

A PRELIMINARY DISTRIBUTIONAL LIST  
OF THE MAMMALS OF VIRGINIA

By

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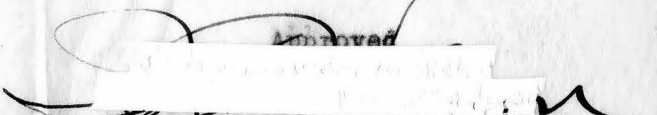
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## PURPOSE OF STUDY

The objective of this study has been to list the mammals of Virginia and determine their intra-state distribution in so far as possible in the time allotted. Four procedures have been followed in conducting the study, namely, examination of available literature, collecting study material, examination of museum specimens and field observations.

At the present time much effort is being exerted by research workers to establish a system of management for game animals which will aid in restoring these species to depleted areas in the State. The information on occurrence and distribution brought together by this study should be of aid to the game manager in working out more efficient practices, as all species of a fauna are interdependent. Not only will this knowledge be of considerable aid to the game manager in solving problems relative to valuable species and predatory species in a particular area, but it will also be of interest to the general public in that some forms affect agriculture practices. The mammiferous fauna of Virginia bear an important relation to mammals of other parts of the eastern United States, since several species occurring here are intermediate between northern and southern forms.

## ACKNOWLEDGEMENTS

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#### REVIEW OF LITERATURE

Available historic literature by well known travelers and naturalists describing the early wonders in Virginia, together with later references dealing more or less exclusively with mammals, constitutes the extent of this review.

#### Early References

Several explorers visited Virginia in early colonial days and some have published detailed descriptions of the country, but their refer-

ences to mammals are few and usually brief. An account of the observations on mammals by the most prominent of these men is herein given.

According to Arber (1910) Captain John Smith, in his rare book "A Map of Virginia with a Description of the Country ....." which covers the period from 1606 - '12, gives a list of seventeen of the larger more easily observed mammals which were encountered during his travels in eastern Virginia. His list, although briefly annotated and very interesting from a historical standpoint, is of little value due to its incompleteness. Between the years 1650 - '71 inclusive, according to Alvord (1912), attempts to explore the regions lying west of the Blue Ridge were made by several expeditions, the first of which was headed by Edward Bland and Captain Abraham Wood. In 1650 Wood's party started from Fort Henry toward the southeast, crossed the Blackwater, Rottaway and Meherrin Rivers, arrived at a point in Mecklenburg County near the present site of Clarksville and returned to Fort Henry by a different route. John Lederer headed three expeditions in 1669 - '70, the first starting from the York River, King William County, the second from the James River, Henrico County and the third from the Rappahannock River, Spottsylvania County, each proceeding west as far as the Blue Ridge but none attempting to go further. The first recorded passage of the Allegheny Mountains was made in 1671 under the auspices of Abraham Wood. Leaving Fort Henry and proceeding west, his expedition, consisting of Thomas Batts, Thomas Wood and Robert Fallam, forded the Staunton River, crossed the Blue Ridge and came to the Totero town near the city of Roanoke. From this point the trail changed to the southeast and led via Roanoke and New Rivers to the present site of Radford, northwest to

the point where New River breaks through Peter's Mountain at Peter's Falls in Giles County. The notes kept by these early explorers indicate that bear, beaver, deer, elk, foxes, otters, panthers, raccoons, squirrels, wildcats, and wolves occurred throughout the State but were more abundant in the lower regions. John Clayton, rector of Crofton at Wakefield in Yorkshire, England, traveled in America and communicated some of his natural history observations to the Royal Society of London. In an article "On the Beasts and Serpents of Virginia" published 1694 in the Philosophical Transactions, he mentions several of the larger Virginia mammals. Boyd (1929) has revised William Byrd's account of the first successful effort to establish the boundary between North Carolina and Virginia in 1728. In this account records indicate that bear, beaver, buffalo, deer, elk, otters, panthers and other game and fur bearing animals were plentiful along the southern borders of Virginia. The botanist, John Clayton, who lived in Gloucester County, while primarily interested in botany, also wrote of Virginia mammals. In a letter to a friend in London (1739) he lists twenty-one kinds of mammals including a record of two porcupines killed in Virginia. This list like Smith's includes only the larger, more easily observed mammals and is of historic interest only. Daniel Boone did considerable traveling in Virginia during the eighteenth century and there are many accounts of his hunting and trapping activities which indicate that game and fur bearing mammals were abundant. In 1881 - '82 Thomas Jefferson listed the mammals giving "A Comparative View of the Quadrupeds of Europe and of America" (Jefferson, 1853). While this list is made up chiefly of those species which Jefferson observed and studied in his native state, it contains some forms which are foreign to Virginia and



therefore cannot be considered as a list of Virginia mammals. Audubon and Bachman doubtless passed through Virginia several times during the first half of the nineteenth century and made many observations on the mammals, accounts of which are found in their "Viviparous Quadrupeds of North America" (1846 - 1854). Baird ( 1857) in his "Mammals of North America" listed several specimens from Virginia.

#### Recent References

Recent references to Virginia mammals are found in sports magazines, scientific periodicals, monographs and technical revisions, all containing bits of information contributing to a determination of the distribution of the various forms. Whitehead (1893) published a list of wild animals occurring in Virginia, but this list like the others is incomplete and refers only to groups, e. g. rats and mice. On April 28 - 29, 1929, Dr. W. B. Bell and Vernon Bailey made a brief reconnaissance of Bath and Highland Counties and Bailey (1929) published an account of the mammals which were observed during the trip. This is the first and only scientifically prepared list of Virginia mammals ever published. J. B. Lewis, formerly a county agent in Amelia, Brunswick and Norfolk Counties, has recently prepared an annotated list of the mammals observed and collected in these three counties. Although the list has never been published it is given recognition because of the author's long experience and reputation as a naturalist.

Numerous unpublished references to Virginia mammals by distinguished mammalogists are contained in field reports found in the Office of Wildlife Surveys, U. S. Biological Survey. Many of these reports have been

included and some give valuable information concerning distribution of certain species.

#### VIRGINIA STUDY MATERIAL

During the investigation a collection was made of about three hundred mammal skins and skulls. Identification of study material was verified by Dr. H. H. T. Jackson and A. H. Howell of the Biological Survey and G. S. Miller of the National Museum. With the exception of a few specimens contributed to the National Museum, Biological Survey collection, this material is contained in the collection of the Virginia Cooperative Wildlife Research Unit as may be seen in the text of the discussion. In order to secure additional records of museum specimens an examination was made of the collection of the Academy of Natural Sciences of Philadelphia and that of the National Museum including the Biological Survey collection. A record of the unpublished material located may be found in the text under "Specimens Examined". Attempts to find unpublished records through correspondence with other leading museums revealed that Virginia material was contained in the American Museum of Natural History, New York; Museum of Zoology, Ann Arbor, Michigan, and the Carnegie Museum, Pittsburg, Pennsylvania. In addition there are a few alcoholic specimens contained in the collections of Radford State Teachers College, and the University of Virginia Biology Station, and a number of life-like mounts are in the Virginia Mineral, Timber and Historical Museum, Richmond, and in private collections throughout the State; however, most of the latter are accompanied by

little or no data and only a few can be definitely identified. The Food Habits Section, U. S. Biological Survey, has collected a number of mammals from the State for use in their reference collections. The analysis of the stomachs of reptiles, birds and mammals taken in Virginia have also yielded records of various species of mammals.

When the total information is aggregated it is yet impossible to give complete distributional data on each species occurring in Virginia. It is hoped, however, that the results of this investigation will at least lay a foundation for future work and inspire additional research on this important fauna.

LIST OF VIRGINIA MAMMALS\*

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\*The nomenclature and systematic sequence given in Miller's "List of North American Recent Mammals, 1923" has been followed except where revision has been made.

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Order 1. Marsupialia  
Family Didelphidae

VIRGINIA OPOSSUM  
Didelphis virginiana virginiana Kerr

The Virginia opossum has a state-wide distribution, being found most commonly in habitats where water and cover are readily available. Although its numbers have been somewhat depleted by land use it remains today as one of our most abundant and widely distributed fur-bearing mammals.

Of the many references to the opossum in Virginia a few are given to indicate its past and present status. Captain John Smith, traveler and explorer in Virginia 1606 - 1612 describes the opossum found here at that time as follows: "An Opossum hath an head like a Swine and a taile like a Rat, and is the bignes of a Cat. Under her belly shee hath a bagge, wherein shee lodgeth, carrieth and sucketh her young." (Arber 1910). Beverly (1722) makes mention of the opossum and attempts to give something of its life history. A complete description of an opossum captured in southern Virginia about the year 1728 is given by Boyd (1929).

For Dismal Swamp, Dr. A. K. Fisher (field report, 1895), states that opossums are said to be not uncommon in the swamp, but more abundant on the higher ground around the swamp. H. C. Oberholser (field report, 1895) caught a female carrying eleven young at Eastville, Northampton County, and he reports that they are said to be common in this locality. For Pope's Creek, E. A. Preble reports that this animal was said to be common in 1909 and for Fells Church, Fairfax County (1920), J. H. Riley gives them the same rating (field reports). According to Bailey (1923), a negro and a dog were reported to have caught seventy opossums in one

season near Falls Church. Bailey (1929), writing of this animal in Bath and Highland Counties says: "A few are found and should be counted as one of the fur bearing animals to be studied and maintained in not too great abundance .....". Lewis (1937, unpublished) considers the opossum common in Amelia, Brunswick and Norfolk Counties. Opossums are rather common around Herndon, Fairfax County, and many are taken each season by night hunters. At Blacksburg, Montgomery County, during the spring, summer, and fall of 1937, several were caught in rat traps and squirrel traps. The writer caught a live specimen on State Highway No. 8 near Fearisburg, Giles County, one night about 9 P.M. during the summer of 1937.

Published records of museum specimens: Clark Co., 1 (skull), Mearns (1907), collection of U. S. National Museum. Dismal Swamp, 1; Fairfax Co., Dunn Loring, 2, Allen (1901), collection of American Museum of Natural History.

Specimens examined: Montgomery Co., Blacksburg, 2; Prince George Co., Petersburg, 3; Roanoke Co., Salem, 1; collection of Virginia Co-operative Wildlife Research Unit. Montgomery Co., Radford, 6 (young); collection of Radford State Teachers College. Chesterfield Co., Seven Oaks, 1 (skull only); Dismal Swamp, 1; Fairfax Co., 1; Fairfax Co., Mount Vernon, 1 (skull only); Nelson Co., 2; Powhatan Co., Butterwood Creek, 1 (skull only); Pilkinton, 1 (skull only); Warwick Co., 2 (skull only); collection of U. S. National Museum.

Order 2. Insectivora  
Family Talpidae

HAIRY-TAILED MOLE  
Parascalops breweri (Bachman)

The known range of the hairy-tailed mole in Virginia is limited to

the Allegheny Mountain region extending from northern Augusta County, southwest to the North Carolina line. Locally it is quite common, and is easily recognized by the characteristic mounds of dirt which it throws out on the surface of the ground. One may expect to find this mole mainly in open grass fields at altitudes above 2500 feet.

Audubon and Bachman (1846 - 1854) write that they "obtained specimens in Western Virginia". Bailey (1929), writing of this animal in Bath and Highland Counties says: "Mole runways and hills are seen in many places and most probably are of the hairy-tailed mole, although the common mole and star-nosed mole should both be here." According to Saylor (1938) two specimens of the hairy-tailed mole taken from snake stomachs which were collected near Mount Solon, Augusta County, Virginia, are in the U. S. Biological Survey collection.

Published records of museum specimens: Giles Co., Mountain Lake, 1; Grayson Co., Mount Rogers, 1; Jackson (1916), collection of the U. S. National Museum.

Specimens examined: Giles Co., Mountain Lake, 1; collection of Virginia Cooperative Wildlife Research Unit. Bath Co., Warm Springs, 1; collection of the U. S. National Museum.

EASTERN MOLE  
Scalopus aquaticus aquaticus (Linnaeus)

The eastern mole is common throughout the State. It is abundant in many localities, often attaining such numbers as to become a nuisance on lawns and in gardens.

Lewis (1937 unpublished) writing of this mole, states that it is common in Amelia, Brunswick and Norfolk Counties. Bailey (1929) writing

of the hairy-tailed mole in Bath and Highland Counties says that the common mole should also occur here. The writer examined a live specimen of the eastern mole taken in Prince George County near Petersburg, and specimens have also been examined from Fairfax County, near Herndon. Mounds indicating the presence of this species have been observed in the following localities: Buchanan, Botetourt County, Dinwiddie Court House, Dinwiddie County, Mountain Lake, Giles County, Blacksburg, Montgomery County, and Poor Valley, Tazewell County. There is one specimen from Northampton County, Cobbs Island, in the American Museum of Natural History (Bill, letter, 1938). L. B. Dice writes that a specimen from Mechanicsville, Loudoun County, reposes in the Museum of Zoology, University of Michigan (letter 1938).

Published records of museum specimens: Clark Co., 1; Spottsylvania Co., 1; Baird (1857), collection of U. S. National Museum. Alexandria Co., 3; Arlington Co., Arlington, 3, Fort Myer 6; Clark Co., 1; Dismal Swamp, 9; Fairfax Co., Falls Church, 9, Springvale, 1; Prince William Co., Bristow, 2; Northampton Co., Eastville, 1, Jackson (1918), collection of U. S. National Museum.

Specimens examined: Amelia Co., Amelia Court House, 1; Montgomery Co., Blacksburg, 3; collection of Virginia Cooperative Wildlife Research Unit. Montgomery Co., Radford, 2; collection of Radford State Teachers College. Albemarle Co., Scottsville, 1 (skull only); Arlington Co., Ballston, 1; Buckingham Co., 2; Fairfax Co., Vienna, 1; Loudoun Co., Seneca, 1; Nelson Co., 5; Princess Anne Co., Virginia Beach, 1; collection of U. S. National Museum.



STAR-NOSED MOLE  
Condylura cristata (Linnaeus)

As interpreted from a map by Jackson (1915) this mole occurs in the Virginia coastal region south to the Dismal Swamp and in the Allegheny Mountains south to the North Carolina line.

I have not found specimens of this mole for the mountain region, but Audubon and Bachman (1846 - 1854) write of capturing it in the valleys of Virginia mountains near Red Sulphur Springs. W. D. Saunders of Max Meadows, Wythe County, writes of seeing two star-nosed moles caught near his home, one in 1930 and another in 1931 (letter, 1938). Bailey (1929) writing of the hairy-tailed mole in Bath and Highland Counties says that the star-nosed mole should occur here. Specimens are recorded from the Alleghenies of North Carolina and Pennsylvania by Jackson (1915).

In the coastal region this mole seems to be somewhat commoner than in the mountains. Lt. Colonel B. F. Hardaway in a letter to the U. S. Biological Survey (1926) writes of a specimen from Naylor's, Richmond County; "this specimen was rescued while essaying to swim the Rappahannock River near this place." Lewis (1937 unpublished) writes of the star-nosed mole in Norfolk County: "Fairly common, especially in wet soil. About as many were seen as of the common mole." W. S. Henning, Richmond, in a post card to the U. S. Biological Survey, writes: "I have a freak mole with a "star" nose, and a square tail (about 3 inches) ..... Small projections run out from point of nose 1/4 inch each way. Small size as ordinary mole." E. A. Preble (field note) writes: "Mr. Denit (of Biological Survey Staff) tells me that he has seen many dug out by a small dog, in a meadow bordering Pohick Creek near Burke

Station." At Falls Church, Fairfax County, Riley secured one that was mounted for the National Museum collection (Bailey 1923).

Published records of museum specimens: Dismal Swamp, 4, Jackson (1915), collection of U. S. National Museum.

Specimens examined: Northumberland Co., Callao, 1 (skeleton); collection of Food Habits Section, U. S. Biological Survey. Fairfax Co., Falls Church, 1; collection of U. S. National Museum.

#### Family Soricidae

##### MASKED SHREW

##### Sorex cinereus cinereus Kerr

The masked shrew is known to range through southwest Virginia north in the mountains to Augusta County. The range as interpreted from a map by Jackson (1928) includes Bland, Carroll, Giles, Grayson, Pulaski, Sayth, Tazewell, Washington, and Wythe Counties, but a specimen taken from a snake stomach collected on the Big Levels Refuge, Augusta County, and examined by the Food Habits Section, U. S. Biological Survey, provides reason for extending the range about seventy-five miles to the northeast.

Published records of museum specimens: Grayson Co., Mount Rogers (altitude 5,719 feet), 1, Jackson (1928), collection of U. S. National Museum.

Specimens examined: Augusta Co., Big Levels Refuge, 2 (skulls); collection of Food Habits Section, U. S. Biological Survey.

##### MARYLAND SHREW

##### Sorex fontinalis Hollister

R. S. Bray (letter, 1938), writes that he has recently captured seven

specimens of the Maryland shrew at a point in Virginia six miles from Washington, D. C. Two of these specimens, now in possession of the U. S. National Museum, were identified by Gerrit S. Miller, Jr., the remaining five repose in the collection of B. S. Bray. Apparently these are the first records for this animal in the State.

Specimens examined: Arlington Co., six miles from Washington, D. C., 2; collection of the U. S. National Museum.

SMOKY SHREW  
Sorex fumeus fumeus Miller

In Virginia, the known range of the smoky shrew as taken from a map by Jackson (1928) includes the Blue Ridge Mountains and the entire region west thereof.

Miller (1898) mentions that he took a specimen of this species at Fort Valley, on the northern end of Massanutten Mountain, Warren County. Records of museum specimens in the Wildlife Surveys Office, U. S. Biological Survey show that three smoky shrews collected in the Shenandoah National Park, Madison County, are now contained in the collection of the Chicago Academy of Sciences. J. E. Hill writes that two specimens from Mountain Lake, Bald Mountain, repose in the American Museum of Natural History (letter, 1938).

Published records of museum specimens: Fauquier Co., Paris, 1; Grayson Co., Mount Rogers (altitude 5, 719 feet), 2; Happehannock Co., Washington (Devils Stairs, Altitude 2000 feet), 1. Jackson (1928) collection of U. S. National Museum.

Specimens examined: Giles Co., Mountain Lake (altitude, 3800 feet), 3; collection of Virginia Cooperative Wildlife Research Unit.



