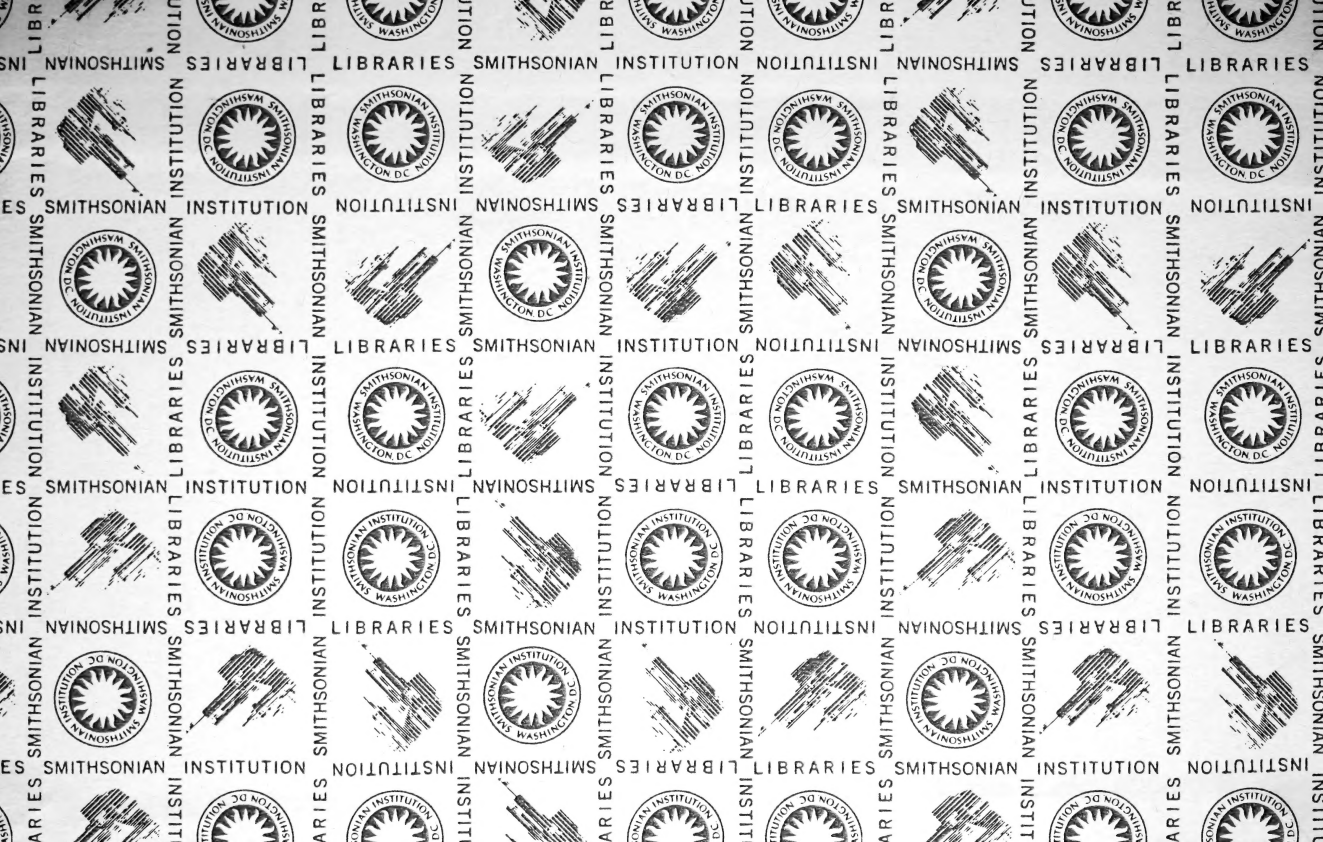

SMITHSONIAN INSTITUTION LIBRARIES

THE OHIO RECENT MAMMAL COLLECTION IN THE CLEVELAND MUSEUM OF NATURAL HISTORY

By

B. Patterson Bole, Jr.

and

Philip N. Moulthrop

SCIENTIFIC PUBLICATIONS
OF THE
CLEVELAND MUSEUM OF NATURAL HISTORY
Vol. V, No. 6, pp. 83-181
Issued, September 11, 1942
CLEVELAND, OHIO

ERRATA

Page 99. Footnote to be supplied, referring to **kirtlandi:**

[1]Named in honor of Dr. Jared Potter Kirtland, pioneer Ohio mammalogist, ornithologist, icthyologist, horticulturist, physician, jurist and eminent citizen; a spiritual founder of the Cleveland Museum of Natural History and the Western Reserve Medical School.

Page 120. Omit "p.126" in first line.

Page 130. Last two lines should read ". . . also east to Crawford County, Pennsylvania, and Genesee County, New York."

Page 146. Fourth line from bottom should read ". . . collected it somewhere" instead of "collected somewhere."

Page 163. Supply the following, under original citation for **Rattus norvegicus** (Erxleben): *Type Locality.*— Norway.

Page 173. **Erithizon** should read **Erethizon.**

Page 180. Citation under **Kirtland, Jared Potter** should read 1838, not 1938.

SCIENTIFIC PUBLICATIONS
OF THE
CLEVELAND MUSEUM OF NATURAL HISTORY

VOL. V ISSUED, SEPTEMBER 11, 1942 No. 6

THE OHIO RECENT MAMMAL COLLECTION IN THE CLEVELAND MUSEUM OF NATURAL HISTORY

BY
B. PATTERSON BOLE, JR.
AND
PHILIP N. MOULTHROP

INTRODUCTION

Since the Cleveland Museum of Natural History was founded in 1920, a large collection of Ohio mammals has been gathered and is now deposited in this museum's department of mammals. This collection now numbers approximately 7000 specimens and is thus much larger than all other Ohio mammal collections put together. Included therein are representatives of every species of recent mammal recorded from the State, with but 9 exceptions. Of these exceptions, 5 are large species of rare occurrence even in pre-settlement days, which were swiftly extirpated with the coming of the white man. Virtually every section of Ohio is represented in this collection, although the great majority of the specimens have been taken within 50 miles of Cleveland.

Since the time of Dr. Jared P. Kirtland no serious taxonomic study of Ohio mammals has been made. Several excellent faunal papers have appeared, but all have followed the nomenclature current for more eastern or western states at their times of publication. The writers, faced with the prospect of early call to military service, therefore hasten to summarize the results of 10 years of research, incomplete for certain species as these may be.

The mammalogy of Ohio has long been assumed to be a simple subject, the species having been considered identical with the various forms described from the Atlantic Coast or certain Mississippi valley points. In other words, Ohio has not been regarded as a region of sufficient topographic diversity or geographical interest to warrant special collecting efforts. Nearly without exception, the State has been represented by a mere handful of specimens in the museums of outside states, and almost no material has been available for the recent revisions. The inadequacy of the 'life zone' theory of animal distribution in North America has nowhere been more clearly evident than in the subject of Ohio mammalogy. Ecologists have discovered en masse that Merriam's life-zones do not apply in Ohio, but taxonomists have failed to appreciate their findings.

To summarize the situation in Ohio, the following facts should be emphasized:

(1) There is, strictly speaking, no 'Upper Austral' or 'Transition' Zone in Ohio. The terms are meaningless. On the basis of plants alone, 'Upper Austral', 'Transition', and 'Canadian' zone areas can be found within a few miles or even rods of each other, especially in Geauga County.

(2) Several different climax forest types occur in Ohio, to wit: A beech-sugar maple climax on the glaciated Allegheny plateau, and many parts of the western till plains as well; an oak-chestnut forest occupying many sites in the central eastern section of the State, on both the glaciated and unglaciated plateaus; a mixed mesophytic forest covering the greater part of the unglaciated plateau; an oak-hickory forest occupying many isolated belts around 'prairie islands' on the till plains in the northern and northwestern portions of the State; and a pine-hemlock forest on the breaks of the Allegheny plateau in northeastern Ohio and scattered other points.

(3) There are extensive subclimax forest areas, such as the boreal tamarack bogs of northeastern Ohio, the shortleaf pine-scrub of Washington and other southern Ohio counties, and the 'prairie islands' themselves.

(4) There are many different climates, the growing season exceeding 200 days in the extreme south and in the extreme north

along the Lake Erie plain, but falling below 100 days in parts of the Allegheny plateau in Ashtabula and Geauga counties; also decided variations in rainfall, from over 50 inches annually at Little Mountain in Lake and Geauga counties to less than 30 in northeastern Cuyahoga County only a few miles away, on the Lake Erie plain in the rain-shadow of the city of Cleveland.

(5) Ohio is not all flat. The unglaciated southeast is very hilly, in fact almost mountainous in Adams County, which is also an area of especially heavy rainfall for the State (over 40 inches annually). The myriads of deep, cool glens and rocky-walled ravines favor the persistence of northern small mammals, while warm, south-facing valleys favor the infiltration of southern forms.

(6) Two thirds of Ohio was glaciated during Wisconsin time, and geologically speaking, the ice left northern Ohio yesterday—about 35,000 years ago. As the ice retreated, the vegetation could not keep abreast of it, and in some places prairie, not conifer forest, followed the glacier. These prairie regions persisted as 'islands' till the coming of the white man, who forthwith enlarged them. The net result is a picture of incredible ecological complexity, and of rapidly shifting mammal populations, with several divergent faunal districts.

With these facts in mind, the results of a careful taxonomic study do not seem so surprising. This study was long delayed by the slowness of the authors to discard the prevailing belief that Ohio was, in its biology, after all very similar to the Atlantic seaboard. It was not possible of even successful initiation until topotypical series of most of the races of mammals reputedly occurring in Ohio had been collected or borrowed, and until a full understanding had been obtained of the sequence of pelages in each form. The study was delayed also by our failure immediately to recognize that the time of molt for certain Ohio species differed from that of the same or nearly related races elsewhere, a tendency particularly noticeable in northeastern Ohio. This is perhaps to be expected in a region where spring is long delayed by Lake Erie pack ice, and where frosts may occur at any time except in July and August, as is the case in parts of Geauga County and in interior Ashtabula County.

The names of colors employed in this report are based on those of Ridgway[1].

The great bulk of the specimens comprising the basis for this report was taken in the course of population studies made with the use of quadrats, the results of which have already been published.[2] Without the continued help and diligent interest of the authors' laboratory and field assistants in this work, the present paper could not have been completed. In this connection the authors are especially indebted to Mr. Scott R. Inkley and Mr. Winston C. Jesseman. Finally, the authors gratefully acknowledge the help and critical comments of their co-workers on the Cleveland Museum of Natural History staff, Mr. Arthur B. Fuller, Dr. David H. Dunkle, and Dr. Harry C. Oberholser.

For the loan of other specimens the writers are greatly indebted to Mr. Edward S. Thomas, of the Ohio State Museum; to Mr. Woodrow Goodpaster, of the Cincinnati Society of Natural History; to Mr. Clifford C. Gregg and Dr. Wilfred H. Osgood of the Field Museum of Natural History; to Dr. William H. Burt and Dr. Emmet T. Hooper of the University of Michigan Museum of Zoology; and to Dr. Hartley H. T. Jackson of the Fish and Wildlife Service (Biological Surveys). For permission to study their extensive collections and for their kindness in making their research facilities available, the senior author is still more indebted to the late Dr. Glover M. Allen of the Museum of Comparative Zoölogy at Harvard University; to Dr. Remington Kellogg of the United States National Museum; and again, to Doctor Jackson.

---

[1]Color Standards and Color Nomenclature, 1912 [January 16, 1913], pp. [1-4], i-iv, 1-44, frontispiece, pls. I-LIII.

[2]Scient. Publ. Cleve. Mus. Nat. Hist., Vol. V, No. 4, December 28, 1939.

MAMMALS OF OHIO

Didelphis virginiana virginiana Kerr

VIRGINIA OPOSSUM

Didelphis virginiana KERR, Animal Kingdom, 1792, p. 193.
Type Locality.—"Virginia".

Opossums from Ohio are apparently indistinguishable from examples taken along the middle Atlantic seaboard. In Ohio the species appears in 2 color phases, the usual one with gray guard hairs, and another, a much rarer dark phase in which the guard hairs are blackish. Opossums are to be found today in all parts of the State, but there is some evidence that their arrival in northeastern Ohio is of comparatively recent date, as the species is very uncommon in bone finds in this region, and occurs only in those of very recent origin.

Ohio specimens examined.[1]—

CUYAHOGA COUNTY.—Chagrin Falls, 1; Cleveland, 1; Cleveland Heights,1; Dover, 1; Gates Mills,1; Orange, 1; Pepper Pike, 1.
GEAUGA COUNTY.—Chardon, 1.
LAKE COUNTY.—Kirtland Hills, 2; Madison, 2; Mentor, 2; Wickliffe, 1; Willoughby, 1.
OTTAWA COUNTY.—Ottawa Co. (no further locality), 1.
PORTAGE COUNTY.—Aurora Pond, 2; Geauga Lake, 1.
SANDUSKY COUNTY.—Fremont, 1.
SENECA COUNTY.—Bettsville, 2; Feaselburg, 1.
STARK COUNTY.—Waynesburg, 1.
SUMMIT COUNTY.—Everett, 2.

Scalopus aquaticus machrinus (Rafinesque)

PRAIRIE MOLE

Talpa machrina RAFINESQUE, Atlantic Journal, Vol. I, 1832, p. 61.

Type Locality.—Near Lexington, Fayette County, Kentucky.

The prairie mole has been reported from all parts of Ohio, but can now be unequivocally stated to be lacking from the northeastern quarter of the State, and certainly to be rare over much

[1]All specimens listed in the present paper are from the collection of the Cleveland Museum of Natural History unless otherwise indicated.

of the southeast as well. In the western half of the State it is locally abundant, and specimens from this section are typical of *S. a. machrinus*. There is a local tendency towards large size in northwestern Ohio.

Ohio specimens examined.—

Adams County.—Smoky Creek, Green Township, 2.
Clermont County.—Union Township, 2.
Erie County.—Ceylon Junction, 1.
Mercer County.—Celina, 1.
Seneca County.—Bettsville, 8; Bunker Hill, 1; Old Fort, 1.

Parascalops breweri (Bachman)

Hairy-tailed Mole

Scalops breweri Bachman, Boston Journ. Nat. Hist., Vol. III, 1842, p. 32.

Type Locality.—According to Bachman, Marthas Vineyard Island, Massachusetts. Repeated efforts by numerous collectors, including the senior author, to trap this species there have to date been unavailing.

This species is the common mole of eastern Ohio, particularly of northeastern Ohio. In some areas of extreme southern Ohio (Lawrence County) it occupies the same ground as *Scalopus*, but the overlap of the ranges is very narrow. Ohio-caught specimens seem identical with examples from New York and New England.

Ohio specimens examined.—

Ashtabula County.—Mechanicsville, 1.
Columbiana County.—Lisbon, 1.
Cuyahoga County.—Brecksville Metropolitan Park, 4; Chagrin Falls, 6; Gates Mills, 4; Lyndhurst, 1; North Chagrin Metropolitan Park, 2; North Olmsted, 1; Rocky River Metropolitan Park, 3.
Fairfield County.—Greenfield Township, 1.
Geauga County.—Auburn Corners, 1; Burton Bog, 2; Chesterland Caves, 1; Lake Punderson, 1; Little Mountain, 29; Shady Lake, 3; Middlefield Township, 1; Thompson Township, 1.
Lake County.—Holden Arboretum, 21; Mentor, 4; Mentor Headlands, 1; Pleasant Valley, 1; Wickliffe, 1; Willoughby, 2.
Lawrence County.—Ironton, 1.
Portage County.—Aurora Pond, 1; Geauga Lake, 1.
Stark County.—Waynesburg, 1.
Summit County.—Darrowville, 1.

Condylura cristata cristata (Linnaeus)

STAR-NOSED MOLE

[*Sorex*] *cristatus* LINNAEUS, Syst. Nat., ed. 10, Vol. I, January 1, 1758, p. 53.

Type Locality.—Pennsylvania.

The description of *Condylura cristata nigra* R. W. Smith[1] necessitates the use of a trinomial for the typical race. Ohio examples of *Condylura c. cristata* differ from those of *C. c. nigra* from Nova Scotia in size as well as color, being smaller and slightly paler. The differences appear even more pronounced when comparison is made with specimens from coastal Maine.

The star-nosed mole is locally abundant in northeastern Ohio, especially on boggy ground and along slow-moving woodland streams. Elsewhere the species is decidedly uncommon.

Ohio specimens examined.—

ASHTABULA COUNTY.—Padanaram, 4.

CUYAHOGA COUNTY.—Chagrin Falls, 1; Gates Mills, 2; North Chagrin Metropolitan Park, 1.

GEAUGA COUNTY.—Auburn Corners, 3; Burton Bog, 1; Little Mountain, 2; Munson Township, 2; Shady Lake, 1.

LAKE COUNTY.—Holden Arboretum, 11; Kirtland Hills, 1; Mentor Marsh, 1.

PORTAGE COUNTY.—Aurora Pond, 6.

SUMMIT COUNTY.—Northfield (owl pellet record), 1.

Sorex cinereus ohionensis, subsp. nov.

OHIO SHREW

Type.—Adult male, skin and skull, No. 16901, Cleveland Museum of Natural History; April 5, 1942; Wilbur B. Quay.

Type Locality.—Hunting Valley, Cuyahoga County, Ohio.

Range.—Northern Ohio, from Ashtabula County at least as far west as Seneca County.

Diagnosis.—A very small race, the third unicuspid of which is usually smaller than the fourth, in this respect differing from all other races of *Sorex cinereus;* it is diminished in all external and cranial measurements; and also has a distinctive dark gray winter pelage and poorly pigmented teeth.

Color.—Winter pelage (the type). Upper parts fuscous to fuscous black, suffused with gray, the colors extending half way

[1]Amer. Midl. Nat., Vol. XXIV, No. 1, July, 1940, p. 218.

down the sides; underfur blackish slate; sides exhibiting a narrow, poorly defined band of dusky drab; under parts light gull gray with slate gray underfur; tail fuscous above, vinaceous buff below; upper surface of feet pale ochraceous buff. *Fresh summer pelage* (No. 15929, C.M.N.H., Holden Arboretum, Lake County, Ohio). Upper parts snuff brown; sides of head and body sayal brown. *Worn summer pelage* (No. 7307 C.M.N.H., Aurora Pond, Portage County, Ohio). Upper parts buffy brown, gradually becoming wood brown on sides; tail above wood brown; under parts pale smoke gray faintly washed with buff.

Skull.—Very small, with braincase greatly shortened and flattened; unicuspid tooth row shortened and crowded; teeth poorly pigmented; mandible short.

Measurements.—*Type:* length, 93.5 mm.; tail, 34.5; hind foot, 11; condylobasal length of skull, 14.7; palatal length, 5.6; cranial breadth, 4.2; maxillary tooth row, 5.3; length of mandible, 8.8. *Twenty topotypes* average, with minimum and maximum: length, 94.3 (88-99); tail, 35.0 (32-38); hind foot, 11.3 (10-12); condylobasal length of skull, 15.1 (14.6-15.9); palatal length, 5.8 (5.5-6.0); cranial breadth, 7.5 (7.2-7.8); interorbital breadth, 2.8 (2.7-3.0); maxillary breadth, 4.1 (3.8-4.2); maxillary tooth row, 5.3 (5.1-5.4); length of mandible, 8.9 (8.7-9.2). *Ten specimens from the Holden Arboretum, Lake County, Ohio,* average: length, 91.6; tail, 34.6; hind foot, 11.4. *Ten specimens from Mentor Marsh, Lake County, Ohio,* average: length, 92.8; tail, 35.0; hind foot, 11.4. *Ten specimens from Maple Grove, Seneca County, Ohio,* average: length, 93.0; tail, 31.8; hind foot, 10.6. *Twenty specimens from Aurora Pond, Portage County, Ohio,* average: length, 93.1; tail, 34.4; hind foot, 11.1.

Remarks.—In determining the proper designation for the *Sorex cinereus* of Ohio, it was necessary first to weigh the possible availability of 2 names now in the synonomy of the species. In 1842 Duvernoy[1] described *Amphisorex lesueurii,* with the type locality as the Wabash River valley, Indiana. The name *lesueurii* persisted for several years, sometimes as *Sorex personatus lesueurii*[2]. Shrews of the species *Sorex cinereus* are apparently very rare in Indiana[3], especially so in the southern part of the State. Jackson[2]

[1]Mag. de Zool. d'Anat. Comp. et de Palaeont., series 2, Vol. IV, 1842, Monogr. du Genre Musaraigne, p. 33.
[2]Jackson, North Amer. Fauna, No. 51, July, 1928, pp. 41-46 and 85-86.
[3]Lyon, Amer. Midl. Nat., Vol. XVII, No. 1, 1936, pp. 42-43.

assigns the Indiana *Sorex cinereus* to the typical subspecies on the basis of 5 specimens seen, but points out that the measurements of a controversial specimen from New Harmony, Posey County, are well below the average for the race, a tendency observable in examples from nearly all parts of the southern limits of the range of the species. However, an example in the U. S. Biological Surveys collection from St. Joseph County, Indiana, in winter pelage is almost black, with unusually dark under parts, presenting a rich velvety appearance, the darkest by far of all the specimens of *Sorex cinereus* seen in the course of the present investigation. Since Ohio specimens from Seneca County taken in April are somewhat darker and more richly colored than those from the Cleveland region in the same month, the Seneca County series shows evidence of intergradation with a darker, subspecifically distinct, but hitherto unrecognized Indiana stock to which, in the authors' opinion, the name *Sorex cinereus lesueurii* should apply.

The other old name to be considered, *Sorex fimbripes* Bachman[1] (type locality, Drury Run, Clinton Co., Pennsylvania), appears to represent intergradation between *Sorex cinereus fontinalis* Hollister[2] and *Sorex cinereus cinereus* Kerr, both geographically and on the basis of measurements given by Jackson[3]. A less conservative reviewer than Doctor Jackson might well have recognized the shrew of the southern Appalachian highlands as sufficiently different to merit subspecific recognition, in which case this name *Sorex cinereus fimbripes* might apply.

From Ohio Doctor Jackson was able to examine but 3 specimens. Since his paper was written, the Cleveland Museum of Natural History has obtained over 180 specimens from northern Ohio, which have provided the most difficult taxonomic problems of the current project.

In the first place, the Ohio form is extremely variable colonially and individually, much more so than is *Sorex cinereus cinereus*. A series from Great South Bog, Geauga County, is characterized by the presence of irregular rows of white spots or flecks in greater or lesser degree, surely a most astonishing character for a shrew of the genus *Sorex*. Specimens from North Chagrin Park, Cuyahoga

[1]Journ. Acad. Nat. Sci. Philadelphia, Vol. VII, Part 2, 1837, p. 391.
[2]Concerning the subspecific status of *Sorex fontinalis* see Poole, Journ. Mamm., Vol. XVIII, February, 1937, p. 96.
[3]Loc. cit.

County, show practically no pigment in the teeth, 2 specimens from this locality being absolutely without dental pigment. A specimen from the Holden Arboretum, Lake County, apparently a freak, is gull gray in color and almost white underneath. Several specimens out of a large series from Aurora Pond, Portage County, are saddle backed in summer pelage like *Sorex arcticus*, while some resemble *Sorex cinereus haydeni*. Many specimens from this locality at the same time of year show no tricolored pattern at all; and every degree of variation occurs between the 'saddle-backs' and those shrews with the dorsal coloration extending down the sides to meet the ventral coloration. In the last category, the uniform dorsal color may be sayal brown or snuff brown in one individual, and deep brownish drab in another. All our larger series of summer specimens to some extent show this pelage variability. The greatest variation occurs in the summer color of the under parts; pale pinkish buff, pinkish buff, vinaceous buff, avellaneous, wood brown, pallid brownish drab, pale drab gray, pale smoke gray, smoke gray, and pale gull gray, to mention some of the phases. It has been impossible to correlate with either sex or age the various phases shown by Ohio specimens.

Our winter-caught specimens show none of this variability. The under parts in winter are usually between pale gull gray and light gull gray, occasionally slightly darker or lighter. For this reason the winter pelage is most suitable for comparisons. In northeastern Ohio, animals in winter pelage may be taken from late October to late April. Plateau specimens generally assume their winter pelages earlier and their summer pelages later than examples from the lake plain.

Because of the many shades of brown in the summer pelages of *Sorex cinereus ohionensis*, specimens of *Sorex cinereus fontinalis* Hollister are lost in the Ohio series, and the color of *S. cinereus cinereus* Kerr from the type region of Ontario can be perfectly matched. Likewise, many Ohio specimens are as reddish as North Carolina specimens of *Sorex longirostris longirostris* Bachman.

But that is not all. The majority of the Ohio specimens display a tendency toward having the third unicuspid tooth smaller than the fourth; and frequently the first and second unicuspids are noticeably larger than the third and fourth; in some this character is developed to an extent comparable to that found in certain far

western shrews, and far more than in *S. longirostris*. Rarely is the fourth unicuspid smaller than the third; often the 2 are of the same size; usually the third is slightly smaller; and all degrees of intergradation between the extremes occur. Consequently, the key to subspecies in Jackson's revision[1] will not work for most specimens from Ohio. The 2 factors so far enumerated—extreme variability of color and the small third unicuspid—are sufficient basis for balking at assigning the Ohio form to *Sorex cinereus cinereus* Kerr. The very small size of the Ohio specimens adds yet another reason.

Remington Kellogg[2] noted the tendency toward the smaller third unicuspid in a series of *Sorex cinereus* from Roan Mountain, North Carolina, and to a less degree in specimens from Suffolk County and Franklin County, New York. He then compared 10 Maryland skulls of *Sorex cinereus fontinalis* with 10 skulls of *S. longirostris* from various parts of its range, and came to the conclusion that the supposed distinctions between the 2 species were nothing more than individual variations. However, winter specimens of *longirostris* in the U. S. Biological Surveys collection may be easily distinguished from winter specimens of *fontinalis* by the reddish color of the former; in addition, *longirostris* is characterized by its slender feet, its short, delicate tail, and trenchant cranial characters other than those dealing with the unicuspid teeth. With tooth characters so unstable in the southern forms of *Sorex cinereus* it now seems more desirable to use the winter pelage as a basis for comparisons not only with the races of *S. cinereus* but of *S. longirostris* as well.

The student may well ask why the shrew here being discussed is not referred to *Sorex longirostris*. Compared to *longirostris* this animal is, however, very different. The cranial proportions, aside from the character of the third unicuspid, are those of *S. cinereus*. Specimens of *Sorex longirostris* in the U. S. Biological Surveys collection have short, flat, broad skulls, a full millimeter shorter than the Ohio specimens in question, with heavier, proportionately larger molar teeth. The robustly proportioned feet of the Ohio specimens are typical of *S. cinereus*, although the inflation of the Ohio skulls is somewhat intermediate between that of *S. longirostris* and *S. cinereus cinereus*, as is also the case with *fontinalis*. This

[1] Loc. cit.
[2] Proc. U. S. Nat. Mus., Vol. LXXXVI, No. 3051, February 14, 1939, pp. 249-251.

reduced inflation, however, seems to be another of the highly variable characters of the Ohio race, topotypical specimens ranging from 4.2 mm. to 4.8 in height of braincase, and examples in the Aurora Pond series from 4.2 to 5.0.

The dark gray winter pelage of the Ohio race also serves for a basis of separation from *Sorex longirostris*, which is a reddish brown animal during both winter and summer. Similarly, *Sorex cinereus fontinalis* is a brownish shrew in winter pelage. A series of winter *S. cinereus cinereus* from Toronto, Ontario, is paler and more brownish than *S. c. ohionensis*. Partially molted spring specimens of the typical subspecies from the Upper Peninsula of Michigan and from Taunton, Massachusetts, show a brownish winter pelage. One winter example from the Bergen Swamp, Genesee County, New York, shows evidence of intergradation between the Ohio race and typical *cinereus*. On the basis of this specimen we might expect to find *Sorex c. ohionensis* entering western New York along the lake plain.

