

NOTES ON THE MAMMALS OF THE DUNE REGION OF  
PORTER COUNTY, INDIANA.

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The following notes on the mammals of the dune region of Porter County are based primarily on a small collection which was made during a brief camping trip into the dunes during the autumn of 1922. They are supplemented by observations on mammals seen but not captured during that trip and numerous Sunday excursions and on reports of apparently good authority. So far as I am aware there are no previously published comprehensive records of the mammals of Porter County. These notes contain little of novelty, but it seems desirable to publish them because owing to the invasion of the region by week-end visitors, the erection of permanent cottages along the lake front, and more or less extensive forest fires it is not unlikely that the biological aspects of this very interesting region will be rapidly altered. Many animals and plants now common in the region are probably destined to disappear as completely as the once common Virginia deer.

Our tent was pitched in a sheltered spot a few yards back from the lake front and about 50 or 60 feet above its level, north of Mineral Springs station of the Chicago, Lake Shore and South Bend Railway. Traps were set in the neighborhood of our camp and westward to opposite Oak Hill station.

Acknowledgement is here made of the valuable assistance of my wife, Dr. Martha Brewer Lyon of South Bend, not only for help in placing traps and looking for mammals but also for acting as chef, etc. while I skinned specimens. Special thanks are also due to Mr. H. W. Leman of Chicago, for the privilege of camping on his property, and to Mr. Gerrit S. Miller, Jr., of the United States National Museum for assistance in the identification of specimens. The specimens collected have all been deposited in the National Museum.

As is well known the sand dunes at the southern end of Lake Michigan are not barren tracts of sand. They present a variety of physiographic features and characteristic associations of plants, if not of mammals. In a general way these may be briefly described as follows.\*

*The beach proper:* This is the area between the calm low water level of the lake and the rough high water level. It is practically devoid of permanent vegetation. While perhaps most of the beach area is dependent upon the size of the breakers formed after every heavy northerly wind on the lake, some of it is evidently due to actual changes in the water level. Northern winds seem to blow the water shoreward as well as to throw it into large waves, while an off shore wind blows it away again. Differences in barometric pressure over different areas of the lake may also have an effect in altering the water level. Even

\* For a detailed description of the various associations in the region see *A Naturalist in the Great Lakes Region* by Elliott Rowland Downing, 1922, and for topographic features *Rand McNally's Map of Indiana Dunes* by P. S. Goodman [1920].

on essentially calm days the water does not always appear at the same level.

*The fore dune region:* The fore dunes are low wind-blown piles of soft sand immediately back of the high water mark of the beach and parallel with the water line. Vegetation on them is not abundant in kind or in number, but is not inconspicuous. The most characteristic plants are sand reed-grass, *Calamovilfa longifolia*; maram grass, *Amophila arenaria*; and sand cherry, *Prunus pumila*. This area gradually blends in with the higher wooded dunes, bare faces of which are characterized by the same association of plants. Around the margins of blow-outs (wind-worn cuts into the larger, wooded and more mature dunes) an association of plants similar to those of the fore dunes occurs mingled with plants of the first portions of the wooded dunes. The only mammals found in the fore dune region were the Baird deer mouse, *Peromyscus maniculatus bairdii* and a few house mice, *Mus musculus*. As the same species of deer mouse was found in an interdunal meadow it can not be considered a characteristic inhabitant of the fore dunes.

*Wooded dunes:* These are the characteristic dunes of the region and occupy the greatest area. They are immediately back of the fore dunes and range in height from 50 to 150 feet. They are covered with permanent vegetation. According to the abundance of certain plants on them and to their proximity to the lake the wooded dunes may be roughly divided into a lakeward portion characterized by an abundance of such plants as white pine, *Pinus strobus*; jack pine, *Pinus banksiana*; common juniper, *Juniperus communis*; red cedar, *Juniperus virginiana*; red osier dogwood, *Cornus stolonifera*; aromatic sumac, *Rhus canadensis*; fox grape, *Vitis vulpina*; basswood, *Tilia americana*; and a considerable number of white and black oaks, *Quercus alba* and *Q. velutina*; and into a landward portion where the oaks predominate and where there is usually a dense growth of blueberry, *Vaccinium pennsylvanicum*. The two portions are not sharply defined but the vegetation has a tendency to be disposed as mentioned. The lakeward portion of these dunes is quite uniform in height, ranging about 50 or 60 feet, and the vegetation of their north faces blends in with that of the fore dunes. The landward portions vary considerably in height and may be only low hills or ridges or rise to high hills of 150 feet. The wooded dunes are often broken into by blowouts and their landward slopes are often being covered by advancing sand. The common deer mouse, *Peromyscus leucopus noveboracensis* was very abundant in the wooded dunes.