BACHMAN SHREW  
Sorex longirostris longirostris Bachman

The Bachman shrew is uncommonly taken in Virginia, but it is known to occur in the Piedmont Plateau, west, including the Blue Ridge Mountains. The range as given by Jackson (1928) includes the "Atlantic Plain and Piedmont region (except vicinity of Dismal Swamp, Va., inhabited by *S. l. fisheri*) from northern Virginia ....., south to northern Florida ....." . A specimen collected in the Blue Ridge (1937) makes it necessary to extend Jackson's range into the mountains.

Bruce (1937) writing of this species says: "Analysis of the contents of series of opossum stomachs collected this past winter (1937) by U. S. Forest Service game technicians on the Big Levels Refuge, George Washington National Forest, Augusta County, Virginia, have established with certainty the presence of Sorex longirostris longirostris in the western mountain sector of Virginia. A complete specimen of this uncommonly collected shrew was taken from the stomach of an opossum secured January 13, 1937. Identification was verified by Dr. H. H. T. Jackson, of the Biological Survey. The record represents a westward extension of range for this subspecies of perhaps 50 miles or more, and adds materially to our knowledge of its distribution, reducing appreciably the gap between the eastern and western boundaries of the previously known range of the animal."

Published records of museum specimens: Fairfax Co., Falls Church, 1, Jackson (1928), collection of U. S. Biological Survey. Augusta Co., Big Levels Game Refuge, George Washington National Forest, 1, Bruce (1937), collection of U. S. Biological Survey.



FISHER SHREW  
Sorex longirostris fisheri Merriam

The range of the fisher shrew in Virginia is confined to the Dismal Swamp. This race was described by Merriam (1895) from a specimen taken at Lake Drummond, Dismal Swamp.

Published records of museum specimens: Lake Drummond, Dismal Swamp (type locality), 15, Jackson (1928), collection of the U. S. National Museum.

GRAY LONG-TAILED SHREW  
Sorex dispar Batchelder

Apparently there are no records for this rare shrew in the State, yet it probably occurs in the Allegheny Mountains of Southwest Virginia. Howell (1911) writes of capturing one of these animals near Pemberton, Raleigh County, West Virginia, at an altitude of 2000 feet. This point is approximately 50 miles from the northern border of Giles County, Virginia.

VIRGINIA PIGMY SHREW  
Microsorex hoyi winnemana Preble

The probable range of the Virginia pigmy shrew in the State as mapped by Jackson (1928) includes the Piedmont Plateau, south through Campbell County, and a portion of the extreme northwestern sector of the Blue Ridge and Allegheny Mountains.

Preble (1910) described and named this shrew from a specimen which he collected along the bank of the Potomac River near Stubblefield Falls, Fairfax County.

Published records of museum specimens: Campbell Co., Altavista, 1; Fairfax Co., Stubblefield Falls, four miles below Great Falls of the Potomac (type locality), 1; Jackson (1926), collection of U. S. National Museum.

LITTLE SHORT-TAILED SHREW  
Cryptotis parva (Say)

Probably having a state-wide distribution, the little short-tailed shrew is rather common and widely distributed in the Piedmont Plateau and Coastal region, but very rare in the mountains. A specimen taken at Blacksburg, Montgomery County, during this investigation, and referred to this species by A. H. Howell of the U. S. Biological Survey, has provided reason for extending the range westward into the Virginia Mountains about 65 miles.

At Falls Church, Fairfax County, J. H. Riley captured a little short-tailed shrew in an old stump in a field (Bailey 1923). A record from Lynchburg, Campbell County, (1936), resulted from an examination of the stomach of a red-tailed hawk collected at Lynchburg (Stomach card, Food Habits Section, U. S. Biological Survey). Lewis (1937 unpublished) writing of the little short-tailed shrew in Amelia County says: "In my trapping in 1937, 14 shrews have been caught, 9 of which have been submitted to Mr. A. H. Howell of the Biological Survey, and referred by him to the above species. The other 5 have not been heard from but are all probably Cryptotis."

Published records of museum specimens: Spottsylvania Co., 1; Baird (1857), collection of U. S. National Museum. Arlington Co, Munson Hill, 23 (skulls), Merriam (1892), collection of U. S. Biological Survey. Dis-

nal Swamp, 1; Merriam (1895), collection of U. S. National Museum.

Specimens examined: Amelia Co., Amelia Court House, 6; Montgomery Co., Blacksburg, 1; Prince George Co., Petersburg, 1; Collection of Virginia Cooperative Wildlife Research Unit. Amelia Co., Amelia Court House, 4; Fairfax Co., Camp Humphries, 1 (skull only); Nelson Co., 4; collection of U. S. National Museum.

LARGE SHORT-TAILED SHREW  
Blarina brevicauda brevicauda (Say)

Pending a complete revision of this group no range limits are given for the large short-tailed shrew, but it is known to be quite common in the mountains and there are records from the northern Piedmont Plateau and Coastal Plain regions.

Anthony (1928) has been followed in considering B. b. talpoides as being indistinguishable from typical brevicauda.

Merriam (1892) records three skulls of this species taken from owl pellets collected at Munson Hill, and Bailey (1896) records specimens taken along the Potomac River above Georgetown. Rhoades and Young (1897) write: "A specimen of typical brevicauda recently taken in eastern Gloucester County, Virginia, indicates not only that telmalestes is connected with the northern form but that carolinensis is a distinct species whose habitat overlaps brevicauda in these regions." Miller (1898) writes of taking a short-tailed shrew (Blarina brevicauda) at Fort Valley, on the north end of Massanutten Mountain, Warren County. This animal was found to be common at Blacksburg, Montgomery County, and at Mountain Lake, Giles County, during 1936 - '37. Analysis of snake stomachs collected in Augusta County gave records of this species (stomach cards, Food Habits

Section, U. S. Biological Survey). In the American Museum of Natural History there is one specimen from Falls Church, Fairfax County, five from Mount Rogers, Grayson County, one from Troutdale, Grayson County, six from Bald Mountain, Giles County, and two from Hightown, Highland County (Dr. H. H. T. Jackson, letter, 1938).

Published records of museum specimens: Clark Co., 1; Spotsylvania Co., 1 (alc), listed as B. talpoides, Baird (1857), collection of U. S. National Museum.

Specimens examined: Botetourt Co., Arcadia, 1, Buchanan, 1; Giles Co., Mountain Lake, 4; Montgomery Co., Blacksburg, 3; Tazewell Co., North Tazewell, 1; collection of Virginia Cooperative Wildlife Research Unit. Gloucester Co., Capahosic, 1; collection of Academy of Natural Sciences of Philadelphia. Arlington Co., Arlington, 1, Fort Myer, 2, Four Mile Run, 1, Rosslyn, 1; Augusta Co., 7 miles west of Staunton, 2; Bedford Co., Peaks of Otter, 5; Fairfax Co., Falls Church, 3, Potomac River (opposite Plummers Island), 3; Roanoke Co., Salem, 1; collection of U. S. National Museum.

CAROLINA SHORT-TAILED SHREW  
Blarina brevicauda carolinensis (Bachman)

The range limits of this shrew are imperfectly known but it occurs in southeastern Virginia, probably throughout the Coastal Plain region. According to Merriam and Miller (1895) this form intergrades with typical brevicauda in southeastern Virginia at Cape Charles, Northampton County.

H. C. Oberholser (field report, 1895) writing of this shrew at Cape Charles, Northampton County, says that this is "the most numerous of all



the mammals met with". According to Bailey (1923) "A specimen from the Rappahannock River near Warsaw, Virginia, can, however, be referred to carolinensis".

Published records of museum specimens: Accomac Co., Belle Haven, 1; Elizabeth City Co., Old Point Comfort, 1; Northampton Co., Cape Charles, 16; Westmoreland Co., Kinsale, 1, Merriam and Miller (1895), collection of U. S. National Museum.

DISMAL SWAMP SHORT-TAILED SHREW  
Blarina tennalastes Merriam

Described by Merriam (1895) from a specimen collected at Lake Drummond, Dismal Swamp, this shrew's range is limited to the Dismal Swamp.

Published records of museum specimens: Dismal Swamp, Lake Drummond, 14, Merriam (1895), collection of U. S. National Museum.

Specimens examined: Dismal Swamp, 20; collection of U. S. National Museum.

Order S. Chiroptera  
Family Vespertilionidae

LITTLE BROWN BAT  
Myotis lucifugus lucifugus (LeConte)

The little brown bat ranges throughout the State and is probably the commonest and most widely distributed member of this family which we have.

J. H. Riley (field report, 1920) writing of this bat at Falls Church, Fairfax County, rates it common, "outnumbering all other species five to one". A few little browns were found in Ogden Cave near Middle-

town, fifteen or twenty miles south of Winchester, Frederick County (Vernon Bailey, field report, 1922). In Towney's Cave near Newport, Giles County, many were observed hanging from the walls and ceiling, and a few were collected for identification (September, 1936). L. S. Givens of Newport relates that fifty or sixty of these animals were frightened from beneath the roof of a small boat-house at Mountain Lake, Giles County (May, 1938), and two were collected and identified.

Published records of museum specimens: Arlington Co., Four Mile Run, 1 (skin); Fairfax Co., Falls Church, 4 (skins), 67 (alc), 2 (skins U. C. ), Spring Hill, 2 (skins); Frederick Co., Middletown, 2 (skins), 2 (alc); King William Co., Aylett, 4 (alc); Warren Co., Riverton, 1 (skin), Miller and Allen (1929), collection of U. S. National Museum.

Specimens examined: Giles Co., Towney's Cave, near Newport, 2, Mountain Lake, 2; collection of Virginia Cooperative Wildlife Research Unit.

#### LEAST BROWN BAT

Myotis subulatus leibii (Audubon and Bachman)

Although I know of no record of this bat in the State it doubtless occurs at times within our borders. According to Bailey (1923) three specimens have been taken on Plummers Island in the Potomac River, ten miles above Washington, D. C. Brooks (1929) writes that many bats of this form hibernate in caves in West Virginia. This animal should be searched for in Virginia.

#### TROUSSART BAT

Myotis keenii septentrionalis (Trouessart)

Miller and Allen (1928) include the entire State in the range of this species.

In the American Museum of Natural History there is one specimen from Norfolk County, Lake Drummond, Dismal Swamp (Hill, letter, 1938).

Published records of museum specimens: Alexandria, 1 (alc); Dismal Swamp, 1 (alc); Page Co., Luray, 1 (skin); Rockingham Co., Endless Caverns, 1 (skin); Shenandoah Co., Orkney Springs, 1 (skin), 1 (alc), Miller and Allen (1928), collection of U. S. National Museum.

Specimens examined: Augusta Co., Stuarts Draft, 1 (alc); collection of U. S. National Museum.

SILVER-HAIRED BAT  
Lasionycteris noctivagans (LeConte)

This migrant bat undoubtedly occurs occasionally throughout the State, but is an uncommon species. Being more partial to wooded sections than other species it is usually found clinging to the bark of trees.

J. H. Riley (field report, 1920) says that he has observed only two of these bats alive in Fairfax County. There is one specimen of this species from Cobbs Island, Northampton County, in the American Museum of Natural History (Hill, letter, 1938). According to Bailey (1896) "Dr. Fisher shot one of these bats November 12, 1893 between Arlington and Rosslyn, Virginia. In the National Museum collection are two skins, one labeled Washington, D. C., January, 1893, the other Smith Island, Va., September 3, 1893. These dates indicate that the species is a migrant or winter visitor."

Specimens examined: Nelson Co., 2 (dated December 23, 1922); collection of U. S. National Museum.

GEORGIAN BAT  
Pipistrellus subflavus subflavus (F. Cuvier)

Often hibernating in caves or crevices in buildings during the winter months, the Georgian bat is rather common and widely distributed in the State. In September, 1936, the writer found this bat in large numbers hanging from the ceiling of Tawney's Cave, near Newport, Giles County. Similarly it was found in a cave near Buchanan, Botetourt County, on November 19, 1937. At Charlotte Court House, Charlotte County, May 29, 1938, many of these bats were seen flying at dusk, and from a barn near Herndon, Fairfax County, several were collected in July, 1938.

A specimen from Ridgeway, Henry County, and one from Endless Caverns, Rockingham County, are contained in the American Museum of Natural History (Hill, letter, 1938).

Published records of museum specimens: Clarke Co., 2 (alc); Fairfax Co., Mount Vernon, 1 (alc); Hampshire Co., 1 (skin), Allen (1864), collection of U. S. National Museum. Hampshire Co., 1 (skin); Spottsylvania Co., Fredericksburg, 6 (skins); Warren Co., Cedarville, 6 (skins, Miller collection); Wythe Co., Wytheville, 2, Miller (1897), collection of U. S. National Museum.

Specimens examined: Botetourt Co., Buchanan, 1; Charlotte Co., Charlotte Court House, 1; Fairfax Co., Herndon, 1; Giles Co., Newport, 1; collection of Virginia Cooperative Wildlife Research Unit. Arlington Co., Arlington, 1 (alc); Dismal Swamp, 4 (alc); Fairfax Co., 1; Fairfax Co., Falls Church, 2 (alc), Potomac River, 3; Frederick Co., Middletown, 1; Hampshire Co., 1; Rockingham Co., Endless Caverns, 1; Spottsylvania Co., Fredericksburg, 6; Westmoreland Co., Stratford, 2;



Wythe Co., Wytheville, 2 (alc); collection of U. S. National Museum.  
Clarke Co., 1 (alc); collection of Academy of Natural Sciences of  
Philadelphia.

NEW YORK PIPISTRELLE  
Pipistrellus subflavus obscurus Miller

No definite records for this bat in Virginia have been found, but  
it probably occurs as a straggler in the northern part of the State.

Bailey (1923) writing of this bat around the District of Columbia  
says: "The dark colored northern form described by Gerrit S. Miller, Jr.  
from Lake George, New York, is probably not a resident of the District.  
Two specimens taken as they were flying over the river near Plummer's  
Island, September 9, 1905, are typical in color. They may have migrated  
out of their northern habitat, or merely wandered out of their regular  
range after the breeding season was over."

BIG BROWN BAT  
Eptesicus fuscus fuscus (Beauvois)

Although at present known to occur in only a few localities in the  
State this bat may be found to have a state-wide distribution. It should  
be searched for in hollow trees, crevices in buildings, caves and other  
similar habitats.

Howell (1909) rates it as being common at Tazewell, Tazewell County,  
in August 1908. Bailey (1929) writes that he was uncertain about the  
identity of a bat seen flying about Warm Springs Inn, Bath County, but  
he thought it to be the big brown. According to Wetmore (1936) a brown

bat was seen flying along the Potomac, near Lucketts, Loudoun County, in March, 1936.

Published records of museum specimens: Tazewell Co., Tazewell, 1, Howell (1909), collection of U. S. National Museum.

Specimens examined: Augusta Co., West Augusta, 1; Montgomery Co., Blacksburg, 1; collection of Virginia Cooperative Wildlife Research Unit. Bath Co., Hot Springs, 1; Fairfax Co., Drainsville, 1 (alc), Balls Church, 3 (alc); Smyth Co., Saltville, 1 (alc); collection of U. S. National Museum.

NORTHERN RED BAT  
Lasiurus borealis borealis (Muller)

The northern red bat is common over the entire State, and may be considered as one of our most abundant bats. It is partial to wooded sections and may often be found suspended from the limb of a shrub or small tree during the day.

J. H. Riley (field report, 1920) rates this bat second in abundance to Myotis lucifugus lucifugus at Falls Church, Fairfax County. He found it not uncommon at Suffolk, Virginia, November 20, 1909. Bailey (1923) records museum specimens for Arlington and Fairfax Counties. Wetmore (1933) writes that he saw a red bat flying near Dumfries, Prince William County, February 19, 1932. At Camp Lee, Prince George County (July, 1937), the writer found red bats to be the most common species. W. R. De Carmo, Junior Biologist, U. S. Biological Survey, reported them abundant near Swift Creek, Chesterfield County, during the summer of 1937. There is one specimen from Ridgeway, Henry County, in the American Mu-

seum of Natural History (Hill, letter, 1938).

Published records of museum specimens: Amelia Co., Amelia Court House, 1; Clarke Co., Berryville, 1 (skin); Dismal Swamp, 2; Prince William Co., Gainesville, 1, Miller (1897), collection of U. S. National Museum.

Specimens examined: Botetourt Co., Troutville, 1; Chesterfield Co., Chesterfield Court House (near Swift Creek), 6; Montgomery Co., Blacksburg, 1; Prince George Co., Petersburg, 2; collection of Virginia Cooperative Wildlife Research Unit. Alexandria (2 miles south), 1 (alc); Arlington Co., Arlington, 2; Bath Co., Hot Springs, 1; Caroline Co., Woodford, 4 (skins), 1 (alc); Fairfax Co., Falls Church, 2 (skins), 13 (alc), Great Falls, 1 (alc), Potomac River, 1; Hansemond Co., Suffolk, 1 (alc); Rappahannock Co., Washington, 1 (skin), 2 (skulls); Waverly Hills (probably in Sussex Co.), 1; collection of U. S. National Museum.

HOARY BAT

Lasiurus cinereus (Beauvois)

The hoary bat is quite rare in Virginia and may be considered as a migrant visitor. It has been taken at Chain Bridge, Washington, D. C. just across the Potomac River from Fairfax County, Virginia (Bailey 1923). A specimen from Cobbe Island, Northampton County is contained in the American Museum of Natural History (Hill, letter, 1938).

Specimens examined: Sulseper Co., Raccoon Ford, 1 (alc); collection of U. S. National Museum.

RAFINESQUE BAT

Nycticeius humeralis (Rafinesque)

In Virginia the Rafinesque bat ranges in the Coastal Plain and eastern Piedmont Plateau regions from northern Virginia south to the North Carolina line. It is fairly common in the southern sections, decreasing in abundance as the northern portions of the State are approached. It is evident that northern Virginia marks the approximate northern limit of range for this species.

At Falls Church, Fairfax County, J. H. Riley reports specimens taken July 28, 1898, July 9, 1902, July 28, 1906, and July 29, 1914, and specimens have been taken as far north as Riverton, Warren County (Bailey 1923). J. E. Hill writes that a Rafinesque bat from Lake Drummond, Dismal Swamp, reposes in the American Museum of Natural History (letter, 1936).