A topotype, No. 16206, C.M.N.H., presents an amazing anomaly in lacking one unicuspid tooth on each side, leaving a unicuspid tooth row of 3 larger teeth followed by 1 very small, peg-like tooth. The skull of this individual is perfectly proportioned and symmetrical, with slightly worn teeth. Still another topotype lacks 1 unicuspid tooth on one side, but this specimen's unicuspid tooth row is obviously deformed.

A large series collected by Morton L. Church on Seal Island, Guysborough County, Nova Scotia, is not typical of *S. c. cinereus* and may be referable to *S. c. acadicus* Gilpin.

In the course of this study it was found that a series of both winter and summer *Sorex cinereus* from Mays Landing, Atlantic County, New Jersey, could not be referred to *S. cinereus nigriculus* Green (type locality at the Tuckahoe River, east of Tuckahoe, Cape May County, New Jersey) on the basis of the description given by that author.[1]

Specimens examined.—

Sorex cinereus ohionensis

Ohio.—Geneva, Ashtabula Co., 3; Mechanicsville, Ashtabula Co., 2; Bedford, Cuyahoga Co., 4; Chagrin Falls, Cuyahoga Co., 3; Hunting Valley,

[1]Univ. Calif. Publ. Zool., Vol. XXXVIII, No. 7, 1932, pp. 387-388.

Cuyahoga Co. (type locality), 30; North Chagrin Metropolitan Park, Cuyahoga Co., 5; Pepper Pike, Cuyahoga Co., 4; Solon, Cuyahoga Co., 1; Auburn Corners, Geauga Co., 3; Great South Bog, Geauga Co., 9; Lake Punderson, Geauga Co., 1; Black Brook, Lake Co., 1; Holden Arboretum, Lake Co., 15; Mentor Marsh, Lake Co., 20; Wellington, Lorain Co., 1 (owl pellet record); Aurora Pond, Portage Co., 67; Maple Grove, Seneca Co., 10; Northfield, Summit Co., 2 (owl pellet records).

Sorex cinereus cinereus

MANITOBA.—Churchill, 1.

NOVA SCOTIA.—Seal Island, Guysborough Co., 18 (not typical).

ONTARIO.—South shore of Lake Nipissing, Parry Sound Co., 1; Aurora, York Co., 2; Toronto, York Co., 10.

QUEBEC.—Bark Lake, Pontiac Co., 4.

MAINE.—Vinalhaven, Knox Co., 1; Mooselookmeguntic Lake, Franklin Co., 1; Kimball Island, Hancock Co., 1.

MASSACHUSETTS.—Essex, Essex Co., 1; Taunton, Bristol Co., 1; Monomoy Island, Barnstable Co., 1.

MICHIGAN.—Newberry, Luce Co., 6; Waters, Otsego Co., 1.

NEW HAMPSHIRE.—Pittsburg, Coos Co., 3; Mt. Moosilauke, Grafton Co., 1.

NEW JERSEY.—Tuckerton, Ocean Co., 1 (U. S. Biological Surveys coll.); Mays Landing, Atlantic Co., 8 (2 in U. S. Biological Surveys coll.).

NEW YORK.—Giant Mountain, Essex Co., 1; Peterboro, Madison Co., 12; Bergen Swamp, Genesee Co., 1; Elba, Genesee Co., 2.

NORTH CAROLINA.—Mt. Mitchell, Yancey Co., 1 (U. S. Biological Surveys coll.); Grandfather Mountain, Watauga Co., 1 (U. S. Biological Surveys coll.).

VERMONT.—Wells River, Orange Co., 1.

WEST VIRGINIA.—Cheat Bridge, Randolph Co., 4 (U. S. National Museum); Cranberry Glades, Pocahontas Co., 1 (U. S. National Museum).

Sorex cinereus haydeni

SOUTH DAKOTA.—Bull Springs, Custer Co., 1.

Sorex cinereus lesueurii

INDIANA.—Liberty Township, St. Joseph Co., 1 (U. S. Biological Surveys coll.).

Sorex cinereus fontinalis

MARYLAND.—Hyattsville, Prince George Co., 2 (U. S. Biological Surveys coll.); Cambridge, Dorchester Co., 1 (U. S. Biological Surveys coll.).

Sorex longirostris longirostris

NORTH CAROLINA.—Raleigh, Wake Co., 1 (U. S. Biological Surveys coll.); Pisgah Forest, 1 (U. S. Biological Surveys coll.).

Sorex fumeus fumeus Miller

APPALACHIAN SMOKY SHREW

Sorex fumeus MILLER, North Amer. Fauna, No. 10, December 31, 1895, p. 50.

Type Locality.—Peterboro, Madison County, New York.

The smoky shrew, in Ohio, is confined to the Allegheny plateau, where it has been recorded from Ross County[1], northeastward through the Cleveland region to the Pennsylvania state line at Pymatuning Lake. It thus seems largely restricted to the glaciated portion of the plateau, avoiding the plains portion of the State, and apparently straying but a short distance into the unglaciated southeast. Further trapping, however, may disclose its presence deep within the lattermost province.

On the drainage area of the Chagrin River in Lake, Geauga, and eastern Cuyahoga counties, *Sorex fumeus* is one of the most abundant mammals and occurs in almost every rich beech-hemlock woodland. Because of this local concentration, the Cleveland Museum of Natural History has amassed large series of specimens taken at all seasons of the year. There is in these series some variation from place to place, although those from any given locality seem to be fairly constant. This variability manifests itself chiefly in size. Compared to topotypes from Peterboro, New York, all the Ohio specimens are very slightly paler and more reddish in summer pelage, and most are smaller. There are also minor cranial differences, but the range of overlap is great; therefore it seems best to assign the Ohio form definitely to *Sorex fumeus fumeus*. The characters that the Ohio series show are but slight intensifications of the features differentiating topotypical *Sorex fumeus fumeus* from *Sorex fumeus umbrosus* Jackson. Compared to a series from Aurora, York County, Ontario, the Ohio series differ to the same slight degree. There is more aberrance between a series of Ohio *S. f. fumeus* and a series from St. Huberts, Essex County, New York, some specimens of which are near *S. f. umbrosus*. Examples from Bergen Swamp, Genesee County, New York, are much larger than either the Ohio, Ontario, or topotypical specimens.

[1]Enders, Occ. Papers Mus. Zool. Univ. Mich., No. 212, April 23, 1930, p. 8.

Specimens examined.—

Ontario.—Aurora, York Co., 11.

Kentucky.—Mammoth Cave, Edmondson Co., 2 (U. S. Biological Surveys coll.).

New Hampshire.—Jaffrey, Cheshire Co., 1.

New York.—St. Huberts, Essex Co., 21; Bergen Swamp, Genesee Co., 8; Peterboro, Madison Co., 4 (topotypes).

Ohio.—Andover, Ashtabula Co., 1; Mechanicsville, Ashtabula Co., 1; Brecksville Metropolitan Park, Cuyahoga Co., 8; Chagrin Falls, Cuyahoga Co., 1; Gates Mills, Cuyahoga Co., 1; North Chagrin Metropolitan Park, Cuyahoga Co., 23; Carvers Pond, Geauga Co., 1; Chesterland Caves, Geauga Co., 4; Little Mountain, Geauga Co., 124; Munson Township, Geauga Co., 1; Stebbens Gulch, Geauga Co., 2; Holden Arboretum, Lake Co., 96; Kirtland Hills, Lake Co., 1; Aurora Pond, Portage Co., 28; Northfield, Summit Co., 1 (owl pellet record).

Vermont.—Wells River, Orange Co., 1.

West Virginia.—Spruce Knob, Pendleton Co., 1 (U. S. National Museum); Cranberry Glades, Pocahontas Co., 2 (U. S. National Museum); Odd, Raleigh Co., 1 (U. S. National Museum); Cheat Bridge, Randolph Co., 1 (U. S. National Museum).

Cryptotis parva elasson, subsp. nov.

Gray Cryptotis

Type.—Adult female, skin and skull, No. 14025, Cleveland Museum of Natural History; February 1, 1939; Winston C. Jesseman, original number, 685.

Type Locality.—Bettsville, Seneca County, Ohio.

Range.—Ohio, intergrading with *Cryptotis parva harlani* (Duvernoy) along the Ohio-Indiana boundary.

Diagnosis.—The smallest cryptotis; very grayish with rostrum and tooth row much shortened; and with deeply pigmented teeth.

Color.—*Winter pelage* (the type). Upper parts slightly glossy, between fuscous and deep mouse gray; underfur slate gray; lower surface glossy gull gray; upper surfaces of feet gull gray; tail above like upper parts, below nearly white. *Fresh summer pelage* (No. 12878, C. M. N. H., a topotype, early June). Slightly paler, more grayish, and less glossy than the type, otherwise very similar. *Worn summer pelage* (No. 13771, C. M. N. H., a topotype, October). Still paler and more grayish, near mouse gray.

Skull.—Very small, low-crowned, and with relatively broad cranium; teeth small, deeply pigmented; unicuspid tooth row crowded, shortened; maxillary projections well developed.

Measurements.—Type: Length, 76 mm.; tail, 12; hind foot, 9; condylobasal length of skull, 14.4; palatal length, 6.4; maxillary breadth, 7.6; interorbital constriction 3.5; length of tooth row (from anterior border of i_2), 5.5.

Remarks.—A cryptotis, taken by Lesueur, was described from New Harmony, Indiana, in 1842 by Duvernoy, as *Sorex harlani*[1]. A specimen at hand from New Harmony is easily separable from either *Cryptotis parva elasson* or topotypical *C. p. parva* from Blair, Nebraska. In the opinion of the authors, the cryptotis of Indiana represents a recognizable race which should stand as *Cryptotis parva harlani* (Duvernoy).

Compared to *C. p. harlani*, *C. p. elasson* is much smaller in all proportions; much more grayish; its dentition is much weaker and less heavily pigmented. Certain skulls, recovered from owl pellets, taken in Steuben and Adams Counties, Indiana, and in Paulding County, Ohio, are somewhat intermediate. There is apparently no close relationship between true *C. p. parva* and *C. p. elasson*, since the differences might be considered of specific rather than subspecific proportions. However, *C. p. harlani* affords in this connection a very distinctive link; it is of the size of *parva*, but is of a much darker color, and is considerably more grayish, indicating an approach to *elasson*. So extreme are the differences between *parva* and *elasson*, however, that there is ample room for 1 or even 2 intermediate races. A specimen from Bloomington, Illinois, is strictly intermediate between *C. p. parva* and *C. p. harlani*, but is herein assigned to the latter form.

The subspecies *C. p. elasson* is Ohio's smallest mammal. It is very difficult to trap, as it moves with its back highly arched so that in motion the shrew looks like a little round ball of fur. In this position it is so short (far less than in an extended skin or dead specimen) that ordinary mousetraps will snap over the intended victim and throw the animal clear of the trap. Most of the specimens listed below were taken as the result of accidents of one sort or another; only a few were trapped. That the species is far more abundant than trapping records show is indicated by the regularity with which the species is recovered from owl pellets. The 27 specimens of this shrew taken from owl pellets collected

[1]Mag. de Zool., 1842, Mon. XL, pl. liii, texte p. 6.

at Evansport, Defiance County, Ohio, comprised more than 25 percent of the mammal records from this source.

Specimens examined.—

Cryptotis parva elasson

Ohio.—Geneva, Ashtabula Co., 2; Lyndhurst, Cuyahoga Co., 1; North Chagrin Metropolitan Park, Cuyahoga Co., 1; Big Creek, Madison Township, Lake Co., 2; Mentor, Lake Co., 2; Bay Point, Ottawa Co., 1; Aurora Pond, Portage Co., 1; Bettsville, Seneca Co. (type locality), 7. *Owl pellet skulls:* Smoky Creek, Green Township, Adams Co., 1; Austinburg, Ashtabula Co., 1; Evansport, Defiance Co., 27; Mentor, Lake Co., 9; Kipton, Lorain Co., 13; Oberlin, Lorain Co., 9; Antwerp, Paulding Co., 24; Paulding, Paulding Co., 1; Northfield, Summit Co., 2.

Cryptotis parva harlani

Illinois.—Bloomington, McLean Co., 1.

Indiana.—New Harmony, Posey Co., 1; Terre Haute, Vigo Co., 1 (U. S. Biological Surveys coll.). *Owl pellet skulls:* Pleasant Mills, Adams Co., 7; Orland, Steuben Co., 2.

Cryptotis parva parva

Nebraska.—Blair, Washington Co., 9 (topotypes; all in U. S. Biological Surveys coll.).

Texas.—Victoria, Victoria Co., 1.

Blarina brevicauda kirtlandi, subsp. nov.

Lake States Blarina

Type.—Young adult male, skin and skull, No. 16895, Cleveland Museum of Natural History; October 13, 1939; B. Patterson Bole, Jr., original number, X-881.

Type Locality.—The Holden Arboretum, Kirtland Township, Lake County, and Chardon Township, Geauga County, Ohio. (The county line bisects the type locality.)

Range.—From northwestern Michigan, central Wisconsin, and central Illinois, east to southeastern West Virginia, eastern Pennsylvania, and southwestern New York.

Diagnosis.—A medium-sized, dark-colored, stockily-built, short-tailed blarina with the proportionately shortest, broadest feet, and most strongly recurved maxillary projections of any race of *Blarina brevicauda.*

Color.—Fresh winter pelage (the type). Upper parts very dark slate gray, with light silvery gloss; under parts very little lighter

than back, the hairs narrowly tipped with dull silver; an indistinct brownish wash on throat and belly; upper surface of hind feet lightly covered with short black hairs along the outer edges, and with short whitish hairs along the inner; tail blackish above, light silvery gray below; forearms densely clothed with long, conspicuous, silvery hairs. *Fresh summer pelage* (No. 12935, C. M. N. H., early July; a paratype). Upper parts sooty grayish black, with very little gloss; under parts like upper surface; tail black above and below; forearms clothed with inconspicuous sooty blackish hairs; most of upper surface of hind feet covered with black hairs.

Skull (of type).—Of medium proportions for a blarina; foramen magnum very large; occipital steeply sloping; posterior maxillary projections sharply hooked and recurved, terminating in a plane vertically bisecting m_3; pm_1 (fifth unicuspid) without pigment; other teeth well pigmented; cranium low crowned.

Measurements.—Type: total length, 116 mm.; tail, 22; hind foot, 14; condylobasal length of skull, 21.0; interorbital constriction, 6.0; maxillary breadth, 7.6; palatal length, 10.0; mastoid breadth, 11.9; tooth row (from anterior border of i_2), 8.9; width of foramen magnum, 3.2; weight (in flesh), 15.5 grams.

Remarks.—This race, *Blarina brevicauda kirtlandi*, differs from all other forms of the genus *Blarina* in the great development of the maxillary projections; in the large size of the foramen magnum; and in having relatively the shortest and broadest feet. In other characters it is intermediate between other forms, as one might expect from its geographical position. It is very short-tailed; this becomes apparent only when series from all over the range are compared, series from the type locality being less remarkable in this regard than are the shortest-tailed stocks from northwestern Ohio. The type series, however, best illustrates the other characteristics of the race.

Every one of the forms of *Blarina brevicauda* heretofore described has its type locality peripherally situated with respect to the range of the species as a whole. This situation has led to endless confusion in museums whose workers have attempted to allocate their specimens properly. The situation has further been complicated by the fact that for some of the forms topotypes are hard to obtain; that there is almost no color range in the species;

and that the range in measurements of any given series from any one locality is usually tremendous. Trenchant proportional differences appear when large series are measured, however, and the color characters, while slight, are remarkably constant. It proved impossible to identify the Ohio blarina for the purposes of this paper until a revision of the genus was undertaken. This enterprise is far from completed at the present time, but with the senior author faced with the prospect of an early call to military service, it seems best to publish the results so far obtained in the course of the study.

The subspecies *Blarina b. kirtlandi*, herein described, is the short-tailed shrew of the 'blarina belt', that is, the tier of states south of the Great Lakes, where *Blarina brevicauda* is the commonest mammal, and where every trapper is plagued with a continual bumper crop of this species. From a population standpoint, it is probably safe to say that 75 percent of all blarinas belong to this race, which constitutes the central stock of the species, being intermediate in its characters and geographical distribution. It differs from the type race *Blarina brevicauda brevicauda* in being much smaller in all dimensions, the maximum measurements of *kirtlandi*, obtained from hundreds of topotypes and thousands of specimens, barely overlapping the minimum of *brevicauda* from the latter's type region. It differs from *brevicauda* also in cranial characters and in color, being less sooty black and having little or none of the deep brownish gloss seen in fresh pelages of *brevicauda*.

From *Blarina brevicauda talpoides*, the common northeastern form, *B. b. kirtlandi* differs in being much smaller, shorter and broader footed, darker colored, less suffused with silvery iridescence in comparable pelages, and in having a low-crowned, robustly proportioned skull as opposed to the high-crowned, lightly built skull of *talpoides*. The dentition of *kirtlandi* is much the more heavily pigmented. The maxillary projections of *talpoides*, less well developed, usually terminate in a plane bisecting the *anterior* instead of the middle portions of m_3.

From *Blarina brevicauda carolinensis*, this new subspecies may be readily distinguished by various cranial characters and by its very much greater size, the disparity in this regard being even greater than between it and *B. b. brevicauda*. The minimum measurements

of the topotypical series of *B. b. kirtlandi* are in all cases far above the maximum of a series of topotypical *B. b. carolinensis.*

From the blarina of the Great Smoky Mountains region, described below as new, *Blarina b. kirtlandi* may be separated by its lighter coloration, smaller foot, and much shorter tail. Intergradation is not shown in the material so far examined by the writers, specimens from southeastern West Virginia being in every way typical of *kirtlandi.* From other races of *Blarina brevicauda* so far described, *kirtlandi* differs sharply in so many characteristics that close comparison is scarcely needed. It must always be remembered, however, that between *Blarina brevicauda compacta,* the palest of eastern blarinas, and the Great Smoky form, darkest of the series, there is much less color difference than between the extremes of most other species of small mammals.

Specimens examined.—

INDIANA.—Lagrange Co., 1 (Univ. Michigan Mus. Zool.); Schneider, Lake Co., 1 (Univ. Michigan Mus. Zool.); New Harmony, Posey Co., 14.

ILLINOIS.—Bloomington, McLean Co., 26 (*kirtlandi-brevicauda* intergrades).

MICHIGAN.—Alger Co., 5 (Univ. Michigan Mus. Zool.); Warren Woods, Berrien Co., 6 (Univ. Michigan Mus. Zool.); Boyne Falls, Charlevoix Co., 19 (Univ. Michigan Mus. Zool.) Fish Hawk Lake, Gogebic Co., 6 (Univ. Michigan Mus. Zool.); Golden Lake, Iron Co., 1; Two Hearted River, Luce Co., 6 (Univ. Michigan Mus. Zool.); Newberry, Luce Co., 5; Banat, Menominee Co., 10 (Univ. Michigan Mus. Zool.); Roscommon Co., 2 (U. S. Biological Surveys coll.); Ann Arbor, Washtenaw Co., 13 (Univ. Michigan Mus. Zool.); Portage Lake, Washtenaw Co., (Univ. Michigan Mus. Zool.); Saline, Washtenaw Co., 1 (Univ. Michigan Mus. Zool.).

OHIO.—Smoky Creek, Adams Co., 9; Andover, Ashtabula Co., 6; Farnham, Ashtabula Co., 5; Mechanicsville, Ashtabula Co., 39; Cat Run, Belmont Co.. 22; Ripley, Brown Co., 5; Middlefield, Butler Co., 1; Reily, Butler Co., 2; Chilo, Clermont Co., 2; Union Township, Clermont Co., 1; Lisbon, Columbiana Co., 33; Bedford, Cuyahoga Co., 21; Brecksville, Cuyahoga Co., 16; Chagrin Falls, Cuyahoga Co., 53; Cleveland, Cuyahoga Co., 3; Cleveland Heights, Cuyahoga, Co., 8; Euclid, Cuyahoga Co., 3; Gates Mills, Cuyahoga Co., 55; Lyndhurst, Cuyahoga Co., 44; North Chagrin Metropolitan Park, Cuyahoga Co., 179; Pepper Pike, Cuyahoga Co., 9; Richmond Heights, Cuyahoga Co., 7; Rocky River Metropolitan Park, Cuyahoga Co., 17; South Euclid, Cuyahoga Co., 3; University Heights, Cuyahoga Co., 18; Lancaster, Fairfield Co., 1; Auburn Corners, Geauga Co., 9; Carvers Pond, Geauga Co., 8; Chesterland Caves, Geauga Co., 44; Great South Bog, Geauga Co., 33; Holden Arboretum, Geauga Co., 22 (topotypes); Lake Punderson, Geauga Co., 16; Little Mountain, Geauga Co., 340; Middlefield, Geauga Co., 12; Munson Town-

ship, Geauga Co., 15; Thompson Township, Geauga Co., 45; Parkman, Geauga Co., 8; Shady Lake, Geauga Co., 14; Stebbens Gulch, Geauga Co., 11; Cincinnati, Hamilton Co., 3; Fostoria, Hancock Co., 15; Holden Arboretum, Lake Co., 135 (the type and 134 topotypes); Kirtland Hills, Lake Co., 20; Leroy Township, Lake Co., 6; Madison Township, Lake Co., 4; Mentor Harbor, Lake Co., 4; Mentor Marsh, Lake Co., 24; Richmond Beach, Lake Co., 18; Wickliffe, Lake Co., 2; Symmes Creek, Lawrence Co., 6; Celina, Mercer Co., 4; Fort Recovery, Mercer Co., 2; Perry Township, Mongtomery Co., 1; Bay Point, Ottawa Co., 2; Payne, Paulding Co., 1; Aurora Pond, Portage Co., 75; Burgoon, Sandusky Co., 32; Fremont, Sandusky Co., 10; Bettsville, Seneca Co., 86; Cromers, Seneca Co., 10; Feaselburg, Seneca Co., 2; Lowell, Seneca Co., 2; Maple Grove, Seneca Co., 25; Old Fort, Seneca Co., 14; Pleasant Township, Seneca Co., 6; Longley, Wood Co., 7.

PENNSYLVANIA.—Drury Run, Clinton Co., 3 (U. S. Biological Surveys coll.); Pymatuning Lake, Crawford Co., 3; McKean, Erie Co., 4 (U. S. Biological Surveys coll.); Nazareth, Northampton Co., 1 (U. S. Biological Surveys coll.); Philadelphia, Philadelphia Co., 5.

WEST VIRGINIA.—Bickles Knob, Randolph Co., 18.

WISCONSIN.—Clarks Lake, Door Co., 3 (U. S. Biological Surveys coll.); Fish Creek, Door Co., 2 (U. S. Biological Surveys coll.); Sawyers Harbor, Door Co., 8 (Univ. Michigan Mus. Zool.); Florence, Florence Co., 1 (U. S. Biological Surveys coll.); Green Lake, Green Lake Co., 1 (U. S. Biological Surveys coll.); Mamie Lake, Vilas Co., 3 (U. S. Biological Surveys coll.).

So involved and complicated are the relationships of the races of *Blarina brevicauda*, that the following synopsis of the forms recognized by the present writers may prove useful.

1.—*Blarina brevicauda brevicauda* (Say). GIANT BLARINA

Sorex brevicaudus SAY, in Long's Exped. Rocky Mts., I, 1823, p. 164.

Type Locality.—Blair, Washington County, Nebraska.

Range.—The Missouri and Mississippi River valleys from northeastern Kansas and west central Illinois northwestward over Iowa, eastern Nebraska, eastern South Dakota, eastern North Dakota, western Minnesota, and western Wisconsin; smaller at northern edge of range; intergrading with *B. b. kirtlandi* in Illinois, Wisconsin, and northwestern Michigan.

Diagnosis.—The largest blarina, a massively proportioned shrew, with heavy, deeply-pigmented dentition.

Measurements.—Twelve topotypes from Blair, Nebraska, average: length, 134 mm.; tail, 25; hind foot, 17; weight: *specimens from Decorah, Iowa* (Univ. Michigan Mus. Zool.), average over 25 grams.

Specimens examined.—

Iowa.—Hillsboro, Henry Co., 2 (U. S. Biological Surveys coll.); Iowa City, Johnson Co., 3 (U. S. Biological Surveys coll.); Council Bluffs, Pottawattamie Co., 4 (U. S. Biological Surveys coll.); Tama, Tama Co., 2; Ireton, Sioux Co., 4 (Univ. Michigan Mus. Zool.); Decorah, Winneshiek Co., 6 (Univ. Michigan Mus. Zool.).

Minnesota.—Cass Lake, Cass Co., 1 (U. S. Biological Surveys coll.); Grand Marais, Cook Co., 6 (Univ. Michigan Mus. Zool.); Barrett, Grant Co., 5 (Univ. Michigan Mus. Zool.); La Crescent, Houston Co., 1 (U. S. Biological Surveys coll.); Elk River, Sherburne Co., 5 (U. S. Biological Surveys coll.); Towers, St. Louis Co., 4 (U. S. Biological Surveys coll.).

Nebraska.—Neligh, Antelope Co., 1 (U. S. Biological Surveys coll.); Kearney, Buffalo Co., 2 (U. S. Biological Surveys coll.); Valentine, Cherry Co., 1 (U. S. Biological Surveys coll.); Columbus, Platte Co., 3 (U. S. Biological Surveys coll.); Blair, Washington Co., 15 (topotypes, 1 in U. S. Biological Surveys coll.).

North Dakota.—Valley City, Barnes Co., 2 (U. S. Biological Surveys coll.); Oakes, Dickey Co., 3 (U. S. Biological Surveys coll.); Walhalla, Pembina Co., 1 (U. S. Biological Surveys coll.); Sweetwater, Ramsey Co., 2 (U. S. Biological Surveys coll.); Fairmount, Richland Co., 4 (U. S. Biological Surveys coll.); Wahpeton, Richland Co., 11 (U. S. Biological Surveys coll.); Turtle Mountain, Rolette Co., 1 (U. S. Biological Surveys coll.); Portland, Traill Co., 9 (U. S. Biological Surveys coll.).

Wisconsin.—Worden Township, Clark Co., 6 (5 in U. S. Biological Surveys coll.); Platteville, Grant Co., 5 (U. S. Biological Surveys coll.); Lynxville, Crawford Co., 2 (U. S. Biological Surveys coll.).

2.—*Blarina brevicauda kirtlandi* Bole and Moulthrop. Lake States Blarina

Type Locality.—Holden Arboretum, Lake and Geauga counties, Ohio.

Range.—From northwestern Michigan, eastern Wisconsin, and central Illinois, to West Virginia, eastern Pennsylvania, and southwestern New York; intergrading with *Blarina b. talpoides* over northeastern Pennsylvania and the greater part of New York State. Specimens from most of New York (Genesee, Madison, Essex, Westchester, and Suffolk counties) are more nearly referable to *B. b. talpoides.*

Diagnosis.—A medium sized blarina with strongly hooked maxillary projections and other distinctive cranial characters; proportionately the shortest and broadest footed race of the species.

Measurements.—One hundred and fifty topotypes average: length, 116 mm.; tail, 23; hind foot, 14; weight, 14.2 grams.

3.—*Blarina brevicauda talpoides* (Gapper). Ontario Blarina

Sorex talpoides Gapper, Zool. Journ., Vol. V, 1830, p. 202.

Type Locality.—Between York (Toronto) and Lake Simcoe, Ontario.

Range.—Ontario, and in less typical form, New York State, northeastern Pennsylvania, New Jersey, and southern New England from Connecticut and Cape Cod at least as far north as Sagadahoc County, Maine.

