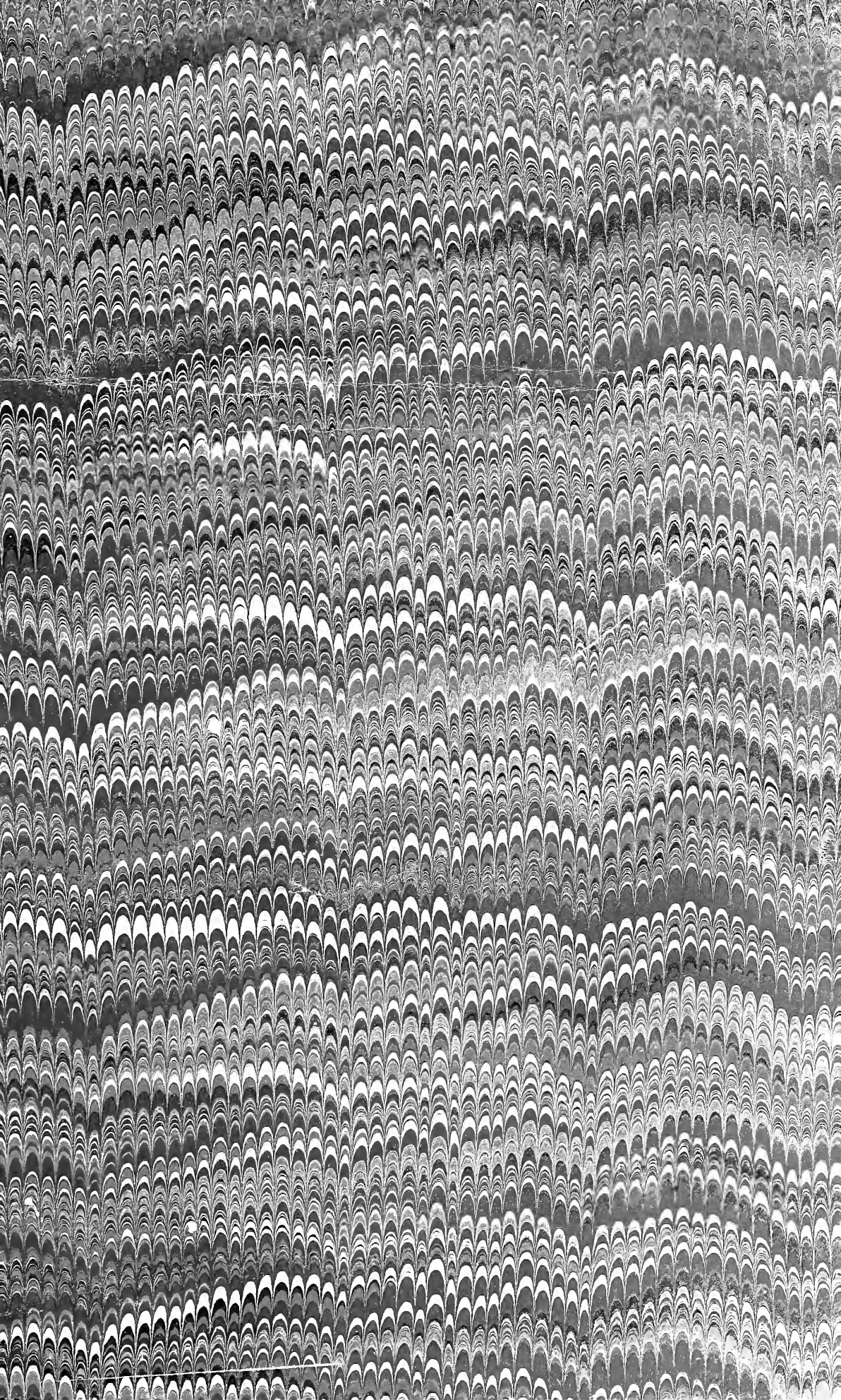

Carl Linnæus
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The Frontispiece accompanying this number is after an old engraving in the possession of Mr. L. S. Foster, by whom it is contributed.

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The Vertebrates of the Adirondack Region,

Northeastern New York.

BY

CLINTON HART MERRIAM, M. D.

[FIRST INSTALMENT.]

Read in part before the Linnæan Society of New York, January 14, 1882.

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GENERAL INTRODUCTION.

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(*Continued.*)

Chapter I.

GENERAL INTRODUCTION.

1.—LOCATION AND BOUNDARIES.

IN general terms the Adirondack Wilderness may be said to embrace that portion of New York State lying to the north of the Mohawk Valley, and included between Lake Champlain on the east and the valley of the Black River on the west. These limits, however, include much territory not properly belonging to the region under consideration, for its boundaries are more or less irregular, and in many places fall short of the limits above defined. The Adirondacks proper, or the area to which the subject-matter of this paper is restricted, can be stated, with sufficient exactness, to lie between parallels 43° 15′ and 44° 45′ north latitude, hence measuring about an hundred and twenty miles (193,121 metres) in a north and south direction.

The transverse diameter of the region is approximately of equal extent. A large area on its western border is well known by the name of "Brown's Tract," and the whole territory is frequently spoken of as the "North Woods." It covers more or less extensive portions of twelve counties, namely: St. Lawrence, Franklin, Clinton, Lewis, Herkimer, Hamilton, Essex, Warren, Oneida, Fulton, Saratoga, and Washington.

2.-GEOLOGICAL HISTORY.

From a geological stand-point, the Adirondacks are interesting as constituting one of the few islands that rose above the level of

the mighty Continental sea, previous to Paleozoic time. Its stern Archæan shores were washed by the waves of countless ages before the undermost strata of the Lower Silurian were deposited upon them, entombing and preserving many of the Trilobites, Brachiopods, and other curious inhabitants of that vast ocean. This Lower Silurian zone marked the shore line, so to speak, of the ancient island, and consists of Potsdam sandstone and the lime rocks of the Trenton period. Though broken and interrupted, enough of it still remains to afford us tantalizing glimpses of the life of the time, torn pages of fragmentary chapters that constitute but a half-told story to excite our imagination and regret.

The old Archæan centre, which we call the Adirondacks, is made up mainly of gneiss, and includes areas of syenite, hypersthenite, granite, iron ore, and other metamorphic rocks. The soil, therefore, except that resulting from decomposed vegetation, is largely silicious sand.

3.--TOPOGRAPHY.

The topography of the region is diversified, and in some respects peculiar. The mountains and short ranges of high hills have no regular trend, and conform to no definite axis. They are in no sense a chain of mountains, and have no backbone at all; but, on the contrary, consist of more or less irregular groups, isolated peaks, short ranges, and "hog-backs," scattered over the entire area—the highest to the eastward. They slope in all possible directions, according to the position and courses of the valleys and river beds adjacent. Like the grand old Lawrentian Hills of Canada, and other Archæan mountains, they are bold and rugged, with well-defined and often much broken outlines. Nearly thirty peaks exceed four thousand feet (1,219.20 metres) in height, several are about five thousand (1,524 metres), and one, Mt. Marcy, attains an

altitude of five thousand three hundred and forty-four feet (1,628.-851 metres).*

The entire region is studded with hundreds of beautiful lakes of various sizes and depths, and two of them are upwards of four thousand feet above tide level. The altitude of the western border of this area is nowhere less than one thousand feet (304.80 metres), and in most places is considerably more than this. From the valley of the Black River the slope is gradual, and the flattened summits of the first range of foot-hills form a terrace of great extent. The dense forests that formerly covered this terrace have mostly been destroyed, and it is now a sandy, barren region, overrun with blackberries and other rank undergrowth. Beyond, to the eastward, lie the ranges of low hills and irregularly distributed mountains, with their many lakes and rivers, that indicate the confines of the Adirondacks.

On the eastward the case is very different. Lake Champlain is not an hundred feet † (30.48 metres) above tide-level, and Lake George is but three hundred and forty-three feet (104.546 metres). From the head (south end) of Lake George to Glen's Falls, a distance of but nine miles (14,484 metres), there is a fall of sixty-one feet (18.69 metres). Glen's Falls, it will be remembered, is directly on the Hudson, just east of Luzerne. Hence it is clear that one can travel from New York city to Montreal on the St. Lawrence River, and by a very direct road, too, without passing over any elevation greater than the shore of Lake George. The route would be : up the Hudson to Glen's Falls, thence overland nine miles to Fort William Henry on Lake George, or down the valley to Whitehall, and thence, skirting the Adirondacks, down Lake Champlain and its outlet, the river Richelieu, to Sorel on the St. Lawrence, at the head of Lake St. Peter—about forty miles below Montreal. This is, indeed, the exact pathway traversed, but little more than two

* Report of Adirondack Survey, Verplanck Colvin, Superintendent, 1880.

† Exactly 99 feet.

centuries ago, by the fierce war parties of the merciless Iroquois, as they journeyed with a fleet of birch-bark canoes, from their wigwams on the Mohawk, to harass and imperil the three exposed colonies of New France—Montreal, Three Rivers, and Quebec—already crippled and disheartened by early struggles with the Hurons and Algonquins. It is well to bear these facts in mind, lest, by forgetting that modern civilization has overcome so many barriers and established so many channels of communication between different regions, we lose sight of the great natural avenues that were known so well to the aborigines, and to our forefathers. This narrow valley, penetrating the primeval forests of the north, and walled in by the Adirondacks on the west, and the Green Mountains of Vermont on the east, exerts a powerful influence over the life of adjoining lands, carrying southern forms into the heart of a great northern wilderness. Along the opposite border of the Adirondacks we have seen that the mountains and foot-hills slope gradually to the westward till they disappear in the valley of the Black River. Here, on the contrary, lofty rugged mountains rise, some from the very water's edge, and many of the highest peaks of the entire region lie within a few miles from the shores of Lakes George and Champlain. Among these mountains breed such northern birds as the Hermit and Olive-backed Thrushes, the Red-bellied Nuthatch, the Winter Wren, the Yellow-rumped, Blackburnian, Black and Yellow, Mourning, and Canada Fly-catching Warblers, both Crossbills, the White-throated Sparrow, the Raven, the Canada Jay, both Three toed Woodpeckers, and the Spruce Grouse; while in the valley below may be found the Wood Thrush, Brown Thrasher, House Wren, Large-billed Water Thrush, Field Sparrow, Chewink, Mourning Dove and other species supposed to pertain to the Alleghanian Fauna, through much more characteristic of the Carolinian. Nowhere, except in the Catskills, do representatives from the Canadian and Carolinian Faunæ so nearly meet as upon the mountain sides bordering the southwestern part of Lake George.

4.-CLIMATE.

The climate of the Adirondack Wilderness varies greatly with the season. Snow covers the ground from some time in November till the middle or latter part of April, and in mid-winter averages over four feet in depth on the level. During this period the mercury often falls below —25° Fahr. (—32° C.), and more than once it has been frozen (—40° F. and C.) In summer the days are warm and the nights cool. Owing to the altitude of the region its mean annual temperature falls considerably below that of the surrounding country. Guyot says: "On an average an increase of three hundred and thirty feet of altitude diminishes the temperature one degree Fahrenheit; hence the rate of diminution is about three degrees to every thousand feet." Therefore the temperature at the summit of Mt. Marcy should average sixteen degrees Fahrenheit below that of tide-level in the same latitude. Mr. Verplanck Colvin found, from observations made at three sets of localities, in 1876, that the mean decrease in temperature per each thousand feet increase in altitude, in this region was 2.93° Fahr. in August, 4.11° F. in September, and 4.52° F. in November.* On this basis the mean temperature of that portion of the Adirondacks having an altitude of four thousand feet (1,219.20 metres) would average below that of New York city during the same time, 11.72° F. in August, 16.44° F. in September, and 18.08° F. in November, if in the same latitude.

There are probably few places on this continent that are subject to greater or more sudden changes of temperature than this area. Variations of forty, fifty, and sixty degrees Fahrenheit, during the twenty-four hours, are by no means uncommon; and I have seen the mercury fall over seventy degrees Fahrenheit in fifteen hours in winter. My journal records a rise of 42° in six hours, of 32° in five hours, and of 12° in one hour; a fall of 38° in thirteen hours, and one of 20° in four hours. These great and rapid changes usually occur in winter—dur-

* Report of Adirondack Survey, Verplanck Colvin, Superintendent, 1880, pp. 324-6.

ing January, February, and March. Notwithstanding these facts, diseases of the lungs are rare among the inhabitants, and even the severe winters have proved of benefit to those consumptives that have remained here throughout the entire year.

The mean annual rain-fall exceeds that of most portions of the State, and is estimated by Mr. Colvin, from the available data, to be 45.18 inches (1,149 mm.) for the entire region. The mean annual rain-fall over the whole State is 41.94 inches (1,063 mm.).*

There are two elements that tend to increase the humidity of this region: 1st, its mountainous character, for mountains always act as condensers of moisture; and 2d, its heavy covering of forests, for dense vegetation protects the underlying soil and rock from the direct action of the sun, and keeps the temperature lower—thus favoring condensation and the precipitation of excess moisture.

"A deciduous tree, during the season when in foliage, is constantly drawing from the earth and giving off from its leaves a considerable amount of moisture, and in some cases this amount is very great. This change of state, from a fluid to a gaseous condition, is a cooling process, and the air near the surface, being screened from the sun and from the winds, becomes by this means so humid, that a rank succulent vegetation often springs up and thrives, which in an open field would wither and perish in an hour."†

Now it is well known that there is, in nature, no such thing as a perfectly dry atmosphere, for at all times, and in all places, it is laden with less or more aqueous vapor in a state of suspension. The higher the temperature the greater the capacity for carrying moisture, and consequently the more moisture required to produce saturation—by which term we understand the maximum quantity of watery vapor that a definite amount of atmospheric air can contain at any given degree of temperature. No evaporation whatever can take place from any surface in a saturated atmosphere, and any cooling of such an atmos-

* Meteorology of New York State, Second Series, F. B. Hough, 1872, p. ix.

† Hough's Report on Forestry, 1878, p. 289.

phere produces instant precipitation of the excess of moisture above the degree to which the temperature has been lowered. Therefore, the temperature and dew point being low in this great wilderness, and a large amount of moisture being given off, both from the dense forests themselves, and from the multitude of lakes and swamps scattered over its surface, the atmosphere is often saturated, and showers during the summer season are of frequent occurrence. The conformation of the country, too, favors precipitation within its own borders, for a wind, from whatsoever direction blowing, could not easily convey the lower vapor-laden atmosphere away without coming in contact with some cool area or mountain side that would so lower its temperature as to cause instant precipitation. Clouds carried over the Adirondacks from a distance would, when sufficiently low, share the same fate, and disappear in showers over the foot-hills.

And such is, in fact, the case; for a long residence overlooking a considerable portion of the western slope of the region has enabled me to observe repeatedly, not only occasional showers, but sometimes even whole days of more or less continuous rain there, when not a drop, or at most a slight shower, fell at the point of observation, only twelve or fifteen miles distant.

5.–GENERAL FEATURES.

We have found, then, that the atmospheric and general climatic conditions, over this area, favor the production of a luxuriance of vegetation; and, on the other hand, the conformation of the land and the density of the forests and undergrowth tend to lower the temperature and increase the humidity—interacting causes whose effect upon floræ and faunæ has hardly received the attention it deserves.

The deep beds of moss upon the mountain tops consist chiefly of species of *Sphagnum* and the "Shining Feather Moss" (*Hypnum splendens*), over which runs, in various places, the pretty Creeping Snow-berry (*Chiogenes hispidula*) and the lovely twin bell-flowers of *Linnæa borealis*. Other still more characteristic marsh plants grow

upon these elevated summits, for, in the language of our State Botanist, Mr. Charles H. Peck, "the frequent rains, the investing clouds, and the low temperature which retards evaporation, all conspire to produce that prevalence of moisture which imitates the condition of the marshes."* On the open summit of Mt. Marcy (altitude 5,344 feet, or 1,628 metres) Mr. Peck found *Cassandra calyculata*, *Ledum latifolium*, *Kalmia glauca*, *Habenaria dilatata*, *Veratrum viride*, *Carex irrigua*, and *Calamagrostis Canadensis*—all swamp plants. There are no trees here to protect them from the sun, for they grow upon the *open summit "above timber line"*—which is about 4,800–4,900 feet (1,463.04–1,493.52 metres) above tide-level.

Many of the valleys are occupied by extensive balsam and tamarack swamps, which are always carpeted with dense mats of wet *Sphagnum*, into which one sinks half a foot or more and yet rarely leaves a trail—so perfectly does the spongy mass resume its former shape. These places are the homes of the Spruce Grouse or Canada Partridge, the Blue Yellow-backed Warbler that builds its pensile nest of the gray tamarack lichen (*Usnea*), the Canada Fly-catching Warbler, and several other species.

Most of the mountains are covered with a tolerably dense growth of coniferous trees, but there are quite a number whose summits have been laid bare by tornadoes. These devastating winds every now and then uncover a mountain so effectually that not only the trees and undershrubs, but even the soil itself, and all life upon it, are hurled together into the valley below—forming vast and lasting "windfalls" to bar the path of inquisitive man.

Fire, also, too frequently overruns and lays waste tracts of large extent, that, for years afterwards, constitute marked features in the make-up of the country, and exert a decided influence upon the minor local distribution of life over its surface. The charred stubs of the larger trees long remain as favorite haunts for several species

* Report of Adirondack Survey, Albany, 1880, pp. 405–6.

of Woodpeckers, while the dense growth of blackberry and raspberry bushes, dotted over with the large showy flowers of the Willow Herb (*Epilobium angustifolium*), is well known to the ornithologist as the summer home of the Mourning Warbler.

Here is a sparkling trout stream, perhaps the outlet of a mountain lake; let us follow its winding course through yonder thicket of alders. Working our way through the tangled bushes we soon emerge into the open grassy bottom of one of the most beautiful and interesting of nature's many adornments—a Beaver meadow. Here, less than a century ago, might have been heard the splash and seen the hut of the sagacious Beaver. But, like the Moose that once roamed these mighty forests, they have, excepting a few isolated individuals, been exterminated or driven beyond our borders, till now these green meadows, with occasionally the buried ruin of an ancient dam, are about all that remain to remind us of the former existence here of one of the most curious, interesting, and typical of North American mammals.

The dam has long since disappeared, and as it gave way the pond again became a narrow stream, spreading its way through the broad muddy bottom, now verdant with marsh grasses that spring from a thick bed of elastic *Sphagnum*. Upon this moist level now stand scattered clumps of feathery tamaracks; and here and there over the uniform light green of the meadow rise, in marked contrast, the odd-looking Blue Gentians and the bright scarlet Cardinal Flowers. These are favorite haunts of the Canada Jay and, in the autumn, of immense flocks of Robins that come to feed upon the handsome berries of the mountain ash trees that always skirt the open places, easing the stiff edge of the bordering forest. Here, too, may be heard the quick snap of the Wood Pewee, as he gobbles up some passing insect, and the characteristic note of his congener, the Olive-sided Flycatcher, who is perched upon the topmost branch of yonder hemlock. Should you possess the keen eye and stealthy tread of the experienced hunter, you may surprise a red

deer quietly feeding in supposed security, and may rest assured that a nice bit of fresh venison steak will in no way interfere with your investigations.

Crossing from the Beaver meadow to the nearest lake, we find its shores steep and rocky, with a dense border of dark cedars overhanging the water—which is of considerable depth, even close to the shore. A little farther along, the steep rocks are replaced by a more sloping bank, covered with stones of various sizes, and spruce and hemlocks, mingled, perhaps, with a few birches and maples, are substituted for the cedars just passed. Beyond still is a beach of clean white sand, strewn with smooth quartz pebbles, and backed with a grove of tall pines, beneath whose lofty summits a cluster of paper birch saplings casts flitting shadows over the blue huckleberries below. Continuing the circuit, we next come to a marshy bay lined with sedges and covered with lily-pads—a feeding ground, at night, for the much persecuted deer. Finally we reach the outlet, with its dense thicket of alders, and are startled by the splash of a diving Musk-rat, or the sudden flight of a Wood Duck or Heron. In the alders and undershrubs bordering the stream we notice a few Song Sparrows, Rusty Blackbirds, and a solitary Maryland Yellow-throat. Turning from the lake into the adjoining forest, the dark form and yellow crown of a Three-toed Woodpecker arrest our eye, and rounding a rocky knoll we get a glimpse of his princely cousin, the Cock-of-the-Woods. From various quarters may be heard the clear mellow whistle of the Peabody Bird, and the less frequent but sadder note of the Wood Pewee. Winding slowly up the shady ravine that leads to the pass between the mountains that separate us from the valley beyond, a Hermit Thrush silently glides across our path, and we notice here a pair of Slate-colored Snow-birds, and the trim form of a little Winter Wren as she flits from a moss-covered log to the branches of a fallen tree-top, pertly tipping her tail in salute. Nearing the summit a passing flock of noisy Blue Jays excites the wrath of a Red Squirrel who, perched on a neighboring limb, manifests his

indignation by chippering saucily, keeping time with vehement jerks of the body and spasmodic flourishes of the tail, which he has by no means neglected to cock up over his arched back. Crossing the crest of the divide the coarse croak of a Raven greets our ears; and, descending into the valley below, the shrill cry of a wary Loon, from the distant lake, melts away into the evening air, and the silence of the fast-approaching twilight is unbroken save by the soft flute-like song of the sombre Thrush.

During winter and early spring the birds one is most apt to find here are the White-winged and Red Crossbills, the Blue and Canada Jays, Black-capped and Hudsonian Titmice, Nuthatches, Ravens, several species of Woodpeckers, the Ruffed and Spruce Grouse, and once in a while an Owl. Sometimes the Pine Grosbeak is common, in flocks; and occasionally, during February, March, and April, the Wilderness literally swarms with Pine Linnets which then breed here in thousands and may hardly be seen again for several years.

In autumn, during the fall migrations, the most marked feature in the bird line consists in what I have for many years designated the "mixed flocks." At this season one may hunt for hours and scarcely see a bird, when, suddenly, he finds himself surrounded by a host of individuals, representing many species and pertaining to widely different families. To illustrate, I quote from my journal under date of October, 1879—a lowery day—the locality being Big Moose Lake in the heart of the Wilderness. "During the afternoon one of those mixed flocks of birds, so characteristic of the Adirondacks at this season, passed slowly by our camp and I stepped out, in the rain, and watched them till all were gone. There were at least fifty Robins and they loaded down a mountain ash, feeding upon its berries and making a most unnecessary amount of noise—very unlike their conduct at home, where, when similarly engaged in our garden, they are noted for their silence. In the trees overhead were several Blue Jays, and in the undergrowth and amongst the fallen timber were large numbers of Slate-colored Snow-birds, a few White-throated, Song,

and Fox-colored Sparrows, a couple of Winter Wrens, and one Nashville Warbler—which I shot. A dozen Chickadees, with an equal number of Yellow-birds and a few Golden-crowned Kinglets, could be seen among the branches of a low spruce near by, while several Red-bellied Nuthatches and a pair of Brown Creepers amused themselves with winding up and down its trunk. Leaving out the Fox Sparrows and the Nashville Warbler, this flock stands as a very fair example of these incongruous assemblages, several of which one falls in with every day at this time of year. It seems strange that the desire for company, always marked during the migrations, should induce such unlike species to collect and wander together over this wilderness. It must be that they have faith in the old adage that 'there is strength in numbers!' I have seen the Purple Finch in some of these mixed flocks; and a few Hairy and Downy Woodpeckers and Hermit Thrushes sometimes hang about their outskirts, but the latter are more commonly seen by themselves in groups of half a dozen or thereabouts."

6.—BOTANY.

While the grand scenic effect of any region, the effect that is dependent on the general contour and make up of the country and its gross reliefs, is governed by its geology and topography; so is the general aspect, or *physiognomy*, of a region dependent upon the character of the vegetation in which it is clothed. As, in the tropics, the stately Palms, the colossal arborescent Ferns, the solemn Aloes, and the light and feathery Mimosas contribute such striking features to the physiographical areas to which they severally pertain; so do the deciduous hardwood groves of the temperate zone, and the dark coniferous forests of the north give to these regions their peculiar and characteristic appearance.

The distinctive physiognomic aspect of the Adirondack Wilderness, the dark and sombre evergreen forests, is chiefly the consequence of the large development of a single genus of coniferous trees; for the

predominating forms are not only coniferous evergreens, but consist mainly of Spruce, Hemlock, and Balsam—all representatives of the genus *Abies*. Tall Pines, at intervals, rear their lofty summits above the level of surrounding tree-tops, fragrant Cedars overhang the lake-shores and swamps, delicate Tamaracks wave over the soft grassy bottoms of Beaver meadows, dense thickets of tangled Alders border many of the streams and rivers, hardy Birches and light Poplars are scattered sparingly upon the mountain-sides and in the valleys, and areas of hard timber, indicating second growth, mark tracts that have been bared by fire, wind, or the woodman's axe. These hardwood areas are readily distinguished, at a distance, by the marked contrast afforded by the light color and different aspect of the foliage, in summer, and by their nakedness in winter. They are composed, chiefly, of Maple, Beech, and Birch.

The common forest trees of the Adirondacks are: the American Linden or Bass Wood (*Tilia Americana*), Sugar Maple (*Acer saccharinum*), Black Sugar Maple (*A. saccharinum nigrum*), Red or Swamp Maple (*A. rubrum*), Black Cherry (*Prunus serotina*), Beech, (*Fagus ferruginea*), Iron Wood (*Ostrya Virginica*), Cherry Birch (*Betula lenta*), Yellow Birch (*B. lutea*), Paper or Canoe Birch (*B. papyracea*), American Aspen (*Populus tremuloides*), Large-toothed Aspen (*P. grandidentata*), White Pine (*Pinus strobus*), Red or "Norway" Pine (*P. resinosa*—common only in certain localities, not generally distributed), Black Spruce (*Abies nigra*), White Spruce (*A. alba*), Hemlock (*A. Canadensis*), Balsam Fir (*A. balsamea*), Tamarack or Larch (*Larix Americana*), White Cedar or Arbor Vitæ (*Thuja occidentalis*). Besides these occur the following, which are rare, or are common only along the borders of the region: Locust (*Robinia pseudacacia*), White Ash (*Fraxinus Americana*), Black Ash (*F. sambucifolia*), Elm (*Ulmus Americana*), Slippery Elm (*U. fulva*), Butternut (*Juglans cinerea*), Swamp Hickory (*Carya amara*), three or more Oaks (*Quercus*), Balsam Poplar or Tacamahac (*Populus balsamifera*), Pitch Pine (*Pinus rigida*), and Juniper (*Juniperus Virginiana*).

The more common undershrubs (some of them growing to be small trees) are : *Acer Pennsylvanicum*, *A. spicatum*, *Prunus pumila*, *P. Pennsylvanica*, *P. Virginiana*, *Spiræa salicifolia*, *S. tomentosa*, *Rubus odoratus*, *R. triflorus*, *R. strigosus*, *R. occidentalis*, *R. villosus*, *R. Canadensis*, *Rosa Carolina*, *Cratægus coccinea*, *C. tomentosa*, *C. crus-galli*, *Pyrus sambucifolia*, *Amelanchier Canadensis*, *A. Canadensis botryapium*, *A. Canadensis oblongifolia*, *Ribes lacustre*, *R. rubrum*, *Hamamelis Virginica*, *Cornus circinata*, *C. stolonifera*, *C. paniculata*, *C. alternifolia*, *Lonicera ciliata*, *Diervilla trifida*, *Sambucus pubens*, *S. Canadensis*, *Viburnum lentago*, *V. acerifolium*, *V. opulus*, *V. lantanoides*, *Cephalanthus occidentalis*, *Gaylussacia resinosa*, *Vaccinium Pennsylvanicum*, *V. corymbosum*, *Arctostaphylos uva-ursi*, *Cassandra calyculata*, *Andromeda polifolia*, *Kalmia angustifolia*, *K. glauca*, *Azalia nudiflora*, *Rhodora Canadensis*, *Ledum latifolium*, *Apocynum androsæmifolium*, *Ilex lævigata*, *Corylus rostrata*, *Carpinus Americana*, *Myrica gale*, *Alnus viridis*, *A. incana*, *Salix* (several species), and *Taxus baccata Canadensis*.

Of the smaller flowering plants the following are among the most noticeable: *Clematis Virginiana*, *Anemone Pennsylvanica*, *A. nemorosa*, *Hepatica triloba*, *Thalictrum dioicum*, *Ranunculus flammula reptans*, *R. abortivus*, *R. recurvatus*, *Caltha palustris*, *Coptis trifolia*, *Aquilegia Canadensis*, *Actæa spicata rubra*, *A. alba*, *Caulophyllum thalictroides*, *Nymphæa odorata*, *Nuphar advena*, *Sarracenia purpurea*, *Sanguinaria Canadensis*, *Dicentra cucullaria*, *D. Canadensis*, *Dentaria diphylla*, *D. laciniata*, *Arabis lyrata*, *Viola rotundifolia*, *V. blanda*, *V. Selkerki*, *V. cucullata*, *V. canina sylvestris*, *V. rostrata*, *V. Canadensis*, *V. pubescens*, *Drosera rotundifolia*, *D. longifolia*, *Helianthemum Canadense*, *Hypericum pyramidatum*, *H. ellipticum*, *H. perforatum*, *Elodes Virginica*, *Silene inflata*, *Arenaria Grœnlandica*, *A. lateriflora*, *Claytonia Caroliniana*, *Geranium Robertianum*, *Impatiens pallida*, *Oxalis acetosella*, *Ampelopsis quinquefolia*, *Celastrus scandens*, *Polygala paucifolia*, *Poterium Canadense*, *Geum macrophyllum*, *Waldsteinia fragarioides*, *Potentilla Norvegica*, *P. Canadensis*, *P. tridentata*, *P. palustris*,

Fragaria vesca, *Dalibarda repens*, *Saxifraga Pennsylvanica*, *Mitella diphylla*, *M. nuda*, *Tiarella cordifolia*, *Circæa alpina*, *Epilobium angustifolium*, *E. palustre lineare*, *E. coloratum*, *Œnothera biennis*, *Œ. pumila*, *Heraclium lanatum*, *Archangelica atropurpurea*, *Osmorrhiza longistylis*, *O. brevistylis*, *Aralia racemosa*, *A. nudicaulis*, *A. trifolia*, *Cornus Canadensis*, *Linnæa borealis*, *Triosteum perfoliatum*, *Galium trifidum pusillum*, *Mitchella repens*, *Houstonia cærulea*, *Eupatorium purpureum*, *E. perfoliatum*, *E. ageratoides*, *Tussilago farfara*, *Solidago thyrsoidea*, *Bidens cernua*, *Achillea millefolium*, *Tanacetum vulgare*, *Antennaria margaritacea*, *Senecio aureus*, *Lobelia cardinalis*, *L. syphylitica*, *L. inflata*, *L. Kalmii*, *Campanula rotundifolia*, *Vaccinium macrocarpon*, *V. cæspitosum*, *Chiogenes hispidula*, *Epigæa repens*, *Gaultheria procumbens*, *Pyrola rotundifolia*, *P. chlorantha*, *P. secunda*, *Chimaphila umbellata*, *Monotropa uniflora*, *Trientalis Americana*, *Lysimachia ciliata*, *L. thyrsiflora*, *Utricularia cornuta*, *Epiphegus Virginiana*, *Verbascum Thapsus*, *Scrophularia nodosa*, *Chelone glabra*, *Mimulus ringens*, *Rhinanthus crista-galli*, *Pedicularis Canadensis*, *Monarda didyma*, *Scutellaria galericulata*, *S. lateriflora*, *Symphytum officinale*, *Cynoglossum officinale*, *C. Morrisoni*, *Hydrophyllum Virginicum*, *H. Canadense*, *Diapensia Lapponica*, *Gentiana* (several species), *Asarum Canadense*, *Laportea Canadensis*, *Comandra umbellata*, *Arisæma triphyllum*, *Calla palustris*, *Acorus calamus*, *Scheuchzeria palustris*, *Saggitaria calycina*, *Orchis spectabilis*, *Habenaria tridentata*, *H. viridis bracteata*, *H. hyperborea*, *H. dilitata*, *H. Hookeri*, *H. orbiculata*, *H. blephariglottis*, *H. lacera*, *H. psycodes*, *H. fimbriata*, *Goodyera repens*, *Spiranthes latifolia*, *S. cernua*, *S. gracilis*, *Listera cordata*, *Pogonia ophioglossoides*, *Calopogon pulchellus*, *Calypso borealis*, *Microstylis monophyllos*, *Cypripedium parviflorum*, *C. pubescens*, *C. spectabile*, *C. acaule*, *Trillium grandiflorum*, *T. erectum*, *T. erythrocarpum*, *Medeola Virginica*, *Veratrum viride*, *Uvularia grandiflora*, *U. sessifolia*, *Streptopus roseus*, *Clintonia borealis*, *Smilacena racemosa*, *S. stellata*, *S. trifolia*, *S. bifolia*, *Polygonatum*

biflorum, *Erythronium Americanum*, *Allium tricoccum*, *Pontederia cordata*, and *Eriocaulon septangulare*.

Among the Mosses the genera *Sphagnum*, *Dicranum*, *Orthotrichum*, and *Hypnum* are particularly well represented, both in species and individuals; but such a vast number of mosses are found here that an enumeration of even the more common or characteristic would be out of place.

The so-called "Iceland Moss" (*Cetraria Islandica*) and "Reindeer Moss" (*Cladonia rangiferina*), together with the common gray *Usnea*, are worthy of special mention from out the host of Lichens that thrive upon the moist atmosphere of the Wilderness.

7.—FAUNAL POSITION.

There remains to be considered the Faunal Position of the Adirondacks.

Data are wanting for the determination of exact thermometric means over any considerable portion of the region, but sufficient exist to establish the fact that during the months of May, June, and July (the breeding season of birds) the thermometer shows an average of 57° Fahr. (14° C.), or lower, everywhere within the limits of the Wilderness, and averages below 50° Fahr. (10° C.) throughout much of the interior. The temperature alone, therefore, would indicate that the district pertained to the Canadian Fauna, and a brief study of its characteristic animal and plant life will suffice to confirm the fact.

Amongst the Mammals the following species are eminently northern in habitat: the Lynx, Fisher, Marten, Hudsonian Flying Squirrel, Jumping Mouse, Long-eared Wood Mouse, Porcupine, and Northern Hare.

Of the Birds that breed here many are characteristic of the Canadian Fauna. Such are: the Hermit Thrush, Swainson's Thrush, Red-bellied Nuthatch, Winter Wren; Tennessee, Yellow-rumped, Blackburnian, Black and Yellow, Mourning, and Canada Flycatching

Warblers; White-winged and Red Crossbills, White-throated Sparrow, Junco, Rusty Blackbird, Raven, Canada Jay, Olive-sided Flycatcher, Black-backed and Banded-backed Three-toed Woodpeckers, Spruce Grouse, Goshawk, and Golden-eyed Duck. In addition to the above it is not improbable that the Hudsonian Tit and one (or both) of the Kinglets will be found nesting here.

Mention of the characteristic Reptiles, Batrachians, and Fishes is deferred, and will be made in the chapters pertaining to these groups.