Published records of museum specimens: Dismal Swamp, 5; Warren Co., near Riverton, 1 (skin Miller collection), Miller (1897), collection of U. S. National Museum.

Specimens examined: Chesterfield Co., Chesterfield Court House, 1; collection of Virginia Cooperative Wildlife Research Unit. Caroline Co., Woodford, 12 (alc), 1 (skin); Dismal Swamp, 8 (alc), 3 (skins); Fairfax Co., Falls Church, 1 (alc); Prince William Co., Gainesville, 1 (alc); collection of U. S. National Museum. Clarke Co., 2 (alc); collection of Academy of Natural Sciences of Philadelphia.

RAFINESQUE LUMP-NOSED BAT  
Corynorhinus rafinesquii rafinesquii (Lesson)

Howell (1909) states that he found ten or fifteen Corynorhinus macrotis = C. r. rafinesquii in one of the larger caves in Burkes Garden,



Tazewell County. This is the only record for this species in the State but it probably occurs in suitable habitats throughout southwestern Virginia.

Published records of museum specimens: Tazewell Co., Burkes Garden, (5, August 7), Howell (1909), collection of U. S. National Museum.

LECONTE LUMP-NOSED BAT  
Corynorhinus macrotis (LeConte)

A specimen of the LeConte lump-nosed bat from the Dismal Swamp is the only definite record for this species in Virginia. Miller (1897), gives the range as "Lower Austral zone in the eastern United States", therefore it may come as far north as the Potomac River in the Virginia Coastal Plain.

Published records of museum specimens: Dismal Swamp, 1 (skin), Miller (1897), collection of U. S. National Museum.

Order 4. Carnivora  
Family Ursidae

AMERICAN BLACK BEAR  
Euarctos americanus americanus (Pallas)

Histories of the first settlements in Virginia indicate that the black bear was found in abundance throughout the State. A few of the many records are given to show the extent of its former and present range. Captain John Smith mentions the occurrence of the black bear in Eastern Virginia between the years 1608 - 1612 (Arber 1910). Abraham Wood's expedition, the first to traverse the State from east to west (1671), killed and observed many bear along their route (Alvord and Bidgood 1912). A bear was killed in the Blue Ridge Mountains almost daily

often 3 per day, by the Spottswood Expedition, 1716 (Thornton 1896). Boyd (1939) writing of the Virginia - North Carolina dividing line histories, makes frequent mention of bear being killed along the southern border of Virginia at that time (1728). It is reported that W. B. Winnick of Broadway, Rockingham County, killed 13 bear in his home county during the season of 1890 (Wayland, 1912).

The present range of the black bear in Virginia is limited to isolated sections of the Blue Ridge and Allegheny Mountains, and the Dismal Swamp. Murray (1933) writing of Black bears in Virginia, gives official records of the Commission of Game and Inland Fisheries as follows: "In 1932, 340 black bears were reported killed in the State. In the Dismal Swamp section of Norfolk and Nansemond Counties 55 were killed. The game warden of Rockingham County reports 118 and 50 each were reported in Allegheny and Augusta Counties. Bears were also reported from Amherst, Bath, Bedford, Bland, Botetourt, Highland, Nelson, and Rockbridge." The writer examined a specimen of this species which had been shot in Bolton Mountain, Botetourt County (November 1937). F. C. Wiley, Salem, Roanoke County, has a life like mount of a black bear taken in the mountains of Virginia.

Published records of museum specimens: Dismal Swamp, 1, Seton (1929), collection of U. S. National Museum.

Specimens examined: Augusta Co., Cold Spring, 1 (skull), Mount Solon, 1 (skull); Dismal Swamp, 3 (skulls); Loudoun Co., near Selden Island, 1 (piece of jaw bone); collection of U. S. National Museum.

#### Family Procyonidae

EASTERN RACCOON  
Procyon lotor lotor (Linnaeus)

The eastern raccoon has a state wide distribution. Although its numbers have been reduced in recent years, it is still common in favorable habitats along forested watercourses.

Dr. A. K. Fisher (field report, 1893) considers the raccoon abundant in the Dismal Swamp, Lake Drummond. A. E. Freble (field report, 1909) rates this species as fairly common along Popes Creek, Westmoreland County. Raccoons were considered common in Rappahannock County, Washington, by A. H. Howell (field report, 1911). J. H. Riley, (field report, 1920) writing of this animal in Fairfax County, says that it is still found but not in its former numbers. Bailey (1929) reports a few found in Bath and Highland Counties. Lewis (1937 unpublished) reports the raccoon to be locally common in large tracts of woods, in Amelia, Brunswick, and Norfolk Counties. The writer observed many tracks of this animal along a stream in Tazewell County, Poor Valley (summer 1937). There are several specimens of the raccoon from the Virginia mountains in Mr. F. C. Wiley's collection at Salem, Virginia. A bobcat stomach card, Food Habits Section, U. S. Biological Survey, furnishes a record from Bath County, Hot Springs.

Published records of museum specimens: Spottsylvania County, 1, Baird (1857), collection of U. S. National Museum.

Specimens examined: Amelia Co., 1 (skull); Buckingham Co., 2; Chesterfield Co., 1 (skull); Chesterfield Co., Good's Creek, 1; Clarke Co., 1; Dismal Swamp, 6; Dismal Swamp, Lake Drummond, 2 (skulls); Fairfax Co., Gunston, 2 (skull); Northampton Co., Smith Island, 2; Rappahannock Co., Washington, 2; Spottsylvania Co., Fredericksburg, 3; Warwick Co., 1 (skull); Warwick Co., Morrison, 1 (skull); collection of U. S. National Museum.



Family Mustelidae

AMERICAN MARTIN

Martes americana americana (Turton)

Although I have not succeeded in finding authentic proof that the American martin ever occurred in Virginia it was probably present in the mountains at the time of the arrival of the white settlers, but being unable to endure the presence of man it disappeared from the State at an early date.

Audubon and Bachman (1845 - 1853) write that they have "sought for it in vain on the mountains of Virginia". According to Allen (1876) early records indicate the martin to be a common inhabitant of the Atlantic States south to Virginia, except a narrow belt along the coast. "None, however, now exist in the United States east of the Mississippi River, south of Northern New England and Northern New York, except at a few points in the Alleghanies."

FISHER

Martes pennanti pennanti (Erxleben)

Once probably rather common in Virginia, but unable to withstand the encroachment upon its territory by the white settlers, the fisher disappeared from the State at an early unknown date.

Allen (1876) believes the range of this animal to have extended south to Virginia, and states that none now exist "south of Northern New England and Northern New York, except at a few points in the Alleghanies." Kellogg (1937) gives several authentic records for the occurrence of this animal in West Virginia, but I have been unable to find positive evidence for its former occurrence in Virginia.



ALLEGHENIAN LEAST WEASEL  
Mustela allegheniensis (Rhoads)

The Alleghenian least weasel occurs uncommonly in the Allegheny Mountains of Virginia. An adult male specimen in summer pelage which I collected at Blacksburg, Montgomery County (altitude 2,100 feet) October 31, 1936, and contributed to the U. S. National Museum collection, establishes with certainty the occurrence of Mustela allegheniensis in the Allegheny Mountains of Virginia and is apparently the first record for this animal in the State.

Specimens examined: Montgomery County, near Blacksburg, 1; collection of U. S. National Museum.

NEW YORK WEASEL  
Mustela frenata noveboracensis (Emmons)

The New York weasel occurs throughout Virginia and has a vertical range from the Dismal Swamp, at about sealevel, to Mount Rogers (altitude 5,719 feet), the highest point in Virginia. Historic references indicate that weasels were formerly quite abundant, but their numbers have been greatly reduced until today they are an uncommon animal over most of the State.

Sudubon and Bachman (1851), writing of Putorius erminea = Mustela f. noveboracensis say that "we have observed it along the whole chain of mountains in Virginia and North Carolina". Dr. A. K. Fisher (field report, 1895) writes that weasels are not very common in the Dismal Swamp. At Falls Church, Fairfax County, three are reported to have been taken in 1897, 1907, and 1909 respectively (J. H. Riley, field report, 1920).

For the west end of Chain Bridge, Mount Vernon, and Falls Church, Fairfax County, Bailey (1923) records specimens which he says are in the U. S. National Museum. Bailey (1929), writing of Bath and Highland Counties mammals says that weasels are "not very common but probably occur over all of both counties". Lewis (1937, unpublished) writes that weasels are almost unknown in Amelia County, but he has heard of a few being killed. He records two specimens collected in Brunswick County, one caught in a rat trap in a stable, the other shot while eating a rabbit. A specimen collected at Camp Lee, near Petersburg, Prince George County, in June, 1935, was sent to the Food Habits Section, U. S. Biological Survey for an analysis of the food in its stomach.

Specimens examined: Prince Edward Co., Farnville, 1 (skin only); collection of Virginia Cooperative Wildlife Research Unit. Montgomery Co., Radford, 1 (alc); collection of Radford State Teachers College. Alexandria, 3; Arlington Co., Ballston, 1; Dismal Swamp, 2; Essex Co., Montague, 1 (skull); Fairfax Co., 4 (skins), 1 (skull); Fairfax Co., Falls Church, 1 (skin), 3 (skulls); Grayson Co., Mount Rogers, 3; Massanutten Mountain (excavation on side), 1 (skull only); Nelson Co., 3 (skins), 2 (skulls); Prince George Co., 1; Shenandoah Co., Toms Brook, 1; collection of U. S. National Museum.

#### COMMON MINK

Mustela vison mink (Peale and Beauvois)

The common mink occurs throughout the State, but is nowhere abundant or even common.

For the mountain regions there are no skin or skull records of this animal yet it doubtless occurs, but is probably less common than in the

eastern lower regions. A field note made by J. T. Paxton in 1887 says that mink are a great enemy to poultry along Lick Run, Botetourt County. Bailey (1929) writes that they "occur along the streams" in Bath and Highland Counties. W. O. Warsko, Refuge Keeper, Havens Refuge, near Salem, Roanoke County, records one mink trapped on the refuge during the winter of 1930-31. The writer observed tracks of this animal in Rich Valley, Smyth County, during the summer of 1937.

For northern Virginia, at Falls Church, Fairfax County, Bailey (1923) writes that "J. H. Riley tells me of an old trapper who caught six minke in one trap inside of two weeks in the town of Falls Church, Virginia and also of an old mink that visited his hen house and killed 22 chickens....." In eastern Virginia, about 1901, along the James River near Richmond, three mink were trapped in one winter (Howle, 1915). Lewis (1927), writes of observing a fight between two minke in a stream near Lawrenceville, Brunswick County. Again in 1937, Lewis (unpublished) writes that mink are rather rare in Amelia County, but in Brunswick County they are fairly common along wooded streams. He says that they are "present in the Dismal Swamp". Hollister (1913) writes that three National Museum specimens from Smith Island, Northampton County, show a tendency to approach the southern form lutensis and "appear to be intermediates".

Published records of museum specimens: Northampton Co., Smith Island, 3, Hollister (1913), collection of U. S. National Museum.

Specimens examined: Prince George Co., Petersburg, 1 (skull), collection of Virginia Cooperative Wildlife Research Unit. Henrico Co., near Richmond, 3 (life-like mounts); collection of Virginia Mineral, Timber, and Historical Museum. Arlington Co., Arlington, 1, Ballston, 1; Dis-

nal Swamp, Lake Drummond, 1; Fairfax Co., Dunn Loring, 1, Falls Church, 1; Nelson Co., 1; Virginia (from National Zoological Park), 4; collection of U. S. National Museum.

OTTER

Lutra canadensis canadensis (Schreber)

The otter may still be rarely found along isolated streams and in wooded swamps of the Piedmont Plateau and Coastal Plain regions of Virginia. A few recent records indicate the possibility of its present occurrence in the Northern Blue Ridge and Allegheny Mountain regions, but apparently it has been exterminated from the southwestern portion of the State.

Early writers on natural history mention the otter as a common animal in Virginia. Dr. A. K. Fisher (field report, 1898) writes that the otter is said to be common and that he saw tracks in the Dismal Swamp. Bailey (1896) writes that one was reported caught in Fairfax County, near Great Falls. Howle (1915) writes that he caught an otter "about 14 years ago" on the James River. E. A. Preble (field report, 1909) writes that they are said to be seen occasionally along Pope's Creek, Westmoreland County. Bailey (1923) writes: "In 1909, Kenneth Beale saw a fresh skin in a local fur store, said to have come from Virginia only three miles from Washington, D. C. J. H. Riley remembers one killed in a creek near Falls Church when he was a boy." Bailey (1929) writing of the otter in Bath and Highland Counties says that a few follow the streams but he has been told that none have been taken for three or four years. A letter from G. L. Shirley, February 14, 1930, to the Biological Survey, states that one was



living in a 20 acre pond at Dayton, Rockingham County. Lewis (1937 unpublished) writes that he has examined the skin of a specimen trapped (January, 1932) along the Appomattox River near Stony Point Mill, Amelia County, and that he has received reliable reports of three other individuals being seen in the same locality during recent years. An otter was caught in the Chickahominy Swamp near Bottoms Ridge, Henrico County, during the winter of 1937 (reported and pictured in February 4 edition of the Richmond Times-Dispatch). C. O. Handley remarks that an average of eight or ten are reported taken in this region each season and that he has examined one such specimen. Residents of Stony Creek, Sussex County, relate that otter have been seen along Sapony Creek in recent years. T. R. Watkins, of Charlotte Court House, tells me that at least one of these animals is trapped each year in the swamps along Roanoke Creek in Charlotte County.

Specimens examined: Halifax Co., Barksdale Depot (on Dan River), 1 (skull only, 1936); Nelson Co., 1 (summer, 1899); Virginia (from National Zoological Park), 1 (1902); collection of U. S. National Museum.

ALLEGHENIAN SPOTTED SKUNK  
Spilogale putorius (Linnaeus)

The little spotted skunk is locally common throughout the Allegheny and Blue Ridge Mountains of Virginia, preferring rocky outcrops in mountain ravines. In some localities its abundance is equal to that of its larger relative, Mephitis.

Howell (1906) gives the range of this species as ".... western South Carolina, northward along the Alleghenies to Northern Virginia; ...."

Several specimens of this species collected for stomach analysis by T. E. Clarke, Wildlife Technician, George Washington National Forest, from southern Augusta County provides reason for including the Blue Ridge Mountains in the range. A. H. Howell (field report, 1911) says that they were reported to be rather common at Washington, Rappahannock County, but none were captured. Mason Bradley, Buena Vista, Rockbridge County, captured a little spotted skunk in 1928 (pictured in Game and Fish Conservationist, Vol. 7, No. 5, Jan. - Feb., 1928, page 132). B. S. Webster, Wildlife Technician, Jefferson National Forest, writes that he found the little spotted skunk abundant on the Big Levels Game Refuge, southern Augusta County, in 1936 - 37 and that it was confined to the rocky outcrops at the heads of hollows and to the plateau known as Big Levels (letter, 1938). Bailey (1929) writing of this animal in Bath and Highland Counties is quoted as follows: "Mr. Gillet tells me there are a few of these little spotted skunks called civits". O. F. Warsko of Salem relates that he has trapped 5 civit cats on the Ravens Refuge, Roanoke County, since 1933. According to Hall (1936) "A left mandibular ramus with complete dentation, was found by E. D. Cope in a cave deposit in Wythe County, Virginia". D. J. Woolley relates that he captured a little spotted skunk 11 miles southeast of Eminburg in the Massanutten Mountains, January 1937.

Published records of museum specimens: Frederick Co., Winchester, I, Howell (1906), collection of U. S. National Museum.

Specimens examined: Roanoke Co., Salem, (Fort Lewis Mountain), 2 (skins); private collection, F. C. Wiley, Salem.

EASTERN SKUNK  
Mephitis nigra (Pauie and Beauvois)

The eastern skunk is rather common throughout the State. Howell (1901) includes Virginia in the range of this species but gives no records of its occurrence.

In 1908 A. H. Howell writes that skunks are said to be common at Tazewell, Tazewell County, and for Washington, Rappahannock County (1911) he states that they are reported fairly common (field reports). D. E. Lantz (field report, 1909) writes that this species is said to occur near Massies Mill, Nelson County. C. L. Gage of Howison, Spottsylvania County, writes that skunks make nightly visits to his yard and dig holes for the purpose of obtaining the larvae of June bugs (letter, 1924, to the Biological Survey). Pictured in Game and Fish Conservationist for January and February, 1928, are five skunks caught by Mason Bradley of Euena Vista, Rockbridge County. Bailey (1929) rates skunks of this species "moderately common" in Bath and Highland Counties. Lewis (1937 unpublished) writes that skunks are reported occasionally from Amelia and Brunswick Counties. Wildlife technicians in the George Washington National Forest collected several eastern skunks in 1937 on the Big Levels Game Refuge, Augusta County, for the analysis of the food in their stomachs. Skunks were quite common in the Blacksburg region during 1937 - '38, and were reported to be a nuisance around farm buildings and dwelling houses.

Specimens examined: Montgomery Co., Blacksburg, 1 (skull); Roanoke Co., Salem, 1; collection of Virginia Cooperative Wildlife Research Unit. Chesterfield Co., Hector's Spring, 1 (skull); Fairfax Co., opposite High Island, 1 (skull), Falls Church, 1 (skull); Powhatan Co., Butterwood

Creek, 1 (skull); collection of U. S. National Museum.

Family Canidae

RED FOX  
Vulpes fulva (Beemareest)

The red fox has a state wide distribution, occurring most commonly in the semi-open land of the Piedmont Plateau region. A few may be found in the Mountain regions but they are rare.

Originally the red fox was absent from Virginia and there has been some question as to whether it has extended its range southward or whether it was introduced by early English settlers. Evidence given by Seton (1929) indicates that the European red fox was introduced into Virginia about 1750. Seton concludes that the European red fox has mixed with the native red fox, occurring north of latitude 40° or 45° and the offspring has become widely spread in the east.