Diagnosis.—A large blarina, almost as large as *B. b. brevicauda* but much slenderer; strongly glossed with silver in fresh pelages; under parts noticeably paler than in *B. b. kirtlandi* or *B. b. brevicauda;* longer tailed than either of these forms; cranium more elevated; pigmentation of teeth greatly reduced as compared to *B. b. kirtlandi.*

Measurements.—Nineteen topotypes average: length, 127 mm.; tail, 26; hind foot, 16; weight, 20 grams.

Remarks.—Strictly typical *Blarina brevicauda talpoides* occurs only in Ontario. There is a progressive decrease in size towards the Atlantic coast of New Jersey and southern New England, coupled with a notable increase in the size of the external ear and degree of elevation of the cranium. If the southeastern stock from Long Island and coastal New Jersey should prove separable through further study, the name *Blarina brevicauda dekayi*[1] is available.

As here considered, *B. b. talpoides* is a variable race, all stocks of which are characterized by silvery under parts and lighter gray underfur than in the more western and southern races. Some New Hampshire and Vermont examples are confusingly close to *B. b. kirtlandi,* and all specimens from western New York and eastern Pennsylvania are somewhat intermediate between that form and topotypical material from Lake Simcoe, Ontario, particularly in the character of the hind foot.

Specimens examined.—

Ontario.—Haliburton, Haliburton Co., 2; Aurora, York Co., 19 (topotypes).

Quebec.—Bark Lake, Pontiac Co., 1.

Connecticut.—Cos Cob, Fairfield Co., 4 (U. S. Biological Surveys coll.); Stonington, New London Co., 2 (U. S. Biological Surveys coll.).

[1] *Sorex dekayi* Bachman (Cooper MS.), Journ. Acad. Nat. Sci. Philadelphia, Vol. VII, Part 2, 1837, p. 377.

MAINE.—Small Point Beach, Sagadahoc Co., 11.

MASSACHUSETTS.—Taunton, Bristol Co., 4; Essex, Essex Co., 6; Harvard, Middlesex Co., 3 (U. S. Biological Surveys coll.); Raynham, Plymouth Co., 3; Marshfield, Plymouth Co., 1 (U. S. Biological Surveys coll.); Wareham, Plymouth Co., 1.

NEW HAMPSHIRE.—Jackson, Carroll Co., 2; Jaffrey, Cheshire Co., 1; Pittsburg, Coos Co., 3; Mt. Moosilauke, Grafton Co., 1.

NEW JERSEY.—Mays Landing, Atlantic Co., 4; Princeton, Mercer Co., 2; Allaire, Monmouth Co., 2 (Univ. Michigan Mus. Zool.).

NEW YORK.—Giant Mountain, Essex Co., 1; St. Huberts, Essex Co., 15; Bergen Swamp, Genesee Co., 34; Elba, Genesee Co., 19; Peterboro, Madison Co., 2; Montauk Point, Suffolk Co., 23 (U.S. Biological Surveys coll.); Wading River, Suffolk Co., 16; Ossining, Westchester Co., 2.

VERMONT.—Wells River, Orange Co., 1.

4.—*Blarina brevicauda pallida* Smith. NOVA SCOTIA BLARINA

Blarina brevicauda pallida SMITH, Amer. Midl. Nat., Vol. XXIV, No. 1, July 31, 1940, p. 223.

Type Locality.—Wolfville, Kings County, Nova Scotia.

Range.—Nova Scotia and New Brunswick, and intergrading with *Blarina b. talpoides* in central and southwestern Maine.

Diagnosis.—A large pale gray blarina with a very long tail; showing accentuated *talpoides* characters, but the hind foot broader than in stocks of that race. Not all the Nova Scotia material seen by the writers shows measurements as great as a series of topotypes from Wolfville, Kings Co., Nova Scotia, but the tail is disproportionately long in all specimens.

Measurements.—Ten topotypes (Univ. Michigan Mus. Zool.) average: length, 126.6 mm.; tail, 29.1; hind foot, 16.5.

Specimens examined.—

NEW BRUNSWICK.—Scotch Lake, York Co., 3.

NOVA SCOTIA.—Lake Kedgemakooge, Annapolis Co., 8 (Univ. Michigan Mus. Zool.); James River, Antigonish Co., 1 (Univ. Michigan Mus. Zool.); Wolfville, Kings Co., 10 (topotypes, Univ. Michigan Mus. Zool.).

MAINE.—Ashland, Aroostook Co., 4; Caribou, Aroostook Co., 1 (Univ. Michigan Mus. Zool.); Mooselookmeguntic Lake, Franklin Co., 2 (*pallida-talpoides* intergrades).

5.—*Blarina brevicauda aloga* Bangs. MARTHAS VINEYARD BLARINA

Blarina brevicauda aloga BANGS, Proc. New Engl. Zoöl. Club, Vol. III, March 31, 1902, p. 76.

Type Locality.—West Tisbury, Dukes County, Massachusetts.

Range.—Confined to Marthas Vineyard Island, Massachusetts. Specimens showing characters approaching *B. b. aloga* are obtainable from the Cape Cod region of the mainland.

Diagnosis.—A medium sized blarina characterized by extremely pale under parts, reduced cranium, and small feet.

Measurements.—One topotype: length, 112 mm.; tail, 20.5; hind foot, 12.5.

Specimens examined.—

Massachusetts.—West Chop, Marthas Vineyard Island, Dukes County, 2.

6.—*Blarina brevicauda compacta* Bangs. Nantucket Blarina

Blarina brevicauda compacta Proc. New Engl. Zoöl. Club, Vol. III, March 31, 1902, p. 77.

Type Locality.—Nantucket Island, Nantucket County, Massachusetts.

Range.—Nantucket Island, Massachusetts.

Diagnosis.—A small race in which the light color of the under parts has been carried up the flanks and onto the dorsal region.

7.—*Blarina brevicauda carolinensis* (Bachman). Carolina Blarina

Sorex carolinensis Bachman, Journ. Acad. Nat. Sci. Philadelphia, Vol. VII, Part 2, 1837, p. 366.

Type Locality.—Eastern South Carolina.

Range.—As currently understood, *Blarina brevicauda carolinensis* ranges from Virginia to central Florida, and westward around the Appalachian Mountain system to Kentucky, Arkansas, and eastern Texas.

Diagnosis.—A very small, slaty black subspecies, so very much smaller than the other races thus far herein listed that detailed comparison is unnecessary. The writers have made no attempt to examine *carolinensis* stocks critically. The sepia tints frequently encountered in certain stocks are partly due to wear. The race badly needs careful study.

Measurements.—Thirteen topotypes from Eastern South Carolina (Beaufort County) average: length, 95 mm.; tail, 17; hind foot, 11.5; weight, 8.9 grams.

Specimens examined.—

FLORIDA.—Gainesville, Alachua Co., 4 (Univ. Michigan Mus. Zool.).
MARYLAND.—Cambridge, Dorchester Co., 2 (Univ. Michigan Mus. Zool.).
NORTH CAROLINA.—Currituck, Currituck Co., 1.
SOUTH CAROLINA.—Grays Hill, Beaufort Co., 13.

8.—*Blarina brevicauda peninsulae* Merriam. EVERGLADE BLARINA

Blarina carolinensis peninsulae MERRIAM, North Amer. Fauna, No. 10, December 31, 1895, p. 14.

Type Locality.—Miami River, Dade County, Florida.

Range.—"Peninsula of Florida, south of 28°" (Merriam).

Diagnosis.—"Similar to *carolinensis*, but with larger hind feet and more slaty coloration; molariform teeth larger" (Merriam). The writers of this report have seen no topotypes. Intergrades from northern Florida are no more slaty than *carolinensis* topotypes.

9.—*Blarina brevicauda hulophaga* Elliot. OKLAHOMA BLARINA

Blarina brevicauda hulophaga ELLIOT, Publ. Field Columbian Mus. No. 38, Zool. Ser., Vol. I; 1899, p. 287.

Type Locality.—Dougherty, Murray County, Oklahoma.

Range.—From Dougherty, Murray County, central southern Oklahoma, northeast at least as far as Tulsa, Oklahoma; probably occurs in suitable habitats throughout the eastern part of this State.

Diagnosis.—A small blarina, "uniform silvery gray in most lights, changing to light brown in others; under parts, paler hues of same colors . . . . becoming buff" (Elliot). Specimens (Univ. Michigan Mus. Zool.) from the vicinity of Tulsa, Oklahoma, show these characters. Much paler and larger footed than *B. b. carolinensis* and much smaller than *B. b. brevicauda* or *B. b. kirtlandi*.

Specimens examined.—

OKLAHOMA.—Mohawk Park, Tulsa Co., 2 (Univ. Michigan Mus. Zool.).

10.—*Blarina brevicauda plumbea* Davis. TEXAS COAST BLARINA

Blarina brevicauda plumbea DAVIS, Journ. Mamm., Vol. XXII, No. 3, August 14, 1941, p. 317.

Type Locality.—Aransas National Wildlife Refuge, Aransas County, Texas.

Range.—Known from only the Aransas National Wildlife Refuge in Aransas County, Texas, but presumably will be found to inhabit more extensive territory along the Texas coast.

Diagnosis.—"A small plumbeous-colored *Blarina* resembling *B. b. hulophaga*, but smaller and much paler; posterior border of palate highly arched anterodorsally . . ." (Davis). As described, the smallest blarina.

11.—*Blarina brevicauda churchi*, subsp. nov. GREAT SMOKY BLARINA

Type.—Adult female, skin and skull, No. 3640, Cleveland Museum of Natural History; August 20, 1910; Morton L. Church, original number (Church collection), 640.

Type Locality.—Roan Mountain, Mitchell County, North Carolina.

Range.—Presumably the higher portions of the Appalachian Mountains in western North Carolina and eastern Tennessee.

Diagnosis.—A very dark colored blarina of medium to large size, with proportionately the broadest skull of any of the races of *Blarina brevicauda.*

Color.—Summer pelage (the type). Upper parts very dark slaty gray, almost black, with little gloss; underfur dark slaty gray, darker than in other races of *Blarina*; under surface dark, only slightly lighter than upper parts; hairs of hind feet black; tail black above, grayish black below. There is a barely perceptible brownish cast to such gloss as the specimen shows.

Skull.—Very broad for a blarina, and of rather heavy build; rostrum broad, but the disproportionately broad cranium makes the rostrum appear narrow; cranium of medium depth; dentition well pigmented, with the fifth unicuspid (pm_1) regularly tipped with brown; unicuspid tooth row crowded, and the premaxillary portion of the rostrum shortened accordingly, as in *Blarina b. carolinensis.*

Measurements.—Type: total length, 125 mm.; tail, 28.5; hind foot, 16.5; condylobasal length, 20.2; mastoid breadth, 13.0; maxillary breadth, 8.0; palatal length, 8.8; tooth row, 8.8; width of foramen magnum, 2.9. *Type and 5 topotypes:* average, length, 118.4; tail, 26.1; hind foot, 15.3.

Remarks.—This new race is distinguishable from all other large blarinas by its very dark coloration, especially in the summer pelage, which is, however, but little darker than that of winter. It is further characterized by its broad cranium, which is as wide as in typical *B. b. brevicauda*, while the occipitonasal length of the latter form is usually from 2 to 4 millimeters greater. This relatively great mastoid breadth in proportion to the skull length is found to a somewhat less degree in *B. b. carolinensis* also, and it seems likely that *B. b. churchi* is but a giant mountain derivative of that subspecies, whose range almost completely surrounds that of the mountain animal. From *Blarina telmalestes* Merriam, *Blarina b. churchi* is distinguishable by numerous cranial details such as its greater mastoid breadth, more heavily pigmented dentition, and greater robustness of skull; it is furthermore more darkly colored, especially on the under surface. From *Blarina b. kirtlandi* it differs as indicated in the general statements made above, and in its spectacularly narrower foramen magnum. It has also a much longer tail.

The writers have the honor of naming this new race for Morton L. Church of Charlotte, North Carolina, long a student of mammals and a benefactor of this museum's mammal department.

Specimens examined.—

NORTH CAROLINA.—Roan Mountain, Mitchell Co., 6 (type and 5 topotypes; including 1 in the U. S. Biological Surveys collection).

12.—*Blarina brevicauda hooperi*, subsp. nov. LONG-TAILED BLARINA

Type.—Young adult female, skin and skull, No. 77380, University of Michigan Museum of Zoology; July 26, 1931; Victor H. Cahalane.

Type Locality.—Lyndon, Caledonia County, Vermont.

Range.—Known from only the type locality.

Diagnosis.—A small blarina characterized by its disproportionately large head and feet and its long tail, the last more than 23 percent of the total length, in these characters differing from all other forms of *Blarina*.

Color.—*Summer pelage* (the type). Upper parts smoke gray, with a noticeable brownish cast and very little gloss; under surface

lighter, more glossy; tail drab above and below; hind feet covered with dull grayish hairs, somewhat darker on outer surface of feet (inner edge as seen in prepared skin).

Skull (of type).—Short, broad, and low crowned; dentition heavy, with light pigmentation; maxillary projections very weakly developed, their points terminating in plane through hypocone and metastyle of m_2; second and third incisors well developed; pm_1 conspicuous but unpigmented.

Measurements.—Type: length, 105 mm.; tail, 26; hind foot, 14.5 (measurement taken from skin; field measurement given as 24, obviously an error); condylobasal length of skull, 22.5; interorbital constriction, 6.1; maxillary breadth, 7.7; mastoid breadth, 12.7; palatal length, 9.7; width of foramen magnum, 2.9; tooth row (from anterior border of i_3), 8.8. *Twelve topotypes and the type:* average, length, 104.1; tail, 24.1; hind foot, 14.6.

Remarks.—This new subspecies is a most astonishing departure from the general trend of the races of the genus *Blarina* to develop large northern forms. As represented by 13 specimens from the type locality (all in the collection of the Museum of Zoology at the University of Michigan), the race is utterly unique in its body proportions, but is considerably variable in size. The type is close to the average of the series, most of which are smaller than the type; 1 specimen is much larger (125 mm.). All agree in the peculiar smoky coloration, the large feet and tail, and in cranial characters.

Obviously, *Blarina brevicauda hooperi* is closely related to *Blarina brevicauda pallida* R. W. Smith, and is in effect a diminutive darker representative of that race. Its tail is relatively the longest of any race of *Blarina*, and its hind foot is, relatively, equally large. It is thus startlingly different from all *Blarina b. talpoides* stocks and is apparently unrelated to the more western races of the genus. Intergradation is not shown by any specimens seen by the writers, though certain series from eastern New Hampshire are apparently intermediates between *B. b. talpoides* and *B. b. pallida;* and a specimen from Wells River, Orange County, Vermont, is surprisingly close to *Blarina b. kirtlandi*, i.e., darker than either *hooperi* or *talpoides* and of different measurements.

In 1857 Baird named *Blarina angusticeps*[1] from Burlington,

[1]Rep. Explor. and Surv. R. R. Pac., Vol. VIII, 1857, p. 47.

Vermont, on the basis of what subsequently has proved to be a deformed skull. Since the cranial characters of the specimen are quite the opposite of broad-skulled *Blarina b. hooperi*, and since the specimens at hand from Giant Mountain, Essex County, New York (less than 30 miles from Burlington), are typical *B. b. talpoides*, the writers feel that the name *angusticeps* is not applicable to the northeastern Vermont race. Baird states (loc. cit.) that his specimen is externally identical with *Blarina talpoides*.

The writers take pleasure in naming the present form for Dr. Emmet T. Hooper of the Museum of Zoology at the University of Michigan, in recognition of his generosity in curtailing his own researches on *Blarina* in favor of those reported herein.

Specimens examined.—

VERMONT.—Lyndon, Caledonia Co., 13 (including the type; all in the collection of the University of Michigan Museum of Zoology).

13.—*Blarina telmalestes* Merriam. DISMAL SWAMP BLARINA

Blarina telmalestes MERRIAM, North American Fauna, No. 10, December 31, 1895, p. 15.

Type Locality.—Lake Drummond, Dismal Swamp, Norfolk County, Virginia.

Range.—The Dismal Swamp of extreme southeastern Virginia. This region is entirely surrounded, on the landward side, by the range of *Blarina b. carolinensis*, a form to which *Blarina telmalestes* bears almost no resemblance whatever.

Diagnosis.—A medium-sized blarina of dark, dull coloration, almost without gloss above, and lighter below; hind foot large and broad; tail rather long; skull excessively long and slender, as large as in topotypical *Blarina b. talpoides;* dentition with scant pigmentation. The general proportions and cranial characters of this 'species' suggest that it is closely related to *B. b. talpoides*, although differing in color and in other minor details.

Specimens examined.—

VIRGINIA.—Dismal Swamp, Norfolk Co., 30 (topotypes, U. S. Biological Surveys coll.).

14.—*Blarina costaricensis* J. A. Allen

Blarina costaricensis J. A. ALLEN, Bull. Amer. Mus. Nat. Hist., Vol. III, Art. 14, April 17, 1891, p. 205.

Type Locality.—La Carpintera, Costa Rica; or upper Mississippi valley, United States.

Remarks.—This shrew was described in 1891 from a specimen reputedly from Costa Rica, obtained by George K. Cherrie, who lived in Iowa before he collected in Central America. The specimen apparently closely resembles *Blarina brevicauda brevicauda*, and caused a lively controversy between the describer and Dr. C. Hart Merriam, who believed the shrew to have come from Cherrie's home country[1]. The dispute is as yet unsettled, and might be finally ended only by the capture of another *Blarina* in Costa Rica. The writers have not seen Doctor Allen's type.

Myotis lucifugus lucifugus (LeConte)

LITTLE BROWN BAT

V[espertilio]. lucifugus LECONTE, in McMurtrie's Cuvier, Animal Kingdom, Vol. I, 1831, p. 431.

Type Locality.—Georgia; probably near Riceboro, Liberty County.

Despite the fact that only 1 Ohio specimen of *Myotis lucifugus* was seen by Miller and Allen for their revision of the genus[2], the large series of specimens collected since that date confirms their allocation of Ohio to the range of the subspecies *Myotis l. lucifugus*.

This bat is far less common in northern Ohio than several other species. In the southern part of the State it is, as is the case over most of its range, one of the 2 or 3 commonest species.

Ohio specimens examined.—

ADAMS COUNTY.—Ohio Brush Creek, 1.

ASHTABULA COUNTY.—Mechanicsville, 4; northwestern corner of Ashtabula County, 17.

CUYAHOGA COUNTY.—Cleveland, 1; Dover, 1.

DELAWARE COUNTY.—Lawrence Cave, 5.

FAIRFIELD COUNTY.—Lancaster, 3.

GEAUGA COUNTY.—Chesterland, 2.

HOCKING COUNTY.—Bat Cave, Laurel Township, 4.

LAKE COUNTY.—Mentor-on-the-Lake, 1; Willoughby, 1.

SENECA COUNTY.—Flat Rock, 3.

[1]See Merriam, North Amer. Fauna, No. 10, December 31, 1895, p. 10; also J. A. Allen, Bull. Amer. Mus. Nat. Hist., Vol. IX, March 11, 1897, p. 34.

[2]Bull. U. S. Nat. Mus., No. 144, April 18, 1928, p. 46.

Myotis keenii septentrionalis (Trouessart)

EASTERN LONG-EARED BAT

Vespertilio gryphus var. *septentrionalis* Trouessart, Cat. Mamm. Viv. et Foss., 1897, p. 131.

Type Locality.—Halifax, Nova Scotia.

This species has been collected but a few times in Ohio, yet the records indicate that its range is state wide. There is great variation in color of the specimens at hand. It is apparently the commonest species of woodland *Myotis* in northeastern Ohio, albeit not at all frequently met with. The species *Myotis lucifugus* tends to confine itself to open country and the vicinity of human habitations.

Ohio specimens examined.—

CLERMONT COUNTY.—Union Township, 1.
DELAWARE COUNTY.—Lawrence Cave, 1.
GEAUGA COUNTY.—Little Mountain, 4.
HOCKING COUNTY.—Bat Cave, Laurel Township, 1.
SENECA COUNTY.—Flat Rock, 2.

Myotis sodalis Miller and Allen

CAVE BAT

Myotis sodalis MILLER AND ALLEN, Bull. U. S. Nat. Mus., No. 144, April 18, 1928, p. 130.

Type Locality.—Wyandotte Cave, Harrison County, Indiana.

Robert Goslin of the Ohio State Museum was the first to collect *Myotis sodalis* in Ohio. The species is apparently very rare in the State, despite its abundance at its type locality near by and in Kentucky. It is known in Ohio from 2 counties only—Hocking and Highland. There is but a single specimen in the Cleveland Museum of Natural History, which was taken by Mr. Goslin and was received in exchange with the Ohio State Museum. This specimen is indistinguishable from a large series from War Eagle, Benton County, Arkansas, and from Kentucky specimens collected by Mr. Goslin for the Cleveland Museum's collection.

Ohio specimens examined.—

HOCKING COUNTY.—Goodhope Township, 1.

Pipistrellus subflavus subflavus (F. Cuvier)

SOUTHERN PIPISTRELLE

Vespertilio subflavus F. CUVIER, Nouv. Ann. Mus. Nat. Hist. Paris, Vol. I, 1832, p. 17.

Type Locality.—Eastern United States, probably Georgia.

All of Ohio lies within the area of intergradation between the 2 forms of *Pipistrellus subflavus* known to occur in the United States. As might be expected, there is enormous variability demonstrated in series from any one locality, particularly from the central part of the State. Specimens from the Cincinnati region and from as far east as Adams County along the Ohio River are nevertheless pale enough, in the aggregate, to be indistinguishable from specimens from North Carolina and Arkansas. Very few, however, are as pale as members of a series from Belleview, Marion County, Florida. Only from the extreme southwestern part of Ohio come specimens that can be definitely assigned to *Pipistrellus subflavus subflavus.*

Ohio specimens examined.—

ADAMS COUNTY.—Smoky Creek, 10.

CLERMONT COUNTY.—Union Township, 6.

HAMILTON COUNTY.—(No further locality) 10 (Woodrow Goodpaster coll.).

Pipistrellus subflavus obscurus Miller

NORTHERN PIPISTRELLE

Pipistrellus subflavus obscurus Miller, North Amer. Fauna, No. 13, October 16, 1897, p. 93.

Type Locality.—Lake George, Warren County, New York.

In the opinion of the writers most of the specimens of *Pipistrellus* from Ohio belong to this race. There is a well-marked tendency towards increasing darkness of coloration from the southwest towards the northeast. Robert Goslin, who was the first to recognize this fact, submitted specimens from Hocking and Seneca counties to Remington Kellogg who identified them as *P. s. obscurus.* These specimens are mostly in the Ohio State Museum. Subsequently, the Cleveland Museum of Natural History obtained from Mr. Goslin, series taken in Hocking and Fairfield counties and from Winston Jesseman others collected in Seneca County. None of these specimens is as dark as a series from Liberty Hill, New London County, Connecticut. The individuals

of a small series from Lawrence County, Ohio (in the southernmost tip of the State), are fully as dark, however, and isolated examples from other localities are still darker.

Twelve specimens from Liberty Hill, Connecticut, are fully as dark as examples from the type region in New York State. The writers have to date been unable to discover another record of the occurrence of the species in Connecticut. Two examples are of special interest in being melanistic, coal black in color, which, taken as they were soon after the great New England hurricane, caused considerable excitement among the collectors who obtained them. Examination of their skulls speedily revealed their true identity.

Ohio specimens examined.—

Belmont County.—Cat Run, 9.
Fairfield County.—Sugar Grove, 3.
Highland County.—Dry Cave, 1.
Hocking County.—Bat Cave, Laurel Township, 5.
Lawrence County.—Symmes Creek, 3.
Medina County.—Hinckley, 1.
Ross County.—Bainbridge, 4.
Sandusky County.—Fremont, 1.
Seneca County.—Flat Rock, 15; Goods Cave, 1 (Ohio State Museum).

Eptesicus fuscus fuscus (Beauvois)

Big Brown Bat

Vespertilio fuscus Beauvois, Cat. Raisonné Mus. Peale, Philadelphia, 1796, p. 18 (page 14 of the English edition by Peale and Beauvois).

Type Locality.—Philadelphia, Pennsylvania.

Big brown bats from Ohio are quite indistinguishable from examples from the middle Atlantic states. Throughout Ohio the species is very common, in many localities the commonest bat.

Ohio specimens examined.—

Adams County.—Manchester, 5; Smoky Creek, 1.
Cuyahoga County.—Cleveland, 8; Cleveland Heights, 1; North Chagrin Metropolitan Park, 5; Shaker Heights, 1.
Fairfield County.—Bern Township, 1.
Geauga County.—Chesterland, 1.
Hamilton County.—(No further locality) 3.
Hocking County.—Bat Cave, Laurel Township, 3; Clear Creek Cave, 1.
Medina County.—Hinckley, 1.
Portage County.—Geauga Lake, 3.
Ross County.—Bainbridge, 3.
Seneca County.—Bettsville, 3.

Lasionycteris noctivagans (LeConte)

Silver-haired Bat

Vespertilio noctivagans LeConte, in McMurtrie's Cuvier, Animal Kingdom, Vol. I, 1831, p. 431.

Type Locality.—Eastern United States.

Despite the fact that there are but 4 specimens of this species in the Cleveland Museum's Ohio material, it is not uncommon in northeastern Ohio, and is frequently identifiable under street lights in the suburban portions of Cleveland. These 4 cannot be distinguished with certainty from a large series from western North Carolina or a small series from Saline Valley, Inyo County, California.

Ohio specimens examined.—

Cuyahoga County.—Cleveland, 3; North Chagrin Metropolitan Park, 1.

Nycticeius humeralis (Rafinesque)

Evening Bat

Vespertilio humeralis Rafinesque, Amer. Monthly Mag., Vol. III, 1818, p. 445.

Type Locality.—Kentucky.

Evening bats are known from Cincinnati[1], and from only a few records in the Ohio River valley, mostly near Cincinnati; but are very rare elsewhere in Ohio. Robert Goslin has taken the species in Fairfield County. Two of the Ohio specimens in the Cleveland Museum's collection are juveniles and hence are somewhat inadequate for comparison with other material at hand. Both are considerably darker than a specimen of the same age from Raleigh, North Carolina. An adult from Clermont County differs similarly from a specimen from Oak Lodge, Florida. Should this difference prove significant when larger series become available, the name of the Ohio animal would, in view of the type locality, probably remain the same.

Ohio specimens examined.—

Clermont County.—Union Township, 3.

[1]Goodpaster, Journ. Cincinnati Soc. Nat. Hist., Vol. XXII, No. 3, June, 1941, p. 42.

Lasiurus borealis borealis (Müller)

NORTHERN RED BAT

Vespertilio borealis MÜLLER, Natursyst., Suppl., 1776, p. 20.

Type Locality.—New York State.

All the red bats of the Cleveland Museum's Ohio collection are referable to *Lasiurus borealis borealis*, but a tendency towards *Lasiurus borealis seminola* is shown in specimens from the extreme southern parts of the State. This manifests itself in the slightly more brownish, less reddish coloration of the southern specimens.

Over much of Ohio the red bat is the commonest species of bat during the short time that it is in the State, that is, from May to September. Only in certain areas in southern Ohio is it regularly outnumbered by other forms (*Myotis* and *Pipistrellus*).

Ohio specimens examined.—

ADAMS COUNTY.—Smoky Creek, 3.

CLERMONT COUNTY.—Union Township, 4.

CUYAHOGA COUNTY.—Cleveland, 5; Lyndhurst, 1; North Chagrin Metropolitan Park, 1; Parma, 1.

GEAUGA COUNTY.—Chardon, 1.

LAKE COUNTY.—Mentor, 1.

LAWRENCE COUNTY.—Symmes Creek, 1.

ROSS COUNTY.—Bainbridge, 3.

SENECA COUNTY.—Bettsville, 8.

