, coincident with *S. audubonii neomexicanus*. A lactating female carrying four half-term fetuses was taken June 23; two other lactating females were taken June 24 and July 7.

*Cervus canadensis canadensis* (Erxleben); American wapiti. A pair of elk, liberated in the park enclosure, have shown an increase each year in number. The elk was once common along the lowland meadows of this region.

*Odocoileus hemionus hemionus* (Rafinesque); Mule deer. A number of mule deer have been introduced into the park area where they have become very tame, and have shown an increase in number each year. During the summer of 1937, while camped at the park, a young buck mule deer with two points was chased up from the Cimarron river on to the plains north of Plains, Kan. The deer was winded and stiff when found and driven into a barn, since it was thought to have been an escape from the park. Due to injuries received, it was dead by the time we reached it. The deer did not belong in the park, but was one of the few wild deer still found along the Cimarron breaks. The specimen is now in the University Museum.

*Odocoileus virginianus macrourus* (Rafinesque); White tailed deer. The white tailed deer has been introduced into the park area where it has become well adapted. It is also showing an increase as long as the deer remain in the protected area.

*Antilocapra americana americana* (Ord); American Pronghorn. Much credit is due Mr. Lee Larrabee, of Liberal, Kan., who has spent considerable time and money in trying to establish a small herd of antelope in the park. The first attempt was unsuccessful, due to shooting of one of the antelopes within the enclosure. The second pair was successful in increasing to a number of five which was reduced, however, to a single doe, due to the severe dust storms of the spring of 1937. It is hoped that the State Fish and Game Commission will purchase a mate for the remaining antelope and endeavor to reestablish this native mammal in the park area.

*Bison bison bison* (Linne); Plains bison. A young pair of bison in the "Deer Park" affords the visitor a view of the once abundant mammal that roamed over our prairies. Adjoining the "Deer Park" is suitable land which would furnish an adequate range for a small herd of bison if it could be purchased by the state.
Fig. 2. Semiaquatic habitat (brooder pond), and adjacent tree belt and meadow.
Fig. 3. Lowland tree belt and meadow habitat.
PLATE III

Fig. 4. High plains habitat in foreground; transitional habitat to right near trees; lowland meadow beyond trees.

Fig. 5. Rocky canyon of high plains habitat.