Following is a list of "Subarctic" species of Lepidoptera collected in the immediate vicinity of Beaver Lake (also called "Fenton's," and "Number 4") in Lewis County, by Mr. Hill, and identified by Prof. J. A. Lintner, late State Entomologist: *Agrotis Chardinyi*, *A. conflua*, *A. astricta*, *Plusia bimacalata*, *P. u-aureum*, *Thamnonoma brunneata*, *Melanippe hastata*, *M. fluctuata*, *Coremia ferrugaria*, *Cidaria Packardata*, *C. albolineata*, *C. cunigerata*, *C. hersiliata*, *C. truncata*, *Spargamia magnoliata*, *Oporabia cambricaria*, and *Larentia cæsiata*. These were all found in a single locality, and therefore probably constitute but a small proportion of the northern Lepidoptera that occur in the Adirondacks.

Floral limitations are by no means so clearly defined as the boundaries of Faunal areas, and for the reason that plants are much more easily than animals affected by minor physiographical conditions. They are more susceptible to the influences of local topographical and climatic conditions, such as altitude, humidity, etc., and are also affected by the nature of the soil, and by association with one another. This is seen in the influence which certain kinds of forests exert in determining the character of the more humble plants that grow in their shade. For example, it is well known that the destruction of an evergreen coniferous forest is commonly followed, in the course of nature, by a growth of hard timber—maple, beech, and birch (all deciduous trees) usually predominating. Coincident with this change of forest is an equally radical change in the kinds of small plants that spring up underneath.

Many plants that are quite characteristic of northern latitudes are found in greater or less abundance in isolated localities, such as high mountain sides and cool shaded ravines or deep swamps, far southward of their usual homes; and, on the other hand, representatives of many southern species find their way far northward along suitable water-courses, and warm valleys, that penetrate regions clothed in vegetation of a very different type. These seeming peculiarities of distribution are dependent on definite physiographical conditions and are not difficult of explanation, however annoying they may be to those engaged in the determination of distributional areas. Nevertheless there are species that are more or less distinctive of certain tolerably well-defined areas, and I present the following as a provisional list, fairly characteristic of a CANADIAN FLORA: *Ranunculus flammula reptans*, *Coptis trifolia*, *Dicentra Canadensis*, *Viola rotundifolia*, *V. Canadensis*, *Arenaria Grœnlandica*, *Claytonia Caroliniana*, *Geranium Robertianum*, *Impatiens pallida*, *Oxalis acetosella*, *Acer spicatum*, *Polygala paucifolia*, *Poterium Canadense*, *Geum macrophyllum*, *Waldsteinia fragarioides*, *Potentilla tridentata*, *Dalabarda repens*, *Ribes lacustre*, *Mitella diphylla*, *M. nuda*, *Tiarella cordifolia*, *Epilobium alpinum*, *E. palustre lineare*, *Circea alpina*, *Aralia trifolia*, *Cornus Canadensis*, *Linnæa borealis*, *Aster acuminatus*, *Solidago thyrsoidea*, *S. Virga-aurea alpina*, *Nabulus nanus*, *N. Boottii*, *Campanula rotundifolia*, *Vaccineum uliginosum*, *V. cæspitosum*, *V. Vitis-Idæa*, *Chiogenes hispidula*, *Cassiope hypnoides* (Dr. Parry), *Cassandra calyculata*, *Kalmia glauca*, *Rhododendron Lapponicum*, *Rhodora Canadensis*, *Ledum latifolium*, *Pyrola rotundifolia*, *Chimaphila umbellata*, *Trientalis Americana*, *Empetrum nigrum*, *Betula glandulosa*, *Salix Cutleri*, *Pinus strobus*, *Abies nigra*, *A. Canadensis*, *A. balsamea*, *Thuja occidentalis*, *Diapensia Lapponica*, *Orchis spectabilis*, *Habenaria hyperborea*, *H. dilitata*, *Goodyera repens*, *Listera cordata*, *Microstylis monophyllos*, *Cypripedium pubescens*, *C. spectabile*, *C. acaule*, *Trillium grandiflorum*, *T. erectum*, *T. erythrocarpum*, *Streptopus roseus*, *Clintonia borealis*, *Smilacena trifolia*, *S. bifolia*.

Chapter II.

MAMMALIA.

In the following pages forty-two species of mammals are enumerated as occurring in the Adirondack region, and it is not probable that future investigation will greatly augment this number. With the exception of one or two additional Shrews, and two or three Bats, I know of no others that are likely to be found. The Harbor Seal and the Fox Squirrel are accidental stragglers, but the remaining forty are permanent residents. Among them are several of considerable economic value. These are: the Marten, Fisher, Ermine, Mink, Skunk, Otter, Bear, Deer, Beaver, and Muskrat; and it is not many years since the Moose could have been reckoned with the rest, for it was formerly abundant here, and large numbers were killed for their flesh and hides.

The great majority of our mammals move both by day and night, few being either strictly nocturnal or exclusively diurnal. The only species that can fairly be called nocturnal are the Skunk, the Raccoon, the Bats, and the Flying Squirrels; and even these are occasionally seen abroad during cloudy days, and do much of their hunting in the twilight. Of strictly diurnal forms the number is still smaller, for I know of but two, the Gray Squirrel and the Chipmunk, that have not been seen after nightfall. The truth of the matter seems to be that very few mammals range about much during the brightest part of the day, or darkest part of the night, these being the times when most of them do the greater part of their sleeping. It is between the dark and the daylight, before sunrise in the morning and in the dusk of evening, when the faint light obscures their

outlines and hides their movements, that the larger number do their hunting. Many of them are also out during cloudy days and moonlight nights; and in winter, when the ground is white with snow, they apparently circumambulate all night long.

The phenomenon of hibernation, which enables many mammals to endure a climate to the severity of which they would inevitably succumb were they to remain active throughout the year, and to thrive in regions where they would starve during certain seasons but for their ability to become dormant when scarcity of food prevails, is well exemplified in a number of our species. The following are known to pass a greater or less period of the winter season in a condition of lethargy: the Bear, Raccoon, Bats, Gray Squirrel, Chipmunk, Woodchuck, and Jumping Mouse. Of these the Woodchuck affords the most remarkable example. With astonishing regularity and precision, and utterly regardless of the state of the weather or condition of his food supply, he sinks into his burrow about the 20th of September, and is rarely seen again before the middle of March. It frequently, indeed usually, happens that the time chosen for entering upon the execution of this singular proclivity is during fine warm weather and at a time when the fields are clothed with a luxuriant growth of his favorite food, clover. In fact the Woodchuck retires to the cold dank recesses of his cheerless subterranean abode to commence a period of voluntary seclusion, to enter upon a state of complete oblivion and absolute lethargy, at the very time when one would naturally suppose he would most enjoy himself above ground.

The Gray Squirrel, on the other hand, remains out nearly the entire winter and withdraws to its nest, in some hollow tree, only during the severest weather. The Raccoon and the Bear furnish examples of animals whose dormant periods are intermediate in duration between those above cited.

Hibernation is, after all, merely a profound sleep, intensified and protracted. During ordinary sleep respiration is slackened and the temperature of the body is lower than when the animal is awake.

The longer the sleep continues the less frequent do the respirations become and the lower does the temperature fall, till finally the condition of deep and continued sleep—the true lethargy of hibernation—is attained. This apparent phenomenon, then, is a genuine physiological process, differing in degree only from ordinary sleep. It is the result of conditions of environment, and has become an hereditary habit, enabling certain mammals to exist during a period when their usual food supply is cut off. The dormant state is sometimes brought on by extremes of temperature, but this is not often the case.

Few mammals are commonly seen by those who traverse the forests of the Adirondacks, and it is a fact that the average sportsman, during his annual "trip to the North Woods," rarely sees any save Red Squirrels, Chipmunks, a few Mice, and perhaps a Deer or Porcupine. This is in part due to the nature of their haunts, partly because they do not roam about much in broad daylight, but chiefly because of their shy dispositions and wary habits. The experienced hunter, more familiar with their haunts and ways, falls in with a larger number; still, by far the greater portion go unobserved. Of the forty-two kinds found here I have myself seen living, and in the wild state, all but three; therefore the remarks upon their habits, in the following biographies, are, when the contrary is not stated, drawn largely from the results of personal observation.

Order FERÆ. FISSIPEDIA. Family FELIDÆ.

FELIS CONCOLOR Linnæus.

Cougar; Panther; Mountain Lion (of the West); Puma (of South Am.).

It is not many years since the Cougar or Panther, second largest of American *Felidæ*, was a common inhabitant of the primeval forests of the Adirondacks; but, since the State offered a bounty* for their

* The law granting this bounty was passed April 26, 1871. It reads as follows: "A State bounty of thirty dollars for a grown wolf, fifteen dollars for a pup wolf, and twenty dollars for a panther,

destruction, so many more have been killed than born that they are now well nigh exterminated. However, a few still remain, and some years may yet elapse before the last Panther disappears from the dense evergreen swamps and high rocky ridges of this Wilderness.

For many of the facts related in the following narrative of the habits of this gigantic "Cat," I am indebted to the experienced hunter and guide, Mr. E. L. Sheppard, who has himself killed, or been instrumental in killing, twenty-eight Panthers in the Adirondacks.

Cougars are either particularly fond of porcupines, or else are frequently forced by hunger to make a distasteful meal, for certain it is that large numbers of these spiny beasts are destroyed by them. Indeed, it often happens that a Panther is killed whose mouth and lips, and sometimes other parts also, fairly bristle with the quills of this formidable rodent. Porcupines are such logy, sluggish creatures, that in their noctivagations they fall an easy prey to any animal that cares to meddle with them.

But the Panther feeds chiefly upon venison, which he captures by "still-hunting," in a way not unlike, save in the manner of killing, that practised by its greatest enemy—man. Both creep stealthily upon the intended victim until within range, when the one springs, the other shoots.

Panthers hunt both by day and by night, but undoubtedly kill the larger part of their game after nightfall. When one scents a deer he keeps to the leeward and creeps stealthily toward it, as a cat does after a mouse. With noiseless tread and crouching form does he

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shall be paid to any person or persons who shall kill any of said animals within the boundaries of this State. The person or persons obtaining said bounty shall prove the death of the animal so killed by him or them, by producing satisfactory affidavits, and the skull and skin of said animal, before the supervisor and one of the justices of the peace of the town within the boundaries of which the said animal was killed. Whereupon said supervisor and justice of the peace, in the presence of each other, shall burn and destroy the said skull, and brand the said skin so that it may be thereafter identified," etc.—thus ruining many valuable specimens. (Laws of 1871, chap. 721, § 39.) When the game laws were repealed, in 1879, this section became a part of the new law, and it may be found in the Laws of 1879, chap. 534, § 31.

May 5, 1874, a law was passed providing the sum of $500, or so much thereof as might be necessary for the payment of bounties in pursuance of the requirements of the above law of April 26, 1871, chap. 721, § 39. (See Laws of 1874, chap. 323, § 2.) But nearly double this amount has already been paid on Panthers alone (see p. 39).

pass over fallen trees and ragged ledges, or through dense swamps and tangled thickets, till, if unobserved, within thirty or forty feet of his intended victim. If he can now attain a slight elevation and a firm footing he springs directly upon his prey, but if upon level ground makes one or two preliminary leaps before striking it. The noise thus made frightens the deer, who makes a sudden and desperate effort to escape. But, if lying down, several seconds are necessary to get under full headway, and the Panther follows so rapidly, in a series of successive leaps, that it often succeeds in alighting upon the back of its unhappy quarry. Its long claws are planted deep into the quivering flesh, and its sharp teeth make quick work with the ill-fated sufferer. If, however, the deer sees him in season, and can get a good footing for a sudden move, it commonly escapes, and the Panther rarely follows it more than a few rods, for as soon as he finds that the deer is gaining on him he at once gives up the chase. In fact, a Panther rarely secures more than one out of every four or five deer upon which he attempts to spring. Then, too, it not infrequently happens that he strikes a deer when it is under such headway that it escapes; and when Panthers were more plenty here than they now are it was no uncommon thing to shoot a deer bearing deep scars upon its flanks—scars that were clearly made by the claws of this powerful beast. The female is by far the better hunter and does not lose so many deer as the male.

The deer that furnish the most nutriment to our Panthers are generally under two years of age. This is not because this beast is afraid to attack a full-grown animal, but because young deer are less wary, and therefore more easily captured.

The distance that a Panther can pass over in a single leap is almost incredible. On level ground a single spring of twenty feet is by no means uncommon, and on one occasion Mr. Sheppard measured a leap, over snow, of nearly forty feet. In this instance there were three preliminary springs, and the Panther struck his deer on the fourth. The longest leap measured by Mr. Sheppard was one of sixty feet,

but here the Panther jumped from a ledge of rocks about twenty feet above the level upon which the deer was standing. He struck it with such force as to knock it nearly a rod farther off.

Under certain conditions of the deep snows the deer cut in so deeply that the poor animals can make but slow progress. At such times a Panther, by spreading the toes of his great broad paws, simulates a man on snow-shoes and sinks but a short distance in the snow. He thus gains a vital advantage over his prey, and will now give chase to and capture one that he missed on his first spring. Under no other circumstances will a Panther pursue a deer, for he is too well aware of the uselessness of an attempt to overtake so fleet an animal. Immediately upon killing one he drags it bodily into some dense thicket or windfall, where he will not be likely to be observed. He has thus been known to drag a full-grown deer considerably over a hundred feet before reaching a satisfactory covert. Unlike the wolf, he makes the most of his prey and devours it all before killing another. One deer generally lasts a Panther a week or ten days, and during this time he may usually be found within a mile of the carcass, hidden under some log or uprooted tree. Sometimes, but very rarely, does he partially bury it, after each meal, by scraping leaves and brush over it. When all but enough for one or two meals has been eaten, the Panther, especially if a female with young, will often make another hunt, but if unsuccessful returns to the remains of the old carcass.

The young follow the mother till nearly two years old—that is until about two-thirds grown. She leaves them when hunting, and, after having killed a deer, returns and leads them to it.

It is often stated that Panthers hunt in pairs, but on one occasion only has Mr. Sheppard found an adult male and female in company. This was early in December and the tracks on the snow indicated that they had been sporting considerably, and were probably rutting. He killed them both.

The range of these animals, as individuals, is very extensive, and

is only limited by the confines of the Adirondacks. They are, indeed, famous travellers, and when not hunting, roam far and wide, following the highest ridges of the Wilderness, and finding their path along the steepest and most inaccessible ledges. During the winter of 1877–78 J. W. Shultz killed one near Lake Terror that he, in company with E. L. Sheppard, had followed over the summit of Lake Terror Mountain. They sometimes make use of trees to aid in the ascent and descent of steep rocky cliffs, and generally take refuge in a spruce or hemlock when pursued by dogs; but under no other circumstances do any but the young sporting kittens ever climb trees.

Panthers are hunted during the deep snows of winter, when the hunter, on snow-shoes, makes wide circuits in various directions till he finds a track. This he follows, leading the dogs, till he comes to the carcass of a deer which the Panther has recently killed and partially devoured. Knowing that the animal is not far off he now "lets loose" the dogs, and as a rule the cowardly beast is soon "treed" and shot. Out of the twenty-eight Panthers in the killing of which Mr. Sheppard was concerned, four refused to "tree," and were shot while on the ground. When attacked they never spring after the dogs, but merely act on the defensive. When a dog makes bold to come too near he receives such an energetic "cuff" from the Panther's paw that he rarely solicits another.

Though possessed of great strength and power, and naturally quick in his movements, the Panther is a positive coward. For all that, when seriously wounded, without being entirely crippled, all his latent ferocity is aroused, and he rushes fiercely at his assailants. But even at such times, when in an attitude of supreme anger and rage, and while lashing the snow impetuously with his long tail, anything thrust into his open mouth serves to divert his wrath from the enemy to his weapon. Thus on two occasions, once with an axe, and once with the muzzle of his gun, has Mr. Sheppard saved himself and his dogs from mutilation, if not from a horrible death.

The hunter commonly follows a Panther for many days, and some-

times for weeks, before overtaking him, and could never get him were it not for the fact that he remains near the spot where he kills a deer till it is eaten. When the hunter has followed a Panther for days, and has, perhaps, nearly come up with him, a heavy snow-storm often sets in and obliterates all signs of the track. He is then obliged to make wide detours to ascertain in which direction the animal has gone. On these long and tiresome snow-shoe tramps he is of course obliged to sleep, without shelter, wherever night overtakes him. The heavy walking makes it impossible for him to carry many days' rations, and when his provisions give out he must strike for some camp or settlement for a new supply—this of course consumes valuable time and enables the Panther to get still farther away. When the beast is finally killed the event is celebrated by a feast, for Panther meat is not only palatable, but is really very fine eating.

Most mammals are larger at the north than at the south, but with the present species the reverse is true. Individuals from various parts of the south and southwest average considerably larger than those found in the Adirondacks. This is in obedience to the law, clearly defined by Mr. J. A. Allen, that: "The maximum physical development of the individual is attained where the conditions of environment are most favorable to the life of the species." *

In the Adirondacks, it is an uncommonly large Panther that measures eight feet from the end of its nose to the tip of its tail, and an unusually heavy one that weighs a hundred and fifty pounds. Still, on the 15th of February, 1877, Mr. Verplanck Colvin, Superintendent of the Adirondack Survey, shot a male on Seventh Lake Mountain, in Hamilton County, that weighed about two hundred pounds. This is the heaviest Panther concerning which I have been able to procure trustworthy information. It was killed near a deer "yard," and the carcasses of two of its victims were found hard by. Hence it is fair to infer that he had been for some time lurking in this vi-

* Bulletin of the U. S. Geol. Survey, Aug., 1876, Vol. II, No. 4, p. 310.

cinity, feasting and fattening upon the deer that were unable to escape in the deep snow.

An adult Panther stands about two and a half feet high at the shoulders and is so slender that it generally appears to be very thin and gaunt when in reality it may be quite fat. Either the old males kill the young males (which I do not think probable), or the females greatly preponderate at birth; for out of twenty-eight killed by, or through the instrumentality of E. L. Sheppard, only five were males.

The mother commonly has two kittens at a birth, sometimes one, three, or even four. The period of gestation was ascertained to be ninety-seven days in a female observed by the Zoological Society of London. The young are brought forth late in the winter or in early spring, and the lair is usually in a shallow cavern on the face of some inaccessible cliff or ledge of rocks. It is probable that they do not, with us, have young oftener than every other year.*

Some common fallacies concerning Panthers.

1st. Concerning the alleged Fierceness of the Panther.

Not only is it customary for the community at large to speak of the terrible danger of encountering one of these dreadful and savage animals, but even many very respectable works upon Natural History contain the most detailed and heart-rending accounts of the loss of human

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* William A. Conklin, Esq., Ph. D., has had the kindness to favor me with the following very valuable note concerning the breeding of a female Panther, during a series of years, at the Central Park Menagerie, of which he is director, in New York city. Mr. Conklin writes: "In my experience the period of gestation is thirteen weeks (91 days), and it occasionally, but rarely, exceeds that time by one or two days. I have one Panther that has bred seven times, as follows:

In her	1st	litter	were	4	kittens.		In her	4th	litter	were	4 kittens.
"	2d	"	"	4	"		"	5th	"	"	3 "
"	3d	"	"	2	"		"	6th	"	"	2 "

In her 7th litter was 1 kitten.

Her age, 16 years, at the time of her last litter, and the fact that this female came from Texas, may have some bearing on the number of young produced at a birth. The cubs are born with the eyelids closed; they open after eight or nine days. The incisors and canine teeth cut through the gums in eighteen or twenty days. The body is at first spotted, the spots disappearing in about six months. They are weaned when three months old. The mother carries the young about in her mouth in the same way that a cat does her kittens."

life by the brutal attacks of these ferocious beasts. Even as cautious and reliable a naturalist as Zadock Thompson quotes the following appalling and blood-curdling tale as an authentic narrative: "Two hunters, accompanied by two dogs, went out in quest of game, near the Catskill Mountains. At the foot of a large hill, they agreed to go round it in opposite directions, and when either discharged his rifle, the other was to hasten toward him to aid him in securing the game. Soon after parting, the report of a rifle was heard by one of them, who, hastening toward the spot, after some search, found nothing but the dog, dreadfully lacerated and dead. He now became much alarmed for the fate of his companion, and, while anxiously looking round, was horror-struck by the harsh growl of a Catamount, which he perceived on a large limb of a tree, crouching upon the body of his friend, and apparently meditating an attack on himself. Instantly he levelled his rifle at the beast, and was so fortunate as to wound it mortally, when it fell to the ground along with the body of his slaughtered companion. His dog then rushed upon the wounded Catamount, which, with one blow of its paw, laid the poor creature dead by his side,"* et cetera. The illustrious Audubon, in his great work upon the Quadrupeds of North America, cautions the reader not to credit the legends of the vulgar in regard to the ferocity of this animal, and its propensity to attack man, and then goes on to picture midnight encounters and hair-breadth escapes almost as thrilling and improbable as the story above quoted. Oh, the inconsistency of man!

It is now so well known that the Panther is one of the most cowardly of beasts, never attacking man unless wounded and cornered, that it is unnecessary to do more than contradict the popular impression to the contrary.

2d. Concerning the Method of Capturing its Prey.

It is commonly and widely believed, and frequently and boldly as-

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

serted in print, that the Panther lurks in ambush for its prey; that it lies in wait beside the runways of the wary deer, hidden by some rock or thicket, or crouching upon an overhanging limb, and falls, like a thunderbolt from heaven, upon the back of its hapless and unsuspecting victim. Such romances, however gratifying to the narrator, and entertaining to the community, are without foundation in fact, and could only have originated in the over-fertile imagination of a conscienceless fabricator:

"——— a false creation,
Proceeding from the heat-oppressed brain."

3d. Concerning the Screams of the Panther.

Who has not heard of the piercing cries and startling screams of the Panther? Who has listened, about the evening camp-fire, to the tales of hunters and woodsmen, but has felt his blood run cold, and his hat lighten on his head, as the earnest speaker, perhaps in a whisper, and uninterrupted save by the sputtering of the fire, told of the time when alone in the solitudes of the deep forest, and at the dead of night, he was suddenly awakened by a piercing scream that burst upon his weary ears. It seemed like the shriek of a woman in distress, or the pitiful cry of a lost child. Half asleep, bewildered, and amazed, he starts to his feet to render assistance, when the glaring eyeballs of a fierce Cougar meet his horrified gaze and acquaint him with the nature of his unwelcome guest!

An attack of indigestion, the cry of a Loon, or the screech of an Owl, a piece of phosphorescent wood, and a very moderate imagination, are all that are necessary, in the way of material and connections, to build up a thrilling tale of this description. Indeed, the writer once had a bit of personal experience in this line that is not yet forgotten.

In conversing with honest hunters upon this point it has been my uniform experience to find that those who have had most to do with Panthers are the most skeptical in regard to their cries; and I have yet to find the man, whose statements on this point are of any value, that

has ever heard a wild Panther scream. This is negative evidence it is true, but it is by no means without value; and it is certainly safe to assert that at least ninety-nine per cent. of the so-called "Panther screams" emanate from a widely different source.

4th. Concerning the Size of the Panther.

In talking with border hunters of a certain type, and in perusing the literature of the subject, one is every now and then confronted with the most fabulous statements concerning the size of the beast now under consideration. Some would have us believe that Panthers have been killed and measured with a "two-foot rule" that were eleven, twelve, and even thirteen feet in length. Formidable beasts, indeed! No less an authority than James De Kay tells us, in apparent good faith, that one was killed on an island in Fourth Lake (of the Fulton Chain) in Herkimer County, that, when recently killed, "had a total length of eleven feet three inches."* To those that are inclined to credit such statements I have only to say: measure off eleven feet on your floor; place the largest Panther you ever saw on this measured line, and then tell me on what part of the beast you would "annex" or "splice on" the three or more additional feet.

5th. Concerning the way a Panther carries its Prey.

We often see statements to the effect that a Panther has killed a deer or a young bullock, "slung it over his back," and marched off (perhaps up an embankment, or even climbed a tree) with it. A Panther drags a deer along the ground just as a dog drags a sheep, or a cat a big piece of meat, and if he is a large one he may be able to lift the deer so high that only its hinder parts drag.

* Zoology of New York, Part I, Mammals, 1842, p. 48.

Bounties paid on Panthers under the Law of 1871.

Data concerning Panthers killed in the Adirondacks from June, 1871, to August, 1882, on which bounties have been paid by the State.* (From official records on file in the Comptroller's office, at Albany.)

Locality where killed. County.	Town.	Date of killing.	By whom killed.	No killed.	Amt. paid.
Essex,	Newcomb,	Nov. 10, 1871,	J. C. Farmer,	1	$20
"	"	Dec. 11, 1871,	J. C. Farmer,	3	60
"	"	Feb. 25, 1880,	Wm. H. Cullen,	1	20
Franklin,	Dickinson,	Aug. 29, 1873,	Chas. A. Merrill,	1	20
"	"	Dec. 4, 1872,	Milo H. Ober,	1	20
Hamilton,	Lake Pleasant,	Feb. 29, 1872,	Aaron B. Sturges and B. Page,	1	20
"	Long Lake,	Feb., 1878,	J. W. Shultz,	1	20
"	Wells,	Dec. 19, 1876,	Silas Call,	1	20
Herkimer,	Wilmurt,	Dec. 11, 1877,	Edwin L. Sheppard,	1	20
"	"	Dec. 12, 1877,	Edwin L. Sheppard,	1	20
"	"	Dec. 13, 1877,	Edwin L. Sheppard,	1	20
"	"	Feb. 26, 1878,	E. N. Arnold,	1	20
"	"	March 8, 1878,	E. N. Arnold,	1	20
Lewis,	Diana,	May 23, 1882,	George Muir,	1	20
"	"	June 10, 1882,	George Muir,	1	20
"	"	June 27, 1882,	George Muir,	1	20
"	"	July 13, 1882,	George Muir,	1	20
St. Lawrence,	Fine,	June 7, 1871,	Spencer B. Ward,	1	20
"	"	June 22, 1871,	Spencer B. Ward,	1	20
"	Township, No. 11,	Oct. 24, 1871,	Michael Duffy,	1	20
"	Fine,	June 15, 1872,	John Muir,	1	20
"	"	June 26, 1872,	John Muir,	1	20
"	"	June 29, 1872,	John Muir,	1	20
"	Hopkinton,	Nov. 19, 1873,	Noah A. Gale,	1	20
"	Fine,	June 8, 1873,	John Muir,	1	20
"	"	Oct. 23, 1872,	Wm. Henry Marsh,	1	20
"	Hopkinton,	Nov. 4, 1874,	Norman E. Wait,	1	20
"	"	Dec. 26, 1876,	Charles W. Gale,	1	20
"	Fine,	Jan. 24, 1877,	Webster Partlow,	1	20
"	Colton,	Feb. 15, 1878,	Hiram Hutchins,	1	20
"	Fine,	May 1, 1879,	George Muir,	1	20
"	Hopkinton,	Oct. 12, 1879,	Peter Burreau,	1	20
"	Fine,	June 15, 1880,	George Muir,	1	20
"	Colton,	Jan. 15, 1881,	Hiram Hutchins,	1	20
"	"	Nov. 23, 1880,	Hiram Hutchins,	1	20
"	Fine,	Oct. 7, 1881,	George Muir,	1	20
"	"	Oct. 6, 1881,	George Muir,	1	20
"	"	Aug. 26, 1881,	George Muir,	1	20
"	"	July 16, 1881,	George Muir,	1	20
"	"	May 23, 1881,	George Muir,	1	20
"	"	April 26, 1881,	George Muir,	1	20
"	"	Sept. 10, 1881,	George Muir,	2	40
"	"	Nov. 7, 1881,	George Muir,	1	20
				46	$920

*It is impossible to obtain, even with approximate accuracy, any satisfactory estimate of the total number of Panthers that have been killed in the Adirondacks, even during the past fifty years. Mr. Byron P. Graves, of Boonville, N. Y., shot three in Herkimer and Hamilton Counties during February and March, 1871, four were killed about the same time in Franklin County, and others in other parts of the Woods. A year or two previous to this several Panthers, one of which I skinned, were shot on the extreme western confines of the Wilderness—in the town of Greig, in Lewis County. As near as I can reckon, from the data that I have been able to procure, nearly an hundred Panthers have been killed in the Adirondacks since the year 1860.

LYNX CANADENSIS (Desm.) Raf.

Canada Lynx.

The Lynx is, and so far as I can learn, has always been a rather rare inhabitant of this region. It is most often met with on the Champlain or eastern side of the Woods, but is nowhere common.

The Lynx is called "Loup Cervier" by the French Canadians, and has been erroneously termed Carcajou, or Wolverine, by some of the older hunters in this State.

It preys upon the northern hare, and such other small mammals as it can catch, and upon the Ruffed Grouse and Spruce Partridge. It has also been known to devour pigs, lambs, and young fawns, but the accounts of its attacking full-grown deer are not to be credited.

Its haunts are in the deep forests and burnt districts, remote from the paths of man; and consequently it rarely intrudes upon the barn-yard.

Its ordinary gait when in a hurry is a long gallop, like that of the hare, and it is said to swim well.

The female commonly has two young at a birth, her lair being usually located in a cavern or hollow tree.

The older naturalists, having little or no personal acquaintance with the animals of which they wrote, were often led into grave errors when treating of their habits, and even Thomas Pennant, writing in 1770, said, of the present species, that it "is long lived: climbs trees: lies in wait for the deer which pass under, falls on them, and seizing on the jugular vein soon makes them its prey: will not attack mankind, but is very destructive to the rest of the animal creation: the furs of these animals are valuable for their softness and warmth: . . . The ancients celebrated the great quickness of its sight; and feigned that its urine was converted into a precious stone." *

* Synopsis of Quadrupeds, 1771, pp. 187–188.

LYNX RUFUS (Gmelin) Raf.

Wild Cat; Bay Lynx; "Chat Cervier."

The Wild Cat is, for some reason, an extremely rare animal in the Adirondacks. It may be that our climate is too severe for it, since it is much more common farther south.

It frequents rocky hills and ledges, and does not show that antipathy to civilization so marked in its congener, the Lynx. In fact it is often quite common in thickly settled portions of the State, and sometimes proves of much annoyance to the farmer by carrying off lambs, little pigs, and poultry—ducks, geese, turkeys, and chickens proving alike acceptable. Away from the farm-yard it feeds upon rabbits, squirrels, mice, grouse, and what small birds it is fortunate enough to capture. It generally makes its nest in a hollow tree or log, and lines it well with moss. From two to four young constitute a litter, the most frequent number being three.

In 1873 or 1874, I shot a grouse as it was flying along the north side of Mt. Tom, in Massachusetts. Scarcely had it touched the rocky slope when a Wild Cat sprang upon it, from behind a neighboring bush, and, in a succession of rapid leaps, started up the side of the mountain with the grouse in its mouth. The contents of the other barrel of my gun caused him to change his mind as well as direction.

I have eaten the flesh of the Wild Cat, and can pronounce it excellent. It is white, very tender, and suggests veal more than any other meat with which I am familiar.

When enraged, this animal is the most ferocious-looking beast I have ever seen, and hisses, spits, and growls in the most unattractive manner imaginable.

The term "Wild Cat" is sometimes also applied to certain erratic individuals of the domestic cat kind, that have become wild and make their homes in the forest, bringing forth their young in hollow logs,

old stumps, and caves, and preying upon poultry and eggs as well as upon wild game. With these the present species must not be confounded.

Family CANIDÆ.

CANIS LUPUS Linnæus.

Wolf.

Comparatively few Wolves are now to be found in the Adirondacks, though twelve years ago they were quite abundant, and used to hunt in packs of half a dozen or more.

They have hard work to get a living here, and are always gaunt and hungry. They cannot catch deer with any certainty except in deep snow, and are, therefore, during the greater part of the year, forced to subsist upon skunks, hares, mice, frogs, carrion, and such other food as they are able to procure. In times past they were a great enemy to the settlers of this region and within fifty years have caused our border farmers much annoyance by destroying their sheep and pigs; they have also been known to kill calves and young colts.

In summer they sometimes drive a deer into a lake and follow it along the shore, from time to time jumping high in the air in order to sight it and determine the direction in which it is swimming. If the lake is a small one and there are enough Wolves, they are occasionally able to pounce upon it as it emerges from the water; but this rarely happens, and the deer almost always escapes. In September, 1870, I saw a pack of Wolves drive a deer into the head of Seventh Lake, Fulton Chain. It escaped the Wolves to be slain by a man with a shot-gun!

Within my recollection Wolves were so common here that scarcely a night passed when they could not be heard howling in various parts of the forest. So bold and impudent were they that they often came about camp while the inmates were sleeping and stole any venison, or other meat, that chanced to hang within reach.

The amount of noise that a single Wolf is capable of producing is simply astonishing, and many amusing episodes of camp lore owe their origin to this fact. More than one "lone traveller" has hastily taken to a tree, and remained in the inhospitable shelter of its scrawny branches for an entire night, believing himself surrounded by a pack of at least fifty fierce and hungry Wolves, when, in reality, there was but one, and (as its tracks afterwards proved) it was on the farther side of a lake, a couple of miles away.

The Wolf is one of the most cowardly and wary of our mammals, always taking good care to keep out of sight; and he is so crafty and sagacious that it is almost impossible to allure him into any kind of a trap.

When opportunity affords he is one of the most destructive and wasteful of brutes, always killing as much game as possible, regardless of the condition of his appetite, and he used to be the greatest enemy that our deer had to contend with. During the deep snows a small pack of Wolves would sometimes kill hundreds of deer, taking here and there a bite, but leaving the greater number untouched.

In the year 1871 the State put a bounty* on their scalps, and it is a most singular coincidence that a great and sudden decrease in their numbers took place about that time. What became of them is a great and, to me, inexplicable mystery, for it is known that but few were killed. There is but one direction in which they could have escaped, and that is through Clinton County into Lower Canada. In so doing they would have been obliged to pass around the north end of Lake Champlain and cross the River Richelieu, and before reaching any extensive forests would have had to travel long distances through tolerably well-settled portions of country. And there is no evidence that they made any such journey.

The Wolf makes its nest in rocky caverns, under the upturned roots of fallen trees, and in hollow logs; and where suitable shelter

* The law granting this bounty has already been given in a foot note under the Panther. See pp. 29–30.

cannot be found, it digs holes in the ground for its home. From six to ten pups constitute a litter, and they are usually produced in April or May. The period of gestation is said to be sixty-three days.*

Bounties paid on Wolves under the Law of 1871.

Data concerning Wolves killed in the Adirondacks from June, 1871, to July, 1882, on which bounties have been paid by the State. (From official records on file in the Comptroller's office, at Albany.)