Lasiurus cinereus (Beauvois)

GREAT HOARY BAT

Vespertilio linereus (err. typ. for *cinereus*) BEAUVOIS, Cat. Raisonné Mus. Peale, Philadelphia, 1796, p. 18 (page 15 of the English edition by Peale and Beauvois).

Type Locality.—Philadelphia, Pennsylvania.

The great hoary bat is a rare species in Ohio, and is in most places probably a 'bat of passage'. The species has been mentioned, however, as seen in Geauga and other northern Ohio counties during the summer months. S. V. Wharram reports it for the same season in Ashtabula County[1]. Unfortunately these records are unsupported by specimens.

Ohio specimens examined.—

CUYAHOGA COUNTY.—Cleveland, 2; Lakewood, 1.

LORAIN COUNTY.—Lorain, 1.

[1]Unpublished manuscript in library of the Cleveland Museum of Natural History.

Euarctos americanus americanus (Pallas)

EASTERN BLACK BEAR

Ursus americanus PALLAS, Spicilegia Zoologica, Fasc. XIV, 1780, p. 5.

Type Locality.—Eastern North America.

The black bear is represented in the Ohio collections of the Cleveland Museum of Natural History by only skeletal remains recovered from Indian sites and peat bog excavations. It is, however, a matter of historic record that the species formerly occupied the entire State. In recent years it has been reintroduced into Scioto County, and the animal is of casual occurrence along the Ohio-Pennsylvania border.

Procyon lotor lotor (Linnaeus)

EASTERN RACCOON

[*Ursus*] *lotor* LINNAEUS, Syst. Nat., ed. 10, Vol. I, January 1, 1758, p. 48.

Type Locality.—Eastern United States.

Raccoons were formerly found in all parts of Ohio, and are still locally common over most of the State. The Cleveland Museum of Natural History has no raccoons from outside of Ohio that are referable to the subspecies *Procyon l. lotor*, and the writers have not seen other northeastern specimens. On geographical grounds there is no reason to suspect that the Ohio animal is anything other than *Procyon lotor lotor*.

Ohio specimens examined.—

CUYAHOGA COUNTY.—Cleveland, 3; Dover, 1; Rocky River Metropolitan Park, 1.

LAKE COUNTY.—Kirtland Hills, 1.

PORTAGE COUNTY.—Geauga Lake, 2.

Bassariscus astutus subsp.

CACOMISTLE

The inclusion of a cacomistle in a list of mammals from Ohio is certain to excite critical comment. The record of the species in the State is most interesting. This record is to a large extent summarized in the Proceedings of the Cleveland Academy of Science,

p. 126, where the minutes of that organization's meeting of Jan. 30, 1857, are chronicled on page 126. This account mentions 5 specimens, of which all but 1 are definitely Ohio records, the assumption being that the fifth came also from Ohio. Two of the specimens are given definite locality records—Parma, Cuyahoga County, and Fairfield County. One of the specimens listed is mentioned as existing in the museum of the Kirtland Society of Natural Sciences in Cleveland. This individual has been seen by the authors.

After the dissolution of the Kirtland Society of Natural Sciences, its museum specimens, all mounted, were distributed, about the year 1880, to Case School of Applied Science and to Western Reserve University. In 1934 those at the former school were transferred to the Cleveland Museum of Natural History, the legal and financial heir of the Kirtland Society, which at an earlier date had absorbed the physical assets of the Cleveland Academy of Sciences. The specimens had suffered from neglect for many years at Case School, and were very dirty. The labels were, when provided, glued to the bottoms of the stands. One of these specimens was a *Bassariscus* and was labelled "Boston Ledges, O. 1871." The Boston Ledges are a rugged area of sandstone cliffs and ledges some 20 miles south of Cleveland. This is apparently the last specimen referred to in the citation given above.

This specimen was to have been cleaned and turned into a study skin, and the skull, contained in the mount, recovered. However, a number of the animals had fallen off their stands, and it was decided that these should be attended to first. While this was being done, an over zealous new employee of the Cleveland Museum's Building Department, discovering the dirty old mounts in the store-room in a separate building where they were being kept, burned the entire remaining lot. Gone in the holocaust were the *Bassariscus* in question; another *Bassariscus*, unlabeled, but probably the one that precipitated the account in the Proceedings of the Cleveland Academy of Science cited above; a wolf shot in 1810 on the present site of the Cleveland Museum of Natural History; a wolf from near the city of Quebec (topotypical of *Canis lupus lycaon* Schreber); a pine marten from Ohio; also other rarities and specimens of historical importance.

The writers feel that the evidence favors the probability that a form of *Bassariscus astutus* occurred very sparingly in Ohio until about 1875. It is possible that every one of the records resulted from the recapture of escaped captives, although it seems highly unlikely that 5 of these small carnivores should be trapped in the wild as a result of such escapes. At least 1 Ohio cacomistle record has definitely resulted from the capture of an escaped animal, as is shown by a statement made by Brayton[1]. Brayton's paper was written in 1882, however, and there is no means of determining whether or not he refers to 1 of the specimens mentioned in the Proceedings of the Cleveland Academy of Science, as he does not refer to that journal in this connection, and repeatedly gives evidence of his unfamiliarity with its contents.

Ohio specimens examined.—

SUMMIT COUNTY.—Boston Ledges, 1.
OHIO.—(No further locality), 1.

Martes americana americana (Turton)

EASTERN MARTEN

[*Mustela*] *americanus* TURTON; Linnaeus, System of Nature, Vol. I, 1806, p. 60.

Type Locality.—Eastern North America.

Two specimens of pine marten, both taken in Ashtabula County, Ohio, were included in the collections of the Cleveland Museum's antecedent organizations. One of these specimens was destroyed in the manner alluded to in the foregoing account; the other, however, had fallen off its stand and hence was saved from the catastrophe. This specimen is now in the museum's collection (No. 7507). It is typical of the pine marten of Eastern Canada. The species has been extinct in Ohio for approximately 100 years. It was never common. Kirtland, writing in November, 1838[2], says "the pine weasel is admitted on the authority of Dr. Ward, who informs me that he has taken it in the vicinity of Chillicothe".

Ohio specimens examined.—

ASHTABULA COUNTY.—(No further locality), 2.

[1]Rep. Geol. Surv. Ohio, Vol. IV, 1882, p. 43.
[2]Second Ann. Rep. Geol. Surv. Ohio, 1838, p. 176.

Martes pennanti pennanti (Erxleben)

EASTERN FISHER

[*Mustela*] *pennanti* ERXLEBEN, Syst. Regni Anim., Vol. I, 1777, p. 470.

Type Locality.—Eastern Canada.

Kirtland states[1] that 2 specimens of the fisher were taken in Ashtabula County in 1837. Two specimens also survived in the Kirtland Society and came to the Cleveland Museum of Natural History, where 1 was burned, and the other saved in the manner similar to the case outlined above. Unfortunately, the specimen saved had parted company with its data by the time it reached the Cleveland Museum, so that there is no means of ascertaining whether or not it is 1 of the specimens that Kirtland mentions. As Kirtland placed most of his specimens in the Cleveland Academy of Science's museum, its chances of being 1 of the last 2 fishers known to have been killed in Ohio are good.

Mustela cicognanii cicognanii Bonaparte

BONAPARTE WEASEL

M[*ustela*]. *cigognanii* [sic] BONAPARTE, Charlsworth's Mag. Nat. Hist., Vol. II, 1838, p. 37.

Type Locality.—Northeastern North America.

The Bonaparte weasel has been recorded in almost every list of Ohio mammals that appeared before 1900. As 'ermine' it was listed by Kirtland as "occasionally met with, but is mistaken for a *white weasel*". This state of confusion persisted for years. E. Raymond Hall went to some length to run down these records, and concluded, on the basis of existing specimens, that *Mustela c. cicognanii* should be stricken from the State list[2]. In November of 1937, however, George W. Jek, a young Cleveland taxidermist, collected a female at Pepper Pike, Cuyahoga County, Ohio. The specimen subsequently was given to the Cleveland Museum of Natural History. It is in winter pelage and is much smaller than any other female *M. c. cicognanii* that the writers have seen; it is no larger than a large male *Mustela rixosa*. The species must therefore be readmitted to the State list.

Ohio specimens examined.—

CUYAHOGA COUNTY.—Pepper Pike, 1.

[1]Second Ann. Rep. Geol. Surv. Ohio, 1838, p. 176.
[2]Amer. Midl. Nat., Vol. XVIII, March, 1937, p. 304.

Mustela rixosa allegheniensis (Rhoads)

ALLEGHENY LEAST WEASEL

Putorius allegheniensis RHOADS, Proc. Acad. Nat. Sci. Philadelphia, for 1900 (March, 1901), p. 751.

Type Locality.—Near Beallsville, Washington County, Pennsylvania.

The least weasel ranges over most if not all of Ohio. S. V. Wharram in his manuscript notes calls it rare in Ashtabula County. The series of specimens in the Cleveland Museum is rather uniform. In Ohio, this species regularly turns white in winter.

Ohio specimens examined.—

COLUMBIANA COUNTY.—Salem, 1.

CUYAHOGA COUNTY.—Chagrin Falls, 1; Cleveland Heights, 2; Lyndhurst, 1; North Olmsted, 1 (owl pellet record).

FRANKLIN COUNTY.—Columbus, 1.

HANCOCK COUNTY.—(No further locality known), 8.

LAKE COUNTY.—Holden Arboretum, 1; Kirtland Hills, 4.

PAULDING COUNTY.—Payne, 1.

PORTAGE COUNTY.—Aurora Pond, 1; Freedom Station, 5.

SENECA COUNTY.—Bettsville, 2.

SUMMIT COUNTY.—Akron, 1.

WOOD COUNTY.—Bowling Green, 1; Luckey, 1.

Mustela frenata noveboracensis (Emmons)

NEW YORK WEASEL

Putorius noveboracensis EMMONS, Report Quadrupeds Massachusetts, 1840, p. 45.

Type Locality.—Southern New York.

New York weasels from Ohio are identical with examples from various parts of New York State. The animal does not always turn white in winter in Ohio. Of 12 specimens taken between November 1 and April 1 in the Cleveland region, 5 are in the white pelage and 7 in the brown.

Ohio specimens examined.—

CUYAHOGA COUNTY.—Chagrin Falls, 1; Cleveland, 2; Newburgh, 1; North Chagrin Metropolitan Park, 2.

GEAUGA COUNTY.—Newbury, 1.

HURON COUNTY.—New London, 1.

LAKE COUNTY.—Kirtland, 2; Kirtland Hills, 2; Mentor, 1.

LORAIN COUNTY.—Elyria, 1.

PORTAGE COUNTY.—Freedom Station, 8.

SENECA COUNTY.—Bettsville, 1.

WAYNE COUNTY.—Wooster, 1.

Mustela vison mink Peale and Beauvois

COMMON MINK

Mustela mink PEALE AND BEAUVOIS, Cat. Peale's Mus., Philadelphia, 1796, p. 39.

Type Locality.—Maryland.

The writers have not yet had time critically to examine the minks in the Cleveland Museum collection. On geographical grounds, there is reason to suspect that the race occurring in western Ohio may be referable to *Mustela vison letifera* Hollister. The northeastern Ohio specimens listed below are all very dark, however, and are, on the basis of published descriptions, clearly referable to *Mustela vison mink.*

Ohio specimens examined.—

CUYAHOGA COUNTY.—Gates Mills, 1.
LAKE COUNTY.—Holden Arboretum, 1; Kirtland Hills, 3.
OHIO.—(No further locality,) 2.

Mustela putorius furo Linnaeus

FERRET

[*Mustela*] *furo* LINNAEUS, Syst. Nat., ed. 10, Vol. I, January 1, 1758, p. 46.

Type Locality.—"Africa".

Ferrets have escaped from captivity repeatedly since Ohio was settled, and the species has become established in southern Geauga County and the adjacent portions of Cuyahoga County. Reports of the animal's existence as a wild species are occasionally brought in from this section, and the Cleveland Museum of Natural History has 1 wild-caught specimen. Details concerning the capture of the other example are not known.

Ohio specimens examined.—

CUYAHOGA COUNTY.—North Randall, 1.
GEAUGA COUNTY.—Bainbridge Township, 1.

Mephitis mephitis nigra (Peale and Beauvois)

COMMON BLACK SKUNK

Viverra nigra PEALE AND BEAUVOIS, Cat. Peale's Mus., Philadelphia, 1796, p. 37.

Type Locality.—Maryland.

The writers have made no effort to examine the Cleveland Museum's Ohio skunks critically, and are following the taxonomic judgment of E. Raymond Hall, as expressed in Publication 473 of the Carnegie Institution of Washington, 1936, p. 65.

Ohio specimens examined.—

Cuyahoga County.—Brook Park, 1; Cleveland, 2; Gates Mills, 1.
Erie County.—Kimball, 1.
Geauga County.—Stebbens Gulch, 1; Thompson Township, 1.
Lake County.—Holden Arboretum, 1; Mentor, 2; Willoughby, 1.
Lorain County.—Oberlin, 1.
Summit County.—Hudson, 8.

Taxidea taxus taxus (Schreber)

Common Badger

Ursus taxus Schreber, Säugthiere, Vol. III, 1778, p. 520.

Type Locality.—Labrador and Hudson Bay. It is very likely that Schreber's material came from the interior of Manitoba or Saskatchewan, rather than from Hudson Bay.

The Cleveland Museum of Natural History has a single specimen of badger from Ohio, which was supplied by E. L. Moseley of Bowling Green State College, who is the authority on the distribution of the badger in Ohio. The species was unknown to the earliest writers; Kirtland does not mention it, and Brayton believed the animal to have become extinct recently. There can be little doubt, however, that the species is, at the present time, actually increasing rather than disappearing. It is not uncommon locally in the northwestern part of the State[1].

The Cleveland Museum of Natural History has also skeletal fragments recovered from Indian village sites. Two such specimens were collected at Independence, Cuyahoga County, which are the easternmost records for the State.

Ohio specimens examined.—

Cuyahoga County.—Independence, 2 (skeletal fragments recovered from Indian village site).
Henry County.—Liberty Township, 1.

[The Cleveland Museum of Natural History has no Ohio specimens of either the wolverine, *Gulo luscus* (Linnaeus), or of the otter, *Lutra canadensis canadensis* (Schreber). Both

[1]Moseley, Journ. Mamm., Vol. XV, No. 2, May, 1934, pp. 156-158.

species formerly occupied most of the State, and the otter is still of rare occurrence in northeastern Ohio. An unlabeled wolverine in the Kirtland Society collection, burned, may have been from this State.]

Vulpes fulva fulva (Desmarest)

COMMON RED FOX

Canis fulvus DESMAREST, Mammalogie, Vol. I, 1820, p. 203.

Type Locality.—Virginia.

The career of the red fox has been a checkered one in Ohio. Kirtland says: "the red fox was unknown in this region of the country until the introduction of the white population, and is supposed by many not to have been originally a native of America. It has now become a common and troublesome inhabitant."[1] However, he goes on to state that the "cross fox was formerly killed on the Connecticut Western Reserve . . .". The species has continued in fluctuating numbers ever since Kirtland's time, but in recent years has become markedly rarer, particularly in the eastern part of the State, and is missing entirely from certain sections. Its numbers have been artificially bolstered in the Cleveland region through wholesale introductions by various hunt clubs. As the bulk of these animals were obtained from the middle Atlantic seaboard, particularly Virginia, there can be no doubt about the identification of the current northeastern Ohio red fox.

Ohio specimens examined.—
CUYAHOGA COUNTY.—Chagrin Falls, 1; Gates Mills, 2.
GEAUGA COUNTY.—South Newberry, 1.
LAKE COUNTY.—Kirtland, 1.
MEDINA COUNTY.—Hinckley, 1.
OHIO.—(No further locality), 1.

Urocyon cinereoargenteus cinereoargenteus (Schreber)

SOUTHERN GRAY FOX

Canis cinereo argenteus SCHREBER, Säugthiere, 1775, pl. XCII.

Type Locality.—Eastern North America.

The gray fox was, according to all the early writers, originally the only common fox in Ohio. It apparently had completely dis-

[1]Second Ann. Rep. Geol. Surv. Ohio, 1838, p. 176.

appeared from all except the wildest southeastern counties by 1850, and was very rare even there. Within the past quarter century, however, the species has made a most remarkable recovery, and is once again the common fox of the forested portions of the Allegheny plateau in eastern Ohio. It has made its reappearance in the Cleveland region only within the last 10 years.

The specimens listed below are identical with examples from North Carolina, West Virginia, and Connecticut.

Ohio specimens examined.—

GEAUGA COUNTY.—Chardon Township, 2; Little Mountain, 2.

Canis lupus nubilus Say

MIDDLE WESTERN TIMBER WOLF

Canis nubilus SAY, Long's Exped. Rocky Mts., Vol. I, 1823, p. 169.

Type Locality.—Engineer Cantonment, near Blair, Washington County, Nebraska.

The wolf of Ohio is herein assigned to *Canis lupus nubilus* on the basis of the specimens mentioned above under the account of the burning of certain specimens from the Kirtland Society of Natural Sciences. The Cleveland specimen was a gray wolf, answering the description of *C. l. nubilus;* while the Quebec specimen[1] was much more reddish. Unfortunately, the specimens were destroyed before the skulls could be recovered and carefully examined.

Wolves were extirpated in Ohio during Kirtland's time; he, writing in 1838[2] said "the wolf is becoming very rare. A black species is said to have been a native of our state". The Cleveland Museum of Natural History has skeletal material recovered from bogs and Indian village sites.

Ohio specimens examined (destroyed).—

CUYAHOGA COUNTY.—Cleveland, 1.

[Of the coyote (*Canis latrans latrans* Say), which is currently invading Ohio from Indiana, the Cleveland Museum of Natural History as yet has no specimens from Ohio.]

[1] A topotype; see Goldman, Journ. Mamm., Vol. XVIII, No. 1, February 14, 1937, pp. 37-45.

[2] Second Ann. Rep. Geol. Surv. Ohio, 1838, p. 176.

Felis catus Linnaeus

House Cat

[*Felis*] *catus* Linnaeus, Syst. Nat., ed. 10, Vol. I, January 1, 1758, p. 42.

Type Locality.—Upsala, Sweden.

The familiar house cat is a feral animal in many parts of Ohio. The Cleveland Museum of Natural History has not taken pains to obtain series, but considerable skeletal material has found its way into the collection during the absorption of older collections.

Feral cats are commonly of two color types, either the familiar 'tiger' coloration or a dark, smoke gray phase. As a feral animal the house cat is confined largely to cities, but occurs in many rural districts as well.

[The Cleveland Museum of Natural History has no Ohio specimens whatever of the three native cats that formerly occupied the State—the Canada lynx (*Lynx canadensis canadensis* Kerr); the bobcat (*Lynx rufus rufus* [Schreber]); and the mountain lion or cougar (*Felis couguar* Kerr). There is reason to believe that a specimen of *Lynx canadensis*, without data, in the Cleveland Museum of Natural History (Kirtland Society collection) cannot possibly have come from Ohio.]

Marmota monax rufescens Howell

Rufescent Woodchuck

Marmota monax rufescens Howell, Proc. Biol. Soc. Washington, Vol. XXVII, February 2, 1914, p. 13.

Type Locality.—Elk River, Sherburne County, Minnesota.

The late Arthur H. Howell, author of the most recent revision of the American marmots[1], had for examination but 1 Ohio specimen, which came from Hicksville, near Toledo. This is a peculiar faunal area, its mammals generally differing considerably from those found elsewhere in the State. On the basis of what has already been discovered concerning the relationships of other Ohio species, it is logical to suppose that the woodchucks of Ohio would be far more closely related to more northern and western representatives of the species than to a form described from the

[1]North Amer. Fauna, No. 37, April 7, 1915, pp. 1-80; pls. I-XV.

middle Atlantic seaboard. Unfortunately the Cleveland Museum of Natural History has not yet obtained topotypical material of any race of *Marmota monax*, and in consequence the authors cannot effectively dispute Howell's assignment[1] of the western Ohio animal to *M. monax monax*. The authors are also hampered by the fact that all but 2 of the Cleveland Museum of Natural History's Ohio woodchucks were taken in the immediate vicinity of Cleveland.

Howell assigned the woodchucks of New York State to *M. m. rufescens*. Assuming that he was correct in so doing, the authors are compelled to add this form to the Ohio list, since a specimen from Orleans County, New York, is entirely indistinguishable from the northeastern Ohio series.

A specimen from Bettsville, Seneca County, is very peculiar and not strictly referable to any of the neighboring races of *Marmota monax*.

Specimens examined.—

Marmota monax rufescens

New York.—Orleans Co. (no further locality), 1.

Ohio.—Pymatuning Swamp, Ashtabula Co., 1; Chagrin Falls, Cuyahoga Co., 1; Cleveland, Cuyahoga Co., 2; North Chagrin Metropolitan Park, Cuyahoga Co., 1; Chardon Township, Geauga Co., 1; Thompson Township, Geauga Co., 1; Kirtland Hills, Lake Co., 4; Mentor, Lake Co., 1; Geauga Lake, Portage Co., 5; Mesopotamia Township, Trumbull Co., 1.

Marmota monax canadensis

Michigan.—Golden Lake, Iron Co., 1.

Marmota monax preblorum

Massachusetts.—Berkley, Bristol Co., 1; Taunton, Bristol Co., 2; Essex, Essex Co., 7; Plymouth, Plymouth Co., 1.

Marmota monax monax (Linnaeus)

Southern Woodchuck

[*Mus*] *monax* Linnaeus, Syst. Nat., ed. 10, Vol. I, January 1, 1758, p. 60.

Type Locality.—Maryland.

A single juvenile from Clermont County, Ohio, must be referred to this subspecies, on the basis of available descriptions

[1]Loc. cit.

and comparison with juveniles of the same age from the northeastern part of the State.

Specimens examined.—

Arkansas.—Winslow, Washington Co., 1.
Ohio.—Union Township, Clermont Co., 1.

Citellus tridecem-lineatus tridecem-lineatus (Mitchill)

Eastern Striped Ground Squirrel

Sciurus tridecem-lineatus Mitchill, Med. Repos., n. s., Vol. VI (XXI), 1821, p. 248.

Type Locality.—Central Minnesota[1].

The thirteen-lined ground squirrel is very local in its Ohio distribution, but it has been reported from the Indiana boundary eastward to Sandusky and Morrow counties[2]. It is also known as far east as Muskingum and Fairfield counties[3]. Ohio-caught specimens are considerably larger than the average for the subspecies *C. t. tridecem-lineatus*, but otherwise do not differ. This might be considered of sufficient importance to warrant their being described as a new race. The hiatus in the range as given by Howell in his "Revision of the North American Ground Squirrels"[4] does not exist[5].

Ohio specimens examined.—

Ross County.—Bainbridge, 15; Mound City, 4.

Tamias striatus rufescens, subsp. nov.

Ohio Red Chipmunk

Type.—Young adult female, No. 9077, Cleveland Museum of Natural History; August 14, 1935; Philip N. Moulthrop.

Type Locality.—Chesterland Caves, Chester Township, Geauga County, Ohio.

Range.—The Allegheny plateau of northeastern Ohio at least as far south as Columbiana County, also east to Crawford County, Pennsylvania.

---

[1]See Allen, Bull. Amer. Mus. Nat. Hist., Vol. VII, November 8, 1895, p. 338.
[2]See Enders, Occ. Papers Univ. Mich. Mus. Zool., No. 212, April 23, 1930, p. 12; also Preble, Journ. Mamm., Vol. XXIII, No. 1, February 14, 1942, p. 84.
[3]See Goslin, Journ. Mamm., Vol. XIV, No. 4, November 13, 1933, p. 369.
[4]North Amer. Fauna, No. 56, April [May 18], 1938, p. 108.
[5]See also Lyon, Amer. Midl. Nat., Vol. XVII, No. 1, February 27, 1936, p. 182.

Diagnosis.—A very short-tailed chipmunk of brilliant reddish coloration in summer pelage; similar to *Tamias striatus lysteri*, but darker and much more reddish both above and below.

Color.—Fresh summer pelage (August) (the type).—General coloration very reddish compared to comparable pelages of other races of *Tamias*. Rump reddish tawny, shading into the bright ochraceous buff (near ochraceous orange) of the flanks; feet near apricot buff; thighs like rump, verging toward color of flanks; light stripes of face bright ochraceous buff; dark stripes of face indistinct, near hazel, but heavily suffused with tawny; median dorsal stripe black-centered posteriorly for about two thirds of its length, rich reddish tawny at its anterior end and connecting with the tawny crown; black portion of stripe bordered throughout its length on both sides with narrow tawny bands that connect with the tawny rump; nose paler than crown, ochraceous buff suffused with black; ears tawny, fading to ochraceous orange at their anterior bases; lateral light stripes pale buff, suffused with tawny; lateral dark stripes black, the lower stripes shorter than the upper and heavily suffused with tawny and bright ochraceous buff hair at the ends; dorsal gray bands and shoulders suffused with buff; tail black above, each hair buff-tipped; tail ochraceous tawny below, bordered with buff-tipped black hairs; under parts clear white, the hairs white to their roots along the mid-line, elsewhere plumbeous basally. *Fresh winter pelage* (mid-October, No. 2591, C. M. N. H.). Much more grayish than the summer pelage, the reddish areas of the head and rump much restricted and suffused with blackish hairs, and the reddish areas brownish rather than tawny; tail with white-tipped hairs and light colored dorsal stripes nearer clear white, black stripes less invaded by buffy and tawny hairs.

Skull (type).—Short and broad for a chipmunk of the genus *Tamias*, with a shortened rostrum; molar teeth large; incisors narrow; brain case large.

Measurements.—Type: length, 230 mm.; tail, 72; hind foot, 33; greatest length of skull, 39.5; zygomatic breadth, 21.9; cranial breadth, 17.2; interorbital breadth, 10.8; postorbital breadth, 11.7; length of nasals, 13.5 *Ten specimens from near the type locality:* weight, average, 97.5 grams.

Remarks.—The writers have been unable to follow the late Arthur H. Howell's viewpoints with regard to the chipmunks of the genus *Tamias*[1]. As in the case of several other species of small mammals, the type localities of the 5 races heretofore recognized are peripherally situated within the range of the species. Howell attempted to assign the chipmunks of the southern Great Lakes region to several of these races, finally concluding that they belonged to the race *Tamias striatus fisheri* Howell which is topotypical at Ossining, Westchester County, New York. The only specimens that he had at hand from northeastern Ohio were series from Garrettsville and Ravenna in Portage County, both well within the region wherein typical *Tamias striatus rufescens* occurs.

A word on the subject of chipmunk molting is definitely in order here. Howell[2] says: "Apparently there is but one annual molt, which occurs usually in June or July. Very few molting specimens have been found in the material examined, but these indicate that the new hair appears in irregular patches over the whole dorsal surface . . .". Close critical study of the chipmunks in the Cleveland Museum of Natural History's collections, which were not available to Howell, indicates that there are dozens of specimens that show molting, and that there are 2 molts as well as 2 very different and very well-marked pelages—summer, and fresh winter. In *T. s. rufescens* the summer pelage is acquired during the latter part of June and the first weeks of July, as Howell indicates. Full summer pelage is confined to August and September. In the latter month the fall molt begins, first on the head, which changes from tawny to a buffy hazel color. By mid-October the fresh winter pelage is acquired, with the clear gray dorsal stripes and the loss of the brilliant rufescent coloration of the face, rump, ears, and flanks. The light stripes, buff in summer, become white. By late spring, when the winter pelage becomes faded and worn, a pelage is sometimes found which is astonishingly similar to the fresh summer pelage of *Tamias striatus griseus*. As the reddish summer fur is acquired, and again when it is lost, changes occur which make comparison with other races very difficult unless specimens of exactly comparable pelage are at

[1]North Amer. Fauna, No. 52, November, 1929, pp. 11-23.
[2]Loc. cit., p. 13.

hand. Howell apparently failed to recognize that the summer molt in topotypical *Tamias striatus lysteri* occurs in August, not June or July, and that it is of very short duration. He says[1] that the winter pelage of *T. s. lysteri* is not very different from the summer pelage, but the senior author, having seen the July-caught Ontario specimens in the Museum of Comparative Zoölogy that Howell uses to describe the summer pelage of that form, believes that these specimens are actually in worn winter pelage! By *Tamias striatus lysteri* the writers mean chipmunks of the genus *Tamias* from the type region around Georgian Bay only.

