

**Article XVI.—A STUDY OF THE VERTEBRATE
FAUNA OF THE HUDSON HIGHLANDS, WITH
OBSERVATIONS ON THE MOLLUSCA, CRUSTA-
CEA, LEPIDOPTERA, AND THE FLORA OF THE
REGION.**

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I.—INTRODUCTION.

The mountainous section of the Hudson Valley, beginning at the Fishkill Mountains and Storm King, and extending south for 20 miles to Kidd's Point or Caldwell's Landing, is known as the 'Highlands of the Hudson.' Restricting the scope of this paper to the immediate Hudson River drainage on the east and west, we have as the field of observation an area about 20 miles square.

The topography of this region is rough, the country abounding in rugged mountains, belonging to the Alleghany chain, with peaks rising to heights between 1500 and 2000 feet, and the Hudson River—a long brackish estuary—winding below. Rocky ledges and vertical cliffs on the sides next to the river give a bold character to the scenery, which is beautified by a varied arborescent flora and dashing mountain streams. A charm is added by the islets in the Hudson, which are often joined to the shore by green salt-marshes, fretted with tide-creeks, and, in summer, flecked with flowers. Numerous small lakes occupy basins among the hills, at various levels, some close to the Hudson, others near the summits of the mountains.

This region belongs essentially to the 'Transition Life Zone, though with local traces of the faunas of the Lower Boreal and Upper Austral Zones. It contains elements of three recognized faunas: Alleghanian, Carolinian and Canadian. The prevailing fauna and flora are, of course, Alleghanian, but there are distinct evidences of an overlying Carolinian tinge on low ground near the Hudson, and a slighter capping of the Canadian on the peaks and high spruce-grown swamps.¹

¹ In the interior of the Catskill Mountains, farther up the Hudson, where the streams have an altitude of from 1500 to 2000 feet, with neighboring mountains reaching 4000 feet, the Canadian element predominates over the Alleghanian in the valleys, and alone prevails on the mountains.

The period covered by the following observations is rather difficult to state with exactness, as this region was my birthplace, and my home during the first twenty-seven years of my life, so that it is impossible to say when they began; but most of the collections were made between the years 1872 and 1884 (when I entered the military service and was ordered to the West).¹ During those years, from my country home two miles south of the West Point Military Academy (latitude, $41^{\circ} 23'$ north; longitude, $3^{\circ} 3'$ east) as a center, I ransacked almost all of this area. Again, in September and October, 1896, several weeks were spent in making collections about my old home; in this I was greatly assisted by my children.²

For assistance in verifying names and identifying specimens my grateful acknowledgments are due to the curators of the several departments of the Smithsonian Institution and United States National Museum, especially to Miss M. G. Rathbun, Mr. James E. Benedict, Mr. Charles T. Simpson, Mr. Barton A. Bean, Dr. Tarleton H. Bean, and Dr. Leonhard Stejneger.

The flora of the Hudson Highlands, as would be inferred from the above remarks on the topography and floral position of the region, is somewhat varied, and rather extensive for an area of no more than 400 square miles. A general collection of Spermatophyta and Pteridophyta was made by my wife during the years 1882 and 1883, and again in 1896. These plants were donated to the American Museum of Natural History, in New York, where they have been determined and catalogued by Mr. L. P. Gratacap. The country is well wooded in most parts, though, owing to the shallowness of the soil, which is mostly rocky, the trees seldom grow to a large size. On account of the sterility of the soil much of the land is still wild, and supports but a small population. The forests are largely composed of coniferous and deciduous trees mixed, the coniferous being, however, most abundant on the river banks, and the deciduous greatly outnumbering the coniferous in the back country. Following is a list of the trees, shrubs, and woody vines found by us in the Hudson Highlands:³

¹ These early collections now belong to the American Museum of Natural History in New York.

² These last collections were sent to the U. S. National Museum at Washington.

³ The scientific names of the trees are printed in **heavy-faced** type, and those of the shrubs and vines in *italics*.

TREES, SHRUBS AND WOODY VINES.

1. *Pinus rigida* Miller. Pitch Pine.
2. *Pinus strobus* Linn. White Pine.
3. *Larix laricina* (DuRoi). Tamarack.
4. *Picea mariana* (Miller). Black Spruce.
5. *Tsuga canadensis* (Linn.). Hemlock.
6. *Thuja occidentalis* Linn. Arborvitæ.
7. *Juniperus communis* Linn. Common Juniper.
8. *Juniperus virginiana* Linn. Red Juniper ; Red Cedar.
9. *Taxus minor* (Michx.). Ground Hemlock ; American Yew.
10. *Juglans cinerea* Linn. Butternut.
11. *Juglans nigra* Linn. Black Walnut.
12. *Hicoria alba* (Linn.). Mockernut Hickory.
13. *Hicoria ovata* (Miller). Shagbark Hickory.
14. *Hicoria glabra* (Miller). Pignut Hickory.
15. *Hicoria minima* (Marshall). Bitternut Hickory.
16. *Comptonia peregrina* (Linn.). Sweet-Fern.
17. *Populus balsamifera* Linn. Balsam Poplar.
18. *Populus heterophylla* Linn. Swamp Cottonwood.
19. *Populus tremuloides* Michx. Aspen.
20. *Salix cordata* Muehl. Heart-leaved Willow.
21. *Salix discolor* Muehl. Pussy Willow ; Glaucous Willow.
22. *Salix babylonica* Linn. Weeping Willow.
23. *Salix fragilis* Linn. Brittle Willow.
24. *Salix nigra falcata* Pursh. Crescent-leaf Willow.
25. *Carpinus caroliniana* Walter. Blue Beech.
26. *Ostrya virginiana* (Miller). Hop Hornbeam.
27. *Corylus americana* Walter. Hazel-nut.
28. *Corylus rostrata* Ait. Beaked Hazel-nut.
29. *Betula lenta* Linn. Sweet Birch.
30. *Betula lutea* Michx. Yellow Birch.
31. *Betula nigra* Linn. Red Birch ; River Birch.
32. *Betula populifolia* Marshall. White Birch.
33. *Alnus incana* (Linn.). Speckled or Hoary Alder.
34. *Alnus rugosa* (Ehrhart). Smooth Alder.
35. *Fagus latifolia* (Muenchhausen). Beech.
36. *Castanea dentata* (Marshall). Chestnut.
37. *Quercus alba* Linn. White Oak.
38. *Quercus coccinea* Muenchhausen. Scarlet Oak.
39. *Quercus pumila* (Marshall). Bear Oak.
40. *Quercus platanoidea* (Lamarck). Swamp White Oak.
41. *Quercus prinus* Linn. Chestnut Oak.
42. *Quercus rubra* Linn. Red Oak.

43. *Quercus velutina* Lamarck. Yellow Oak.
44. *Ulmus americana* Linn. White Elm.
45. *Ulmus pubescens* Walter. Slippery Elm.
46. *Celtis occidentalis* Linn. Sugarberry ; Hackberry.
47. *Morus rubra* Linn. Red Mulberry.
48. *Liriodendron tulipifera* Linn. Tulip-tree.
49. *Sassafras sassafras* (Linn.). Sassafras.
50. *Benzoin benzoin* (Linn.). Spice-bush.
51. *Ribes cynosbati* Linn. Wild Gooseberry.
52. *Ribes lacustre* (Pursh). Swamp Gooseberry.
53. *Ribes floridum* L'Her. Wild Black Currant.
54. *Hamamelis virginiana* Linn. Witch Hazel.
55. *Platanus occidentalis* Linn. Sycamore ; Buttonball.
56. *Spiræa salicifolia* Linn. Common Meadow-Sweet.
57. *Spiræa tomentosa* Linn. Hardhack ; Steeple-Bush.
58. *Aronia arbutifolia* (Linn.). Red Choke-berry.
59. *Aronia nigra* (Willd.). Black Choke-berry.
60. *Amelanchier canadensis* (Linn.). Shad-bush ; Service-berry.
61. *Cratægus coccinea* Linn. Scarlet Haw.
62. *Cratægus tomentosa* Linn. Black Haw.
63. *Rubus odoratus* Linn. Purple Flowering Raspberry.
64. *Rubus strigosus* Michx. Wild Red Raspberry.
65. *Rubus occidentalis* Linn. Black Raspberry ; Thimbleberry.
66. *Rubus villosus* Ait. High Blackberry.
67. *Rubus canadensis* Linn. Dewberry.
68. *Rubus hispidus* Linn. Running Swamp Blackberry.
69. *Rosa blanda* Ait. Early Wild-rose.
70. *Rosa lucida* Ehrh. Dwarf Wild-rose.
71. *Rosa carolina* Linn. Swamp Rose.
72. *Rosa rubiginosa* Linn. Sweetbrier.
73. *Prunus pennsylvanica* Linn. Pin Cherry.
74. *Prunus serotina* Ehrh. Black Cherry.
75. *Prunus virginiana* Linn. Choke Cherry.
76. *Cassia marylandica* Linn. Wild Senna.
77. *Gleditschia triacanthos* Linn. Honey Locust.
78. *Robinia pseudacacia* Linn. Locust.
79. *Xanthoxylum americanum* Miller. Prickly Ash.
80. *Ptelea trifoliata* Linn. Hop-tree.
81. *Ailanthus glandulosa* Desfont. Ailanthus.
82. *Rhus hirta* (Linn.). Staghorn Sumach.
83. *Rhus copallina* Linn. Dwarf Sumach.
84. *Rhus glabra* Linn. Smooth Sumach.
85. *Rhus radicans* Linn. Poison Ivy ; Poison Oak.
86. *Rhus vernix* Linn. Poison or Swamp Sumach.
87. *Ilex verticillata* (Linn.). Black Alder ; Winterberry.

88. *Celastrus scandens* Linn. Climbing Bitter-sweet.
89. *Staphylea trifolia* Linn. American Bladder-nut.
90. ***Acer pennsylvanicum*** Linn. Striped Maple.
91. ***Acer rubrum*** Linn. Red Maple ; Swamp Maple.
92. ***Acer saccharinum*** Linn. Silver Maple.
93. ***Acer saccharum*** Marshall. Sugar or Rock Maple.
94. *Acer spicatum* Lamarck. Mountain Maple.
95. *Vitis labrusca* Linn. Summer Grape.
96. *Vitis aestivalis* Michx. Frost Grape.
97. *Parthenocissus quinquefolia* (Linn.). Virginian Creeper.
98. ***Tilia americana*** Linn. Basswood.
99. *Cornus amomum* Miller. Kinnikinnik.
100. ***Cornus alternifolia*** Linn. Blue Dogwood.
101. *Cornus canadensis* Linn. Dwarf Cornel ; Bunch-berry.
102. ***Cornus florida*** Linn. Flowering Dogwood.
103. *Cornus candidissima* Marshall. Panicked Cornel.
104. ***Nyssa sylvatica*** Marshall. Black Gum ; Pepperidge.
105. *Clethra alnifolia* Linn. Sweet Pepperbush.
106. *Ledum grænlandicum* Oeder. Labrador Tea.
107. *Azalea nudiflora* Linn. Pink Azalea ; May-apple.
108. *Azalea viscosa* Linn. White Swamp Honeysuckle.
109. *Rhododendron maximum* Linn. Rhododendron.
110. *Kalmia angustifolia* Linn. Sheep Laurel.
111. *Kalmia glauca* Ait. Pale Laurel.
112. *Kalmia latifolia* Linn. Mountain Laurel.
113. *Arctostaphylos uva-ursi* (Linn.). Bearberry.
114. *Gaylussacia resinosa* (Ait.). Black Huckleberry.
115. *Vaccinium corymbosum* Linn. Swamp Blueberry.
116. *Vaccinium pennsylvanicum* Lamarck. Dwarf Blueberry.
117. *Vaccinium vacillans* Kalm. Low Blueberry.
118. *Vaccinium staminium* Linn. Deerberry ; Foxberry ; Dangleberry.
119. ***Fraxinus americana*** Linn. White Ash.
120. ***Fraxinus nigra*** Marshall. Black Ash.
121. ***Catalpa catalpa*** (Linn.). Common Catalpa.
122. *Cephalanthus occidentalis* Linn. Buttonbush.
123. *Sambucus canadensis* Linn. Common Elder.
124. *Sambucus pubens* Michx. Red-berried Elder.
125. *Viburnum acerifolium* Linn. Dockmackie.
126. *Viburnum dentatum* Linn. Arrow-wood.
127. ***Viburnum lentago*** Linn. Nannyberry ; Sheepberry.
128. *Lonicera sempervirens* Linn. Trumpet Honeysuckle.
129. *Diervilla diervilla* (Linn.). Bush Honeysuckle.

MOLLUSKS.

