

NOTES ON MAMMALS OF THE KANKAKEE VALLEY.

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During the month of August, 1905, the writer was engaged in field work for the United States National Museum in the Kankakee basin in northwestern Indiana. Most of the time was spent in trapping small mammals and the results of this collecting, together with the information obtained from trappers and other residents of the region, are embodied in the present paper.

The region is one of considerable interest to the naturalist. In a general way it marks the eastern limit of several species of mammals which are characteristic of the prairies, and in zonal position it is also intermediate, having elements of both the Transition and Upper Austral life zones. The large areas of almost impenetrable swamp have furnished retreats for many of the larger animals so that some of them have survived here longer than in most other localities in Indiana or the adjoining States. At the present time, however, the land is being drained and reduced to cultivation and the effect of such extensive changes as are being caused by these processes afford opportunities for a closer study of problems in local adaptation than the writer was able to make in the limited time at his disposal.

According to the official report of a survey made in 1882, the reclaimable swamp land of the Kankakee Valley in Indiana at that time comprised an area of 500,000 acres. A part of this was permanently under water, while the remainder was flooded only during periods of heavy rainfall. Most of the area was covered with a dense growth of coarse marsh grass and reeds and was treeless, but a heavy growth of timber of varying width lined the banks of the river. Low sand hills, rising above the level of the marsh, formed islands, which were generally wooded and which afforded homes for nonaquatic plants and animals.

Since 1882 much of the land has been drained. English Lake, represented on maps still in general use as the largest lake in the State, no longer exists. Beaver Lake, a large body of water in Newton County, has been drained and its former site is now under cultivation. At other localities also marshes have been drained and, it

may be said, that places permanently under water twenty-five years ago are now marshes utilized for grazing during the dry season, while the marshes of that period have become cultivated fields.

Such important physical changes necessarily have a marked effect upon the fauna and flora of the region. Aquatic plants and animals are being reduced in number and restricted in habitat while such nonaquatic species as are not held in check by man are increasing in numbers and extending their range. The influence of recent hydrographic changes is seen in the local distribution of certain species of mammals which are absent from some localities now well adapted for their habitat, although abundant not many miles away. This is especially true of some of the members of the squirrel family, as noted later.

Trapping was carried on at three localities, which are as follows: A place known as Bluegrass Landing, lying about 6 miles west of the village of Roselawn in Newton County; Mountayr, a village 15 miles southwest of the first place and in the same county; the Koehler farm, 6 miles southeast of Hebron and 2 miles from Aylesworth switch on the Pittsburgh, Cincinnati, Chicago and St. Louis Railway in Porter County. The first and last named places are on the banks of the Kankakee River, and are "islands" or sand hills which rise above the level of the marsh and are not subject to overflow. Collections were made at each place, both on the "island" itself and in the surrounding swamps on both sides of the river. Mountayr is situated near the border of the prairies, such as are found throughout much of northern Indiana and Illinois, but there are marshes of small area at this place also.

SYSTEMATIC LIST OF SPECIES.

DIDELPHIS VIRGINIANA Kerr.

OPOSSUM.

The opossum is fairly common, though less abundant than at some places in the southern part of the State.

ODOCOILEUS VIRGINIANUS (Boddaert).

VIRGINIA DEER.

Deer are said to have survived in this region as late as 1891.^a It is not probable that any now exist here in the wild state.

SCIURUS CAROLINENSIS LEUCOTIS (Gapper).

NORTHERN GRAY SQUIRREL.

Sciurus carolinensis hypophæus MERRIAM, Science, VIII, 1886, p. 351.