Audubon and Bachman (1846 - 1854) rate the red fox more abundant than the gray in the mountains of Virginia. Wayland (1912) writing of the red fox in Rockingham County, mentions that James Steele and his associates killed 17 red foxes and 1 gray fox during the winter and spring of 1856 - 1866. Kilzey (1885) writes that he has killed many red foxes near Fairfax Court House, Fairfax County. E. A. Preble (field report, 1909) states that an occasional one was to be seen along Pope's Creek, Westmoreland County. D. E. Lantz (field report, 1909) says that red foxes are reported abundant near Massies Mill, Nelson County. Will Wildfowl (1920) writes that he shot one of these animals in Fauquier County. B. H. Warren writes that the red fox mysteriously appeared on Kellops Island in 1919



and was doing much damage to wildlife and domestic stock (letter to U. S. Biological Survey 1921). Bailey (1923) writes as follows: "during the years from 1768 to 1775, George Washington did a great deal of fox hunting in the vicinity of Mount Vernon and Washington, most of the foxes being of this species, as shown by their long runs before the hounds and occasionally taking refuge in holes in the ground". In the same reference it is mentioned that Morris M. Green saw a red fox on the west bank of the Potomac River in 1889. Bailey (1929) rates the red fox "scarce" in Bath and Highland Counties. C. F. Phelps relates that he saw two red foxes (winter, 1937) on the Blacksburg Quail Demonstration Area, Montgomery County. Lewis (1938) writes that the red fox is rather rare but on the increase in Amelia County. In Brunswick County he considers it very rare until 1928 when it began to appear in greater numbers.

Specimens examined: Clarke Co., 1 (skull only); Fairfax Co., Scotts Run, 1 (skull only); Northampton Co., Hog Island, 1 (skull only); Virginia (National Zoological Park), 2; collection of U. S. National Museum. Roanoke Co., 1; private collection of F. C. Wiley, Salem, Virginia.

#### GRAY FOX

*Urocyon cinereargenteus cinereargenteus* (Schreber)

The gray fox has a state-wide distribution and is abundant in many isolated localities where food and water are sufficient for its support.

Of the many references to gray foxes in Virginia a few are chosen to indicate its recent status. Bailey (1929) writing of this animal in Bath and Highland Counties states that it is common all through the mountains. C. O. Handley, Leader, Virginia Cooperative Wildlife Research Unit, picked up a gray fox which had been hit by a car on U. S. Highway No. 11 near

Salas, Roanoke County, in March, 1938 and the writer saw two hounds catch one of these animals on Bolton Mountain, Botetourt County, in November, 1937. B. S. Webster, Wildlife Technician, Jefferson National Forest, relates that he found this species common on the Big Levels Game Refuge, Augusta County, and that he trapped several (1936-'37) for the analysis of the food in their stomachs. Lewis (1937 unpublished) considers the gray fox common in Amelia and Brunswick Counties. At Camp Lee, Prince George County, where they are reported to be quite common, two specimens were trapped near a turkey pen in March, 1938. In the same locality, the writer examined a specimen caught by fox hunters in the fall of 1937. In northern Virginia a number of gray foxes are reported caught each year by fox hunters.

Published records of museum specimens: Spottsylvania Co., 1, Baird (1857), collection of U. S. National Museum.

Specimens examined: Prince George Co., near Petersburg, 2; Roanoke Co., Salas, 2; Shenandoah Co., Devil's Hole Mountain, 1 (skull); collection of Virginia Cooperative Wildlife Research Unit. Frederick Co., Winchester, 1; Nelson Co., 2; Virginia(National Zoological Park), 1; collection of U. S. National Museum.

#### GRAY WOLF

Canis lupus lycaon Schreber

Once having a state-wide distribution, the gray wolf was probably present in isolated parts of Virginia mountains until about the ending of the last century.

According to early records by such men as Captain John Smith, John

Clayton, William Byrd and others, this animal was once a common species throughout the State. Seton (1929) thinks that gray wolves were extirpated in the eastern states by the beginning of this century. Goods (1896) writing of old methods used for capturing wolves in Virginia says: "I have myself seen in this locality pits partially filled up, which were used as wolf traps not half a century ago, etc." Bailey (1929) writing of this species in Bath and Highland Counties says: "Wolves were common in these mountains a hundred years ago and few Mr. Hite thinks up to fifty years ago". According to Denbigh (1882) a large pack of wolves was ranging on Bromley Ridge in Clinch Mountain, Washington County, and J. H. Watson writes that two were reported taken (1909 - 1910) in Clinch Mountain eight miles from Burke's Garden, Tazewell County (letter, 1912). In 1887 J. T. Paxton writes that wolves were "nearly extinct" at Lick Run, Botetourt County (letter). According to J. L. Montague (letter, 1936), A. S. Graham of Williamsville, Virginia "has the pelt of an animal that was killed in that neighborhood a good many years ago which has the appearance of having been a wolf". Montague states that another wolf was killed near Felling Springs during the winter of 1890.

#### Family Felidae

##### PANTHER

##### Felis concolor cougar Kerr

According to early writers the panther was formerly rather common in Virginia but it is very improbable that any of these animals occur here at present.

Audubon and Bachman (1846 - 1854) write of an experience which a Mr. Randolph and a Kentuckian had with a panther in the Virginia moun-

tains "about thirty years ago". Wayland (1912) writing of this animal in Rockingham County says: "About 1850 Mr. Wynant's mother, a daughter of Rev. John Brown of the Reformed Church, found a panther in the cow stable, and narrowly escaped with her life - the beast so nearly catching her as he sprung that he tore part of her clothing." True (1868 - 1889) writing of the occurrence of this species in Virginia says: "A specimen was received from Capon Springs in 1850 by the National Museum. Mr. Hallock makes the very interesting statement that the Puma is found in Dismal Swamp. I find no other reference to its occurrence in the low coast lands of the South Atlantic States, except in Florida (Sportsman's Gazetteer, 1877, p. 167)." At present the locality Capon Springs is in southern Hampshire County, West Virginia, a short distance from the Virginia-West Virginia state line. Concerning this species in Bath and Highland Counties, Hailey (1929) writes: "Many places still bear the names of Panther Ridge or Panther Rocks and Panther Springs and Mr. Hite says he has heard many stories of panthers hunted and killed; he thinks not later than fifty years ago. He showed me the Panther Rocks near the top of great ridge on the east side of Calfpasture valley. There seems no possibility that any of these big cats remain and it is probably better so." Denbight (1882) writes of some darkies who treed an animal in Washington County supposed to have been a raccoon. It was shot from the tree and in the battle that followed several dogs and one negro were badly injured, and the animal was found to be a panther. A. H. Howell (field report, 1911) writes that "Mr. John Manuel, a mountaineer living at the foot of Mount Marshall, described an animal seen in these mountains by several persons last winter which must have been a puma. He had no name for it and said everyone was afraid to hunt it."



WILDCAT  
Lynx rufus rufus (Schreber)

The wildcat was formerly found throughout Virginia and is still present in the more isolated mountain sections and in the Dismal Swamp. Apparently it has been exterminated from the Piedmont Plateau region but it is possible that an occasional one will follow down the water courses into the eastern section of the State.

Bailey (1896) states that Dr. Fisher took one in 1893 at Dismal Swamp, where he reports them as very common. According to Bailey (1923) "they were recently and probably are still common in the Dismal Swamp and along the Allegheny Mountains of Virginia, and they have been reported from the Blue Ridge country ....." Lewis (1927 unpublished) writes that bobcats are very common in Dismal Swamp and that he has the skull of one from here.

For the mountains at Washington, Rappahannock County, A. H. Howell (field report, 1911) writes that they are thought to be common and that he captured two in number one traps but they both escaped leaving only a pad and some fur. Murrill (1927) says that the bobcat was not uncommon in the Blue Ridge Mountains when he was a boy. Bailey (1929) writes that bobcats are far too numerous in Bath and Highland Counties. H. S. Lefler relates that they are still often taken on Whitetop Mountain in Grayson County. F. O. Warsko, Refuge Keeper, Havens State Game Refuge, Roanoke County, has records of eleven bobcats caught on Fort Lewis Mountain since 1930. In October, 1929, four were collected near Barn Springs, Bath County, and sent to the Food Habits Section, U. S. Biological Survey for stomach analysis. Likewise in 1937 the Biological Survey received bobcat stomachs from Laurel Fork, Carroll County, and Big Levels Game

Refuge, Augusta County.

J. E. Hill writes that there are three specimens from the Dismal Swamp and one from Suffolk, Hansemond County, in the American Museum of Natural History (letter, 1938).

Published records of museum specimens: Howleysburg, 2, Baird (1857), collection of U. S. National Museum.

Specimens examined: Bath Co., Hot Springs, 1 (skull); Buckingham Co., 5 (skins), 7 (skulls); Dismal Swamp, 1 (skin), 2 (skulls); Page Co., Luray, 1 (skin only); Pieliance, 1 (skin only); Warren Co., Reliance, 1 (skull only); collection of U. S. National Museum.

Life-like mounts examined: Fort Lewis Mountain, Roanoke Co., 2; collection of F. C. Wiley, Salem. Mountain Lake, Giles County, 1; collection of J. B. Laing, Mountain Lake. Walker's Mountain, Bland Co., 1; in drug store at Bland Court House.

Order 5, Pinnipedia  
Family Phocidae

ATLANTIC HARBOR SEAL  
Phoca vitulina concolor (DeKay)

The Atlantic harbor seal has been taken in the Chesapeake Bay and inland along the James River to Richmond, Henrico County.

Wyman (1850) writes that a part of a cranium of an animal belonging to this family was found near Richmond. According to Leidy (1857) a specimen was secured from the sea beach of Accomac County. A specimen of this seal captured by Thomas L. Waltrip in his fyke net in the James River is now contained in the Virginia Mineral, Timber and Historical

Museums (recorded and pictured in Game and Fish Conservationist, Vol. 4, No. 1, March - April, 1924, page 21). A seal captured in March, 1937, by H. F. Beal in his pound net in the Chesapeake Bay off Back River Spit, York County, now reposes in H. H. Bailey's collection at Coral Gables, Florida (Bailey, letter, 1938).

HOODED SEAL  
Cystophora cristata (Erzleben)

While there are no Virginia records of this seal it may be expected to occur occasionally along the coast. It is an inhabitant of the colder waters of the north and only rarely is it found as far south as the Middle Atlantic States.

A species of Cystophora collected from an arm of the Chesapeake Bay, near Cambridge Maryland, and contained in the Academy of Natural Sciences of Philadelphia was recorded by Cope (1865), and a record of a specimen from Florida, now reposing in the U. S. National Museum, is given by Miller (1917).

Order 6. Rodentia  
Family Sciuridae

SOUTHERN WOODCHUCK  
Marmota monax monax (Linnaeus)

The known range of the southern woodchuck in Virginia includes the Mountain regions where it is common and widely distributed, and the northern two thirds of the Piedmont Plateau and Coastal region where it is found in fewer numbers and of more local distribution. In the Piedmont Plateau region it is quite possible that this animal ranges southward to the North Carolina line, but as yet there is not sufficient



evidence to substantiate this.

Robinson (1923) writes of the woodchuck occurring in Nelson County along the rocky bluffs across the James River from his home. Bailey (1929) gives sight records for this animal in Bath and Highland Counties, and states that it is not numerous enough to do any real damage. The writer examined many woodchuck burrows in Tazewell, Smyth, and Bland Counties during the summer of 1937, and observed two woodchucks in Poor Valley, Tazewell County. Their burrows are quite common in the Blacksburg region, Montgomery County, at the present time. L. S. Givens captured a woodchuck in a grassy meadow near Newport, Giles County (July, 1937). V. Bailey (field report, 1922) says that woodchucks are common all over the Shenandoah Valley. According to Bailey (1923) "Woodchucks are common on the bluffs on both sides of the Potomac River above Chain Bridge and on several of the small islands in the River. Riley reports a very few at Falls Church and they occur in some numbers between there and the Potomac as well as in other locations around the District." E. A. Preble (field report, 1909) states that many burrows of this animal were seen along Popes Creek, Westmoreland County. Mr. A. D. Montgomery of Comorn, King George County, relates that woodchucks are abundant in King George County, many living along the edge of the river marshes where there are bluffs. Lewis (1937 unpublished) writes that in Amelia County this species is locally common along the bluffs of the larger streams. In Brunswick County he rates them as very rare and remarks that he saw no sign of the animal in 17 years of residence in that county. Lewis explains further that woodchucks were reported on good authority to be found occasionally along the bluffs of the Meherrin River near the Lunenburg and Mecklenburg County Line, in western Brunswick County.



Published records of museum specimens: Bedford Co., Peaks of Otter, 1; Botetourt Co., Fincastle, 1; Clark Co., 1; Fairfax Co., 1; Fairfax Co., (Potomac River), 3; Hanover Co., Doswell, 1; Loudoun Co., Bluemont, 1; Rappahannock Co., Washington, 2; Spottsylvania Co., Fredericksburg, 2, Howell (1915), collection of U. S. National Museum.

Specimens examined: Giles Co., Newport, 1; collection of Virginia Cooperative Wildlife Research Unit. Highland Co., 1 (life-like mount); collection of Virginia Mineral, Timber and Historical Museum. Loudoun Co., Waterford, 1 (skeleton) collection of Food Habits Section, U. S. Biological Survey. Alexandria (five miles west), 1; Buckingham Co., 1; Fairfax Co., Langley, 1; Nelson Co., 1; Nelson Co., Midway Hills, 1; collection of U. S. National Museum.

FISHER CHIPMUNK  
Tamias striatus fisheri Howell

The chipmunk is found in wooded regions throughout the State. In the Coastal Plain and eastern Piedmont Plateau they are uncommon, but towards the Blue Ridge they increase in numbers and in the Alleghenies are quite abundant.

In 1920 J. H. Riley considered chipmunks uncommon in Fairfax County (field report). Bailey (1896) writes that Preble found it rather common at Mount Vernon, Fairfax County, and that it is reported from Munson Hill and Arlington. Gordon W. Jones of Wilderness, Orange County, relates that he has seen but two of these animals around his home in fifteen years.

For the Dismal Swamp Dr. A. K. Fisher considers chipmunks common on the high ground in the region (field report, 1895), and J. E. Hill reports one specimen from Suffolk, Hansemond County, in the American Museum of Natural History (letter, 1938). Lewis (1937 unpublished) writes that

chipmunks are only fairly common and of local distribution in Amelia and Brunswick Counties.

In a field report (1922) V. Bailey considers chipmunks common at Winchester, Frederick County. Similarly, A. W. Howell rates them fairly common at Big Stone Gap, Wise County (1908), and says that they were reported abundant at Washington, Rappahannock County (1911). Bailey (1929) writes that this species is common in Bath and Highland Counties. Five specimens from Hightown, Highland County, repose in the American Museum of Natural History (Hill, letter, 1938). Several records of the chipmunk from Augusta, Rockingham and Shenandoah Counties resulted from the analysis of snake stomachs collected in these three counties (stomach cards, Food Habits Section, U. S. Biological Survey). In Bland, Giles, Gayth and Hazewell Counties the writer found chipmunks to be abundant throughout the mountains (summer, 1937).

Published records of museum specimens: Bath Co., Hot Springs, 3; Bedford Co., Peaks of Otter, 4; Fairfax Co., Falls Church, 5, Great Falls, 2, McLean, 1, Potomac River (opposite Cabin John, Md.), 1; Fauquier Co., 1; Giles Co., Mountain Lake, 5; Hanover Co., 1; Henrico Co., 1; King George Co., Hempstead, 1; Loudoun Co., Bluemont, 1; Page Co., Stony Man Mountain, 1; Prince William Co., Gainesville, 1; Rappahannock Co., Washington, 4, Howell (1929), collection of U. S. National Museum. Nansemond Co., Suffolk, 1, Howell (1929), collection of American Museum of Natural History.

Specimens examined: Giles Co., Mountain Lake, 1; collection of U. S. National Museum. Augusta Co., Mount Solon, 1; collection of Virginia Cooperative Wildlife Research Unit. Giles Co., Mountain Lake,

2 (also); collection of Radford State Teachers College.

EASTERN RED SQUIRREL  
Tamiasciurus hudsonicus loquax (Bangs)

The range of the eastern red squirrel in Virginia includes the lower Mountain regions (mainly the northeastern half below 3000 feet), and the northern two thirds of the Piedmont Plateau, east in the middle Coastal region through Henrico County. Formerly being fairly common, especially in the northern regions of the State, its numbers have dwindled in recent years until at present red squirrels are quite rare in most localities.

For Tazewell County, A. H. Howell (field report, 1909) writes that this form was reported fairly common on the mountains, and one was seen in a deciduous forest at 4000 feet altitude. Again in 1911 Howell reports that red squirrels were said to occur in small numbers in the wooded creek valleys near Washington, Rappahannock County. At Falls Church, Fairfax County, J. H. Riley (field report, 1922) considers them "very common and quite a nuisance." V. Bailey in 1922 writes that they were said to be common in the timbered borders of the valleys near Winchester, Frederick County, and that he found one living in a wren nest in an orchard (field report). Bailey (1929) writing of this animal in Bath and Highland Counties says that "A few red squirrels are found over the mountains but so scarce that we have seen but one on the trip over two counties." Lewis (1937 unpublished) reports seeing one of these squirrels in June, 1926, at the base of Sounding Knob, Highland County. In November, 1936, the writer observed an animal of this species in a wooded area near Blacksburg, Montgomery County (altitude 2,100 feet).

C. O. Handley, Leader, Virginia Cooperative Wildlife Research Unit, writes that he observed a red squirrel, March 30, 1937, on the Cumberland Resettlement Administration Project, Cumberland County (field note). There is a life-like mount of an albino red squirrel in the Carnegie Museum, Pittsburg, Pennsylvania, with a label having no locality recorded other than Virginia (Caroline Heppenstall, letter, 1938). J. E. Hill writes that there is one specimen from Falls Church, Fairfax County, in the American Museum of Natural History (letter, 1938).

Specimens examined: Henrico Co., near Richmond, 2 (life-like mounts); collection of Virginia Mineral, Timber and Historical Museum. Alexandria Co., 1; Arlington Co., Four Mile Run, 1; Fairfax Co., Baileys Cross Roads, 1, Falls Church, 2; collection of U. S. National Museum.