Of Mollusks, the following-named species were collected :¹

1. *Limax maximus* Linn. Common Slug.—Abundant. Other species of this genus occur.
2. *Mesomphix fuliginosus* Griffith.—Rare at Highland Falls; common at Highland (opposite Poughkeepsie), Ulster County, N. Y.
3. *Pyramidula alternata* Say.—Apparently not common in the Highlands, but abundant at Highland, farther up the Hudson.
4. *Polygyra tridentata* Say.—Common on shaded, stony slopes; most abundant near the Hudson River. It was also collected at Highland, Ulster County, N. Y., and at the Delaware Water Gap, Pa.
5. *Polygyra fallax* Say.—One specimen from Highland Falls, in Orange County.
6. *Polygyra albolabris* Say.—This is the common snail of the region, and occurs at all altitudes. During protracted droughts, a devastating forest fire not infrequently sweeps over one of our mountains, always leaving thousands of scorched snail-shells, mostly of this species, exposed to view in its path. The toothed variety was collected at Highland, N. Y., and at Delaware Water Gap, Pa., in 1889, but never in the Hudson Highlands.
7. *Polygyra thyroides* Say.—Abundant; also common at Delaware Water Gap, Pa.
8. *Polygyra hirsuta* Say.—A common shell, under stones in shady places, at Highland Falls, in Orange County, and at Highland, in Ulster County.
9. *Polygyra monodon* Rackett.—One specimen from Long Pond, Orange County; abundant at Highland, Ulster County, N. Y., and at the Delaware Water Gap, Pa.
10. *Succinea obliqua* Say.—Wet woods, at high altitudes; also collected in Ulster and Greene Counties, N. Y., and at Delaware Water Gap, Pa.
11. *Limnæa columella* Say.—One specimen from a swampy stream, near Highland Falls, September 14, 1896.
12. *Limnæa elodes* Say.—Very common on margins and tide-creeks of the brackish river marshes.
13. *Limnæa catascopium* Say.—Abundant on the river marshes.
14. *Planorbis trivolvis* Say.—Common in the Hudson and in ponds.

¹ A much larger collection of shells was gathered in the Highlands years ago, but the specimens have been distributed among several museums and private collections, and a manuscript list of them is not now accessible. All save one of the species here given were collected during the autumn of 1896, the specimens being in the U. S. National Museum collection.

15. *Planorbis bicarinatus* Say.—Abundant in Highland Lake and Echo Lake.
16. *Physa heterostropha* Say.—Very numerous in weedy ponds and streams, as well as in the tide-creeks of the river marshes.
17. *Physa ancillaria* Say.—Very abundant in brackish marshes along the Hudson River.
18. *Campelema decisa* Say.—Highland Lake, in the Highlands. My mother collected this shell on Lake Champlain.
19. *Cingula minuta* Totten.—Very abundant on the edges of Consook Marsh, and other river marshes, beside the Hudson.
20. *Sphærium partumeium* Say.—Rather common in ponds and slow streams, even in the highest suitable places in the mountains.
21. *Pisidium abditum* Hald.—Swamps and sluggish streams.
22. *Unio radiatus* Gmel.—Hudson River at estuary of Moodna Creek, Orange County, N. Y., where a remarkably large specimen was taken May 3, 1882.
23. *Unio complanatus* Solander.—Long Pond, four miles west of Highland Falls; abundant.
24. *Anodonta fluviatilis* Dill.—Long Pond and Highland Lake.
25. *Anodonta implicata* Say.—Highland Lake.

NOTE.—I have found egg-cases of *Fulgur canaliculata* Linn. on Consook Island, more than fifty miles above the mouth of the Hudson River; but the shells were never seen there.

CRUSTACEANS.

Some of the large marine Crustaceans ascend the Hudson River; and our fresh-water streams, ponds and stagnant pools are the home of numerous small species. The most conspicuous Crustaceans of the Highlands are those included in the following list:

1. *Callinectes sapidus* Rathbun. Common Edible Crab.—This toothsome articulate usually appears in this section of the Hudson River late in summer, but its numbers vary greatly in different years. Small young were exceedingly numerous at Consook Island, in September and October, 1896. The specimens were identified by Miss M. J. Rathbun.
2. *Platyonichus ocellatus* (Herbst). Lady Crab.—During the winter of 1877-78 this species was abundant on the flats along the Hudson. Specimens were taken through the ice, at Iona Island, by Dr. C. Hart Merriam and myself.

3. *Panopeus harrisii* (Gould).—This small crab is abundant in tide-pools and tide-creeks along the Hudson. Specimens were taken at Consook Island, October 3, 1896.

4. *Cambarus bartoni* (Fabric.). Crawfish ; Fresh-water Lobster.—Common in all our mountain brooks, living under stones, and breeding in nests or caverns in the beds of streams. Those who angle for black bass pronounce the Crawfish a most seductive bait.

5. *Penæus brasiliensis* Latr. Shrimp.—Croton and Hudson Rivers.

6. *Palmonetes vulgaris* (Say). Big Shrimp ; American Prawn.—Hudson River.

7. *Livoneca ovalis* (Say).—This parasite is common upon the gills of the young bluefish (*Pomatomus saltatrix*), which here goes by the name of "snap mackerel."

8. *Gammarus* sp.—This lively animal abounds in the eel grass along the shores of this part of the Hudson.

9. *Branchipus vernalis* Verrill.—April 29, 1883, Dr. Louis A. di Zerega and myself found numbers of this crustacean in a large, swampy, stagnant pool near the Hudson River. They swam with considerable swiftness "on their backs," and were difficult to capture. Most of them, however, were lying quiet upon the green algæ covering the bottom of the pool, but seemed not to care to burrow and hide in the debris. Their forked tails were bright red ; otherwise, except their eyes and a dorsal—not superficial—dark line, they were almost white. One female, carrying a batch of dark-colored eggs, was captured and preserved, together with many other specimens.

NOTE.—Carapaces of the King Crab (*Limulus polyphemus* Latr.) are occasionally found beside the Hudson. I have never taken a living 'Horse-foot' ; but on one occasion a fresh one was seen hanging from a tree on Consook Island, in the Hudson River, beside a shad-fishing camp.

LEPIDOPTERA.

A small collection of Lepidoptera, gathered at Highland Falls, New York, during the summer of 1883, was submitted to Mr. William Beutenmüller, curator of Entomology in the American Museum of Natural History, who identified the species as follows :

<i>Papilio turnus</i> Linn.	<i>Hemaris buffaloensis</i> .
" <i>asterias</i> Fab.	<i>Sphinx cinerea</i> Harris.
" <i>cresphontes</i> Cramer.	<i>Actias luna</i> Drury.
<i>Melitæa phaëton</i> Cramer.	<i>Telea polyphemus</i> Fab.
<i>Vannessa antiopa</i> Linn.	<i>Automeris io</i> Fab.
<i>Limenitis ursula</i> Fab.	<i>Arctia virgo</i> Linn.

II—VERTEBRATES OF THE HUDSON HIGHLANDS.

FISHES.¹

Besides the Hudson River, the waters of the Hudson Highlands comprise several good-sized mountain brooks and a number of ponds or small lakes.

1. ***Petromyzon marinus* Linnaeus.** GREAT SEA LAMPREY ; LAMPREY EEL.—Dr. James E. DeKay (Zoölogy of New York, Part IV, 1842, p. 380) writes: "I have observed them at Albany in the spring, and was assured that they were taken a few miles below that city." In the Highlands it is well known to the fisherman as the 'Lamper Eel.' Both old and young (= *P. nigricans*) specimens were taken in the Highlands.

2. ***Carcharhinus obscurus* (Le Sueur).** DUSKY SHARK.—Several were taken in the lower part of the Hudson River during the summer of 1881, and one as far up the river as Peekskill.²

3. ***Acipenser sturio* Linn.** COMMON SHARP-NOSED STURGEON.—I have not seen them much more than two feet in length. The fishermen take numbers of them in their nets, but rarely use them for food, or offer them for sale.

4. ***Acipenser brevirostris* Le Sueur.** SHORT-NOSED STURGEON.—Special nets are used by the fishermen who make a business of fishing for Sturgeons, and the fishes are skinned, sliced and sold under the name of 'Albany beef.' Individuals weighing several hundred pounds are sometimes taken. This fish often leaps high out of the water—"to see how far they are from Albany," the skippers say, the residents of that ancient town

¹ I collected fishes in the Hudson Highlands from 1874 to 1883, and again in the autumn of 1896. These collections numbered 399 entries; and all of the individuals of the same species, if taken at the same time and place, were usually entered under one number. The specimens collected in 1896 were preserved in formalin, and are in the collection of the United States National Museum. The earlier collections are in the American Museum of Natural History in New York. Of the latter, sixteen specimens (ten species) were mounted, and the rest preserved in alcohol. All of the species collected in 1896 were included in the earlier collections.

² As Sharks are frequently captured in the lower course of the Hudson, and also in the East River, it is probable that several other species occur, at times, in the Highlands. About 1876, Mr. Gilbert Ward, of Cornwall-on-Hudson, while rowing a pleasure party on the Hudson, between West Point and Cornwall, struck a Shark with an oar, and captured it. From the description of it given me by a fisherman who saw it, I supposed it to be a Hammer-headed Shark, *Sphyrna zygaena* (Linn.).

being notorious by reason of their sturgeon-devouring propensity. It not infrequently leaps from the water to alight, unintentionally, in a passing small boat, where, if of large size and agile, it occasions inconvenience to the passengers.

5. *Ameiurus catus* (Linn.). WHITE CAT; CHANNEL CAT OF THE POTOMAC.—This species is abundant in the Hudson, where it is called 'Lake Cat' and 'Fork-tailed Cat' by the fishermen. It often swims near the surface, and is taken in shad and ice nets, specimens so caught often weighing from five to ten pounds each.

6. *Ameiurus nebulosus* (Le Sueur). HORNED POUT; COMMON BULLHEAD; SMALL CATFISH.—This species is found in abundance in the Hudson River, and in every pond and stream of this region, where I have searched for it. The maximum weight here is about two pounds. It is chiefly carnivorous,¹ and will take any sort of bait, from a living shiner to a grasshopper or worm. Occasionally I have seen it taken upon live bait through holes in the ice, but it rarely bites in winter.

7. *Catostomus commersonii* (Lacépède). COMMON SUCKER; FINE-SCALED SUCKER; BROOK SUCKER; WHITE SUCKER.—Found in great numbers in the Hudson River, and in our ponds and streams. In the Hudson, and also in our small mountain lakes, I have found it throughout the year. In cold weather it is edible, but scarcely so at other times. It is caught in seines and fykes, and is frequently held for sale. This Sucker rarely takes a hook; but, when ascending streams in the springtime for the purpose of spawning, it affords amusement to boys, who catch it by means of wire snares fastened to poles. This species and the 'Nub-nose' (*Erimyzon sucetta oblongus*) are also speared, at night, by torch light.

8. *Erimyzon sucetta oblongus* (Mitchill). NUB-NOSE; CREEK-FISH; CHUB SUCKER.—This species is common in our streams and larger ponds. I have never known it to take a hook.

¹ Mr. Gerrit S. Miller, Jr., informs me that it commonly feeds upon seeds of the yellow water lily (*Nymphaea advena*) in ponds on Oneida Creek, central New York.

Though it probably occurs in the Hudson River, I have never found it there, nor do I know of any getting into the fishermen's fyke-nets. In spring I have speared males, in Poplopen's Creek, whose heads were ornamented with three large horny tubercles upon each side. I have occasionally eaten this fish, but found it bony and flavorless.

9. *Cyprinus carpio* Linn. CARP; GERMAN CARP.—A few were put in Echo Lake in 1892. They were obtained from the United States Fish Commission, and increased rapidly until the pond was drained, several years ago.

10. *Crassius auratus* (Linn.). GOLDFISH.—This introduced species is abundant in the Hudson River and the saltmarsh creeks which border it. The red ones are utilized for aquaria, fountains and fish-ponds. Fishermen take enormous quantities of them in seines. They are usually used for fertilizing, or sold in winter at a small price for food; but they are rarely purchased twice by the same person, they are so exceedingly bony.

11. *Semotilus corporalis* (Mitchill). FALL-FISH; SILVER CHUB; WIND-FISH; CORPORAL.—The 'Wind-fish' is our largest Minnow. I have taken several from a deep hole in Poplopen's Creek, close to Poplopen's Pond, which weighed a pound apiece; and others have taken individuals from the same pool which weighed more than two pounds. In this region I have only found this beautiful fish in Poplopen's Creek and its branches. I have taken it at various points, from the sources of the stream to the estuary near the Hudson, where the water becomes brackish from the inflowing tides. It is voracious, but shy, and takes living grasshoppers in the same way that the Trout does. It is remarkably strong and swift, and affords excellent angling and tolerably good food. In Wappinger's Creek, Dutchess County, N. Y., this fish is quite numerous, grows to a large size, and is called 'Wind-fish,' as it also is in Orange County.