The race *T. s. rufescens* passes through a pelage in October which closely resembles *Tamias striatus fisheri* in fresh summer pelage, but even then is more reddish. At all seasons, the white stripes of *rufescens* are shorter than in *fisheri;* in the latter form they extend almost to the base of the tail. The median dorsal black stripe, which is black in *fisheri* for its entire length, is generally red for the anterior third of its length in *rufescens.* The rich reddish tones of *rufescens* in fresh summer pelage are unmatched in any other race, and set this subspecies apart as the most distinctive of all chipmunks, and certainly the most beautiful. It is much shorter-tailed than *fisheri,* the difference averaging 10 millimeters. It is also stouter skulled and smaller footed, but weighs more.

Compared to *T. s. lysteri, T. s. rufescens* is much darker and more reddish in all summer pelages; much darker and more grayish in winter pelages; also decidedly shorter tailed, the difference averaging 25 millimeters.

Comparable pelages of the other races are so different that close comparison is scarcely necessary. In worn winter pelages, *T. s. rufescens* bears a superficial resemblance to summer *T. s. griseus,* and some specimens may approach *T. s. venustus.* In no pelage does *rufescens* approach typical *Tamias s. striatus* or *Tamias striatus ohionensis,* which is diagnosed herein as new.

For the purpose of the description of this and the following race of chipmunks, the writers have used the Cleveland Museum of Natural History's topotypical series of *Tamias striatus lysteri* and *T. s. fisheri;* series from within a few miles of the type localities of *Tamias striatus striatus* and *T. s. venustus;* and a small series of

[1]Loc. cit., p. 18.

Tamias striatus griseus from southwestern Wisconsin. All these except the examples of *T. s. striatus* are in fresh summer pelage.

Specimens examined.—

Tamias striatus rufescens

New York.—Elba, Genesee Co., 1.

Ohio.—Mechanicsville, Ashtabula Co., 7; Lisbon, Columbiana Co., 1; Bratenahl, Cuyahoga Co., 3 (not typical); Brecksville Metropolitan Park, Cuyahoga Co., 2; Chagrin Falls, Cuyahoga Co., 2; Cleveland, Cuyahoga Co., 1; Cleveland Heights, Cuyahoga Co., 1; Gates Mills, Cuyahoga Co., 8; Lakewood, Cuyahoga Co., 3; North Chagrin Metropolitan Park, Cuyahoga Co., 20; North Olmsted, Cuyahoga Co., 4; Rocky River Metropolitan Park, Cuyahoga Co., 4 (not typical); South Euclid, Cuyahoga Co., 1; Auburn Corners, Geauga Co., 2; Burton Bog, Geauga Co., 7; Chesterland Caves, Geauga Co., 14 (including type); Little Mountain, Geauga Co., 95; Middlefield Township, Geauga Co., 4; Parkman Township, Geauga Co., 4; Shady Lake, Geauga Co., 1; Thompson Township, Geauga Co., 9; Welshfield, Geauga Co., 1; Holden Arboretum, Lake Co., 9; Kirtland Hills, Lake Co., 6; Leroy Township, Lake Co., 1; Mentor, Lake Co., 3; Pleasant Valley, Lake Co., 1; Mentor Marsh, Lake Co., 1; Wickliffe, Lake Co., 1; Willoughby, Lake Co., 2; Aurora Pond, Portage Co., 7; Geauga Lake, Portage Co., 8; Everett, Summit Co., 2; Twinsburg, Summit Co., 1.

Pennsylvania.—Pymatuning Lake, Crawford Co., 3.

Tamias striatus lysteri

New Brunswick.—Scotch Lake, York Co., 1.

Ontario.—South shore of Lake Nipissing, Parry Sound Co., 1; Haliburton, Peterborough Co., 2; Penetanguishene, Simcoe Co., 11 (topotypes); Mount Forest, Wellington Co., 5 (Mus. Comp. Zoöl.); Lansing, York Co., 1; Pottageville, York Co., 8.

Quebec.—Bark Lake, Pontiac Co., 2 (not typical).

Massachusetts.—Essex, Essex Co., 1; Carlisle, Middlesex Co., 1; Taunton, Plymouth Co., 1; Wareham, Plymouth Co., 1.

New Hampshire.—Jackson, Carroll Co., 6; Jaffrey, Cheshire Co., 1.

New York.—Lake Placid, Essex Co., 1; St. Huberts, Essex Co., 2.

Tamias striatus fisheri

New York.—Cohoes, Albany Co., 1; Ossining, Westchester Co., 10 (topotypes).

Tamias striatus griseus

Wisconsin.—Wausau, Marathon Co., 4.

Tamias striatus striatus

Indiana.—New Harmony, Posey Co., 1.

North Carolina.—Heywood Co. (no further locality), 3; Marshall, Madison Co., 14.

Tamias striatus venustus

Arkansas.—Winslow, Washington Co., 2.

Tamias striatus ohionensis, subsp. nov.

OHIO BROWN CHIPMUNK

Type.—Adult male, skin and skull, No. 16189, Cleveland Museum of Natural History; July 4, 1940; Woodrow Goodpaster.

Type Locality.—Cincinnati, Hamilton County, Ohio.

Range.—From northwestern and central Indiana to northeastern Kentucky and middle Ohio, east in the last mentioned State at least as far as Adams, Hocking, and Senaca counties.

Diagnosis.—A very dark, dull colored chipmunk with dark under parts, the darkest and dullest of the chipmunks of the genus *Tamias.*

Color.—Fresh summer pelage (the type). Rump between verona brown and dark chestnut brown, fading to hazel; sides of throat bright ochraceous buff; flanks dull buff; feet near clay color; pale dorsal stripes light ochraceous buff; median dorsal stripe black for three quarters of its length, terminating anteriorly in dark brown, which is faintly continuous with the hazel of the crown; shoulders and dorsal bands dark gray, heavily sprinkled with black hairs and faintly suffused with straw color; tail dull black above, with scattered buff-tipped hairs; tail ochraceous tawny below, bordered with blackish hairs thinly tipped with pale buff; under surface white, the hairs plumbeous at their bases all across the abdomen. *Winter pelage* (early April; No. 8809, C. M. N. H.). Very similar, but duller throughout, with the outer dorsal stripes heavily suffused with brown.

Skull (type).—Without distinctive features other than the very narrow incisors; slenderer than that of *T. s. rufescens* and with proportionally greater interorbital breadth; molar dentition rather robust; zygomata spreading less widely than in *T. s. rufescens* or *T. s. fisheri*; rostrum narrower than in *fisheri;* nasals shorter than in *fisheri,* terminating in front of the posterior premaxillary borders, instead of behind these borders as in *fisheri.*

Measurements.—Type: length, 247 mm.; tail, 92; hind foot, 34; greatest length of skull, 40.3; zygomatic breadth, 21.2; cranial breadth, 16.5; interorbital breadth, 10.6; postorbital breadth, 11.9; length of nasals, 13.6. Weights are not available for this form.

Remarks.—The chipmunks of western, southern, and central Ohio and of northern Indiana and southwestern Michigan caused

Arthur H. Howell a great deal of trouble. In his revision of the genus *Tamias*[1] he assigns certain chipmunks from the State of Indiana to *Tamias striatus striatus*, but the ranges of the various races as shown on the map on page 15 do not agree with statements made in the text. On the map, Indiana specimens are assigned to *Tamias striatus griseus*. Later, Howell apologizes for this state of confusion[2] and assigns all the chipmunks of this controversial area to *T. s. fisheri*. He also records *Tamias s. lysteri* from Hicksville, Ohio, near Toledo, a region from which the writers have seen no specimens. Since Howell failed to notice the differences between *Tamias s. rufescens* and true *T. s. fisheri*, there is small wonder that he eventually assigned the western Ohio animal to the latter race, which it certainly very closely resembles superficially. The taxonomy of the genus is simplified, however, by the recognition of the distinctive features of *Tamias striatus ohionensis*, since a very difficult geographical problem is thus avoided.

While *Tamias striatus ohionensis* is the darkest and dullest of the chipmunks of the genus *Tamias*, it resembles typical *T. s. striatus* in the degree of its darkness, but it is much less richly colored in all pelages. Compared to *T. s. striatus*, it would seem to be intergrading towards *T. s. griseus*, which doubtless caused some of Howell's difficulties. But it is so very much darker than *griseus* that close comparison on other points is scarcely necessary. Surprisingly, it is utterly unlike *T. s. rufescens* cranially as well as in color, and requires close comparison with only *T. s. fisheri*. Compared to this race it is darker and much duller; its whitish stripes are more buffy; the tail is much darker above as well as below; and the hairs of the tail are buff tipped rather than white tipped. The median dorsal stripe of *T. s. ohionensis* terminates anteriorly in dark brown, rather than in black as in *fisheri*.

Despite its resemblance to *fisheri*, *T. s. ohionensis* intergrades with *rufescens* through central northern Ohio, the area of intergradation beginning near Bettsville, Seneca County, and being nearly complete at the Cuyahoga River (Cleveland). Two specimens from Paulding County are typical *ohionensis*, as are all of the northern and central Indiana specimens that the senior writer has seen in the U. S. Biological Surveys collection. An example from

[1]North Amer. Fauna, No. 52, November, 1929, pp. 11-23.
[2]Journ. Mamm., Vol. XIII, No. 2, May 11, 1932, p. 166.

New Harmony, Posey County, however, is typical of *Tamias s. striatus* in everything except the color of the under side of the tail, which is near that of *ohionesnis*. An individual from southern Adams County, Ohio, is also very close to *striatus*, but 2 from Bath County, Kentucky, are typical *T. s. ohionensis*. Howell assigned all his Kentucky specimens to *T. s. striatus* except 1 from the northeastern part of the State, which he called *fisheri*.

Specimens from the intergradation area between *ohionensis* and *rufescens* are very close to topotypical *fisheri* when the last mentioned is in fresh summer pelage; but the inclusion of *fisheri* in Ohio's list is unjustifiable on the basis of this alone, particularly since the skulls of these specimens show the characters of *rufescens*.

Specimens examined.—

INDIANA.—Miami Co., 2 (Mus. Comp. Zoöl.); Mount Ayr, Newton Co., 1 (U. S. Biological Surveys coll.); Hebron, Porter Co., 1 (U. S. Biological Surveys coll.).

KENTUCKY.—Bath Co., 2 (Cinc. Soc. Nat. Hist.).

OHIO.—Smoky Creek, Green Township, Adams Co., 2; Spring Grove Cemetery, Cincinnati, Hamilton Co., 14 (including the type); 7 miles east of Logan, Hocking Co., 1; Payne, Paulding Co., 2; Bettsville, Seneca Co., 4; Maple Grove, Seneca Co., 1; Wolf Creek, Seneca Co., 3.

Sciurus hudsonicus loquax Bangs

MIDDLE EASTERN RED SQUIRREL

Sciurus hudsonicus loquax BANGS, Proc. Biol. Soc. Washington, Vol. X, December 28, 1896, p. 161.

Type Locality.—Liberty Hill, New London County, Connecticut.

Comparison of Ohio red squirrels with topotypes of *Sciurus hudsonicus loquax* from Connecticut fails to reveal any trenchant differences. In comparable pelage (August) the Ohio animal seems to have a longer lateral black stripe, but even this character is not definitive. Furthermore, there is no difference in size. Specimens from northwestern Ohio seem somewhat darker in summer pelage than specimens from the northeastern part of the State, but there is little or no distinction in the winter pelages.

Red squirrels are still *Sciurus* to the writers, who do not believe that the possession of abnormally large Cowper's glands and lack of baculum constitute sufficient basis for the elevation of the

subgenus *Tamiasciurus* Trouessart to generic rank, particularly when the baculum is occasionally missing in individuals of other sciurine subgenera, notably in examples of the Central American species *Sciurus variegatoides.*

Ohio specimens examined.—

Ashtabula County.—Mechanicsville, 4.

Cuyahoga County.—Brecksville, 1; Chagrin Falls, 3; Cleveland, 1; Cleveland Heights, 1; Gates Mills, 20; Lakewood, 1; Lyndhurst, 1; North Chagrin Metropolitan Park, 5; North Olmsted, 4; Olmsted Falls, 1; Rocky River Metropolitan Park, 4; South Euclid, 3; Wickliffe, 2.

Geauga County.—Bradley Pond, 1; Chesterland, 7; Claridon, 1; Great South Bog, 2; Leroy, 1; Little Mountain, 14.

Hancock County.—Fostoria, 1.

Lake County.—Holden Arboretum, 4; Kirtland Hills, 15; Mentor, 1; Mentor Marsh, 1; Pleasant Valley, 1; Wickliffe, 1; Willoughby, 2.

Portage County.—Aurora Pond, 1; Freedom Station, 7.

Seneca County.—Bettsville, 3; Feaselburg, 1; Old Fort, 4; Pleasant Township, 1.

Summit County.—Everett, 1.

Sciurus carolinensis carolinensis Gmelin

Southern Gray Squirrel

[*Sciurus*] *carolinensis* Gmelin, Syst. Nat., Vol. I, Part 1, 1788, p. 148.

Type Locality.—"Carolina."

The Cleveland Museum of Natural History has extensive series of gray squirrels collected by Morton L. Church in Madison and Heywood counties, North Carolina, and 2 specimens from Beaufort County, South Carolina. All this material may be assumed to be topotypical. There is enough variation in it completely to engulf specimens from southern Ohio, particularly those specimens from the southern third of the State. Examples from Ross County show intergradation toward the subspecies *Sciurus carolinensis leucotis.*

Ohio specimens examined.—

Adams County.—Smoky Creek, 1.

Clermont County.—Union Township, 5.

Hamilton County.—(No further locality) 3.

Ross County.—Bainbridge, 3.

Sciurus carolinensis leucotis Gapper

NORTHERN GRAY SQUIRREL

Sciurus leucotis GAPPER, Zool. Journ. Vol. V, 1830, p. 206.

Type Locality.—Region between York (i. e., Toronto) and Lake Simcoe, Ontario.

The northern gray squirrel, in typical form, occupies the northern half of Ohio. Specimens in winter pelage from the Geauga plateau region are if anything more grayish than examples from New York and New England. Intergradation with *Sciurus c. carolinensis* takes place in a belt slightly south of the middle of the State.

Individuals in the black phase are frequently encountered in parts of Geauga County, especially where the species is not very common. Wherever the gray squirrel becomes very abundant the black color phase seems to disappear.

Ohio specimens examined.—

CUYAHOGA COUNTY.—North Chagrin Metropolitan Park, 2; Orange Township, 1.

GEAUGA COUNTY.—Little Mountain, 2; Middlefield, 1.

LAKE COUNTY.—Kirtland Hills, 6; Leroy, 1; Mentor, 1.

OTTAWA COUNTY.—Mud Creek, 1.

Sciurus niger rufiventer Geoffroy

MIDDLE WESTERN FOX SQUIRREL

Sciurus rufiventer GEOFFROY, Cat. Mamm. Mus. Nat. Hist. Nat. Paris, 1803, p. 176.

Type Locality.—Mississippi Valley, exact locality not known; according to Osgood[1] probably between southern Illinois and central Tennessee; but it appears to the writers that there are also excellent chances that the type specimen may have come from southern Ohio or southern Indiana.

Ohio fox squirrels are very uniformly colored, when seasonal pelage variations are taken into account. A slight darkening and graying of the pelage, noticeable in examples from the extreme southeastern portions of the State, may indicate a little approach to *Sciurus niger neglectus* which occupies most of West Virginia. The Ohio River may be taken as a convenient dividing line for

[1]Proc. Biol. Soc. Wash., Vol. XX, April 18, 1907, pp. 45-46.

the 2 races. Ohio specimens are not certainly distinguishable from examples at hand from Lake County, Tennessee, Washington County, Arkansas, and McLean County, Illinois. A specimen from Albany County, New York, apparently a record of considerable local interest, is likewise indistinguishable.

Ohio specimens examined.—

Adams County.—Smoky Creek, 2.

Cuyahoga County.—Chagrin Falls, 2; Cleveland, 5; Cleveland Heights, 7; Dover, 1; Gates Mills, 2; Lyndhurst, 2; North Chagrin Metropolitan Park, 1; North Olmsted, 1; South Euclid, 1; University Heights, 1.

Fairfield County.—Bern Township, 6.

Geauga County.—Chardon, 1; Montville, 1.

Lake County.—Kirtland Hills, 3; Mentor, 7; Pleasant Valley, 1; Wickliffe, 1; Willoughby, 1.

Lorain County.—Lorain, 1.

Ottawa County.—Mud Creek, 1.

Portage County.—Aurora Pond, 1; Earlville, 1.

Ross County.—Bainbridge, 1.

Sandusky County.—Fremont, 1.

Seneca County.—Pleasant Township, 1.

Glaucomys volans volans (Linnaeus)

Common Flying Squirrel

[*Mus*] *volans* Linnaeus, Syst. Nat., ed. 10, Vol. I, January 1, 1758, p. 63.

Type Locality.—Virginia.

The common flying squirrel assumes a dark pelage in May and June which can easily be misinterpreted by students unaware of the changes occurring in any single individual within a year's time. With these changes in mind, comparable pelages of Ohio flying squirrels and those from elsewhere in the northeastern and middle western United States fail to show any significant differences. The species is equally static with regard to cranial characters.

Ohio flying squirrel populations are highly cyclical[1]. During peak years, which occur at 3 or 4 year intervals, the species becomes very abundant. Dr. Jared P. Kirtland recorded the species in his first State list[2].

[1]See Bole, Scient. Publ. Cleve. Mus. Nat. Hist., Vol. V, No. 4, December 28, 1939, p. 67.
[2]Second Ann. Rep. Geol. Surv. Ohio, 1838, p. 160.

Ohio specimens examined.—

Ashtabula County.—Mechanicsville, 5.

Clermont County.—Union Township, 1.

Cuyahoga County.—Bratenahl, 1; Brecksville, 1; Cleveland, 2; Euclid, 3; Gates Mills, 5; Lakewood, 1; North Chagrin Metropolitan Park, 2; Rocky River Metropolitan Park, 1.

Geauga County.—Auburn Corners, 2; Chesterland, 4; Great South Bog, 1; East Claridon, 2; Little Mountain, 26; Middlefield Township, 1; Shady Lake, 4.

Guernsey County.—4 miles south of Londonderry, 2.

Lake County.—Holden Arboretum, 6; Mentor Marsh, 8; South Kirtland, 1.

Portage County.—Aurora Pond, 2; Freedom Station, 1.

Seneca County.—Bettsville, 1; Pleasant Township, 1.

Stark County.—Canton, 1.

Dipodomys ordii richardsoni (Allen)

Richardson Kangaroo Rat

Dipodops richardsoni Allen, Bull. Amer. Mus. Nat. Hist., Vol. III, Art. 20, June 30, 1891, p. 277.

Type Locality.—On one of the sources of the Beaver River, Beaver County, Oklahoma.

The Richardson kangaroo rat has been introduced and is established on the shores of Lake Erie near Fairport, Lake County, Ohio. In a sand dune region not exceeding a square mile in area, the species is very abundant despite the local presence of *Rattus norvegicus* in great numbers. The locality is one from which snowy owls (*Nyctea nyctea*) are frequently reported in the winter months, so a number of interesting ecological relationships will possibly be discovered.

Ohio specimens examined.—

Lake County.—Richmond Beach, 2.

Castor canadensis canadensis Kuhl

Eastern Canadian Beaver

Castor canadensis Kuhl, Beiträge Zoologie, 1820, p. 64.

Type Locality.—Hudson Bay.

Beavers, once very abundant in Ohio, were exterminated by 1830. Now, 100 years later, the species is again reappearing in

northeastern Ohio, particularly along the Chagrin River. There is evidence that some of the individuals have reached Ohio by way of the shore of Lake Erie; others were deliberate introductions or have escaped from confinement. The species is very abundantly represented in remains from Indian village sites all over the State, and the Cleveland Museum of Natural History has several records from such sources. The single specimen listed below was run over by an automobile in 1939.

Ohio specimens examined.—

CUYAHOGA COUNTY.—South Chagrin Metropolitan Park, 1.

Reithrodontomys humulis merriami Allen

MERRIAM HARVEST MOUSE

Reithrodontomys merriami ALLEN, Bull. Amer. Mus. Nat. Hist., Vol. VII, Art. 3, May 21, 1895, p. 119.

Type Locality.—Austin Bayou, near Alvin, Brazoria County, Texas.

This harvest mouse is, to judge from the records, the rarest of Ohio's murine rodents. There are but 2 specimens in the Cleveland Museum of Natural History, both from Smoky Creek near Rome, Adams County. The species has been taken also in Fairfield County by Robert Goslin of the Ohio State Museum. It seems unlikely, on geographical and ecological grounds, that Ohio specimens should be referred to *Reithrodontomys h. merriami*, but to that race they were tentatively assigned on examination by A. H. Howell. The species is currently under study at the University of Michigan by Dr. Emmet Hooper, where the specimens listed below are on loan at the present time of writing.

Ohio specimens examined.—

ADAMS COUNTY.—Smoky Creek, 4 (including 2 skulls from barn owl pellets).

Peromyscus leucopus noveboracensis (Fischer)

COMMON DEER MOUSE

[*Mus sylvaticus*] δ *noveboracensis* FISCHER, Synopsis Mammalium, 1829, p. 318.

Type Locality.—New York.

Specimens of the common deer mouse from Ohio are, in comparable pelage, quite indistinguishable from examples from all parts of New York State. Compared to examples from northern New England, however, these same Ohio specimens are noticeably shorter tailed, indicating approach on the part of the New England specimens toward *Peromyscus leucopus caudatus* Smith.

The Cleveland Museum of Natural History has no topotypes of *Peromyscus leucopus leucopus* (Rafinesque), but as southwestern Ohio specimens seem as close to typical *P. l. noveboracensis* as those from the opposite corner of the State, this is no handicap for the purposes of this report.

The race *Peromyscus leucopus noveboracensis*, as it appears in Ohio, is the shortest-tailed stock of the species. The difference is at best very slight, but is of interest because almost all species of small mammals from Ohio show this variation, while New England and Nova Scotia examples of the same species are very long-tailed. Some species exhibit a corresponding tendency toward short, broad feet also. The environmental causes of these differences are totally unknown, and might provide the subject of some intensely interesting dietary and physiological researches. The tendency of all subspecific variations in Ohio species of small mammals to follow the same general trends is very marked.

Ohio specimens examined.—

Adams County.—Smoky Creek, 19.

Ashtabula County.—Andover, 5; Farnham, 8; Geneva, 1; Jefferson, 1; Lake Cardinal, 1; Mechanicsville, 35; Padanaram, 12.

Belmont County.—Cat Run, 37.

Brown County.—Ripley, 5.

Butler County.—Middletown, 5; Reily, 6.

Clermont County.—Chilo, 3; Union Township, 6.

Columbiana County.—Lisbon, 16.

Cuyahoga County.—Bedford, 12; Brecksville Metropolitan Park, 2; Chagrin Falls, 12; Dover, 3; Euclid, 9; Gates Mills, 109; Lyndhurst, 10; North Chagrin Metropolitan Park, 163; North Olmsted, 5; Rocky River Metropolitan Park, 31; South Euclid, 5; University Heights, 5.

Fairfield County.—Hocking Township, 11; Lancaster, 4.

Franklin County.—Columbus, 2.

Geauga County.—Auburn Corners, 5; Burton Bog, 24; Carvers Pond, 10; Chesterland Caves, 95; Lake Punderson, 5; Little Mountain, 298; Middlefield Township, 5; Munson Township, 3; Parkman, 6; Shady Lake, 15; Stebbens Gulch, 8; Thompson Township, 23.

Hamilton County.—Cincinnati, 2.

Hancock County.—Fostoria, 9.

Lake County.—Holden Arboretum, 130; Indian Point, 5; Kirtland, 3; Kirtland Hills, 19; Madison Township, 6; Mentor, 15; Mentor Marsh, 45; Richmond Beach, 12; Wickliffe, 9.

Lawrence County.—Symmes Creek, 2.

Lucas County.—Little Cedar Point, 3.

Mercer County.—Celina, 3; Fort Recovery, 9.

Montgomery County.—Perry Township, 3.

Ottawa County.—Bay Point, 5.

Paulding County.—Payne, 6.

Portage County.—Aurora Pond, 73.

Ross County.—Spargursville, 1.

Sandusky County.—Ballville, 6; Burgoon, 22; Fremont, 2.

Seneca County.—Bettsville, 63; Cromers, 8; Feaselburg, 3; Liberty Township, 4; Lowell, 2; Maple Grove, 12; Old Fort, 8; Pleasant Township, 6.

Summit County.—Northfield, 1; Peninsula, 1.

Wood County.—Longley, 13.

Peromyscus maniculatus bairdii (Kennicott)

Prairie White-footed Mouse

Mus bairdii Kennicott (Hoy and Kennicott MS.), Agric. Report, U. S. Patent Office, for 1856 (1857), p. 92.

Type Locality.—Bloomington, McLean County, Illinois.

The Cleveland Museum of Natural History's collectors were unable to capture any prairie white-footed mice at the type locality, and the writers have not seen any topotypes. The species has an enormous seasonal range of color, details of which are now being worked out by the junior author. A large series is on hand from Blair, Washington County, Nebraska, and material from Ohio in comparable pelage (September) is only very slightly darker and slightly shorter tailed. As eastern Nebraska specimens would naturally be expected to be near *Peromyscus maniculatus nebrascensis* (Coues), the writers, in the light of their present knowledge, feel that the Ohio form cannot be assigned to any other race than *P. m. bairdii*. Specimens from Genesee County, New York, first reported by Moulthrop[1], are quite indistinguishable from those from Ohio.

Prairie white-footed mice are becoming more abundant in Ohio but are strongly cyclical in their populations. Their range is state wide today, but the species is rare in the unglaciated portions of the southeast.

[1]Journ. Mamm., Vol. XIX, No. 4, November 14, 1938, p. 503.

Ohio specimens examined.—

Ashtabula County.—Geneva, 3.

Cuyahoga County.—Bedford, 2; Euclid, 1; Lyndhurst, 20; North Chagrin Metropolitan Park, 1; Pepper Pike, 1; Richmond Heights, 2; South Euclid, 3.

Fairfield County.—Pleasant Township, 1.

Geauga County.—Auburn Corners, 2; Shady Lake, 2.

Hancock County.—Fostoria, 9.

Lake County.—Fairport, 1; Holden Arboretum, 11; Madison Township, 1; Mentor, 18; Mentor Headlands, 3; Richmond Beach, 50.

Lucas County.—Little Cedar Point, 4.

Montgomery County.—Perry Township, 4.

Ottawa County.—Bay Point, 1.

Paulding County.—Payne, 6.

Portage County.—Aurora Pond, 6.

Sandusky County.—Ballville Township, 1; Burgoon, 1.

Seneca County.—Bettsville, 16; Maple Grove, 4; Pleasant Township, 1.

Wood County.—Longley, 14.

Neotoma magister Baird

Allegheny Wood Rat

Neotoma magister Baird, Rep. Explor. and Surv. R. R. Pac., Vol. VIII, 1857, p. 498.

Type Locality.—Carlisle, Cumberland County, Pennsylvania, or Harrisburg, Dauphin County, Pennsylvania.

For the use of the name *Neotoma magister* in place of the commonly accepted *Neotoma pennsylvanica* Stone, the type locality of which is South Mountain, Cumberland County, Pennsylvania, the reader is referred to E. L. Poole's recent discussion[1].