Locality where killed. County.	Town.	Date of killing.	By whom killed.	No. killed.	Amt. paid.
Essex,	Minerva,	Sept. 6, 1872,	Wesley Rice,	2	60
Franklin,	Duane,	July 4, 1874,	James H. Bean,	1	30
"	Brandon,	Juue 12, 1875,	Calvin Wait,	1	30
"	"	June 17, 1875,	Calvin Wait,	1	30
Herkimer,	Ohio,	Jan. 28, 1882,	Henry Sheldon,	1	30
"	"	Feb. 2, 1882,	Henry Sheldon,	1	30
Oneida,	Forest Port,	Feb. 14, 1882,	Henry Dunan,	1	30
"	"	March 15, 1882,	Henry Dunan,	1	30
"	"	March 19, 1882,	Henry Dunan,	1	30
Lewis,	Greig,	Nov. 10, 1881,	George Botchford,	1	30
"	Diana,	June 27, 1882,	George Muir,	1	30
St. Lawrence,	Fine,	Oct. 17, 1871,	John Muir,	1	30
"	Hopkinton,	Aug. 17, 1871,	George Spear,	1	30
"	"	Aug. 17, 1871,	George Spear,	1 Pup	15
"	"	Oct. 6, 1871,	Joseph Whitney,	1	30
"	Fine,	Nov. 7, 1872,	John Muir,	1	30
"	"	May 26, 1872,	John Muir,	1	30
"	Pitcairn,	Nov. 4, 1872,	Aaron Thomas,	1	30
"	"	Dec. 12, 1873,	Aaron Thomas,	1	30
"	Brasher,	Dec. 21, 1872,	Timothy Desmond,	1	30
"	Fine,	May 22, 1875,	John Muir,	1	30
"	"	May 24, 1875,	John Muir,	1	30
"	"	May 15, 1876,	John Muir,	1	30
"	Hopkinton,	Oct. 9, 1876,	George Peek,	1	30
"	Fine,	April 8, 1878,	George Muir,	1	30
"	"	May 5, 1877,	George Muir,	1	30
"	"	July 14, 1877,	George Muir,	1	30
"	"	April 29, 1879,	George Muir,	1	30
"	"	Sept. 16, 1878,	George Muir,	1	30
"	"	April 26, 1880,	George Muir,	1	30
"	"	Oct. 3, 1880,	George Muir,	1	30
"	Parishville,	Nov. 13, 1880,	Henry C. Hibbard,	1	30
"	Colton,	Nov. 5, 1880,	Abram Barkley,	1	30
"	Hopkinton,	Nov. 6, 1880,	Jonathan Baldwin,	1	30
"	Fine,	Sept. 25, 1881,	George Muir,	1	30
"	"	Aug. 24, 1881,	George Muir,	1	30
"	"	July 20, 1881,	George Muir,	1	30
"	"	June 11, 1881,	George Muir,	1 Pup	15
"	"	June 11, 1881,	George Muir,	1	30
"	"	April 28, 1881,	George Muir,	1	30
"	"	Nov. 8, 1881,	George Muir,	1	30
"	Hopkinton,	Sept. 20, 1881,	Henry Hibbard,	1	30
Washington,	Dresden,	Feb., 1882, latter part,	Rollin Gamby,	1	30
"	"	Mareh, 1882, early part,	Rollin Gamby,	1	30
				45	$1,320

* Fauna Americana, by Richard Harlan, M.D., 1825, p. 81.

VULPES VULGARIS PENNSYLVANICUS (Bodd.) Coues.

Fox; Red Fox; Cross Fox; Silver Fox; Black Fox.

The common Fox is a tolerably abundant resident in the "North Woods," and its short bark is often heard, after nightfall, by parties encamped about our lakes.

He is both nocturnal and diurnal in habits, and preys upon skunks, woodchucks, muskrats, hares, rabbits, squirrels, mice, and small birds and eggs. He is a well-known and much-dreaded depredator of the poultry-yard, destroying, with equal alacrity, turkeys, ducks, geese, hens, chickens, and doves; and has been known to make off with young lambs. He will also eat carrion, and even fish, and is said to be fond of ripe grapes and strawberries.

The cunning of the Fox is proverbial. Wily, crafty, and sagacious, to a degree almost beyond credibility, he defies the superior skill and intelligence of man, and meets, with shrewd manœuvre and subtle stratagem, all attempts at his extermination. He lives and thrives and multiplies in our very midst, and is as common in many of the thickly settled portions of the State as in the remotest depths of the primeval forests.

He is hunted both for pleasure and profit, and for the gratification of a malicious spite that seems to be inherent in man for his destruction. He is trapped for where his presence is suspected, hounded when his foot-prints are seen on the snow, dug out when found in his subterranean burrow, and shot at when surprised at any of his tricks, from the first hour of his youthful gambols till the time that he finally succumbs before man's combined and persistent efforts toward his annihilation. Nevertheless, his race survives, and I have yet to be convinced that his numbers have undergone any very material diminution during the last hundred years.

The influence of *natural selection* in developing hereditary habits for the protection of the species is well exemplified in this animal, for he seems familiar, from earliest infancy, with the multifarious contri-

vances devised by man for his capture, and avoids them all, eluding and circumventing his pursuer with an intelligence and promptness that command our wonder and respect.

The pastime (?) of Fox hunting is largely practised everywhere along the border-lands of our Wilderness, and two or three men, with one or two fox-hounds, commonly constitute a hunting party. As soon as a fresh track is found the dog is allowed to follow it, which he does with great joy and alacrity. The men now separate, each proceeding, without further delay, to some ravine, hill-side, or other point that is known to be one of the "run-ways" of the Fox. Occasionally the Fox, on being started, makes a round on one of these courses, and is shot while passing the first station. More commonly, however, he makes off, taking a tolerably straight course, and runs several miles before commencing to circle and wind about among the hills. Therefore the hunter is, on these interesting excursions, generally obliged to walk many miles over the deep snow, and night frequently overtakes him, tired and hungry, far from the cheerful fireside of his pleasant home. And he may, or may not, have been rewarded by securing the object of the chase.

It sometimes happens, especially during a thaw, when the snow "slumps," that the dog catches up with the Fox. At such times both pursuer and pursued are commonly well-nigh exhausted, and the weary hunter lags far behind. The resulting scene, to which I have myself been an eye-witness, is so graphically depicted by Audubon and Bachman that I take pleasure in reproducing their account of it here: ". . . . every bound and plunge into the snow, diminishes the distance between the Fox and his relentless foe. . . . . One more desperate leap, and with a sudden snappish growl he turns upon his pursuer, and endeavors to defend himself with his sharp teeth. For a moment he resists the dog, but is almost instantly overcome. He is not killed, however, in the first onset; both dog and Fox are so fatigued that they now sit on their haunches facing each other, resting, panting, their tongues hanging out, and the foam from their lips

dropping on the snow. After fiercely eyeing each other for a while, both become impatient—the former to seize his prey, and the latter to escape. At the first leap of the Fox, the dog is upon him; with renewed vigor he seizes him by the throat, and does not loose his hold until the snow is stained with his blood, and he lies rumpled, draggled, with blood-shot eye, and frothy open mouth, a mangled carcass on the ground."*

Not infrequently the Fox, after leading his pursuers a long and tiresome chase, betakes himself to his hole. If this chances to lie within a ledge of rocks it is the safest of retreats, but if it be merely a burrow in the earth he is by no means secure, for the hunters (provided they have enough energy and ambition left) repair to the nearest farm-house for spade and pick with which to dig out the luckless beast.

Hence Fox hunting, with us, can hardly be ranked among the most fascinating of sports; and those that indulge in it must have good pluck and hard muscle or they are apt to come out the worse for wear. *Sic transit gloria mundi!* Having "killed my Fox" I am not now easily seduced into this form of recreation.

Foxes make rather pretty pets, and, when taken young, are easily tamed; but they are so deceitful and treacherous that they are not apt to gain one's affection.

The Fox makes its nest in caverns and ledges of rocks, in burrows in the earth, and occasionally in old stumps and hollow logs. From four to nine young are brought forth at a time, the usual period being, with us, the latter part of March or first of April.

Family MUSTELIDÆ. Subfamily MUSTELINÆ.

NOTE.—The Wolverine (*Gulo luscus*) is not now an inhabitant of the Adirondacks, and I have been unable to find among the hunters and trappers of this region anyone who has ever seen it in our Wilder-

* Quadrupeds of North America, Vol. I, 1846, p. 48.

ness. Dr. DeKay, writing in 1842, said: "Although we have not met with this animal, yet hunters who have killed them repeatedly, and knew them well, have assured us that they are still found in the districts north of Raquet Lake."*

Dr. Bachman killed one, about the year 1811, in its den in a ledge of rocks, in Rensselaer County.†

This animal is the *Carcajou* of the Canadians.

MUSTELA PENNANTI Erxleben.

Fisher; Pekan; Pennant's Marten; "Black Cat;" "Black Fox."

Though not so common as formerly, the Fisher, as it is here termed, is by no means a rare inhabitant of these mountains.

The name Fisher is somewhat of a misnomer, for these animals commonly frequent deep swamps and wooded mountain-sides, away from the immediate vicinage of water, and are not known to catch fish for themselves as do the Mink and Otter. However, they are fond of fish and never neglect to devour those that chance to fall in their way. They prey chiefly upon hares, squirrels, mice, grouse, small birds, and frogs, and are said to eat snakes. They also catch and feed upon their own congener, the Marten, and make a practice of devouring all that they discover in dead-falls and steel-traps, thus proving almost as great a nuisance to the trapper as the Wolverine. It is said to be less objectionable than the Wolverine in one particular: *i. e.* it leaves the traps where it finds them, while the other blackleg often lugs them off and hides them.

Sir John Richardson tells us that "its favorite food is the Canada Porcupine, which it kills by biting in the belly." This habit, which has been questioned, has recently received additional confirmation from the pen of Corporal Lot Warfield, who writes of this animal, from Weston, Vermont, stating his experience as follows: "I agree with 'Penobscot' that they are not plenty, but account for it on

* Zoology of New York, Part I, Mammals, 1842, p. 28.

† Quadrupeds of North America, Vol. I, 1846, pp. 207–208.

different grounds, namely, its fondness for the flesh of the porcupine, whose quills often prove fatal to it. I have several times found the quills buried in their bodies, besides quantities of flesh, hair, and quills in the stomach and excrements, and from this gained a point in baiting them; let other trappers try it. They are an agile, muscular animal, jumping from tree to tree like a squirrel, clearing a distance of forty feet in a descending leap, never failing a secure grip."*

During a recent visit to the north shore of the Gulf of St. Lawrence I was informed, both by an agent of the Hudson's Bay Company and by the trappers themselves, that porcupines constitute a large and important element in the food supply of the Pekan. Mr. Nap. A. Comeau, of Godbout, who secured for me a large and handsome male of this species, tells me that its intestine contained hundreds of porcupine quills, arranged in clusters, like so many packages of needles, throughout its length. In no case had a single quill penetrated the mucous lining of the intestine, but they were, apparently, passing along its interior as smoothly and surely as if within a tube of glass or metal. Mr. Comeau could not discover a quill in any of the abdominal viscera, or anywhere in the abdominal cavity, excepting as above stated. A great many, however, were found imbedded in the muscles of the head, chest, back, and legs, and it was remarked that their presence gave rise to no irritation, no products of inflammation being discovered in their vicinity. In examining the partially cleaned skeleton of this specimen I still find some of the quills in the deep muscles and ligaments about the joints. A knee, in particular, shows several in its immediate neighborhood. One is deeply imbedded in the dense ligament alongside the patella; three lie parallel to and close against the tibia, and two can be seen between it and the fibula.

It is probable that all of these quills entered the body of the animal while engaged in killing and devouring the porcupine, for those swal-

* Forest and Stream, Vol. XII, No. 21, June 26, 1879, p. 405.

lowed seemed to have caused no trouble after having fairly entered the alimentary canal. Therefore there remains no question whatever that the Fisher feeds upon the porcupine, but I do not agree with Corporal Warfield in the belief that the "quills often prove fatal to it."

It is indeed remarkable that an animal no larger than the one now under consideration should habitually feed upon a beast in whose capture he must be pierced with numbers of large and sharp needles, many of which exceed two and a half inches (64 mm.) in length—needles that are destined to penetrate to the remotest parts of his body.

That it, at times, attacks so large and tough an animal as the Raccoon is evident from the following : Dr. Coues, in his valuable Monograph of North American Mustelidæ (pp. 73–74), quotes a letter from Peter Reed to Prof. Spencer F. Baird, to the effect that the writer once followed, on the snow, the bloody trail that marked the progress of a fierce and desperate contest between a Fisher and a 'Coon. This was in Washington County, New York, near the southeastern border of the Adirondack region. Mr. Reed further stated that as the Fisher became rare in that section the Raccoon greatly increased in abundance, and he regards these circumstances as cause and effect.

When pressed by hunger the Pekan is said to subsist upon beech-nuts. This could hardly be true in the Adirondacks, for here a good yield of beech-nuts is almost invariably followed by an abundance of small game—grouse, squirrels, chipmunks, and mice alike fattening upon the mast. "Beech-nut years," too, are apt to be followed by mild winters; while it is during the deep snows of our severest winters, when there are few or no beech-nuts, and a consequent scarcity of small game prevails, that Pennant's Marten is likely to be pinched for food.

The Pekan is a large and powerful mammal, with resemblances pointing both toward the Marten and the Wolverine. Individuals have been killed that stood a foot high and measured three and a half feet in length, but this is much above the average size. As there

are "giants among men," and "giant wolves," so are there giants among Fishers. They are always males. About twenty years ago E. L. Sheppard caught one on Seventh Lake (Fulton Chain) that was estimated to weigh about forty pounds and whose skin was larger than that of a good-sized Otter! In my Osteological Cabinet reposes the skull of a Fisher that measures five inches in length. It was presented to me by Mr. John Constable, who killed it between Stony Lake and "The Hollow," near Independence River, during the early part of the winter of 1840. Mr. Constable tells me that it ascended a gigantic dead pine, the tip of which had broken off. The "stub" of this tree was more than six feet through at the base, and upwards of an hundred and fifty feet in height. The Fisher climbed to the very top and lodged in a depression where the tip had broken off. He was shot but was so lodged that he did not fall, and the tree had to be felled before he was secured. The pine was an unusually fine one—a straight pillar, tapering uniformly to the top, and so perpendicular and well balanced that when the side choppings met it did not fall, and was with great difficulty overthrown. When it did finally tumble, and the cloud of snow that filled the air as it came crashing and thundering to the ground had cleared away, the Fisher was found to be dead. It proved to be in keeping with the tree it had climbed, for it was as large as an Otter and by far the biggest Fisher that Mr. Constable, or the old hunter with him, had ever seen.

Though chiefly nocturnal they sometimes hunt by day. They are expert climbers and have been known to leap from one tree to another when in pursuit of their prey, and also when badly frightened.

Their nest is made in the hollow of some standing tree, generally thirty or forty feet from the ground, and from two to four young are commonly brought forth about the first of May.

MUSTELA AMERICANA Turton.

Marten; American Sable; Pine Marten; Hudson's Bay Sable.

The Marten is a common resident of the dark evergreen forests of the Adirondacks, and hundreds of them are trapped here every winter for their fur. Like the Fisher, it is chiefly nocturnal, but is occasionally seen abroad by day. They prey upon partridges, rabbits, squirrels, chipmunks, mice, shrews, and any other "small game" that they are smart enough to catch. Birds' eggs and young birds are greedily devoured, and frogs and toads, and even our larger insects, do not come amiss. It is said that they are exceedingly fond of honey, but on how good authority I am unable to attest. They are arboreal to such an extent that they are never found in districts devoid of timber, and seem to show a predilection for coniferous forests. Not only are they expert climbers, but they sport about amongst the tree-tops, both in pursuit of game and pleasure, with the ease and grace of squirrels. Preferring moss-covered logs and the seclusion of deep evergreen woods to the beaten paths and stir of the settled districts, or even the rude civilization of the hardy frontiersman, the Marten avoids the clearings and habitations of man, and cannot be reckoned among the depredators of the poultry-yard.

It is one of the prettiest of North American mammals, but its disposition is sadly out of harmony with its attractive exterior. Mr. John Constable has narrated to me a most interesting and vivid account of an affray that he once witnessed, in company with his brother, Mr. Stevenson Constable, between a Marten and a Great Northern Hare. The Marten, generally so meek and docile in appearance, assumed the savage mien and demeanor of a fierce tiger, as it attacked and slew the luckless hare—an animal of several times its own size and weight. And even after the poor hare was dead the Marten's fury did not abate, and he angrily jerked and twisted the lifeless body from side to side, as if to reek vengeance, for sins never committed, upon the defenceless body of his innocent victim. So in-

tent was he upon this deed of carnage that he was utterly oblivious to the human spectators, who put an end to the scene by driving a bullet through his obdurate pate.

Audubon said of it : " Let us take a share of the cunning and sneaking character of the fox, as much of the wide-awake and cautious habits of the weasel, a similar proportion of the voracity (and a little of the fetid odor) of the mink, and add thereto some of the climbing propensities of the raccoon, and we have a tolerable idea of the attributes of the little prowler."*

Mr. Constable tells me that when the hunter discovers a Marten climbing about amongst the tree-tops he has only to whistle, and the inquisitive animal will stop and peer down at him, affording an excellent shot.

I have no personal knowledge of the size of a litter of Martens, and the number of young produced at a time is variously stated (2 to 8 being the extremes given) by different authors. The assertion that from four to six constitute an average litter would probably hit pretty close to the truth. The nest is placed in a hollow tree or log, rarely in the ground, and the young are brought forth in April.

The fur of this species, which is one of the most valuable of fur-bearing animals, becomes prime early in November. As long ago as 1770, Pennant said that their skins were "a prodigious article of commerce"; † and Richardson, in 1829, stated that " Upward of one hundred thousand skins have long been collected annually in the fur countries." ‡ Dr. Coues tells us that : " Even in Nova Scotia a thousand skins are said to have been exported annually within a few years, and they may justly be regarded as among the most important of the land fur-bearing animals." And goes on to say, " Respecting their comparative scarcity at times, Mr. Ross has recorded a remarkable fact of periodical disappearance. ' It occurs in decades,'

* Quadrupeds of North America, Vol. III, 1854, p. 177.

† Synopsis of Quadrupeds, 1771, p. 216.

‡ Fauna Boreali Americana, Vol. I, 1829.

he says, 'or thereabouts, with wonderful regularity, and it is quite unknown what becomes of them. They are not found dead. The failure extends throughout the Hudson's Bay Territory at the same time. And there is no tract or region to which they can migrate where we have not posts, or into which our hunters have not penetrated.'" *

PUTORIUS VULGARIS (Aldrov.) Griff.

Least Weasel.

Having been reared in the rural districts of northeastern New York, I early became acquainted with this interesting little animal, and have always watched its habits with a great deal of pleasure. It is the commonest Weasel in the Adirondack region, and always turns white shortly after the first fall of snow. It inhabits all parts of the Wilderness, being found alike along water-courses, in deep swamps, and on rocky ledges and mountain sides. It preys upon mice, moles, shrews, small birds and eggs, and insects—chiefly *Coleoptera*. I have never known it to attack larger mammals or poultry.

Numbers of mice make their homes under the heaps of brush and rubbish and piles of stones that accumulate along the borders of clearings and in neglected pastures. Such places, together with old tumbled-down stone walls and log heaps constitute, therefore, the favorite haunts of the Least Weasel in the semi-civilized districts. It is not wary and will suffer man to approach within a few feet of it before withdrawing from view. It is curious and inquisitive and will soon stick its head out of some hole near by to see what has become of the intruder. Ever on the alert it moves backwards and forwards generally keeping near some object, behind, into, or under which it can disappear at a moment's notice, and is never still for any appreciable length of time—a fact which can easily be demonstrated by attempting to hit one of them with a rifle ball.

* Fur-Bearing Animals, 1877, p. 94

They are said to be nocturnal in habits, but those that I have seen, and their number is not small, all seemed very much at home in broad daylight. I have often surprised them in the woods and fields, and have observed that on such occasions they usually make for some convenient covert and, when within reach of its shelter, immediately turn about to view the stranger, who is now an object of curiosity rather than of alarm. Once, while sitting quietly on the end of an old log, in the woods, I noticed one of these pretty little Weasels coming obliquely toward me, in a series of leisurely leaps, stopping every now and then to look about. Perceiving me he stood bolt upright, his head bent at right angles to his slender body, and eyed me for a moment without moving a muscle; he then betook himself to the roots of the nearest tree, and under the quasi-protection of this open retreat, commenced a more deliberate survey of my peculiarities. Many times did he advance toward me, and as many back up to the tree again, with his head elevated, and constantly sniffing the air in my direction. He finally gathered sufficient courage to cross over to the log upon which I was sitting, and under the shelter of its shadow scrutinized me still more closely.

The Least Weasel is so small and slender that it can easily enter the burrows of a large proportion of the animals that constitute its prey. When they take to the open fields and outrun their pursuer, he is not discouraged, but follows their tracks by the scent, like a hound, and overtakes them in their securest retreats; thus are his ill-fated victims attacked in their own homes, and thus are they deprived of any haven to which they may fly to escape from the eager pursuit of this indefatigable and inexorable little beast.

I have never found the nest of the Weasel, and therefore transcribe the following account of its breeding habits from the pen of Thomas Bell: "The female Weasel brings forth four, or more frequently five young, and is said to have two or three litters in a year. The nest is composed of dry leaves and herbage, and is warm and dry, being usually placed in a hole in a bank, in a dry ditch, or in a hollow tree.

She will defend her young with the utmost desperation against any assailant, and sacrifice her own life rather than desert them; and even when the nest is torn up by a dog, rushing out with great fury, and fastening upon his nose or lips." *

PUTORIUS ERMINEA (Linn.) Cuvier.

Ermine; Stoat; Large Weasel; "White Weasel"; "Brown Weasel."

The Ermine is a common resident and, like the preceding species, becomes white at the approach of winter. Like it also, it wanders over different kinds of territory, and is frequently taken in traps set for more valuable fur. In addition to the small game mentioned as constituting the larder of the Least Weasel, the Ermine attacks and slays animals many times its own size and weight. Thus the house rat, squirrels, rabbits, and even the great northern hare fall easy victims before its superior prowess. It is very fond of the ruffed grouse, and its proneness to depopulate the poultry-yard is notorious. Audubon tells us that he has "known forty well-grown fowls to have been killed in one night by a single Ermine." And on our own premises a Stoat once killed fifteen doves in a single night! Rats and mice also it slays by dozens when opportunity presents. Unlike others of its tribe it does not, when game is plenty, devour the flesh of its victims, but merely eats their brains or sucks their blood; and when feasted to satiety continues its work of carnage till scarcity of material, or bodily fatigue, induce it to take a temporary respite.

Ever victorious, of pre-eminent assurance, reliant on its own superiority and power, and confident of success, this indomitable little animal is, in courage and ferocity, insatiate bloodthirstiness, and bold audacity, almost without parallel in the history of mammalia. Hunger plays but little part in the slaughter, the war of destruction and extermination, waged against its multifarious prey by this terrestrial vampire, but pitiless, relentless, wasteful in the extreme, it kills for

* Quoted in Coues' Fur-Bearing Animals, 1877, p. 109.

the mere sake of killing, and its entire existence is almost one continuous course of bloodshed.

Dr. Coues speaks thus of its general aspect: "A glance at the physiognomy of the Weasels would suffice to betray their character. The teeth are almost of the highest known raptorial character; the jaws are worked by enormous masses of muscles covering all the side of the skull. The forehead is low, and the nose is sharp; the eyes are small, penetrating, cunning, and glitter with an angry green light. There is something peculiar, moreover, in the way that this fierce face surmounts a body extraordinarily wiry, lithe, and muscular. It ends a remarkably long and slender neck in such a way that it may be held at a right angle with the axis of the latter. When the creature is glancing around, with the neck stretched up, and flat triangular head bent forward, swaying from one side to the other, we catch the likeness in a moment—it is the image of a serpent."*

The foregoing forcible picture fits the Weasel well when under conditions of excitement and anger; but there are times when its appearance in no wise suggests its sanguinary propensities. In certain states of pelage it is very beautiful, and when at rest a more innocent and harmless looking creature can hardly be found. On the approach of any of the animals that constitute its prey, however, its bearing is instantly changed, and its fiendish nature is soon revealed.

I once put a very large rat into a square tin cage with a Weasel of this species. The rat had been caught in a steel trap, by the toes of one of its hind feet, and was in no way injured. He was very ugly, biting fiercely at the trap and the stick with which I assisted him into the cage of the Weasel. No sooner had he entered the cage than his whole manner and bearing changed. He immediately assumed an attitude of abject terror, trembled from head to foot, and crawled into the nearest corner. The Weasel advanced toward

* Fur-bearing Animals, 1877, p. 129.

him at once, and as he did so the rat raised on his hind legs, letting his fore paws hang helplessly over his breast, and squealed piteously. Not only did he show no disposition to fight, but offered no resistance whatever, and did not even attempt to defend himself when molested. The Weasel did not seize him at first, but cuffed him with his fore paws and drove him from one corner of the cage to another, glaring at him continuously. Then, with a sudden move, he sprang upon his victim, already paralyzed with fear, laid open the back of his head with a single bite, ate the brains, and left the quivering carcass untouched.

The Ermine hunts both by day and by night, and climbs trees with great ease and celerity. I have often "treed" them myself by running after them in the woods, and have also seen them chase chipmunks up trees. Twice have I seen them run up the smooth trunks of the beech. They are not very timid and will allow a near approach before taking fright.

The much lamented Robert Kennicott, whose untimely death on the icy shores of the Yukon* deprived the world, prematurely, of one of her most indefatigable and conscientious naturalists, gave us such an interesting and truthful account of the habits of this species, that I take pleasure in reproducing brief portions of it here. He said: "A more fierce and cruel mammal does not exist in America than this little Weasel. The courage and sanguinary disposition of the panther are insignificant in comparison, having regard to the strength of the two. Without hesitation, the Weasel attacks animals five or ten times its own size; and, not content with killing enough for food, wantonly destroys whatever life it can, ... When a Weasel has gained access to a poultry-yard, it will frequently kill every fowl within its reach in a single visit. . . . Fortunately, however, this animal, even when abundant, does not enter the farm-yard so frequently as might be expected, appearing to prefer a free life in the woods to

* Mr. Kennicott died of heart disease, May 13, 1866, aged thirty. (Dall's Alaska, 1870, p. 70.)

easy but dangerous feasts on domestic fowls. . . . I have observed for several years the presence of a number of these Weasels in a grove near a farm-yard well stocked with poultry, which they never appeared to enter, though repeatedly visited by minks and skunks. Indeed, I am inclined to think that, notwithstanding their occasional predatory inroads, they should not be killed when living permanently about meadows or cultivated fields, at a distance from the poultry; for they are not less destructive to many of the farmer's enemies in the fields. Meadow-mice are certainly the greatest pests among mammals in northern Illinois; and of these the Weasel destroys great numbers. I am informed that, upon the appearance of a Weasel in the field, the army of mice of all kinds begins a precipitate retreat. A gentleman of Wisconsin related to me that, while following the plough, in spring, he noticed a Weasel with a mouse in its mouth, running past him. It entered a hollow log. He determined to watch further, if possible, the animal's movements, and presently saw it come out again, hunt about the roots of some stumps, dead trees, and log-heaps, and then enter a hole, from which a mouse ran out. But the Weasel had caught one, and carried it to the nest. Upon cutting open this log, five young Weasels were found, and the remains of a large number of mice, doubtless conveyed there as food. . . .

"Stacks and barnfuls of grain are often overrun with rats and mice; but let a Weasel take up his residence there and soon the pests will disappear. A Weasel will, occasionally, remain for some time in a barn, feeding on these vermin, without disturbing the fowls. But it is never safe to trust one near the poultry-yard, for, when once an attack is made, there is no limit to the destruction. When the animal has entered stacks or barns, it has the curious habit of collecting in a particular place the bodies of all the rats and mice it has slain; thus sometimes a pile of a hundred or more of their victims may be seen which have been killed in the course of two or three nights."*

* The Quadrupeds of Illinois injurious and beneficial to the Farmer. By Robert Kennicott. Report of the Commissioner of Patents for the year 1857, Agriculture, 1858, pp. 104–106.

And in another place Mr. Kennicott tells us that an Ermine "destroyed nearly fifty chickens, several of which were adults and many half grown, in a single night, and the early part of the following evening; and it was so bold as to kill several young chickens in a coop beside which a man was standing, watching for it. I finally shot it while it was running near me in pursuit of a chicken, though a few minutes before we had chased it into a retreat under a haystack. This extreme boldness could not have been the result of hunger, as it had already, during the same evening, killed a large number of fowls."*

Their nests are usually made in an old stump or log-heap, or under some outbuilding, and from four to six young are commonly brought forth early in May. The young are apt to remain during the summer in the vicinity of the nest.

The Ermine as a Ferret.

That the Ermine can be successfully employed as a Ferret is amply proven by the following narrative, from the pen of Dr. John Bachman: "Whilst residing in the State of New York many years ago, we were desirous of preserving a number of rabbits during the winter from the excessive cold and from the hands of the hunters, who killed so many that we feared the race would be nearly extirpated in our neighborhood; our design being to set them at liberty in the spring. At this period we had in confinement several Weasels of two species existing in that part of the country. . . .

"We bethought ourselves of using one of each species of these Weasels instead of a Ferret, to aid in taking the rabbits we wanted, and having provided ourselves with a man and a dog to hunt the rabbits to their holes, we took the Weasels in a small tin box with us, having first tied a small cord around their necks in such a manner as to prevent them from escaping, or remaining in the holes to eat the rabbits, whilst it could not slip and choke them.

* Ibid., 1858, p. 244.

"We soon raced a rabbit to its hole, . . ." and the Ermine "although we had captured the individual but a few days before, entered readily; but having his jaws at liberty, it killed the rabbit. Relinquishing the Weasel to our man, he afterwards filed its teeth down to prevent it from destroying the rabbits; and when thus rendered harmless, the Ermine pursued the rabbits to the bottom of their holes, and terrified them so that they instantly fled to the entrance and were taken alive in the hand; and although they sometimes scrambled up some distance in a hollow tree, their active and persevering little foe followed them, and instantly forced them down. In this manner the man procured twelve rabbits alive in the course of one morning, and more than fifty in about three weeks, when we requested him to desist."*

Concerning the Change in Color in the Ermine.

It is eminently proper that a subject which has attracted so much attention, and occasioned so much controversy, as the seasonal change in color in this and other species, should receive, in the present connection, the consideration that its importance demands. Audubon and Bachman, who observed the spring moult in an individual kept in confinement, give, with much detail, full notes (taken at the time) concerning the progress and nature of the change, as it advanced from day to day. The result of their observations is thus stated: "As far as our observations have enabled us to form an opinion on this subject, we have arrived at the conclusion, that the animal sheds its coat twice a year, *i. e.*, at the periods when these semi-annual changes take place. In autumn, the summer hair gradually and almost imperceptibly drops out, and is succeeded by a fresh coat of hair, which in the course of two or three weeks becomes pure white; while in the spring the animal undergoes its change from white to brown in consequence of shedding its winter coat, the new hairs then coming

* Quadrupeds of North America, Vol. I, 1846, pp. 177–178.

out brown."* On this point Dr. Coues writes as follows: "The question practically narrows to this: Is the change coincident with renewal of the coat, or is it independent of this, or may it occur in both ways? Specimens before me prove the last statement. Some among them, notably those taken in spring, show the long woolly white coat of winter in most places, and in others present patches—generally a streak along the back—of shorter, coarser, thinner hair, evidently of the new spring coat, wholly dark brown. Other specimens, notably autumnal ones, demonstrate the turning to white of existing hairs, these being white at the roots for a varying distance, and tipped with brown. These are simple facts not open to question. We may safely conclude that if the requisite temperature be experienced at the periods of renewal of the coat, the new hairs will come out of the opposite color; if not, they will appear of the same color, and afterwards change; that is, the change may or may not be coincident with shedding. That it ordinarily is not so coincident seems shown by the greater number of specimens in which we observe white hairs brown-tipped. As Mr. Bell contends, temperature is the immediate controlling agent. This is amply proven in the fact that the northern animals always change; that in those from intermediate latitudes the change is incomplete, while those from farther south do not change at all."†

Dr. Coues, it will be observed, states, without qualification, that "temperature is the immediate controlling agent" in this change of color, and remarks: "This is amply proven in the fact that the northern animals always change," etc. Now the facts with which I am familiar lead me to take a very different view of the case, and I am of opinion that temperature, *per se*, has very little to do, either with the time of the change, or the fact of the change; and in support of this view I adduce the following facts—and let it be understood that my observations pertain to the species as found in the

* Quadrupeds of North America, Vol. II, 1851, pp. 62–63.
† Fur-bearing Animals, 1877, p. 123.

Adirondack region only, for I have not seen it elsewhere during the transition. It has been my experience, and the experience of the many hunters and trappers that I have consulted on this point (an experience resulting from the examination of upwards of an hundred specimens caught at about the time of the first snow) that the Ermine never assumes the white coat till after the ground is covered with snow, which is generally late in October or early in November. It frequently happens that the temperature of the atmosphere is many degrees lower during the week or ten days preceding the first fall of snow than at, or immediately subsequent to, the time of its deposition. Notwithstanding these facts, it is equally true that Ermine caught up to the very day of the first appearance of snow bear no evidence of the impending change. Within forty-eight hours, however, after the occurrence of this snow-storm (provided enough has fallen to remain and cover the ground; and regardless of the temperature, which commonly rises several degrees soon after the storm sets in) the coat of the Ermine has already commenced to assume a pied and mottled appearance (often symmetrically marked and strikingly handsome), and the change now commenced progresses to its termination with great rapidity. In early spring, the period for the reversal of this process, the changing back from the white coat of winter to the brown summer coat is determined by the same cause—the presence or absence of snow.

It may be asked "what induces the change in individuals kept in confinement?" My reply is: *certainly not temperature*, for it has taken place when the animal was caged in a warm room, indoors. The transition is more tardy in confinement than in a state of nature, and may be coincident with the moult. In any case, we find the explanation of its occurrence in the inevitable influence of hereditary habit; and it is not rational to suppose that the temporary effect of different conditions of environment would, in a single season, nullify a tendency that is the outgrowth of causes that have been operating for ages to bring about and perpetuate certain fashions for the pro-

tection of the species. And this leads us to the consideration of of an important element in the discussion, to wit, the cause, or causes, which, acting through a long period of years, resulted in establishing this seasonal change in color. If the Ermine is the direct descendant of a dark-colored animal, and was, originally, an inhabitant of the temperate zone, it would have found, upon extending its range northward, and indeed, wherever snow covers the ground in winter, that its dark color, by rendering it conspicuous on the white surface, proved a disadvantage to it, both in the pursuit of its prey, and in the escape from its natural enemies. Therefore, by individual variation, and by the effect of light upon the snow, aided and directed by the laws of natural selection, it finally got to assume, during the winter season, a dress that is in harmony with the objects among which it moves—a garb well adapted for the maintenance and preservation of the species.

Mr. Bell's theory, that the object of the white color is, by retarding radiation, to increase the amount of heat retained by the animal, is not only inadequate to account for the facts in the case, but, it seems to me, arises from straining a point (and an imagination as well!) to invent an improbable hypothesis for the explanation of a phenomenon the rationale of which is almost self-evident. The cause cited must have played the part of a very subordinate factor.

PUTORIUS VISON (Brisson) Gapper.