12. *Semotilus atromaculatus* (Mitchill). HORNED DACE; CREEK CHUB.—The 'Chub' is a common fish in all of our fresh-

water brooks. I have never heard of its capture in any of our larger mountain ponds or lakes ; and, in fact, the only pond where I have seen it is the small one owned by Messrs. John Denton and J. Pierpont Morgan, near Highland Falls. Pickerel were lately introduced into this little pond, and, owing to the abundance of food which this species afforded them, increased and grew rapidly. Some years ago only a few Brook Trout and the ubiquitous Eel inhabited the pond with the Chubs, which then grew to an unusually large size. I have caught upwards of two hundred of them in a day, among them one or two weighing about a pound apiece. Holes in rapid streams are the favorite abode of this species. It rises readily to a fly, and is so voracious that I have taken numbers of them with an unbaited hook. The best bait is a living grasshopper, but it readily bites at worms. The larger ones are excellent food. Males develop rosy tints in April and May, when they sometimes have horny spines on their heads.

13. *Abramus chrysoleucas* (Mitchill). GOLDEN SHINER ; ROACH ; BREAM.—This handsome species is sometimes abundant in the Hudson River, where it goes by the name of 'Roach.' In our inland ponds and lakes, in most of which it is abundant, it is called 'Shiner,' and, on account of its tenacity of life and showy colors, is highly valued as a bait-fish for taking Pickerel, Yellow Perch, Catfishes and Eels, all of which seize it with avidity. Occasionally the larger individuals may be induced to take a small hook baited with worm ; but meal, dough, or bread attract them much more readily, as they are not specially carnivorous. They swim in large schools, and rise to the surface frequently, from which circumstance, Dr. DeKay tells us, they are called 'Wind-fish,' as he states that they rise to the surface whenever a light flaw of wind ruffles the water ; but this I have not observed. I think, in fact, that they rise much more frequently when the surface is smooth. Small urchins catch them in the Hudson with small hooks, baited with dough. The fishermen use a bagging net fastened to an iron rim, which they lower in the water by means of cords attached to a stout pole. A handful of bread scattered upon the surface over the net will attract thousands of them, and hundreds may be taken in a short time. This species

is seldom found in rapid brooks, and only by accident. I have noted some variation in the average size and coloration of this species in different ponds which it inhabits. Seven or eight inches is about the maximum size, both in the Hudson and the ponds.

14. *Notropis hudsonius* (*DeWitt Clinton*). SPAWN-EATER ; SPOT-TAILED MINNOW ; SHINER.—Dr. DeKay says: "It is not uncommon in the Hudson River and its tributaries." Governor DeWitt Clinton, in the 'Annals' of the Lyceum of Natural History of New York, Vol. I, p. 49, pl. ii, fig. 2, 1824, gave the original description and figure of this interesting species, of which I have never seen more than a single specimen, which I caught, using a hook baited with worm, at the rocky point where Poplopen's Creek estuary joins the Hudson River, on the north side, on October 15, 1875.

15. *Notropis cornutus* (*Mitchell*). SHINER ; RED-FIN ; DACE ; ROUGH-HEAD.—The 'Red-finned Shiner' or 'Horned Chub,' as this species is called in the Highlands, is a remarkably handsome fish when in spring breeding dress. At this season it is ornamented with prickly spines upon the upper surface of the head, in addition to the bright red fins and golden lateral bands. It is fairly common in most of our rapid brooks ; but I have never heard of its occurrence in the Hudson River. It hides under stones, and is shy, but takes a worm or grasshopper bait with alacrity, and is a vigorous biter. I have seen a few specimens of this species, which were seven or eight inches in length, caught in the Bog Meadow Brook between Echo Lake and the Parry Pond. I have also found it in Morgan's Brook, and in Poplopen's Creek from the Hudson to its sources in the mountains.

16. *Rhinichthys atronasus* (*Mitchell*). BLACK-NOSED DACE.—This very small but beautiful Minnow is found in clear, rocky streams. In August the males develop red fins and a golden yellow color on the under surface. It is possible to catch only the largest specimens, on very small hooks, baited with worms. I have found it in waters that were strongly impregnated with sulphur.

17. *Anguilla chrysypa* Rafinesque. AMERICAN EEL; FRESH-WATER EEL.—The Eel is common in all our waters. Specimens weighing five pounds apiece are sometimes taken in mountain ponds and streams. Eels are sometimes found in damp meadows, under stones, usually near springs from which rivulets flow.

18. *Pomolobus pseudoharengus* (Wilson). ALEWIFE; BRANCH HERRING; SPRING HERRING; GASPEREAU; WALL-EYED HERRING; BIG-EYED HERRING.—This species arrives in April and becomes abundant during May, when large numbers are taken in drift nets, and sold at a very moderate price per dozen. Though bony, they are tolerably good food.

19. *Pomolobus æstivalis* (Mitchill). GLUT HERRING; BLUE-BACK; SUMMER HERRING; KYACK; SAW-BELLY.—‘Shoals’ of the fry of this species are sometimes seen agitating the surface of the Hudson in late summer. When dozens of them are leaping out of the water it is not difficult to kill them with a shotgun.

20. *Alosa sapidissima* (Wilson). COMMON SHAD; AMERICAN SHAD; NORTH RIVER SHAD.—The Shad fishing is an important industry in this region. The Shad arrives about the first of April, and is abundant by the end of the month. I have not heard of its ascending any of our small streams.

21. *Brevoortia tyrannus* (Latrobe). MENHADEN; MOSS-BUNKER; BONY-FISH; WHITEFISH; BUG-FISH.—‘Mossbunkers’ are said to occur in the Highlands. In the autumn of 1877, I saw a number that had just been caught by a fisherman in the estuary where the Croton River empties into the Hudson, north of Sing Sing.

22. *Salvelinus fontinalis* (Mitchill). BROOK TROUT; SPECKLED TROUT.—This species is found in some of our ponds, many of our brooks, and in the Hudson River. In April, 1882, Mr. Jerome Denna caught a Trout weighing half a pound in a net set in the estuary of Poplopen’s Creek, near the Hudson, where the water is brackish; and one is occasionally taken in a fyke-net from the Hudson itself. When a small boy, I caught them in

Morgan's Brook, and well remember a huge fellow that lived under a projecting rooty bank of a shady hole in the brook, and which resisted all my angling efforts for more than one season. I caught a half-pound one in the Morgan Pond (then owned by Messrs. Baldwin and Denton), and shot a still larger one in the brook below the pond. During those years Mr. Denna and myself got some fine ones each year from streams in Rockland and Putnam Counties. Trout are now said to be very scarce in the Highlands.

23. *Umbra pygmæa* (DeKay). EASTERN MUD MINNOW.—This diminutive species is included on the authority of Dr. Theodore Gill, who took specimens in Rockland County, N. Y., in 1855. In the original description of this species (New York Fauna, Fishes, 1842, p. 214), Dr. James E. DeKay observes: "It is the smallest of the American Cyprinidæ, the above being the largest size."¹ It occurs in brooks near Tappan, Rockland County, from whence it was obtained by Mr. John G. Bell."

"A locality which, with the water perfectly clear, will appear destitute of fish will perhaps yield a number of mud-fish on stirring up the mud at the bottom and drawing a seine through it." (*Baird.*)

24. *Lucius reticulatus* (Le Sueur). COMMON EASTERN PICKEREL; GREEN PIKE; JACK.—The Pickerel is common in our ponds and streams, living under logs and stumps or jutting rocks, where it lies in wait for its prey, occasionally swimming out in a circle and then returning to its sheltered abode. This is the fish most sought for by amateur sportsmen, who take them by trolling a spoon-hook, or with live Minnow bait. It bites as well in winter, when the ponds are ice-bound, as during the summer. Pickerel are frequently taken in fykes set in the Hudson, and are abundant in some of the tide creeks in marshes bordering the river. A specimen weighing 3½ pounds was taken in Poplopen's Pond, in 1882, by Mr. Jerome Denna.

25. *Fundulus heteroclitus macrolepidotus* (Walbaum).—COMMON COBBLER; KILLIFISH.—Abundant in saltmarsh tide

¹ "Length one inch."

creeks along the Hudson, and commonly used for bait. Males, in the breeding season, are gorgeously colored.

26. *Fundulus diaphanus* (*Le Sueur*). SPRING MINNOW ; SPRING MUMMICHOG.—I have found this Minnow in several ponds, among them Echo Lake and Long Pond, in this vicinity. Shoals of these semi-transparent Minnows may be seen apparently sunning themselves upon the sand along the shores of ponds, and occasionally in slow streams running from them. They are difficult to distinguish unless in motion. Sometimes a large one will bite at a worm bait.

27. *Tylosurus marinus* (*Walbaum*). GARFISH ; BILLFISH ; NEEDLE-FISH ; AGUJON.—This species is seen swimming upon the surface of the Hudson River and its estuaries in autumn, at which season it is usually quite common.

28. *Apeltes quadracus* (*Mitchill*). FOUR-SPINED STICKLEBACK.—April 30, 1883, I preserved 100 specimens of this tiny fish, obtained from a tide-creek of the Hudson, and counted the number of dorsal spines on each. In 79 specimens there were 4 spines each ; in 19 there were 5 each ; and in 2 there were but 3 each.

29. *Hippocampus hudsonius* *DeKay*. COMMON AMERICAN SEA-HORSE.—During the summers of 1895 and 1896, a number of Sea-horses were taken by fishermen, when netting shrimp in the eel-grass bordering the saltmarshes near Consook Island, at low tide.

30. *Caranx hippos* (*Linn.*). CREVALLÉ ; TORO ; HORSE CREVALLÉ ; CAVALLY ; JACK ; JIGNAGUA.—One was caught in a drift-net, and others in a fyke-net. Dr. DeKay wrote, in 1842 : "This is perhaps one of the most gorgeously beautiful fishes to be found in our waters." In this assertion I heartily concur. It only occurs in the Hudson Highlands after severe and protracted droughts, when the water of the Hudson becomes quite salt. I have seen it only in August.

31. *Pomatomus saltatrix* (Linn.). BLUEFISH; SNAP MACKEREL; SKIPJACK.—This species swims in large shoals on the surface of the Hudson, and is so voracious that it can be taken with any sort of bait; but a short quill answers the purpose best. The tide current keeps the quill upon the surface, and the 'Snappers' strike at it just as other fishes do at a trolling-spoon. In this way it is often possible to fill a market-basket with them. Adults do not reach this portion of the Hudson. The largest one I ever saw in the Highlands weighed little more than a pound, and the average size is very much less. I have caught very small fry as early as June 22. The larger specimens are taken in autumn.

32. *Rhombus triacanthus* (Peck). DOLLAR-FISH; LAFAYETTE; BUTTER-FISH.—The 'Butter-fish' is abundant in the lowest part of the Hudson, but only reaches the Highlands during dry seasons when the river becomes unusually saline. It appeared in some numbers at West Point in the summers of 1882 and 1883. When crabs are abundant the Butter-fish is likely to occur.

33. *Ambloplites rupestris* (Rafinesque). COMMON ROCK BASS; RED-EYE; GOGGLE-EYE.—This pretty fish was abundant in Bog Meadow Pond, about twenty-five years ago, when I saw several individuals taken weighing about a pound apiece. A few are still to be found there; but I have never seen it in any other pond or stream of the region, except the Highland Lake and in the Hudson River, whence fishermen frequently take them in fyke-nets.

34. *Enneacanthus gloriosus* (Holbr.). BLUE-SPOTTED SUN-FISH.—The beautiful Blue-spotted Sun-fish appears to be found, in this region, only in Long Pond, a sheet of deep water almost a mile in length, four miles west of the village of Highland Falls. I found them more than twenty years ago; and the species is still common there. Specimens were identified by Dr. Tarleton H. Bean.

35. *Lepomis auritus* (Linn.). LONG-EARED SUN-FISH; YELLOWBELLY; REDBREAST BREAM.—This Sun-fish is abundant in the Hudson; elsewhere I have found it only in Poplopen's Creek, which it ascends from the Hudson to the sources of the

stream, in the mountains twelve to fifteen miles distant. It is commonly sold in the market. Fishermen take them in fykes, and by angling, using dough, grasshoppers, angle-worms, etc., for bait. I have taken it in the most rapid portions of Poplopen's Creek when angling for Brook Trout. A large individual, taken from Highland Lake, September 15, 1883, measured 6.25 inches in length, exclusive of the caudal, and 2.75 inches in greatest depth.

36. *Eupomotis gibbosus* (Linn.). COMMON SUN-FISH; BREAM; PUMPKIN-SEED; SUNNY.—Abundant in the Hudson, and in all of our ponds and slow streams; but it is seldom found in rapid streams.