*Interdunal meadows and ponds:* These are open treeless stretches between the wooded dunes and toward the landward side. They may be permanent meadows or permanent shallow ponds, or meadows which early in the season were shallow ponds. Around the edges of the permanent or temporary ponds there is always more or less meadow. These meadows are covered with a variety of annual and perennial herbaceous plants varying considerably in different meadows and drying ponds. Some of the meadows are quite damp and may contain much sphagnum and masses of such plants as cassandra, *Chamaedaphne calyculata*, chain fern, *Woodwardia virginica*, and sundew, *Drosera intermedia*.

About the edges of such meadows and ponds the sour gum, *Nyssa sylvatica* is found quite characteristically. Although such places appear to be quite ideal for many species of mammals, yet comparatively few runways or other signs of mammals were found in them. The species taken were the common deer mouse, *Peromyscus leucopus noveboracensis*; on one occasion, the Baird deer mouse, *P. maniculatus bairdii*; prairie and pine voles, *Microtus ochrogaster* and *Pitymys pinctorum scalopsoides*, and the short-tailed shrew, *Blarina brevicauda talpoides*.

*Subdunal swamp or marsh:* Between the tracks of the Chicago, Lake Shore and South Bend Railway and the dunes proper is an extensive area of low ground, almost as low as the level of Lake Michigan. At Mineral Springs station the track is said to be 13 feet above the lake level and the track is higher than the swamp. Part of this low ground drains into the lake at Waverly Beach by Dune Creek. Toward Michigan City much of this low ground is being cultivated and from most of the other treeless portions much hay is cut. Most of the subdunal swamp or meadow is treeless, but near the dunes in many places it is timbered with such trees as tamarack, *Larix laricina*; white pine, *Pinus strobus*; yellow birch, *Betula lutea*; occasionally, paper birch, *B. papyrifera*; red maple, *Acer rubrum*; elm, *Ulmus americana*; speckled alder, *Alnus incana*; and tupelo, *Nyssa sylvatica*. A conspicuous shrub in this area is the poison sumac, *Toxicodendron vernix*. Opposite Mineral Springs this wooded portion is usually termed the tamarack swamp although tamaracks are by no means the most common trees. Farther west white pines predominate, in places the floor being almost solid with their needles. Parts of this subdunal swamp are very boggy, containing such vegetation as pitcher plants, *Sarracenia purpurea*; cranberry, *Oxycoccus macrocarpus*, etc. In many places it is comparatively easy to sink to considerable depth in the more boggy portions. It is in such places if they should ever be explored or drainage ditches cut into them that one might expect to find remains of large mammals, elk, deer, bison which had become mired there years ago when such species were common in Indiana. In this subdunal swamp traps were placed in various sections excepting in the extremely boggy areas. The deer mouse, *Peromyscus leucopus noveboracensis*, was the common mammal. In the open portions of the marsh rattle-snakes, *Sistrurus cernatus* are frequently taken, especially during haying.

*Dune Creek:* This is a small sluggish stream draining part of the subdunal swamp. It starts in the Furnessville region and flowing slowly westward and northward empties into Lake Michigan just west of Waverly Beach. Most of its course is through swampy woods. Owing to lack of time no trapping was done along its course.

#### MAMMALS COLLECTED IN THE DUNE REGION OF PORTER COUNTY OR MAMMALS OBSERVED IN THE REGION.

Opossum (*Didelphis virginiana* Kerr): A few years ago near Dune Park Dr. and Mrs. W. D. Richardson found the dead body of a mature opossum and on another occasion found a half-grown young.