Mink.

The Mink is a well-known and tolerably abundant inhabitant of this region, frequenting water-courses, and preying upon muskrats, rats, mice, birds and their eggs, fish, frogs, turtle's eggs, cray-fish, and fresh-water mussels. It occasionally enters the poultry-yard of the border farmer and thins out his stock of ducks and chickens. It also feeds upon the rabbit; and on the salt-water marshes of the South kills great numbers of the clapper rail and the sharp-tailed and seaside finches.

The Mink is an excellent example of an amphibious mammal, for it not only swims and dives with facility, but can remain long under water, and pursues and captures fish by following them under logs or other places from which there is not a free escape. It has thus been known to secure as swift and agile a fish as the brook-trout, and Audubon says that he has seen a Mink catch a trout upwards of a foot in length! It is remarkably strong for so small an animal, and a single one has been known to drag a mallard duck more than a mile, in order to get it to its hole, where its mate joined in the feast.

They are partially nocturnal, and hunt both at night and in broad daylight, like most of their tribe. I once saw three together on the banks of the outlet of Seventh Lake, and have many times met them singly about our water-courses, both in summer and in winter. They prowl about the lakes after nightfall and devour any fish that have been left on shore near the camps.

As an enemy to the farmer, in point of destructiveness in the poultry-yard, the Mink ranks next to the Ermine; and I sometimes incline to the opinion that, in the long run, more fowls and ducks are slain by him than by the last-named animal. He does not, it is true, make those occasional devastating raids, slaughtering everything that falls in his way, that constitute a chapter in the life-history of the Ermine, but takes one victim at a time, commonly devouring it before killing another. Still, the wholesale butchery sometimes carried on by the Ermine occurs at long and irregular intervals, whilst the depredations of the Mink are apt to be more frequent and continuous. Taking up his abode in, or in proximity to, the poultry-yard, or duck-pond, he is pretty sure to remain for weeks, helping himself, daily, to as many birds as his voracious appetite enables him to dispose of. His small size and partially nocturnal habits tend to conceal his movements, and the daily loss of a fowl is commonly laid at the door of the skunk, fox, or owl, long before the true marauder is suspected.

I find that many hunters and trappers believe that the Mink does not make long journeys, but remains in the vicinity of its nest, to

which it returns every twenty-four hours or thereabouts. My experience, in certain cases at least, proves the contrary. On the banks of a stream, along which I once had a line of traps, I noticed at intervals of two or three weeks, the tracks of an unusually large Mink. After a long while I succeeded in tracking him to an old bridge, in a pasture, and on lifting the planks at one end discovered his nest (or one of them). It consisted of a mass of dead leaves, a foot or more in thickness, well lined with feathers. Alongside it were the remains of a muskrat, a red squirrel, and a downy woodpecker, but the Mink was not there—he had gone on up the stream. Concealing a good Newhouse steel trap in the approach to his nest, I replaced the old planks and went away. This was about the middle of October. Two weeks passed without any indication of his return, but the time had arrived when he might be expected to "happen around" almost any day. I therefore made daily visits to the stream to search for his tracks, taking care to avoid the immediate neighborhood of the bridge. A heavy snow-storm now set in and next morning a foot of newly fallen snow covered the ground. During this storm the Mink returned and was caught. He was the largest and handsomest Mink I have ever seen, and I regret to have lost the record of his dimensions, taken at the time. Some idea, however, of his size and the quality of his fur may be had from the fact that his pelt sold for fourteen dollars.

This, and other more or less similar experiences, have convinced me that the Mink frequently, if not commonly, makes long excursions, like the Otter, following one water-course and then another, and returning over the same route; and I believe that they have a number of nests scattered at convenient intervals along these circuits. This habit may be confined to the old males, but whether it is so or not remains to be proven.

Concerning its manner and actions when caught we have the following graphic account from the facile pen of Dr. Coues: "One who has not taken a Mink in a steel trap can scarcely form an idea of the

terrible expression the animal's face assumes as the captor approaches. It has always struck me as the most nearly diabolical of anything in animal physiognomy. A sullen stare from the crouched, motionless form gives way to a new look of surprise and fear, accompanied with the most violent contortions of the body, with renewed champing of the iron, till breathless, with heaving flanks, and open mouth dribbling saliva, the animal settles again, and watches with a look of concentrated hatred, mingled with impotent rage and frightful despair. . . . As may well be supposed, the creature must not be incautiously dealt with when in such a frame of mind." *

When taken sufficiently young he is easily domesticated, and makes one of the very best of "ratters." He follows these common pests into their holes, and destroys large numbers of them. The remainder are so terrified that they leave the premises in great haste and are not apt soon to return.

The Mink carries a pair of anal glands that secrete a fluid of an extremely fetid and disgusting odor. It cannot be ejected to a distance, like that of the skunk, but is poured out under sexual excitement, and when the animal is enraged. It is commonly emitted when the beast is trapped, and sometimes becomes insufferably sickening while removing the skin. It is the most execrable smell with which my nostrils have as yet been offended, and is more powerful and offensive in some individuals than in others—the difference probably depending upon season and age. In one specimen the fetor was so intolerably rank and loathsome that I was unable to skin it at one sitting; and I am free to confess that it is one of the few substances, of animal, vegetable, or mineral origin, that has, on land or sea, rendered me aware of the existence of the abominable sensation called *nausea*.

The fur of the Mink being valuable, the species has been extensively trapped and is consequently not nearly so abundant here as formerly. It is prime early in November.

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* Fur-Bearing Animals, 1877, p. 176.

They rut during the latter part of February or early in March, and during this season their tracks may be seen everywhere—along rocky ridges, over high mountains, and in all sorts of places. Dr. Bachman tells us that at this time the Mink "seems to keep on foot all day as well as through the whole night," and says further: "Having for several days in succession observed a number of Minks on the ice hurrying up and down a mill-pond, where we had not observed any during a whole winter, we took a position near a place which we had seen them pass, in order to procure some of them.

"We shot six in the course of the morning, and ascertained that they were all large and old males. As we did not find a single female in a week, whilst we obtained a great number of males, we came to the conclusion that the females, during this period, remain in their burrows."*

From four to six young constitute an ordinary litter, and they are brought forth early in May. The nests are in burrows or hollow logs and are usually well-lined with feathers, and sometimes, it is said, with the fur of the female. The young follow the mother till the fall, and then generally disperse to look out for themselves.

The famous "*Minkery*" of Mr. H. Resseque, at Verona, Oneida County, New York, has afforded rare facilities for the study of the breeding habits of this species, and from the accounts of it that have been published in the Fanciers' Journal and Poultry Exchange, and Forest and Stream, and summarized by Dr. Coues, I quote the following: "At this time [early in March] the males fight desperately, and if not soon separated one always gets the mastery. . . . . The females reproduce when one year old. The duration of gestation scarcely varies twelve hours from six weeks. There is but one litter annually. The litters run from three to ten in number; the young are born blind, and remain so for five weeks. When newly born, they are light-colored, hairless, and about the size and shape of a little finger.

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*Quadrupeds of North America, vol. I, 1846, p. 258.

By the time the eyes are open, they are covered with a beautiful coat of glossy hair. The young females develop sooner than the males, attaining their stature in ten months, while the males are not full-grown until they are a year and a half old. It is noted that in every litter one or the other sex predominates in numbers, there being rarely half of them males and the other half females."*

Subfamily MEPHITINÆ.

MEPHITIS MEPHITICA (Shaw) Baird.

Skunk; Polecat; "Alaska Sable."

The Skunk is very common in the clearings and settled districts bordering this region, and is found, sparingly, throughout the Adirondacks.

He preys upon mice, salamanders, frogs, and the eggs of birds that nest on, or within reach from, the ground. At times he eats carrion, and if he chances to stumble upon a hen's nest the eggs are liable to suffer; and once in a while he acquires the evil habit of robbing the hen-roost. Still, as a rule, Skunks are not addicted to this vice, and it is with them very much as it is with dogs and cats; for every now and then a dog will get into the habit of killing sheep, and a cat of killing chickens and sucking eggs, and yet we do not wage a warfare of extermination against them, collectively, on account of the sins of a few of their number.

Of all our native mammals perhaps no one is so universally abused, and has so many unpleasant things said about it, as the innocent subject of the present biography; and yet no other species is half so valuable to the farmer. Pre-eminently an insect eater, he destroys more beetles, grasshoppers, and the like than all our other mammals together, and in addition to these devours vast numbers of mice.

He is not fond of extensive forests, but seeks the clearings and pastures that surround the habitations of man, and not infrequently

* Fur-bearing Animals, 1877, pp. 182–183.

takes up his abode under one of the outbuildings; or, retiring to a neighboring grove, may make his nest under an old stump, or dig a hole into some wooded knoll or side-hill hard by. Being loath to intrude the presence of man, he sleeps away the day, and at nightfall comes forth to wander through the garden, orchard, and meadow, to prey upon the insects that feast upon the product of man's toil.

He is of the greatest practical value to the hop-grower, for he frequents the hop-yard with great regularity, and greedily devours the insect pests that, from their numbers and destructiveness, always injure, and sometimes ruin the crop. Such is the extent and importance of the services rendered in this direction that, at a recent Session of our State Legislature, a bill was introduced for his protection. Indeed, the benefit that accrues to the farmer from the occupancy of his premises by a family of these useful animals can hardly be overestimated. They are large eaters and subsist almost exclusively upon his greatest enemies—insects and mice. Of the truth of this assertion he may easily convince himself by merely taking the trouble to examine any bit of "Skunk sign" that he happens to come across; for, in the summer season, their dejections consist wholly of the indigestible chitenous coverings of beetles, grasshoppers and other insects. The raids that some of their numbers occasionally make upon his poultry-yard are more than compensated for by the constant and unremitting services of the entire family in ridding his fields and garden of the vermin that destroy his crops. In fact, I do not hesitate to assert that a single Skunk nets the farmer more, in dollars and cents, each year, than he loses from their depredations during his entire life-time. And yet so short-sighted is he, that he rarely lets slip a chance to kill one; and were they more diurnal in habits their race would doubtless, ere now, be well-nigh exterminated.

Many of our mammals are noted for their beauty and attractive appearance, but amongst them it would be difficult to find a prettier beast than the Skunk. He was not built after the most graceful of patterns, to be sure, and it must be acknowledged that his

snout is strongly suggestive of the pig's; still, his *tout ensemble* is decidedly pleasing. There is nothing obscure in his color or markings. The handsome black body, the narrow white stripe running up the forehead, the clear white crown from which a broad band of the same color commonly extends down the nape, splitting into two as it passes along the back, contrasting handsomely with the glossy black of the surrounding fur, and the large, bushy tail, terminating in a tuft of creamy white, combine to produce an exterior of unusual attractiveness. His fur is long, thick, and glossy, and makes an elegant centre for a robe. During the past few years prime pelts (those lacking the white back stripes) have been largely employed in the manufacture of fine furs, and are sold under the *nom de guerre* of "Alaska Sable."

Excepting alone the weasels, the Skunk is the least wary, not only of the *Mustelidæ*, but of all our Carnivores. He is not suspicious, and may be taken in almost any kind of a device contrived for the purpose—box-traps, steel-traps, and dead-falls being most commonly employed in his destruction. To the trapper he often proves a source of great annoyance, by getting into toils set for the fox and other more valuable fur.

He does not evince that dread of man that is so manifest in the vast majority of our mammals, and when met during any of his circumambulations rarely thinks of running away. On the contrary, his curiosity is aroused, and he is full as apt to come towards one as to make off in the opposite direction. He is slow in movement and deliberate in action, and does not often hurry himself in whatever he does. His ordinary gait is a measured walk, but when pressed for time he breaks into a low, shuffling gallop. It is hard to intimidate a Skunk, but when once really frightened he manages to get over the ground at a very fair pace.

He is an inquisitive beast, and will often take much trouble to examine anything peculiar about the premises. One evening, while sitting near the open door of my museum, one came and peeped in

at me. As I remained motionless he climbed up and rested his fore-paws on the threshold, so near that I could easily have reached him with my hands. After carefully scrutinizing me with his keen, black eyes, he began to stamp and scold saucily, and then backed slowly off, keeping his eye on me all the while. Scarcely had he commenced this quasi-retreat, when he chanced to back into a beech-tree that stood near by. Evidently thinking that someone had attacked him from the rear (risky business!) he whirled about in a jiffy, with his tail up and hair on end, growling excitedly, and scampered away into the bushes.

Skunks are so slow to get out of the way that they are often run over by vehicles in the evening, and are liable, under such circumstances, to perfume the establishment unapproachably. I have had many such experiences.

When engaged in the nefarious business of plundering the poultry-yard (an iniquity to which he rarely descends) he makes no provision for escape, and, in the terse language of Dr. Coues, "even after discovery, the Skunk seems to forget the propriety of making off, and generally falls a victim to his lack of wit."

Skunks remain active throughout the greater part of the year, in this region, and hibernate only during the severest portion of the winter. They differ from most of our hibernating mammals in that the inactive period is, apparently, dependent solely upon the temperature; in this respect they resemble the gray squirrel. That the amount of snow has no influence upon their movements is evident from the fact that they are frequently out, in numbers, when its average depth exceeds a metre and a half (a trifle over five feet) on the level. Neither can it be a difference in food supply that affects them, for at this season they subsist almost wholly upon mice and shrews, and I have repeatedly noticed these little beasts scampering about on the crisp snow when the thermometer indicated a temperature below −30° C. (−20° F.) With us there is apt to be a month or six weeks of very cold weather in January or February, and

during its continuance I have never seen evidence of their presence; for it is at such times that they "den up." The length of time that they remain in their holes depends entirely upon the duration of the period of low temperature, and they are always out and active with the first thaws of March. The occurrence of a thaw, at any time, commonly brings them to the surface, but a recurrence of the severe cold suffices to drive them back to their burrows.

Skunks, particularly when young, make very pretty pets, being attractive in appearance, gentle in disposition, interesting in manners, and cleanly in habits—rare qualities indeed! They are playful, sometimes mischievous, and manifest considerable affection for those who have the care of them. I have had, at different times, ten live Skunks in confinement. They were all quite young, measuring from 100 to 150 mm. (approximately 4 to 7 in.) only, in length, when first taken. Some were dug out of their holes, and the rest caught in box traps. Two were so young that they could walk but a few steps at a time, and had to be brought up on milk, being fed with a spoon. The others ate meat and insects from the start. From some of them I removed the scent bags, but the greater number were left in a state of nature. None ever emitted any odor, although a couple of them, when half grown, used to assume a painfully suggestive attitude on the too-near approach of strangers—so suggestive, indeed, that their visitors commonly beat a hasty retreat. These same Skunks, when I came within reach, would climb up my legs and get into my arms. They liked to be caressed, and never offered to bite. Others that I have had did not show the aversion for strangers evinced by this pair, and I believe the difference to be due to the way in which they are brought up. If accustomed to the presence of a number of people they are familiar and friendly toward all; while if kept where they habitually see but one or two persons they will not permit a stranger to touch them.

Two summers ago I was the happy master of the cleverest young Skunk that I have thus far chanced to meet. For a name he receiv-

ed the title of his genus, and we called him "Meph." for short. By way of precaution I removed his scent sacs, and he made a rapid and complete recovery, after a few days of temporary indisposition. While driving about the country, in the performance of professional duties, he usually slept in my pocket. After supper I commonly took a walk, and he always followed, close at my heels. If I chanced to walk too fast for him, he would scold and stamp with his fore-feet, and if I persisted in keeping too far ahead, would turn about, disgusted, and make off in an opposite direction; but if I stopped and called him he would hurry along at a sort of ambling pace, and soon overtake me. He was particularly fond of ladies, and I think it was the dress that attracted him; but be this as it may he would invariably leave me to follow any lady that chanced to come near. We used to walk through the woods to a large meadow which abounded in grasshoppers. Here "Meph." would fairly revel in his favorite food, and it was rich sport to watch his manœuvres. When a grasshopper jumped he jumped, and I have seen him with as many as three in his mouth, and two under his fore-paws, at one time! He would eat so many that his over-distended little belly actually dragged upon the ground, and when so full that he could hold no more, would still catch and slay them. When so small that he could scarcely toddle about he never hesitated to tackle the large and powerful beetle known as the "horned bug," and got many smart nips for his audacity. But he was a courageous little fellow and it was not long before he learned to handle them with impunity, and it was very amusing to see him kill one. Ere many weeks he ventured to attack a mouse, and the ferocity displayed in its destruction was truly astonishing. He devoured the entire body of his victim, and growled and stamped his feet if anyone came near before the repast was over.

His nest was in a box near the foot of the stairs, and before he grew strong enough to climb out by himself he would, whenever he heard me coming, stand on his hind legs with his paws resting on the edge of the box, and beg to be carried up-stairs. If I passed by

without appearing to notice him he invariably became much enraged and chippered and scolded away at a great rate, stamping, meanwhile, most vehemently. He always liked to be carried up to my office, and as soon as strong enough, would climb up of his own accord. He was very sprightly and frolicsome, and used to hop about the floor and run from room to room in search of something to play with, and frequently amused himself by attempting to demolish my slippers. I have often given him a bit of old sponge, with a string attached, in order to keep him out of mischief. During the evening he occasionally assumed a cunning mood, and would steal softly up to my chair, and standing erect would claw at my pants once or twice, and then scamper off as fast as his little legs could carry him, evidently anxious to have me give chase. If I refused to follow, he was soon back, ready to try a new scheme to attract my attention.

I have heard many persons, who reside in the country, say that they had never seen a live Skunk. This must be because they are not much in the fields and groves at dawn of day, or dusk of evening, for at these times they are frequently seen. The farmer's boy, in going after his cows early every morning, meets plenty of them.

Skunks have large families, from six to ten young being commonly raised each season; and as a rule they all live in the same hole till the following spring. A steel trap, set at the mouth of this hole, will often capture the entire family, at the rate of one per night. In winter half a dozen or more may sometimes be taken in a single night, in the following manner: the hunter treads a narrow path in the snow, leading from the mouth of the hole away in the direction of some favorite resort and, at intervals along this path, the traps are set in the snow. At nightfall, when the Skunks come out, they march, single file, down the path, the mother usually taking the lead. The head one is generally caught in the first trap, and the others climb over the resulting obstruction and move on till a second is taken, and a third, and so on.

The flesh of the Skunk is white, tender and sweet, and is delicious eating. It is not unlike chicken, but is more delicate, and its taste is particularly agreeable. Being, happily, free from any of that "squeamishness" which Audubon and Bachman lament as preventing them from tasting the meat of this animal, I am able to speak on this point from ample personal experience—having eaten its flesh cooked in a variety of ways, boiled, broiled, roasted, fried, and fricasseed—and am prepared to assert that a more "toothsome bit" than a broiled Skunk is hard to get, and rarely finds its way to the table of the epicure.

The fore-feet of the Skunk are provided with long claws, which he employs in excavating his burrows and in digging after mice, which latter occupation consumes a large share of his time. He is also armed with a fine set of sharp teeth, that are capable of inflicting severe wounds; still, his chief weapon of defence lies in the secretion of a pair of anal glands, that lie on either side of the rectum, and are imbedded in a dense, gizzard-like mass of muscle which serves to compress them so forcibly that the contained fluid may be ejected to the distance of four or five metres (approximately 13 to 16½ feet). Each sac is furnished with a single duct that leads into a prominent nipple-like papilla that is capable of being protruded from the anus, and by means of which the direction of the jet is governed. The secretion is a clear limpid fluid of an amber or golden yellow color, has an intensely acid reaction, and, in the evening, is slightly luminous. On standing, in a bottle, a flocculent, whitish precipitate separates and falls to the bottom. The fluid sometimes shows a decided greenish cast, and it always possesses an odor that is characteristic, and in some respects unique. Its all-pervading, penetrating, and lasting properties are too well known to require more than passing comment. I have known the scent to become strikingly apparent in every part of a well-closed house, in winter, within five minutes' time after a Skunk had been killed at a distance of an hundred metres (about twenty rods)! The

odor generally remains noticeable for weeks, and sometimes for months, about the place where one has been killed. The condition of the atmosphere has much to do in determining this matter, for the more humid the air and the higher the temperature, the farther is the scent discernible, and the longer does it last. Under favorable conditions it is certainly distinctly recognizable at the distance of a mile, and DeKay quotes a statement from the Medical Repository that a Dr. Wiley, of Block Island, "distinctly perceived the smell of a Skunk, although the nearest land was twenty miles distant"!*

There is a marked difference in the intensity of the scent in different Skunks, and I am persuaded that it is due, chiefly, to the age of the animal whence it emanates. It is not impossible that there may also be a difference due to the length of time that the secretion has been retained, *i. e.*, that it is not so rank and overpowering when recently secreted as when there has been no discharge for some time—when it seems to have become concentrated.

When recently ejected the fumes from this liquid are overpoweringly pungent, and extremely irritating to the air passages; and, I have no doubt, are as capable of producing œdema of the glottis as the fumes from stronger ammonia. When inhaled without the admixture of a large amount of atmospheric air the unhappy victim loses consciousness and breathes stertorously, the temperature falls and the pulse slackens, and if the inhalation were prolonged the result would doubtless prove fatal.†

* Zoology of New York, Mammals, 1842, p. 30.

† In connection with the foregoing remarks, I introduce the following clipping, which has gone the rounds of the Medical press:

"Skunk Perfume as an Anæsthetic.—Dr. W. B. Conway (*Virginia Medical Monthly*, August, 1881) reports a case where roguish school-boys caused one of their number to inhale from a two-ounce phial an unknown quantity of Skunk perfume. The effects produced were total unconsciousness, muscular relaxation, a temperature of 94 and pulse of 65, together with cool extremities. The respiration and pupils were normal. The patient soon recovered under hot pediluvia and stimulants. The Skunk perfume is rather an unpleasant substance to experiment with, still, those endowed with anosmia might obtain results of value from similar experiments with it."

Dr. Conway (of Blacksburg, Va.) further stated that the patient "remained for one hour" in a state of "total unconsciousness." During that time the Doctor "admnistered small quantities of whiskey at short intervals," having "some difficulty in getting him to swallow. . . . He was finally aroused, suffering no inconvenience from its effects except a slight headache, which passed off after a good night's sleep." (Virg. Med. Month., Vol. VIII, No. 5, Aug., 1881, pp. 359–360.)

The evidence is pretty conclusive that the peculiar substance under consideration is an efficacious remedy in certain spasmodic affections of the air passages, such as asthma, hooping-cough, and spasmodic croup. It certainly deserves more extended trial, but, unfortunately, its offensive odor is a practical bar to its general employment. Still, to my nostrils, it is not half so disagreeable as many less wholesome smells. It is powerful, pungent, and penetrating, to be sure, but is not one-tenth part so disgustingly nauseating as the secretion from the corresponding glands of many other members of the *Mustelidæ*, and particularly of the mink and weasel.

If any of this acrid liquid finds its way into the eye it produces intense pain and sets up an acute conjunctivitis, which commonly runs its course in a week or ten days. I have myself met with this misfortune, but suffered no permanent injury therefrom. However, we have reliable accounts of the entire loss of vision from this cause, and it is reasonable to suppose that attendant circumstances would have much to do with the result.

The scent glands of the Skunk may be removed, bodily, without in any way affecting the health or happiness of the animal. The gizzard-like mass of muscle in which they are imbedded completely surrounds the gut, just at the outlet of the pelvis, and is attached to the tuberosities of the ischium. The chief danger attending the operation is the liability of wounding the rectum, or of creating so much irritation about it that the subsequent inflammation and cicatrization will result in stricture of that important viscus. Care must also be exercised in order to avoid wounding the genito-urinary passages. I have operated, with complete success, both with and without antiseptic precautions. A much simpler operation, where the end in view is merely to disarm the animal, is that performed by Dr. J. M. Warren, of Boston, in the year 1849.* It consists in making an incision through the skin, directly in front of the anus, and in snipping the ducts of the glands, at the bases of the nipple-like

* "Proceed. Bost. Soc. Nat. Hist., vol. III, p. 175, 1849."

papillæ which project into the gut, just within the sphincter. Adhesive inflammation follows and permanently occludes the ducts at the points of division. Therefore, although the glands themselves are left in situ, the animal is, forever after, incapable of ridding himself of their contents.

The Skunk is a sort of "little lord" of the domain over which he roams, for there are few enemies, save short-sighted man, that care to dispute his right of way. It is true that the wolf, fox, and great-horned owl occasionally dine upon his tender flesh, but the details of the struggle, inevitable to his capture, are not altogether pleasant; hence he is not often interfered with, and becomes as bold as he is abundant. Concerning his confidence in the efficacy of his overpowering weapon, and the effect of this assurance upon his disposition and habits, Dr. Coues makes the following pertinent remarks—condensing into one brief sentence thoughts that suggest whole chapters in the history of this interesting animal: "Its heedless familiarity, its temerity in pushing into places which other animals avoid as dangerous, and its indisposition to seek safety by hasty retreat, are evident results of its confidence in the extraordinary means of defence with which it is provided." And further on observes: "the abundance of the animal in most parts of the country, and its audacity in the face of danger, show that its confidence in the singular means of defence it possesses is not misplaced."*

Dr. Coues expresses the belief in which I cannot concur, that the scent of the Skunk is not only used as a means of defence, but also serves as a means or bringing these animals together—that they are attracted to one another by it—and goes on to say: "Burrows are sometimes found to contain as many as a dozen individuals, not members of one family, but various adult animals drawn together." Now, as previously stated, the Skunk is a very prolific animal, commonly bringing forth from six to ten at a birth, and these young, with their parents, remain in one hole for the ensuing year. Before the expira-

* Loc. cit., p. 215.

tion of this period the young Skunks have grown up and several of them, at least, have attained the full dimensions of their parents, so that it is impossible to distinguish between them except by a careful examination of their teeth and claws; and even these means sometimes fail, as when the parents themselves are but a year older than their offspring, and nothing short of a comparison of their skulls affords positive evidence of their ages. I have dwelt thus at length on this point in order to show how easy it is to be mistaken in the ages of Skunks after the first six or eight months, so rapidly do they attain their growth; and I have yet to see satisfactory evidence that more than two adult Skunks have been found in the same hole at any one time.

How to Kill a Skunk.

When we bear in mind that thousands of Skunks are slain each year for their fur, it is indeed surprising that so few hunters, trappers, and naturalists should know how to kill them, without provoking a discharge from their scent reservoirs. And yet there is a method, *safe, sure, and simple*, by which they may be killed without the emission of a single drop of the much dreaded secretion. This method depends upon the well-known physiological fact that an injury to the spinal cord produces immediate paralysis or loss of power of the muscles supplied by the nerves that are given off below the point of injury. Hence, loss of control over the posterior extremities (a condition technically known as *paraplegia*) may be produced, in any mammal, by a blow across the back that is sufficiently forcible to destroy the integrity of the cord opposite the injured point. The back must generally be broken to insure this result.

Therefore, to kill a Skunk without permitting the evacuation of its peculiar perfume, it is only necessary to deal it a smart rap across the back. If the animal is in a trap he should be approached slowly and cautiously, for, under these circumstances it is prudent not to be in too much of a hurry, and to avoid making sudden moves. If you go

too fast he will elevate his tail, present his rear, and assume an uncomfortably suspicious attitude. Give him a little time and he will about-face and peer at you again with his little keen black eyes. Now advance a little nearer and be sure of your aim; and when you strike, *strike hard*. The main thing is to keep cool and not strike too soon. On receiving the blow his hinder parts settle helplessly upon the ground, and the tail, which was carried high over the back, now straightens out behind, limp and powerless. As a rule the head soon droops and the animal expires. If he does not die directly he is easily dispatched, being effectually disarmed. The common causes of failure, in this mode of killing, are two: 1st, in using too long a pole, and consequently striking when so far off that the beast has time to jump forward (in attempting to dodge the blow) and is hit too far aft—often on the tail; and 2d, in not striking hard enough to break the back. When properly done this method never fails, and it is the safest, surest, and simplest way to kill a Skunk without occasioning a discharge from his battery. I speak with some confidence on this point, having myself killed upwards of an hundred Skunks in the manner above recommended. Out of this number were six failures, due to the causes above specified.

It has been asserted, on high authority, that if the Skunk is shot in a vital part he will die without discharging his scent. This is an error, as I have demonstrated repeatedly to my entire satisfaction. I have put the muzzle of my double-barrelled shot-gun within a foot from the head of a Skunk, that was in a steel-trap, and literally blown his whole head off; under similar circumstances have I tried the effect of both shot and ball upon his heart and lungs; and further, on one occasion, I severed the head from the body with one blow from a sharp axe, and in each instance was the death struggle accompanied by a discharge of the scent. These remarks may seem to conflict with the writings of Audubon and Bachman, who state: "We had one of their burrows opened to within a foot of the extremity, where the animals were huddled together. Placing ourselves a few yards

off, we suffered them successively to come out. As they slowly emerged and were walking off, they were killed with coarse shot aimed at the shoulders. In the course of half an hour, seven (the number contained in the burrow) were obtained; one only was offensive, and we were enabled without inconvenience to prepare six of them for specimens."* But it is explicitly mentioned that "they were killed with coarse shot aimed at the shoulders," and this fact explains why six out of seven did not smell, for some of the shot doubtless hit the cord.

Skunks caught in dead-falls rarely ever emit scent, and for the simple reason that their backs are broken and their hinder parts paralyzed.

A veteran fox trapper, Mr. C. L. Whitman, of Weston, Vermont, rids his traps of Skunks by slipping a wire noose over their heads and choking them to death. He claims that they rarely smell when thus dealt with.†

When caught in the vicinity of water, they are easily drowned, and when so treated never smell.

Some common fallacies concerning Skunks.

1st. What the Scent is.

It was for many years believed, even amongst naturalists, that the scent of the Skunk was its urine, and this belief is still widely prevalent with the masses of our population. The urine of the Skunk has no offensive or even characteristic odor, the scent being the secretion of a pair of highly developed and specialized anal glands, which have already been sufficiently described. (See p. 76.)

2d. How it is Scattered.

The vulgar notion that the Skunk scatters its scent with its tail was formerly so universal and wide spread that no less renowned a

* Quadrupeds of North America, vol. I, 1846, p. 324.

† Forest and Stream, Feb. 17, 1876. Quoted by Coues in Fur-bearing Animals, 1877, p. 217.

zoologist than the accurate and sagacious Dr. Richard Harlan was (mis-) led to write that these animals emit, "particularly when disturbed, a most nauseous, detestable odor, proceeding from the liquor of the anal glands, which they mix with the urine; with this fluid they wet the tail, and scatter it to a considerable distance."* No statement could have less foundation in fact. The Skunk is a very cleanly beast, and, when about to discharge his scent, arches his tail high over his back so that it may not be defiled by the fluid. The scent is thrown by the contraction of the thick muscular tunic in which the glands are imbedded

3d. When do they part with it?

It is commonly believed, by the community at large, that a Skunk is always ready to spatter anyone that chances to come within range. Nothing could be wider from the truth. A Skunk generally waits till he is hurt before discharging his battery, and I have more than once seen a dog get fairly hold of the beast before the emission occurred. Indeed, I have never known one to eject a single drop of the precious fluid except when hard pressed and very much excited—and it takes considerable to excite an adult Skunk. When caught in steel traps not more than one in twenty will smell, and the remaining nineteen suffer themselves to be tormented to an astonishing degree before "opening the valve." One may, with considerable confidence, approach one when in a trap, take hold of the chain, and drag the trap and contents to any convenient place, provided he goes slowly and makes no sudden move. Never but once has my confidence been betrayed while thus engaged. It was when attempting to drag a young Skunk out of its hole, into which it had retreated with the trap; and I was well sprinkled in the operation. These unsophisticated juveniles, when harassed, get excited far more easily than their parents, and sometimes "squirt" upon insufficient provocation.

* Fauna Americana, 1825, p. 69.

It is supposed by many that the Skunk empties his scent sacs at other times than during the excitement of danger; that it is done to attract the opposite sex, or for practice, or for some other reason than the annoyance of his enemy. This is contrary to my experience, and is also, I believe, at variance with the facts of the case, so far as known.

4th. Does one Discharge empty the Sacs?

It is frequently asserted, by those having little or no personal acquaintance with these animals, that the Skunk completely empties his scent reservoirs at the first discharge, and becomes, immediately thereafter, "as harmless as a cat." To such as entertain this opinion I extend a cordial invitation to accompany me to the presence of a Skunk, whom I will provoke to make several distinct and separate discharges, and will then step aside and be pleased to see them pick up the "harmless" animal!

5th. When held by the Tail, what?

I have been told, and have likewise seen the statement in print, that a Skunk, when held up by the tail, cannot eject his scent.

Having in early childhood been the unhappy victim to a sufficiently satisfactory demonstration to the contrary, I will relate the result of a somewhat humiliating experience, for the benefit of those who are in doubt on this point. It was in the fall of the year, and a light snow enabled me to track a Skunk to his hole in the woods, where I set a box trap, baited with meat. Next morning I found the trap sprung, but, hearing no noise within, opened the lid. Before I had time to see what was there my little dog rushed in, and as I reached out my arm to pull him back, I somehow got hold of the Skunk's tail by mistake. My chin dropped with astonishment as I held the affrighted beast up before me, and the dog seized him by the head. Scarce had I realized the peril of the situation when I was blinded and stifled by the terrible discharge, which hit me full in

the face, entering my gaping mouth and one of my eyes. Nearly suffocated by the overpowering stench, and screaming with pain, I rushed into the house, where, in the efforts to wash the fluid from my eye, my head was crowded into a pail of water, and I was well nigh drowned. I had read that a single drop of the secretion was sufficient to produce total blindness, and consequently expected nothing less than to lose the sight in this eye. The resulting inflammation, however, subsided in about a week, leaving no ill effect.*

6th. Skunk Bites and Hydrophobia.

Under this head I take the liberty to reproduce an article that I wrote for *Forest and Stream* in July, 1880:

"Ever since the Rev. Horace G. Hovey, M. A., took it upon himself to notify the civilized world (through the medium of the *American Journal of Science and Arts* for May, 1874, pp. 477–483) of the terrible consequences attending the bite of our common Skunk (*Mephitis mephitica*), the columns of your valuable paper, together with those of various other publications, have been much of the time pregnant with more or less extended remarks upon the subject.

"The Rev. Mr. Hovey announced that the bite of the Skunk was usually fatal, and produces in the human subject a peculiar kind of hydrophobia, which he named *Rabies Mephitica*. In the *New York Medical Record* for March 13, 1875, Dr. John S. Janeway, U. S. A., proves that the disease is nothing more nor less than ordinary hydrophobia as derived from the dog, cat, or other rabid animal.

"Dr. Elliott Coues deems the subject of sufficient importance to reproduce both articles (Rev. Hovey's and Dr. Janeway's), but

* Since penning the above I have again had the misfortune to get a charge of this fluid into one of my eyes. It was due to carelessness on my part, and occurred August 10, 1882, while removing the scent glands from a young Skunk. The contents of one of the sacs was suddenly and unexpectedly discharged, striking me full in the right eye. For a time the pain was intense, but I immediately and thoroughly washed out the fluid by pumping water into the open eye, and the conjunctival congestion that ensued subsided in a few hours. But in this case the fluid was not nearly so strong and irritating as that from the adult animal.

unfortunately without comment, in his most admirable and valuable monograph of our Fur-bearing Animals (pp. 223–235).