The Allegheny wood rat was first reported for Ohio by Dr. Jared P. Kirtland[2] as "Arvicola floridiana [sic]; Neotoma floridiana (Say and Ord)." That Doctor Kirtland's report referred to the Allegheny wood rat, then unknown as a distinct species, and not to *Neotoma floridana floridana* (Ord) cannot be doubted in view of the subsequent trapping records. Consequently, Hine's statement that his capture of a specimen of *Neotoma pennsylvanica* at Neotoma, Hocking County, constituted the first Ohio state record for the species, must be qualified[3].

Comparison of Ohio specimens with examples from the type locality of *Neotoma pennsylvanica* Stone fails to reveal any tren-

[1]Journ. Mamm., Vol. XXI, No. 3, August 14, 1940, p. 316.
[2]Second Ann. Rep. Geol. Surv. Ohio, 1838, pp. 161 and 177.
[3]Proc. Ohio Acad. Sci., Vol. VIII, Part 6, 1929, pp. 267-268.

chant differences. The species is very local in its Ohio distribution, being confined largely to limestone and sandstone cliffs at various scattered points on the unglaciated Allegheny plateau from Adams County northeastward to Hocking, Fairfield, and Washington counties. Doctor Kirtland's records for Ashland County have not been subjected to verification by recent collectors.

Ohio specimens examined.—

Adams County.—Smoky Creek, 3; Stout, 1.
Hocking County.—Clear Creek, 1.

[The Cleveland Museum of Natural History has so far failed to secure Ohio examples of *Oryzomys palustris palustris* (Harlan), which was reported somewhat hesitatingly by Kirtland[1] as *Arvicola amphibius;* by Brayton[2] on the basis of a specimen recovered from the stomach of a red-tailed hawk; and by Hine[3] on the basis of numerous skulls obtained by W. C. Mills from the Baum Village site near Chillicothe. It would appear that the species is extinct in Ohio today.]

Synaptomys cooperi cooperi Baird

Cooper Lemming Mouse

Synaptomys cooperi, Baird, Rep. Explor. and Surv. R. R. Pac., Vol. VIII, 1857, p. 558.

Type Locality.—Heretofore unknown; hereby fixed at Jackson, Carroll County, New Hampshire.

Baird, the original describer of *Synaptomys,* makes the following statement[4] concerning the type specimen: "No locality was assigned, but the animal is undoubtedly North American, probably from the New England States, or New York; possibly from Iowa or Minnesota." Despite this, subsequent authors with the exception of A. B. Howell, have for the most part assumed that William Cooper, who sent the type to Baird, collected somewhere near his home in Hoboken, New Jersey. Concerning these facts, Howell says[5]: "He [Baird] must have had some reason for making such a statement . . .". The present writers fully concur, especially

[1]Second Ann. Rep. Geol. Surv. Ohio, 1838, p. 161.
[2]Rep. Geol. Surv. Ohio, Vol. IV, 1882, p. 141.
[3]Ohio Nat., Vol. VI, No. 8, June, 1906, p. 550; ibid., Vol. X, No. 4, February, 1910, p. 71.
[4]Loc. cit., p. 556.
[5]North Amer. Fauna, No. 50, June 30, 1927, p. 13.

since William Cooper was a great traveler and is known to have received specimens from various collectors in different parts of the country. The writers, therefore, hereby fix the type locality at Jackson, New Hampshire, because adequate material from western New York does not seem to be available in the various museums of the country; because fixing the type locality in New Hampshire does the least possible damage to the existing taxonomic structure of *Synaptomys cooperi;* and because fixation of the type in Iowa or Minnesota would completely nullify the said existing structure.

The senior author has examined a topotype of *Synaptomys cooperi stonei* Rhoads in the U. S. Biological Surveys collection, from Mays Landing, New Jersey, and has also seen specimens in the same collection from Hyattsville, Maryland. In addition, there are, in the Cleveland Museum of Natural History, specimens from Marshall, Madison County, North Carolina, collected by Morton L. Church. From what the senior author has seen, he is forced to disagree with Mr. Howell concerning the identity of the lemmings of Ohio. Howell assigned the species as it occurs in Ohio to the subspecies *Synaptomys cooperi stonei*, on the basis of 2 specimens from Ravenna, Portage County, in the American Museum of Natural History. The present authors have not seen these 2 specimens, but have seen others from Portage County, and such are quite indistinguishable from examples of *S. c. cooperi* from northern New York and New Hampshire in the Cleveland Museum of Natural History, as are most of the more than 70 specimens from Ohio in this institution which came largely from the Geauga plateau of northeastern Ohio.

As these Ohio specimens represent all times of the year, the series shows molting and thus clarifies the molt behavior of the species. Howell did not have a series demonstrating this, which he regrets[1]. Individuals of *Synaptomys cooperi* from northeastern Ohio are in fresh summer pelage by mid-August, but not earlier. The fall molt occurs in October, and the fresh winter pelage—long, soft, and very much paler and more grayish than that of summer—is complete by the first week in November. As wear progresses, the grayishness gradually disappears, due to the loss of the glossy dark hair tips, and the consequent exposure of the light

[1]Loc. cit., p. 7.

brownish sections of the dorsal hairs. This wear progresses still farther, and by late May or early June the race assumes a bright ochraceous tawny cast that is utterly unlike any other pelage, and, because of its variability, is useless for comparative purposes. By the end of June the molt has again begun, and July specimens are of dark and seedy appearance. By mid-August all individuals, old and young alike, are in the familiar dark brownish pelage of summer. Subadults have a different pelage sequence; and in fresh pelage (July) they may closely approximate the fresh winter pelage of the adults.

In comparable pelage, examples from most of Ohio are indistinguishable from those of New York and New England; but it must be remembered that the northeastern Ohio *Synaptomys*, like several other species of small mammals from the same region, molts later than does the same species from other parts of its range. There are slight cranial variations in series, far too slight, however, to be of any particular significance. These variations, in size and dental characters, are in the direction of more western races of the species and not toward *Synaptomys c. stonei*. Certain series from central southern Ohio seem to show slightly more spreading zygomata and slightly darker and wider incisors, which can be interpreted as intergradation toward either *S. c. stonei* or toward *Synaptomys cooperi saturatus* herein described as a new subspecies. They are far closer to typical *S. c. cooperi*, however, and for this reason are referred to that race in this report.

Specimens examined.—

Ontario.—Ste. Rose, Laval Co., 6 (U. S. Biological Surveys coll.).

Quebec.—Godbout, Saguenay Co., 1 (U. S. Biological Surveys coll.).

Ohio.—Smoky Creek, Adams Co., 2; Brecksville, Cuyahoga Co., 1; Greenfield Township, Fairfield Co., 12; Auburn Corners, Geauga Co., 1; Chesterland Caves, Geauga Co., 16; Little Mountain, Geauga Co., 6; Munson Township, Geauga Co., 2; Thompson Township, Geauga Co., 1; Holden Arboretum, Lake Co., 13; Kipton, Lorain Co., 1 (owl pellet skull); Kirtland Hills, Lake Co., 1; Adams Mills, Muskingum Co., 1 (Ohio State Museum); Burgoon, Sandusky Co., 2; Bettsville, Seneca Co., 1.

New Hampshire.—Jackson, Carroll Co., 1; Pittsburg, Coos Co., 1.

New York.—Giant Mountain, Essex Co., 1; Wanakena, St. Lawrence Co., 1 (U. S. Blological Surveys coll.).

Vermont.—Mt. Mansfield, Lamouille Co., 1 (U. S. Biological Surveys coll.).

Synaptomys cooperi stonei Rhoads

STONE LEMMING MOUSE

Synaptomys stonei RHOADS, Amer. Nat., Vol. XXVII, No. 1, January, 1893, p. 53.

Type Locality.—Mays Landing, Atlantic County, New Jersey.

Two specimens in the Cleveland Museum of Natural History's collection of *Synaptomys* are referable to this race. Both of these specimens come from central eastern Ohio, 1 from Belmont County and 1 from Lisbon, Columbiana County. The Belmont County example is practically indistinguishable from examples of *S. c. stonei* from the Atlantic coastal plain. The Columbiana County specimen is very reddish in fresh summer pelage, but this can be interpreted as an intergradation between true *S. c. stonei* and *Synaptomys c. cooperi* as found in northeastern Ohio. The skulls of both specimens are typical of *stonei* in every detail and are at a glance distinguishable from those of Ohio examples of *cooperi*.

Specimens examined.—

OHIO.—Cat Run, Belmont Co., 1; Lisbon, Columbiana Co., 1.

MARYLAND.—Hyattsville, Prince George Co., 7 (U. S. Biological Surveys coll.).

NEW JERSEY.—Mays Landing, Atlantic Co., 1 (topotype in U. S. Biological Surveys coll.).

NORTH CAROLINA.—Marshall, Madison Co., 4; Roan Mountain, Mitchell Co., 2 (not typical).

Synaptomys cooperi saturatus, subsp. nov.

ILLINOIS LEMMING MOUSE

Type.—Adult male, skin and skull, No. 13450, Cleveland Museum of Natural History; September 2, 1938; Winston C. Jesseman.

Type Locality.—Bloomington, McLean County, Illinois.

Range.—Illinois and Indiana, west into eastern Missouri, and east to extreme western Ohio.

Diagnosis.—Large, and very dark colored, with a very long, narrow skull; the darkest of the races of *Synaptomys cooperi*.

Color.—*Summer pelage* (the type). Upper parts near sayal brown, very heavily suffused with black, changing on the crown

and nose to grizzled hair brown and silvery gray; sides very slightly paler than the back; underfur of upper surface dark slate color; lower parts near gull gray, glossy, and with slate gray underfur showing through; a patch of whitish hairs, whitish to the roots, on the throat; cheeks like under surface; sides of face and ears like crown and nose; feet and tail drab above, the tail whitish below, and the heels of the hind feet with a tuft of blackish hairs.

Skull (of type).—Very long and slender, with lengthened narrow rostrum equipped with massive incisors nearly 2 mm. in width; incisors dark ochraceous orange in color; maxillary tooth row short, and the individual teeth very small for so long a skull. The skull is of the length of that of *Synaptomys cooperi gossii* (Coues) but is of the general proportions of that of *S. c. stonei.*

Measurements.—Type: length, 127 mm.; tail, 14; hind foot, 19; condylobasilar length of skull, 24.4; length of rostrum, 6.1; breadth of rostrum, 5.6; interorbital constriction, 3.5; zygomatic breadth, 16.2; lambdoidal width of cranium, 12.7; incisive foramina, 4.9.

Remarks.—This new race, *Synaptomys cooperi saturatus,* is intermediate in its cranial characters between *S. c. cooperi* and *S. c. gossii;* but as it is near *gossii* in length of skull while retaining the general breadth of measurements of *cooperi,* it has the outward appearance of *S. c. stonei,* from which, however, it differs sharply in many cranial details. These are precisely the cranial characters pointed out by Howell[1] for certain specimens from eastern Missouri and Illinois. As the range of *cooperi* lies between that of *stonei* and *saturatus* in Ohio, a fact that Howell could not have fully appreciated since he had for examination but 2 specimens from the State, it is not surprising that he assigned all his Indiana specimens to *stonei.* This is all the more plausible when it is appreciated that Howell wisely refrained from using color as a primary indication of subspecific affinities, since he had insufficient specimens from any one locality to demonstrate the sequence of molt.

In color *S. c. saturatus* is very much the darkest of the races of *Synaptomys cooperi* and is on this basis alone easily separable in all pelages. There is very little difference in the degree of dark-

[1]North Amer. Fauna, No. 50, June 30, 1927, p. 19.

ness between winter and summer pelages, but the winter is more grayish. The winter pelage is *much* darker than in typical *cooperi*, and in all pelages *saturatus* is darker than comparable *gossii*. Compared to *S. c. stonei* as considered in this report, the difference becomes extreme. Also, the tail of *saturatus* is very much abbreviated and its feet proportionately short as well as very broad, in these respects being extreme for the species. It thus follows the general pattern of subspecific variation already demonstrated in many other Ohio mammals. As an Ohio animal it can scarcely be said to occur in typical form, since the skulls and feet of the examples from this State are obviously smaller than those of specimens from farther west. The northwestern Ohio representatives are, however, very dark colored, the darkest of those examined. The specimens listed from the region around Cincinnati, Ohio, are somewhat atypical and represent intergradation between *S. c. cooperi* and *S. c. saturatus*. The specimens from Horseshoe Lake, Missouri, are paler than the type, but the Callaway County specimen is fully as dark as the type.

Specimens examined.—

Illinois.—Bloomington, McLean Co., 2 (including the type).

Indiana.—Brookville, Franklin Co., 6 (U. S. Biological Surveys coll.); Bicknell, Knox Co., 1 (U. S. Biological Surveys coll.); Bascom, Ohio Co., 8 (U. S. Biological Surveys coll.).

Missouri.—East Columbia, Callaway Co., 1 (U. S. Biological Surveys coll.); Horseshoe Lake (near St. Louis), 16 (U. S. Biological Surveys coll.).

Ohio.—Chilo, Clermont Co., 1; Evansport, Defiance Co., 1 (owl pellet skull); Hamilton Co. (no further locality), 2; Coldwater, Mercer Co., 1; Fort Recovery, Mercer Co., 1; Antwerp, Paulding Co., 6 (owl pellet skulls).

Clethrionomys gapperi paludicola Doutt

Pymatuning Red-backed Vole

Clethrionomys gapperi paludicola Doutt, Proc. Biol. Soc. Wash., Vol. LIV, December 8, 1941, p. 162.

Type Locality.—Four miles west of Linesville, Crawford County, Pennsylvania.

The present authors had the description of this race of red-backed vole in manuscript when Mr. Doutt's paper appeared. His description of the new form is so nearly identical with ours that his work may be said to stand partially already verified! Linesville,

Pennsylvania, is only about 6 miles from Padanaram, Ohio, which the present writers had selected as their type locality, and the type of *C. g. paludicola* was taken actually 4 miles west of Linesville, i. e., at the present site of Pymatuning Lake, the creation of which destroyed the forests inhabited by this vole. Padanaram, on the Ohio side, is likewise at the lake edge.

This subspecies formerly occupied the great swampy hemlock forest of Pymatuning in Ashtabula County, Ohio, and Crawford County, Pennsylvania, and was known from also the valley of Conneaut Creek, whence came the specimen first reported from Ohio[1]. Subsequent trapping at this station has proved unfruitful to date, and red-backed voles are perhaps the easiest of all small mammals to trap. At Pymatuning, devastating changes have almost certainly eliminated the species on the Ohio side of the reservoir, since the actual site of the capture of the specimens listed below is now under water. Surrounding forests have been almost completely lumbered, and it is very doubtful that the species, as a member of the Ohio fauna, could have survived the droughts of the past decade.

The present authors cannot concur with Doutt in his remarks concerning the possibility that 2 species of *Clethrionomys* occupy common ground in West Virginia, Pennsylvania, and Maryland. The genus *Clethrionomys* has gone unrevised in recent years, and its species *gapperi* is highly variable. On the basis of studies conducted by the authors in connection with their stillborn description of a new race from Ohio, they are forced to the conclusion that the name *Clethrionomys gapperi gapperi* may ultimately be restricted to eastern Canadian specimens of the red-backed vole. Examples of *C. g. paludicola* from its type region are much nearer to *C. g. gapperi* from Pontiac County, Quebec, than they are to any stock of this species that the writers have seen from the United States side of the St. Lawrence River. Pending revision of the genus, New York State specimens cannot be properly allocated, and the same is obviously true of specimens from central Pennsylvania and West Virginia. The fact that *Clethrionomys gapperi gapperi* (Vigors) has disappeared from its type region between Toronto and Lake Simcoe, Ontario, will not give any assistance to future revisers of the genus.

[1]See Enders, Journ. Mamm., Vol. IX, No. 2, May 9, 1928, p. 155.

Specimens examined.—

Clethrionomys gapperi paludicola Doutt

OHIO.—Padanaram, Ashtabula Co., 5.

Clethrionomys gapperi rhoadsii (Stone)

NEW JERSEY.—Mays Landing, Atlantic Co., 4; Lakehurst, Ocean Co., 3.

Clethrionomys gapperi maurus Kellogg

KENTUCKY.—Lynch, Harlan Co., 4 (topotypes in U. S. Nat. Mus.).

Clethrionomys gapperi carolinensis (Merriam)

NORTH CAROLINA.—Roan Mountain, Mitchell Co., 7 (topotypes).

Clethrionomys gapperi ochraceus (Bangs)

NEW BRUNSWICK.—Queensbury, York Co., 1; Scotch Lake, York Co., 5.

NOVA SCOTIA.—Seal Island, Guysborough Co., 4 (not typical).

MAINE.—Ashland, Aroostook Co., 3; Mooselookmeguntic Lake, Franklin Co., 7.

MASSACHUSETTS.—North Reheboth, Bristol Co., 1; Raynham, Bristol Co., 2; Taunton, Bristol Co., 5; Essex, Essex Co., 1; Wareham, Plymouth Co., 2.

NEW HAMPSHIRE.—Jackson, Carroll Co., 8; Pittsburg, Coos Co., 4.

NEW YORK.—Giant Mountain, Essex Co., 5 (near *C. g. gapperi*); St. Huberts (Keene Heights), Essex Co., 14 (near *C. g. gapperi*).

VERMONT.—Ryegate, Caledonia Co., 1.

Clethrionomys gapperi gapperi (Vigors)

QUEBEC.—Bark Lake, Pontiac Co., 8.

MICHIGAN.—Golden Lake, Iron Co., 3; 12 miles north of Newberry, Luce Co., 3.

NEW YORK.—Peterboro, Madison Co., 17 (not typical).

Clethrionomys gapperi brevicaudus (Merriam)

SOUTH DAKOTA.—Bull Springs, Custer Co., 8.

Clethrionomys gapperi galei (Merriam)

WYOMING.—Gros Ventre Mountains, Sublette Co., 1; Hoback Mountains, Sublette Co., 8; Pinedale, Sublette Co., 1.

Microtus pennsylvanicus pennsylvanicus (Ord)

EASTERN MEADOW VOLE

Mus pennsylvanica ORD, Guthrie's Geography, 2nd Amer. ed., Vol. II, 1815, p. 292.

Type Locality.—Meadows below Philadelphia, Pennsylvania.

The ubiquitous meadow or field vole is found in all parts of Ohio, but becomes rather local in its distribution on the unglaciated Allegheny plateau of the southeastern part of the State. Elsewhere

it is one of the most abundant mammals, populations as high as 50 per acre of rich meadowland being of frequent occurrence.

Ohio meadow voles are shorter tailed and broader footed than most topotypical examples, but the differences are slight. There seem to be no significant differences in coloration or cranial characters. The weights of Ohio specimens seem to be somewhat under those of topotypes. This character is unreliable, however, in a species the weights of whose individuals are so strongly governed by the age of the specimens.

It is significant that the 2 commonest species of Ohio mice, the meadow vole and the deer mouse, and the commonest shrew, the lake states blarina, are the least variable of all Ohio small mammals. It may truly be said that with the exception noted above for the vole, these 3 species cover the State at all times in huge, continuous colonies within their respective habitats. All the other species of these 2 groups become rare or absent in certain parts of the State during their cyclical minima, and their populations become discontinuous. In the rarer forms, the species never attain general distribution even during their maximum populations, and many of these occur in isolated colonies, sometimes widely separated. It is these rarer forms that show the greatest taxonomic variability.

Ohio specimens examined.—

Adams County.—Smoky Creek, Green Township, 2.

Allen County.—Bluffton, 1.

Ashtabula County.—Andover, 2; Farnham, 9 (1 in Ohio State Museum); Lake Cardinal, 2; Mechanicsville, 11; Padanaram, 6.

Belmont County.—Cat Run, 1.

Brown County.—Ripley, 1.

Butler County.—Oxford, 3.

Clermont County.—Union Township, 3.

Cuyahoga County.—Bedford, 6; Bratenahl, 1; Chagrin Falls, 25; Cleveland, 8; Cleveland Heights, 16; Dover, 2; Euclid, 10; Gates Mills, 18; Lakewood, 5; Lyndhurst, 176; North Chagrin Metropolitan Park, 22; North Olmsted, 3; Pepper Pike, 2; Richmond Heights, 1; Rocky River Metropolitan Park, 50; University Heights, 38.

Fairfield County.—Berne Township, 20; Greenfield Township, 5; Hocking Township, 9 (1 in Ohio State Museum); Lancaster, 1 (Ohio State Museum).

Franklin County.—Columbus, 4 (Ohio State Museum).

Geauga County.—Auburn Corners, 2; Carvers Pond, 7; Chesterland

Caves, 19; Great South Bog, 8; Munson Township, 6; Punderson Lake, 1; Shady Lake, 10; Thompson Township, 2.

Hamilton County.—Cincinnati, 9.

Hancock County.—Fostoria, 12.

Lake County.—Holden Arboretum, 65; Kirtland Hills, 15; Leroy Township, 1; Little Mountain, 8; Madison Township, 4; Mentor, 25; Mentor Marsh, 30; Richmond Beach, 24; Wickliffe, 5.

Lawrence County.—Symmes Creek, 5.

Licking County.—Flint Ridge, 1 (Ohio State Museum).

Lorain County.—Elyria, 1.

Lucas County.—Little Cedar Point, 3.

Mahoning County.—Ellsworth, 1 (Ohio State Museum).

Mercer County.—Celina, 3; Fort Recovery, 8.

Montgomery County.—Perry Township, 3.

Ottawa County.—Bay Point, 3.

Paulding County.—Payne, 1.

Portage County.—Aurora Pond, 254.

Sandusky County.—Burgoon, 24; Fremont, 8.

Seneca County.—Bettsville, 65; Five Points, 1; Iler, 1; Maple Grove, 10; Old Fort, 2; Tiffin, 1 (Ohio State Museum).

Shelby County.—(No further locality), 5 (Ohio State Museum).

Summit County.—Northfield, 2.

Microtus ochrogaster ohionensis, subsp. nov.

Ohio Prairie Vole

Type.—Adult female, skin and skull, No. 10430, Cleveland Museum of Natural History; August 26, 1936; Scott R. Inkley.

Type Locality.—Symmes Creek, 2 miles north of Chesapeake, Lawrence County, Ohio.

Range.—Central southern and southwestern Ohio, north to central western Ohio (Shelby County), and in less typical form west to central eastern Indiana (Jay County).

Diagnosis.—The only race of *Microtus ochrogaster* that is not buff-bellied; further characterized by its dark upper surface and short, broad skull with very short tooth row and narrow molars; size larger than *Microtus ochrogaster ochrogaster,* with shorter feet, and smaller, broader skull.

Color.—Summer pelage (the type). Upper parts of finely mixed coloration, the light colored hairs near hazel, the darker ones black, the combined effect being very dark bister; black hairs predominating on nose, crown, back, and rump, the rump very much darker than rest of upper surface; flanks and sides of nose paler, with less admixture of black hairs; underfur of upper parts

dark neutral gray; ears colored like crown; tail like rump above, whitish below except near tip; superior surface of feet dark, colored like rump; under parts silvery gray, the dark gray underfur showing through.

Skull (the type).—Short and broad, with short nasals terminating in a plane anterior to the most anterior orbital border; tooth row short; teeth very narrow; interpterygoid fossa very narrow; tympanic bullae much flattened; cranium proportionately large and well inflated.

Measurements.—Type: length, 149 mm.; tail, 29.5; hind foot, 18; greatest (condylonasal) length of skull, 25.5; basilar length, 22.3; zygomatic breadth, 14.8; interorbital constriction, 4.3; length of nasals, 7.1; palatal length, 11.5; postpalatal length, 10.9; incisive foramina, 4.8; diastema, 7.3; maxillary tooth row, 5.9; width of m_1, 1.0. *Type and 4 paratypes:* average, length, 151; tail, 32; hind foot, 18.

Remarks.—This new subspecies is exceedingly well marked, and is easily separable on the basis of color alone. It is the only race of *Microtus ochrogaster* that is not buff-bellied. In all pelages it is clear, silvery white or gray on the under surface, and in dorsal coloration is the darkest of all the races. Unlike other forms it does not show a pepper-and-salt pelage, as the light-colored hairs on the back are darker and reduced in number. In coloration it so closely resembles *Microtus pennsylvanicus* that collectors who are not sensitive to the coarseness of fur of *Microtus ochrogaster* will likely overlook this animal. It has, of course, a much shorter tail than any *M. pennsylvanicus*, and a glance at its dentition will speedily reveal its true identity. Unfortunately, examination of the plantar tubercles will not, since the local stock of *M. pennsylvanicus* is sometimes five-tubercled. It is a larger animal than typical *Microtus ochrogaster*, averaging nearly 10 millimeters longer. It also has a shorter foot, with a smaller, broader skull, and much reduced teeth.

Specimens examined.—

INDIANA.—Salamonia, Jay Co., 6 (Field Museum coll.).

OHIO.—Smoky Creek, Adams Co., 3; Ripley, Brown Co., 1; Symmes Creek, 1½ miles north of Chesapeake, Lawrence Co., 5 (including type); Union Township, Scioto Co., 4 (Ohio Coop. Wildlife Res. Sta. coll.); Shelby Co., 3 (Ohio State Museum; the specimens first reported for Ohio by Henninger, Journ. Mamm., Vol. II, 1921, p. 239).

Microtus ochrogaster ochrogaster (Wagner)

MIDDLE WESTERN PRAIRIE VOLE

Hypudaeus ochrogaster WAGNER, in Schreber's Säugthiere, Suppl., Vol. III, 1842, p. 592.

Type Locality.—America; hereby fixed at New Harmony, Posey County, Indiana.

At New Harmony, Indiana, *Microtus ochrogaster* appears in its most buff-bellied stock. This also happens to be a spot known to have been visited by the Prince of Wied in the course of his travels in America, and is very likely the source of the specimens that he obtained, and that furnished the basis for Wagner's description. The cranial measurements of 1 of these specimens, as given by Wagner[1], agree with the averages obtained from a series taken at New Harmony.

Specimens of the prairie vole from Hamilton and Clermont counties, Ohio, although strongly variable in all characters, are prevailingly buff bellied, and are paler backed than from elsewhere in the State. Except for one particular, they are clearly intermediate between *Microtus o. ohionensis*, described above, and topotypical *Microtus ochrogaster*, but are closer to the latter. This one particular, however, is of great interest.

The posterior loop of m_3 in the upper jaw of all examples of the subgenus *Pedomys* that the writers have seen is strongly hooked. In most specimens from the Cincinnati region, the hook is poorly developed or absent, and the posterior loop forms a symmetrical pattern very different from that of other stocks. The tooth pattern of *Arvicola cinnamonea* Baird, as pictured by him[2] can be closely matched by many of these specimens. Concerning the type of *Arvicola cinnamonea* Bailey says[3]: "Except for a slightly abnormal tooth pattern Baird's type of *cinnamonea* is a large specimen of typical *austerus*. I cannot believe that it ever came from Pembina." The writers have not examined Baird's type, and have not had the time to study enough specimens to be able to decide whether or not these Cincinnati specimens should stand as *Microtus ochrogaster cinnamoneus* (Baird). They currently believe that pending further study the typical race should be retained on the Ohio State list.

[1]See Osgood, Proc. Biol. Soc. Wash., Vol. XX, April 18, 1907, p. 48.
[2]Rep. Explor. and Surv. R. R. Pac., Vol. VIII, 1857, pl. LIV, No. 1714.
[3]North Amer. Fauna, No. 17, June 6, 1900, p. 74.