Prairie mole (*Scalops aquaticus machrinus* Rafinesque): Residents

state that moles are not uncommon in the region, but they have escaped my personal observation. Wood (6) reports moles as very common on the dunes of Berrien County, Michigan. Runways such as made by moles are very common in the wooded dunes and I have even seen one such runway in the open sand at the top of a blowout. Traps set in these runways yielded many deer mice, occasionally prairie and pine voles, but never moles. It is well known that pine voles make runways essentially like those of moles and the evidence points to the vole as a more frequent maker of such runways in the wooded dunes than the mole.

Short-tailed shrew (*Blarina brevicauda talpoides* Gapper): Five specimens secured, a pair taken in traps in runways in sphagnum and cranberry at edge of an interdunal pond, one in a white pine swamp, and two in the treeless portion of the subdunal swamp. None were taken in the wooded dune region. This shrew did not appear to be common. Very rarely were any of the numerous collected deer mice ever molested in a manner suggestive of the usual depredations of short-tailed shrews. Traps were usually baited with bacon as a special inducement to shrews. Of the two taken in the sphagnum and cranberry, one was captured on checking up the trap line backwards after the night's catch had been taken out thus showing these shrews to be active by day and to be little frightened by persons working around their habitat. Measurements of the two males: total length 122, 103; tail 28, 21; hind foot 17.5, 14 mm. Of the three females: 112, 118, 105; 22, 28, 21; and 15, 17, 15.5 mm.

Red bat (*Nycteris borealis* Mueller): One afternoon in mid-summer I saw a curious looking object in some blackberry bushes. Almost as soon as I recognized it to be a female red bat it flew away. Bats are frequently seen on summer evenings and probably represent most of the species of bats recorded for the state by Hahn (4). The red bat is the only one seen sufficiently close to admit of identification. No specimens were secured.

Timber wolf (*Canis lycaon* Schreber): Timber wolves have probably been extinct in the dune region for some years. Residents state that wolves have been seen recently and if such is the case the animals are most likely the prairie wolf or coyote. Dice (2) records timber wolves as having been taken at Lakeside, Berrien County, Michigan, about 1909 and says that in 1911 four were killed southwest of Three Oaks, Michigan, just over the Indiana line, scarcely 20 miles away. Among some deer bones picked up in a blowout was a considerable portion of the left ramus of a member of the genus *Canis*. The carnassial is the only complete tooth in it. It measures (crown) 25 x 10 mm., height of main cusp 13 mm. The length of premolar and molar series of teeth (alveoli) is 83 mm. Mr. Gerrit S. Miller, Jr., says the carnassial "is below maximum for dog and therefore not diagnostic of wolf, though its size is rather great".

Prairie wolf or coyote (*Canis latrans* Say): Probably the animal referred to by residents when they say that wolves still inhabit or have lately been seen in the dune region. The species is not recorded by

Dice nor by Wood as among the mammals of Berrien County, Michigan, though the latter author (6) refers to its occurrence in Washtenaw County, Michigan, as late as 1910. Hahn (4) records it from Jasper and Laporte counties, Indiana, as late as 1903 and 1906. Newspaper accounts in October, 1922, state the presence of wolves, probably this species, in swamps near Leesburg, Kosciusko County. No fragments of coyotes or first hand evidence of their present occurrence in Porter County were obtained.

Red fox (*Vulpes fulva* Desmarest): This animal is apparently not rare in the dunes though not very frequently seen. Residents state that a small number are obtained each season for their fur. One was seen by my wife October 1, 1922. When we camped in Big Blowout in 1921, the tracks of what were apparently those of a fox were found on the slope of the blowout within several yards of our tent and in a comparatively straight line along the fore dune region for about half a mile. During the past summer, not far west of Michigan City, we found a large burrow in a hillside. It was much too large for a woodchuck's burrow and although no identifiable tracks were found about it, we believed it to be a fox den.

Raccoon (*Procyon lotor* Linnaeus): Residents state that a few "coons" are taken each season for their fur. I have no personal knowledge of the animal and I have never been fortunate enough to find foot prints that might have been made by it.