The *Sciurus carolinensis hypophæus* of Merriam is characterized chiefly by the dark color of the underparts, and, so far as I am aware,

^a Butler, Proc. Ind. Acad. Sci., 1894, p. 83.

there are no good cranial or anatomical characters by which it can be distinguished from *S. c. leucotis*. At Aylesworth I obtained fairly typical *leucotis*, and also one specimen which closely resembles the type of *hypophæus*. Besides these specimens there were others, illustrating various degrees of melanism. In one the back is essentially the same as in normal gray squirrels, but the underparts are somewhat darker, while others are darker both on the back and the underparts, and a few are almost entirely black, the gray annulations of the hair being scarcely noticeable. The series is not large enough to show complete intergradation, but it indicates that *leucotis* probably does intergrade with the black squirrels through "*hypophæus*." If the latter form were valid it would be an instance of two closely related subspecies living at the same locality, and the improbability of this is another reason for regarding *hypophæus* as a synonym of *leucotis*.

In the Kankakee Valley the gray squirrel is found chiefly in the more densely wooded swamps. At Mountayr it is unknown, and at Bluegrass Landing it is rare, but in the swamps south of Aylesworth it is very abundant on both sides of the river. Measurements of specimens collected at this locality are as follows: Average cranial measurements of 4 adults, Cat. Nos. 141716, 141718, 141719, 141722, U.S.N.M. (2 males and 2 females). Basilar length, 46 mm.; palatilar length, 26.4; zygomatic breadth, 33; palatal breadth (measured from inner side of anterior premolars), 8.2; greatest height of cranium above palate, 20; length of audital bullæ, 11.1. Skin measurements (average of 4 males, Cat. Nos. 141716, 141718, 141720, 141721, U.S.N.M., and 3 females, Cat. Nos. 141717, 141719, 141722, U.S.N.M.), total length, 470 mm.; tail, 220; hind foot, 61.

SCIURUS NIGER RUFIVENTER E. Geoffroy.

FOX SQUIRREL.

The fox squirrel is common at each of the places visited, and is found both in the swamps and in the groves on the higher ground. Albinos are sometimes taken in this region. Average cranial measurements of 4 specimens, Cat. Nos. 141712-141715, U.S.N.M., from Aylesworth are as follows: Basilar length, 50.6 mm.; palatilar length, 28.6; zygomatic breadth, 36.6; palatal breadth measured from inner side of anterior premolar, 8.2; greatest height of cranium above palate, 20.5; length of audital bullæ, 10.8. Average skin measurements of the same specimens: Total length, 545 mm.; tail, 247; hind foot, 63.6.

SCIURUS HUDSONICUS LOQUAX Bangs.

RED SQUIRREL, CHICKAREE.

The red squirrel appears to avoid the swamps and is found only in restricted portions of the Kankakee Valley. At Roselawn and Mountayr it does not occur. I obtained one specimen near Aylesworth, and it is said to live in large numbers about the village of Boone Grove. It has also been taken at Laporte.

TAMIAS STRIATUS (Linnæus).

CHIPMUNK.

The chipmunk of this region seems to be the southern form, typical *striatus*. Apparently it does not occur at Bluegrass Landing, but it is abundant about Mountayr and occurs in fewer numbers at Aylesworth. It has also been taken at Laporte.

CITELLUS FRANKLINI (Sabine).

GRAY GROUND SQUIRREL.

This animal is locally known as the prairie squirrel. I obtained three specimens at Mountayr, where I found a colony living in a field of oats, to which they did not seem to be doing any damage. I could not learn of any other colonies in that vicinity, although it has been reported from Benton, Jasper, White, and Porter counties. Mr. W. S. Blatchley reports digging one out of a mound near Boone Grove on October 6, at which date it had already begun to hibernate.

CITELLUS TRIDECIMLINEATUS (Mitchill).

THIRTEEN-LINED GROUND SQUIRREL.

I noticed the burrows of the thirteen-lined ground squirrel in railway embankments at a number of places where I did not do any collecting, and it is probable that it has extended its range, locally, at least, by following these embankments through the marshes. This is another species which does not occur at Bluegrass Landing.

MARMOTA MONAX (Linnæus).

WOODCHUCK.