"Dr. Janeway states that the disease 'is evidently epidemical, no cases of it having been reported previous to 1870 in this region,' which is unquestionably the fact.

"Now it strikes me that there is a good deal of first-class 'poppycock' in the Rev. Mr. Hovey's article, and in most of the contributions that have appeared since

"Let us take a rational view of the case, and glance, for a moment, at the history of an average outbreak of hydrophobia. Here is a rabid dog. Before succumbing to the disease, or to the hand of man, he has probably bitten at least one or two other dogs or cats, which in their turn bite others, and so on, till the community becomes aroused; and scarcely enough of these animals are left to propagate their kind.

"Now, suppose a 'mad dog' should, in his wild delirium, chance to run across and bite a Skunk, and in a region where Skunks happened to abound, would not the natural result be that this Skunk would bite others and so communicate the disease to them, and they to others still, and so on till most of the Skunks of that neighborhood had been infected? During a certain stage of the disease, should any of these hydrophobic Skunks, by any accident fall in with a man sleeping on the ground, that man would certainly be very liable to be bitten, and if bitten, to die of this terrible malady. Exactly such a state of things, apparently, came to the notice of Mr. Hovey, who published the facts in the *American Journal of Science and Arts*, as above stated. But instead of confining his remarks to a simple, truthful narration of facts, he indulges in the wildest speculations and empty theories concerning the fatal nature of Skunk bites in the abstract.

"To suggest, as does the Rev. Hovey, that the bite of a healthy Skunk is followed by hydrophobia is, to speak mildly, the height of irrational nonsense. Equally insane is his idea that Skunks, in the

normal state, are aggressive animals and habitually bite those persons whom they find sleeping upon the ground. Indeed nothing could be more contrary to the known habits and disposition of these beautiful and useful little animals.

"As to the effect of Skunk bites in general I will only state my experience. Twelve or fifteen years ago, when hunting and trapping Skunks, I was twice bitten by adult animals and never suffered therefrom more than from equally severe bites from any other of our common mammals. About the same time Dr. C. L. Bagg was also bitten, but nevertheless he still lives and is practising medicine in New York City. Last summer I was again bitten by a Skunk—this time by a half-grown one that I had alive for several months—and have as yet experienced no evil consequences from the bite.[*] Our dogs have many times been bitten, and were never seriously injured thereby."†

Subfamily LUTRINÆ.

LUTRA CANADENSIS Turton.

Otter.

The Otter is a common inhabitant of the Adirondacks and, from the nature of its habits, and its sagacity, is likely to remain after most of the other representatives of the Mustelidæ have been exterminated. It is thoroughly amphibious, making long journeys through the forest, and swimming the lakes and rivers. It can remain under water almost as long as a Loon, and I have known one to swim nearly a quarter of a mile without showing its head above the surface. Its food consists chiefly of various species of fish, and the lobster-like fresh water Decapod called the cray-fish. When unable to procure these in sufficient quantity it devours frogs, and is said to depopulate

* While these pages have been passing through the press I have again been bitten by a half-grown Skunk. The bite was inflicted upon the end of my left thumb, and healed kindly in the course of three or four days, leaving no scar.

† Forest and Stream, Vol. XVI, No. 24, p. 473, July 14, 1881.

the poultry-yard, and even to prey upon young lambs. It can dive and swim under water with such speed and agility, that it can overtake and secure, with great ease and certainty, almost any of our fresh-water fishes. In confinement it will eat meat, and is said to prefer it boiled. The number of cray-fish (*Cambarus*) that the Otter destroys in the course of a summer is almost incredible. The Otter "sign" that one finds so abundantly about our lakes and streams, on rocks and logs, often consists wholly of fragments of the chitenous exoskeleton of this Crustacean. At other times fish bones are mingled with the broken cray-fish shells. Otters are restless creatures, always on the move, and are constantly roaming about from lake to lake, and river to river. They sometimes go from place to place "just as it happens," so to speak; while at other times they travel in definite routes, following one water course for a number of days or weeks, and returning by another. For example: an Otter will start from, say, Seventh Lake, and work down the Fulton Chain to Moose River, down Moose to Black River, and down this to the mouth of Independence or Beaver River; thence, turning up stream, it finds its way back along either of these rivers, perhaps stopping to fish in adjacent lakes on the way up, and finally crossing to Big Moose and thence back to the Fulton Chain. Or, starting from the same point, an Otter may leave the Fulton Chain near the foot of Fourth Lake, cross to North Branch of Moose River, thence to Big Moose, visiting the Saffords and West Pond on the way. From Big Moose it may work up into the big marsh and over to First and Second Gull Ponds, cross to Lake Terror and follow its outlet through Rose Pond to Beaver River, and down the latter to Black River, making the return trip up Independence to Big Moose, and across, by way of Constable Pond, May's Lake, and Queer Lake, to the Fulton Chain; or it may follow up Moose River directly to the Fulton Chain. These routes are not mere creations of my imagination, but have in great measure been verified by hunters who have followed their tracks on the snow. Otters travel great distances

in winter, and go so fast that a man has great difficulty in overtaking them. On the ice they proceed by a series of what small boys call "a run and a slide," that is, they make several jumps and then slide ahead, flat on their bellies, as far as their impetus and the smoothness of the ice permit, and then do the same thing over again, and so on. And this mode of progression suggests a curious trait in the character of the Otter, *i. e.*, its fondness for sliding down hill. Dr. John D. Godman, in his well-known work on "American Natural History," speaks thus of the habit: "Their favorite sport is sliding, and for this purpose in winter the highest ridge of snow is selected, to the top of which the Otters scramble, where, lying on the belly with the fore-feet bent backwards, they give themselves an impulse with their hind legs and swiftly glide head-foremost down the declivity, sometimes for a distance of twenty yards. This sport they continue apparently with the keenest enjoyment until fatigue or hunger induces them to desist." This statement accords with the observations of Cartwright, Hearne, Richardson, Audubon, and others, and the last-named author goes on to say that he once witnessed a pair of Otters engaged in this pastime, only they were sliding down a mud-bank instead of a snow-bank, and remarks: "we counted each one making twenty-two slides before we disturbed their sportive occupation." * The borders of the lakes and streams of the Adirondacks afford numerous examples of these slides, and also of their wallowing places, which are either level beds, or slight depressions, in which they play and roll. May's Lake, a small and secluded body of water, abounding in trout, is fairly surrounded by them.

On the morning of October 27, 1881, the Big Marsh at the head of Big Moose Lake was frozen over, with the exception of a narrow strip along its north shore. While working our boat up between the ice and the shore E. L. Sheppard and I noticed three Otters sporting in the open water ahead. They were diving and chasing one another after the manner of so many seals. Several times did they jump so

* Quadrupeds of North America, Vol. II, 1851, p. 8.

high that more than half the length of their bodies showed above the water. On firing at one of them all instantly disappeared; one stuck his head up through a hole in the ice to take a parting peep at us, and this was the last we saw of them. Otters are playful creatures and when taken young are easily domesticated, and have frequently been taught to catch fish for their masters. In growing old, however, they are apt to become ugly, and have been known to bite those who attempted to play with them. At all times and on all occasions they manifest an insatiate and uncontrollable desire to break the peace with any dog that chances to cross their path—and woe be to the unfortunate brute! Being compactly built and possessing great strength, and an immense store of endurance, they are quick in movement and make fierce and powerful assailants. Moreover, there is usually such a thick layer of fat under the skin that it slips freely upon the body and renders it well-nigh impossible for a dog to secure a firm hold on them. If the misunderstanding occurs in the vicinity of water, as it commonly does, there is a strong tendency for the participants to drift nearer and nearer the shore, for thitherward the Otter artfully draws his antagonist. I have never witnessed one of these little altercations, but am told that a drowned dog is generally the result.

Thomas Pennant, in his "Synopsis of Quadrupeds," published in 1771, says (p. 239) that the Otter "hunts its prey against the stream; frequents not only fresh waters, but sometimes preys in the sea; but not remote from shore: is a fierce animal; its bite hard and dangerous: is capable of being tamed, to follow its master like a dog, and even to fish for him, and return with its prey."

The fur of the Otter, which is more valuable than that of any other of our fur bearing animals, becomes prime in November, remains good throughout the winter, and is best in spring.

Their skins were formerly much employed by the Indians as material for their garments. In "Wassenaers Historie Van Europa," printed at Amsterdam, 1621–32, occurs the following: "The

Tribes are in the habit of clothing themselves with them; the fur or hair inside, the smooth side without, which, however, they paint so beautifully that, at a distance, it resembles lace. It is the opinion that they make use of the best for that purpose; what has poor fur they deem unsuitable for their clothing. When they bring their commodities to the Traders, and find they are desirous to buy them, they make so very little matter of it, that they at once rip up the skins they are clothed with and sell them as being the best."*

The nest of the Otter is generally placed under some shelving bank or uprooted tree, and has been found in a hollow stub. The young are commonly brought forth about the middle of April, and two (rarely one or three) constitute a litter. Three Otters, the female with her two young, are usually seen together during the summer and fall.

Family PROCYONIDÆ.

PROCYON LOTOR (Linn.) Storer.

Raccoon.

Raccoons are common everywhere about the borders of the Adirondacks, but they do not like dense evergreen forests and are therefore rather rare in the interior; still, they are occasionally met with in all parts of the Wilderness.

They are omnivorous beasts and feed upon mice, young birds, birds' eggs, turtles and their eggs, frogs, fish, cray-fish, mollusks, insects, nuts, fruits, corn, and sometimes poultry.

Excepting alone the bats and flying-squirrels, they are the most strictly nocturnal of all our mammals, and yet I have several times seen them abroad during cloudy days. They like to play in shallow water, along the banks of ponds and streams, and find much of their food in these places. They overturn stones and catch the cray-fish that lurk beneath, and also gather the fresh-water mussels (*Unio* and *Anodon*) that live on sandy and muddy bottoms. They also catch

* Translated in The Documentary Hist. of the State of New York, Vol. III, 1850, p. 36.

and devour the hapless fish that chance to get detained in any of the little pools along shore; but are unable to dive and pursue their prey under water, like the Otter and Mink. They are good swimmers and do not hesitate to cross rivers that lie in their path.

Although excellent climbers, making their nests in a hollow, high up in some large tree, they cannot be said to be arboreal in habits. They do not pursue their prey amongst the tree tops, after the manner of the martens, nor make a practice of gathering nuts from the branches, like squirrels; nor do they, like the porcupine, browse upon the green foliage. Trees constitute the homes in which they rest and bring forth their young, and to which they retreat when pursued by man or beast; but their business is transacted elsewhere. At nightfall they descend to the ground to prowl through groves, fields, and swamps, and follow streams and lake shores in search of food.

Their fondness for fresh corn has brought many a luckless 'Coon to an untimely end, for "'Coon hunting, by the light of the harvest moon," has long been a favorite sport. The method of procedure is simple: several men, with dogs, meet together, generally about midnight, near some maize field which is known to be frequented by these animals. If a Raccoon happens to be present he is soon treed by the dogs, and is either shot, or the tree upon which he hides is felled and he is destroyed by the dogs. An old 'Coon is a tough match for an average dog, and many a plucky cur bears lasting scars of their sharp teeth. The 'Coon first invades the corn fields while the tender kernels, not yet full grown, consist of a soft milky pulp, and he continues to feast upon the maize till fully ripe, and even after it is cut and stacked. He is very expert in breaking down the stalks and stripping the husks from the ear, using his fore-paws as we do our hands.

Raccoons are clever beasts, and in certain directions their cunning surpasses that of the fox. The familiar epithet, "a sly 'Coon," owes its origin to certain of their proclivities. Still they

do not exercise their cunning for self-preservation; they are not sufficiently suspicious of unusual objects, and are easily taken in almost any kind of a trap. They are not swift runners and if pursued take to a tree and are readily killed.

They make, when taken young, intelligent and interesting pets, being easily tamed, and evincing considerable affection for their master. But they cannot be allowed their liberty, like tame skunks, because of their innate propensity for mischief. If not closely watched they will slyly enter the house through some open door or window, and are liable to do considerable damage, for their natural curiosity prompts them to examine everything within reach, and anything out of reach of a 'Coon must be inaccessible indeed. They invariably manifest an insatiate desire to investigate the pantry shelves, and rarely neglect to taste every edible thing that happens to be there. They have a special *penchant* for sweetmeats and greedily devour preserves, honey, molasses, sugar, pies and cakes; and even bread, butter, lard, milk etc., are by no means disregarded. They remove the covers from jars and pails, and uncork bottles, with as much ease and facility, apparently, as if they had been instructed in this art from earliest infancy. Doors that latch, as they do in most old country houses, are soon opened, even by unsophisticated 'Coons, and it takes them but a short time to acquire the method of opening knob doors. Their fore paws are employed as hands, and can be put to almost as great a variety of uses as those of the monkey—which animal they further resemble in the propensity for mischief-making.

The Raccoon hibernates during the severest part of the winter, retiring to his nest rather early, and appearing again in February or March, according to the earliness or lateness of the season. Disliking to wade through deep snow he does not come out much till the alternate thawing and freezing of the surface, suggestive of coming spring, makes a crust upon which he can run with ease. He does not usually walk many miles during a single night, and consequently

is soon tracked to the tree, in some hole of which he has retired for the day. If the tree is too large to be easily felled, a trap set at its foot, and baited with a bit of toasted cod-fish or an ear of corn, is pretty sure to secure him before the next morning.

It is unusual to find a Raccoon alone, for they commonly live and travel in small companies, consisting of the several members of a single family. They do not return to the same nest every morning, but often make little excursions in various directions, being gone several days at a time, and taking refuge, about daylight, in any convenient aboreal shelter. Though preferring a hollow limb high up on some giant elm, ash, or basswood, they will put up with almost any kind of a hollow trunk. I have known them to spend the day in old stubs, in hollow logs, and even in the poor shelter afforded by the angle where a falling tree had lodged in a crotch.

In tracking Raccoons upon the crust I have sometimes observed a family to separate and go in different directions, spending the day in different trees, to come together again on the night following. At this season (before there is any bare ground) they have considerable difficulty in procuring sufficient food.

As already stated, the Raccoon makes its home high up in a hollow of some large tree, preferring a dead limb to the trunk itself. It does little in the way of constructing a nest, and from four to six young are commonly born at a time—generally early in April in this region. The young remain with the mother about a year.

The flesh of young 'Coons is very fair eating, but that of the adult animals is tough and rank, and suggests the meat of old Woodchucks.

More than an hundred years ago Thomas Pennant wrote, in his quaint style, that the Raccoon was "an animal easily made tame, very good-natured and sportive, but as unlucky as a monkey, almost always in motion; very inquisitive, examining everything with its paws; makes use of them as hands: sits up to eat: is extremely fond of sweet things, and strong liquors, and will get excessively drunk: has all the cunning of a fox: very destructive to poultry; but will eat

all sorts of fruits, green corn, &c. at low water feeds much on oysters, will watch their opening, and with its paw snatch out the fish; sometimes is caught in the shell, and kept there till drowned by the coming in of the tide: fond also of crabs: climbs very nimbly up trees: hunted for its skin; the fur next to that of the beaver, being excellent for making hats."*

Family URSIDÆ.

URSUS AMERICANUS Pallas.

Black Bear.

This plantigrade mammal, the largest and most powerful of the inhabitants of the Adirondacks, is still abundant in most parts of the Wilderness. His proper home is within the deep evergreen forests, but he is something of a rover and at certain seasons, particularly in autumn, makes numerous excursions into the surrounding country.

Notwithstanding the carnivorous position of the Bear he is *par excellence* an omnivorous beast, and his larder consists not only of mice and other small mammals, turtles, frogs, and fish; but also, and largely, of ants and their eggs, bees and their honey, cherries, blackberries, raspberries, blueberries and various other fruits, vegetables, and roots. He sometimes makes devastating raids upon the barn-yard, slaying and devouring sheep, calves, pigs, and poultry. In confinement he shares with the inmates of the hog-pen whatever is left from his master's table.

He delights in tearing open old stumps and logs in search of the ants that make their homes in such situations,† and digs out the nests of the "yellow-jackets," devouring both the wasps themselves and the comb containing their honey and grubs. So fond is he of honey that he never misses an opportunity to rob a "bee tree," manifesting

* Synopsis of Quadrupeds, 1771, pp. 199–200.

† While fishing in the North Bay of Big Moose Lake, during the summer of 1881, Mr. Harry Burrell Miller, of New York city, heard a Bear tearing down an old stump that stood on a point in the bay. His guide, Richard Crego, noiselessly paddled him to the spot and he killed the Bear with one ball from his rifle. Its stomach contained about a quart of ants and their eggs.

no fear of the bees that angrily swarm about him, his thick hair and tough hide protecting him from their stings. When plundering the apple orchard he is said to touch only the sweetest fruit.

He must relish prussic acid, for no article of his comprehensive bill-of-fare is more certain to secure his consideration than a tree laden with ripe black-cherries. Here he will spend hours at a time, glutting upon the handsome fruit, which he leisurely collects from the branches, and is apt to return again and again so long as the supply holds out. Fields of ripe blackberries also claim a large share of attention, and his excessive fondness for them often overcomes his natural prudence, and he is sometimes surprised, in broad daylight, indulging his appetite in such situations.

The senses of smell and hearing are so acute in these brutes that under ordinary circumstances it is impossible to approach even within rifle range of them. But in the fall of the year, during their expeditions through the clearings, they sometimes wander for miles through quite thickly settled portions of country, when, owing to the open nature of the ground, they are frequently seen and occasionally shot.

In Lewis County, about twenty miles west of the western border of the Wilderness, is an uninhabited tract of evergreen forest, covering portions of the towns of High Market, Osceola, Montague, and Pinckney. In this forest dwell many Bears, and in the fall they often cross over the intervening valley, a fertile farming country, and enter the Adirondacks. At such times they occasionally pass through our own grounds, at Locust Grove, in the town of Leyden; and during one October, about five years ago, no less than nine Bears were killed within six miles from my residence.

Though good climbers, Bears are unable, on account of their great weight, to ascend to the tree tops or climb far out on the branches. They are excellent swimmers, crossing with ease not only rivers, but even large and broad lakes. Many have been surprised and killed while swimming the lakes that abound in the "North Woods"; and only last year (in July, 1881) the steamer *Ganouskie*, on Lake

George, ran down one of them, and it was killed with an axe by a drummer from Gotham. This was just above Anthony's Nose.

As a rule our Bears "den up" in winter, but their hibernation is not profound, and it is prudent not to take many liberties with them when in this condition. The exact period when the event takes place is determined by the food supply and the severity of the season. If the beech-nut crop has been a failure and deep snows come early, they generally den near the commencement of winter. If, on the contrary, there has been a good yield of mast, and the winter is a mild one (and it is a fact that, with us, good beech-nut years are commonly followed by open winters), the males prowl about nearly, or quite, all winter, and the females only den a short time before the period of bringing forth their young. Indeed, it can be set down as a rule, that so long as a male Bear can find enough to eat he will not den, be the weather never so severe; for it is evident that he does not den to escape either the low temperature or the deep snows, but to thus bridge over a period when, if active, he would be unable to procure sufficient food. And the female, under similar circumstances, remains out till the maternal impulse prompts her to seek a shelter for her prospective offspring; and in this Wilderness they have been found travelling as late as the middle of January.

The den is not commonly much of an affair. It is generally a partial excavation under the upturned roots of a fallen tree, or under a pile of logs, with perhaps a few bushes and leaves scraped together by way of a bed, while to the first snow-storm is left the task of completing the roof and filling the remaining chinks. Not infrequently the den is a great hole or cave dug into the side of a knoll, and generally under some standing tree, whose roots serve as side posts to the entrance. The amount of labor bestowed upon it depends upon the length of time the Bear expects to hibernate. If the prospects point toward a severe winter and there is a scarcity of food, they den early and take pains to make a comfortable nest; but when they stay out late and then den in a hurry, they do not take

the trouble to fix up their nests at all. At such times they simply crawl into any convenient shelter, without gathering so much as a bunch of moss to soften their bed. Snow completes the covering, and as their breath condenses and freezes into it an icy wall begins to form, and increases in thickness and extent day by day till they are soon unable to escape, even if they would, and are obliged to wait in this icy cell till liberated by the sun in April or May.

The diminutive size, premature appearance, and helpless condition of the young of this species at birth cannot fail to excite surprise. They are not six inches (152 mm) in length, weigh less than a pound (453.6 grams), and are not yet covered with hair. Their eyes do not open for more than a month. I know of no other mammal, except among the Marsupials, whose young are so disproportionately small, or are born in such an undeveloped condition. It is necessary for their preservation that the mother should cover them nearly the whole time for the first two months.

Mr. Frank J. Thompson, Superintendent of the Zoological Garden at Cincinnati, has published a thoroughly trustworthy account of the early development of a litter of Black Bears, in confinement; and observations of this nature are so rare that I here reproduce the main part of his communication :

"About the middle of January last, the female Black Bear in the Society's collection refused to come out of her den into the open pit and would not allow the male to approach her. She was immediately closed in and furnished with an abundance of hay, with which she busied herself in making a nice warm bed. At 4 P. M. on January 26th, the young ones were born and I did not see them until the third day after, when I was surprised by the keeper informing me that she would allow him to enter the den. On going with him, he unlocked the door, fearlessly walked in, and quickly began feeding her with bits of bread, which he sliced from a loaf held in his hand. By holding the bread just over her head, he finally tempted her to sit up on her haunches, when I obtained a clear view of the two

young ones, lying asleep just back of her front paws. From where I stood, about six feet distant, they did not seem to exceed six inches in length, were a dirty whitish color, and appeared entirely bare of hair. In about ten days their coats began to show and were of a grayish tint, which gradually passed through the various shades until they became a brownish black. It was just forty days before the first one's eyes opened, and two days after the second followed suit. From that time forward I watched very closely to ascertain the exact time that would elapse before the young ones would leave the nest, and on the seventy-first day after birth, when the mother, as was her habit, came to the grating to be fed, one of the youngsters left the nest and followed her. So soon as she found it out she immediately drew it gently back, and on its second attempt, she cuffed it soundly, which put a stop to its wandering propensity. After a few days she allowed them to wander about at will provided no one was immediately in front of the den; but so soon as a visitor put in an appearance, they were driven back into the nest and not allowed to emerge until the strangers were out of sight. For some time she always suckled them in one position, lying over and completely covering them by stretching flat on her belly with her legs drawn up under her and her head tucked down between her front paws. As they grew older and began to run about she would sit on her haunches, lazily lean back against the wall, take a cub on each fore arm and hold them up to her breast until they were satisfied. They soon became expert climbers, taking advantage of the slightest inequalities of the stone walls and the cracks between the heavy oaken planks to reach the ceiling of the den on three sides, whilst the grating in front served capitally for their skylarking. Occasionally they would have a regular sparring bout, standing erect, feinting, countering, and making use of many of the tricks of old votaries of the P. R. These frolics would generally end in a clinch, fall, and a regular rough and tumble fight, when the mother would abruptly put a stop to it, by suddenly knocking both of the contestants completely

out of time. In fact, as they grew apace, the parental visitations increased so rapidly I began to fear she would put an end to my Bear investigations by chastising the lives out of them, but of late she has slackened in her attentions, and I am in hopes of following the growth of *Ursus Americanus* from babyhood to adolescence."*

Black Bears commonly have two or three cubs at a birth, and rarely, four. It is doubtful if they have young oftener than every other year.

Early in February, 1878, E. L. Sheppard, J. W. Shultz, and E. N. Arnold, while on a Panther hunt in the country northeast of Big Otter Lake, came across a line of dimples in the snow that indicated, to their practised eyes, the course taken by a large Bear some time before, and now almost hidden by a heavy fall of snow that had occurred about three weeks previously. Judging that the animal had been searching for winter quarters they determined to follow it; but being out of provisions Sheppard and Shultz returned to camp for a new supply, while Arnold took the track. Owing to the thickness of the forest the snow had not drifted and therefore he had little difficulty in keeping the track, though nearly a foot of snow covered it. He soon reached the den, which was an excavation in the side of a knoll. Not only was the Bear not asleep, but she was extremely lively and earnest in her attempts to get out. Fortunately, however, she was already frozen in, and during her fierce and furious efforts to reach Mr. Arnold he succeeded in shooting her dead. Notwithstanding the fact that he was well armed Mr. Arnold avers that if the Bear had had a free exit from her den he doubts much if he would have lived to narrate the occurrence. After killing the Bear he discovered that there were three living young beneath her in the den. He put them in his pocket, but they died that night. They were very small and helpless, and were probably about two weeks old.

In April of the same year one of the guides found another Bear in her den in a swamp south of Fourth Lake, Fulton Chain. This den,

* Forest and Stream, Vol. XIII, No. 4, Sept. 4, 1879, p. 605.

which I have myself seen, was also a hole dug into the side of a knoll, and its presence was betrayed by the young who were playing outside and did not know enough to hide away at the approach of man. In this case also the old Bear was unable to get out and was easily killed.

While hunting, June 10, 1878, Dr. C. L. Bagg and the writer followed the old trail from Fourth Lake across Eagle Creek in the direction of John's Lake. In exploring a hardwood ridge a little to the north of the regular course we were suddenly surprised by a loud and peculiar cry with which we were both unacquainted. It came from the direction of a dense balsam swamp below, and somewhat resembled the squealing of a pig, while at the same time it suggested the noise made by the Great Blue Heron when on its nesting grounds. As the cry was repeated Dr. Bagg imitated it, and succeeded so well that we soon perceived it to be coming nearer. Fearing that it might change its course I ran down the hill and soon saw a dark-colored animal, about the size of a Raccoon, emerge from the swamp and jump upon a log, rushing headlong in the direction towards Dr. Bagg, and squealing at brief intervals as if in great distress. Bringing my gun (loaded only with No. 4 shot) hastily to my shoulder I fired, and the report was followed by a shriek of pain and a plaintive, baby-like, sobbing cry that lasted for nearly a minute. On reaching the spot the animal was found to be a cub Bear, and was then quite dead, one of the shot having passed through both ventricles of the heart. It was very thin, weighing but ten pounds (4536 grams), and had evidently been lost from its mother for some time. Its stomach contained nothing but beech-nuts, and beech-nuts that have lain on the ground all winter, and are still fit to eat in June, are certainly few and far between.

In traversing unfrequented portions of the Wilderness one occasionally meets with a tree whose bark has been scratched and torn, at some little height from the ground, in a manner that cannot fail to excite his attention and surprise. This is the work of the Bear,

but the object of it is not known. Hunters claim that whenever a Bear passes one of these trees he stops, stands on his hind-legs and gnaws and scratches it before resuming his journey. The only account of the strange proceeding that I have seen is given by Audubon and Bachman, who state:

"At one season, the Bear may be seen examining the lower part of the trunk of a tree for several minutes with much attention, at the same time looking around and snuffing the air. It then rises on its hind-legs, approaches the trunk, embraces it with the fore-legs, and scratches the bark with its teeth and claws for several minutes in continuance. Its jaws clash against each other until a mass of foam runs down on both sides of the mouth. After this it continues its rambles."*

On the Island of Anticosti, Bears are still numerous, and feed so largely on fish that the inhabitants state that their flesh is, on this account, as unpalatable as that of the Sheldrake. During a recent visit to the west end of this island, I saw the spot, on the beach, where, three days previously, three full-grown Bears had been killed. It was at low water, and they were so busily engaged in capturing and devouring the little fish called Capelin (*Mallotus villosus*) that were detained in the shallow tide-pools on the flat lime-rock shore, that the fishermen approached unobserved and dispatched them without trouble.

Bears are great cowards and never attack man except when wounded, or in defence of their young. When wounded they make desperate and dangerous foes, and more than one hardy hunter has lost his life in encounters with them. In fighting, the large and powerful claws inflict even worse wounds than those made by their formidable teeth, and the bodies of their victims are often frightfully lacerated. If able to "close in" with the luckless hunter they stand upright and hug him tight with their fore-paws, while the hind-claws

* Quadrupeds of North America, Vol. III, 1854, p. 189.

are busy in tearing the flesh from his legs or ripping open his bowels.

Bears are frequently tamed and, being intelligent brutes, make interesting pets; but their dispositions are not of the gentlest type, and in growing old, they are apt, at times, to become obstinate and unruly, if not dangerous, and often have to be killed.

A curious instance of the mischief-making propensity of this animal has recently attracted considerable attention. During the past summer (1882) the Adirondack Survey established a Signal Station on Black Mountain, near the head of Fourth Lake. Returning one day, after a temporary absence, the members of the party were astonished to find their tent torn down, and blankets books, and instruments strewn about upon the ground. The footprints of a Bear revealed the identity of the marauder; and Mr. Colvin, Superintendent of the Survey, afterwards fired at and wounded the beast, but did not succeed in capturing him.

There being no bounty on Bears in New York State, it is impossible to ascertain how many are annually destroyed in this Wilderness. That the average number killed each year exceeds thirty there can be no reasonable doubt, and I have known this number to be killed in Lewis County alone in a single season.

Bear's meat is sometimes very good, and sometimes quite the reverse. I have eaten it when it tasted like fresh pork, and at other times when its flavor was so rank and disagreeable as to render it quite unpalatable. Age, sex, season, and food have to do with this difference.

In Forest and Stream for Dec. 26, 1878, is printed a portion of an original manuscript of one Paul Dudley, written about the year 1718. One paragraph, relating to this species, runs as follows:

"Black Bears—When the snow is deep they den, and don't come out till the snow is so wasted as they can trail their food—nuts, acorns, frogs, berries, crickets, grapes—and preys also. Don't carry food into their dens; generally den alone, unless it be a she with her

cubbs of the first year, sometimes in a Hollow Tree, a Hollow Log, under the Root of a Tree, cleft of a Rock. Dog scents them & Barks, then they come out. But if the snow be deep they won't stir. Kill them, nothing in their gutts but slime; they will put fire in the Hole of a Tree then the Bear will come Thundering out whether they are asleep or only mope, for they easily wake. Bear bring forth but once in 3 years. Suckle their young."

PINNIPEDIA. Family PHOCIDÆ.

PHOCA VITULINA Linnæus.

Harbor Seal.

Mention of the occurrence of a Seal, in a treatise upon the Fauna of the Adirondack region, will doubtless occasion surprise in the minds of the majority of my readers. It must be remembered, however, that the eastern limit of this area embraces a portion of Lake Champlain, and that the waters of this beautiful lake are put in direct communication with those of the St. Lawrence, below Montreal, by its outlet, the River Richelieu.

The Harbor Seal breeds regularly both in the Gulf and River of St. Lawrence, and I have seen numbers of them, in July, as far up the River as the Saguenay, and they are still common even within fifty miles of Quebec.

Zadock Thompson has recorded the capture of two of them on Lake Champlain. He says: "While several persons were skating upon the ice on Lake Champlain, a little south of Burlington, in February, 1810, they discovered a living seal in a wild state, which had found its way through a crack and was crawling upon the ice. They took off their skates, with which they attacked and killed it, and then drew it to the shore. It is said to have been $4\frac{1}{2}$ feet long. It must have reached our lake by way of the St. Lawrence and Richelieu;

but it was not ascertained whether the poor (fat) wanderer had lost his way, or having taken *a miff* at society, was seeking voluntary retirement from the world—*of seals.*" *

"Another Seal was killed upon the ice between Burlington and Port Kent, on the 23d of February, 1846. Mr. Tabor, of Keeseville, and Messrs. Morse and Field, of Peru, were crossing over in sleighs, when they discovered it crawling upon the ice, and, attacking it with the butt-end of their whips, they succeeded in killing it, and brought it on shore at Burlington, where it was purchased by Morton Cole, Esq., and presented to the University of Vermont, where its skin and skeleton are now preserved." † This is followed by a detailed description of this specimen, which was a female, and by the remark that "At the time the above-mentioned Seal was taken, the lake, with the exception of a few cracks, was entirely covered with ice."

During a recent visit to Lake Champlain I was told that a Seal had been killed on the ice, near Crown Point, within four or five years, but was unable to authenticate the statement.

Dr. DeKay mentioned the occasional occurrence of this species on Lake Ontario, many years ago; and during the past winter one was killed on Onondaga Lake that must have reached this remote inland water by way of Lake Ontario.

I have seen many of these Seals in Long Island Sound, chiefly about the Thimble Islands; and March 25, 1879, I saw one on a rock in the Hudson River, near Sing Sing.

We learn, from Mr. J. A. Allen's excellent "History of the North American Pinnipeds," that the period of gestation, in this restless nomad, is about nine months, and that commonly but a single young is born at a time, though they sometimes have twins.

They breed very late, generally in June and July, and their young are deposited upon the shore instead of upon the ice, as is customary with many species.

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

† Loc. cit., Appendix, 1853, p. 13.

This species, like most of the Seal kind, feeds chiefly upon fish, squids, shrimps, and the like. They sometimes prove a great nuisance to the fisherman, by robbing his nets of the salmon and other fish that they happen to contain. They have also been observed to catch sea birds while swimming by seizing them from below.

The Harbor Seal, when taken young, is easily domesticated, and soon becomes very tame and fond of its master. It is a very intelligent animal, and may be taught many things. It is said to be particularly fond of music.

Mr. Allen quotes the following from the pen of Dr. Edmonston: "The young ones are easily domesticated, and display a great deal of sagacity. One in particular became so tame that it lay along the fire among the dogs, bathed in the sea, and returned to the house, but having found the way to the byres, used to steal there unobserved and suck the cows."*

These Seals make a variety of noises. Their most characteristic cry is a sad, plaintive moan, or a prolonged, dismal howl. When a number unite, as is commonly the case, in a doleful chorus the effect is most depressing. Last summer (in July, 1882), when befogged off the Mingan Islands, I on several occasions observed this performance. It seemed like the lament of a doomed race, bewailing an inevitable fate, and bemoaning, in solemn requiem, the loss of former comrades.

This mournful cadence is usually executed in the night-time, and the darkness certainly does not detract from the general melancholy of the effect. The cold, bleak shores, too, lend an additional element of cheerlessness to the scene. However, it must be remembered that the deep-drawn sighs, the woe-begone moans, and the chorus that suggests a dirge, may all, for aught we know, be expressions of joy and contentment; for it is the impression produced upon us that is melancholy and sad. So little do we comprehend the language of our inferiors.

* Monograph of North American Pinnipeds, 1880, p. 594.

Is Not the Fish Crow

(*Corvus ossifragus* Wilson.)

A WINTER AS WELL AS A SUMMER RESIDENT AT THE NORTHERN LIMIT OF ITS RANGE?

BY

WILLIAM DUTCHER.

Read before the Linnæan Society of New York, January 14, 1882.

IS NOT THE FISH CROW (*Corvus ossifragus* Wilson) A WINTER AS WELL AS SUMMER RESIDENT AT THE NORTHERN LIMIT OF ITS RANGE?

THE above query presented itself to me, January 2, 1882, when I received a fine specimen of this bird from Mr. D. B. Keeler, Jr., of Rumsen's Neck, near Sandy Hook, N. J. It proved on dissection to be a female, whose stomach was filled with partially digested fish.