CUMBERLAND RED SQUIRREL  
Tamiasciurus hudsonicus abieticola Howell

A search of the literature has failed to reveal published records for this race in Virginia. A specimen taken June 10, 1938, on Bear Mountain, Highland County (altitude 4,400 feet), in a spruce - hemlock association and a series of five specimens in the U. S. National Museum from Mount Rogers, Grayson County (altitude 5,719 feet), are referred to abieticola and provide evidence of its occurrence along the upper slopes in the lower Canadian Zone of the Allegheny and Blue Ridge Mountains of the State.

Far Mountain Lake, Giles County, the writer has two records of red squirrels, probably of this form, seen in hemlock trees near water (winter, 1937-1938). C. O. Handley, Jr. of Blacksburg, relates that he found



squirrels of this form rather common in Highland County, on the summits of mountains where spruce, hemlock, and other conifers were the predominant species of trees. Handley's observation is substantiated by a specimen of this race which he collected in the mountains of Highland County.

Specimens examined: Highland Co., Bear Mountain, near Hightown, 1; collection of Virginia Cooperative Wildlife Research Unit. Grayson Co., Mount Rogers (altitude 5,719 feet), 5; collection of U. S. National Museum.

SOUTHERN GRAY SQUIRREL  
Sciurus carolinensis carolinensis Gmelin

Formerly this race of gray squirrel was thought to occur throughout the State, but study material examined during the course of this investigation indicates that the southern form occupies the southern half of the Piedmont Plateau and the entire Coastal Plain region, intergrading with S. c. leucotis on the north and northwest. A. H. Howell states that a series of five study skins from Hampstead, King George County, in the U. S. National Museum, are not typical of either the northern or southern form and may best be classed as intermediates. In the Academy of Natural Sciences of Philadelphia the writer has examined four intermediate specimens from Buckingham County. It is evident that the area of intergradation between S. c. carolinensis and S. c. leucotis lies along a line drawn from central King George County to Southeastern Patrick County, but additional study material from the latter locality should be examined to substantiate this.

The gray squirrel was once abundant in Virginia, but hunting and destruction of its habitat has reduced its numbers materially. For the Dismal Swamp, Dr. A. K. Fisher considers the gray squirrel periodically abundant (field report, 1895). E. A. Preble writes that squirrels are said to

be common in Westmoreland County along Pope's Creek in 1909 (field report). Lewis (1937 unpublished) writes that gray squirrels occur rather irregularly but usually common in Amelia and Brunswick Counties. He considers them rather rare in the Dismal Swamp, Norfolk County.

Specimens examined: Charlotte Co., Charlotte Court House, 1; collection of Virginia Cooperative Wildlife Research Unit. Dismal Swamp, 7; Nonesmond Co., Suffolk, 1; Northampton Co., Eastville, 1; collection of U. S. National Museum.

NORTHERN GRAY SQUIRREL  
Sciurus carolinensis leucotis (Capper)

Insofar as I can learn Vernon Bailey (1929), writing of the mammals of Bath and Highland Counties, gives the first and only published record for the occurrence of this race as far south as Virginia. During this investigation material examined and referred to S. c. leucotis shows quite definitely that its range includes the Mountain region south to Montgomery County, and Northern Virginia south in the Piedmont Plateau to Orange County. Areas of intergradation with S. c. carolinensis in the Piedmont Plateau region have been discussed above. It is probably that the distribution of leucotis will eventually be found to extend further south in the mountains of Virginia and possibly into those of North Carolina.

Wayland (1912) writes that a gentleman from Brock's Gap, Rockingham County, killed one hundred squirrels without moving from a log upon which he was sitting (1877). According to Wayland the gentleman saw at least five hundred more proceeding eastward past this same place. Bailey (1896) rates this species as common at Mount Vernon, Fairfax County, and along the Potomac River above Georgetown. In 1909 D. E. Lantz writes that gray

squirrels are abundant in Nelson County near Massies Mill, and A. H. Howell considers them common at Washington, Rappahannock County, in 1911 (field reports). J. H. Riley says that this animal used to be quite common in Fairfax County, but has been much depleted in recent years by excessive shooting and timber cutting (field report, 1920). Vernon Bailey considers gray squirrels scarce and much hunted in Frederick County, near Winchester (field report, 1922). Bailey (1929) writing of this race in Bath and Highland Counties says that he observed several gray squirrels and that they were reported fairly common and a few blacks among them. "This would indicate the larger northern form rather than the Carolina gray squirrel and a better game animal." Gray squirrels of this race were very abundant on the Blacksburg Quail Demonstration Area, Montgomery County, during the Fall of 1937, and Spring of 1938. There is one specimen of this species from Falls Church, Fairfax County, in the American Museum of Natural History (Hill, letter, 1938).

Specimens examined: Augusta Co., Mount Solon, 1; Montgomery Co., Blacksburg, 1; collection of Virginia Cooperative Wildlife Research Unit, Virginia (no definite locality recorded), 1; collection of Academy of Natural Sciences of Philadelphia. Alexandria Co., 1; Arlington Co., Four Mile Run, 1; Bedford Co., Peaks of Otter, 7; Fairfax Co., Falls Church, 9; Fauquier Co., Belvoir, 1, Paris, 11; Loudoun Co., 3; Nelson Co., 3; Orange Co., Wilderness, 2; Rappahannock Co., Washington, 1; collection of U. S. National Museum.

SOUTHERN FOX SQUIRREL  
Sciurus niger niger Linnaeus

A search of the literature and museum collections has failed to



reveal evidence for this animal in Virginia, yet it probably occurs in the southeastern portion of the State. According to Bangs (1896) the northern race meets the southern race somewhere in southern Virginia. Miller (1923) gives the range of the southern form as "Florida, and the Southeastern States". Specimens of the fox squirrel should be collected from southeastern Virginia in order to determine definitely the race which occurs in this region.

At Cape Charles, Northampton County, H. C. Oberholser writes of seeing a single fox squirrel in mixed woodland (field report, 1895). Dr. A. K. Fisher (field report, 1895) rates it as being rather rare on the high ground around Dismal Swamp and states that it is said not to occur in the Swamp.

NORTHERN FOX SQUIRREL  
Sciurus niger neglectus (Gray)

There is not sufficient study material available to determine definitely the range of the northern fox squirrel in Virginia. Bangs (1896) gives its geographic distribution as "from northern Virginia north .....; west through West Virginia and Pennsylvania probably extending some distance south in the Alleghany Mountains and higher land of Virginia and North Carolina". Miller (1923) gives its range as "Central Virginia and West Virginia to Pennsylvania."

Formerly the fox squirrel was abundant throughout the State, but because of its forest loving habits, timber cutting activities have greatly reduced its numbers and entirely exterminated it in many sections. It is most common at higher altitudes in heavily timbered regions where there



is little human contact. In the Piedmont Plateau region it is found occasionally in large tracts of woodland, but it is very scarce.

Clayton (1694) writing of the fox squirrel in Virginia says that it is almost as common as the rabbit. Bachman (1838) writes that he observed one in the hands of a gunner in Spottsylvania County, near Fredericksburg. Dr. A. K. Fisher reports seeing two of these animals in the Blue Ridge Mountains, December 1888 and January 1889 (field report).

Bailey (1896) writes that many of these animals are received at Center Market from points in Virginia 30 or 40 miles west of the city. Bangs (1896) writes: "Col. Wirt Robinson has told me that in ten years' shooting in Buckingham County, Va., he has got only two fox squirrels out of hundreds of squirrels killed." For Washington, Rappahannock County, A. H. Howell writes that fox squirrels are very scarce (field report, 1911). According to J. H. Eiley (field report, 1920) they were exterminated at Falls Church, Fairfax County, about 1880 but a few still remain in the larger woodlands of the County and on nearby islands in the Potomac River. He remarks that he has shot them at Bluemont, Loudoun County, and has heard of one or two being taken at Accotink, Fairfax County. For Frederick County, Vernon Bailey (field report, 1922) writes that fox squirrels are said to be found in the more extensive timber tracts, but they are scarce. Bailey (1929) writes again that this squirrel is "scarce but generally distributed" in Bath and Highland Counties. During the Summer of 1937, the writer observed a few fox squirrels on the top of Walker's Mountain, Smyth County. F. O. Warsko relates that they are fairly common on Fort Lewis Mountain, Roanoke County.

According to Bailey (1923), "there are specimens in the U. S. National

Museum ..... from Virginia at Accotink, Hampstead, Clarke County, and at Bluemgrove, Bluemont, Osso, and Hightown".

Published records of museum specimens: Clarke Co., 1, Baird (1857), collection of U. S. National Museum. Highland Co., Hightown, 1, Kellogg (1937), collection of U. S. National Museum.

Specimens examined: Smyth Co., Mount Carmel, 1; mounted specimen in private collection. Looney, 1 (life-life mount); collection of Academy of National Sciences of Philadelphia.

EASTERN FLYING SQUIRREL  
Glaucomys volans volans (Linnaeus)

Having a state-wide distribution the eastern flying squirrel may be found in wooded areas where it can find places to make its home and obtain food. In localities where the habitat is congenial it is common, much more so than one would expect because of its nocturnal habits.

Bangs (1896) fixes Virginia as the type locality for this squirrel. Audubon and Bachman (1846 - 1854) write of finding several flying squirrels at Red Sulpher Springs, then located in Virginia, but now just across the line in West Virginia. According to Bailey (1923) flying squirrels are common at Mount Vernon and one was taken near Chain Bridge, Fairfax County. "At Falls Church Riley reported finding twelve living in hollows in one tree....." For Frederick County Bailey writes that "flying squirrels are said to be common in the woods along the foothills or on rough or uncleaned country" (field report, 1922). J. B. Lewis (1937 unpublished) writes that these squirrels are fairly common in Amelia and Brunswick Counties and abundant in Norfolk County. Examination of the stomach of

two snakes collected in Shenandoah and Augusta Counties give records of the flying squirrel from each of these counties (stomach cards, Food Habits Section, U. S. Biological Survey). One specimen from Falls Church, Fairfax County, reposes in the American Museum of Natural History (Hill, letter, 1938).

Published records of museum specimens: Nelson Co., 2, Bangs (1896), collection of Museum of Comparative Zoology. Arlington Co., Cherrydale, 1, Fort Myer, 1; Fairfax Co., Drainsville, 1, Dunn Loring, 4, Falls Church, 8, Mount Vernon, 7; Grayson Co., Mount Rogers, 2; Henrico Co., 1; Maywood (near Alexandria), 1; Manassas Co., Suffolk, 1; Warwick Co., 2, Howell (1918), collection of U. S. National Museum.

Specimens examined: Amelia Co., Amelia Court House, 2; Giles Co., Mountain Lake, 1; collection of Virginia Cooperative Wildlife Research Unit. Arlington Co., Four Mile Run, 1; Norfolk Co., 1; collection of U. S. National Museum.

#### Family Castoridae

##### CANADIAN BEAVER

##### Castor canadensis canadensis Kuhl

The first settlers who came to Virginia doubtless found beaver to be very abundant and widely distributed over the State, however, heavy trapping because of high fur prices soon reduced its numbers and finally exterminated it early in the twentieth century.

In 1932 the Virginia Commission of Game and Inland Fisheries started a beaver restocking program by introducing five pairs of these animals from Pennsylvania. During the following year two additional pair were privately purchased and placed in a private fish pond in Goochland County.

In the Fall of 1937, the National Park Service and the Commission of Game and Inland Fisheries secured seven pair from Michigan, New York and New Hampshire, and placed them in favorable localities throughout the State. As a result of this restocking, beaver are now present in the following counties: Augusta, Brunswick, Chesterfield, Cumberland, Dinwiddie, Fluvanna, Giles, Goochland, Louisa, Prince George, and Sussex.

Among the early writers to mention the occurrence of beaver in Virginia were Captain John Smith, 1612 (Arber, 1910), Beverly (1722), J. Clayton (1739)\*, and Audubon and Bachman (1846 - 1854). An article appearing in Forest and Stream (Vol. 7, No. 13, Nov. 2, 1876, page 197) states that beaver are still plentiful in Dinwiddie, Nottoway, Brunswick, Cumberland, and Greenville Counties. Whitehead (1893) writes that the clearing of the river bottoms and the cultivation of the bottomlands drove the beaver to the sluggish streams of the Tidewater, but later when millions of acres of uncultivated land grew up into forests, they came again into middle Virginia. Howle (1915) writes of trapping along the James River about "14 years ago" and states that he captured a 67-pound beaver and several smaller ones.

Published records of museum specimens: Powhatan Co., Genito, 1, Kearns (1907), collection of U. S. National Museum.

Specimens examined: Stony Creek, Dinwiddie Co., 2 (reintroduced); collection of Virginia Cooperative Wildlife Research Unit. Arlington Co., Four Mile Run, 1 (skin and skull, dated May 10, 1894); Sussex Co., Stony Creek, 1 (from National Zoological Park); collection of U. S. National Museum.

\*Virginia Historical Magazine, Vol. 7, No. 2, Oct., 1899, pp. 172-174.



Family Cricetidae

EASTERN HARVEST MOUSE

Reithrodontomys humulis humulis (Audubon and Bachman)

The range limits of the eastern harvest mouse in Virginia are imperfectly known. Howell (1914) gives its range as "southeastern United States, east of the Alleghenies, from southern Virginia to central Florida".

Audubon and Bachman (1846 - 1854) mention that they received a specimen of this species obtained in Virginia, but give no locality. H. S. Peters and E. G. Lung report that they collected two mice of this form at Petersburg, Prince George County, in April 1923, but the specimens cannot be located. A series of 24 skins and skulls from Amelia Court House, Amelia County, are decidedly grayer than specimens of R. h. humulis from the Dismal Swamp and their characters do not agree with R. h. impiger from northern Virginia. After examining these skins and skulls, A. H. Howell states that they should be described as a new subspecies when additional specimens have been received from localities adjoining Amelia County.

Published records of museum specimens: Dismal Swamp, 14, Howell (1914), collection of U. S. National Museum.

SMALL-EARED HARVEST MOUSE

Reithrodontomys humulis impiger (Bangs)

In Virginia this harvest mouse is known only from Fairfax and Arlington Counties, but undoubtedly its range extends further south in the Piedmont Plateau region of the State.

Published records of museum specimens: Arlington Co., Fort Myer, 1,

Mearns (1897), collection of U. S. National Museum. Alexandria, 1; Fairfax Co., Falls Church, 1, Howell (1914), collection of U. S. National Museum.

CLOUDLAND WHITE-FOOTED MOUSE  
Peromyscus maniculatus nubiterrae (Rhoads)

The cloudland white-footed mouse is a common species at the higher altitudes in the Blue Ridge and Allegheny Mountains. Along the semi-barren rocky cliffs at Bald Knob (altitude 4,363 feet), near Mountain Lake, Giles County, three days trapping in February, 1938, proved this mouse to be by far the most abundant species; while at Mountain Lake (altitude 3,873 feet) in more densely forested areas only three of these mice were taken during periodic trapping since September, 1936. In 1911, A. H. Howell took a specimen of this species at Devils Stairs (altitude 1,500 feet), near Washington, Rappahannock County, (record from Wildlife Surveys Office, U.S. Biological Survey). The latter record indicates that its occurrence is not strictly limited to the highest mountain tops but may rarely be found at lower altitudes in the Mountain region. In the American Museum of Natural History there are seven specimens from Highland County, Hightown; six from Grayson County (four from Mount Rogers, and two from Troutdale); and five from Giles County, Bald Knob (Hill, letter, 1938).

Published records of museum specimens: Bedford Co., Peaks of Otter, 2; Grayson Co., Mount Rogers, 4; Page Co., Skyland, 1; Tazewell Co., Tazewell Peak, 1, Osgood (1909), collection of U. S. National Museum. Tazewell Co., Rich Mountain, near Tazewell, 1 (altitude 4,100 feet), Howell (1909), collection of U. S. National Museum.

WHITE-FOOTED MOUSE  
Peromyscus leucopus leucopus (Rafinesque)

As interpreted from a map by Osgood (1909) the white-footed mouse occurs in southern Greenville, Isle of Wight, Nansemond, Norfolk, Princess Anne and Southampton Counties. Northwest of these counties to a diagonal line drawn from western King George to southwest Pittsylvania County, the map shows an area of intergradation with P. l. noveboracensis. Intergradation of these two races is also shown to occur in extreme southwest Virginia, north to southern Tazewell County. Osgood states that a series of specimens from the Dismal Swamp are referred to leucopus although it shows a decided tendency toward noveboracensis. From Dinwiddie and Prince George Counties six specimens collected during this investigation were considered as intermediates by A. H. Howell, yet he thinks that they possess characters which approach P. l. leucopus and are referable to this form.

In the Wildlife Surveys Office, U. S. Biological Survey, are museum records of specimens from Morrison, Warwick County, and Hog Island, Northampton County, contained in the collection of E. H. Bailey, Coral Gables, Florida. Four specimens from the Dismal Swamp are contained in the Museum of Zoology, University of Michigan (Dice, letter, 1938), and twenty-three specimens from Dismal Swamp, Lake Drummond, repose in the American Museum of Natural History (Dr. H. H. T. Jackson, letter, 1938). The latter specimens were identified by A. H. Howell.

Published records of museum specimens: Dismal Swamp, chiefly from Lake Drummond, 79; Elizabeth City Co., Hampton, 9; Gloucester Co., Capahosic, 4; Nansemond Co., Suffolk, 4; Tazewell Co., Tazewell, 6; Warwick Co., Newport News, 3, Osgood (1909), collection of U. S. National Museum.

Specimens examined: Gloucester Co., Capahosic, 4; Warwick Co.,

Newport News, 3; collection of Academy of Natural Sciences of Philadelphia. Dinwiddie Co., Stony Creek, 3; Prince George Co., Petersburg, 3; collection of Virginia Cooperative Wildlife Research Unit.

NORTHERN WHITE-FOOTED MOUSE  
Peromyscus leucopus noveboracensis (Fischer)

The northern white-footed mouse is probably the most abundant species of the family Cricetidae in Virginia.

According to a map by Osgood (1909) the range of this mouse includes the Mountain regions, east in the Piedmont Plateau to a diagonal line drawn from western King George County to southwestern Pittsylvania County. East of this line, intergradation with leucopus is shown. Intergradation of the two forms in southwest Virginia has been discussed above.