As in the case of the genus *Blarina*, it was impossible to work out the ranges of the Ohio races of the species under present consideration without assembling material from all over its range. With specimens sent on loan by the United States Biological Surveys, the Cincinnati Society of Natural History, The Ohio State Museum, The Ohio Wildlife Experiment Station, and the Field Museum of Natural History; others received in exchange from the Kansas University Museum of Zoology; and material already at hand in the Cleveland Museum of Natural History, it becomes possible to make a preliminary revision of the meadow voles of the subgenus *Pedomys* Baird. From the material at hand, it appears that most of the names so far applied to forms of the subgenus *Pedomys* are valid, and that these forms should stand as subspecies of *Microtus ochrogaster* (Wagner), with the exception of *Microtus ludovicianus* Bailey, which is geographically far removed from the others and shows distinctive cranial characters, thus appearing to be a distinct species. The forms may be defined thus:

1.—*Microtus ochrogaster ochrogaster* (Wagner). MIDDLE WESTERN PRAIRIE VOLE

Hypudaeus ochrogaster WAGNER, in Schreber's Säugthiere, Suppl., Vol. III, 1842, p. 592.

Arvicola austerus LECONTE, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1853, p. 405 (type from Racine, Wisconsin).

Arvicola (*Pedomys*) *cinnamonea* BAIRD, Rep. Explor. and Surv. R. R. Pac., Vol. VIII, 1857, p. 543 (type supposed to have come from Pembina, North Dakota).

Type Locality.—New Harmony, Posey County, Indiana.

Range.—From extreme southwestern Ohio, southeastern Indiana, and northwestern Kentucky; west over Illinois to western Iowa and eastern Kansas.

Diagnosis.—Dark colored with very buffy under parts and very grizzled upper parts; skull of median proportions.

Specimens examined:

ILLINOIS.—Olive Branch, Alexander Co., 21 (20 in Field Museum, 1 in U. S. Biological Surveys coll.); McClure, Alexander Co., 1 (U. S. Biological Surveys coll.); Rosiclare, Hardin Co., 15 (Field Museum); Galena, Jo Davies Co., 2 (Field Museum); Ozark, Johnson Co., 2 (Field Museum); Reevesville,

Johnson Co., 2 (Field Museum); Beach, Lake Co., 1 (Field Museum); Fox Lake, Lake Co., 6 (Field Museum); Odin, Marion Co., 1 (U. S. Biological Surveys coll.); Bloomington, McLean Co., 9; Golconda, Pope Co., 6 (Field Museum); Olney, Richland Co., 1 (U. S. Biological Surveys coll.); Wolflake, Union Co., 1 (U. S. Biological Surveys coll.); Wheatland, Will Co., 2 (Field Museum).

INDIANA.—Vincennes, Knox Co., 1 (U. S. Biological Surveys coll.); La Porte, La Porte Co., 2 (Field Museum); New Harmony, Posey Co., 16.

IOWA.—Knoxville, Marion Co., 3 (*haydenii-ochrogaster* intergrades; Field Museum); Fairport, Muscatine Co., 3 (*haydenii-ochrogaster* intergrades; U. S. Biological Surveys coll.).

KANSAS.—Lawrence, Douglas Co., 4 (*haydenii-ochrogaster* intergrades; Field Museum); Douglas Co. (no further locality), 5 (*haydenii-ochrogaster* intergrades).

MINNESOTA.—Hokah, Houston Co., 1 (*minor-ochrogaster* intergrades; Field Museum).

NEBRASKA.—Blair, Washington Co., 9.

OHIO.—Union Township, Clermont Co., 37 (22 in Cincinnati Soc. Nat. Hist.); Hamilton Co. (no further locality), 31 (22 in Cincinnati Soc. Nat. Hist.).

WISCONSIN.—Racine, Racine Co., 4 (U. S. Biological Surveys coll.).

2.—*Microtus ochrogaster ohionensis* Bole and Moulthrop. OHIO PRAIRIE VOLE

Microtus ochrogaster ohionensis BOLE and MOULTHROP, Scient. Pub. Cleveland Mus. Nat. Hist., Vol. V, No. 6, September, 1942, p. 155.

Type Locality.—Symmes Creek, 2 miles north of Chesapeake, Lawrence County, Ohio.

Range.—Occupies the northeastern border of the range of the species south of the Great Lakes, in a belt of unknown width extending from Jay County, Indiana, southeastward through Shelby County, Ohio, to the Ohio Valley counties of extreme central southern Ohio.

Diagnosis.—As described above, the only white-bellied race of the group, with slightly mixed very dark upper parts.

3.—*Microtus ochrogaster haydenii* (Baird). WESTERN PRAIRIE VOLE

Arvicola (*Pedomys*) *haydenii* BAIRD, Rep. Explor. and Surv. R. R. Pac., Vol. VIII, 1857, after July 20, p. 543.

Type Locality.—Fort Pierre, Stanley County, South Dakota.

Range.—South Dakota, south to Nebraska and western Kansas; and west to eastern Colorado, eastern Wyoming, and southeastern Montana.

Diagnosis.—Large and very pale; with a huge skull, grayish, grizzled upper parts, and very pale buff under surface.

Specimens examined.—

NEBRASKA.—Southeast of Wood Lake, Cherry Co., 2 (Field Museum).

SOUTH DAKOTA.—Elk Mountain, Custer Co., 1; Interior, Jackson Co., 4.

4.—*Microtus ochrogaster minor* (Merriam). LEAST PRAIRIE VOLE

Arvicola austerus minor MERRIAM, Amer. Nat., Vol. XXII, No. 7, July, 1888, p. 600.

Type Locality.—Bottineau, at base of Turtle Mountains, Bottineau County, North Dakota.

Range.—Northwestern Minnesota and northern North Dakota to central Alberta, occupying the northern edge of the range of the species.

Diagnosis.—Similar to *Microtus ochrogaster haydenii* in dorsal coloration, but even more grizzled; more buffy below, and with a very much smaller skull; also in every way a much smaller animal.

Specimens examined.—

ALBERTA.—Red Deer River, 9 (Field Museum).

SASKATCHEWAN.—Dundurn, Hanley Co., 1; Indian Head, Qu' Appelle Co., 2 (U. S. Biological Surveys coll.).

MINNESOTA.—Fort Snelling, Hennepin Co., 3 (Field Museum).

NORTH DAKOTA.—Minnewaukan, Benson Co., 1 (Field Museum); Oakes, Dickey Co., 1 (U. S. Biological Surveys coll.); Goodall, McKenzie Co., 1 (U. S. Biological Surveys coll.); Stump Lake, Nelson Co., 1 (U. S. Biological Surveys coll.); Jamestown, Stutsman Co., 2 (Field Museum coll.); Kenmore, Ward Co., 1 (U. S. Biological Surveys Coll.); Minot, Ward Co., 2 (Field Museum).

5.—*Microtus ludovicianus* Bailey. LOUISIANA PRAIRIE VOLE

Microtus ludovicianus BAILEY, North Amer. Fauna, No. 17, June 6, 1900, p. 74.

Type Locality.—Iowa, Calcasieu Parish, Louisiana.

Range.—The coastal prairie of southwestern Louisiana.

Diagnosis.—A dark, richly colored form of *Pedomys*, characterized by its greatly elongated, narrowed skull; the pinkish cast of

the upper parts is very outstanding, as are numerous cranial characters such as the great size of the molar teeth, distinctive molar pattern, dark color of the incisors, and flattened dorsal outline of the cranium. This vole well merits specific separation from *Microtus ochrogaster* in view of its divergent characters, the isolated position of its range, and the lack of evidence of intergradation.

Specimens examined.—

LOUISIANA.—Iowa, Calcasieu Parish, 6 (topotypes; U. S. Biological Surveys coll.).

Pitymys pinetorum pinetorum (LeConte)

SOUTHEASTERN PINE VOLE

Psammomys pinetorum LECONTE, Ann. Lyceum Nat. Hist. N. Y., Vol. III, 1830, p. 133.

Type Locality.—Pine forests of Georgia. Probably the old LeConte plantation at Riceboro[1].

Most of the pine voles in the Cleveland Museum of Natural History collection (150 specimens) are at present in the United States National Museum awaiting a revision of the genus by Remington Kellogg. However, 4 specimens at hand from Belmont County in southeastern Ohio seem, on the basis of Bailey's description[1], to be referable to *Pitymys p. pinetorum*, the Atlantic coast race.

Specimens examined.—

NORTH CAROLINA.—Currituck, Currituck Co., 17; Marshall, Madison Co., 9.

OHIO.—Cat Run, Belmont Co., 19.

Pitymys pinetorum scalopsoides (Audubon and Bachman)

NORTHEASTERN PINE VOLE

Arvicola scalopsoides AUDUBON AND BACHMAN, Proc. Acad. Nat. Sci. Phila., Vol. I, 1841, p. 97.

Type Locality.—Long Island, New York.

Pine voles from northeastern and central Ohio have by the senior author[2] previously been referred to *Pitymys pinetorum*

[1]See Bailey, North Amer. Fauna, No. 17, June 6, 1900, p. 63.
[2]Bole, Journ. Mamm., Vol. XIX, No. 3, August 18, 1938, p. 377.

scalopsoides. The available pine voles in this museum's collection show a very close color resemblance to a series of 7 topotypes from Long Island (Wading River, Suffolk County), New York. Although the remaining skulls at hand are not of comparable age, the northeastern Ohio skulls appear to be smaller and more lightly built than those of the topotypical series. The average external measurements of a series of 9 adults from the Holden Arboretum, Lake County, Ohio, are smaller than the same measurements in the topotypical series, and are as follows, with also the average of 7 topotypes in parentheses: total length, 118.9 (130.1); tail, 18.8 (20.9); hind foot, 15.4 (16.7). Intergradation with *Pitymys p. auricularis* occurs in south central Ohio[1].

Specimens examined.—

New Jersey.—Mays Landing, Atlantic Co., 4.

New York.—Wading River, Suffolk Co., 7 (topotypes).

Ohio.—Mechanicsville, Ashtabula Co., 1; Clinton Co., 1 (Ohio State Museum); Brecksville, Cuyahoga Co., 1; Chagrin Falls, Cuyahoga Co., 1; Gates Mills, Cuyahoga Co., 7; North Chagrin Metropolitan Park, 21; Bern Township, Fairfield Co., 14 (Ohio State Museum); Chesterland Caves, Geauga Co., 2; Little Mountain, Geauga Co., 29; Thompson Township, Geauga Co., 12; Neotoma, Hocking Co., 1 (Ohio State Museum); Holden Arboretum, Lake Co., 26; Kirtland, Lake Co., 3; London, Madison Co., 4 (Ohio State Museum).

Pitymys pinetorum auricularis (Bailey)

Bluegrass Pine Vole

Microtus pinetorum auricularis Bailey, Proc. Biol. Soc. Wash., Vol. XII, April 30, 1898, p. 90.

Type Locality.—Washington, Adams County, Mississippi.

Pine voles from extreme southern Ohio are referable to this dark, richly colored southern race[1]. Average measurements of a series of 8 adults from Clermont County, Ohio, are as follows: length, 126.4 mm.; tail, 23.3; hind foot, 16.1.

A series of autumn, winter, and spring specimens from Clermont County shows a very dark, glossy winter pelage. Judging from these examples this winter pelage is of extremely short duration, appearing in late December and disappearing in early March.

Specimens examined.—

Indiana.—New Harmony, Posey Co., 2.

[1]See Bole, loc. cit.

OHIO.—Lynx Prairie, Adams Co., 1 (Ohio State Museum); Smoky Creek, Adams Co., 8; Ripley, Brown Co., 4; Union Township, Clermont Co., 10 (1 in Ohio State Museum); Symmes Creek, Lawrence Co., 1.
TENNESSEE.—Jefferson Co. (no further locality), 2.

Ondatra zibethica zibethica (Linnaeus)

COMMON MUSKRAT

[*Castor*] *zibethicus* LINNAEUS, Syst. Nat., ed. 12, Vol. I, 1766, p. 79.

Type Locality.—Eastern Canada.

The muskrat is a common animal in Ohio, wherever it can find aquatic habitats suitable to its needs. Ohio-caught specimens are not separable from those taken in other parts of the northeastern United States.

An interesting series of cranial variations is provided by skulls of early post-glacial age recovered from peat bogs, notably that at Johnstown, Ohio, from which was obtained the splendid mastodon now on exhibition in the Cleveland Museum of Natural History. In general these muskrat skulls are more robustly built than are those from present-day specimens, are considerably larger, and cannot be referred to the subspecies *Ondatra zibethica zibethica.*

Ohio specimens examined.—
CUYAHOGA COUNTY.—Brooklyn, 1; Cleveland, 2; Pepper Pike, 1.
LAKE COUNTY.—Holden Arboretum, 9; Kirtland Hills, 22; Mentor, 1.
PORTAGE COUNTY.—Aurora Pond, 1; Freedom Station, 1.
OTTAWA COUNTY.—Sandusky Bay, 1; Winous Point, 4.

Rattus norvegicus (Erxleben)

NORWAY RAT

[*Mus*] *norvegicus* ERXLEBEN, Syst. Regni Anim., Vol. I, 1777, p. 381.

The Norway, or barn, rat is all too common near the habitations of the white man throughout Ohio. This introduced species is without doubt the least interesting, from a taxonomic point of view, of any of Ohio's mammals.

Ohio specimens examined.—
ADAMS COUNTY.—Smoky Creek, 2.

CUYAHOGA COUNTY.—Cleveland, 4; Cleveland Heights, 1; Gates Mills, 3; Independence, 1; Lakewood, 1; Lyndhurst, 3; North Chagrin Metropolitan Park, 1; Rocky River Metropolitan Park, 1.

LAKE COUNTY.—Kirtland Hills, 1.

ROSS COUNTY.—Bainbridge, 1.

SENECA COUNTY.—Bettsville, 6.

Rattus rattus rattus Linnaeus

BLACK RAT

[*Mus*] *rattus* LINNAEUS, Syst. Nat., ed. 10, Vol. I, January 1, 1758, p. 61.

Type Locality.—Upsala, Sweden.

The Cleveland Museum of Natural History's only specimens of Ohio-caught black rats were destroyed in the fire already mentioned[1]. The species was listed by Kirtland[2], and it was apparently rather common soon after the country was settled, but subsequently died out. It is very rare if not wholly extinct in Ohio today.

Mus musculus musculus Linnaeus

COMMON HOUSE MOUSE

[*Mus*] *musculus* LINNAEUS, Syst. Nat., ed. 10, Vol. I, January 1, 1758, p. 62.

Type Locality.—Upsala, Sweden.

The house mouse is thoroughly established as a wild species throughout Ohio. Outside of cities, it shows a strong preference for damp grassland habitats, and is especially fond of sedge meadows. Northern Ohio house mice are typical *Mus musculus musculus* and are prevailingly dark bellied (almost always so in wild-caught specimens).

Ohio specimens examined.—

ASHTABULA COUNTY.—Mechanicsville, 1; Padanaram, 1.

BELMONT COUNTY.—Cat Run, 5.

COLUMBIANA COUNTY.—Lisbon, 3.

CUYAHOGA COUNTY.—Bedford, 2; Chagrin Falls, 4; Cleveland, 12; Cleveland Heights, 3; Gates Mills, 4; Independence, 1; Lakewood, 4; Lyndhurst, 7; Rocky River Metropolitan Park, 1.

GEAUGA COUNTY.—Chesterland, 2; Lake Punderson, 1; Little Mountain, 4; Parkman, 1.

[1]Antea, p. 120.
[2]Second Ann. Rep. Geol. Surv. Ohio, 1838, p. 161.

Hancock County.—Fostoria, 2.
Lake County.—Holden Arboretum, 8; Madison Township, 2; Mentor, 6; Mentor Harbor, 1; Richmond Beach, 3.
Lorain County.—Avon Lake, 1.
Ottawa County.—Bay Point, 4.
Paulding County.—Payne, 1.
Portage County.—Aurora Pond, 10.
Sandusky County.—Burgoon, 3.
Seneca County.—Bettsville, 26; Cromers, 3; Feaselburg, 1; Liberty Township, 1; Maple Grove, 3; Old Fort, 2.
Summit County.—Peninsula, 1.
Wood County.—Longley, 1.

Mus musculus brevirostris Waterhouse

Southern House Mouse

[*Mus*] *brevirostris* Waterhouse, Proc. Zool. Soc. London, Part V, November 21, 1837, p. 19.

Type Locality.—Maldonado, Uruguay[1].

Moulthrop has shown[2] that the house mouse of extreme southern Ohio and of the southern United States in general should be recognized as *Mus musculus brevirostris*, the common house mouse of southern Europe and northern Morocco, of which *Mus musculus azoricus* Schinz is a synonym. House mice from the Ohio River counties of the State are prevailingly white bellied, and are somewhat lighter colored above than the larger specimens from the northern part of Ohio. Intergradation is shown in examples from a wide belt across the southern half of the State.

Ohio Specimens examined.—
Adams County.—Smoky Creek, 14.
Lawrence County.—Symmes Creek, 1.

Zapus hudsonius hardyi Batchelder

New England Jumping Mouse

Zapus hudsonius hardyi Batchelder, Proc. New Eng. Zoöl. Club, Vol. I, February 8, 1899, p. 5.

Type Locality.—Mt. Desert Island, Maine.

In the present unrevised condition of the genus *Zapus* it is quite impossible to draw any completely satisfactory conclusions

[1]See Cabrera, Trab. Mus. Nac. de Cienc. Nat. Madrid, Zool. Ser. No. 57, December 30, 1932, p. 255.
[2]Scient. Publ. Cleve. Mus. Nat. Hist., Vol. V, No. 5, June 1, 1942, pp. 80-81.

regarding the status of *Zapus hudsonius* in Ohio. Edward A. Preble, author of the most recent revision[1], was extremely conservative in his treatment of the species, so much so, that the true range of variation cannot be appreciated from a study of the distribution that he gives[2]. Mr. Preble had for examination only alcoholic material from Hudson Bay, the type locality of *Zapus hudsonius*. So far as topotypes are concerned, the writers are in the same position as Mr. Preble, since they have seen no fresh topotypes. In the Cleveland Museum of Natural History, however, there are specimens enough to show that the range of *Zapus hudsonius hudsonius*, as conceived by Preble, embraces at least 8 currently unrecognized forms. Preble was extremely brief in his treatment of *Zapus hudsonius hardyi* Batchelder; but this form is, in the opinion of the authors, absolutely valid, and is applicable to the bright-flanked, dark-backed *Zapus* that ranges from coastal Maine and central New Hampshire through southern New England, New York, and northwestern Pennsylvania into northeastern Ohio. This decision is arrived at on the assumption that specimens from the upper peninsula of Michigan, from Lake Simcoe, Ontario, and Lake Nipigon, Ontario, represent typical *Zapus hudsonius*, an assumption fraught with some danger, as there is considerable difference in series from these 3 regions. Specimens in *fresh summer pelage* from the range of *Z. h. hardyi* as given above are distinguishable at a glance from those in comparable pelage from Ontario, being much brighter on the sides, as well as darker on the back.

In northeastern Ohio *Zapus hudsonius hardyi* becomes extremely variable in all pelages, but there occur regularly specimens that in every respect match those from Massachusetts and Maine. Certain examples from Geauga County are much more blackish on the back than any from other parts of the race's range; while others are very dull colored, indicating approach to the subspecies from southeastern Ohio, hereinafter described as new. Still others are rich orange and show characters near *Zapus hudsonius brevipes* from the northwestern part of the State, also herein described as new, even to the extent of having shorter tails and feet. It seems best to treat specimens from northeastern Ohio as *Z. h. hardyi*, which they for the greater part most closely resemble. That there

[1]North Amer. Fauna, No. 15, August 8, 1899, pp. 1-42, pl. I.
[2]Loc. cit., p. 15.

is a local tendency toward the development of a new subspecies in Geauga County cannot be denied. Geauga specimens also seem to molt at a time different from other stocks of the present race. June specimens of *hardyi* from Massachusetts are in full molt; in northeastern Ohio the race molts in July, and individuals in fresh pelage are not available before August 1.

A series from Madison Township, Lake County, is very peculiar, and seems to show intergradation toward both *Zapus hudsonius brevipes* and typical *Z. h. hudsonius*. West of the Cuyahoga River, *Zapus* is found in ever increasing brightness of coloration as the range of *Z. h. brevipes* is approached. Most of the specimens at hand from Western Cuyahoga County are nearer *Z. h. brevipes* than to *Z. h. hardyi*.

Specimens examined.—

Zapus hudsonius hardyi

MAINE.—Small Point Beach, Sagadohoc Co., 1.

MASSACHUSETTS.—West Chop, Marthas Vineyard Island, Dukes Co., 1; Essex, Essex Co., 4; Plymouth, Plymouth Co., 1; Raynham, Plymouth Co., 1; Wareham, Plymouth Co., 1.

NEW HAMPSHIRE.—Jackson, Carroll Co., 1; Pittsburg, Coos Co., 4.

NEW YORK.—Elba, Genesee Co., 2; Peterboro, Madison Co., 4.

OHIO.—Mechanicsville, Ashtabula Co., 3; Chagrin Falls, Cuyahoga Co., 6; Gates Mills, Cuyahoga Co., 3; Mayfield Village, Cuyahoga Co., 1; North Chagrin Metropolitan Park, Cuyahoga Co., 1; Auburn Corners, Geauga Co., 1; Carvers Pond, Geauga Co., 3; Great South Bog, Geauga Co., 9; Little Mountain, Geauga Co., 1; Munson Township, Geauga Co., 8; Novelty, Geauga Co., 1; Lake Punderson, Geauga Co., 4; Parkman, Geauga Co., 1; Shady Lake, Geauga Co., 2; Holden Arboretum, Lake Co., 21; Indian Point, Lake County, 1; Madison Township, Lake Co., 11; Mentor Marsh, Lake Co., 3; Wickliffe, Lake Co., 2; Aurora Pond, Portage Co., 15.

PENNSYLVANIA.—Pymatuning Lake, Crawford Co., 3.

Zapus hudsonius hudsonius

ONTARIO.—Aurora, York Co., 4; Nipigon, Thunder Bay, 3 (U. S. Biological Surveys coll.).

MICHIGAN.—Newberry, Luce Co., 10.

Zapus hudsonius campestris

SOUTH DAKOTA.—Bull Springs, Custer Co., 10.

Zapus hudsonius americanus

NEW JERSEY.—Mays Landing, Atlantic Co., 3.

Zapus hudsonius brevipes, subsp. nov.

SHORT-FOOTED JUMPING MOUSE

Type.—Adult female, skin and skull, No. 13797, Cleveland Museum of Natural History; November 5, 1938; Winston C. Jesseman.

Type Locality.—Bettsville, Seneca County, Ohio.

Range.—Northwestern Ohio, also probably most of Indiana and the lower peninsula of Michigan.

Diagnosis.—A brightly colored jumping mouse with a distinct dorsal band which is heavily suffused with the color of the flanks; with shorter hind feet and a shorter tail than found in *Zapus hudsonius hardyi* or *Zapus hudsonius hudsonius;* much more richly colored than *Zapus hudsonius campestris.*

Color.—Fresh winter pelage (the type). Upper parts with darkened dorsal band, not much darker than the sides, but well-defined; general color of sides, crown, and back, ochraceous buff, the dorsal band heavily sprinkled with black hairs, the sides lightly so; lateral line clear ochraceous buff, the hairs clear white at their bases; underfur of upper parts slate color; ears black on outer surfaces, bright ochraceous buff on margins and inner surfaces; nose somewhat more blackish than rest of upper parts; lower parts white, lightly suffused with ochraceous buff in a band across chest and between forelegs; feet silvery white above, naked below; hocks black; tail slaty gray above, clear white below. *Fresh summer pelage* (No. 15665, C. M. N. H., July 14, a paratype). Much brighter and more richly colored than the type, more orange tinged throughout; sides light ochraceous orange; dorsal band very distinct and heavily suffused with the color of the flanks; a spot of bright ochraceous buff over each eye; ears as in winter pelage, but the inner surfaces more blackened; a faint buffy chest band present.

Skull.—Similar to that of examples of *Zapus hudsonius hardyi* from New England or of *Zapus h. hudsonius* from Ontario, but narrower.

Measurements.—Type: length, 205 mm.; tail, 113; hind foot, 28; greatest length of skull (occipitonasal), 21.6; condylobasilar length, 17.8; zygomatic breadth, 10.6; mastoid breadth, 9.7; interorbital constriction, 4.3; palatal length (incisors to notch), 8.0;

postpalatal length (notch to anterior border of foramen magnum), 8.5; tooth row, 3.5; fronto-palatal depth at m_2, 7.5.

Remarks.—This is a well defined race not very closely related to other neighboring subspecies. It differs from typical *Zapus hudsonius hardyi* from Massachusetts and Maine in having a shorter tail, much shorter foot, and more yellowish back; its skull is narrower but otherwise similar. It differs still more sharply from examples of *Zapus h. hardyi* from northeastern Ohio, which are in many cases very much more blackish on the back than specimens from Maine. Actually, the color of *Zapus h. brevipes* is almost identical with the otherwise very distinct *Zapus trinotatus trinotatus* from the northwestern coast of the United States. Compared to typical *Zapus h. hudsonius* from Ontario or northern Michigan, *Z. h. brevipes* differs very strongly in color, smaller skull, shorter foot, and shorter tail. It is much more richly colored than *Zapus hudsonius campestris.*

A specimen from Waters, Otsego County, Michigan, is quite indistinguishable from the paratype series from Seneca County, Ohio, except for an anomalous patch of white behind one ear. This individual is radically different from examples of *Zapus* from Luce County, across the Straits of Mackinac, and it seems safe to infer that the range of *Z. h. brevipes* includes most, if not all, of the southern peninsula of Michigan.

Specimens examined.—

Michigan.—Waters, Otsego Co., 1.

Ohio.—Big Creek (Cleveland), Cuyahoga Co., 1 (near *hardyi*); Dover, Cuyahoga Co., 1; North Olmsted, Cuyahoga Co., 1 (near *hardyi*); Rocky River Metropolitan Park, Cuyahoga Co., 2 (near *hardyi*); Mill Hollow, Erie Co., 1; Bettsville, Seneca Co., 3 (including type); Cromers, Seneca Co., 1; Old Fort, Seneca Co., 5.

Zapus hudsonius rafinesquei[1], subsp. nov.

Rafinesque Jumping Mouse

Type.—Adult male, skin and skull, No. 13260, Cleveland Museum of Natural History; August 27, 1938; Scott R. Inkley.

Type Locality.—Cat Run, extreme southeastern Belmont County, Ohio.

[1]Named for Constantine S. Rafinesque, naturalist of the early nineteenth century.

Range.—The hill country of southeastern Ohio; also southwestern Indiana; presumably all the Ohio Valley as well.

Diagnosis.—A very distinctive race characterized by a combination of important cranial characters, small body, very long tail, and almost total lack of a dorsal band; similar to *Zapus hudsonius americanus* but paler; the only race of *Zapus hudsonius* without a distinct dorsal band.

Color.—Fresh summer pelage (the type). Upper parts, including sides and crown, light ochraceous buff, heavily sprinkled with long coarse black hairs; dorsal band almost obliterated; back slightly darker than sides; underfur of upper surface light slaty gray; lateral line pale ochraceous buff, broad and not distinctly separated from color of under parts, and widening as well as brightening on head, forming a conspicuous bright ochraceous buff patch on side of face below the eyes; nose colored like upper surface; lower parts white, faintly suffused with buff; feet silvery white; hocks light gray; tail gray above, clear white below; ears blackish on both surfaces, lightly sprinkled with buffy hairs; margins of ears light ochraceous buff.

Skull.—Of the general proportions of *Zapus hudsonius hudsonius*, but with a much shorter postpalatal length (nearly 1 mm.), longer tooth row, and the narrowest interorbital constriction of any race of the species.