37. *Micropterus dolomieu* Lacépède. SMALL-MOUTHED BLACK BASS.—This is the common species with which our ponds and lakes abound, and which affords the best of sport to anglers. One or two individuals have been caught in Long Pond, which weighed five or six pounds apiece; but the weight seldom exceeds three or four pounds. In autumn it bites most readily at living crickets. At other seasons crawfishes and hellgrammites are most in favor, though it frequently takes a fly-hook. I have never seen any from the Hudson River.

38. *Micropterus salmoides* (Lacépède). LARGE-MOUTHED BLACK BASS; OSWEGO BASS.—In the autumn of 1882 these fishes were first brought to my notice by fishermen who caught them in fyke-nets during October and November. These fishermen had fished in the Hudson for many years, and never took this species before. It was supposed that they were introduced by the U. S. Fish Commission.

39. *Perca flavescens* (Mitchill). YELLOW PERCH.—This is our most abundant game-fish. It inhabits the Hudson River in large numbers, as well as all of our larger mountain lakes and ponds; but the only stream which I have known it to habitually frequent is Poplopen's Creek, where it occurs from its sources to its mouth. The fishermen inform me that it is very unusual to

take specimens from the Hudson weighing over a pound ; but, in Poplopen's Pond, I have taken a number that weighed about two pounds apiece. Mr. Jerome Denna has taken two, in Poplopen's Pond, which weighed $2\frac{1}{2}$ to 3 pounds each ; and a professional fisherman, named Samuel Runnels, assured me that he took a Yellow Perch there which weighed $4\frac{1}{4}$ pounds, by actual weight on the scales at the village store. The small individuals nibble at worms ; but large ones seldom take any save a live bait. Minnows or grasshoppers are the best. At the former they will bite throughout the winter, at which season numbers are caught through holes cut in the ice.

40. *Roccus lineatus* (Bloch). STRIPED BASS ; ROCKFISH ; ROCK.—This, with us, is a valuable food-fish, which is taken in great numbers in nets set through the ice of the Hudson in winter, and in drift nets by shad-fishers in spring. The young take the hook readily, and afford excellent sport to anglers, who fish for them with drop-lines, upon reefs in the Hudson. They bite at worms, clams, shrimp, crabs, etc. Large individuals, weighing 60 pounds and upwards, are sometimes taken in nets through the ice, and in shad-nets in spring. It is found, in this region, only in the Hudson and its estuaries, though I once took one a little above the estuary of Poplopen's Creek, in fresh water.

41. *Morone americana* (Gmel.). WHITE PERCH.—This species supplies our table with an excellent article of food. It remains in the Hudson throughout the year, and affords amusement to the anglers, who take numbers of them upon rocky reefs in the Hudson. In winter they are taken in abundance in nets set through the ice. In the river, I have rarely seen specimens taken of a pound in weight ; but in Oscawana Lake, a pond in Putnam County, individuals are said often to attain to the weight of two or even three pounds. I am not aware that the White Perch has been introduced into any other ponds of this region. It bites at worms, grasshoppers and clams ; but the most successful anglers use shrimp or soft crab for bait.

42. *Leiostomus xanthurus* Lacépède. SPOT ; GOODY ; OLDWIFE ; LAFAYETTE.—This beautiful species, locally known
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as the 'Sand Porgee,' is of frequent occurrence in summer in the Hudson River and its estuaries, where it frequents the sandy shores, and delights the schoolboy by biting at his worms. Besides being good to eat, it is one of the most exquisitely beautiful of living creatures.¹

43. *Microgadus tomcod* (Walbaum). TOMCOD; FROST-FISH. — This is the only species of Cod that I have found in the Hudson. The Tomcod is usually called 'Frost-fish' by the fishermen, who catch numbers of them in their fykes and ice-nets during fall and winter. It bites readily, and is esteemed as an article of food. I have found it during the entire year, and in August have seen young ones only an inch or two in length. For some reason which I have not discovered, this fish is very often found in eel-grass, along shore, half dead, but able to swim a little though floating on the surface. I noticed this for several years prior to 1883, and preserved specimens so found on August 11, 1879, and August 30 and September 10, 1881.

44. *Achirus fasciatus* Lacépède. AMERICAN SOLE; CALICO SOLE; HOG-CHOKER; COVERLIP; SPOTTED SOLE. — Common throughout the year in shallow water along the Hudson; often found in the gullets of our two Mergansers (*Merganser americanus* and *M. serrator*).

BATRACHIANS.

1. *Ambystoma opacum* (Gravenhorst). MARBLED SALAMANDER. — This species is generally dispersed throughout this region, though not very numerous. It is found in dry places, as a rule, and even basks in the sun. On October 21, 1875, I caught a large one, sunning itself on a rock. A very large one was found under a stone in our garden, April 26, 1880. Another was found under a stone, near the summit of Bear Mountain, at nearly 1,400 feet altitude, August 8, 1880. In digging a deep trench through dry ground, on our place at Highland Falls, one was obtained on April 10, 1880. One was found crawling on the ground in February, 1872.

¹ NOTE.—*Prionotus* sp.? SEA ROBIN; GURNARD.—An individual of this genus was caught in the Hudson, at Sing Sing, in the summer of 1875, by Mr. William Cole, who was fishing from a dock. It has not been known to reach the Highlands to my knowledge.

2. **Ambystoma punctatum** (*Linn.*). LARGE SPOTTED SALAMANDER.—On March 2, 1876, I caught one upon the snow near a little hole in the ice on a small stream. I saw no more until April 8, 1883, when a large one was found near Pell's Pond. In October, 1896, my son, Louis di Z. Mearns, caught two more in 'cyclone' traps, set for small mammals and baited with oat-meal; and he found a third beneath a stone, making, in all, five specimens from the region.

3. **Hemidactylium scutatum** (*Schlegel*). FOUR-TOED SALAMANDER.—A single specimen was obtained by my son in October, 1896.

4. **Plethodon cinereus** (*Green*). GRAY SALAMANDER.—I found a typical specimen of this form under a stone on the slope of Bear Mountain, west of Echo Lake, October 20, 1875.

5. **Plethodon erythronotus** (*Green*). RED-BACKED SALAMANDER.—This terrestrial species is common here, and is found under stones and logs in dry places.

6. **Plethodon glutinosus** (*Green*). VISCID SALAMANDER ; BLUE-SPOTTED SALAMANDER.—Fairly common. It is found under stones and logs, often on high ground, and in moist leaf-mould, through which it makes long tunnels, or else uses those of the Mole-shrew (*Blarina brevicauda*). I have found specimens of unusually large size, measuring five to six inches in length.

7. **Gyrinophilus porphyriticus** (*Green*). FIERCE SALAMANDER.—Quite rare. A fine adult example of this species was found in a spring, near Highland Falls, during the autumn of 1872. It was not again seen until 1875, when several were caught in a muddy brook, in company with the common species of *Desmognathus*.

8. **Spelerpes bilineatus** (*Green*). STRIPED-BACKED SALAMANDER.—This is common under mossy stones beside shaded brooks. It is exceedingly swift and nimble, and loves moist places, though the adults are seldom found either in the water or far from it.

9. *Spelerpes ruber* (Daudin). RED SALAMANDER.—The 'Red Triton,' as this Salamander is locally called, is only moderately common, and in autumn is usually found in cold springs with turfy margins. One was found in a path, during a rain storm, as early in the season as February 14, 1876.

10. *Desmognathus ochrophæa* Cope. ALLEGHANY MOUNTAIN SALAMANDER.—Taken at Highland Falls, near a brook, under stones, April 13, 1882. It is said to be abundant in the Catskill Mountains, though I failed to find it in the neighborhood of Schoharie Creek and Hunter Mountain.

11. *Desmognathus fusca* (Rafinesque). DUSKY SALAMANDER.—This is the common Salamander of our rapid, pebbly brooks. It often crawls out upon stones, but rarely wanders far from water. It is strong and agile.

12. *Diemyctylus viridescens* Rafinesque. SPOTTED TRITON; NEWT; EFT.—This is our commonest Salamander. The larval form is found in abundance in all our ponds and ditches throughout the year, and is active during severe winter weather, when the waters are frozen over. The aquatic form sometimes crawls out of water upon stones. It was seen copulating, in winter, under the ice, and also as late in the season as May 2. Boys frequently hook them when fishing, with angle-worms for bait. The terrestrial form is very common in wet woods after showers, but otherwise seeks concealment beneath stones and logs, though it is sometimes found in the water late in autumn.

13. *Bufo americanus* Le Conte. AMERICAN TOAD.—Very numerous; some specimens bright brick-red. About the beginning of May this species resorts in pairs to the edges of ponds, and spawning begins; during this period its voice—a long-drawn nasal snarl—fills the air incessantly during warm evenings.

14. *Hyla versicolor* J. Le Conte. COMMON TREE TOAD.—Abundant, ranging from the Hudson to the mountain tops.

15. *Hyla pickeringii* (Storer). PICKERING'S TREE TOAD; 'PEEPER.'—Abundant. Clamorous in spring, and again in autumn; also in winter during thaws. In spring it usually attunes its voice to 'peeping' early in March (1st to 25th, according to season), continuing until May. Ice is still lying on the north slopes of the mountains when its cheerful voice is first heard in the swamps to which it repairs to breed. During long warm rains it wanders away from the pools into the woods.

16. *Rana pipiens* Schreber. COMMON FROG; LEOPARD FROG.—Very common. Often found in tide creeks of the brackish marshes bordering the Hudson River, and common in all grassy, swampy places, even to the highest wet places on the mountains. Four specimens, mainly from the summit of the mountains, near Bog Meadow Pond, collected in 1896, were identified as this species by Dr. Leonhard Stejneger. Some of the earlier specimens may have been *Rana palustris* Le Conte.

17. *Rana septentrionalis* Baird. NORTHERN FROG.—Three specimens, identified as this species by Dr. Stejneger, were collected in the highest part of the Highlands, about Tamarack Swamp, during the last week of September, 1896.

18. *Rana sylvatica* Le Conte. WOOD FROG.—A terrestrial species, except during the breeding season in spring; fond of damp, shady woods, and noted for its prodigious leaps. In the spring it repairs to swamps and ditches to deposit its eggs, and sets up a mighty croaking; we therefore do not take the author of the 'Manual of Vertebrates' seriously when he says it is "an almost silent frog." About the middle of March (20, 1882; 25, 1883), unless the season is late, the first croaking of the nimble Wood Frog is heard in the Highlands. During April the racket is tremendous in the vicinity of the swamps in which it is spawning. The species is then to be seen all around the edges and islands of the shady, sphagnous pools in which it breeds. The female is about double the size of the male, and brown, whereas the male is blackish. Its voice ceases early in May, and thereafter it becomes 'an almost silent frog.' It is common in wet woods of this region, at all altitudes. Two specimens were taken as high as the Tamarack Swamp, September 30, 1896.

19. *Rana clamitans* Latreille. GREEN FROG.—This Frog is common in all our ponds, brooks and springs, up to the highest altitudes, and supplies our tables with a delicate and delicious dish. A specimen was collected at Tamarack Swamp, at the summit of the mountains, September 28, 1896, where the species was common.

20. *Rana catesbeiana* Shaw. BULL-FROG.—This is the common edible Frog, known for its nocturnal serenades. I shot a remarkably large one, more than a foot in length, about 1870, in Pell's Pond. Its color, above, was pale rusty brown. Smaller ones are abundant in our ponds, and are commonly angled for.

REPTILES.

1. *Eumeces fasciatus* (Linn.). BLUE-TAILED LIZARD.—Not common, but seen nearly every year at my old home, near Highland Falls. There are two specimens, male and female, in the American Museum collection, which I shot on May 13, 1880. They were together, sunning themselves on a rock. This beautiful and entertaining animal lives among rocks, under buildings, walls, etc. It is exceedingly swift, but often surprisingly gentle, coming out of its hole and close to an intruder as often as driven in, but usually so nimble as to elude capture.

2. *Sceloporus undulatus* (Daudin). COMMON TREE LIZARD.—There is a specimen in my collection, taken at Highland Falls, Orange County, N. Y., in 1877. It is, however, not common here.

3. *Lampropeltis doliatus triangulus* (Boie). MILK SNAKE.—A very uncommon species.

4. *Diadophis punctatus* (Linn.). RING-NECKED SNAKE.—Quite numerous.

5. *Liopeltis vernalis* (De Kay). GREEN SNAKE.—Still common in the Highlands.

6. *Bascanion constrictor* (Linn.). BLACK SNAKE.—Formerly extremely abundant; now fairly so. A specimen taken May 25, 1883, measured 58 inches in length.

7. *Callopeltis obsoletus* (Say). PILOT BLACK SNAKE.—Formerly quite common; now rare.