Bailey (1929) writing of this mouse in Bath and Highland Counties, says that "These are probably the common woods mice of the region". Lewis (1937 unpublished) considers this form the most abundant native mouse in Amelia County, and remarks that white-footed mice (probably P. l. leucopus) are very abundant in Brunswick County. All references to other localities in the State indicate that this mouse is abundant.

In the Carnegie Museum, Pittsburg, Pennsylvania, there are 21 specimens of this form: eight from Augusta County, nine from Bedford County, and four from Page County (Caroline Heppenstall, letter, 1938). The American Museum of Natural History has one specimen from Coovesville, Albemarle County, one from Bald Knob, Giles County, and one from Hightown, Highland County (Hill, letter, 1938).

Published records of museum specimens: Bedford Co., Peaks of Otter, 1, Osgood (1909), collection of U. S. National Museum.



Specimens examined: Amelia Co., 62; Bland Co., Bland Court House, 1, Botetourt Co., Buchanan, 2; Chesterfield Co., Chesterfield Court House, 9; Giles Co., Mountain Lake, 2; Montgomery Co., Blacksburg, 17; Roanoke Co., Salem, 1; Tazewell Co., North Tazewell, 1, Asbury's 1; collection of Virginia Cooperative Wildlife Research Unit.

COTTON MOUSE  
Peromyscus gossypinus gossypinus (LeConte)

The range of the cotton mouse in Virginia is restricted to the lowlands of the extreme southeast, mainly the Dismal Swamp. According to a map by Osgood (1909), Nansemond, Norfolk and Princess Anne Counties are included in its range. Dr. A. K. Fisher (field report, 1895) states that he took a specimen at Suffolk, Nansemond County, near the northern edge of the Swamp. To the writer's knowledge there are no records north of this point. Thirteen of these mice from the Dismal Swamp were referred to this race by A. H. Howell, and are contained in the American Museum of Natural History (Dr. H. H. T. Jackson, letter, 1926).

Published records of museum specimens: Dismal Swamp, 44, Osgood (1909), collection of U. S. National Museum.

NORTHERN GOLDEN MOUSE  
Peromyscus nuttalli nuttalli (Harlan)

In Virginia the known range of the golden mouse includes the Dismal Swamp northwest across the Piedmont Plateau, south of the James River, into the Allegheny Mountains of Southwest Virginia to Montgomery County. Specimens collected during this investigation from Amelia Court House, Amelia County and Blacksburg, Montgomery County, have established the occurrence of

this species in the southern Piedmont Plateau and southwestern Mountain regions of the State. These records provide reason for a westward extension of Osgood's (1909) range for this species of approximately 300 miles or more and aids in filling the gap previously existing between the eastern and western range limits of this mouse. Concerning six specimens from Amelia County, A. H. Howell (letter, 1937) writes that they "are of the golden mouse species P. nuttalli, but they are much paler than typical specimens and apparently represent a new subspecies". Howell states that additional specimens of this mouse are needed before the new form can be described.

In the Wildlife Surveys Office, U. S. Biological Survey, there are museum records of one specimen from Southampton County contained in H. H. Bailey's collection, Coral Gables, Florida. Four specimens from Lake Drummond, Dismal Swamp reposing in the American Museum of Natural History were referred to this race by A. H. Howell (Dr. H. H. T. Jackson, letter, 1938).

According to Osgood (1909) the type locality of this mouse is Norfolk, Norfolk County, and the type specimen is not known to exist.

Published records of museum specimens: Dismal Swamp, 44, Osgood (1909), collection of U. S. National Museum.

Specimens examined: Montgomery Co., Blacksburg, 1; collection of Virginia Cooperative Wildlife Research Unit.

#### RICE RAT

Oryzomys palustris palustris (Harlan)

The range of the rice rat is limited to the Coastal Plain region of the State. In the tidal flats of this region where there is a rank growth of various marsh plants these rats occur abundantly, but as the Piedmont Plateau region is approached their numbers decrease.

Dr. A. K. Fisher (field report, 1895) rates this animal very common in the Dismal Swamp, and V. Bailey (field report, 1916) writes that rice rats are very abundant in the big brackish marshes along the north side of the Rappahannock River opposite Tappahannock. McAtee (1918) writes of their occurrence at Colonial Beach, Westmoreland County.

J. E. Hill writes that seven specimens from the Dismal Swamp repose in the American Museum of Natural History (letter, 1928). According to museum records in the Wildlife Surveys Office, U. S. Biological Survey, there is one specimen from Morrison, Warwick County, in H. H. Bailey's collection, Coral Gables, Florida.

Published records of museum specimens: Accomac Co., Wallops Island, 3; Dismal Swamp, 20; Nansemond Co., Suffolk, 1; Northampton Co., Smith Island, 6, Wreck Island, 1; Richmond Co., Warsaw (4 miles southwest), 5; Westmoreland Co., Pope's Creek (5 miles southeast of Colonial Beach), 2, Goldman (1918), collection of U. S. National Museum.

EASTERN COTTON RAT  
Sigmodon hispidus hispidus Say and Ord

There are no authentic records for this animal from Virginia. It has been found at Raleigh, North Carolina and perhaps future collecting will extend its range north to Virginia.

Audubon and Bachman (1846 - '54) write that they "have traced it as far north as Virginia", but give no records of specimens to substantiate their statement.

ALLEGHENY WOOD RAT  
Nectoma pennsylvanica Stone

The wood rat is locally common throughout the Allegheny and Blue

Ridge Mountains and it has been taken in the Piedmont Plateau at points along the Potomac River between the Blue Ridge and Washington, D. C.

Concerning the occurrence of this animal along the rocky bluffs on the west side of the Potomac River in Fairfax County, Bailey (1896) writes that "they are fairly common at this point which they doubtless reach by following the river cliffs from Harpers Ferry, where the Potomac cuts through the Blue Ridge. No doubt they come a little further down, probably to the end of the high ridge opposite Georgetown". According to Howell (1909) wood rats are "abundant in crevices and caves in the cliffs at the summit" of Rich Mountain, Tazewell County. Again in 1911 A. H. Howell states in a field report that they are common on the mountains where there are cliffs and rock slides in Rappahannock County. McAtee (1918) writes of their occurrence along the upper Potomac. Bailey (1929) writing of this species in Bath and Highland Counties says: "Wood rats are found in many of the caves, among the rocks and rarely around buildings." During the Fall of 1937 the writer found wood rats quite common in rocky habitats in Dismal Creek Valley, Giles and Bland Counties. In November, 1937, near Buchanan, Botetourt County, they were found to be numerous in a cave through which a small stream ran.

Dr. P. R. Burch relates that an alcoholic specimen contained in the collection of the University of Virginia Biological Station was taken from a snake's stomach collected at Mountain Lake, Giles County. From the same locality there are five specimens contained in the American Museum of Natural History (Hill, letter, 1938).

Published records of museum specimens: Wythe Co., near Austinville, 1, Rhoades (1894), collection of Academy of Natural Sciences of Philadelphia.



Bedford Co., Peaks of Otter, 1; Fairfax Co., Difficult Run, (near mouth), 2, Franklin, 11, Great Falls, 10, Potomac River (opposite Hog Island), 2, Potomac River (10 miles above Washington), 7; Loudoun Co., Hillsboro, 1; Tazewell Co., Tazewell Peak, 4, Goldman (1910), collection of U. S. National Museum.

Specimens examined: Bland Co., near Hollybrook (Dismal Creek Valley), 1; Botetourt Co., near Buchanan (cave), 1; collection of Virginia Cooperative Wildlife Research Unit. Rappahannock Co., Washington, 3; collection of U. S. National Museum.

STONE LEMMING MOUSE  
Synaptomys cooperi stonsei Rhoads

The known range of the stone lemming mouse in Virginia as interpreted from a map by Howell (1927) includes the Mountain regions, east in the Piedmont Plateau to a line drawn from northern Westmoreland County to southwestern Pittsylvania County. Further work on this species will probably broaden its range to include the entire Piedmont Plateau region in the State.

Inhabiting a number of ecological situations it is difficult to state which is preferred. The writer has collected specimens from neglected fence rows, steep eroded banks supporting a sparse growth of honeysuckle and blackberry, and from open fields matted with a thick growth of Agrostis spp. (bent grass). In the latter situation the runways of this mouse were very abundant, but the animals were difficult to trap, only two specimens being taken from several traps in three nights.

Merriam (1892) records three skulls of S. cooperi from Arlington County, Munson Hill, found in long-eared owl pellets.

Published records of museum specimens: Campbell Co., 13; Grayson Co., Mount Rogers, 5, Howell (1927), collection of American Museum of Natural History.

Specimens examined: Giles Co., Mountain Lake, 1; Montgomery Co., Blacksburg, 1, Yellow Sulphur Springs (near Blacksburg), 1; collection of Virginia Cooperative Wildlife Research Unit. Giles Co., Mountain Lake, 1; collection of U. S. National Museum.

DISMAL SWAMP LEWMING MOUSE  
Synaptomys cooperi helalstes Merriam

As its common name implies this mouse inhabits the Dismal Swamp, Virginia. Howell (1927) gives the range as "Extreme southeastern Virginia and northeastern North Carolina".

Merriam (1896) describes this mouse from a specimen collected at Lake Drummond, Dismal Swamp, Norfolk County, Virginia, by Dr. A. K. Fisher, October 14, 1896.

Published records of museum specimens: Dismal Swamp, Lake Drummond, 22 (including type), Howell (1927), collection of U. S. National Museum.

GAPPER RED-BACKED MOUSE  
Clethrionomys gapperi gapperi (Vigors)

The gapper red-backed mouse is seldom taken and evidently quite uncommon in Virginia, but it has been found in boreal spots in both the Allegheny and Blue Ridge Mountains. The geographic distribution as given by Bailey (1897) is "From Massachusetts, New Jersey, and Pennsylvania northward and the Atlantic Coast westward to the Rocky Mountains in Canada".

Specimens taken in Virginia by members of the U. S. Biological Survey and the writer, provide reason for extending Bailey's range south in the mountains to Giles County, Virginia.

Bailey (1929) writing of C. sapperi in Bath and Highland Counties mentions that he observed favorable habitats where these mice would probably occur.

Specimens examined: Augusta Co., Elliott Knob, 1, Stokesville, 1; Bedford Co., Peaks of Otter, 1; Rappahannock Co., Washington, 2; collection of U. S. National Museum. Giles County, Mountain Lake, 1; collection of Virginia Cooperative Wildlife Research Unit.

CAROLINA RED-BACKED MOUSE  
Clethrionomys carolinensis (Merriam)

The limits of range of the Carolina red-backed mouse in Virginia have not been determined but it is known to occur in boreal spots in the extreme southwest portion of the Allegheny and Blue Ridge regions.

Miller (1898) writes of taking specimens of this form in a cold mossy rock-slide on the north end of Massanutten Mountain, Fort Valley, Warren County, but the specimens cannot be located. At Big Stone Gap, Wise County, this mouse was found to be numerous in a cool shady ravine where three specimens were taken July 28 and 29, 1908 (Howell, 1909). Five specimens of this species from Mount Rogers, Grayson County, repose in the American Museum of Natural History (Hill, letter, 1938).

Specimens examined: Grayson Co., Mount Rogers, 1, Whitetop, 1 (alc); Wise Co., Big Stone Gap, 3; collection of U. S. National Museum.

EASTERN MEADOW MOUSE  
Microtus pennsylvanicus pennsylvanicus (Ord)

The eastern meadow mouse occurs abundantly in favorable habitats throughout the Mountain, Piedmont Plateau, and northern Coastal regions in Virginia. In the latter region it intergrades with Microtus p. nigrans which occupies this area southward into North Carolina.

Audubon and Bachman (1846 - 1854) write that "It exists in the valleys of Virginia mountains; and we obtained a number of specimens from our friend, Edmund Ruffen, Esq., who procured them on the Pamunkey River in Hanover County, in that States where it was abundant". Concerning this animal in Bath and Highland Counties, Bailey (1929) writes that signs were found but none trapped or identified. Records from Augusta County resulted from the analysis of snake stomachs collected near Ramseys Draft (stomach cards, Food Habits Section, U. S. Biological Survey). According to Merriam (1892) ninety-five skulls of this species were found in long-eared owl pellets collected at Munson Hill. In a letter dated March 19, 1934, to the U. S. Biological Survey it is stated that eight specimens were taken by H. S. Peters and R. G. Lutz in April, 1933, at Petersburg, Prince George County. For Amelia and Brunswick Counties, Lewis (1937 unpublished) considers this species as occurring "irregular, but usually abundant in fields and meadows". Eight specimens from Bald Mountain, near Mountain Lake, Giles County, and eight from Campbell County repose in the American Museum of Natural History (Hill, letter, 1938).

Published records of museum specimens: Clarke Co., 3; Spottsylvania Co., 3, (Coues and Allen, 1877), collection of U. S. National Museum. Arlington Co., Arlington, 2, Fort Myer, 1; Fairfax Co., Falls Church, 2,



Dunn Loring, 2; Prince William Co., Bristow, 1, (Bailey, 1900), collection of U. S. National Museum.

Specimens examined: Albemarle Co., near Charlottesville, 1; Amelia Co., Amelia Court House, 15; Charlotte Co., Phenix, 1; Montgomery Co., Blacksburg, 8; Prince George Co., near Petersburg, 2; collection of Virginia Cooperative Wildlife Research Unit. Smyth Co., Southeast of Matton, 1 (skelton); collection of Food Habits Section, U. S. Biological Survey, Alexandria Co., 2; Alexandria, 1; Amelia Co., Amelia Court House, 2; Analostan Island, 1 (skin); Grayson Co., Mount Rogers, 3; Nelson Co., 1; Nelson Co., Midway Mills, 1; Westmoreland Co., Pope's Creek, 2 (1 odd skull); collection of U. S. National Museum.

ALBEMARLE MEADOW MOUSE  
Microtus pennsylvanicus nigrans (Rhoads)

The known range of this form in Virginia is confined to the Coastal Plain region from the North Carolina line north to Warsaw, Richmond County. Specimens examined from the latter locality have characters which show a tendency to approach M. p. pennsylvanicus, indicating intergradation of the two forms in the northern Coastal region. Bailey (1900) gives the geographic distribution of M. p. nigrans as "Coast region of northern North Carolina and southern Virginia, in the Austroriparian zone".

In the American Museum of Natural History there is one specimen from Suffolk, Nansemond County, and one from Lake Drummond, Dismal Swamp, both of which are labeled Microtus p. pennsylvanicus (Hill, letter, 1938). Since these specimens were taken in localities where typical nigrans occurs I am inclined to believe that they should be referred to this subspecies instead of pennsylvanicus.

Published records of museum specimens: Dismal Swamp, Wallaceton, 7; Northampton Co., Eastville, 1, Smith Island, 2, (Bailey (1900), collection of U. S. National Museum.

Specimens examined: Gloucester Co., Capahosic, 1; collection of Academy of Natural Sciences of Philadelphia. Northampton Co., Smith Island, 10; Richmond Co., near Warsaw, 2; collection of U. S. National Museum.

SMOKY MOUNTAIN ROCK VOLE  
Microtus shrotorhinus (Miller)

Although there are no Virginia records of this mouse it may be expected to occur at rather high altitudes along the Allegheny Mountain range.

Bailey (1929) writing of this species in Bath and Highland Counties says: "Some of the Microtus signs may have been of this yellow-nosed mouse but I could get no evidence if so. Still they should be searched for". Kellogg (1937) records specimens of this species from Cranberry Glades, Pocahontas County, West Virginia.

MOLE PINE MOUSE  
Pitymys pinetorum scalopsoides (Audubon and Bachman)

Having a state-wide distribution the mole pine mouse is abundant in the Coastal Plain and Piedmont Plateau regions, becoming less common through the mountains in the southwestern portions of the State.

Audubon and Bachman (1846 - 1854) write that they received specimens of the pine mouse from Virginia. Miller (1898) writing of this mouse at Fort Valley, on the north end of Massanutten Mountain, Warren County, says

that "Colonies of pine mice (Microtus pinetorum) occupied places that were sufficient sandy,....." V. Bailey (field report, 1928), rates them as very abundant in apple orchards in the northeastern end of the Shenandoah Valley. According to Bailey (1929) a few burrows and ridges which may have been made by this species were noted in Bath and Highland Counties. In May, 1937, while plowing feed patches on the Blacksburg Quail Demonstration Area, Montgomery County, a nest of pine mice was turned up and two of the half-grown young captured. This is the first record which I have obtained for this animal in two years of periodic collecting in the southwestern Mountain region, indicating that it is uncommon in this part of the State. In Nelson County, near Massies Mill, D. E. Lantz says that pine mice are abundant, especially in orchards (field report, 1909).

In the Piedmont Plateau region where pine mice are more common, there are records of specimens taken at Fort Marcy, on the west side of the Potomac River, and also near the west end of Long Bridge, which crosses the river from Washington (Bailey, 1896). At Falls Church, Fairfax County, J. H. Riley (field report, 1920) writes that in recent years pine mice have become "exceedingly abundant" and have done much damage to gardens. In Arlington County several specimens have been collected for food habit studies by members of the Food Habits Section, U. S. Biological Survey. According to Merriam (1892) twenty-four skulls of this mouse were taken from long-eared owl pellets collected at Munson Hill. Lewis (1937 unpublished) writes that pine mice are locally abundant in fields and meadows in Amelia and Brunswick Counties. In April, 1933, H. S. Peters and G. R. Lutz write that they collected two specimens near Petersburg, Prince George County, (letter, 1934). The writer captured a specimen which was disked up in a

grassy field at Camp Lee, Prince George County, in the Spring of 1937.

In the American Museum of Natural History there are four specimens from Fort Myer, Arlington County, one from Coveseville, Albemarle County, and two from Campbell County (Hill, letter, 1938).

Published records of museum specimens: Clover Green 1 (alc); Clarke Co., 3 (alc), 2 (skins), Baird (1857), collection of U. S. National Museum. Accomac Co., Belle Haven, 1; Arlington Co., Fort Myer, 1; Clarke Co., 2; Fairfax Co., Falls Church, 4, Dunn Loring, 1; Northampton Co., Cape Charles, 4; Wallaceton, Dismal Swamp, 4, Bailey (1900), collection of U. S. National Museum.