I presume that no one now questions the northern boundary of the habitat of the Fish Crow to be the upper New Jersey coast, Long Island, Lower Hudson Valley, and the coast line of Connecticut, with an occasional visitor to Massachusetts. I think that the records given by Messrs. Zerega, Roosevelt, Bicknell, and others, to which I will more particularly refer hereafter, establish this as a fact without doubt. It is only within a few years that this Crow has been positively credited to the localities above mentioned, although it may be that it was always as common with us as it is now, but that owing to the close resemblance to its larger brother (*C. frugivorus*), it escaped the observation of the earlier naturalists.

Until very recently all references to the Fish Crow at the northern limit of its habitat have been to the effect that it was there a summer resident only. This opinion has been so generally accepted that it is unnecessary here to bring forward any particular records. The

more recent records, on the other hand, I think establish it as a winter resident wherever it is found in the summer.

In the Bulletin of the Nuttall Ornithological Club, Vol. I, page 19, Mr. William Brewster reports having seen, March 16, 1875, a Fish Crow at Cambridge, Mass.

In the same, Vol. III, page 131, Mr Eugene P. Bicknell, in his article on "Evidences of the Carolinian Fauna in the Lower Hudson Valley," records a pair observed at Riverdale, New York city, on February 24, and after.[*]

In the same, Vol. IV, page 82, Prof. W. E. D. Scott, of Princeton College, in his "Late Fall and Winter Notes on some Birds observed in the vicinity of Princeton, N. J., 1878–79" says: "On January 21 I took a Fish Crow (*Corvus ossifragus*), and another on the following day, and saw many others flying about with the common species." He says further: "The preceding notes are not particularly remarkable except in the case of the Hermit Thrush and Fox Sparrow, both of which are, to say the least, very rare during so severe a season." Mr. Scott had been speaking of a number of birds and among others the Fish Crow, and the inference is very marked that he did not consider it (the Fish Crow) in the least a rare bird in winter, even though the winter was an exceptionally severe one.

In the same, Vol. V, page 205, Mr. Louis A. Zerega, in his "Notes on the Northern Range of the Fish Crow," says: "Mr. Theodore Roosevelt shot a male at Oyster Bay, Long Island, on December 30, 1874." . . . . "On the 17th of March, 1880, Mr. Keeler 'winged' a Fish Crow." In speaking of the semi-diurnal movements from the sleeping place in the woods to the feeding ground along the shores he says: "These flights do not occur during

[* Although it is not improbable that the Fish Crow may remain during winter in the Lower Hudson Valley, it is proper here to state that it has not actually been found at that season earlier than the time above indicated.

In this connection reference should not be omitted to Dr. E. A. Mearns' remarks on the Fish Crow, bringing its history as a bird of New York State up to a recent date.—See Bull. Essex Institute, Vol. XII, pp. 110–112.—Eds.]

summer, when Crows are decidedly scarce. In the winter and fall one sees immense numbers of Crows flying in the general course, but from May until September scarcely a dozen may be seen in a day." In his measurements of Seabright specimens he gives the following dates of capture : Nov. 15 (two specimens), Nov. 22, and Dec. 2, 1879; March 17, 1880.

We have above a complete *winter* record of the capture of this bird, and moreover Messrs. Scott and Zerega both say positively that it was plentiful at the time their observations were made.

Mr. Keeler tells me that he considers the Fish Crow a winter resident in the vicinity of Sandy Hook, N. J., in fact that he has no doubt about it whatever. He also stated that he could any day during the *winter* secure specimens. At the present time they are very plentiful. Of five Crows shot by him near his residence on the 2d of January, 1882, two were *C. ossifragus*.

In view of the evidence presented above, should we not hereafter class the Fish Crow, as a *permanent winter* resident in its northern habitat, instead of a *rare summer visitor*?

A Review of the Summer Birds

OF A PART OF

The Catskill Mountains,

WITH PREFATORY REMARKS ON

THE FAUNAL AND FLORAL FEATURES OF THE REGION.

BY

EUGENE PINTARD BICKNELL.

Read in part before the Linnæan Society of New York, February 11 and April 8, 1882.

A REVIEW OF THE SUMMER BIRDS OF A PART OF THE CATSKILL MOUNTAINS, WITH PREFATORY REMARKS ON THE FAUNAL AND FLORAL FEATURES OF THE REGION.

OUR present knowledge of the birds, if it cannot as truly be said the entire vertebrate fauna, of our great Appalachian chain of mountains, with the exception of a few limited sections, is virtually reducible to a recognition of the law of latitudinal equivalent in altitude obtaining in the distribution of terrestrial life, qualified by observations scanty and sporadic.

Notwithstanding the ease of access and popularity as summer resorts of many sections of this great mountain system, and its importance from a zoological standpoint, few parts of it are so satisfactorily treated in our ornithological literature as are portions of the distant ranges of the West. Until recently, it could not be said that we had anything at all comprehensive or authoritative pertaining to the birds of any part of this system, and the extent of our published knowledge of its ornithology could almost be summed up in the contents of a few isolated notes and of scanty facts scattered through biographical matter. Indeed the bird biographies of Wilson and Audubon furnish important facts relating to this subject which still remain without other authority.

It is this state of our knowledge which so urgently demands all facts in point, whether for actual increase or merely for verification,

that has called forth the present paper. No excuse need be offered for its manifest incompleteness, albeit it falls far short of a complete review of the summer birds of the region treated, and the subject of their environment is but cursorily entertained, for it is presented solely as the contribution to an important subject permitted by a transient experience in an unworked field. Moreover, completeness in delineating the more pronounced features of the avi-fauna of the defined region may be considered as reasonably attained; and a precise knowledge of salient faunal features, extended and applied, must yield a true conception of the broader principles of geographical distribution. Primary features rather than incidental details must bestow the character of all broad generalization.

Of the Alleghanian system in New York State the Adirondacks have received the most attention, and though we have as yet nothing full on the ornithology of this section, the recent preliminary papers of Dr. Merriam indicate that we have much to expect.

In connection with a knowledge of the avi-fauna of the Adirondacks, a knowledge of that of the Catskills, second in importance only to the former as a culminating point of the mountain system to which both pertain, in New York State, is highly desirable; and though we have had from Mr. John Burroughs some beautiful pen-pictures of the bird-life of this region, and the writings of this author* have much *passim* on the subject of its feathered inhabitants, other than this, and incidental allusions in published matter, a short note by Mr. T. M. Trippe,† is all I find applying directly to it.‡

The observations on which the present paper is based were made during brief explorations of the more southern Catskills in three suc-

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*It may here be stated that all references made in this paper to Mr. Burroughs' writings are to the volumes in which have been collected many of his essays which first appeared as magazine articles.

† American Naturalist, VI, 1, 47–48, January, 1872.

‡ A recent paper by the writer renders this statement hardly exact and may here be cited:

"A Sketch of the Home of *Hylocichla Alicie Bicknelli*, Ridgway, with some Critical Remarks on the Allies of this new Race." Bull. Nutt. Ornith. Club, VII, 3, 152–9, July, 1882.

cessive years: from June 6–15, 1880; 12–18, 1881; 24–27, 1882; on the latter occasion accompanied by Dr. A. K. Fisher, of Sing Sing, N. Y. Mr. R. F. Pearsall, of Brooklyn, also visited the same section of the region from May 30 to June 13, 1882, during this time confining his attention principally to the nidification of the birds, and has kindly permitted me the use of his notes. I have also had occasion to refer to notes taken by my brothers, Pierrepont C. and G. A. Bicknell, who at different times made trout-fishing and camping excursions into these mountains, always carefully noting observations on the birds.

On my first visit to the region head-quarters were made near Summit,* from whence exploration was conducted southward through the Big Indian Valley, over a distance of about twenty miles,—nearly to the southern terminus of the mountains; towards the northeast, about ten miles; and to lesser distances in other directions. On the subsequent visits, exploration was mainly confined to the region about the head of the Big Indian Valley and adjacent mountains, which my former trip had demonstrated to be an interesting section for that purpose.

The country here is very sparingly cultivated, and tilled ground is seen only as a necessary accessory to the dwellings of the settlers which extend interruptedly along the valley, becoming increasingly separated and of more primitive construction towards the remoter portions. Still farther beyond, and above, indications of the former presence of lumbermen, in natural sequence to an abandoned saw-mill in the valley below, remain along the rough mountain road; but up on the precipitous slopes, where the ancient forests of deciduous trees have repelled the devastating bark-peeler, Nature, too austere to re-

*This point is on the line of the Ulster and Delaware Railroad, about thirty miles west from the Hudson River; the altitude in the immediate vicinity varies from 1,500–1,600 feet in the valleys to 2,482 feet on the highest hill.

The altitudes and distances given in this paper are from, or approximated from, Prof. A. Guyot's "Map of the Catskill Mountains," 1880.

tain any impression of the chance explorer or, perhaps, never invaded by the foot of man, remains rugged and absolute as it came from the cosmic forces.

The entire region is decidedly mountainous, and traversed by numerous valleys, of greater or less extent, with their streams and brooks all swiftly flowing over rough and stony beds. The main water-course of that part of the region here considered is Esopus Creek, which, rising in one branch (Birch Creek) almost at a point of junction of three counties—Ulster, Delaware, and Greene—circuitously traverses the former towards the Hudson, which it finally reaches, after a journey of nearly sixty miles, at a point not thirty miles from its source.

The railroad follows the course of this stream on its track through the mountains, and that the birds have also taken advantage of this unobstructed way from the Hudson to the heart of the Catskills seems to be shown by the presence of several species along the valley, even far in the mountains, which were not noticed without its limits.

Extending from this valley, less than thirty miles from the Hudson, is the Big Indian Valley or Hollow, which passes irregularly southward with a gradually increasing elevation until dissipated in mountain passes, about eight miles from its entrance. Here it cradles the early flow of the main branch of Esopus Creek, guiding its rapid and increasing waters into more expansive course below.

The highest elevations in the Catskills are found among the mountains about this point, where are clustered several peaks closely approaching four thousand feet in altitude. Rising among these is Slide Mountain (4,205 feet), which has recently been ascertained to exceed in height all other peaks of the Catskill group, so that to this comparatively unknown mountain has now been awarded the palm which was long supposed to belong to others. Its name was evidently bestowed with reference to an extensive land slide which has bared its eastern slope, for a varying width of rods, from near the summit far down into a gorge, where, from above, its devastation becomes

lost to sight. The sandy and rocky surface of its course seems gradually becoming encroached upon by a sparse growth of small shrubs and plants from the mountain vegetation on either side, and with this was growing scattered clumps of a wood-rush (*Luzula parviflora* Desv.) not before, I think, reported from as far south. Here was found the only exposed ground met with at a high altitude, most of the mountains being well wooded, and lacking those more imposing features which are conferred by bold and rugged outlines and barren summits.

The mountains grouped about the Slide separate two very different water-sheds, and there are many streams of proximate sources, whose waters reach the Atlantic through no less separated outlets than Delaware and New York Bays. From a recent paper "On the Physical Geography and Hypsometry of the Catskill Mountain Region," by Arnold Guyot,* the following, relating to this subject and to Slide Mountain, may be transcribed :—

"The Slide Mountain, the culminating point of the Southern, and the highest of all the Catskills, is in many respects quite remarkable. It terminates abruptly on the northeast towards the deep valley of Woodland . . . From its broad triangular top it sends a ridge towards the southeast, which divides the waters of the Esopus from those of the Rondout, and terminates in the Lone Mountain 3670 feet, by which it is almost connected with the Wittemberg chain. Another high ridge descends towards the south and nearly reaches the high group of Table Mountain 3865 feet, and Peak-o'-Mouse [Peak-o'-Moose] 3875 feet, which separates the head-waters of the Rondout from those of the East branch of the Navesink. It thus becomes the main hydrographic centre of the region, sending its waters to the northwest by the Esopus; northeast to the same by the Woodland Creek; south by the Rondout to the Hudson; southwest by the Navesink to the Delaware."

Though an exploration of other peaks adjoining the Slide Mountain would have been of the highest interest, circumstances did not admit of its accomplishment, and, excepting that of the Slide Mountain itself, no summits much over 3,000 feet altitude were visited. The greater

* American Journal of Science, XIX, 114, 429–451, June, 1880.

part of the region traversed is in the southern Catskills, as defined by the authority already quoted, in the following words:—

"The mountain region is divided by the Esopus Creek into two groups differing considerably in their physical structure, one on the north, the northern or Catskills proper, situated mainly in Greene county; the other on the south, the southern Catskills or Shandaken Mountains, in Ulster county."

Of the geological origin of the region Mr. Guyot says:—

"The masses of rocks forming the Catskill Mountains were deposited in a gulf of the Devonian Sea comprised between the Adirondack plateau and the Green Mountain range, including the low Silurian ridges between the Hudson and the foot of the Catskills, all of which were probably emerged when the Devonian age began. Most of New England was also above the level of the ocean. The thickness of the sediments shows that the bottom of this gulf gradually subsided during that time to a depth of some 5000 feet, constantly making room for new deposits. The presence of the gray conglomerate capping the highest hills proves that the deposition of these sediments continued into the sub-carboniferous period, after which they were upheaved above the level of the ocean, before the deposit of the Coal-measures, and have remained emerged ever since."

A further quotation of some very pertinent remarks on the general character of the region may here be made:—

"In a former paper on the physical structure of the Appalachian system, I noted the fact that, though extending through the most populated and civilized part of the United States, that system of mountains was still among the least known of our country. This remark applies with double force to the Catskill Mountain region.

"Situated in the old and flourishing State of New York, only one hundred miles from its metropolis, in full sight and within a few miles of the great artery of travel, the Hudson River; visited every summer by thousands of tourists in search of the beauties of nature and of the cool air of its high valleys and plateaus, its real mountain region has been thus far almost a sealed book to the geographer and the geologist as well as to the transient visitor . . . . The whole region was originally an unbroken forest, and, with the exception of the bottom and slopes of a few valleys and of some portions of the northeastern plateaus, it has remained so to this day.

"The wilderness of the Adirondacks is more extensive but hardly more complete than that of the pathless forests of the Southern Catskills, the habitual haunts of numerous bears, wild-cats, and occasional panthers."

In connection with the summer birds of the region it will be profitable to consider briefly the general aspect of its Fauna and Flora, as exhibited by associated forms of life, so far as the result of limited observation will permit.

Necessarily so transient an acquaintance with the region as was experienced was insufficient to afford a clear idea of its Mammalian Fauna, so that few quadrupeds not of special faunal significance in the present connection will be alluded to.

One of the most interesting mammals encountered was the Porcupine (*Erethizon dorsatus*). The local distribution of this animal seemed to be but little influenced by altitude, and it was observed in the lower valley as well as at the mountain tops. On the occasion of my first visit several were met with about the summit of Slide Mountain, but the following year at the same spot none were to be found, and a necrology inscribed on a smooth log accounted for two victims, and was interpreted as a tale of the local disappearance of their race with the advent of thoughtless tourists. The next year, however, it was discovered not only that there were survivors, but that these were given to aggressive familiarity toward strangers. From evening till morning dusk our cabin on the extreme summit of the mountain was virtually besieged by them, and through the chinks their dark forms could be seen moving about among the shadows in the moonlight, while their sharp cries, and often low conversational chatter singularly like the voices of infants, were weird interruptions of the midnight silence, or later, of the moaning wind.

The seeming nocturnal temerity of these creatures appeared to be simply an exhibition of excessive stupidity. It was found impossible to drive them from the camp for any length of time; they seemed to be destitute of the faculty of memory, and even a light charge of shot sent among them was only for the moment effectual. Even when one particularly stupid individual had been shot dead in the doorway trying to effect an entrance by gnawing its way through a

gap, another, shortly after, continued the operation beside the lifeless body of its companion.

It seems probable that these singular rodents cannot long survive human settlement. Incapable of rapid motion they are easily approached, and their spiny armature, so potent a protection from their natural enemies, fails before the merciless power of man. In the isolation of the mountain top where we have just seen them, they appeared to be at a loss to understand the nature of their disturbers, and when met with showed little excitement, or anxiety to escape. Their greatest effort in this direction appeared to be leisurely shuffling out of the immediate way, often climbing with sluggish effort into a small balsam and composing themselves among the branches just out of easy reach.

An interesting interchange of animal forms between the highlands of this region and the lower country is remarked by Mr. Burroughs,* who speaks of the Little Gray Rabbit (*Lepus sylvaticus*) of the lowlands, being replaced by the Northern Hare (*Lepus Americanus*) on the mountains. The latter species, though long known to extend far southward in the Alleghanies, is characterized by the same writer as abundant in this section.† Testimony to the same effect was given by residents, and both species were said to occur together in certain parts of the valleys; but nothing further regarding them than the presence of both was determined by personal observation.

The most abundant animal appeared to be the Chipmunk (*Tamias striatus*) which was everywhere met with, even near the top of Slide Mountain. These little rodents probably constitute a large proportion of the prey of the rapacious birds inhabiting the region, which, however, do not appear to be many either in species or, excepting owls, in individuals. In a pellet of fur and bones from some bird of prey were the remains of one or more of these animals, and with them those of the Mole Shrew (*Blarina brevicauda*) were recognized by

* Wake Robin, ed. 1871, 42.

† Winter Sunshine, 1876, 65–66.

Dr. Fisher. Red Squirrels (*Sciurus Hudsonius*) were common, but the Gray Squirrel (*Sciurus Carolinensis*) was not observed. Inquiry elicited the information that it sparingly occurred on the mountains about the Big Indian Valley, and never in the black form, which, however, was common in an adjoining town. Bears were said to be common, and indications of their presence in "scratched trees" and torn ground were not infrequent.

A marked negative character in the Fauna and one bearing out its Canadian affinity is the scarcity of the *Testudinata*. In the case of certain aquatic turtles this is of course coincident with the scarcity of localities suited to their habits, but with the terrestrial species is undoubtedly the result of faunal restrictions. None, indeed, of the terrestrial forms were observed, nor could I learn of their presence, so that though the occurrence of at least one species is probable it certainly cannot be common.

Except in the case of a single species, a scarcity of *Ophidia* was also noticeable, and three serpents only were observed: the Striped Snake (*Eutænia sirtalis*), the Ring-necked Snake (*Diadophis punctatus*), and the Milk Snake (*Ophibolus doliatus triangulus*), and evidence gathered of the occurrence of one other. The former was the common serpent of the region and showed the impress of an environment diverse from that which dominates the species in the Lower Hudson Valley, in differences from the typical form there found which doubtless constitute the variety *ordinata*. Individuals, seen but not secured, at the highest altitudes at which the species was observed—about 3,000 feet—appeared to typically represent this race and were strikingly different from the striped forms, but others, captured in the valley, were less completely differentiated. A specimen of the Ring-necked Snake was found dead on June 12, 1880, containing five ova measuring .90 inches by .25–.30. This individual was of large size for the species, measuring eighteen and one-eighth inches in length. The residents were well acquainted with a "bright green" snake, without question *Liopeltis*. It was a common belief among

the inhabitants that Rattlesnakes do not occur where there is white ash timber, and I was assured that there were none nearer than Phœnicia, of about 800 feet elevation.

Of the *Batrachia* the following named species were observed :—

Rana clamitans Merrem.—Green Frog.

Rana Catesbiana Shaw.—Bull Frog; occurs about certain small lakes not distant from the Big Indian Valley, in which section it was not observed.

Rana temporaria sylvatica (Le Conte) Gthr.—Wood Frog.

Hyla Pickeringii Holbrook.—Hyla; Piping Tree Frog.

Bufo lentiginosus Americanus (Le Conte) Cope.—Common Toad.

Plethodon erythronotus (Green) Baird.—Red-backed Salamander.

Spelerpes bilineatus (Green) Baird.—Two-striped Salamander.

Spelerpes ruber (Daudin) Gray.—Red Triton or Salamander.

Desmognathus ochrophæa Cope.—Alleghany Mountain Salamander.*

In addition to these, *Amblystoma punctatum* (L.) Baird (Large Yellow-spotted Salamander) and *Diemyctylus miniatus* Raf. (Red Eft)† were brought by my brother (P. C. B.) from the same county.

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*The only common name that I have seen used for this Salmander, "Yellow Desmognath" (Jordan's Manual), it seems undesirable to perpetuate. The animal is *not yellow*, and there is no reason why the surnominal appellation should not conform with that of other members of the same genus. For these reasons I have taken the liberty of using a common name based on the very characteristic distribution of the animal.

† Although this species has been regarded as merely a variety, or state, of *D. viridescens*, and recently developed facts (See *American Naturalist*, XII, 6, 399) have been construed as proof of its identity with that species, it is perhaps yet too soon for a final decision in the premises. I am induced here to retain the forms as distinct, from the fact of having dredged an individual of *miniatus* from a pond containing abundance of *viridescens;* both animals under these common conditions remaining obviously different. The specimen referred to was taken from a depth of over two feet of water, and showed indications of activity of the procreative functions. The pond where it occurred was well shaded, with dark water and muddy bottom, and naturally the influence of these conditions was expressed in the color of the animal. This was unusually dull with little obvious reddish tinge, and a careless glance might have referred the specimen to *viridescens;* but a difference in the texture and appearance of the skin, and a slenderness and delicacy of general form at once proclaimed the difference, which comparison emphasized.

The notes of *Hyla versicolor* Le Conte (Common Tree Toad) were heard from the train on the way into the mountains, but this species appeared to be absent from the higher parts of the region.

Along the borders of Esopus Creek *Spelerpes bilineatus* was found to be common, and its larvæ were numerous among the stones at the shallow margin. One individual was taken at an elevation of nearly 2,700 feet. Extending to a still greater altitude—nearly or quite a thousand feet higher—occurred that high northwardly extending Salamander, *Plethodon erythronotus*, of which several specimens were unearthed. In one example the red color of the dorsal aspect was of a brighter and more pink shade than is common, and seemed to have burst out laterally from the conventional dorsal band, invading the dusky color of the sides, running out on the limbs and passing almost around the neck. That characteristic Alleghany Mountain Salamander, *Desmognathus ochrophæa*, was found in abundance near Pine Hill exhibiting great variation in color. In some fresh examples the yellowish-brown coloration of the upper surface had a peculiar satiny or metallic lustre, closely resembling the color of old gold. This same characteristic of coloration is often seen in *Spelerpes bilineatus*, rendering the singular general resemblance between these species still more close.

The mountain streams abounded with Brook Trout, but no other fish large enough to take the hook was noticed beyond, about, 1,600–1,700 feet elevation, though, as no special search was made, small species could easily have been and doubtless were overlooked. The little Black-nosed Dace (*Rhinichthys atronasus*) ascended however to about the elevation named, and several common fishes were reported from the stream in the main valley.

Although it was intended to limit this cursory survey of faunal characteristics to the vertebrates, we may pause for a brief glance at the Molluscous Fauna of the region, which differs strikingly from that of the Lower Hudson Valley at New York City. In general it may be said that the more conspicuous species of land-shells most

abundant in the mountains occur rarely, or not at all, in the latter section, and the converse is also, in a measure, true. Indeed, several genera, or subgenera, of each region are unrepresented in the other. Twenty-one species of land, and two of fresh-water mollusks which were collected, are named as follows by Mr. Henry Prime of Riverdale :

Macrocyclis concava Say,
Zonites fuliginosus Griff.,
" *ligerus* Say,
" *inornatus* Say,
" *arboreus* Say,
" *indentatus* Say,
" *minusculus* Binn. (?),*
" *Binneyanus* Morse,
" *exiguus* Stimpson,
" *fulvus* Drap.,
" *multidentatus* Binn.,
Patula alternata Say,
P. striatella Anth.,
Tebennophorus Carolinensis Bosc.,
Helicodiscus lineatus Say,
Pallifera dorsalis Binn.,
Stenotrema monodon Rack., and var. *fraterna*,
Mesodon albolabris Say,
" *dentifera* Binn.,
" *Sayii* Binn.,
Succinea obliqua Say,
Physa heterostropha Say,
Anodon Benedictii Lea.

This collection was made without systematic or extended search, and, though it is to be considered as reasonably representative of the immediate localities explored, must necessarily be too imperfect for a broader application.

Although justice cannot here be done to the Flora of the region it should not be passed over without some allusion to its decidedly Canadian characteristics. These, and the abrupt physiographical changes from contiguous regions which they represent, cannot be more clearly brought out than by comparison, and to this end the Flora of the vicinity of my own home at Riverdale-on-Hudson may be considered in counterview. The Flora of this section may be regarded as fairly representative of that of the Hudson Valley for some distance above New York City, and is far less southern in character than that of the coast region of New York and New Jersey,

* Specimen too fragmentary for positive identification.

not many miles below, where numerous species occur, many in abundance, which do not reach the Hudson Valley. Although many plants absent from this locality have been recorded from points at no great distance, the fact of their non-occurrence over a certain diversified tract shows them to be not of general distribution, and it would obviously tend to a false result to include other than well-represented species in a comparison of general features.

The deciduous forests of that section of the Catskills under consideration are largely composed of hard maple, beech, and birch; the oaks, hickories, and chestnuts of the lower country gradually disappearing with increasing elevation, a few stragglers only of some of these trees penetrating the region through the main valley, and none occurring in the mountain forests.

Whatever invasion there has been of the vegetation of the lower country into the mountains has without doubt been assisted by involuntary human agency, for the influence that has resulted in the introduction and naturalization of many foreign plants along the railroad and about the villages, and the effects of which are often recognized remote from human settlement, cannot have been inoperative with native vegetation.

The many familiar introduced plants abounding near the railroad, and in populated sections, affords a feature of correspondence with the Flora of the Lower Hudson Valley, but in ascending the secondary valleys, the true Flora of the region appears with gradually increasing purity, and in those portions remote from settlement, and in the mountains, the contrast between the vegetation of these adjoining districts is most striking. A more detailed comparison will show that this contrast is caused more by the absence in the vegetation of the mountains of genera and species which abound in the Hudson Valley, than by the addition of forms not found in the latter region. In the arboreous vegetation of the mountains the following genera of trees, which constitute the most conspicuous and important elements of the Hudson Valley woodland, are not represented: *Liriodendron*,

Liquidambar, *Nyssa*, *Sassafras*, *Celtis*, *Morus*, *Carya*, *Quercus*, *Castanea*, *Juniperus*, *Platanus*.* On the other hand, one of the most abundant and characteristic forest trees of the mountains, the Yellow Birch (*Betula lutea* Michx.), extends only as a chance straggler into the lower country. This species, however, among the deciduous trees, and the Balsam Fir and Black Spruce (*Abies balsamea* Marshall, and *A. nigra* Poir.) among the evergreens, were the only larger trees which the contrasted Flora does not also possess. Continuing the list of important absences from the mountain Flora, the following genera and species of smaller trees, shrubs, and woody plants may be mentioned: *Enonymus*, *Cornus florida* L., *Viburnum prunifolium* L. *Vaccinium vacillans* Sol., *Leucothoë*, *Andromeda ligustrina* Muhl., *Clethra*, *Azalea viscosa* L., *Lindera*, *Myrica*, and *Alnus serrulata* Ait.

Of the arborescent and woody vegetation of the mountains the following species I have never observed about Riverdale: *Acer Pennsylvanicum* L., and *A. spicatum* Lam., *Pyrus Americana* DeC., *Amelanchier Canadensis oligocarpa* Gray, *Ribes Cynosbati* L., *R. rotundifolium* Michx., *R. lacustre* Poir., *R. prostratum* L'Her., and *R. hirtellum* Michx., *Lonicera ciliata* Muhl., *Sambucus pubens* Michx. (occurs on Palisades in Lower Hudson Valley), *Viburnum nudum cassinoides* Gray, *V. opulus* L., *V. lantanoides* Michx., *Rhododendron maximum* L., *Ilex lævigata* Gray, *Corylus rostrata* Ait., *Taxus baccata Canadensis* Gray, *Nemopanthes Canadensis* DeC.

The foregoing comparison is, of course, merely a superficial one dealing only with more prominent species, and many other names might have been mentioned.

More than three hundred and twenty-five species of trees and plants, exclusive of Vascular Cryptogams, were observed during my stay in the mountains, and of these the names of some seventy-five do not appear on my records of the Riverdale Flora. Nearly fifty of the number mentioned, however, are not indigenous to the region,

* Representatives of the latter five were noticed sparingly in the main valley, but did not occur in the mountains.

and leaving these out of consideration, together with the species of *Cyperaceæ* and *Gramineæ*, for, at the time of my visits, owing to their immaturity, few but the most familiar species of these orders were to be recognized, we find nearly one-third of the indigenous Flora to be different from that of the region with which it is compared.

Reversing the comparison it appears that of over three hundred indigenous Phanerogams which, in the less elevated region, come into flower prior to the end of June, nearly two-thirds were not found in the Catskills. Not having visited any bodies of water in the latter region, restricted aquatic species have not been allowed to figure in the enumeration.

Among the characteristic plants of the Catskills, such northern species as most of the following occur, many in abundance : *Coptis trifolia* Salisb., *Actæa spicata rubra* Michx., *Dicentra Canadensis* DeC., *Arabis perfoliata* Lam , *Viola rotundifolia* Michx., and *V. Canadensis* L., *Claytonia Caroliniana* Michx., *Geranium Robertianum* L., *Impatiens pallida* Nutt., *Oxalis acetosella* L., *Geum rivale* L., *Fragaria Virginiana* Ehrhart, and *F. vesca* L., *Rubus odoratus* L., *R. triflorus* Rich., and *R. strigosus* Michx., *Tiarella cordifolia* L., *Mitella diphylla* L., *Circæa alpina* L., *Epilobium spicatum* Lam. (=*E. angustifolium* L.), *Archangelica atropurpurea* Hoffm.,—abundant along the railroad before entering the mountains; *Aralia racemosa* L., *A. hispida* Michx, *A. nudicaulis* L., and *A. quinquefolia* Gray, *Cornus Canadensis* L., *Lonicera ciliata* Muhl., *Diervilla trifida* Mœnch, *Galium lanceolatum* Torr., *Aster acuminatus* Michx., *Solidago thyrsoidea* E. Meyer, *Trientalis Americana* Pursh, *Veronica Americana* Schw., and *V. officinalis* L., *Polygonum cilinode* Michx., *Calla palustris* L., *Habenaria viridis bracteata* Reich., *Trillium erythrocarpum* Michx., *T. erectum* L., *Veratrum viride* Ait., *Streptopus amplexifolius* DeC., and *S. roseus* Michx., *Clintonia borealis* Raf., *Smilacena bifolia* Ker., *Luzula parviflora* Desv., *Carex vitilis* Fr., *C. Deweyana* Schw., *C. arctata* Boot, *C. plantaginea* Lam. and *Careyana* Torr., which are per-

haps closer than specifically related, *C. pallescens* L., and *C. scabrata* Schw., and *Poa alsodes* Gray.

Of twenty-seven species of Ferns (including *Ophioglossaceæ*) which were noted (a number of others have been reported from different localities in the Catskills) ten do not occur about Riverdale, and one, *Aspidium aculeatum Braunii* Koch, discovered in Greene County on June 14, 1880, in "Deep Hollow,"—a steep defile where the winter's ice was yet lingering in the recesses of the rocks,—although before found in the Catskills, has been reported farther south only from a single locality in the mountains of Pennsylvania.

Some plants find their extreme southern limit, so far as known, in these mountains, while others which assist in bearing out the northern aspect of its Flora are known to extend along the higher peaks of the Alleghanies into the Southern States.

In passing from the valleys into the mountains it was interesting to observe of plants of general distribution how much less advanced was their seasonal condition as the elevation increased. The extremes of this contrast, as shown by the vegetation at the summit of Slide Mountain and that of the valleys below, was most striking. Some species which in the valleys had ceased flowering and were bearing green fruit were still in full bloom at the mountain tops, while others in like condition in the valleys and on lower slopes, on the mountains had not advanced beyond their earliest buds. In the case of generally diffused species this retrogressive gradation in seasonal condition with increasing altitude was, of course, complete.

Professor Chas. H. Peck has somewhere recorded* the fact that many swamp-loving plants grow upon the higher mountains of the Adirondacks, the necessary condition of moisture being supplied by the frequent presence of clouds and the increased precipitation on the elevated summits. The same fact was observable in the Catskills,

* Since this was written I have received from Prof. Peck a paper entitled, "Plants of the summit of Mount Marcy," from the seventh report of the Adirondack survey by Verplanck Colvin, in which the facts here referred to are repeated, pp. 405–406.

and most strikingly illustrated by that well-known swamp plant, the White Hellebore (*Veratrum viride* Ait.). This plant was observed in low damp woods in the valleys, and along the streams, and again, nearing the summit of Slide Mountain where it was growing in some profusion. Close around the summit, too, were found, growing in abundance upon the carpeting of wet moss, plants which at a less elevation were rare or altogether absent, owing, obviously, to the scarcity of suitable swampy land. Thus, *Coptis trifolia*, which had not been noticed lower was abundant. *Viburnum cassinoides*, elsewhere met with only in a small marsh at an elevation of about 1,900 feet, here reappeared, as well as *Viola blanda* Willd., *Carex intumescens* Rudge, and other plants less distinctly confined to wet and marshy situations.

I am not aware that the fact of high mountain summits simulating the conditions of swampy lowland has ever been recognized as a factor of special influence in the distribution of vertebrate life; but it certainly appears to be thus resultant, at least in certain cases, with birds. Besides abundant moisture supplied by enveloping clouds and active precipitation, which completely saturates and is long retained by the deep beds of moss among the rocks, the analogy is further borne out by resemblances in the general character of the vegetation, especially as contrasted with the surroundings. Instancing the case of the summit of Slide Mountain, we see imitated not alone the conditions but also the general features of low marsh land. The largest trees are of very moderate size, and the prevailing growth is of Canada Balsams of most diverse age, stature, and vitality. In their exposed situation these trees, from a vigorous youth, seem rapidly to decline, retaining but a weak and precarious hold on life, and many have succumbed, gnarled and distorted from their struggles with the elements. Interspaces thus opened in the general growth admit the sunlight to an undergrowth of moss, ferns, mountain plants, and occasional shrubbery That conditions obtaining at high altitudes similiar to those of the mountain top now under con-

sideration are not without special influence on avian life can scarcely be doubted; and it seems highly probable that, in the case of several species found about the summit referred to, and not elsewhere in the same region, that their presence was due not alone to the altitude *per se* but also to the collateral conditions above depicted.

Passing up the mountain side few birds were observed, but when the high ridge leading to the summit was gained their numbers increased, and about the summit the following species were noted :

Olive-backed Thrush,
Bicknell's Thrush,
Hermit Thrush,
Winter Wren,
Black-capped Chickadee,
Canada Nuthatch,
Brown Creeper,
Yellow-rumped Warbler,
Black-and-yellow Warbler,
Black-poll Warbler,
Black-throated Green Warbler,
Mourning Warbler,
Purple Finch,
Red Crossbill,
Slate-colored Snowbird,
Blue Jay,
Yellow-bellied Flycatcher,
Hairy Woodpecker,
Red-tailed Hawk.