Woodchucks are very abundant, and seem to inhabit every sand hill and elevated point throughout the region. Porter County pays a bounty of 10 cents for each animal killed and a statement furnished me by the county treasurer shows that an average of about 1,400 woodchucks a year have been killed for the five years ending with 1905, at a total cost to the county of \$700. Apparently the bounty has not caused any appreciable diminution in numbers.

I obtained a woodchuck which had been "treed" by dogs in a

sassafras bush, and an examination showed that its stomach was gorged with sassafras leaves. So far as I know it is not a usual habit for these animals to obtain their food from trees.

SCIUROPTERUS VOLANS (Linnæus).

FLYING SQUIRREL.

The flying squirrel is known to occur in the Kankakee Valley, although I did not obtain any specimens.

MUS MUSCULUS Linnæus.

HOUSE MOUSE.

Lives in the fields as well as in buildings.

MUS NORVEGICUS Erxleben.

HOUSE RAT.

Abundant about houses and farm buildings.

PEROMYSCUS LEUCOPUS NOVEBORACENSIS (Fischer).

WHITE-FOOTED MOUSE.

This species is abundant everywhere, being found in small numbers at places in the swamps where all the land within the radius of 1 mile is submerged for weeks at a time. I do not know how it exists at such times unless it lives on the supplies which squirrels have stored away in the trees. No doubt many individuals perish in the floods. In these wooded swamps the white-footed mouse is not as exclusively nocturnal as it is supposed to be elsewhere.

PEROMYSCUS MICHIGANENSIS (Audubon and Bachman).

MICHIGAN WHITE-FOOTED MOUSE.

I took this species only at Mountayr, where it was found in the bluegrass by the roadside and in the dryer pastures. I have never known the species to live in either swamps or woods.

MICROTUS PENNSYLVANICUS (Ord).

MEADOW MOUSE.

Like the white-footed mouse, this species is found in places which are submerged during the winter and spring months. Since it does not climb trees nor hve in the woods I am unable to see how it escapes drowning. I did not find it in places remote from higher ground, as was the case with the former species, but at one place where a low hill covered with bluegrass was bordered by a marsh overgrown with coarse, high marsh grass, I trapped both on the hill and in the marsh for several days. On the hill I did not get a single meadow mouse, while in the marsh I got five and saw many runways. It is possible that they retreat to the hill in times of flood, and then, finding the marsh grass better suited to their taste, go back to it in the summer.

MICROTUS AUSTERUS (Le Conte).

PRAIRIE MEADOW MOUSE.

I did not take this species, but specimens collected by Mr. C. M. Barber at Laporte are in the collections of the Field Columbian Museum in Chicago.^a

FIBER ZIBETHICUS (Linnæus).

MUSKRAT.

The muskrat was formerly extremely abundant in this region. Rev. T. H. Ball^b says that during the period from 1834 to 1884 from 20,000 to 40,000 muskrats were trapped annually in Lake County alone. Since the work of draining the land has begun, the area suited to the habitat of these animals has diminished and consequently the number of the animals themselves is diminishing. However, they are still abundant and form an important source of revenue to many of the inhabitants. One trapper told me that he secured from 700 to 1,200 skins annually. Another man trapped 300 muskrats within a month during the autumn of 1904.

SYNAPTOMYS COOPERI STONEI (Rhoads).

STONE LEMMING MOUSE.

The genus *Synaptomys* has received considerable attention from mammalogists in recent years, but there is still lack of agreement concerning the status of some of the forms. Without attempting to settle all the points at issue, the facts, in so far as they relate to the identity of the Indiana form, are as follows: *Synaptomys cooperi* was described by Baird in 1857 from a specimen supposed to have come from northern New Jersey, the exact locality being unknown. In 1893 Rhoads^c described *Synaptomys stonei* from May's Landing, Atlantic County, New Jersey. In 1896 Merriam^d revised the genus, describing *Synaptomys helalctes* from the Dismal Swamp, Virginia, and *S. h. gossi* from Neosho Falls, Kansas, and placing *S. stonei* in synonymy with *S. cooperi*. In 1897 Rhoads^e again discussed the status of these forms, recognizing *stonei* as a subspecies of *cooperi*, and making *helalctes* a synonym of the former.