Specimens examined: Amelia Co., Amelia Court House, 8; Montgomery Co., Blacksburg, 1; Prince George Co., Petersburg, 1; collection of Virginia Cooperative Wildlife Research Unit. Warwick Co., Newport News, 1; collection of Academy of Natural Sciences of Philadelphia. Elizabeth City Co., Hampton, 1; Frederick Co., Winchester, 1; King George Co., Hampstead, 1; Nelson Co., 1; Pharsalia Farm, 1; collection of U. S. National Museum.

#### COMMON MUSKRAT

#### Ondatra zibethica zibethica (Linnaeus)

The range limits of the common muskrat in Virginia have not been definitely determined, but it is known to inhabit the southwestern portions of the Allegheny Mountains. It is probable that the range of this race will be found to include the entire Allegheny Mountain region and possibly a part of the Blue Ridge.

Muskrats are fairly common throughout the Mountain region of the



State, inhabiting streams, ponds and swamps where their favorite vegetable food grows in sufficient quantities to supply their needs. Bailey (1929) writes that a few muskrats were reported to be found along the river and creek banks in the mountain valleys in Bath and Highland Counties and that he saw one in a creek near Staunton, Augusta County. During the Fall of 1936 in the College Lake and along the adjoining stream at Virginia Polytechnic Institute, Blacksburg, muskrats became so numerous that they did serious damage to the lake banks. In April, 1938, near Prices Fork, Montgomery County, the writer examined two muskrat houses located in a small swamp along New River. Fresh tracks indicated that the houses were inhabited at that time. Dr. P. R. Burch of Radford relates that a specimen from Plum Creek, Montgomery County, reposes in the collection of the University of Virginia Biological Station, Mountain Lake.

Specimens examined: Montgomery Co., Blacksburg, 2 (1 odd skull); collection of Virginia Cooperative Wildlife Research Unit.

VIRGINIA MUSKRAT  
Ondatra zibethica macrodon (Merriam)

The Virginia muskrat, described by Merriam (1897) from a specimen taken at Lake Drummond, Dismal Swamp, is known to inhabit the Coastal Plain, Piedmont Plateau and northeastern Blue Ridge Mountain regions inland to Washington, Rappahannock County, in northern Virginia and to Nelson County in central Virginia. It is probable that further collecting in the southwestern Piedmont Plateau will extend the range west and establish a definite line of intergradation with O. z. zibethica.

Historical references to Virginia mammals include the muskrat as

being abundant during the early development of the country. Although not occurring in its former numbers it is considered as one of the most common fur bearers in the State.

In a field report (1898) Dr. A. K. Fisher considers the muskrat common along the ditches and lake shore at Lake Drummond, Dismal Swamp. E. A. Preble (field report, 1909) rates this species common along Pope's Creek, Westmoreland County, and states that many were trapped in 1909. Along the streams in the lowlands near Massies Mill, Nelson County, muskrats are considered common (D. E. Lantz, field report, 1909). Howle (1915) writes that he "caught 89 muskrats" about 1901 along the James River while trapping for beaver. In Fairfax County, J. H. Riley of Falls Church, says that fur trappers have greatly depleted the number of these animals in recent years (field report, 1920). Lewis (1937 unpublished) writes that muskrats are locally common along water courses and in swamps in Amelia, Brunswick and Norfolk Counties. In November, 1937, across the Rappahannock River from Tappahannock, the writer observed many muskrat houses in a large tidal marsh of several hundred acres. About 1000 skins are reported to be taken from this marsh each season without injury to the breeding stock. In a large swamp along Roanoke Creek, Charlotte County, muskrats were reported common and several newly built houses were observed in May, 1938.

Four specimens from Suffolk, Nansemond County, repose in the American Museum of Natural History (Hill, letter, 1938).

Published records of museum specimens: Arlington Co., Arlington, 1; Fairfax Co., Dunn Loring, 4, Warwick, 8; Lake Drummond, Dismal Swamp, 5; Nansemond Co., Suffolk, 6; Prince William Co., Quantico, 5; Rappahannock Co., Washington, 6; Spottsylvania Co., Fredericksburg, 1; Wallace-

ton, Dismal Swamp, 2; Westmoreland Co., Pope's Creek, 5, Hollister (1911), collection of U. S. National Museum.

Specimens examined: Charlotte Co., Charlotte Court House, 1; collection of Virginia Cooperative Wildlife Research Unit. Accomac Co., Chincoteague, 1; Fairfax Co., Potomac River (opposite Hog Island), 1; Nansemond Co., Suffolk, 6; Nelson Co., 2; Richmond Co., Warsaw, 1 (skull only); collection of U. S. National Museum.

#### Family Muridae

##### BLACK RAT

##### Rattus rattus rattus (Linnaeus)

At present this introduced rat is rare, and perhaps extinct in Virginia. In 1895 Dr. A. K. Fisher collected one at Lake Drummond, Dismal Swamp. From the same locality there is a specimen contained in the Museum of Zoology, University of Michigan (Dice, letter, 1938).

Specimens examined: Dismal Swamp, Lake Drummond, 1; collection of U. S. National Museum.

##### ROOF RAT

##### Rattus rattus alexandrinus (Geoffroy)

The present status of this exotic rat in Virginia is not definitely known, but it is undoubtedly very rare in all localities.

Specimens examined: Bedford Co., Peaks of Otter, 1 (July, 1906); Dismal Swamp, Lake Drummond, 1 (May, 1906); Page Co., Pass Creek, 12 miles east of Luray, 1, (November, 1916); collection of U. S. National Museum.

HOUSE RAT  
Rattus norvegicus (Erxleben)

This well-known introduced rat is abundant throughout the State and may be considered our most destructive rodent.

Specimens examined: Dinwiddie Co., Dinwiddie Court House, 1; Montgomery Co., Blacksburg, 2; collection of Virginia Cooperative Wildlife Research Unit. Wythe Co., near Austinville, 1 (alc); collection of Academy of Natural Sciences of Philadelphia.

HOUSE MOUSE  
Mus musculus musculus Linnaeus

Like the other members of this family, the familiar house mouse was accidentally introduced by the first settlers. It has a wide distribution and is unusually abundant in buildings often working out into fields.

Specimens examined: Amelia Co., Amelia Court House, 1; Montgomery Co., Blacksburg, 1; collection of Virginia Cooperative Wildlife Research Unit.

Family Zapodidae

HUDSON BAY JUMPING MOUSE  
Zapus hudsonius hudsonius (Zimmermann)

A search of the literature and museum collections has failed to reveal definite evidence for the occurrence of this subspecies in Virginia.

According to Preble (1899) the Hudson Bay jumping mouse ranges "..... from the southern shores of Hudson Bay south to New Jersey, and in the Mountains to North Carolina, ....." Specimens are listed from the mountains of West Virginia and North Carolina but there



are none from Virginia, yet it probably occurs here. This mouse should be searched for in open fields near water at the higher altitudes throughout the mountains.

CAROLINIAN JUMPING MOUSE  
Zapus hudsonius americanus (Barton)

The Carolinian jumping mouse is known to range through the Coastal Plain and Piedmont Plateau regions west in the southern Blue Ridge to Floyd County and in the northern mountains to central Shenandoah County. According to Preble (1899) this race intergrades with Z. h. hudsonius in the upper edge of the upper Austral Zone, but no Virginia specimens of the latter race have been examined to substantiate this.

This jumping mouse is well distributed throughout its range, but seldom collected and evidently rather uncommon. Audubon and Bachman (1846 - 1854) writing of Meriones hudsonius = Zapus hudsonius, state that they obtained a specimen from the Virginia mountains. Coues (1877) writes of observing this species in Virginia. Bailey (1923) states that Dr. Merriam caught one just above the west end of Aqueduct Bridge on the Virginia side of the Potomac in 1886, and in 1888 Morris M. Green secured several at a point a quarter of a mile below the west end of the old Long Bridge. In the same reference he writes again that Rorebeck, in 1896, collected one at Falls Church, Fairfax County, and in 1917 J. H. Riley found one in a barn owl's nest in the same locality. Lewis (1937 unpublished) writes that on October 24, 1935, a highway foreman sent him a living specimen which had been dug out of its winter quarters on a hillside above Deep Creek near the south line of Amelia County. This specimen is now in the

U. S. National. Gordon W. Jones of Wilderness, Orange County, tells me that he captured a live jumping mouse in a meadow on his farm during the Summer of 1937, but it escaped from its cage.

Published records of museum specimens: Fairfax Co., Accotink, 1, Falls Church, 1, Preble (1899), collection of U. S. National Museum.

Specimens examined: Albemarle Co., Charlottesville, 1 (skin only); collection of Virginia Cooperative Wildlife Research Unit. Floyd Co., Willis, 1 (alc); collection of Radford State Teachers College. Elizabeth City Co., near Hampton, 2; Fairfax Co., Accotink, 1 (alc); Page Co., 1; Prince William Co., Gainesville, 1 (alc); Shenandoah Co., Maurertown, 1 (alc); collection of U. S. National Museum.

ROAN MOUNTAIN JUMPING MOUSE  
Nesaozapus insignis roanensis (Preble)

This bright colored jumping mouse is known to occur in wooded boreal spots in the Virginia Allegheny and Blue Ridge Mountains from southern Grayson to northern Augusta County. Further collecting will probably extend the present known range northeast in the Virginia mountains.

During this investigation a specimen was collected near Mountain Lake, Giles County (altitude 3,600 feet), in a cool mossy habitat along a stream bank supporting a sparse growth of hemlock and rhododendron. Greenfield (1938) writes of taking two specimens from the stomachs of snakes which were collected in Augusta County in 1937. These specimens are in the collection of the U. S. Biological Survey.

Specimens examined: Giles Co., near Mountain Lake, 1; collection of Virginia Cooperative Wildlife Research Unit. Giles Co., Eggleston, 1; Grayson Co., Mount Rogers, 1; collection of U. S. National Museum.

Family Erethizontidae

AMERICAN PORCUPINE  
Erethizon dorsatum dorsatum (Linnaeus)

It is barely possible that the American porcupine occurs as far south as Virginia but I have found no specimens to substantiate this.

In 1739, John Clayton of Gloucester County writing to a friend in London says: "..... and there has been two Porcupines killed here, but they are very scarce". (Virginia Historical Magazine, Vol. 7, No. 2, October 1899, pages 172 - 174.) DeKay (1842) gives the southern limit of range as "..... the northern parts of Virginia, Kentucky, and through the western regions of the Rocky Mountains." Audubon and Bachman (1846 - 1854) state that they have had no success in finding porcupines in Virginia. Elliott (1901) writes: "Formerly it extended along the Alleghenies through Pennsylvania into Virginia and possibly to Kentucky." W. D. Saunders of Blacksburg, relates that he secured some of the quills from a porcupine killed a few years ago at Black Hill Farm, Franklin County, by opossum hunters.

Order 7. Lagomorpha  
Family Leporidae

VIRGINIA VARYING HARE  
Lepus americanus virginianus (Harlan)

No authentic records, backed by study material, have been located for this hare in the State, yet it is included by most writers as occurring south in the mountains to Virginia.

Audubon and Bachman (1846 - 1854) write: "Mr. Doughty informed us that he had procured a specimen on the Alleghany Mountains in the Northern part of Virginia, Latitude 40° 29', where it had never before been ob-

served by the inhabitants. On seeking for it afterwards in the locality from which he obtained it, we were unsuccessful, and we are inclined to believe that it is only occasionally that some straggler wanders so far South among these mountains, and that its southern limit may be set down at about 41°." According to Bangs (1898), it ranges "in the Allegheny Mountains to Virginia and West Virginia". He further states that "Mr. Thaddeus Surber writes me that it still occurs in the heavy hemlock and spruce forests of some of the higher mountains near White Sulphur Springs, West Virginia." This locality is less than eight miles from the Virginia - West Virginia line. Elliott (1901) and Nelson (1909) give the range as south in the mountains to Virginia, but give no records to substantiate it.

It was thought that this animal might occur at Mountain Lake, Giles County, but an ecological study of the region (1936 -1938) failed to give evidence of its presence.

EASTERN COTTONTAIL

Sylvilagus floridanus mallurus (Thomas)

The geographic distribution of this cottontail rabbit as given by Nelson (1909), is "Mainly east of Allegheny Mountains....." Although this species is more common in its prescribed range, it is known to occur further west in the lower regions of the Alleghenies in the State. For Bath and Highland Counties, Bailey (1929) writes that "these cottontails are common in all the valleys and are valuable game animals". At Blacksburg, Montgomery County, this race was found to be abundant and one specimen was collected for identification in February, 1937.



In the Piedmont Plateau region, where it is common, the eastern cottontail is the only species of rabbit which occurs. It is also quite common in the Coastal Plain region, but here the marsh rabbit, S. p. palustris, and hitchens rabbit, S. f. hitchensi, occupy restricted areas within its range. E. A. Preble considers this species as very common at Pope's Creek, Westmoreland County, and states that he saved two skulls from several that were shot (field report, 1909). Other field men use "common" in diagnosing the numbers present in the following localities: Accomac Co., Belle Haven; Dismal Swamp; Frederick Co., Winchester; Northampton Co., Cape Charles, and Rappahannock Co., Washington (field reports). J. H. Riley considers them abundant at Falls Church, Fairfax County in 1920 (field report).

For Amelia and Brunswick Counties, Lewis (1937 unpublished) considers this rabbit common to abundant, and for Norfolk County he rates it common except in swamps and marshes. Specimens from Smith Island and Fishermans Island referred to this form by Nelson (1909), were renamed S. f. hitchensi by Mearns (1911).

Published records of museum specimens: Accomac Co., Belle Haven, 2; Alexandria, 1; Arlington Co., Arlington, 6, Fort Myer, 1; Bedford Co., Peaks of Otter, 2; Campbell Co., 3; Dismal Swamp, 5; Fairfax Co., DunnLoring, 1, Great Falls, 1, Mount Vernon, 1; King George Co., Hampstead, 2; Northampton Co., Cape Charles, 2; Westmoreland Co., Kinsale, 1, Nelson (1909); collection of U. S. National Museum.

Specimens examined: Montgomery Co., Blacksburg, 1 (skull); collection of Virginia Cooperative Wildlife Research Unit. Westmoreland Co., Pope's Creek, (5 miles Southeast of Colonial Beach) 2 (skulls); col-

lection of U. S. National Museum.

HITCHENS COTTONTAIL  
Sylvilagus floridanus hitchensi Mearns

This cottontail is known only from Smith Island and Fishersman Island in southern Northampton County. Mearns (1911) described it from a specimen which he took on Smith Island, May 13, 1910.

Published records of museum specimens: Northampton Co., Smith Island, 6 (including type), Fishersman Island, 1, Mearns (1911), collection of U. S. National Museum.

MEARNS COTTONTAIL  
Sylvilagus floridanus mearnsii (Allen)

As interpreted from a map by Nelson (1909) the range of this cottontail includes Buchanan, Dickenson, Lee, Russell, Scott, Washington, Wise and the western part of Smyth and Tazewell Counties, but no Virginia specimens are listed. A search of museum collections has failed to reveal specimens of cottontail rabbits from extreme southwest Virginia, and none have been collected from this locality during this investigation.

In order to obtain positive evidence for its occurrence in Virginia and determine the range limits and areas of intergradation with S. f. malurus, it will be necessary to collect a series of cottontail skins and skulls from the designated range.

NEW ENGLAND COTTONTAIL  
Sylvilagus transitionalis (Bangs)

Although there are only three definite Virginia records from two lo-

calities, the New England cottontail doubtless occurs commonly along the wooded hilltops throughout the higher parts of the Virginia Alleghenies. The eastern and western limits of its range are unknown. Nelson (1909) gives the geographic distribution as "....., eastern Pennsylvania and Maryland to Alexandria, Virginia; also along the Alleghenies through West Virginia to Roan Mountain, North Carolina .....", and lists one specimen for Virginia from Alexandria. Concerning this specimen, Bailey (1923) writes that "..... a specimen which I bought on January 1, 1904, of a colored man on the street, who said he killed it at Alexandria, probably came from West Virginia where they are common and often included in shipments of rabbits to market ..... These cottontails belong to the Transition Zone of the Allegheny Mountains and there is no unquestionable record of their occurrence nearer Washington than White Sulphur Springs and Travelers Repose, West Virginia."

Bailey (1929) writing of this animal in Bath and Highland Counties says that "two species of cottontails undoubtedly occur here, the big dark brown one high up and in the brush and woods is undoubtedly of this species. Signs were seen all through the woods along the crests of ridges clear up to the fire lookout on Warm Springs Mountain. It is a distinct species and does not mix with the common cottontail of the valley country". In July, 1937, these rabbits were frequently jumped and often seen along the trails on Fort Lewis Mountain, near Salem, Roanoke County, and a specimen collected was referred to this species by A. H. Howell. At Mountain Lake, Giles County, during the winter of 1937-1938, rabbit sign was abundant along the tops of ridges and a few of the animals were seen but no specimens collected and identified.

Specimen examined: Roanoke Co., Fort Lewis Mountain (near Salem), 1; collection of Virginia Cooperative Wildlife Research Unit. Augusta Co., Elliott Knob, 2; collection of U. S. National Museum.

MARSH RABBIT  
Sylvilagus palustris palustris (Eachman)

The marsh rabbit is known to occupy the lowlands and marshes in Hansemond, Norfolk and Princess Anne Counties and it probably occurs further north along the Virginia Coast, possibly to the mouth of the Potomac River, but there is no material yet available to substantiate this.

E. A. Preble (field report, 1909) writing of this species at Pope's Creek, Westmoreland County says: "A marsh rabbit larger than a cottontail is said to be occasionally taken." H. H. Bailey (1930) writes that he has taken these rabbits during high water from the brackish marshes of Lynnhaven and down the coast to Back Bay, Princess Anne County. Lewis (1937 unpublished) considers this rabbit "common in the Dismal Swamp and in the fresh water tide marshes along the headwaters of the Elizabeth River".

Published records of museum specimens: Dismal Swamp, 4, Nelson (1909), collection of U. S. National Museum.

Specimens examined: Dismal Swamp, 1; collection of U. S. National Museum.