Weasel (*Mustela noveboracensis* Emmons): These animals are fairly common in the region, though I have never seen any. Mr. A. E. Didelot who has trapped about 200 specimens of weasels in the past three winters in the region of the dunes and near Chesterton, says that only two of that number were in white pelage. In Washtenaw County, Michigan, Wood (5) says only about 75 per cent of the weasels change to the white coat in winter. The percentage of those changing in northern Indiana appears to be much smaller.

Mink (*Mustela vison* Schreber): A number of minks are said to be trapped each season in the region. One dead specimen was collected on the bottom of a dried interdunal pond in a spot which had been covered with water two weeks before. The body gave the impression of not having been dead for more than a week or ten days.

Eastern skunk (*Mephitis nigra* Peale and Beauvois): Skunks are fairly common in the region and a number are taken each season for fur. By November 30, 1922, R. W. Sabinske had taken seven. He gave me two carcasses that he had not yet thrown away. They were covered with an enormously thick layer of fat. Their stomachs contained unidentifiable ground up material and a few small roundworms. His skins were all turned inside out, but he said they ranged in color from solid black except for a white patch on head to a specimen in which white predominated. There seems to have been some doubt as to the identity of the skunk in the dunes. Dice (2) uses *Mephitis nigra* for the animal of Berrien County, Michigan. Hahn (4) thinks the eastern skunk is one commonly found in the state, but in speaking of the Illinois skunk, *Mephitis mesomelas ariva*, he says "It is very probable that this is the

species inhabiting all the northern part of the state". According to Cory (1) the region under consideration is in the area of intergradation of *Mephitis mesomelas aria* with *M. m. putida*. A. H. Howell of the Biological Survey has identified the two skulls given me as *Mephitis nigra*.

Northern deer mouse (*Peromyscus leucopus noveboracensis* Fischer): This deer mouse is the commonest mammal in the region. It was found in every situation except in the low dunes along the lake front where it appears to be replaced by the Baird deer mouse. The percentage of traps holding deer mice ranged from 10 to 40 a night except when the traps were placed in the fore dunes. Of the three baits employed, rolled oats, peanut butter, and bacon, the latter seemed to be the most effective. Several were taken in larger traps baited with apple and set for squirrels and chipmunks. They were quite common about our tent and helped themselves to exposed food. In addition to these taken opposite Mineral Springs, one of this species was taken in a wooded dune opposite Furnessville in 1921.

Most of the adult males were in a rather bright yellowish pelage although three or four had a short-haired coat of a sort of house mouse gray. In the case of the females about half were in a bright and yellowish pelage while the rest were in a short-haired house mouse gray coat. Only three young specimens in a "blue" pelage were saved. Two of these show an incoming yellowish coat on the sides.

Three stages of development are represented among the specimens collected, breeding adults, animals which have reached adult size and coloration but not yet breeding, and young specimens in the "blue" coat. In addition to these very immature young were noted. Of 18 mature females all were apparently nursing young, none being pregnant. The impression was gained that reproduction was carried on at regular intervals and simultaneously by nearly all the mice. On the spot where our tent was placed another party had previously camped leaving much food around and many pasteboard boxes. On our arrival, there was noticed in one of these boxes a *Peromyscus* nest, made of torn bits of paper after the manner of house mice. It contained several young covered with hair but unable to walk. On examining the nest a few hours later it was found the young had been carried away. As the previous occupants of the site had left Sept. 4 and we had come there Sept. 26, the mice had evidently built the nest and reared young of small size in the course of three weeks. The mammae are pectoral 1/1, inguinal 2/2=6.

In subterranean runways in which traps were placed for pine voles, deer mice were so often taken as to make one wonder if some of these runways may not have been made by them. In some of the interdunal meadows which had been quite wet or even covered with water earlier in the season were numerous holes apparently the work of crayfish though only rarely was anything suggesting a "chimney" seen. Traps set about these holes frequently yielded northern deer mice, some being caught in such a manner as to indicate that the animal had been in the burrow at which the trap was placed. Once a crayfish was caught in a trap placed at these burrows. W. D. Richardson states that deer mice frequently enter his cottage and have the same activities as house mice in cities.