The following characters are said to distinguish *stonei* from typical *cooperi*: "Larger with much larger and more massive skull and

^aSpecial effort was made to secure specimens of the red-backed mouse, *Evotomys*, but without success. It may occur in the Kankakee Valley, but it seems to be rare everywhere in Indiana.

^bHistory of Lake County and the Ball Family, p. 181.

^cAmer. Nat., XVII, p. 63.

^dProc. Biol. Soc. Washington, X, pp. 55-64.

^eProc. Acad. Nat. Sci. Phila., 1897, p. 305.

broader rostrum and incisors; colors darker, especially on the under-side, which is more plumbeous or slaty (less hoary).” The average measurements of nine adults are: “Total length, 125 mm.; tail vertebræ, 20; hind foot, 20; greatest length of skull, 27.8.”

I have seen no specimens of typical *Synaptomys cooperi*, excepting the skull of the type, nor have I seen specimens of *S. c. stonei* from near the type locality. However, a comparison of skulls from Indiana with the type of *cooperi* and with the type of *gossi* shows that they do not closely resemble either one, and that they differ from the former to about the same degree and in the same manner as given by Rhoads for *stonei*. The latter name being older than *heleletes*, it is here adopted for the form of lemming mouse from the Kankakee Valley, the status of the Dismal Swamp form being left an open question.

The skin of an adult male from Aylesworth measured as follows: Total length, 123 mm.; tail vertebræ, 18; hind foot 18. Average of two skulls, Cat. Nos. 141741, 141767, U.S.N.M., from Bluegrass Landing and Aylesworth: Greatest length, 28 mm.; palatilar length, 12.7; upper molar series, 7; width of rostrum, 5; greatest length of mandible, 16.2. Same measurements, in order for the type of *Synaptomys gossi*: 30; 14; 7; 5.5; 16.5. Same for the type of *S. cooperi* (the greatest length not being obtainable). 12; 6.5; 4; 15.

In the Atlantic Coast States *Synaptomys* is always found associated with sphagnum bogs and marshes. In Indiana it has been found only in dry, grassy fields. The two I obtained in the Kankakee region were both taken in dense bluegrass by the side of the road, and it did not seem to live in the marshy places where *Microtus pennsylvanicus* was most abundant.

GEOMYS BURSARIUS (Shaw).

POCKET GOPHER.

The pocket gopher is known to occur in Newton County, but it is rare, and I did not obtain any specimens.

ZAPUS HUDSONIUS (Zimmerman).

JUMPING MOUSE.

The only representative of this species that I obtained was taken from the stomach of a bull snake, *Pituophis sayi* (Schlegel).

ERETHIZON DORSATUM (Linnæus).

PORCUPINE.

I did not hear of this species, but there is a pair of porcupines in the State museum in Indianapolis, which were taken in Laporte County a few years ago.

LEPUS FLORIDANUS MEARNSI (Allen).**PRAIRIE COTTONTAIL.**

The rabbit occurring here seems to be the western form of the common cottontail. This is to be expected, since it has been reported from central New York.

VULPES FULVUS (Desmarest).**RED FOX.^a**

The red fox is not common in the marshes, though occasionally taken there. At Mountayr they were very abundant and troublesome. One farmer told me that he had had 150 chickens killed by them during the spring and summer of 1905. He dug up some of the chickens they had buried and poisoned them and afterwards found the carcasses of four foxes which had been poisoned and he believed others were killed which he did not find.

CANIS OCCIDENTALIS (Richardson).**TIMBER WOLF.**

The timber wolf is said to live in the Kankakee swamps in small numbers. Reports are conflicting, however, and the following species may be the only wolf surviving in that region at the present time. The proper specific name for the timber wolf of this region is also a matter of uncertainty.