8. *Heterodon platyrhinus* Latreille. SPREADING ADDER; BLOWING VIPER; HOG-NOSED SNAKE.—One of our common Snakes; called 'Flat-headed Adder,' 'Blowing Adder,' and 'Hissing Adder.' It flattens out and expands its head when excited, and, though harmless, is universally believed to be poisonous.

9. *Thamnophis saurita* (Linn.). RIBBON SNAKE.—Common, especially in fields and meadows through which streams flow and frogs are abundant.

10. *Thamnophis sirtalis* (Linn.). GARTER SNAKE.—Abundant. Stout, with shorter tail, than the preceding. It ranges from the Hudson River to the highest altitudes in the Highlands.

11. *Natrix fasciata sipedon* (Linn.). WATER SNAKE.—One of our largest, handsomest and most abundant snakes. It lives beside water, in which it swims swiftly and gracefully, with only its head and a small extent of neck raised above the surface. It can remain under for a considerable length of time. In spring, climbing up into bushes—preferably those standing in shallow water—it twists itself about the branches and sleeps in the sunshine.

12. *Storeria occipitomaculata* (Storer). RED-BELLIED BROWN SNAKE.—Common under stones and leaves. I have seen many when searching for salamanders and terrestrial molluscs.

13. *Agkistrodon contortrix* (Linn.). COPPERHEAD.—Much more common than the 'Rattler.' Some are killed in hay-fields in this neighborhood each year.

14. *Crotalus horridus* Linn. BANDED RATTLESNAKE.—Formerly numerous about Highland Falls; now extremely rare. One was killed on our place many years ago, and its rattles are still preserved. One was killed near Tamarack Swamp, on one of

the highest points in the Highlands, September 28, 1896. A specimen in the American Museum collection was killed near the old Highland Falls cemetery, August 6, 1881, and presented to me by Mr. Arthur Pell.

15. *Chelydra serpentina* (Linn.). SNAPPING TURTLE.—Abundant in ponds and streams. It often lays its numerous spherical eggs in ploughed fields. Its tenacity of life and snap-pishness are proverbial. It fights fiercely with others of its species. Its tracks are often mixed with those of the Muskrat and Great Blue Heron on the muddy margins of our ponds; and it not infrequently swallows a live minnow intended by the fisherman for the Reticulated Pickerel. Females are usually larger than males. The sex of two fine specimens, taken by the writer, and mounted in the American Museum collection, was determined by the taxidermist as masculine in each case; one weighed 23 and the other 26 pounds.

16. *Aromochelys odorata* (Latreille). MUSK TURTLE; STINK-POT.—This species is abundant in Oscawana Lake, Putnam County, where its shell is always densely covered with cryptogamic vegetation. On the west side of the Hudson it is less abundant. I obtained specimens from Poplopen's Pond and Long Pond, in Orange County. It takes a baited hook freely, and is often pulled out by juvenile anglers.

17. *Chrysemys picta* (Hermann). PAINTED TURTLE.—Common in ponds and along the Hudson. It only leaves the water to crawl out upon a rock, stump or sloping bank to sun itself, except when it goes to deposit its eggs. If confined in a dry place it soon dies. Like the Speckled Tortoise it sometimes wanders forth on warm days in winter. It regularly appears during March (6, 1880; 20, 1882), unless the season is late and cold weather unusually protracted. If the ice has melted sufficiently, it usually comes out about the time the mercury has risen to 70° Fahr. It follows the largest streams well up amongst the mountains.

18. *Clemmys insculpta* (Le Conte). WOOD TORTOISE.—Common on the margins of brooks ; occasionally found beside the Hudson River. It is not infrequently met with on dry ground. In 1896 I caught one in the mountains near Bog Meadow Pond, at a considerable altitude, and forwarded it alive to the U. S. National Museum. Like many species of Turtles, it lives for a long time in confinement. I caught a large female in the estuary of Moodna Creek, at Cornwall-on-Hudson, May 3, 1882. An unusually large one was taken by Dr. Louis A. di Zéréga, in Poplopen's Pond, in the mountains of Orange County, May 2, 1883.

19. *Clemmys guttata* (Schneider). SPECKLED TORTOISE.—Common in brooks, ponds and in the Hudson River. It often basks on rocks, logs and sunny banks, and comes out in winter during protracted thaws. In spring it generally makes its appearance early in March (6, 1880 ; 2, 1882 ; 15, 1883), and is first seen in little rills running from the swamps ; or, if the ice has melted, it crawls out on rocks and stumps in the ponds, and beside small streams and ditches. I have seen them in such situations before the ice had broken up on the Hudson. Copulation occurs during April. In a swamp near my home, on June 13, 1883, I found a nest containing three eggs, which were white, equally rounded at both ends, and measured, respectively, 1.35 x .70 ; 1.29 x .68 ; 1.31 x .68 inches. The eggs were placed in mossy turf on a stone in a bog. A small, shallow excavation had been made by the parent, and the eggs were covered after oviposition. I have seen them copulating in tide creeks of the river marshes, and at the sources of the larger streams, high among the mountains. In the mountain streams the shell-markings were observed to be unusually clear and bright. On April 1, 1883, I obtained a good proof of its acuteness of hearing : While leaning against a wall and looking into a swamp-hole, a Turtle arose to the surface of the pool, but appeared not to see me or to be aware of my presence until I made a sharp sound, when it instantly turned its head and looked at me before disappearing.

20. *Terrapene carolina* (Linn.). COMMON BOX TURTLE.—Very common. I have found it eating wild strawberries ; and,

when removed to a bed of cultivated strawberries, it remained there for several days, eating the ripe fruit. It is also very fond of mushroom fungi. When approached it produces a loud hissing sound and closes its shell. Though commonly found on high ground and in dry places, it seeks moist swamps during dry weather. It usually makes its appearance early in May (1 and 12, 1878; 7, 1883).

BIRDS.

Having already published a very fully annotated list of the Birds of the Hudson Highlands,¹ it seems sufficient to refer to this list in the present connection rather than to include even a nominal list of the species here. It may, therefore, suffice to say that the total number of species recorded from this region is 213, of which 100 are known to breed in the Hudson Highlands. Of the total number, 33 may be classified as permanent residents; 100 as summer residents, and 16 as casual summer visitors; 73 as winter residents and visitors (this includes the permanent residents); and 90 as spring and fall migrants.

MAMMALS.

1. *Didelphis virginiana* Kerr. VIRGINIAN OPOSSUM.—In the Highlands the Opossum has always been fairly common since my boyhood, and hence long before its too 'successful' introduction on Long Island, New York. As a lad, I sometimes caught them in my deadfalls set for rabbits and baited with pieces of sweet apple. About 1880 specimens were taken by Mr. Benjamin P. Keith as far up the Hudson as the neighborhood of the town of Catskill. I also heard of its capture at Newburgh, on the Hudson, about that time. On my recent visit to Highland Falls, I was pleased to learn that the new generation of 'coon-hunters' kill about as many Opossums as we used to twenty years ago; and one or two were brought in during my stay.

¹ 'A List of the Birds of the Hudson Highlands, with Annotations.' By Edgar A. Mearns. *Bulletin of the Essex Institute*, Vol. X, 1878, pp. 166-179; Vol. XI, 1879, pp. 43-52, 154-204; Vol. XII, 1880, pp. 11-25, 109-128; Vol. XIII, 1881, pp. 75-93. 'Addendum to "A List of the Birds of the Hudson Highlands, with Annotations."' By Dr. Edgar A. Mearns. *The Auk*, Vol. VII, Jan., 1890, pp. 55, 56.

It is certain that the Opossum sometimes roams abroad during cold winter weather. The night of January 13, 1882, was stormy and cold, and the snow lay deep on the ground; as I returned on horseback from visiting a patient and had nearly reached my house, the horse suddenly shied at something in the road that proved to be an Opossum. On another occasion, a specimen was killed in a hennery, January 30, 1877. This was an adult male, and furnished the following measurements: length, 840 mm.; tail vertebræ, 330; ear from crown, 45; ear from notch, 52; width of ear, 63.5; distance from tip of nose to eye, 59; length of head, 148; length of hind foot, 76.

2. *Lepus sylvaticus* Bachman. WOOD HARE; EASTERN COTTONTAIL; GRAY RABBIT.—Fairly common throughout the Highlands, and found everywhere, from the brackish marshes besides the Hudson to the tops of the highest mountains. Some individuals—those from the highest localities—verge towards the subspecies *transitionalis* of Bangs, which is the only form of this species found about Fort Miller, about 150 miles higher up the Hudson, in Washington County, N. Y. It is quite probable that *Lepus sylvaticus transitionalis* also occurs in the mountains in the northeastern corner of Orange County, where the Varying Hare (*Lepus americanus virginianus*) is said to occur sparingly. In the Catskill Mountains, typical *Lepus sylvaticus transitionalis* is found; but its range does not extend to the highest elevations, where the Varying Hare alone occurs.

This Cottontail is more prolific than most of the western species. I once found no less than nine little ones in a nest—a shallow burrow, thickly lined with rabbit-hair, in an orchard. I have known the Black Snake (*Bascanion constrictor*) to feast on young Rabbits still in the nest. The young that are born in early spring, when the weather is cold, have a coating similar to that of adults in winter; those born in summer, however, at once acquire the coarse post-breeding pelage of adults.

Dimensions.—Average of three adults, taken at Highland Falls, in January and April, 1871: total length, 436 mm.; tail vertebræ, 50; ear from crown, 76; from tip of nose to eye, 48; length of head, 80; length of hind foot, 84.

3. **Zapus hudsonius** (*Zimmermann*). MEADOW JUMPING-MOUSE.—Common at Poplopen's Pond and on J. Pierpont Morgan's mountain farm, but not seen elsewhere in the Highlands.

4. **Fiber zibethicus** (*Linnaeus*). MUSKRAT.—The Muskrat is abundant in all situations where there is sufficient water. It is most numerous in the brackish marshes that border the Hudson, but occurs at the highest altitudes wherever there are swamps, ponds or streams. In winter it builds houses regularly in all of the localities which it frequents. In the Hudson River it is very commonly taken in fyke-nets set by fishermen. Though living chiefly on vegetable food, it often eats fish, and its fondness for mussels of the genera *Unio* and *Anodonta* is evidenced by heaps of these shells on all the shores where it feeds. It often eats garden vegetables, and not infrequently enters houses and root-cellars in search of them. Where gardens and corn-fields are contiguous to its habitat, it does some damage by tearing open the ears of corn or carrying the vegetables into its burrows. It is especially fond of the sweet potato. It is easily taken by placing steel-traps in its well-beaten runways, which resemble those made by the Meadow-Mouse (*Microtus pennsylvanicus*).

If not molested, Muskrats become quite confiding. One spent the greater part of a winter in our store-room ; and they are usually numerous in the cellar of the Highland Falls Hotel, adjacent to Bog Meadow Brook, in the midst of the village of Highland Falls. Even in the woods they are sometimes quite fearless, as illustrated by the following incident copied from my journal : " May 11, 1883. Towards evening, after a rainy day, I walked to Echo Lake and saw a Muskrat swimming about and across the pond. After liberating some captive turtles, I seated myself beside the water, and immediately detected a strong scent of musk. Looking up, I saw a large Muskrat swimming in front of me. After swimming about for awhile, it came to the shore only a few feet away, and seated itself on a stone beneath the surface, so that only a portion of its head was above the water. After watching me for several minutes, it approached to within a yard or two of me, then passed on and came out upon the bank at a distance of only a few yards.

Measurements.—Average of three adult males: length, 575 mm.; tail vertebrae, 252; ear from crown, 15.6; ear from notch, 22.3; length of head, 75; length of hind foot, 86.3.

5. *Microtus pennsylvanicus* (Ord). COMMON MEADOW-MOUSE.—This species is abundant in the river marshes, woodland swamps, and wet meadows. Like the Muskrat it is most abundant in the salt marshes along the Hudson that are submerged by the tides. Among the mountains, a few were found in the wettest places in the forest; and several were trapped in Tamarack Swamp, in the highest part of the mountains (altitude about 1800 feet), where it associated with the Masked Shrew (*Sorex personatus*) and New Jersey Red-backed Mouse (*Evotomys gapperi rhoadsi*), living among wet sphagnum and pitcher-plants, in a forest growth of black spruce and tamarack. These specimens were not perceptibly different from those taken at the edge of the Hudson River. In the Hudson valley I have taken this Vole from Fort Miller, in Washington County (November, 1883), to Central Park, in New York City (April 17, 1881).

Measurements.—Average of eight adults (3 males and 5 females) from Consook Marsh, beside the Hudson River: length, 178 mm.; tail vertebrae, 49; ear from crown, 8.1; ear from notch, 12.8; length of head, 34.2; length of hind foot, 22.5. Average of two adults (male and female) from Tamarack Swamp, near the summit of the Highlands: length, 178; tail vertebrae, 54; ear from crown, 8; ear from notch, 12.8; length of head, 31.5; length of hind foot, 21.8.