The activities of these mice at night could be well inferred from their footprints in the sand the following morning providing the night had been still. Such footprints were well observed about our tent, and about the fox grapes, red osier dogwood, and grasses, plants growing out of clear sand. The usual mode of locomotion appeared to be a jump using all four feet at once. The tail appeared to have been carried in the air as no marks of it were left in the sand. The longest jumps were from 10 to 12 inches, but usually they were much shorter being but little more than the length of the animal. Only rarely did one find foot impressions showing that the animals had been walking and sometimes, in such cases, what appeared to be tail marks could be seen.

Extreme and average measurements of ten adult males: total length 180, 172, 160; tail 82, 79, 75; hind foot 22, 21, 20 mm. Of ten adult females: 187, 176, 172; 88, 80.5, 75; 21.5, 20.5, 20 mm.

Between five and ten per cent of these mice captured were infested in the inguinal region with a large fly larva, perhaps *Cuterebra emasculator*. These larvae seemed well advanced in development, ranging between 10 and 15 mm. in length. Only one larva was found to a mouse. On one occasion a particularly large larva emerged from its sac in a dead mouse. The others remained within until removed in the process of skinning. The majority of the mice infested were nursing females. Only one was noticed in a male in which case the swelling caused by the subcutaneous larva superficially resembled a swollen testicle.

Baird, or prairie, deer mouse (*Peromyscus maniculatus bairdii*, Hoy and Kennicott): Eleven specimens of this mouse were secured, nine being taken in the fore dune area amid *Calamovilfa longifolia* and *Prunus pumila*, and two in an interdunal meadow. The latter were caught in traps set near holes that appeared to have been made by crayfish. Besides the two captured in this meadow a third got into a trap and left only its tail. None of the traps set in this meadow secured *Peromyscus leucopus noveboracensis* or other mammals. With the exception of two house mice, the Baird deer mouse was the only mammal taken in the fore dunes. Traps set at the top of a blowout about 150 feet above the lake and where much *Calamovilfa* was growing yielded only the northern deer mouse. The Baird deer mouse does not appear to be very common. On one occasion 80 traps were placed in the fore dune area and not a specimen of any kind was secured and on another occasion 78 traps were placed in the fore dunes and only two of this species and a house mouse were secured. Hahn (4) did not find this species very common in the state, recording it from only five counties. Evermann and Clark (3) record three specimens from Lake Maxinkuckee region and state: "It is very abundant in the sand dunes that border Lake Michigan".

What these mice do with themselves during the day, at least in the fore dune region, is difficult to say, unless they dig down into the sand. Only once I found what appeared to be a burrow. A trap placed near it yielded nothing. As the habitat of these mice is much sandier than that of the northern deer mouse their nightly activities were much more visible. Judged by the large number of foot prints and the small number

of mice taken the individual mice are quite active. Like the other species of deer mouse their usual mode of progression is by jumping on all four feet at once. Only rarely does one find tracks apparently made by



Fig. 1. Course of Baird's Deer Mouse, *Peromyscus maniculatus bairdii*, in dry sand.

walking, in which case what appear to be tail marks are sometimes present. In the jumping mode of progression the tail does not touch the ground. There seemed to be a tendency for the animals to jump along the same course or else for the same animal to jump back and



Fig. 2. Footprints of Baird's Deer Mouse, *Peromyscus maniculatus bairdii*, in dry sand.

forth along it. The sand was often well marked by their tracks into almost a runway, usually in a direction parallel to the axis of the low dunes.

The mammae are pectoral 1/1 inguinal 2/2=6. Of the four females



taken only two were adult, one was nursing and the other contained four fetuses, each about 20 mm. in length.

This species although closely resembling the more common northern deer mouse is readily distinguishable in the adult state by its darker coloration and more sharply bicolored tail, as well as by its smaller size, shorter hind foot, and shorter tail. Immature specimens of the two species are almost indistinguishable in point of color, but are apparently easily distinguished by measurements. Five adult or nearly adult males give these extreme and average measurements: total length 150, 141, 130; tail 62, 57, 52; hind foot 18, 17.7, 17 mm. Two adult females measure respectively, 148, 137; 60, 52; 17, 18 mm.

One of the specimens of this species was infested in the inguinal region with a fly larva, similar to the one found in the northern deer mouse.