CANIS LATRANS Say.**COYOTE; PRAIRIE WOLF.**

There is no doubt that the coyote has increased in numbers and extended its range in northern Indiana during the past ten years. One reason for this is doubtless the fencing of the swamps for cattle ranges, which has made hunting on horseback impracticable. It may be also that the race has become better adapted to the presence of man by becoming more wary or by modifying its habits in some way. In a letter to the writer, Hon. L. Darrow of Laporte, says that he has seen as many as 20 prairie wolves in a pack on one occasion and at another time 8. Mr. C. W. Bussel, of McCoysburg, Jasper County, also writes that they congregate in large numbers during the mating season, which is in February. Mr. Bussel killed 10 of these animals during the winter of 1903-4, and other hunters also killed a number in the same vicinity. He further says that they live in burrows which they dig in the knolls on the prairie; that from 5 to 11 young are born to each female between the 1st and 15th of April; that these wolves

^a The newspapers occasionally contain stories of "wild cats" being seen in this region and it is possible that the Canada lynx or the red lynx still exists in the swamps. However, the reports are too vague to credit.

generally avoid timber, although the young are sometimes brought forth in hollow logs instead of burrows, and that they frequently change the location of their dens, especially if they are approached by man or dog, so that it is almost impossible to find them and dig them out.

Two specimens, Cat. Nos. $\frac{143633}{49889}$ and $\frac{143634}{49890}$, U.S.N.M., taken by Mr. Bussel at McCoysburg in May, 1906, and sent to the U. S. National Museum, had the following measurements: Adult male—total length, 1,095 mm.; tail vertebra, 165; hind foot, 195; height at shoulder, 560; ear, 105. Adult female, measurements in the same order—1,040; 130; 500; 110.

LUTRA CANADENSIS (Schreber).

OTTER.

Otter are becoming very scarce, but a few are still taken every winter.

MEPHITIS MESOMELAS AVIA (Bangs).

ILLINOIS SKUNK.

Skunks are common in this region, but I did not secure any specimens. They probably belong to this species, although it is possible that the eastern skunk, *M. putida* (Boitard), also occurs.

TAXIDEA TAXUS (Schreber).

BADGER.

Reported from Newton ^a and other counties in northern Indiana as rare. I obtained no definite records of its occurrence while in the region.

LUTREOLA VISON (Schreber).

MINK.

The mink is abundant in the wooded swamps along the river.

PUTORIUS NOVEBORACENSIS Emmons.

NEW YORK WEASEL.

Weasels are abundant at most points in the Kankakee Valley and are trapped for fur, although their skins are not very valuable.

PROCYON LOTOR (Linnæus).

RACCOON.

Abundant. Many are trapped for fur each year.

^a Butler, Proc. Ind. Acad. Sci., 1894, p. 84.

BLARINA BREVICAUDA (Say).

SHORT-TAILED SHREW.

The short-tailed shrew is common everywhere except in the lower marshes. It is especially abundant at Bluegrass Landing, both in the woods and fields.^a

SCALOPUS ACQUATICUS (Linnæus).

MOLE.

I saw the work of moles about Bluegrass Landing and heard of their occurrence there, but did not obtain any specimens. It does not live in the swamps and is not common anywhere in the vicinity of the river.

LASIURUS CINEREUS (Beauvois).

HOARY BAT.

There is a specimen of the hoary bat from Lake County in the State museum in Indianapolis.

LASIONYCTERIS NOCTIVAGANS (Le Conte).

SILVERY-HAIRED BAT.

Reported by Butler and Evermann^b from Laporte County.

Other species of bats occur in this region, but I was unable to obtain definite records. I saw bats flying frequently and was shown where a colony had formerly occupied a hole in some old piling in the river at Bluegrass Landing. None was there at the time of my visit, but judging from the description they were probably the large brown bat, *Vespertilio fuscus*.

^a I made an effort to get shrews of the genus *Sorex* but without success. One or more species of this genus certainly occurs in the Kankakee Valley but probably is not abundant.

^b Proc. Ind. Acad. Sci., 1893, p. 134.