6. *Evotomys gapperi rhoadsi* Stone. NEW JERSEY RED-BACKED MOUSE.—I have found this Mouse only in Tamarack Swamp, a boreal swamp near the summit of the Highlands. This tract is forested with white pine, tamarack and black spruce, with an undergrowth of rhododendron, Labrador tea, swamp huckleberry, sheep laurel and spice-bush. In it are numerous swampy openings, carpeted with sphagnum, cranberry, pitcher-plant, sundew and cotton-grass (*Eriophorum vaginatum*); while here and there are pools that float the golden-club, the buckbean, and other aquatic plants. This is the only spot in the region where I have found the small white lady's slipper (*Cypripedium candidum*). In September, 1896, four small mammals were trapped in these

sphagnous openings—the Meadow-Mouse (*Microtus pennsylvanicus*), Mole-Shrew (*Blarina brevicauda*), Masked Shrew (*Sorex personatus*), and the present species. Of these the Red-backed Mouse and Masked Shrew have not been found elsewhere in the region. I was surprised at finding no species of the genus *Peromyscus* near this locality.

7. *Peromyscus leucopus* (Rafinesque). COMMON DEER MOUSE.—This is, doubtless, the most abundant mammal of the region. It is common on the islands in the Hudson River, and beside the salt marshes. It sometimes inhabits barns and houses, and occurs in swamp bogs as well as on high ground. Its young are brought forth in nests built with materials similar to those used by the Red Squirrel, and placed in hollows of trees, or on old nests of the Catbird or Brown Thrasher in thickets of vines, cat-briers and underbrush. They often occupy such nests in winter. One found in the Fishkill Mountains was built on a Robin's nest, and contained five young mice. I have never found any species of *Peromyscus* on the highest mountains or about Tamarack Swamp.

Measurements.—Average of ten adult males: length, 176 mm.; tail vertebrae, 78.5; ear from crown, 12.8; ear from notch, 16.7; length of head, 29.5; length of hind foot, 20.7. Average of eight adult females: length, 185; tail vertebrae, 82.3; ear from crown, 12.5; ear from notch, 16.8; head, 30; hind foot, 21.1. Total average of eighteen adults (ten males and eight females): length, 180; tail vertebrae, 80.2; ear from crown, 12.7; ear from notch, 16.7; head, 29.7; hind foot, 20.9.

8. *Neotoma pennsylvanica* Stone. ALLEGHANY WOOD RAT.—Mr. Samuel N. Rhoads, in a paper entitled 'A Contribution to the Life History of the Alleghany Cave Rat, *Neotoma magister* Baird,' published in the 'Proceedings' of the Academy of Natural Sciences of Philadelphia for 1894, pages 213-221, claims that the recent species described by Mr. Witmer Stone,¹ under the name *Neotoma pennsylvanica*, is specifically identical

¹ Proc. Acad. Nat. Sci. Phila., 1893, p. 16.

with the subfossil cave species, named *Neotoma magister* by Baird.¹ I am unable to concur in this opinion, for the reason that a comparison of eight jaws—one upper and seven lower—belonging to Baird's type series of his *Neotoma magister* differ in important respects from a series of recent skulls, accompanied by skins, of *Neotoma pennsylvanica* Stone, for the use of which I am indebted to the kindness of Dr. C. Hart Merriam. In this comparison, *Neotoma magister* proves to have been a considerably larger and stouter animal than *N. pennsylvanica*; the skull is relatively shorter in proportion to its breadth, as best seen when the mandibles are articulated; the mandibles are deeper, wider, and with the notch between the condyloid and angular processes shallower; the upper incisor is larger; the lower molars have the cusps more condensed and the tooth-row broader and longer, with rounded instead of sharp angles, and with the salient angles of the middle lower molar opposite, not oblique—much as in *Baiomys* as compared with *Peromyscus*.

I therefore incline to the opinion that *Neotoma pennsylvanica* Stone is a distinct species from *N. magister* Baird, and that the latter will never more appear to us in the flesh, but belongs to a remote post-glacial epoch. One fragment of a lower jaw in Professor Baird's series looks very much like a young individual of *N. pennsylvanica*, which it probably is, since Mr. Rhoads informs us that bones of the Horse and Norway Rat have been found in the bone caves of Pennsylvania.

The only authentic record of the occurrence of this species in the Hudson Highlands is that of Dr. J. A. Allen, in his paper entitled 'Rediscovery of *Neotoma* in New York.'² This record is based on one specimen, obtained by Mr. Cleveland Allen (son of Dr. J. A. Allen), October 30, 1894, "on Storm King Mountain, Cornwall, Orange County, New York, about fifty miles north of

¹ In his *Mammals of North America*, 1857, page 486, Baird states: "One species (*N. magister*) occurs fossil in the caves of Pennsylvania"; and, on page 498, he describes it as follows:

"The bone caves of Pennsylvania have furnished me with several lower jaws of a fossil *Neotoma*, considerably larger than that of the largest specimen even of any recent species which I have seen. The body could not have been less than twelve inches in length; it differs from the others in the wider and more massive molars, the lobes of which are all more nearly equal than in the rest, and all rounded, not angular. The inner and outer sides of the molars are very nearly symmetrical, and the indentations or folds of nearly equal depth. The axis of the condyloid process is quite oblique, and the condyle below the level of the coronoid. The species may be called *N. magister*."

² Bull. Am. Mus. Nat. Hist., VI, 1894, pp. 362-364.

New York City, and forty miles north of Piermont," Rockland County, New York, where Mr. John G. Bell took several specimens about 1850, one of which (No. 375) is still in the collection of the U. S. National Museum. In the paper cited, Dr. Allen also referred to "an early and rather indefinite record of the Wood Rat in Massachusetts"; also mentions the probable capture "of six specimens at Liberty Hill, in the northern part of New London County, Connecticut"; and concludes his article thus: "It hence seems probable that small colonies of Wood Rats may exist at various points in southern New York and southern New England, as well as in New Jersey, Pennsylvania, and in the mountains of Virginia, all probably referable to the recently described *N. pennsylvanica*."

Mr. Samuel N. Rhoads has recently discovered this Rat at Greenwood Mountain, at the south end of Greenwood Lake, in northern New Jersey.¹

Mr. Charles H. Townsend writes me: "I found a Wood Rat (*Neotoma*) near Latrobe, Westmoreland County, Pennsylvania, many years ago. The specimen was skinned and stuffed, and probably given away, as I do not know what became of it. The Wood Rat must be rare in that region as I never found another."

Recollecting that I had once seen a published record of the capture of a *Neotoma* in Connecticut by Dr. Robert T. Morris, I wrote to him for a reference to the publication. My letter elicited the following information: "I do not remember just the time when the *Neotoma* was killed in Connecticut, but am pretty sure that it was in the summer vacation late in the seventies or early eighties. I made a note of the capture in 'Forest and Stream,' I think; and the specimen is probably in a bottle of alcohol in the Peabody Museum at New Haven—very likely carrying the date of capture on the label of the bottle. The Rat was running through a ditch, newly dug, on Prospect Street, when I made a lucky shot with a stone, and collected the results."

9. *Mus decumanus* *Linnaeus*. RAT.—Too abundant.

Measurements.—An adult female (No. 20, collection of Louis di Zerega Mearns), taken at Highland Falls, September 28, 1896, gave the following

¹ See Proc. Acad. Nat. Sci. Phila., 1897, p. 28.

measurements: length, 396 mm.; tail vertebræ, 187; ear from crown, 16.5; ear from notch, 20; length of head, 51.5; length of hind foot, 41. Mammæ, 6 pairs (3 pectoral, 1 abdominal, and 2 inguinal).

10. *Mus musculus* Linnaeus. HOUSE MOUSE.—Found in woods as well as houses.

Measurements.—Average of two adult males: length, 164 mm.; tail vertebræ, 79; ear from crown, 10.5; ear from notch, 13.2; head, 24; hind foot, 18.2.

11. *Arctomys monax* (Linnaeus). WOODCHUCK; GROUND HOG.—Abundant in the Highlands, and sometimes found on the highest mountains. It is seldom seen out of its burrows before April, and retires for the winter in early autumn. One was seen out, at Fort Miller, about 200 miles up the Hudson, as late as November 20, 1883. The young are born about the first of May, and are seen frolicking around the entrance to their burrows a few weeks later. At the residence of Mr. Alfred Pell, a Woodchuck's tunnel terminated in a greenhouse. The animals sometimes came out during winter and devoured some of the plants. On the estate of E. P. Roe, at Cornwall-on-Hudson, they also became very gentle. We visited one on April 22, 1883, that had become quite a pet. When we chased it into its den in a rocky bank beside a garden, its head was seen repeatedly cropping out of one or another crevice among the rocks, until, after 'whistling' and stamping for awhile, it finally tumbled out altogether, and began digging and scratching amongst the leaves. Ordinarily they are shy, and often pause when feeding to sit up and look about them, dreading lest some enemy should come upon them by stealth.

On May 25, 1878, I caught two young Woodchucks no larger than House Rats. One was cross and had to be liberated; but the other became gentle and affectionate at once. Within a few hours it would sit on my knee and take clover from my hand, holding the stems clasped in its fingers as Chipmunks do. It slept under cotton batting in a closet, drank water freely, and usually searched my pockets for food when I entered the room. Like other youngsters, it was good while I was present, but mischievously destructive as soon as my back was turned; and it finally died of poisoning after eating some birdskins that were coated inside with arsenic.

The pertinacity of the Woodchuck in attempting to return to its burrow, when surprised away from home, has been frequently commented upon. Among my own notes I find the following: "Highland Falls, New York, September 5, 1882. As I was skirting a swampy meadow, searching for orchids, I came suddenly upon a Woodchuck that was feeding in the grass. I was standing beside its burrow. It ran towards me, at first, and then stopped. Not knowing the location of the burrow, I momentarily expected to see it pop into a hole in the ground; but, as it did not move, but crouched flat upon the grass, I knew that I must be in its path, and that it did not intend to run from me. Not seeing a suitable stick with which to arm myself, I selected a handful of large stones and started to advance upon it; but the moment I did so the Woodchuck came at me full tilt. I threw a stone, but the beast came on so swiftly that the stone went over it. In fact, the animal advanced with such celerity that I backed to one side, expecting that it would pass by me; but it followed me! I threw another stone feebly towards it, then dropped the rest, and took to my heels, whereupon the Woodchuck ran into a burrow that opened in a horizontal crevice of a ledge of rock some three feet above the ground."

12. *Tamias striatus* (Linnaeus). SOUTHERN CHIPMUNK.—The Chipmunk is by far the most abundant member of the Squirrel family in the Highlands. It lives everywhere, from the islands of the Hudson to the highest mountaintops, though it is least common on the high ground. The form found in the Highlands, though distinctly *striatus*, is not quite typical, but slightly approaches the northern form *lysteri*, which is the prevailing form in the high Catskills. I have seen perfect intergrades from the Hudson River slope of the Catskill Mountains near Palenville, New York.

This familiar and attractive little animal stores up food in autumn on which to subsist through the long winter; but on winter days, when the sun shines brightly, it sometimes comes out in sheltered spots and suns itself on the stone walls and ledges. I have seen it running about during every month of the year, but seldom every month of any one winter, as there are usually several

consecutive weeks of severely cold or stormy weather, during which none can be found. Thus, under date of March 15, 1883, I have noted the appearance of a pair on a wall—"the first seen since last fall." On April 23, 1877, I noted as follows: "Chipmunks have not shown themselves upon a single occasion during the past winter, although the weather has been unusually mild and pleasant. Last winter they were to be seen at any time, in favorable localities, when the sun was shining brightly." I shot one on the snow, in Lewis County, New York, in January, 1878; another at Circleville, Ohio, December 4, 1880, when the weather was coldest and a heavy snow lying on the ground. The cheek-pouches of the Chipmunk will accommodate a pignut or the ginsing groundnut without much stretching, though it makes the animal look as if it had the mumps. Breeding sometimes occurs early in the season, as I have seen young ones half as large as their parents by the beginning of May.

Measurements.—Average of 13 adults (4 males and 9 females): length, 245 mm.; tail vertebrae, 91.4; ear from crown, 11.6; ear from notch, 17.7; head, 44.6; hind foot, 34.1.