Order S. Artiodactyla  
Family Cervidae

ELK  
Cervus canadensis canadensis (Erxleben)

Upon the arrival of the white settlers elk were found to be a common species in Virginia. Of the many printed references to this animal in the



State a few have been selected to indicate its status until the time of its extinction about 80 years ago.

Seton (1929) quotes Purchas as saying that Captain George Weymouth, during his visit to Virginia in 1605, found animals with horns and broad ears which he took to be "Olks or Loshes". Beverly (1722), Alford and Bidgood (1912) and others, in accounts of the first expeditions into the western mountains of Virginia speak of elk being plentiful on the broad level plains. John Clayton who lived in Gloucester County, writing to a friend in London in 1739, mentions the occurrence of elk in the State (Virginia Historical Magazine, Vol. 7, No. 2, pages 172 - 174). In 1781, Thomas Jefferson writing of the animals in Virginia says that the elk was formerly abundant and "still exists in smaller numbers" (Jefferson, 1853). Audubon and Beckman (1846 - 1854) writing of elk in the Mountain region say: "On a visit to western Virginia in 1847, we heard of the existence of a small herd of Elk that had been known for many years to range along the high and sterile mountains about forty miles to the west of Red Sulphur Springs. The herd was composed of eight males, whose number was ascertained by their tracks in the snow..... As, however, the males at certain seasons keep in separate groups, we have no doubt there was a similar number or larger herd of females in the same range; but the number is doubtless annually lessening,....." According to Baird (1857) specimens were sent to the Smithsonian Institution from Clarke County by Jos. Tuley in October 1854 and January 1855.

The present occurrence of elk in Virginia has resulted from restocking by the State Department of Game and Inland Fisheries. One of the first acts of this State agency was to import 150 elk in 1917 from the

Yellowstone National Park herd. In 1935, through the cooperation of the U. S. Park Service and the U. S. Biological Survey, another consignment of 54 animals was received from the same source. At present two herds exist, one ranging to the west of Pearisburg in Giles and Bland Counties, and the other is east of Buchanan in Botetourt County. The former herd probably numbering 100 animals, inhabits the rough mountainous section of some 60,000 acres comprising the watershed of Dismal, No Business and Mill Creeks in the eastern border of the Allegheny Mountains, and the latter herd, of probably thirty animals, the more restricted range in eastern Botetourt County in the Blue Ridge Mountains.

Published records of museum specimens: Clarke Co., 2, Baird (1859), collection of U. S. National Museum.

VIRGINIA DEER  
Odocoileus virginianus virginianus (Boddaert)

According to Seton (1929), the first identifiable record for deer in Virginia was made by Thomas Hariot who visited this territory in 1584. In his account of the colony he says: "Of Beasts. Deer in some places there are great store: neere unto the seacoast they are of the ordinary bignes as ours in England, and some lesse: but further up into the country where there is better feed, they are greater: they differ from ours only in this, their tails are longer, and their hornes look backward." (Quaritch Reprint 1893 p. 29). Apparently the next mention of deer in Virginia is made by Captain John Smith when early in the seventeenth century, according to Arber (1910), he writes: "Of beasts the chief are Deere, nothing different from ours. In the deserts towards the heads of rivers, there) are many, but amongst the rivers few." Clayton (1694) writing of "beasts" in

Virginia says: "there are abundance of brave red deer so that a good woodsman, as they call them, will keep a house in venison." Beverly (1722), mentions the occurrence of deer in Virginia and Boyd (1933), gives many instances of deer being killed by William Byrd along the Virginia - North Carolina dividing line in 1728. George Washington, at Mount Vernon, Fairfax County, in his diary for the latter part of the eighteenth century makes frequent mention of his fox hounds being side-tracked on a deer chase. Audubon and Bachman (1846 - 1854) writing of deer say: "In the mountainous portions of Virginia it is hunted with success." According to Wayland (1912), an article in The Register (Nov. 29, 1877) contained the following about the hunting experiences of the late James Todd of Rockingham County: "He was the most remarkable hunter in the Valley of Virginia, having killed over 2700 deer up to 1860, with one muzzle loading rifle....." Shaler (1888 - '89), writing of animal life in the Dismal Swamp says: "Deer are now rare but they have been somewhat plenty." For Nimrod Hall, Bath County, Watson (1901), writes that "there are more deer here than was ever known before." He remarks that during a six-day hunt they killed six deer and missed twenty-one. Near Richmond, Henrico County, Bell (1913), writes of starting twelve deer and killing four during a five-day hunt.

That deer were once abundant throughout the State is indicated by the foregoing references and others too numerous to mention. In spite of the inconceivable destruction of these animals since the white man first arrived native deer are yet plentiful enough in a few localities to allow an annual open season on bucks without injury to the breeding stock. In extensively wooded areas in eastern and northern Virginia native deer are found mainly along the rivers and their larger tributaries, and in the mountains native

stock is known to occur only in isolated sections of Allegheny, Augusta, Bath, Botetourt, Craig, Frederick, Highland, and Shenandoah Counties.

Deer in other counties in the Mountain region have been reintroduced from other states. The location of native stock and reintroduced stock as indicated in figure 1, shows the present general distribution of deer in Virginia very well.


During the Summer of 1937 the writer found introduced deer to be on the increase in northern Smyth and southern Tazewell Counties, but in Bland County unfavorable conditions had caused most of the introduced animals to stray into adjoining territory. For Bath and Highland Counties, Bailey (1929) says that "deer are still well represented, but not in half the numbers they should be". Wm. A. Hite, Game Warden of Bath County, estimates 1500 deer in the County and Bailey thinks that this is a very conservative estimate. Bailey considers 1000 a safe estimate of the number in Highland County.


Life-like mounts of deer heads from Virginia are not uncommon in private collections throughout the State, but in very few instances has there been any definite date kept for such specimens. Among several mounts of Virginia deer in the Virginia Timber, Mineral and Historical Museum, there is one albino buck shot in Greensville County during the season of 1922-1923.

Published records of museum specimens: Rowleysburg, 2, Baird (1859), collection of U. S. National Museum. Appomattox River, 1 (skull); Bath Co., Hot Springs, 1 (skull); Frederick Co., Winchester, 1 (skull); Henrico Co., Richmond, 1 (skull); Highland Co., 1 (skull); Rowleysburg, 1 (skull); Surry Co., Claremont, 1 (skull), Barbour and Allen (1922), collection of U. S. National Museum and American Museum of Natural History.



LEGEND

 Native deer

 Restocked deer

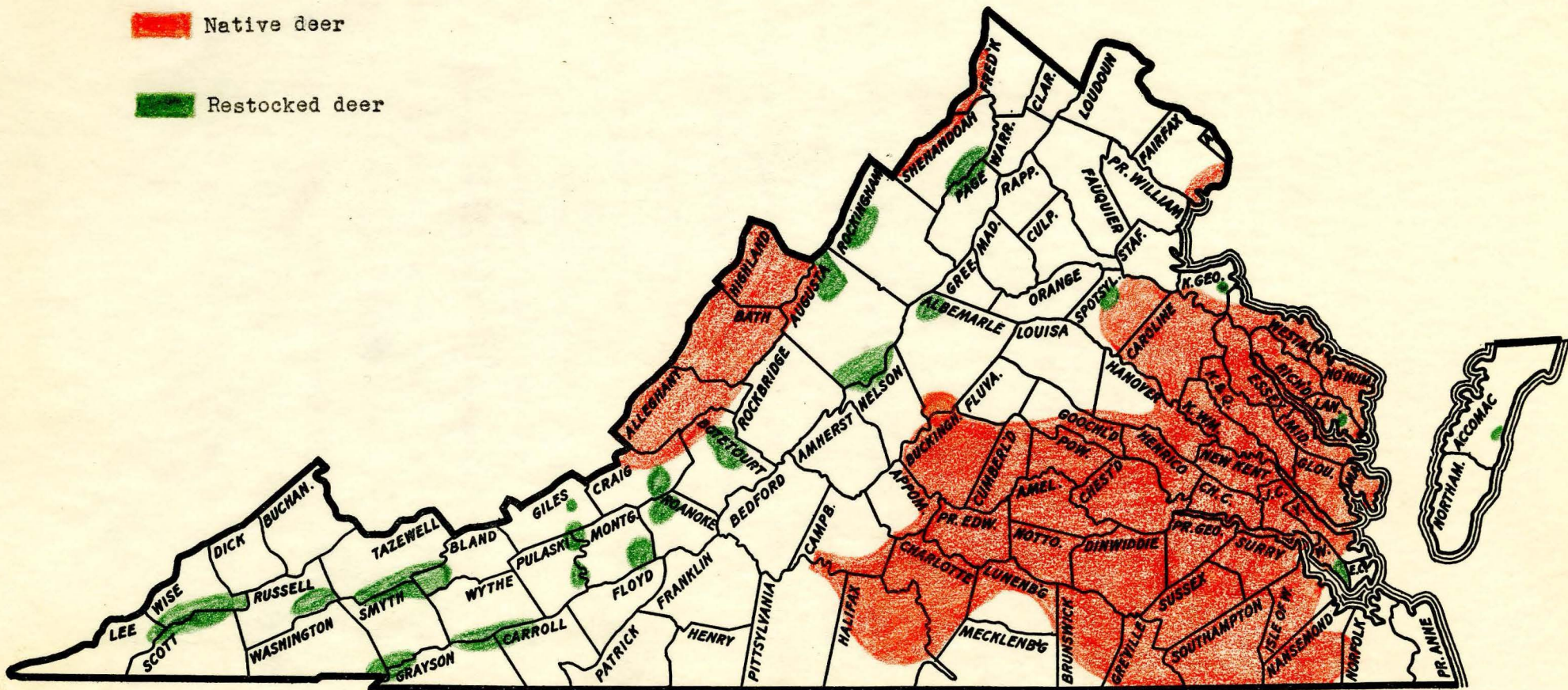


Fig. 1. DISTRIBUTION OF NATIVE AND RESTOCKED DEER.  
Information compiled by Handley and Patton,  
September 1938

Specimens examined: Chesterfield Co., 1 (skull); Greensville Co., Emporia, 1 (skull); Henrico Co., 1 (skull); New Kent Co., 1 (skull); Prince George Co., Hopewell, 1 (skull); collection of U. S. National Museum. Craig Co., 1 (skull); collection of Academy of Natural Sciences of Philadelphia.

Family Bovidae

EASTERN BISON

Bison bison pennsylvanicus (Shoemaker)

Early records indicate that the first settlers found buffalo rather common in some portions of the State and that a few were still present during the latter years of the eighteenth century. A buffalo killed near the "Big Sandy" in 1798 is the last record which I have found for this animal in the wilds of Virginia and from this it might be assumed that they disappeared about one hundred and thirty-eight years ago.

According to Seton (1929) the occurrence of buffalo was recorded for Virginia in 1612 by Sir Samuel Argoll. Doyle (1861) writes as follows: "Purchas says that as early as 1613 the adventurers in Virginia discovered a "slow kind of cattel as bigge as kine, which were good meate". Beverly (1722) records the occurrence of buffalo on the frontier plantations. Hays (1871) writes: "Brickell says that two were taken alive in 1730, near where Newbern now stands." In November, 1933 William Byrd killed a young buffalo, 2 years old, on Sugar-tree Creek, a branch of the Dan River near Danville (Boyd, 1929). In 1739 John Clayton included the buffalo in his list of mammals occurring in Virginia (Virginia Historical Magazine, Vol. 7, No. 2, October, 1899, pp. 172 - 174). Goode (1896) writing of Thomas Jefferson's boyhood days says: "At the time of his birth, in 1743, buffalo still s-

\*Reference is to what is now West Virginia territory - formerly Virginia territory



bounded in the neighborhood. Ten years before a buffalo calf had been captured just across the Blue Ridge and taken as a gift to the governor at Williamsburg. The Huguenot colonist at Manikintown, fifty miles down the James, kept buffalo in domestication for milk and beef. A trail frequented by the buffalo herds crossed the Blue Ridge at Rockfish Gap, twenty-four miles west of Charlottesville, passed the Shenandoah at a ford near Staunton, and afterward over the next range by a passage still known as "Buffalo Gap", into the beautiful valleys, then, as at present, called the "Cow Pasture" and the "Calf Pasture", doubtless because of the presence there of buffalo herds in the days when they were named." According to Coues (1871) "The occurrence of buffalo in Virginia up to the close of the last century, can be substantiated beyond question. Surgeon J. Simpson, U. S. A., who was well acquainted with Nathan Boone (son of Daniel Boone the pioneer, and then a captain in the service), informs me that he had the fact, in 1843, from Nathan Boone himself, who killed buffalo in Virginia in 1793 - '97 - '98." In giving particulars of the incident Coues quotes part of a letter by Dr. Charles McCormick as follows: "I have just seen Capt. Boone and he promises to write and tell you all about it. In the meantime, he says he killed his first buffalo somewhere about 1793, on the Kenawha in Virginia. He was then quite a small boy. He has also killed buffalo on New River and near the Big Sandy in Virginia in '97 and '98." Bailey (1929) writing of buffalo in Bath and Highland Counties says: "Buffalo are not remembered by the oldest inhabitants but are well known by tradition in the valleys of Bullpasture, Cowpasture and Calfpasture Creeks, which are said to owe their names to these animals a hundred years ago or more". Bailey thinks that there were never many buffalo in this region because it is too rough and steep and heavily

\*References are to what is now West Virginia territory - formerly Virginia territory.

timbered.

Order 9. Cetacea  
Family Balaenidae

NORTH ATLANTIC RIGHT WHALE  
Eubalaena glacialis (Bonaterre)

The North Atlantic right whale is rather uncommon along the Virginia coast, but it is included in the authentic list on the basis of a specimen reported taken in North River, Gloucester County.

Reynard (1889) writes: "In the fall of 1886, Dr. P. A. Taliaferro, with a double-barreled shotgun, killed a Greenland or right whale in North River, Va., an estuary of Mobjack Bay which opens into the Chesapeake between New Point Comfort and the mouth of York River on York Spit. The whale was forty-six feet long, and if I remember correctly girthed twenty feet. The measurements and incident are sworn to, and were, until they were destroyed by fire during the late war, a part of the records of Gloucester County."

Family Balaenopteridae

COMMON FINBACK WHALE  
Balaenoptera physalus (Linnaeus)

According to Stone (1907) this seems to be the most common whale along the eastern shores of the United States. It is included for Virginia on the basis of a specimen caught in Mobjack Bay in May, 1866 (Allen 1869). R. L. C. Barret in an article in the Richmond News Leader (March 25, 1935) writes of a large whale which got stranded on a sandbar in Cobbs Channel, Northampton County, in the eighties. This animal was probably a finback.



POLLACK WHALE  
Balaenoptera borealis Lesson

There is one record of this rare whale from the Virginia coast. Miller (1927) writing of the pollack whale says: "..... a second North American specimen, likewise an entire skeleton, was added to the national collection (No. 239, 307). This individual came ashore at Walnut Point, Northumberland County, Virginia, in March 1923."

HUMPBACK WHALE  
Megaptera novae - angliae (Bonaterre)

While no actual Virginia specimens of this whale have been located, it is included on the basis of Stone's (1907) statement that "it has been taken as far south as Virginia."

Family Kogiidae

PIGMY SPERM WHALE  
Kogia breviceps (Blainville)

There is a specimen of the pigmy sperm whale from Dam Neck Mills, Virginia, in the U. S. National Museum. Although reported rather uncommon this is a widely distributed species and may be expected along the Virginia coast at any time.

Family Delphinidae

SPOTTED DOLPHIN  
Prodelphinus plagiodon (Cope)

Definite evidence of this dolphin from Virginia has not been found. Miller (1924) gives its range as "Atlantic coast of United States; Cape Hatteras; Gulf of Mexico." It may be expected to occur along the Virginia

coast at any time.

COMMON DOLPHIN  
Delphinus delphis Linnaeus

The common dolphin is reported to be uncommon on the Atlantic coast, but there are two Virginia specimens in the U. S. National Museum; one from Dan Neck Mills, and the other from Cobbs Island, Northampton County.

BOTTLE - NOSED DOLPHIN  
Tursiops truncatus (Montague)

This dolphin is quite common along the Atlantic coast and three specimens of this species in the U. S. National Museum have been taken from Virginia waters; one from Bluff Point, and two from Cherrystone Point.

ATLANTIC KILLER  
Orcinus orca (Linnaeus)

I have found no records of this species from Virginia waters, but since its distribution is considered "Cosmopolitan" (Miller, 1924) it may occur here at any time.

FALSE KILLER  
Pseudorca crassidens (Owen)

A search of the records has failed to reveal evidence for this species from Virginia. Miller (1920) records a specimen in the U. S. National Museum from Princeton, Florida and mentions that the animal has a cosmopolitan range. It is possible, therefore, that the false killer may at some time be taken along the Virginia coast.

BLACKFISH  
Globicephala melaena (Traill)

Miller (1924) gives the range of this animal as "Atlantic coast of North America to New Jersey; ....." Specimens in the U. S. National Museum from Cape Henry and Chincoteague provide reason for extending Miller's range south to southern Virginia. Apparently this species is rare in the southern limits of its range.

SHORT - FINNED BLACKFISH  
Globicephala brachyptera (Cope)

Virginia records for this species have not been found. According to Miller (1924) it ranges along the "Atlantic coast of North America from New Jersey to the Gulf of Mexico and the West Indies." Future collecting will probably give definite evidence for the occurrence of this animal in Virginia waters.

HARBOR PORPOISE  
Phocaena phocaena (Linnaeus)

The range of this porpoise on the eastern coast of the United States as given by Miller (1924) is "..... Maine to New Jersey; ....." No Virginia records have been found but future collecting will probably add this species to the State list of authentic records.

Family Ziphiidae

TRUE'S BEAKED WHALE  
Mesoplodon mirum True

Virginia records for this whale have not been found, yet it probably

occurs at times along the coast. According to Miller (1924) the type specimen of this species from Beaufort Harbor, Carteret County, North Carolina, reposes in the National Museum collection.

CUVIER WHALE  
Ziphius cavirostris G. Cuvier

A search of the records has failed to reveal evidence of this whale from Virginia, but since its distribution is considered "Cosmopolitan" (Miller, 1924) it may be expected to occur periodically along the coast.



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