Fig. 3. Habitat of Baird's Deer Mouse, *Peromyscus maniculatus bairdii*, the low fore dunes in the foreground covered with *Calamovilfa longifolia*.

Prairie vole (*Microtus ochrogaster* Wagner): Represented by seven specimens, three adult or nearly so and four young. Three of the specimens, an adult and two young were taken in a wooded dune, though near a meadow, in subterranean runways in traps specially set for pine voles. The others were taken in an interdunal meadow in traps placed at random on the ground as no runways were discernible. Although traps were placed in four different interdunal meadows, in only one were these voles taken. It may be that colonies are somewhat local in distribution. One female was nursing, mammae: pectoral 1/1, inguinal 2/2=6. Three stages of growth appear to be present, breeding adults, half grown young, represented by four immature specimens, and very young represented by those belonging to the nursing female. Hahn (4) records this vole as being rather generally and commonly distributed throughout the state. Dice (2) found it common in Berrien County, Michigan.

Pine vole (*Pitymys pinetorum scalopsoides* Audubon and Bachman): Two specimens of this species were secured, a male in a runway in damp sphagnum and cranberry at the edge of an interdunal pond, and a female taken in a wooded dune in a trap set in a subterranean runway. Upheaved subterranean runways like those made by moles are very common in the wooded portions of the dunes. On one occasion such an upheaved runway was found on top of a blowout in sand not stiff enough in places to hold up. Whether all these runways are made by pine voles can not be said. Traps placed in them yielded chiefly deer mice. One of the present species was taken in them and two *Microtus ochrogaster*. I failed to capture moles and short-tailed shrews in such runways but perhaps they were insufficiently set with traps. These two specimens of pine vole are the most northern taken in the state. Hahn (4) says he has not taken this species in the northern part of the state, Wabash County being his most northern record. Evermann and Clark (3) record one specimen from Marshall County. Dice (2) records it from Berrien County, Michigan. Measurements of the two specimens, male and female respectively: total length 122, 122; tail 22, 22; hind foot 16.5, 17.5.

Muskrat (*Ondatra zibethica* Linnaeus): Some muskrats are said to be trapped for their skins each winter, being found in the subdunal great marsh and in interdunal ponds such as Little Lake and Walker Lake. In dry seasons, as in 1922, they must become quite terrestrial.

Norway, or common house rat (*Rattus norvegicus* Erxleben): No specimens seen or taken. Residents say rats are sometimes found about the outbuildings of the store at Waverly Beach. As the region becomes more populated rats will probably form a constant part of the fauna.

House mouse (*Mus musculus* Linnaeus): In spite of the large number of week-end visitors to the dunes who leave much food scattered about, and the numerous cottages toward Waverly Beach the house mouse does not appear to be common in the region. Only two specimens were secured, each in the fore dune area, one in 1921 when we were camped at Big Blowout, opposite Furnessville and over a mile from any permanent dwelling, and one in 1922 not more than 300 yards from a cottage occupied every week-end. W. D. Richardson states that the only mice he has observed in his cottage are deer mice. The adult female taken in 1922 measures: total length 172, tail 85, hind foot 18 mm.

Thirteen-striped spermophile or ground squirrel (*Citellus tridecemlineatus* Mitchell): This species is not uncommon along the Chicago, Lake Shore and South Bend Railway just south of the dunes. In the dunes proper just north of Oak Hill station and a few feet above the subdunal swamp my wife saw one of these spermophiles. It is not improbable that these animals have entered the region by following the railway and that the one seen opposite Oak Hill had followed the road leading from the station to the dunes.

Chipmunk (*Tamias striatus* Linnaeus): Chipmunks do not appear to be very common in the dunes. I have only one record of them in my notes but feel certain I have seen more than one. None were trapped though suitable traps baited with apples were set in what appeared to

be good chipmunk territory. Wood (6) says it is rare in Berrien County, Michigan, and Dice (2) seems to record but a single specimen. There is some doubt as to the race of chipmunk inhabiting Indiana. Hahn (4), and Evermann and Clark (3) refer the Indiana chipmunk to the typical form *striatus*, and former disputing McAtee's identification of it as *lysteri*. Dice (2) and Wood (6) identify the chipmunk of Berrien County, Michigan, as *lysteri*. Cory (1) gives a map showing the ranges of the different forms of the genus. According to it *lysteri* is not found in Michigan. The form in the southern portion of Indiana is *striatus* and the form at the southern end of Lake Michigan is *griseus*. The rest of the northern portion of Indiana is occupied by intermediates between *striatus* and *griseus*. As the flora of the dunes contains many northern forms of plants, and in the absence of a series of chipmunks, one is inclined to refer the dune animal to a northern race, either *griseus* as adopted by Cory or *lysteri* by Dice.