It seems strongly probable that the presence of some of these birds was governed, in a measure at least, by the dampness and humidity of the situation. From what is known of the breeding habits of the Black poll Warbler and the Yellow-bellied Flycatcher, it seems evident that low swampy situations are their favorite haunts during their season of reproduction; and it is probable that considerations of humidity in surroundings influence, in a greater or less degree, others of the species mentioned in the choice of a breeding resort.

That so many birds should have found their way to so remote and isolated a situation when it is not probable that all reached it by direct migration, is an interesting fact, and may for a moment be dwelt upon. In a recent paper by the writer* allusion is made to the gradual awakening of the birds at the top of Slide Mountain.

* Previously cited.

In watching, as there related, from the first ray of dawn on an elevated summit the effect of the gradually increasing light upon bird life, the thought is naturally suggested that, the light of morning reaching first the mountain tops thence gradually descending, not improbably exerts an influence in attracting avian-life to high summits; for at the early hour at which they stir, the birds, it would seem, must unconsciously be guided upward toward light rather than downward toward darkness.

The longer period of daylight, also, upon high as compared with lower elevations, furnishes another point of similarity between such situations and the northern habitats of those species which extend southward on mountain ranges.

This difference in the length of the period of daylight in valleys and on mountains is not improbably a cause of some variation in color of species inhabiting both situations; and from the known effect of the action of light on organic color, the varying period of light in different regions would seem properly to be a matter for consideration in connection with the subject of geographical variation of species, as well as their seasonal movements. In regions where occur great seasonal changes of light, there, also, take place the most complete seasonal color-changes in resident animals.

Before passing to a formal consideration of the birds of the region a few remarks upon the subject of its Avi-fauna in general will not be out of place.

Although along the more cultivated portions of the valleys the familiar birds were not different from those which abound at the same season in the valley of the lower Hudson, a marked difference in the Fauna resulted from the absence or rarity of many species common in the latter region. Aside from those southern species now well known to characterize the Fauna of the lower Hudson Valley, but which would obviously be excluded from this territory, there were absent other species, less definitely restricted in their northward range, as well as certain Alleghanian forms which, from the latitude

and moderate elevation, might reasonably be expected to occur. Though some of these deficiencies are doubtless, in part, due to causes other than those acting directly on the physical organization, they furnish the investigator entering the region the first insight into its true faunal character.

Passing along the Big Indian Valley, among the songs of the common birds along the way there were missed the notes of such familiar species as: the Brown Thrush, the Warbling, Yellow-throated, and White-eyed Vireos, the Chewink, the Meadow Lark, the Great-crested Flycatcher, and the Orioles and Cuckoos. Some of these species were sparingly represented in the main valley, but none appeared to regularly extend into the secondary valleys at this portion of the region. Other familiar species, of which mention is made beyond, although somewhat generally distributed were not abundant and were rather restricted in their local distribution. Of the familiar birds, one only, the Cliff Swallow, seemed to be more abundant than in the region with which I have compared this. This bird, from its numbers and domestic habits, was conspicuous and well-known all along the valley, and far outnumbered the Barn Swallow, the only other species which occurred.

Another feature to be noticed in this hasty comparison was a local variation in the habits of some of the birds between this and other, more settled, districts. Certain species which, closer to civilization, are more or less familiar and confiding in disposition, often making their abode in the close vicinity of man, here were rarely found about human habitation, although well represented in the wilder portions of the valleys or even in the mountains. This was very noticeable in the cases of the Wood Thrush, Scarlet Tanager, and Golden-crowned Thrush; and less so with the House Wren, Purple Finch, Least Flycatcher, and other species. In the case of the Wood Thrush these habits seemed to be quite general throughout, but with most of the other species appeared to be more or less local, seeming to be directly dependent on the extent of settlement. Thus about the vil-

lages of Pine Hill and Big Indian, some of the named species were somewhat common and familiar, while in the main valley where the settlers' cottages were few and scattered their habits were as above indicated.

These facts seem to show a tendency toward primitive habits so long as the original and natural predominate over the artificial in surroundings, and the adoption of artificial habits (if the term may be employed) when similiar conditions prevail.

Ere proceeding with the individual treatment of the birds observed it may be well to glance at the character of the lowland between the mountains and the Hudson, at the same time remembering that along the valley of this river, not many miles farther down, occur, as regular and, in most cases, common summer residents, such species among the land birds as: the Worm-eating, Blue-winged Yellow, Golden-winged, and Hooded Warblers (*Helminthotherus vermivorous*, *Helminthophila pinus*, *H. chrysoptera*, and *Myiodioctes mitratus*), the Yellow-breasted Chat (*Icteria virens*), the Large-billed Water Thrush (*Siurus motacilla*), the Rough-winged Swallow (*Stelgidopteryx serripennis*), and, less commonly, other species of limited northward range.*

In correspondence from Mr. John Burroughs, the following species are given as occurring at Esopus-on-Hudson, but not inland among the mountains :—

White-eyed Vireo (*Vireo Noveboracensis*). Common.
Fish Crow (*Corvus maritimus*).† Common; breeds.
Chewink (*Pipilo erythrophthalmus*). Common.
Great Crested Flycatcher (*Myiarchus crinitus*). Breeds.
Orchard Oriole (*Icterus spurius*). Breeds.
Mourning Dove (*Zenaidura Carolinensis*). Common.

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* See "A List of the Birds of Hudson Highlands," by E. A. Mearns (Bulletin Essex Institute, vols. X–XIII).

† The Fish Crow has not before been reported from so far north in this State, and in reply to inquiries concerning its occurrence, Mr. Burroughs sent me the following particulars: "The Fish Crow

Mr. Trippes' note, already referred to, on "Birds found breeding in the Catskills," makes mention of the following species, all of which are further considered beyond: *Regulus satrapa* (Golden-crested Kinglet), *Sitta Canadensis* (Canada Nuthatch), *Anothura ' hyemalis* (Winter Wren), *Dendræca Canadensis = D. cærulescens* (Black-throated Blue Warbler), *Dendræca coronata* (Yellow-rumped Warbler), *Dendræca virens* (Black-throated Green Warbler), *Junco hyemalis* (Slate-colored Snowbird).

The wide faunal diversity between continuate regions indicated in the above comparison of characteristic birds, is called for by the complete and abrupt physiographical changes which give rise to the Catskill range, the eastern end of which "stands isolated on three sides by deep and broadly open valleys, as a mighty promontory, to within ten miles of tide water in the Hudson River."

How far southward the Fauna of the Alleghany range preserves the Canadian characteristics possessed in the Catskills, and under what restrictions and modifications, is an interesting question; but the reply is not yet, although scattered notices of the occurrence in summer and, in some cases, the breeding of birds southward of their usual range, in the Alleghanies, allow an insight into what it will be.

Apropos to this subject are some remarks by Professor E. D. Cope in a paper entitled "Observations on the Fauna of the Southern Alleghanies":*

"In Giles County, E. Virginia, at an elevation of five thousand feet, I observed in August, 1867, the following species of birds: *Junco hyemalis*, *Dendræca icterocephala* [= *D. Pennsylvanica*] *D. Blackburniæ*, *D. cærulescens*, *D. maculosa*, *D. virens*, *Myiodioctes Canadensis*, *M. mitratus* [sic], *Parula Americana*, *Mniotilta varia*,

is common here [Esopus] and annoys me much by robbing birds' nests. Last summer [1881] a pair built their nest in a Norway spruce that stands in a thick grove near a gentleman's country house adjoining my place." I am myself almost positive of having seen one of these Crows, in June, near Rondout, perched upon a spile far out in the here shallow river; and also feel almost satisfied that, on different occasions, I have seen the Rough-winged Swallow at the same locality, where undoubtedly it occurs.

* American Naturalist, IV, 7, 395–399, September, 1870.

Setophaga ruticilla. From the season at which these were observed, they evidently bred in the locality in question. They were most of them abundant.

"In the high valley of Henderson County, and on the Black, Rich, and other mountains in southern North Carolina, in September, 1869, I observed the following: *Junco hyemalis*, *Vireo solitarius*, *Dendræca coronata*, *D. maculosa*, *D. virens*, *D. cærulescens*, *D. Blackburniæ*, *Parula Americana*, *Mniotilta varia*, *Myiodioctes mitratus*, *Setophaga ruticilla*. These were also abundant, and no doubt bred in the localities in question."

Of the species mentioned of any direct value to the present consideration, the only one which has actually been ascertained to breed with regularity in the southern Alleghanies is the Slate-colored Snowbird. Although it is very probable that with this species are associated in the breeding season most of the others mentioned, the evidence quoted is hardly sufficient to establish this. Again accepting the Snowbird and, of the latter enumeration, the Blue-Headed Vireo and Yellow-rumped Warbler in addition, all the species mentioned,—contrary to what most published records of migrations would lead us to suppose, but which data is at hand abundantly to prove,—enter upon their southward migration in August, most of them, indeed, so early as the middle of that month; therefore, the fact of the occurrence of any of these birds in the late summer or early autumn in the southern Alleghanies is by no means conclusive evidence that they have bred there.

Most of the birds referred to, however, have been recorded as breeding in southern Pennsylvania, although the fact appears to have been very generally overlooked. In the Bairds' "List of Birds found in the vicinity of Carlisle, Cumberland County, Penn., . . . "* the following named species, of interest to the present consideration,

* Sillim. Am. Journ., XVI, 1844, 261–273.

are marked as breeding :—

Sylvicola pardalina Bon.	=	*Myiodioctes Canadensis* Aud.
" *virens* Lath.	=	*Dendræca virens* Baird.
" *Blackburnia* Lath.	=	" *Blackburniæ* Baird.
" *icterocephala* Lath.	=	" *Pennsylvanica* Baird.
" *Canadensis* Lath.	=	" *cærulescens* Baird.
Vireo solitarius Vieill.		
Picus varius L.	=	*Sphyropicus varius* Baird.

A distinct Canadian element in the Fauna of the south Pennsylvanian Alleghanies is thus shown.

The facts hereinbefore narrated regarding the animal and vegetable life of the Catskill Mountain region are sufficient for a tolerably full understanding of the faunal character of this geographical tract. Considered in its entirety, the region, though of limited extent, cannot be said to pertain exclusively to any minor Faunal Province,—the totality of its life cannot be summed up in a single abstract term expressive of a distinct zoö-geographical relation. Between the Hudson River and the mountainous parts of the region, where we can recognize the influence of three distinct Faunæ, one only can be considered to prevail in its integrity at any single point. This is the Alleghanian, and extends over all the less elevated country. In the lowland along the Hudson it is perceptibly modified by a southern element introduced with certain species which extend up from the lower part of the valley of that river where the influence of the Carolinian Fauna is so strongly impressed, but passing inland this Carolinian affinity is gradually lost, the Alleghanian Fauna, true and untainted, succeeding, spreading over the greater part of the region and passing into and up the valleys in its invasion of the mountainous sections, but in its turn gradually giving way to a still more northern Fauna,—the Canadian; it is not, however, before the high mountain elevations are gained that this Fauna has completely succeeded and all traces of the Alleghanian, as such, are obliterated. But even at the highest altitudes the Canadian Fauna, although taintlessly, is not fully represented, for some of the most character-

istic Canadian birds undoubtedly never occur. But these are non-migratory species, and it becomes plain, with this fact in view, that the limited extent and isolation of the Catskill region renders their absence in the face of favorable conditions easily explicable. The higher mountain Fauna of the Catskills may therefore be regarded as purely Canadian in character.

Between those altitudes where these simplified faunal conditions prevail and the lower valleys, we may trace the two approximating Faunæ in every degree of union. The result is that we find species of totally different distributional relationship occupying the same ground. This is easily illustrated: While such species as the Winter Wren, Black-throated Blue, Black-and-Yellow, Mourning, and Canadian Fly-catching Warblers, Blue-headed Vireo, and Slate-colored Snowbird, occur certainly as low down as 1,500–1,600 feet, species of much more southern distribution, as the Chewink, Field Sparrow, House Wren, Wood Thrush, Indigo Bird, Large-billed Water Thrush, and Bluebird (named approximately in the order of their altitudinal limitation from below upward) extend to an altitude of from 2,000 to perhaps 2,500 feet.

Further details regarding the local distribution of species appears in the following review of the birds, in which, with respect to a very limited portion (already defined, page 117) of the great Appalachian Mountain system, the facts regarding the summer Avi fauna will, so far as brief but continuous and careful observation could discover them, be presented.

As has already been said, the geographical scope of the present paper is restricted to the southern Catskills. But as this section of the region can claim the highest of the mountains, it seems probable that few if any birds of the Canadian Fauna are regular summer residents in the northern Catskills which do not also occur in the southern.

Unless otherwise stated, all references to the region are to the Big Indian Valley and the adjoining mountain slopes in Ulster County, the whole section being included in the township of Shandaken.

THE SUMMER BIRDS OF THE SOUTHERN CATSKILL MOUNTAINS.

FAMILY TURDIDÆ: THRUSHES.

The summer Fauna of the Catskill region lacks but two members of this family of the full number of its species pertaining to the Eastern Faunal Province of the United States, viz.—the Mocking-bird (*Mimus polyglottus* Boie.) of more southern, and the Gray-cheeked Thrush (*Hylocichla Aliciæ* Baird) of more northern breeding range.

It can be said of no other region of such limited extent, that all eastern representatives of the genus *Hylocichla*, excepting of course true *H. Aliciæ*, are found as summer residents within its borders; much less that they all breed within an area of a few miles. Among the Catskills we find in the valleys, *H. mustelina* and *H. fuscescens*, on the mountains, *H.' nanus* and *H.' Swainsoni*, while *H.' Bicknelli* inhabits one if not others of the higher peaks.

Hylocichla mustelina (Gm.) Baird. Wood Thrush.

Apparently not uncommon, but showing none of the confidence or familiarity which characterize it in other, more settled, regions. Here it was found to be a shy, retiring inhabitant of the woodland along the valleys and lower slopes, and except in the morning and evening hours its song was not often heard. Once only was it found high on the mountains. This was at an elevation of perhaps 2,500 feet, where the refrain of a most accomplished singer reached me simultaneously with the wilder melody of the Winter Wren.

Mr. Pearsall discovered two nests, completed but without eggs, June 12.

Hylocichla fuscescens (Steph.) Baird. Wilson's Thrush.

Common along the water-courses in the valleys and in damp woody tracts on the lower slopes of the hills, but not noticed at a greater elevation than about 2,000 feet.

A nest discovered near Summit, June 7, 1880, contained two eggs, and the following day a third had been deposited. The situation and position of this nest were rather unusual. It was built near the border of a wood containing little undergrowth, and placed at a height of about three feet, on the stumps of several closely clustered saplings which, having been chopped into and incompletely severed, had fallen over on one side. In the Big Indian Valley, Mr. Pearsall discovered seven nests; the first June 3, with two eggs, the last June 12, with three eggs, both sets being fresh; the largest set observed was of four eggs—June 10. Without exception these nests were

placed "about six inches to a foot above the ground, fixed upon some dead branch or in a patch of fallen branches, generally but little concealed."

Hylocichla Aliciæ Bicknelli Ridgw. Bicknell's Thrush.

Regarding this Thrush little at present can be said beyond what has already been made public—by Mr. Ridgway in his introduction of the bird,* and by the writer in the paper previously cited. Since the latter appeared, however, the Slide Mountain was again visited by the writer, in company with Dr. A. K. Fisher, and the bird met with as before; but although a night was passed on the mountain, and an afternoon and morning spent in exploration, with this bird directly in view, a single specimen only was secured. This result was owing to the difficulty of detecting the birds in the dense balsam growth they principally inhabited before they had been startled by the unavoidable sound of approach; and not seldom were they heard singing at close quarters as secure as if out of range. Although no one of this species was actually identified in the act of singing, circumstantial evidence seems demonstrative that a song must be attributed to it which was neither that of the Hermit, or Olive-backed Thrush,—at least, differed from the usual songs of these species, both of which were to be heard singing at the same time,—but was very similar to that of the Gray-cheeked Thrush, as the latter is heard on its spring migration.. This granted, the bird may be considered common about the mountain top. The songs referred to were, in fact, like that, as I recalled it, of the type specimen of *H. 'Bicknelli*, which was shot while singing.

The dimensions of the single specimen secured agree closely with those of the two which were previously taken, and are as follows in inches and hundredths: length, 7.22; wing, 3.60; tail, 2.90; tarsus, 1.20; middle toe, .67; bill, culmen and from nostril, .53–.38. The length of the original Slide Mountain specimens was 7.28 and 7.40 inches, but the latter figures are excessive as the bird was limp when measured. The singular shape of the bill of these specimens which was remarked upon by Mr. Ridgway, does not hold with the latest taken example. In this, the bill, as compared with the former, is less slender, with the base of the culmen instead of being depressed plainly elevated in outline, so much so, indeed, as to suggest an abnormality.

Hylocichla ustulata Swainsoni (Cab.) Ridgw. Olive-backed Thrush.

Not uncommon on the mountains, especially in the balsam woods of the Slide, and in full song. An adult male taken at the top of

* "Descriptions of two new Thrushes from the United States." Proceedings U. S. National Museum, IV, 374–379.

Slide Mountain, June 15, 1881, and two taken on the same mountain by Mr. Pearsall, June 7, 1882, are perfectly typical of the species and manifestly distinct from the preceding. In connection with the latter their dimensions are of interest and are appended, in inches and hundredths :—

Ad. ♂ June 7, '82—wing, 4.15; tail, 3.10; tarsus, 1.03; middle toe, .65; bill, culmen and from nostril, .49–.37.

Ad. ♂ June 7, '82—wing, 3.90; tail, 3.00; tarsus, 1 10; middle toe, .68; bill, .48–.37.

Ad. ♂ June 15, '81—wing, 3 85; tail, 2.87; length of this specimen in the flesh, 7.10.

It is possible that the earlier taken of these specimens were late migrants representative of a more northern habitat; certainly they do not show the reduction from maximum specific size that we should expect to find in individuals from the southern limit of the breeding range of their species. But with this bird decrease of latitude seems to be nearly compensated by moderate increase in altitude, and a specimen from another locality at the southern breeding limit of the species is rather over than under the average size. This was taken by my brother (P. C. B.), in the western part of the State (Allegany County) at about the same latitude as the Catskills, and gives the measurements here recorded in the order previously followed :—

Ad. ♂ ? July 19, 1871—3.92, 3.00, 1.08, .68, .51–.37.

I have elsewhere alluded to a Thrush's nest taken at the top of Slide Mountain which, containing blue brown-speckled eggs, may have belonged either to *H. 'Swainsoni* or *H. 'Bicknelli*. Notwithstanding the uncertainty as to the identity of this nest a brief description may be not without interest. It was built upon some lateral branches of a young balsam, close to the trunk, about seven feet from the ground. Moss had been largely used in the external construction with plant stems and some dead leaves, the interior being finished with a lining of black rootlets. Several nests of the previous year were similar to this, both in position and construction.

The three eggs were fresh and measured respectively : .82×.63, .82×.64, .81×.65. These dimensions appear to be much smaller than the average of those of *H. 'Swainsoni*, and smaller than any minimum measurements of those of either this species or of *H. Aliciæ* that I have seen. While one is nearly elliptical the others are more ovate in outline, and all differ in shade and markings; but from the uncertainty of their ownership further description is not called for. A nest, supposed to be of *H. 'Swainsoni*, was discovered near Slide Mountain by my brother (P. C. B.), on June 26, 1873, which was built about fifteen feet from the ground in a small beech-tree, and

contained young and a single spotted egg. The latter, still in my possession, though in a fragmentary condition allows a measurement of .66 of an inch in transverse diameter.

Hylocichla unalascæ nanus (Aud.). Hermit Thrush.

Mr. Burroughs' remarks upon this Thrush (Wake Robin, p. 51) indicate it to be a not uncommon summer resident of this region; and undoubtedly it is somewhat generally distributed at suitable places on the mountains, although apparently absent from the valleys.

Its song was frequently heard from elevated balsam woods, and high on the Slide Mountain a specimen was secured. Being representative of the more southerly breeding individuals of its species the measurements of this bird are appended:—

Ad. ♂ June 25, 1881—length, 7.10; wing, 3 52; tail, 2.85; tarsus, 1.17; mid. toe, .66; bill, culmen and from nostril, .53–.38.

Merula migratoria (L.) Sw. & Rich. Robin.

Common; their songs at daybreak showing them to be much more so than observations at a later hour indicated. Two nests—June 6 and 13, 1880—both but a few feet from the ground in small trees by the roadside, contained young almost able to fly.

Mimus Carolinensis (L.) Gr. Cat-bird.

Common along the more cultivated parts of the valley, a few extending into the wilder portions about shrubbery bordering the way and the woods.

Harporhynchus rufus (L.) Cab. Brown Thrush.

Mr. Pearsall observed a single individual of this species in the lower part of the Big Indian Valley, though I failed to find it outside of the main valley, where two were noted.

FAMILY SAXICOLIDÆ: STONECHATS AND BLUEBIRDS.

Sialia sialis (L.) Hald. Bluebird.

Abundant along the line of the railroad, numbers being startled from the telegraph wires by the passing train. Less common in the Big Indian Valley, where a brood, noticed on June 11, 1881, were stated to have been in their nest, in a hollow stump, a few days previously.

FAMILY SYLVIIDÆ: TRUE WARBLERS—KINGLETS.

Regulus satrapa Licht. Golden-crowned Kinglet.

Mr. T. Martin Trippe states* that he found this species breeding in the Catskills, and says of it: "The golden-crested wren, I noticed only on the summits of Round Top, and one or two others of the highest peaks On the eighth of July, I saw several young birds apparently not many days from the nest. They were attended by their parents and hid themselves from observation amid the densest hemlock boughs. At times the old birds uttered a lisping sort of warble, beginning like that of *Dendræca striata* but winding up with a few sprightly notes similar to those of *D. virens*. The young had no notes save the usual faint chirp." Near the summit of Slide Mountain in 1880, I felt almost positive of seeing this species, but failed to get as atisfactory sight or to secure a specimen. On subsequent visits to the same mountain, although looked for, none were observed.

FAMILY PARIDÆ: TITMICE OR CHICKADEES.

It is hardly to be presumed that the Hudsonian Chickadee (*Parus Hudsonicus* Forst.) ever occurs in summer so far south as the Catskills.

Parus artricapillus L. Black-capped Chickadee.

Noted at various places from the valleys to the mountain tops.

FAMILY SITTIDÆ: NUTHATCHES.

Sitta Carolinensis Gm. White-bellied Nuthatch.

Seemingly not common: observed on three occasions only. A pair followed by their young were seen near Summit, June 7, 1880.

Sitta Canadensis L. Red-bellied Nuthatch.

Inhabiting the stricken growths of Canada balsams upon the wild slopes of Slide Mountain, this species was met with from an altitude of about three thousand feet up to the extreme summit, where its characteristic notes were frequently heard.

FAMILY CERTHIIDÆ: CREEPERS.

Certhia familiaris rufa (Bartr.) Ridgw. Brown Creeper.

Observed at different localities on Slide Mountain, almost to the summit.

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* Loc. cit.

FAMILY TROGLODYTIDÆ: WRENS.

Naturally the Long-billed Marsh Wren (*Telmatodytes palustris* Baird) is wanting in the Catskills; though sections inhabited by it are plainly visible from the mountain tops.

The Short-billed Marsh Wren is of too uncertain distribution to be here considered.

Troglodytes domesticus (Bartr.) Coues. House Wren.

Not uncommon, though more retiring and less domesticated in habits than in more settled regions; its song, also, seeming often to be more subdued On different occasions it was met with in wild and uninhabited localities, and none were noticed domiciled about the farm buildings in the valley. These facts may be taken as indicative of the primitive habits of the species, before the advent of civilization, and sufficiently explain the supposed diverse habits from it of Audubon's "Wood Wren."

Anorthura troglodytes hiemalis (Wils.) Coues. Winter Wren.

This little minstrel of the mountain woods inhabits the wildest retreats from the higher valleys to the highest mountain tops. Even the summit of Slide Mountain had not proved too distant for its tiny wings, and on this remote height Dr. Fisher came upon one at work on its nest. The upturned roots of a fallen tree had been selected as a building site, and within a cavity, extending behind a flat stone inlaid in the perpendicular face of the earthy mass, the nest was being framed. The substructure alone had been laid, consisting mainly of moss with a few dried plant stems; and these materials had been disposed so as to reduce the natural entrance to a small circular opening. This was two feet above the bottom of the concavity remaining from the uptorn foundations of the tree, and was so inconspicuous that had not the diminutive architect been surprised at work its secret would never have been disclosed.

This bird is a common inhabitant of the mountains throughout the Catskill group. Often it is found near the noisy brooks, often in the silent depths of the forest; but in whatever situation, mossy logs, rocks and dampness, with the negative requisite of absence of sunlight, seem to be all that is necessary to render its happiness complete. In such situations as may readily be imagined from these given characteristics, it makes its home; and, though so retiring in disposition and furtive in movements as rarely to allow a glimpse of itself, small and sombre-hued, its voice continually tells of its presence. There is an indescribable effect from the song of this bird peculiarly

in keeping with the wildness of its haunts; others may excel it in more definable vocal qualities, but "None sing so wildly well."

FAMILY MNIOTILTIDÆ: AMERICAN WARBLERS.

As represented in the Catskills, the Mniotiltidæ constitutes an important definitive element of the Avi-fauna, and is the most numerously represented family of birds in species, and doubtless also in individuals, of the region. Notwithstanding that seventeen species are enumerated as occurring, it is probable that several others will have to be added; while some half a dozen species which faunal limitations exclude from the mountain region proper, regularly breed in numbers in the adjacent Hudson Valley. These have already been named. Of species which were not observed *Helminthophila ruficapilla* Ridgw. is of probable occurrence; *Dendrœca pinus* Baird, less so, while several others are not improbably occasional summer residents.

Mniotilta varia (L.) Vieill. Black-and-White Creeping Warbler.

Frequent in the woods along the valley, but not extending far into the mountains.

NOTE.—The Blue-winged Yellow Warbler (*Helminthophila pinus* Ridgw.) is given by Giraud,* under Audubon's name of *Helinaia solitaria*, as having "been shot during summer on the Catskill Mountains." Even if this bird was found in the mountainous portions of the Catskills it can hardly be considered as more than a straggler there; but we may be allowed to suspect that the capture referred to was on some of the outlying hills or the lowland bordering the Catskills proper.

Parula Americana (L.) Bp. Blue Yellow-backed Warbler

Not uncommon in the wooded valleys, and noticed in the mountains up to about 2,700 feet altitude.

Dendrœca æstiva (Gm.) Baird. Summer Yellow Warbler.

Seemingly confined to the immediate vicinity of the dwellers' cottages in the valleys, and noticed on three or four occasions only.

Dendrœca cœrulescens (L.) Baird. Black-throated Blue Warbler.

Between the lower parts of the valleys and the higher elevations of the mountains this warbler seemed to be generally distributed in

* Birds of Long Island, 1844, p. 67.

suitable woodland, and excepting the Chestnut-sided Warbler was, perhaps, the most common representative of its genus.

Three nests were discovered by Mr. Pearsall. One was in process of construction, May 31, and nine days later contained four eggs; another held the same number on June 12; and one found with a single egg in the intermediate time on a subsequent visit had been destroyed. The respective situations of these nests were: "fully four feet from the ground in a wild raspberry;" "in the crotch of a Hobble Bush [*Viburnum lantanoides*] about a foot high;" about the same distance from the ground "in a bunch of beech sprouts." Mr. Pearsall's description of two of these nests shows that a single type of structure is not adhered to: The first nest was bulky "and not so neat a structure as that of the Chestnut-sided Warbler, the outside seeming a thick layer of dead bits of wood and fine bleached leaves, the cup being rather shallow and small, and lined with fine grasses." The last nest found was "more loosely constructed, of fine hemlock bark exclusively, depending upon the thick sprouts for its support." Mr. Burroughs describes a nest of this bird from the Catskills* which was "built in the fork of a little hemlock, about fifteen inches from the ground." My brothers, on May 31, 1874, met with a pair of these warblers working on a partially constructed nest "in a beech sprout, about a foot above the ground."

Dendrœca coronata (L.) Gray. Yellow-rumped Warbler.

Not until my last visit to the Catskills was this species detected. Although I had twice previously failed to find it, even at the summit of Slide Mountain, on the latter occasion it was found to be a rather common bird, not only at that elevated point but for some distance lower down, and seemed almost entirely to replace the Black-and-Yellow Warbler which had before been common there. The birds were in full song, and a female which was shot showed evident signs of incubating. Mr. Pearsall observed a pair on one of the lower slopes along the valley.

Dendrœca maculosa (Gmel.) Baird. Black-and-Yellow Warbler.

Found about Summit and throughout the Big Indian Valley, but evidently much more at home among the balsams on the mountains. At the top of Slide Mountain a nest was discovered June 12, 1880, built about five feet above the ground in a young balsam tree; it contained three fresh eggs but was somewhat disordered and had been deserted. Mr. H. B. Bailey who examined this nest states that it is so nearly identical with those of the Black-and-Yellow Warbler

* Locusts and Wild Honey, 1880, p. 258.

taken at the Umbagog Lakes in Maine, as to leave no question as to its identity.

Dendrœca Pennsylvanica (L.) Baird. Chestnut-sided Warbler.

Perhaps the most common warbler and, excepting the Summer Yellow Warbler, the only one ever noticed about cultivated land. Though apparently not penetrating high in the forests it was, nevertheless, found in the woods, but principally about their borders and in clearings.

A nest found June 8, 1880, amidst briers and shrubbery at the edge of woods, contained four young several days old. Four nests were taken by Mr. Pearsall between June 10 and 13, all, except one on the latter date with three, containing four fresh eggs. "One taken June 12, was commenced May 31." With one exception these nests were built in the forked stem of a brier. The excepted instance was one in which a "cluster of young beech sprouts in an open hillside pasture" had been utilized.

Dendrœca striata (Forst.) Baird. Black-poll Warbler.

This northerly breeding species was found to be common, in fact, the most common warbler, about the summit of Slide Mountain, though lower than a few hundred feet from this point it was not met with. In June of three successive years (12, 1880; 15–16, 1881; and 25–26, 1882) it was there present, and, on the last occasion especially its characteristic notes more frequently, perhaps, than those of any other bird, broke the silence of that lonely spot. That it is there a regular summer resident can hardly be doubted. Though from the exceeding lateness of the spring of 1882 its presence late in June of that year might well have been exceptional, the balance of the evidence above given weighs strongly against the probability of its having so been. As the Black-poll Warbler is, however, our most dilatory spring migrant, and its southernmost breeding limit has been supposed to fall far short of southern New York, some collated data bearing on the duration of its vernal migration and the time of its nesting period will here be apposite.

Pertinent to the subject are the following latest dates of its departure on the spring migration from points of the Middle and Eastern States: Washington, D. C., June 1 (Coues and Prentiss); New Jersey, June 5 (Gentry); my own record carries the time of its presence near New York City to June 11 (1882; a female), but this instance of its stay is exceptional, the record of other years not extending beyond June 4; Hudson Highlands, May 29 (Mearns); Connecticut, June 2, (Merriam = Sage); Massachusetts, June 10 (Brewer);

eastern Massachusetts, June 9 (Maynard), and we have the same authority for its departure from Upton, Maine, June 5; Central Vermont, "only a few days in the first of June" (N. A. Birds), while Audubon gives it as arriving in Labrador, June 1 to 10. As to the data of its breeding we have the records of nests with eggs at Fort Yukon, June 1 and 9, and at Great Slave Lake the same month. In a paper read before the Linnæan Society of New York, an abstract only of which has appeared in print,* Mr. R. F. Pearsall said of this species that, on the island of Grand Menan, "We found them (June 12, 1878) with full complements of four, frequently five eggs, incubation having just commenced," and also, that at the Rangeley Lakes, Maine, a nest with five eggs was taken June 19, 1879.†

The facts above stated form a chain of evidence which strongly supports the probability that the individuals of the Black-poll Warbler found in southern New York after the middle of June were summer residents of the mountain summit they inhabited.

Dendrœca Blackburniæ (Gm.) Baird. Blackburnian Warbler.

Though I did not myself meet with this species, Mr. Burroughs writes me that it breeds in Delaware County, just beyond Pine Hill. The same author, in a delightful account of the bird life of a Catskill forest, in "Wake Robin," page 49, alludes to the capture of one of these beautiful warblers.

Mr. Pearsall observed an individual of this species in the Big Indian Valley on May 30.

Dendrœca virens (Gm.) Baird. Black-throated Green Warbler.

Not uncommon; preferably inhabiting hemlock woods, and scattered sparingly through the deciduous forests.

Siurus auricapillus (L.) Sw. Golden-crowned Thrush.

Not uncommon in mountain woods; often its song was heard far in the forest.

Siurus motacilla (Vieill) Coues. Large-billed Water Thrush.

Had we not been prepared by Dr. A. K. Fisher's recent announcements ‡ of the presence of this species in its breeding season at Lake George for other records of its occurrence north of its known

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* Forest and Stream, April 8, 1880, XIV, 184.

† Since the above was penned Mr. Brewster has described a nest and set of three eggs of the Black-poll Warbler which was taken by Mr. M. A. Frazar at the Magdalen Islands, June 23, 1882. The eggs were fresh.—See Bull. Nutt. Ornith. Club, VII, 4, 253–254, October, 1882.

‡ Bull. Nutt. Ornith. Club, V, 2, 117, April, 1880; and VI, 4, 245, October, 1881.

range, the discovery of its being a regular inhabitant of the Catskill Mountains would have been a matter of greater surprise. Though the Catskill region is not forty miles north of the Highlands of the Hudson where the Large-billed Water Thrush has been characterized as a common summer resident by Dr. E. A. Mearns,* it was scarcely to be expected that a species regarded as of distinctly Carolinian relationship would be found in the character of a regular summer resident under conditions congenial to other species pertaining to a sub-fauna two removes northward. The seeming incongruity is especially striking when we consider that not only do none of its associates in the Hudson Valley, which with it there constitute the decided southern element of the Avi-fauna, enter this region, but several Alleghanian forms (already specified) seem to be completely barred out, while others are much restricted in their entrance. As explanatory of these facts are to be entertained the distinctive traits of the species under consideration. Its preferences are decidedly, at least Eastward, for active shaded water-courses, with rocky and deeply worn beds; and it can easily be conceived how an inherent trait of ascending toward head-waters in search of these conditions might result in the continuance of a slight deviation from its usual range into a more or less extended journey. Thus may strong specific traits result as primary factors in distribution. In the case before us, unless the bird be of less southern relationship than has been supposed, this apparent innovation in the recognized rules of the distribution of a species would seem to arise from the subordination of physical regulations to specific characteristics and preferences. There are many localities in the Catskills admirably adapted to the requirements of this bird—that is, in so far as appearances permit judgment—and which unoccupied by it would suggest a vacuum in nature.

There are birds adapted to the many characteristic features of mountains and valleys, but the mountain torrents but for this species would be left unavailed. We have, indeed, in the Large-billed Water Thrush, our closest Eastern representative of our *Cinclus* of the West.