Measurements.—Type: length, 208 mm.; tail, 130; hind foot, 28; greatest length (occipitonasal) of skull, 21.7; condylobasilar length, 18.5; zygomatic breadth, 11.3; mastoid breadth, 10.0; interorbital constriction, 3.9; palatal length (incisors to notch), 8.3; postpalatal length (notch to foramen magnum), 7.4; tooth row, 3.7; fronto-palatal depth at m_2, 7.2.

Remarks.—Rafinesque, erratic genius that he was, was never so erratic as when assigning names to jumping mice of the genus now known as *Zapus*. He supplied 8 names for supposed species of this genus, most of which stand as *nomina nuda* or synonyms today[1]. Several of these names are clearly referable to known forms, but unfortunately, those that are identifiable refer not to examples of *Zapus* but to species of some other genus. That his *"Gerbillus leonurus"* refers to some kind of *Dipodomys* can scarcely be doubted.

[1]See Preble, North Amer. Fauna, No. 15, August 8, 1899, pp. 10-13.

His description of "*Gerbillus megalops*" from the "pine barrens" of Kentucky can refer only to a juvenal *Peromyscus*. Rafinesque probably had a specimen of the animal now known as *Zapus princeps* in his hands when he applied the *nomen nudum* "*Gerbillus niger*" to it, since that species is the only *Zapus* that commonly occurs in melanistic pelage. It is equally probable that the race here described as *Zapus hudsonius rafinesquei* was the one that he had in mind when he named *Gerbillus sylvaticus*, without describing it or designating a type or type locality, in a letter to Samuel L. Mitchill at Louisville, Kentucky, dated July 20, 1818. As 2 specimens of *Zapus* in the Cleveland Museum of Natural History, from New Harmony, Indiana, are very much closer to the type of *rafinesquei* than they are to anything else, and as the race is thus known to inhabit country close to Louisville, it is reasonable to suppose that Rafinesque had this form in view.

This is a very distinct subspecies and is closest to *Zapus hudsonius americanus* (Barton), but is much paler than comparable specimens from the type region of that race, and differs in many other color details as well. It is quite unlike *Zapus hudsonius brevipes* from the plains of northwestern Ohio; but 1 of the 2 New Harmony, Indiana, specimens is suffused with orange in a way suggestive of *brevipes*, and both specimens are much shorter tailed than the type of *rafinesquei*. The dorsal bands of both are slightly more noticeable than in the type, indicating another approach to *Z. h. brevipes*. Intergradation with *Zapus hudsonius hardyi* is indicated by numerous examples of the latter race from its variable stock in northeastern Ohio.

It appears that *Zapus hudsonius rafinesquei* is a very rare animal, occupying as it does the southern border of the range of the species. Woodrow Goodpaster, despite the very thorough collecting that he did for the Cincinnati Society of Natural History in the Cincinnati region, does not list the species[1]; and the Cleveland Museum of Natural History's collectors have consistently failed to record it from Adams, Brown, and Lawrence counties at the southern tip of Ohio. Preble lists 1 specimen (as *Z. h. hudsonius*) from Wheeling, West Virginia[2], which is slightly north of the type locality of *Zapus h. refinesquei*. The present writers have not seen this specimen.

[1]Journ. Cinc. Soc. Nat. Hist., Vol. XXII, No. 3, June, 1941, pp. 41-47.
[2]Loc. cit., p. 17.

Specimens examined.—
INDIANA.—New Harmony, Posey Co., 2.
OHIO.—Cat Run, Belmont Co., 1 (type specimen).

Napaeozapus insignis insignis (Miller)

NORTHEASTERN WOODLAND JUMPING MOUSE

Zapus insignis MILLER, Amer. Nat., Vol. XXV, No. 8, August, 1891, p. 742.

Type Locality.—Restigouche River, New Brunswick.

Ohio specimens of the woodland jumping mouse are barely distinguishable from examples from New York and New Hampshire, and in the absence of topotypical material at the Cleveland Museum of Natural History it is inadvisable to do more than point out these divergent characteristics. On geographical grounds, it would seem very likely that the Ohio *Napaeozapus* should be subspecifically different from the form found in New England and New Brunswick. The average measurements of 33 Ohio adults are: length, 212 mm.; tail, 129; hind foot, 29; weight, 16.07 grams; of 6 from St. Huberts, Essex County, New York: length, 232; tail, 141.7; hind foot, 30.5; weight, 20.3 grams; of 16 from central New Hampshire: length, 226.3; tail, 139; hind foot, 30.9. These demonstrate that the Ohio animal is considerably smaller in series, but isolated individuals are as large as any from farther northeast. There is not the slightest difference in color, and only one cranial variation of note. In adults of the New England form the interpterygoid fossa terminates anteriorly in a plane bisecting the third molar, or even farther forward. In most of the Ohio specimens, the anterior border of the fossa is behind the third molar, but in several it is as far forward as in the northeastern specimens.

Woodland jumping mice are fairly common on the drainage of the Chagrin River in Lake and Geauga counties. In the ravines and gorges of this region the species finds a congenial environment in forests of hemlock and yellow birch, and frequents also rich beech-maple woodlands. The Chagrin River colony is apparently isolated, as not a specimen has as yet been taken in eastern Ashtabula County, despite trapping in suitable habitats. A single example is at hand from Cat Run, Belmont County, and is peculiar in having no white on the tail. As this station is the type locality of

Zapus hudsonius rafinesquei this specimen received special study. The lack of white, however, may indicate intergradation with *Napaeozapus insignis roanensis* (Preble), which in some individuals shows this character.

Specimens examined.—

New Hampshire.—Jackson, Carroll Co., 10; Jaffrey, Cheshire Co., 2; Pittsburg, Coos Co., 2; Mt. Moosilauke, Grafton Co., 1.

New York.—St. Huberts, Essex Co., 7.

Ohio.—Mechanicsville, Ashtabula Co., 1; Cat Run, Belmont Co., 1; Gates Mills, Cuyahoga Co., 1; North Chagrin Metropolitan Park, Cuyahoga Co., 3; Carvers Pond, Geauga Co., 1; Chester, Geauga Co., 1; Chesterland Caves, Geauga Co., 1; Lake Punderson, Geauga Co., 1; Little Mountain, Geauga Co., 3; Shady Lake, Geauga Co., 9; Holden Arboretum, Lake Co., 16; Kirtland Hills, Lake Co., 1; Willoughby Township, Lake Co., 1.

Erithizon dorsatum dorsatum (Linnaeus)

Canada Porcupine

[*Hystrix*] *dorsata* Linnaeus, Syst. Nat., ed. 10, Vol. I, January 1, 1758, p. 57.

Type Locality.—Eastern Canada.

Porcupines were once common in northeastern and northwestern Ohio and are still of sporadic occurrence along the Pennsylvania boundary. The Cleveland Museum of Natural History failed to secure a specimen run over by a car a few miles east of Cleveland, near the Chagrin River, in 1931. This museum formerly owned a specimen taken about 1830 in Lucas County. This specimen, which was part of the collections of the Cleveland Museum of Natural History's antecedent organizations, was burned in the manner already described[1].

Ohio specimens examined.—

Ohio.—(No further locality), 1.

Lucas County.—(No further locality), 1.

Lepus americanus virginianus Harlan

Northeastern Varying Hare

Lepus virginianus Harlan, Fauna Americana, 1825, p. 196.

Type Locality.—Blue Mountains, northeast of Harrisburg, Pennsylvania.

[1]Antea, p. 120.

The Cleveland Museum of Natural History's varying hares from Ohio suffered the same dismal fate as its porcupine. There were several in the Cleveland Academy of Science collection received from Case School of Applied Science. All were from Ashtabula County, in so far as data were provided. The species was first reported for Ohio by Dr. J. P. Kirtland, who says it ". . . . is sometimes seen in the northeastern part of our limits".[1] The species is still to be expected in Ashtabula County. Regarding its distribution in that county, S. V. Wharram says: "I have not seen a snowshoe rabbit in this part of the State for many years. Many winters ago a boy about 15 years of age brought 1 to me to be mounted. He shot it in Harpersfield Township . . . . . I also saw 1 near Cat Swamp in Austinburg Township. Again I saw 1 in each of the townships of Monroe and Pierpont . . . .".

Ohio specimens examined.—

ASHTABULA COUNTY.—(No further locality), 5 (all destroyed).

Sylvilagus floridanus mearnsii (J. A. Allen)

MIDDLE WESTERN COTTONTAIL

Lepus sylvaticus mearnsii ALLEN, Bull. Amer. Mus. Nat. Hist., Vol. VI, Art. 6, May 31, 1894, p. 171.

Type Locality.—Fort Snelling, Hennepin County, Minnesota.

Cottontail rabbits occur in all parts of Ohio, and where divergent stocks are found these generally prove to be the result of hybridization between various non-native stocks. The State Division of Conservation has from time to time introduced cottontails from Missouri and Kansas into various parts of Ohio. These animals are presumably referable to *Sylvilagus floridanus alacer* (Bangs). Certain stocks of *S. f. mearnsii* from western Ohio, particularly those from Seneca County, show characters approaching *S. f. alacer*. It is highly probable that these tendencies indicate a result of hybridization rather than a local racial variance.

A still more interesting hybridization, consisting of an intergeneric cross, has made itself evident in city-surrounded Bratenahl, a suburb of Cleveland, in northeastern Cuyahoga County. At this station, domestic rabbits of the breed 'Champagne d'Argent' were sometimes allowed to run at large in a field for several years

[1]Second Ann. Rep. Geol. Surv. Ohio, 1838, p. 177.

(1920-1928). Interbreeding with native *Sylvilagus* occurred, and strongly influenced the local native stocks. The Champagne d'Argent, a medium-sized gray rabbit whose juveniles are coal black until half grown, is presumably a derivative of *Oryctolagus cuniculus*, the common European rabbit. During the years following 1928, the wild rabbits of Bratenahl were noticeably larger and more grayish than normal, and coal black juveniles occasionally appeared until a few years ago. These differences have today almost entirely disappeared.

Ohio specimens examined.—

Clermont County.—Union Township, 2.

Cuyahoga County.—Beechwood, 1; Bratenahl, 1; Chagrin Falls, 3; Cleveland, 4; Cleveland Heights, 1; Lakewood, 1; Lyndhurst, 1; South Euclid, 1.

Geauga County.—Little Mountain, 1.

Highland County.—Hillsboro, 2.

Lake County.—Kirtland Hills, 2; Kirtland Township, 1; Mentor, 2.

Portage County.—Geauga Lake, 6.

Sandusky County.—Burgoon, 1.

Seneca County.—Bettsville, 1; Maple Grove, 1.

Cervus canadensis canadensis Erxleben

American Wapiti

[*Cervus elaphus*] *canadensis* Erxleben, Syst. Regni Anim., Vol. I, 1777, p. 305.

Type Locality.—Eastern Canada.

At the time of white settlement the wapiti was found in all parts of Ohio. It has been extinct in the State since about 1840, at which time the last animals were killed in Ashtabula County. Kirtland reports that it was "frequently met with" in that county until about 1832[1].

To judge from the frequency with which the bones of this animal are found today, the wapiti must have been very abundant since the close of the ice age. Bone finds are on hand from nearly all post-glacial horizons. The following counties are represented by the remains: Ottawa, Sandusky, Erie, Portage, Summit, Cuyahoga, and Geauga.

[1]Second Ann. Rep. Geol. Surv. Ohio, 1838, p. 177.

Odocoileus virginianus virginianus (Boddaert)

VIRGINIA WHITE-TAILED DEER

[*Cervus*] *virginianus* BODDAERT, Elenchus Animalium, Vol. I, 1784, p. 136.

Type Locality.—Virginia.

The white-tailed deer became extinct in Ohio about 1850, although it had been very rare for several decades before that. Sporadic records of occurrence in the southeastern counties continued until about 1870, and in northwestern Ohio until 1881. The far-sighted deer conservation policy of the State of Pennsylvania has, however, resulted in the emphatic reestablishment of the species in northeastern Ohio, while restocking carried out by the Ohio Division of Conservation has added it to many southern counties. By 1925 this deer had pushed westward to the Cleveland region; by 1930 records began to come in with increasing frequency; and by 1940 the species had become common over the entire northeastern portion of Ohio. In Geauga County increasing numbers of highway accidents involving deer have resulted in widespread posting of deer crossing signs; in the Chagrin River district it is not unusual to see groups of 5 to 10 individuals, and deer tracks are commonplace. Wharram reports it as "gathering" in Ashtabula County. The white-tailed deer may now be said almost completely to have reoccupied Ohio, although it is still a rarity in many western counties.

Deer appear in great abundance in Indian village and peat-bog remains, and are common in bone finds from all post-glacial horizons.

Ohio specimens examined.—

LAKE COUNTY.—Willoughby-on-the-lake, 1.

CUYAHOGA, ERIE, GEAUGA, LAKE, PORTAGE, SANDUSKY, and SUMMIT COUNTIES.—Skeletal remains.

[The authors have been unable to locate authentic records of the occurrence of the moose (*Alces americanus americanus*) during historic times in Ohio. The species has appeared in the State mammal lists issued by the Ohio State Museum in recent years, including 1 compiled in part by the senior author[1]. Neither Kirtland, who was very familiar with the early history of Ashta-

[1]See Thomas and Bole, Bull. Ohio State Mus., No. 1,1938, p. 2.

bula County, nor Brayton, who was familiar with Indiana and northwestern Ohio, records the species for the State. Trautman[1] failed to discover evidence of its presence at Buckeye Lake during historic times. The present writers feel that the species should be removed from the State list.]

Bison bison pennsylvanicus Shoemaker

EASTERN BISON

Bison americanus pennsylvanicus SHOEMAKER, A Pennsylvania Bison Hunt, 1915, p. 9.

The eastern bison was formerly abundant over most of Ohio, and particularly numerous in southern Ohio as well as along the shores of Lake Erie. Brayton[2] gives a full historical record of the history of the species in the State at the time of settlement. The last specimens ever reported for Ohio, according to Kirtland[3] were killed on the Sandy Fork of Symmes Creek, Gallia County, in 1800.

The Cleveland Museum of Natural History has a few skeletal remains of the bison from Cuyahoga and Summit counties.

[1]Ohio Journ. Sci., Vol. XXXIX, No. 3, May, 1939, pp. 133-143.
[2]Rep. Geol. Surv. Ohio, Vol. IV, 1882, pp. 62-73.
[3]Second Ann. Rep. Geol. Surv. Ohio, 1838, p. 177.

BIBLIOGRAPHY

The subjoined list of publications contains only those that have been consulted in the present connection, and is not intended as a complete bibliography of the mammals of Ohio. It should, however, prove useful to students of the State fauna.

Allen, Joel Asaph

1895. **Descriptions of New American Mammals.** Bulletin of the American Museum of Natural History, Vol. VII, Article 10, November 8, 1895, pp. 327-340.

1897. **Additional Notes on Costa Rican Mammals, with Descriptions of New Species.** Bulletin of the American Museum of Natural History, Vol. IX, Article 3, March 11, 1897, pp. 31-44, pl. I.

Bachman, John

1837. **Some Remarks on the Genus Sorex, with a Monograph of the North American Species.** Journal of the Academy of Natural Sciences of Philadelphia, Vol. VII, pp. 362-402, pls. XXIII-XXIV.

Bailey, Vernon Orlando

1900. **Revision of the Voles of the Genus Microtus.** North American Fauna, No. 17, June 6, 1900, pp. 1-79, pls. I-IV.

Baird, Spencer Fullerton

1857. **Reports of Explorations and Surveys to Ascertain the Most Practicable and Economical Route for a Railroad from the Mississippi River to the Pacific Ocean, Vol. VIII; General Report upon the Zoology of Several Pacific Railroad Routes, Part I, Mammals;** 1857 (after July 20), pp. I-XLVIII, 1-757, pls. XVII-LX.

Bole, Benjamin Patterson, Jr.

1938. **The Pine Mouse of Southern Ohio.** Journal of Mammalogy, Vol. XIX, No. 3, August 18, 1938, p. 377.

1939. **The Quadrat Method of Studying Small Mammal Populations.** Scientific Publications of the Cleveland Museum of Natural History, Vol. V, No. 4, December 28, 1939, pp. 15-77.

Brayton, Alembert Winthrop

1882. **Report on the Mammals of Ohio.** Report of the Geological Survey of Ohio, Vol. IV, pp. 1-185.

Cabrera, Angel

1932. **Los Mamíferos de Marruecos.** Trabajos del Museo Nacional de Ciencias Naturales, Madrid, Ser.Zool., No. 57, December 30, 1932, pp. 1-361, pls. I-XII, 34 figs.

Duvernoy, G. L.

1842. **Notices pour Servir à la Monographie du Genre Musaraigne.** Magazin de Zoologie, d' Anatomie Comparée et de Paléontologie, Ser. 2, Vol. IV, pp. 1-48, pls. XXXVIII-LV.

Enders, Robert Kendall

1928. **Two New Records for Ohio.** Journal of Mammalogy, Vol. IX, No. 2, May 9, 1928, p. 155.

1930. **Some Factors Influencing the Distribution of Mammals in Ohio.** Occasional Papers of the University of Michigan Museum of Zoology, No. 212, April 23, 1930, pp. 1-27.

Goldman, Edward Alphonso

1937. **The Wolves of North America.** Journal of Mammalogy, Vol. XVIII, No. 1, February 14, 1937, pp. 37-45.

Goodpaster, Woodrow

1941. **Mammals of Southwestern Ohio.** The Journal of the Cincinnati Society of Natural History, Vol. XXII, No. 3, June, 1941, pp. 41-47.

Goslin, Robert

1933. **The Striped Spermophile in Fairfield County, Ohio.** Journal of Mammalogy, Vol. XIV, No. 4, November 13, 1933, p. 369.

Green, Morris Miller

1932. **An Unrecognized Shrew from New Jersey.** University of California Publications in Zoology, Vol. XXXVIII, No. 7, June 9, 1932, pp. 387-388.

Hall, Eugene Raymond

1936. **Mustelid Mammals from the Pleistocene of North America, with Systematic Notes on Some Recent Members of the Genera Mustela, Taxidea, and Mephitis.** Publication of the Carnegie Institution of Washington, No. 473, November 20, 1936, pp. 41-120, pls. I-V, 6 figs.

1937. **Mustela cicognanii, the Short-tailed Weasel, Incorrectly Ascribed to Ohio.** The American Midland Naturalist, Vol. XVIII, No. 2, March [February 23], 1937, p. 304.

Hine, James Stewart

1929. **Distribution of Ohio Mammals.** Proceedings of the Ohio Academy of Science, Vol. VIII, Part 6, August 15, 1929, pp. 260-268.

Henninger, Walther Friedrich

1921. **Two Mammals New to Ohio.** Journal of Mammalogy, Vol. II, No. 4, November 29, 1921, p. 239.

Howell, Alfred Brazier

1927. **Revision of the American Lemming Mice.** North American Fauna, No. 50, June 30, 1927, pp. I-II, 1-37, pls. I-II.

Howell, Arthur Holmes

1915. **Revision of the American Marmots.** North American Fauna, No. 37, April 7, 1915, pp. 1-80, pls. I-XV.

1929. **Revision of the American Chipmunks.** North American Fauna, No. 52, November, 1929, pp. 1-157, pls. I-X.

1932. **Notes on Range of the Eastern Chipmunk in Ohio, Indiana, and Quebec.** Journal of Mammalogy, Vol. XIII, No. 2, May 11, 1932, pp. 166-167.

1938. **Revision of the North American Ground Squirrels.** North American Fauna, No. 56, April [May 18], 1938, pp. 1-256, pls. I-XXXII.

Jackson, Hartley Harrad Thompson

1928. **A Taxonomic Review of the American Long-tailed Shrews.** North American Fauna, No. 51, July, 1928, pp. I-VI, 1-238, pls. I-XIII.

Kellogg, Remington

1939. **Annotated List of Tennessee Mammals.** Proceedings of the United States National Museum, Vol. LXXXVI, No. 3051, February 14, 1939, pp. 245-303.

Kirkpatrick, John

1874. **Minutes of a Meeting of the Cleveland Academy of Science for January 30, 1857.** Proceedings of the Cleveland Academy of Natural Science, pp. 126-129.

Kirtland, Jared Potter

1938. **Report on the Zoology of Ohio.** Second Annual Report, Geological Survey of Ohio, Vol. II, pp. 160-161, 175-177.

Lyon, Marcus Ward, Jr.

1936. **Mammals of Indiana.** The American Midland Naturalist, Vol. XVII, No. 1, January [February 27], 1936, pp. 1-384.

Merriam, Clinton Hart

1895. **Revision of the Shrews of the American Genera Blarina and Notiosorex.** North American Fauna, No. 10, December 31, 1895, pp. 1-34, pls. I-III.

Miller, Gerrit Smith, Jr.; and Allen, Glover Morrill

1928. **The American Bats of the Genera Myotis and Pisonyx.** Bulletin of the United States National Museum, No. 144, April 18, 1928, pp. I-VIII, 1-218, pl. I.

Moseley, Edwin Lincoln

1934. **Increase of Badgers in Northwestern Ohio.** Journal of Mammalogy, Vol. XV, No. 2, May 14, 1934, pp. 156-158.

Moulthrop, Philip Nelson

1938. **The Prairie White-footed Mouse in New York State.** Journal of Mammalogy, Vol. XIX, No. 4, November 14, 1938, p. 503.

1942. **Description of a New House Mouse from Cuba.** Scientific Publications of the Cleveland Museum of Natural History, Vol. V, No. 5, June 1, 1942, pp. 79-82.

Osgood, Wilfred Hudson

1907. **Some Unrecognized and Misapplied Names of American Mammals.** Proceedings of the Biological Society of Washington, Vol. XX, April 18, 1907, pp. 43-52.

Poole, Earl Lincoln

1937. **Pennsylvania Records of Sorex cinereus fontinalis.** Journal of Mammalogy, Vol. XVIII, No. 1, February 14, 1937, p. 96.

1940. **The Technical Name of the Allegheny Woodrat.** Journal of Mammalogy, Vol. XXI, No. 3, August 13, 1940, pp. 316-318.

Preble, Edward Alexander

1899. **Revision of the Jumping Mice of the Genus Zapus.** North American Fauna, No. 15, August 8, 1899, pp. 1-42, pl. I.

Preble, Norman Alexander

1942. **Notes on the Mammals of Morrow County, Ohio.** Journal of Mammalogy, Vol. XXIII, No. 1, February 14, 1942, pp. 82-86.

Ridgway, Robert

1912. **Color Standards and Color Nomenclature.** Washington, D. C. 1912 [January 12, 1913], pp. [1-4], i-iv, 1-44, frontispiece, pls. I-LIII.

Smith, Ronald Ward

1940. **The Land Mammals of Nova Scotia.** The American Midland Naturalist, Vol. XXIV, No. 1, July 31, 1940, pp. 213-241.

Thomas, Edward Sinclair; and Bole, Benjamin Patterson, Jr.

1938. **List of the Mammals of Ohio.** Bulletin of the Ohio State Museum, No. 1, February, 1938, pp. 1-2.

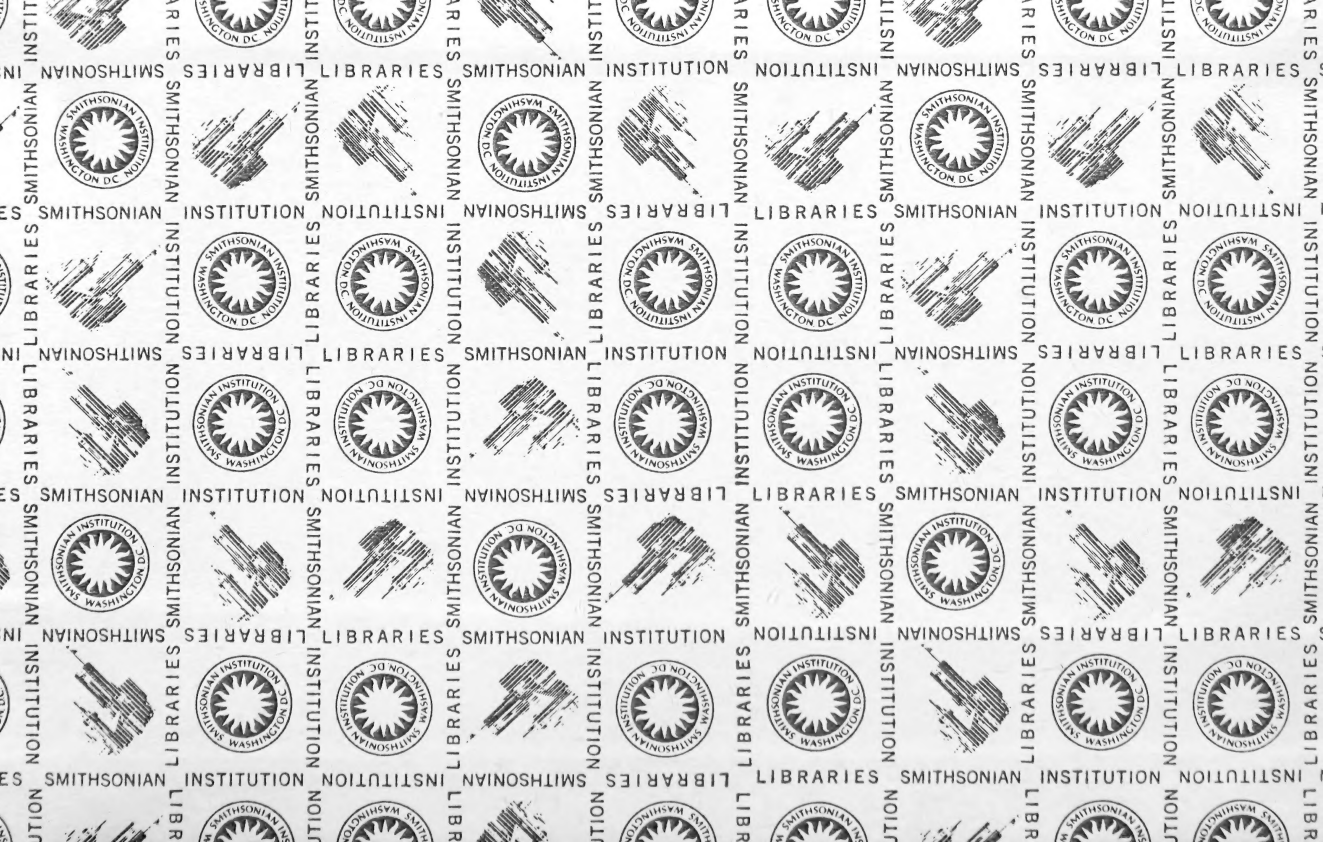
Trautman, Milton Bernhard

1939. **The Numerical Status of Some Mammals throughout Historic Time in the Vicinity of Buckeye Lake, Ohio.** The Ohio Journal of Science, Vol. XXXIX, No. 3, May, 1939, pp. 133-143.

Wharram, Samuel Verrell

1933. **Mammals of Ashtabula County.** (Manuscript in the library of the Cleveland Museum of Natural History.)

SMITHSONIAN INSTITUTION LIBRARIES


SMITHSONIAN INSTITUTION LIBRARIES
SMITHSONIAN INSTITUTION LIBRARIES
SMITHSONIAN INSTITUTION LIBRARIES
SMITHSONIAN INSTITUTION LIBRARIES
SMITHSONIAN INSTITUTION LIBRARIES
SMITHSONIAN INSTITUTION LIBRARIES
SMITHSONIAN INSTITUTION LIBRARIES
SMITHSONIAN INSTITUTION LIBRARIES
SMITHSONIAN INSTITUTION LIBRARIES
SMITHSONIAN INSTITUTION LIBRARIES
SMITHSONIAN INSTITUTION LIBRARIES
SMITHSONIAN INSTITUTION LIBRARIES
SMITHSONIAN INSTITUTION LIBRARIES
SMITHSONIAN INSTITUTION LIBRARIES
SMITHSONIAN INSTITUTION LIBRARIES
SMITHSONIAN INSTITUTION LIBRARIES