Red squirrel or chickaree (*Sciurus hudsonicus loquax* Bangs): The red squirrel is fairly common in the wooded portions of the dunes. They are often seen running about and frequently heard. Four specimens were secured, a pair of adults caught in traps baited with apples, a nearly mature individual given me by Wilbur Eklund, and a half grown young unable to take care of itself found wandering near our tent. The adult female which was trapped September 27, was nursing, (mammary axillary 1/1, pectoral 1/1, inguinal 2/2=8). As young in two stages of development were secured it may be inferred that at least two broods are raised each year. Measurements of the adult male and female: Total length 320, 320; tail 125, 125, hind foot 46.5, 47 mm.

Western fox squirrel (*Sciurus niger rufiventer* Geoffroy): This handsome squirrel is frequently seen in the wooded portions of the dunes. No specimens were secured. It does not appear to mind civilization so long as trees are abundant. There are a number of them living along some of the well treed streets of South Bend.

Woodchuck (*Marmota monax monax Linnaeus*): Woodchucks are very common almost everywhere in wooded portions of the dunes as judged by their many burrows. The animals themselves are not so frequently seen. Their burrows are never placed on the face of dunes on the lake front and I have never seen anything that might be interpreted as their tracks in the light dry sand of the fore dunes. Immediately after the establishment of wooded dunes their burrows are found either high up or just above the levels of the interdunal meadows and ponds or subdunal swamp. No attempt was made to secure specimens. The species is represented in my collection by a weathered skull picked up near the Furnessville blowout. Hahn (4) says, in southern Indiana the woodchucks "usually retire about the middle of October". The first five days of October 1922 were unusually warm, our Six thermometer recording daily maxima of 78, 84, 80, 80, and 86°F. respectively, after that the weather became cooler though not cold. A woodchuck was seen on October 4 and up to the time of the cooling weather fresh tracks appeared about their burrows. After that date woodchucks were not seen and frequent rains interfered with seeing whether their burrows

had been freshly used. W. D. Richardson says he saw a woodchuck as late as the last of October or first of November, 1922. In the dunes I have never seen any evidence of essential damage to plants attributable to them. They certainly are much less destructive than man. It is a pity they do not show themselves oftener than they do.

Mearn's cottontail (*Sylvilagus floridanus mearnsii* Allen): Cottontails seem fairly common in the region. I have seen them in nearly every locality except the fore dunes. On two occasions I saw cottontails running from the red osier dogwood and fox grapes near our tent as we were returning late in the afternoon. They may have been attracted by the fox grapes which were trailing over the sand. No specimens were secured.

Virginia deer (*Odocoileus virginianus* Boddaert): The Virginia deer has been extinct in the region under consideration for many years. H. W. Leman of Chicago, who is much interested in the dunes and owns a large tract of land along the lake front west of Waverly Beach, says that one of his Chicago friends, now dead, told him that when he was a young man there was excellent deer shooting in the dunes. If his friend were living he would be about 75 years of age. One may conclude from this that deer were fairly numerous in the dunes about 1875. They were probably all killed off shortly after that time. If they persisted for ten years longer the date of their disappearance would be only a few years earlier than the last record for Jasper and Newton Counties, 1890 and 1891 according to Butler (4). Their former abundance in the region is attested by remains which are not infrequently found. In his cottage in the dunes H. W. Leman has a very perfect antler picked up in the sand. Miss Rose Leal of Chicago gave me a nearly complete antler which she had picked up in a blowout. Its length following the convexity from burr to broken tip is 320 mm., circumference just above the burr 85 mm. In a blowout adjacent to our camp I found three fragments of antlers not quite so large. With them were various badly weather-worn bones and two molar teeth. Whether all the fragments came from one animal cannot be said. In another blowout to the west I picked up two molar teeth and portion of metatarsals and metacarpals and vertebrae. With these evident deer bones were a fragment of lower jaw of a member of the genus *Canis*, probably a large dog rather than a wolf and the upper end of the femur of possibly a dog. In a blowout near Waverly Beach F. E. Challis collected numerous fragments of deer bones. At the water's edge when the lake was unusually low I picked up an almost perfect left ramus of a deer's mandible. Part of the symphysis is present but none of the incisor or incisor-like teeth, but the cheek teeth are all in place and essentially perfect. The length of this toothrow (alveoli) is 83 mm. The last molar is slightly worn, the teeth anterior to it moderately so. It is said that in the public library of Gary there is a very complete pelvis of a deer found in the dunes by Boy Scouts.