13. *Sciurus hudsonicus loquax* Bangs. RED SQUIRREL; SOUTHERN CHICKAREE.—The very audacity and impudence of this lively little Squirrel seem to have preserved it from extermination, though its small size and comparative worthlessness for food have no doubt contributed to its preservation. It is still abundant throughout the course of the Hudson, never having been exterminated even on Manhattan or New York Island. Though noisy, somewhat mischievous, and destructive to the eggs and young of birds, it is loved and appreciated where better-behaved animals have been destroyed. In this locality its nests are very commonly placed amid the protecting foliage of the red juniper, though hollow trees, bird houses, attics, steeples, bridges, observatories, and similar shelters are often utilized as nesting places, or for winter homes. They are commonly seen mating during February. The young are usually brought forth in the outside nests, which are more warmly built than the coarse leaf-nests of the Gray Squirrel, being composed outwardly of strips of bark, chiefly of the red juniper and grape, and lined with hair, feathers,

moss, finely-shredded inner bark, and other soft materials that are conveniently at hand. The young are usually born in May or June, though, as in the case of the Gray Squirrel, they may be found at any time during the warmer half of the year. Those born early in the season, during cold weather, are coated with the winter pelage, and have red backs and grayish limbs; but those born in hot weather are at once provided with the summer coating, which has the color pattern reversed, the back being grayest and the limbs reddest, and with a black list on the sides. On May 5, 1878, I examined a nest containing six young, in a hollow oak-tree that had been repeatedly used by Flickers for the same purpose. The young Red Squirrels were quite large for the season, and very lively, soft and pretty. Their coats, like their mother's, were of the winter style. On another occasion (April 19, 1882), a Red Squirrel was seen leaving a bird-house on a tall pole covered with climbing rose-vines. Supposing this meant mischief to a family of Bluebirds, I procured a ladder and made an investigation. One compartment was nearly filled with grasses, papers, and bits of rag. After pulling out a quantity of such materials, a large family of very young Squirrels, with unopen eyes, was found. I did not try to count them; but one or two bright-colored and nearly naked little ones that were drawn out of their nest, cried out lustily, and scrambled back with alacrity although not yet able to see. Their bodies were wrinkled, their tails were bare, and their heads seemed disproportionately large.

During the seventies, a race of perfect albinos of this species was perpetuated for several generations, on Constitution Island, in the Hudson River, and several of them were killed and preserved as specimens.

Measurements.—Average of seven adult males: length, 306 mm.; tail vertebræ, 125; tail to end of hairs, 173; ear from crown, 14; ear from notch, 22; distance from nose to eye, 20.9; head, 50.5; hind foot, 46.9. Average of seven adult females: length, 315 mm.; tail to end of vertebræ, 130; tail to end of hairs, 176; ear from crown, 14.5; ear from notch, 21.5; nose to eye, 20.5; head, 50.3; hind foot, 47.3.

14. *Sciurus carolinensis leucotis* (Gapper). NORTHERN GRAY SQUIRREL.—About a dozen Gray Squirrels are preserved in

my collection, and a great many others were bagged during the very early days of my gunning; but the species was never very abundant in my time. On the recent visit I saw but few nests, and none that were occupied. A few black ones were shot on Dunderberg Mountain in 1876. All the others were gray, although blacks and intermediates were comparatively numerous in the northern part of the State. In the Highlands, leaf-nests are usually occupied during the warm weather, but in winter the Gray Squirrel more commonly lives in hollows of old trees, though I believe that leaf-nests are sometimes used in winter. The young are sometimes born as early as April. On April 28, 1877, near Sugar Loaf Mountain, in Putnam County, a leaf-nest was found occupying the site and remains of an old Hawk's nest. Three young, still quite small, were in it. When I climbed up to the nest the parent chanced to be absent, but returned while I was examining the contents of her nest. She was a beautiful Squirrel, with an elegant tail, and, to my astonishment, seemed to be utterly and absolutely devoid of fear. Disregarding consequences, she came straight up to her progeny, took one of them in her mouth, and made off with it towards some safer spot. We then left her without further molestation.

I have seen Gray Squirrels eating the large fungi of which so many animals are fond. In winter they tear open pine cones and devour the seeds. On January 28, 1883, I watched a pair gathering the 'beans' from the pods of a thorny locust tree. They dispatched them rapidly, sometimes holding the pods in their arms in the manner of a performer on the harp. Though they displayed much dexterity in handling this clumsy provender, one Squirrel seemed to be in imminent danger of prying itself off the limb with a huge pod that it was manipulating. After extracting all the seeds it threw the pod down at me. It was flat, about a foot in length, and an inch in width.

Measurements.—Average of 7 adults (4 males and 3 females): length, 515 mm.; tail to end of vertebræ, 249; tail to end of hairs, 331; ear from crown, 26.4; distance from tip of nose to eye, 31.7; head, 67.4; hind foot, 63.5.

15. *Sciuropterus volans* (Linnaeus). SOUTHERN FLYING SQUIRREL.—Abundant throughout the Highlands. Its nest is

usually placed in a hollow tree. I have found nests in the tops of the tallest trees, and once in a stump within a foot of the ground. Not infrequently it builds outside nests, and even lives in them during the winter. Some resemble the leaf nests of the Gray Squirrel externally, though there is always a warm lining within ; other nests are indistinguishable from those of Red Squirrels ; and others still are deftly woven of the softest possible materials. A hemlock that has donated its top to the children for a Christmas-tree is the likeliest spot of all to search for a Flying Squirrel's nest ; but it is sure to be at the point of decapitation and surrounded by such an outgrowth of succulent sprouts that it is hard to see. You will find the young ones in it if you go at the right time ; one of them will make the softest, prettiest and most affectionate little pet that any boy or girl ever loved. If you fail to find the nest on the hemlock stub, tap with a heavy stone on the aspen-tree that the woodpeckers bored out a year or two ago, and you may see a head with a pair of bright black eyes looking out from one of the openings ; tap again, harder, and off will sail the old Flying Squirrel, away down the hill, frequently turning to avoid tree-trunks, and winding about amongst them with perfect ease, at last alighting far below with a strong upward sweep that gives it an impetus that helps it to run swiftly up to the tree-top, again to take a slanting flight towards the foot of another distant tree.

As before remarked, I once found a nest in a stump at the root of a chestnut-tree, close to the ground. It contained a family of five very young Flying Squirrels, which, when disturbed, were removed by their mother to a distant tree. She carried them, one by one, to the top of the tree, and then 'flew,' with a little one in her mouth, and alighted without apparent injury to it.

On May 3, 1877, no less than seven Flying Squirrels were driven from an old dead pepperidge-tree. They left the tree singly, and all appeared to be of about the same size, from which circumstance I suppose they belonged to one family, the young having remained with their parents during their first winter. Flying Squirrels are more apt than Red Squirrels to select cupolas ; pigeon-cotes, attics or outbuildings for their abode. Mr. A. T. Mosman, of the U. S. Coast Survey, told me that one of these

Squirrels took possession of an apartment at the summit of an observatory that had been erected to the height of more than eighty feet, in the State of Indiana.

Measurements.—An adult male, taken at Highland Falls, New York, May 3, 1877, measured as follows: length, 220 mm.; tail to end of vertebræ, 95; tail to end of hairs, 107; head, 37.8; hind foot, 26.9.

16. *Sorex personatus* Geoffroy Saint-Hilaire. MASKED SHREW.—This, the smallest known mammalian inhabitant of the Hudson Highlands, was not found until September 28, 1896, when I trapped a single adult male in a sphagnous opening in the midst of Tamarack Swamp, near the summit of the mountains. Its measurements are as follows: length, 104; tail vertebræ, 40; head, 20.7; hind foot, 12.

17. *Blarina brevicauda* (Say). MOLE-SHREW.—This is one of the most abundant mammals of the Hudson Highlands, and is found in almost all situations. During my recent visit I trapped it on Consook Island, in the Hudson River; in the sphagnum of Tamarack Swamp, near the mountaintops; and in a variety of intermediate localities. These animals are locally known as 'Ground-Moles.' Cats capture them easily, and often bring them into houses and barns, but seldom care to eat them.

Measurements.—Average of eight adults (four males and four females): length, 128 mm.; tail vertebræ, 28; head, 29.2; hind foot, 15.5. The largest specimen came from Tamarack Swamp, and measured as follows: length, 142 mm.; tail vertebræ, 31; tail to end of hairs, 39; head, 29; hind foot, 16.

18. *Scalops aquaticus* (Linnaeus). EASTERN MOLE.—This species is not very common in the Highlands. It, apparently, is more numerous in cultivated lands than elsewhere, and seems to be less aquatic than the Star-nosed Mole.

Moles of this genus are frequently albinistic; and, in fact, such appears to be the case with Moles in general; of this the European genus *Talpa* affords a good illustration. Albino Moles usually exhibit a yellowish glandular discoloration.

19. *Parascalops breweri* (Bachman). BREWER'S MOLE; HAIRY-TAILED MOLE.—This Mole is probably rare in the Highlands, though common in the Catskill Mountains. I have exam-

ined only two specimens. The first was picked up under a hay-pole on a saltmarsh beside the Hudson, and identified by Dr. C. Hart Merriam. On June 28, 1878, Mr. William Church Osborn brought me a perfect albino specimen of this Mole, which a gardener had caught near Garrison's, in Putnam County.

20. *Condylura cristata* (Linnaeus). STAR-NOSED MOLE.—This singular-looking mammal is not uncommon. It sometimes enters ice-houses or damp cellars, but usually prefers marshy ground, and swims amongst the cat-tails of the river marshes when the tide is up. A nest was opened by a ploughman in our garden. It was nearly two feet below the surface, in dry ground, and contained several half-grown young in a nest of shredded grass and weeds.

21. *Myotis subulatus* (Say). LITTLE BROWN BAT.—This Bat is quite uncommon in the Hudson Highlands. It flies about from early spring (March 6, 1880) till late fall; and I have found it dormant, in hollow-trees, in the winter. Inasmuch as Dr. A. K. Fisher, who collected several hundred Bats at Sing Sing, on the Hudson, failed to find in his series even a single specimen of this species, it is worth remarking that one of my early specimens, taken at Highland Falls, in August, 1873 (No. 509, collection of American Museum of Natural History), has recently been examined by Mr. G. S. Miller, Jr., and by Doctors Harrison Allen, J. A. Allen, A. K. Fisher, and myself, and determined to be this species.

22. *Vespertilio fuscus* Beauvois. BROWN BAT.—The Big Brown Bat is very common, often entering houses, in pursuit of insects, after the lamps have been lighted. At Highland Falls, I have seen it flying about as early as April 22 (1877) and as late as November 3 (1876). In New York City I rescued one from a Chinese laundryman into whose shop it flew, on Sixth Avenue, on the night of February 9, 1881; another was seen in Central Park, April 17, 1881.

Measurements.—Average of four adults (one male and three females): total length, 122 mm.; length of head and body, 75; tail, 47; head, 22; ear from crown, 13.7; alar expanse, 325; length of longest finger, 81; forearm, 47; tibia, 20.3.

23. *Pipistrellus subflavus* (*F. Cuvier*). GEORGIA BAT.—This species is not abundant in the Highlands. At Sing Sing it is the most common Bat. Dr. Fisher says he has never taken *Myotis subulatus* at Sing Sing, but that it is entirely replaced there by this species, which is also the most common Bat of the District of Columbia. An adult male, taken at Highland Falls, New York, April 24, 1877 (No. 508, collection of the American Museum of Natural History) measured as follows: length of head and body, 40.1 mm.; tail, 26.4; nose to eye, 5.3; nose to ear, 10.2; nose to occiput, 14; height of ear, 10.2; alar expanse, 222.3.

24. *Lasionycteris noctivagans* (*Le Conte*). SILVERY BAT.—One specimen was taken from a hollow tree. Dr. A. K. Fisher found it "tolerably common" at Sing Sing, New York. Mr. George Marshall, of Washington, D. C., brought me for identification an adult female of this species, taken with one other from a hollow tree, at Laurel, Maryland, October 12, 1896.

25. *Lasiurus borealis* (*Müller*). RED BAT; NEW YORK BAT.—Very abundant in this region during the summer. Bats of several species are frequently discovered in chimneys, hollow trees, caves, mines and similar places of shelter during the winter; but I have never seen a Red Bat taken alive at that season. It is possible that the species migrates to the south in the autumn and returns in the spring. During the latter part of October and the first week of November, I have seen great flights of them during the whole day. In 1876 I noted that all of the individuals shot from any single flock were of the same sex, though another flock might yield all of the opposite sex. One year specimens are recorded on four days, on two days only males and on two only females. So far as they go, these observations suggest that the sexes perhaps separate during their autumnal flights, as birds commonly do. The alar expanse of five males, shot in an open field in broad daylight, November 2, 1876, averaged 295 mm.

26. *Dorcelaphus virginianus* (*Erxleben*). VIRGINIA DEER.—The 'Middletown Journal,' issue of January 13, 1878, contains

¹ The Mammals of Sing Sing, N. Y. < *The Observer*, Portland, Conn., Vol. VII., No. 5, May, 1896, p. 195.

a notice of the capture of a Deer, near Middletown, in Orange County, New York. This record brings the species within the limits of the Hudson Highlands, and is the only authentic one that I know of; but I am informed that Deer are still occasionally found in the extreme northwest corner of Orange County.