MAMMALS ALMOST CERTAIN TO BE FOUND IN THE DUNE REGION OF PORTER COUNTY, BUT CONCERNING WHOSE OCCURRENCE THERE IS NO SATISFACTORY EVIDENCE AT THE PRESENT TIME IN THE NATURE OF SPECIMENS COLLECTED OR OBSERVED.

Little brown bat (*Myotis lucifugus* Le Conte), Say bat (*M. subulatus* Say), brown bat (*Eptesicus fuscus* Beauvois), silver-haired bat (*Lasionycteris noctivagans* Le Conte), hoary bat (*Nycteris cinerea* Beauvois), Pennsylvania vole (*Microtus pennsylvanicus* Ord), jumping-mouse (*Zapus hudsonius* Zimmerman), flying squirrel (*Glaucomys volans* Linnaeus), gray squirrel (*Sciurus carolinensis* Gmelin).

EXISTING MAMMALS WHICH PROBABLY OCCUR OR HAVE LATELY OCCURRED IN THE DUNE REGION OF PORTER COUNTY.

Star-nosed mole (*Condylura cristata* Linnaeus), long-tailed shrew (*Sorex personatus* Geoffroy), small short-tailed shrew (*Cryptotis parva* Say), lemming mouse (*Synaptomys cooperi* Baird), badger (*Taxidea taxus* Schreber). The badger was noted by Wood (6) in Berrien County, Michigan, as late as 1917. A. E. Didelot who is quite familiar with badgers from experience in Wyoming and has information of most of the animals trapped about Waverly Beach and Chesterton, knows of none having been taken in the region.

MAMMALS NOT NOW EXTANT IN THE DUNE REGION OF PORTER COUNTY, BUT WHOSE REMAINS MAY POSSIBLY BE FOUND BURIED IN THE SAND OR IN THE SWAMPS.

Fisher (*Martes pennanti* Erxleben), black bear (*Ursus americanus* Pallas), otter (*Lutra canadensis* Schreber), puma (*Felis cougar* Kerr), Canada lynx (*Lynx canadensis* Kerr), bay lynx (*L. ruffus* Gueldenstaedt), porcupine (*Erethizon dorsatus* Linnaeus), varying hare (*Lepus americanus* Erxleben), bison (*Bison bison* Linnaeus), elk (*Cervus canadensis* Erxleben).

#### References.

- (1) Cory, Charles B. The mammals of Illinois and Wisconsin. Pub. Field Mus. Nat. Hist., zool. ser., vol. 11, 1912.
- (2) Dice, Lee Raymond. The mammals of Warren Woods, Berrien County, Michigan. Occ. Papers Mus. Zool., No. 80, 1920 June 24.
- (3) Evermann, Barton Warren, and Clark, Howard Walton. Lake Maxinkuckee, vol. 1, 1920.
- (4) Hahn, Walter Louis. The mammals of Indiana. 33rd Ann. Rep. Dept. Geol. Nat. Res. Indiana, pp. 419-663, 1909.
- (5) Wood, Norman A. The mammals of Washtenaw County, Michigan. Occ. Papers Mus. Zool., No. 123, 1922 July 10.
- (6) Wood, Norman A. Notes on mammals of Berrien County, Michigan. Occ. Papers Mus. Zool., No. 124, 1922 July 10.