27. *Phoca vitulina* Linnæus. HARBOR SEAL.—The Seal has been seen several times, and once captured, in the Hudson Highlands. One was shot at New Hamburg, on the Hudson, by a Mr. Wood, for whom the specimen was mounted by Mr. James S. Buchanan, a taxidermist of Newburgh, who showed me the specimen and four large jars of oil which he took from it. It was shot on the ice near an air-hole in the river, in midwinter, 1877-78, and weighed sixty pounds. This species has been taken on Lake Champlain, as recorded by Zadock Thompson,¹ and by Dr. C. Hart Merriam,² who also says (*l. c.*, p. 105): "March 25, 1879, I saw one on a rock in the Hudson River, near Sing Sing." On page 200 of his excellent paper on 'The Mammals of Sing Sing, N. Y.,"³ Dr. A. K. Fisher further observes: "Almost every spring one or more Seals are seen about the time the ice is breaking up in the river. On March 11, 1884, an adult male was secured in the cove."

28. *Procyon lotor* (Linnæus). RACCOON.—The Raccoon is a common species of the region; 'Coon-hunting' is still a favorite sport; and 'Coons' are almost always brought home, if the dogs and hunters are of the right sort. It is an almost omnivorous animal, and eats frogs, fishes, and poultry with almost as keen a relish as it does sweet corn in the milk or the large summer grapes. It makes a handsome and affectionate pet, possessing many winning traits and interesting habits to commend it, but is as mischievous as a bear and much too lively after bedtime. I have never seen its tracks in the snow, as it spends the winter in a deep sleep; but Mr. William K. Lente once killed one upon the frozen Hudson, between West Point and Cold Spring, in the middle of winter.

¹ Natural and Civil History of Vermont, 1842, p. 38.

² The Mammals of the Adirondack Region, Northeastern New York, 1884, p. 105.

³ Published in 'The Observer,' Portland, Conn., Vol. VII, No. 5, May, 1896.

29. *Lutra hudsonica* Lacépède. AMERICAN OTTER.—Otters are still found in the Hudson, and in the streams and lakes of the Highlands, though the species has now become extremely scarce. Twenty years ago it was much more numerous. I knew of the capture of several Otters, during the years spent in making my collections in the Highlands. One was trapped in 1875, by Mr. John Redner, on a stream that flows into Poplopen's Pond. I have repeatedly seen signs of the Otter about the Hudson River, Poplopen's Creek, and Bog Meadow Pond, though I never succeeded in capturing them.

30. *Putorius (Lutreola) vison lutrecephalus* (Harlan). LARGE BROWN MINK.—Minks have 'always' been rather common in this vicinity. I have known several persons, at one time or another, who trapped them for profit. I have no specimens at hand, except one fine adult male that was trapped by my son, on our old place at Highland Falls, October 2, 1896. This specimen (No. 23, collection of Louis di Zerega Mearns) gave the following measurements: length, 645 mm.; tail vertebræ, 233; length of head, 85; length of hind foot, 73; ear from crown, 11; ear from notch, 24. It was taken in a steel-trap set in a Muskrat runway. When my son approached this Mink in the trap it was very fierce, and uttered a loud, shrill cry. In its efforts to get free it had dug a trench in the mucky soil at a chain's-length radius from the stake to which the trap was fastened.

On March 26, 1880, while I was standing beside Morgan's Pond, in the mountains, watching the movements and colors of some handsome Mallards and Geese that were swimming close to the spot, a head emerged from the water and was propelled to the nearest rock that projected out of the water; then the head, shoulders and body of a fine Mink successively appeared upon the edge of the sloping rock, and their owner peered cunningly and wickedly at the flock of Mallards that fed close by unconscious of its presence. I was standing with my gun upon my shoulder in plain view, and dared not move, lest the Mink should observe me; but, for the moment, it was too eagerly occupied with watching the ducks to pay any attention to other matters; though, at the first movement of my hand on the gun-stock, it dis-

appeared with a celerity of movement that could scarcely be matched by one of the Grebes. A moment later I could hear the Mink making its way amongst the stones beneath my feet, and it did not again appear, though I waited there a long time. On several occasions I have found dead Dusky Ducks (*Anas obscura*) lying upon the river marshes with a hole eaten beneath the wing, and some of the muscles of the breast devoured ; this I attributed to the Mink.

31. *Putorius noveboracensis* DeKay. NEW YORK WEASEL.
—This is the common Weasel of this region, and quite abundant. There are six specimens in my collection, taken from 1877 to 1884; and many others were trapped or shot, in earlier years, that were not preserved. It regularly changes to white in winter, though this seasonal phenomenon always strikes the residents as a novelty, and never fails to excite their astonishment. We were frequent losers from the nocturnal attacks of this little animal upon our poultry. Once I shot one that had just killed a large hen. Farmers, however, often overlook such trespassing and allow the Weasel to stay about their barns because it is such a good ratter. While a guest at the home of Miss Mary Rutherford Garrettson, at 'Wildercliff,' near Rhinebeck, on the Hudson, in March, 1878, that good lady related to me the following interesting incident, which shows the fearless nature of the Weasel : When upon the stairs, in her house, Miss Garrettson met a Weasel that was carrying a large Rat. The Weasel advanced boldly, and she, having the fire-tongs in hand, seized the Rat with them and proceeded to carry it through the hall, when she observed that the Weasel was following; passing through the hall and across another apartment, she deposited the dead Rat in the library, where the Weasel at once repossessed itself of its prize. The lady then withdrew, and shut the door of the room, hoping to discover some of the habits of her plucky little guest ; but the Weasel immediately disappeared and carried the Rat along, having, no doubt, discovered some hole large enough to allow its escape with the booty ; but the good lady never discovered the opening, and thinks to this day that it must have gone up the chimney, though a fire of logs was burning in the fire-place at the time.

It is not at all uncommon for this Weasel to take to a tree when surprised in the woods. It does not hesitate to climb the largest tree, and sometimes ascends to the top, though it more often runs out towards the extremity of one of the larger limbs and crouches upon it until the danger is past. Several of my specimens were shot in trees. When wounded it sometimes utters loud cries.

While I was walking with my wife, near Highland Falls, April 17, 1883, a Weasel appeared from among some loose rocks around the base of a large granite boulder and approached us fearlessly. It came slowly up to within two yards of us, and then tossed its nose upwards and sniffed the air. A Crow cawed loudly in passing, and at once attracted the attention of the Weasel, for it instantly started and turned toward the sound. Then it ran under the boulder again, but continually darted in and out, appearing alternately at one opening and then another, keeping its bright eyes fixed upon us, and poising its head horizontally. After we had watched it for several minutes, it ran along a ledge of rock to a swamp, and for awhile disappeared; but later it appeared again amongst some broken rocks, where it was shot. Although so late in the season, white hairs were scattered through the entire pelage, and one foot was about half white.

Measurements.—Average of four adult males: length, 401 mm.; tail to end of vertebrae, 140; tail to end of hairs, 178; ear from anterior base, 23.2; nose to eye, 19.3; head, 57.2; hind foot, 43.2.

32. *Putorius cicognani* (*Bonaparte*). BONAPARTE'S WEASEL.

—About the year 1870 I trapped one or two of these little, short-tailed Weasels on our place at Highland Falls, and I have seen a few of them since. It is probably quite uncommon. I am unable to say whether or not, in this locality, it changes to white in winter, as I have seen them only in summer. When a boy, I once met one, carrying a Mouse in its mouth, coming toward me on a stone wall. I was carrying a string of fish, and with this struck the Weasel and dashed it several yards away from the wall, but it secured the Mouse and succeeded in passing on. When struck, it uttered a shrill cry of rage, but turned immediately to pick up the Mouse.

33. *Mephitis mephitis* (Shaw). EASTERN SKUNK.—The Skunk is common, though not very numerous.

34. *Vulpes pensylvanicus* (Boddaert). AMERICAN RED FOX.—This splendid animal is not numerous in the Highlands. It prefers more open country. Now that the Gray Timber Wolf has practically disappeared from the East the cunning Red Fox has only the hunter and the hounds to fear in the thickly settled places. I have watched it running before the dogs many times, and have seen some of its clever manœuvring; it always appeared to me as if the Fox was enjoying most of the sport, unless it came to a shot from one of the stands, an accident that seldom happened. One frosty December morning, at the age of eighteen, I unwittingly ambushed and shot the only Red Fox that ever fell to my gun, though numberless Saturdays and other holidays were spent in hunting with the hounds; and I certainly—perhaps rightly—considered myself the peer of any fox-hunter of the region.

35. *Urocyon cinereoargenteus* (Müller). EASTERN GRAY FOX.—This is the common Fox of the region, the Red Fox being comparatively scarce. It is very destructive to poultry. When I was a boy of perhaps a dozen summers we were much annoyed by the loss of our spring chickens, several of which daily disappeared with a regularity that was disheartening to young poultry-raisers; and one morning, when 'Biddie,' our pet Dorking, was gone, and her thirteen eggs were cold in the barrel of straw, it was understood that a climax had been reached, and that active measures for the suppression of the marauders must be instituted at once. Some of 'Biddie's' white feathers furnished a clew which led to the discovery of a trail through some dense brushwood, leading to a den in a thicket on a rocky hill at the back of our place. There I trapped a half-grown Gray Fox. In this den most of our missing poultry had disappeared, and it was forthwith effectually broken up by digging out the whole length of the burrow. The cavity in which the young had been reared was oval in shape, with about the capacity of a flour barrel. It was located under a large stone, and tunnels extended from it to the surface in two directions for distances of about three and five yards respectively.

Gray Foxes are not very shy. I sometimes came upon them unexpectedly about the ruins of old Fort Putnam, near the West Point Military Academy, and they usually trotted off without breaking into a gallop. When pursued by hounds they soon grow tired or frightened, and end the chase by entering a burrow or crevice among the rocks.

Measurements.—Average of three adult males, from Highland Falls, N. Y.: length of head and body, 642 mm.; tail to end of vertebræ, 333; to end of hairs, 437; breadth of expanded tail, 229; ear from crown, 77; from tip of nose to eye, 54; to ear, 117; length of head, 143; fore limb, from olecranon to end of longest claw, 190. Iris, grayish brown.

36. *Lynx rufus* (Guldenstadt). WILDCAT; BAY LYNX.—On my last visit to the Highlands, in 1896, I saw no signs of the Wildcat; and I was told that none had been killed there for several years past. During the first twenty-five years of my life the Wildcat was at least as numerous as the Red Fox, and more frequently killed. In the early seventies, Wildcats, by their depredations, caused so much loss to the residents of Putnam County, across the Hudson from my home, that bounties were privately subscribed by landowners, amounting to \$25 for every one killed in that neighborhood. Mr. Henry Le Farge, still a hunter of local renown, killed a considerable number of them; but there were still some Wildcats remaining on Sugar Loaf Mountain, when I left the Highlands, in 1884.

Measurements.—A fine adult female (No. $\frac{3118}{118}$ of the American Museum collection), killed on Black-top Mountain, near Highland Falls, Orange County, New York, on November 29, 1874, presented the following measurements: length of head and body, measured from end of nose to root of tail, 795 mm.; tail, measured from root to end of hairs, 185; ear from crown, 68.3; from tip of nose to eye, 51; from tip of nose to ear, 124; from tip of nose to end of outstretched hind limb, 1156; expanse of outspread fore limbs, 825; height of ear, 68. Iris, yellow.

RECENTLY EXTIRPATED MAMMALS.

1. *Castor canadensis* Kuhl. CANADA BEAVER.—When I was a boy, the remains of a Beaver-dam were plainly visible at Bog Meadow Pond, in Orange County. When this pond was

raised, a few years ago, to supply the town waterworks at Highland Falls, the dam was submerged, and with it disappeared the last vestige of the Beaver, long extinct in the Highlands.

2. *Ursus americanus* Pallas. BLACK BEAR.—Though still common in the Adirondack and Catskill Mountains, the Bear disappeared from the Highlands many years ago, though my father's mother saw them there.

3. *Sciurus ludovicianus cinereus* (Le Conte). NORTHERN FOX SQUIRREL.—Doctor Bachman wrote :¹ "In the northern part of New York it is exceedingly rare, as I only saw two pair during fifteen years of close observation. In the lower part of that State, however, it appears to be more common, as I recently received several specimens procured in the County of Orange." I never heard any allusion to the Fox Squirrel as an inhabitant, past or present, of Orange County; and it is probably many years since it occurred there.

¹ Charlesworth's Magazine of Natural History, Vol. III, 1839, p. 161.