The apparent absence in the Adirondacks of any bird specially adapted to the mountain water-courses seems like a deficiency in the life of the region; and now that this species has been found on the borders of that "Canadian Island," it may not be too far in the region of speculation to anticipate a time when we shall learn of it as a true summer resident there.

Among the Catskill Mountains it appeared to be perfectly at home. At the head of the Big Indian Valley, along the Esopus, the louder

* Bull. Essex Inst., XI, 159.

notes of its song rose above the roaring of the torrent, or a sharp sound as of two impacted pebbles, and a darting object more rapid than the waters, marked its flight up or down the stream. On the occasion of my first visit, its fine song, so clear and rapid that the waters might have taught it, in its nestling days in some steep terrace beside their flow, was frequently heard repeated for minutes at a time, high in the trees bordering the stream. An anxious note, doubtless from a female, whenever a certain steep bend in the stream was approached, seemed to argue a special interest in the locality, but as the birds were shy their movements could not be traced, nor could a specimen be secured. It was principally to reverse this ill-fortune that a second trip was undertaken, for the interest of the case demanded scientific verification that the Water Thrushes were the Large-billed species. Although the next visit to the region was but a few days later in the season, the species was silent; but an adult male was secured.

The question of the route taken by these birds in gaining the head of the valley where they were found is an interesting one. Though the locality is not thirty miles from the Hudson River, and directly connected with it by Esopus Creek, the distance following all the windings of the latter is more than twice as great, and with the last seven or eight miles leading toward the south. However, this course, or a modification of it, must have been pursued if the birds came from the Hudson Valley. But, on the other hand, it must be remembered that this is the region of the head-waters of the Delaware River, several tributaries of which rise close to the sources of Esopus Creek. It is therefore possible that individuals of the species under review ascended the Delaware River into the Catskills, and, led up into a low mountain spur, advanced along another water-course, into a different section of the region. Along the Esopus in the main valley the species was not met with.

In this connection appears the interesting fact that the Large-billed Water Thrush enters the Catskills, at least the borders of the mountains, in a more northern and eastern part of the region. Mr. L. S. Foster showed me a specimen which he had taken about seven miles west from Catskill Village on the Hudson, and informed me that he had noticed several individuals between July 18 and August 2, 1880, along a mountain brook near the same locality. This fact reveals a tendency of the species to extend inland from the Hudson; but whether the remoter parts of the region are gained from this or from an opposite direction remains to be ascertained.

Siurus nævius (Bodd.) Coues. Small-billed Water Thrush

Mr. Burroughs speaks of having secured a specimen of this species,

in June, in the Catskills,* and writes me that he has taken both species of Water Thrush in this region. Reference to its occurrence along the Neversink is also made by the same writer.†

The song of a Water Thrush was indistinctly heard at a swampy place in the mountains, beyond the source of Esopus Creek, which was very probably that of the small-billed species.

This Water Thrush is doubtless a regular summer resident at suitable localities.

Geothlypis Philadelphia (Wils.) Baird. Mourning Warbler.

One of the most characteristic birds of parts of the Catskills, inhabiting, chiefly, old cleared or burned-over land grown up with weeds, briers, shrubbery, and saplings. Always conspicuously component of these mixed growths are the Wild Red Cherry (*Prunus Pennsylvanica*) and the Great Willow Herb (*Epilobium spicatum* Lam.) but the breeding-season of the Mourning Warbler must fall between the times when the white flower-clusters of the former and the brilliant crimson spikes of the latter plant beautify the waste tracts which are its home.

Few Mourning Warblers were noticed in the valley until about half its length had been traversed, after which its song was almost constantly heard until entering the forest. At the summit of Slide Mountain, however, several were noticed, and must have there been breeding These remarks apply, in strictness, to the seasons previous to that of the last visit when, except on the mountain top, the bird was found to be uncommon, and in the valley but a single individual was observed.

It will be remembered that the first known nest of this species was discovered by Mr. Burroughs in this region.‡

Geothlypis trichas (L.) Caban. Maryland Yellow-throat.

Not uncommon about the more settled parts of the valley, seeming to be replaced in wilder and more elevated land by *G. Philadelphia*.

Myiodioctes Canadensis (L.) Aud. Canadian Flycatching Warbler.

Though not abundant this species seemed to be generally distributed in suitable localities. Mr. Burroughs gives an account of its nest.§

Setophaga ruticilla (L.) Sw. American Redstart.

Not uncommon about Pine Hill, but apparently rare in the Big Indian Valley, and not noticed at all on the mountains.

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* Wake Robin; ed. 1871, pp. 194–195, 220.

† Locusts and Wild Honey, p. 123.

‡ Wake Robin, pp. 123–124.

§ Loc. cit., pp. 61–62.

FAMILY VIREONIDÆ: VIREOS.

Of our common Vireos, the White-eyed (*V. Noveboracensis* Bp.) and the Yellow-throated (*V. flavifrons* Vieill.) do not appear to belong to the mountainous parts of the Catskills. It is not probable that the former ever extends, unless it be fortuitously, far into the mountains, but it is not unlikely that the latter is an occasional visitant.

Vireo olivaceus (L.) Vieill. Red-eyed Vireo.

A common and unremitting songster.

Vireo gilvus (Vieill.) Bp. Warbling Vireo.

This species was noted only at Pine Hill, where its song was frequent from the elms lining the single village street, and at Big Indian; both places being in the main valley.

Vireo solitarius Vieill. Blue-headed Vireo.

Rather common in rich woods along Birch Creek near Pine Hill; extending, to all appearances sparingly, through the Big Indian Valley, beyond which it was noted to an elevation of about 2,700 feet.

Although this species on its migrations inhabits indiscriminately the low shrubbery of swamps or the high trees of the woodland, here, its preferences were decidedly for the latter situation, and high in the most lofty maples several were often to be heard at the same time in full song. It seems inconsistent with these arboreal habits on its breeding grounds that the nest of this Vireo so often should be built low down. One discovered on June 9, 1880, was not seven feet above the ground. It was built in the fork of a descending branch of a beech tree growing in a lightly wooded depression leading from a "sugar camp," at the foot of a steep timbered slope. The four eggs were perhaps a third incubated. This nest among those of our Vireos most resembles that of *V. flavifrons*.

Two nests taken by Mr. Pearsall in the Big Indian Valley were, one ten the other six feet above the ground, and contained respectively, on June 5 and 8, three and four fresh eggs. The parent of the latter nest sat very closely, and Mr. Pearsall, fearing that by suddenly starting the bird from its nest the eggs might be broken, found it no easy matter to drive it from its charge. In reference to this Mr. Pearsall writes: "I repeatedly pushed her with a stick, striking her sharply on the head, and finally had to bend a twig round her neck and lift her off."

As long since observed by Nuttall, the song of the Blue-headed Vireo partakes of the character of both that of its Red-eyed and Yellow-throated cousins. It has the prolonged interrupted warble of the former, though more irregular and with greater range and varia-

tion, while some of its louder notes, especially when divested through distance of their accompaniment, sound strikingly like the song of the latest mentioned species.

FAMILY AMPELIDÆ: WAXWINGS.

Ampelis cedrorum (Vieill.) Baird. Cedar Waxwing.

Not uncommon. A nest built in a hemlock, against the trunk, about seven feet from the ground, contained five fresh eggs, June 15, 1880. Descriptions of two nests were recorded by my brothers; one was built in the top of a soft maple about twenty-five feet high, July 10, 1874; the other, found three days later, was built about ten feet from the ground in an apple tree, and contained five eggs with large embryos.

FAMILY HIRUNDINIDÆ: SWALLOWS.

As has been earlier remarked there are but two swallows which occur as summer residents in that section of the Catskills here considered, though at least one other is found in the immediate region.

Undoubtedly the Bank Swallow (*Cotile riparia* Baird) occurs at suitable localities, and the Purple Martin (*Progne subis* Baird) may also be locally represented. One species of the Hudson Valley is excluded—*Stelgidopteryx*.

Petrochelidon lunifrons (Say) Lawr. Cliff Swallow.

An abundant, familiar, and characteristic species of the valleys. The nests of a colony, located under the eaves of an old barn in the Big Indian Valley, were examined June 17, 1881, and again the next year, ten days later in the season. On the former occasion the closest approach to the singular retort-shaped structure which this species is so well known to construct, was a semi-globular mud shell with a simple opening on the side no larger than was necessary for the admission of the birds. Most of the nests were of a still more simple form, being merely shallow cups of mud, plastered against the perpendicular boards close up under the eaves. Among the different nests every gradation between these diverse styles was to be seen. In some of the cup-shaped structures one or both sides had been continued upward to the eaves above from behind forward to enclose an opening of varying size in the front wall. Though the young were well advanced the work of building was still being carried on, as shown by fresh pellets of mud in some of the nests, so placed as to reduce the opening; and it was evident that if building operations continued until the young were fledged, the most open nests would

be largely enclosed, and a second brood would give an opportunity for the well known "bottle-neck" extension. In one of the more open nests two adult birds were observed.

On June 27, 1882, the nests of the same colony possessed their complete vestibular attachments. One examined at this time contained four eggs, more than half hatched.

Hirundo erythrogastra Bodd. Barn Swallow.

Associating with the above-mentioned species, but much less numerous. A single nest was noticed in the barn occupied by the colony of the others.

NOTE.—Observation has not shown that the White-bellied Swallow (*Tachycineta bicolor* Caban.) can properly be introduced into the present list. An inconsiderable extension of the limits within which the latter applies, however, would allow of its being included, for Mr. Burroughs has observed it in summer about the head-waters of the Delaware River.

FAMILY TANAGRIDÆ: TANAGERS.

Pyranga rubra (L.) Vieill. Scarlet Tanager.

This brilliantly plumaged bird was not uncommon, but appeared possessed of a wilder nature than at many places where settlement is more advanced; and it was seen and heard more frequently about the borders of the forests along the wilder parts of the valley than elsewhere. In the main valley it appeared to be less of a woodland bird.

FAMILY FRINGILLIDÆ: FINCHES.

This family is more fully represented in the Catskills than any other excepting the Mniotiltidæ, albeit it gives to the region few species which are not abundant throughout the contiguous country; only one, in fact, of the character of a common summer resident—the Slate-colored Snowbird.

Species of the neighboring territory which appear not to enter the mountains are, the Swamp Sparrow (*Melospiza palustris* Baird), which, however, is probably of local occurrence, and the Yellow-winged Sparrow (*Coturniculus passerinus* Bp.), while the Chewink (*Pipilo*) seems to be but a casual visitor. The genus *Ammodramus* is of necessity not represented.

Carpodacus purpureus (Gm.) Baird. Purple Finch.

Both in the valleys and on the mountains a common bird. It appeared to be in full voice, but its song was so different from that of

the same species near New York City that I could not feel complete satisfaction regarding the identity of the birds heard singing until a specimen had been secured. Not only in the notes of the strain, but also in the manner and character of its delivery was this difference noticeable. In the Lower Hudson Valley the song of the Purple Finch, in summer resident birds, is rich and voluble, with the notes of definite character and number. We have, perhaps, no bird melody more expressive of passionate emotion than the outbursts from this species at the height of its breeding season. Especially is this true when, as is often the case, it rises full of song high over the trees, thence descending with undiminished melody to the earth. At such times its song is repeated with a precipitancy which allows no perceptible pause, and this strain may be supported for many moments until, the notes becoming confused, the performer ceases as if from breathlessness or absolute exhaustion. No approach to this exuberance of song was heard in the Catskills, all the notes of the species there being weak and inexpressive and the songs brief and of uncertain character. Somewhat similiar songs are often heard near New York when the birds are passing on their migration; still, it remains to be demonstrated that there actually exists the geographical variation in song which the facts here given seem to indicate.

Loxia curvirostra Americana (Wils.) Coues. American Red Crossbill.

On the high ridge leading to the summit of Slide Mountain, Mr. Pearsall observed a pair of Crossbills on the 7th day of June; "they were apparently feeding on young balsam-tree buds and were very restless and wild for the species." On the 25th day of the same June, Dr. Fisher and I, while separated on the mountain top, both distinctly heard the unmistakable notes of a passing flock of these birds

Astragalinus tristis (L.) Cab. American Goldfinch.

Common.

Passerculus sandvicensis savana (Wils.) Ridgw. Savanna Sparrow.

In full song, and evidently breeding, in some high upland pastures (about 2,500 feet altitude) near Summit.

Pœcetes gramineus (Gm.) Baird. Vesper Sparrow.

The most common Sparrow; frequenting stony pastures and hillsides. A nest with a single fresh egg, June 8, 1880.

The song of this bird remains associated with the evening twilight when often it faintly reaches the listener in the valley from far up some barren mountain side.

NOTE.—*Zonotrichia albicollis* Bp. White-throated Sparrow. Among the notes of my brothers, who were never in the Catskills earlier

than the 29th of May, nor later than July, I find this species recorded from the east branch of the Navesink. Though I failed to note the bird within a few miles of the locality given, the record allows a suspicion that the species may occasionally summer in the region.

Spizella domestica (Bartr.) Coues. Chipping Sparrow.

Common about cultivation; being replaced by the Snowbird, of very similar song, in wilder situations.

Spizella agrestis (Bartr.) Coues. Field Sparrow.

Uncommon, although several times met with; but not at a higher altitude than 2,000 feet.

Junco hiemalis (L.) Scl. Slate-colored Snowbird

Met with almost everywhere, except in the lower and more cultivated portions of the valleys, this species may be considered the most universally distributed bird of the Catskills.

In the valleys, it may be observed along the roadsides, or even hopping about in the roadway like the common Song Sparrow; while it is also found in the woodland glades, and penetrates the mountain forests up to the highest altitudes, where no other ground nesting member of its family attains. Sloping banks overgrown with moss, ferns, and wood-plants, along the borders of mountain roads, are favorite nesting sites. Data of its nidification in the Catskills indicates great variation in the time of laying, and also that two or more broods are reared. On May 30 and 31, 1874, two nests, each with four eggs containing embryos, were found by my brothers, and July 7 and 8, of the same year, two nests contained equal sets of eggs perfectly fresh. In June, 1880, young only were found, but of great diversity of age; on the 7th a brood, out of the nest, and well able to fly was met with, and just a week later two broods were about equally advanced; but on the 8th, a nest contained young but a few days old, and on the 10th, the living contents of another nest were about half grown. A nest on June 20, 1873, contained two young and a single egg. Of three nests examined by Mr. Pearsall between June 5 and 7, the eggs were, in one almost fresh; in another almost hatched; in the remaining one in a condition intermediate to the other two. So far as observed the number of eggs or young was always four, both at the earliest and latest limits of the breeding season.

One nest was built in a cavity scooped directly beneath part of a fence-rail lying on the ground, and was most effectually concealed; another was very similarly situated.

Melospiza fasciata (Gm.) Scott. Song Sparrow.

Common.

NOTE.—The English Sparrow (*Passer domesticus* L.) does not appear yet to have extended to the remoter villages of this region; and for the first time in a number of years the writer experienced the pleasure of passing some consecutive days with this, now well-nigh ubiquitous pest, out of sight and sound.

Pipilo erythrophthalmus (L.) Vieill. Chewink.

Except on my latest trip to the Catskills, when it was twice noted in the Big Indian Valley, this bird was not observed. Evidently the region is uncongenial to it, for there are many localities, including the low growth tracts inhabited by the Mourning Warbler, which are admirably suited to its habits.

Zamelodia Ludoviciana (L.) Coues. Rose-breasted Grosbeak.

A somewhat generally distributed species, much more often heard than seen. It appeared to be a characteristic mountain bird below about 3,000 feet altitude, and did not seem to be common before the higher valley was reached.

Nests were found by Mr. Pearsall on the 9th, 10th, and 13th of June, the first with three, the others with two eggs each. In every case the eggs from the same nest were in different stages of incubation, some being perfectly fresh, while others were approaching the hatching point.

This is another low nesting bird which appears to pass much of its leisure time in the taller trees; and along the higher valley, thence up into the mountains, its rich song from the most lofty tree-tops, was the loudest and most voluble that sounded through the woods.

Passerina cyanea (L.) Gray. Indigo-bird.

Rather common about Summit and Pine Hill; less so in the Big Indian Valley, and not extending throughout its entire length.

FAMILY ICTERIDÆ: AMERICAN STARLINGS.

Of this family the Orchard Oriole (*Icterus spurius* Bp.), though it enters the confines of the region, does not reach the mountainous parts; and the Meadow Lark appears to be confined to the more fertile valleys. The Rusty Blackbird (*Scolecophagus ferrugineus* Sw.) was not found to be present.

Dolychonyx oryzivorus (L.) Sw. Bobolink.

Common in the valleys about pasture lands and meadows.

Molothrus ater (Bodd.) Gray. Cowbird.

Certainly uncommon in that part of the region which was visited, as a single individual only was observed—in the main valley. Mr.

Burroughs, however, speaks of it as common in the adjacent country, and gives instances of its imposition on *Dendrœca virens*, *D. Pennsylvanica*, *Myiodioctes Canadensis*, *Vireo olivaceus*, and *Junco hiemalis*.*

Agelæus phœniceus (L.) Vieill. Red-winged Blackbird.

This species was noticed from the train along the main valley, but scarcely extended beyond Big Indian, doubtless from the absence of suitable breeding places. "One or two" were noticed by Mr. Pearsall in the lower part of the Big Indian Valley.

Sturnella magna (L.) Sw. Meadow Lark.

Noticed only along the railroad below Big Indian.

Icterus galbula (L.) Coues. Baltimore Oriole.

Excepting a single individual noticed by Mr. Pearsall, nothing was seen of this bird in the Big Indian Valley, although it was several times heard about the villages of Big Indian and Pine Hill. Here its notes seemed to be less vigorous and otherwise different than those of the same species near New York.

NOTE.—The Crow Blackbird (*Quiscalus purpureus*) was not observed at any part of the region, nor has Mr. Burroughs met with it. Its name appears, however, in a nominal list of birds observed in the Catskills by my brothers; but probably it was observed before the mountainous portion of the region had been entered.

FAMILY CORVIDÆ: CROWS AND JAYS.

The close approach of the Fish Crow in summer to the Catskills has already been alluded to. The Canada Jay (*Perisoreus Canadensis* Bp.) we would hardly look for so far south.

NOTE.—The Raven (*Corvus corax carnivorus* Ridgw.) must now be nearly extirpated from the Catskill region. Mr. Burroughs writes me that he has known of but one instance of its occurrence—at the border of Schoharie County.

Corvus frugivorus Bartr. Common Crow.

Cyanocitta cristata (L.) Strickl. Blue Jay.

The notes of both of the above species were often heard about the mountains.

NOTE.—An interesting account of the occurrence of the European Skylark (*Alauda arvensis* L.) near Esopus-on-Hudson, on the confines of the Catskill region, has been given by Mr. Burroughs.†

* Loc. cit., pp. 62–64, 70, 124.

† Pepacton, pp. 150–153.

FAMILY TYRANNIDÆ: AMERICAN FLYCATCHERS.

The Great Crested Flycatcher (*Myiarchus crinitus* Cab.) which was not encountered, being a regular inhabitant of the lower country may be an occasional visitor to the mountains.

Tyrannus Carolinensis (L.) Baird. King-bird.

Uncommon far from the main valley, and not noticed distant from human settlement.

Sayiornis fusca (Gm.) Baird. Phœbe-bird.

Not uncommon. Two nests, just completed, were found May 31, 1871 (P. C B.) Mr. Burroughs says* "nearly every high projecting rock in my range has one of these nests, following a trout stream up a wild mountain gorge . . . I counted five in the distance of a mile, all within easy reach."

Contopus borealis (Sw.) Baird. Olive-sided Flycatcher.

This species was found through the upper section of the Big Indian Valley, and while exploring this region its notes were frequently heard. Not uncommon along Biscuit Brook, a tributary of the Delaware River—P. C. B.

Tall charred stubs rising from the low growth of burned-over tracts, and dead branches projecting from topmost foliage along streams or in openings in the woods are favorite lookout stations of this bird. In one place where the woods had been cleared for a "charcoal job" and the charcoal burners were busy below, one of these birds was in full note overhead in the tall maples and beeches which had been left standing here and there through the clearing.

Contopus virens (L.) Cab. Wood Pewee.

More common near the main valley than elsewhere, and seemingly not extending far into the mountain woods.

Empidonax flaviventris Baird. Yellow-bellied Flycatcher.

This little flycatcher was found inhabiting with the Canada Nuthatch the extreme summit and immediate slope of Slide Mountain. On the ascent, it was first met with at an altitude of not more than 3,500 feet, but not far above became common, haunting the growths of thickly clustered balsams which clothed the damp mossy slopes. Though it was evidently in full voice nothing was heard of the "sweet song" which has been attributed to the species. Its notes were low and subdued, with a suggestion of melancholy, which, however, may have been induced by the loneliness and often silence of the situation.

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* Wake Robin, p. 130.

Like the general character of those of all our Empidonaces, each utterance was of two distinct but connected notes, though lacking the abrupt vigor of the other species, and at a little distance the louder and more prolonged final note was often the only one heard.

In view of our very deficient knowledge of the breeding range of this bird, and the short time that we have known anything positive regarding its nidification, the discovery of its breeding in the Catskill Mountains is of interest, not only as greatly extending the area within which its nest has actually been found* but also as assisting to render clear the apparently misunderstood subject of its precise faunal relationship.

Close to the summit of Slide Mountain, on June 26, 1882, its nest, containing four fresh eggs was discovered by Dr. Fisher At the outset it may be said that the eggs were spotted, and generally similar to those of authentic sets which have recently been described.

On the slope whereon the birds had made their home an abundant growth of bright green moss invested the rugged configuration of the surface and enfolded the scattered remains of trees, ancestors, perhaps, of the young growth of balsams which clustered about the spot and afforded seclusion to the little pair that had come among them. The nest was built in a cavity scooped in a bed of moss facing the side of a low rock. The cavity had been excavated to a depth of two and a half inches and was two inches across. The opening, but little less than the width of the nest, was nine inches from the ground and, partially hidden by overhanging roots, revealed the eggs within only to close inspection.

The primary foundation of the nest was a layer of brown rootlets; upon this rested the bulk of the structure, consisting of moss matted together with fine broken weed stalks and other fragmentary material. The inner nest could be removed entire from the outer wall, and was composed of a loosely woven but, from its thickness, somewhat dense fabric of fine materials, consisting mainly of the bleached stems of some slender sedge and the black and shining rootlets of, apparently, ferns, closely resembling horsehair. Between the two sections of the structure, and appearing only when they were separated, was a scant layer of the glossy orange pedicels of a moss (*Polytrichum*) not a fragment of which was elsewhere visible. The walls of the internal nest were about one half an inch in thickness, and had doubtless been accomplished with the view of protection from dampness.

Professor Daniel C. Eaton, of New Haven, very kindly assumed the task of determining the different species of moss which entered into the composition of the nest and of the moss-bed in which it

* All records of the nests and eggs of this bird prior to 1878 are here ignored as being too dubious to be entertained.

rested, and his investigation disclosed the fact that the mosses which abounded immediately about the nest had not been utilized as building material. As determined by Professor Eaton, the species of moss composing the bed were: *Hypnum umbratum*, *H. splendens*, *H. Schreberi*, *H. Crista-castrensis*. Those appearing in the nest: *Hypnum Mullerianum*, *H. Muhlenbeckii* (?), *Dicranum longifolium*, *D. flagellare*, *Polytrichum commune*, *P. formosum*. With these occurred the following Hepaticæ: *Mastigobryum trilobatum*, *Scapania albicans*, *Cephalozia bicuspidata*. In addition were found among the materials of construction, catkin scales of the birch, leaves of the balsam, and fragments of the dried pinnæ of ferns, but, as suggested by Professor Eaton, the presence of some of these was probably accidental. Springing from the verdant moss beds immediately about the nest were scattered plants of *Oxalis acetosella*, *Trientalis Americana*, *Solidago thyrsoidea*, and *Clintonia borealis*.

It is rather surprising to find specimens of the Yellow-bellied Flycatcher—undoubtedly a bird of the Canadian Fauna*—from southern New York to be of large size for the species. We might well have expected the reverse to be the case, and the fact of maximum specific size thus obtaining at, so far as we now know, the southernmost breeding limit of the species, illustrates well the close correspondence between the conditions imposed by altitude and by more advanced latitude without elevation, on organic nature.

The following measurements and comparison will show the relative size of the Catskill birds with the largest examples of eleven specimens taken on the migrations at New York.

New York Specimens.

Date.	Sex.	Length.	Wing.	Tail.	Tarsus.	Middle toe.	Bill, culmen and from nostril.
Aug. 20, '81,	?	5.45	2.63	2.33	.64	.33	.41–.31
May 29, '79,	♂	5.47	2.60	2.30	.65	.35	.41–.31
" 24, '78,	♂	5.50	2.65	2.25	.67	.33	.43–.33
Aug. 25, '75,	♂ (?)	5.56	2.65	2.32	.68	.32	.43–.33

Slide Mountain Specimens.

June 12, '80,	♂	5.60	2.73	2.48	.63	.33	.44–.34
" 26, '82,	♂	5.57	2.65	2.37	.64	.35	.42–.32

As compared with the specimens from New York those from the Catskills, besides greater size, also present some difference in the

* That this bird has been suspected to breed in regions thoroughly Alleghanian or even more southern in Fauna, is to be accounted for from the fact that the times of its migration are such as might easily give rise to the impression. The species is one of the latest of the migrants to remain with us in the spring, and one of the first to reappear on the return movement. Thus, in the neighborhood of New York, where it occurrs strictly as a transient semi-annual migrant, it remains, on the advance movement, sometimes into June, and is always to be again looked for early in August; and, though I have no actual July records, individuals doubtless sometimes appear by the latter part of that month.

proportion of parts, owing to the relative smallness of the tarsi and toes.

The female parent of the nest which was secured is also large for her sex and gives the following measurements, in like sequence to the above :—

June 26, '82, ♀ 5.15 2.47 2.20 .62 .32 .38–.31

Empidonax Trailli (Aud) Baird. Traill's Flycatcher.

Seemingly one of the characteristic birds of the higher valleys, inhabiting growths of shrubbery and small trees, preferably in wet ground, and consequently not found on the mountains. Its characteristic notes were almost daily heard. The late Dr. Brewer has referred to a nest found in the Catskills by Dr. Merrill,* one of the eggs of which was nearly unspotted.

Empidonax minimus Baird. Least Flycatcher.

Not uncommon. In the absence of suitable surroundings to the dwellers' cottages in the valley, they repaired to the shrubbery along the roadsides and streams.

FAMILY TROCHILIDÆ: HUMMING-BIRDS.

Trochilus colubris L. Ruby-throated Humming-bird.

Not uncommon; frequently observed remote from cultivated land.

FAMILY CYPSELIDÆ: SWIFTS.

Chætura pelasgica (L.) Baird. Chimney Swift.

Abundant through the valley; and even on the slope of Slide Mountain beyond an altitude of 3,000 feet, their rapid chatter continued above the tree tops. Mr. Burroughs alludes to a case of their nests being glued to the rafters within a barn,† but from the abundance of the birds in wild and uninhabited sections, it is evident that the majority must here follow their primitive method of nesting; certainly the luxury of housekeeping in a chimney must be unknown to them.

FAMILY CAPRIMULGIDÆ: GOATSUCKERS.

Caprimulgus vociferus Wils. Whip-poor-will.

The Whip-poor-will was well known to residents, by whom its notes were closely imitated. It was said to be frequent at the

* Proceedings U. S. National Museum, II, 4.

† Pepacton, p. 26.

entrance of the valley, but rarely to be heard over five miles within. Mr. Burroughs reports it as common just out of the mountains.

Chordediles popetue (Vieill.) Baird. Night-hawk.

Several times noticed.

FAMILY PICIDÆ: WOODPECKERS.

It would be idle to speculate on the possible occurrence in the Catskill Mountains of either of the Three-toed Woodpeckers.

Picus villosus L. Hairy Woodpecker.

Not uncommon. Two were shot near the top of Slide Mountain showing on the crown the red feathering of the young of the year; though scarcely appreciable in the female, this was conspicuous in the male bird. Another bird of the year was without indication of this character.

Picus pubescens L. Downy Woodpecker.

Though several times noticed in the neighborhood of Pine Hill, this common bird was not elsewhere observed.

Sphyropicus varius (L.) Baird. Yellow-bellied Woodpecker.

Rather common about the head of the valley, often descending close to the ground on small trees and even bushes, and once noticed on a prostrate log. Mr. Pearsall discovered a nest of the species, "about twelve feet from the ground in an immense dead pine stub," which contained six fresh eggs, June 1. "The aperture was so small that had I not witnessed the female bird go through, I should have thought it impossible for her to do so." For an account of another instance of this bird breeding in the Catskills, see "Wake Robin," pp. 107-8.

Hylotomus pileatus (L.) Baird. Pileated Woodpecker.

With regard to this species Mr. Burroughs writes me: "I spent part of last August [1881] near the head of Dry Brook in the southern Catskills. I there saw and heard the Pileated Woodpecker. Last fall a fox-hunter of my acquaintance shot one in Roxbury, my native town." Mr. Pearsall writes of a pair of these birds which he observed on a mountain slope falling into the Big Indian Valley at a point about halfway through its course, that: "One alighted about two hundred feet from me in a live tree whose top was blasted. The pair were nesting on the slope I am fully convinced." James W. Dutcher—guide, whose dwelling is directly across the valley from the point where these observations were made, stated that previous to this time the pair had been very noisy and he had heard them through the spring.

Melanerpes erythrocephalus (L.) Sw. Red-headed Woodpecker.

Although this fine woodpecker was not observed I have the authority of Mr. Burroughs for its occurrence. Mr. L. S. Foster noticed it August 28, 1880, in the vicinity of Catskill village.

Colaptes auratus (L.) Sw. Golden-winged Woodpecker.

Not uncommon.

FAMILY ALCEDINIDÆ: KINGFISHERS.

Ceryle alcyon (L.) Boie. Belted Kingfisher.

Found along the Esopus Creek, even where it had become a rushing trout stream five or six miles within the valley. My guide complained that they were too frequent about his trout pond.

FAMILY CUCULIDÆ: CUCKOOS.

Undoubtedly both of our Cuckoos are more or less frequent visitors to the valleys of the Catskills.

Coccygus sp.——?

A Cuckoo, which appeared to be *C. erythrophthalmus*, was seen in the valley, but escaped capture. *C. erythrophthalmus* was observed by Mr. L. S. Foster in the vicinity of Catskill.

FAMILY STRIGIDÆ: OWLS.

Strix nebulosa Forst. Barred Owl.

This species was unmistakably described to me, and is, of course, common, though I did not myself meet with it.

Scops asio (L.) Bp. Screech Owl.

One seen, attended by irate small birds.

Bubo Virginianus (Gm.) Bp. Great Horned Owl.

Noted by my brothers. The owls were not hooting at the time of my visit and I failed to meet with it.

FAMILY FALCONIDÆ: DIURNAL BIRDS OF PREY.

Both Hawks and Owls appeared to be uncommon at the time of my visits, and, unquestionably, others besides the few which are here recorded breed in the region. Mr. Burroughs writes me that the Golden Eagle (*Aquila chrysaëtus Canadensis* Ridgw.) is occasionally seen in the mountains, and that the Fish Hawk (*Pandion haliaëtus* Sav.) he has seen along the upper Delaware River and lower Beaverkill.

Accipiter fuscus (Gmel.) Bp. Sharp-shinned Hawk.

One observed by Mr. Pearsall.

Buteo borealis (Gm.) Vieill. Red-tailed Hawk.

From the summit of Slide Mountain two handsome adults of this hawk were seen wheeling in the air below.

Haliaëtus leucocephalus (L.) Sav. White-headed Eagle.

From the summit of Slide Mountain an adult bird was seen passing high over the valleys.

FAMILY COLUMBIDÆ: PIGEONS AND DOVES.

The Mourning Dove (*Zenaidura Carolinensis* Bp.) being a bird of the outskirts of the region, may occasionally stray along the valleys into the mountains.

Ectopistes migratorius (L.) Sw. Passenger Pigeon.

Information was received that Wild Pigeons formerly bred abundantly in this region, and Mr. Burroughs has written to the same effect, but also, that owing to the slaughter of both old and young the species has become rare. In "Wake Robin" (p. 174) we read: "Wild Pigeons, in immense numbers, used to breed regularly in the Valley of the Big Ingin and about the head of the Neversink. The tree-tops for miles were full of their nests, while the going and coming of the old birds kept up a constant din. But the gunners soon got wind of it, and from far and near were wont to pour in during the spring, and to slaughter both old and young. This practice soon had the effect of driving the Pigeons all away, and now only a few pairs breed in these woods."

From a reliable resident I received the information that it is not many years since vast numbers of Wild Pigeons formed a breeding colony on the mountains beyond the head of the Big Indian Valley. It seems probable that it is to this breeding ground that Mr. Burroughs alludes (Locusts and Wild Honey, p. 118) in an account of a trout-fishing excursion along the Navesink in 1869: "Here and there I saw the abandoned nests of the pigeons, sometimes half a dozen on one tree. In a yellow birch which the floods had uprooted a number of nests were still in place, little shelves or platforms of twigs loosely arranged and affording little or no protection to the eggs or the young birds against inclement weather."

A single Wild Pigeon seen by Mr. Pearsall was the only evidence furnished by recent exploration in the region of the present occurrence of this formerly abundant bird.

FAMILY TETRAONIDÆ: GROUSE.

The Spruce Partridge (*Canace Canadensis* Bp.) is a conspicuous absentee among the birds of the Canadian Fauna in the Catskills.

Bonasa umbella (L.) Steph. Ruffed Grouse.

Not uncommon, but their drumming at the times of my visits was rarely heard. A brood of very young birds was met with June 15, 1881.

NOTE.—The Quail (*Ortyx Virginiana* Bp.), Mr. Burroughs writes me, "abounds in the town of Olive* but not among the mountains.

NOTE.—Family Ardeidæ: Herons.—Though several members of this family undoubtedly breed in the Catskills, their local absence over that portion of the region covered by the present list is explained by the absence of suitable breeding-places. At least four species of the family are regular visitors along the neighboring Hudson River, others being of casual occurrence. Mr. Burroughs has observed the Great Blue Heron (*Ardea herodias* L.) "along the upper Delaware, in Roxbury."

FAMILY SCOLOPACIDÆ: SNIPE: SANDPIPERS, ETC.

It is not unlikely that the Solitary Sandpiper (*Totanus solitarius* Aud.) is of occasional occurrence in the Catskills in summer.

Philohela minor (Gm.) Gray. Woodcock.

Common.—John Burroughs.

Tringoides macularius (L.) Gray. Spotted Sandpiper.

Frequent along the stony margins of streams in the valleys. A nest with four eggs, May 31, 1874.—G. A. B.

FAMILY ANATDIÆ: WATERFOWL.

Anas obscura Gmel. Dusky Duck.

Noticed by my brothers at Balsam Lake.

Aix sponsa (L.) Boie. Wood Duck.

A female of this species was observed from the train, by Dr. A. K. Fisher, in a pool at the edge of woods beside the railroad. It is undoubtedly a common summer resident.

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* This township adjoins that of Shandaken, and is principally of moderately elevated and rather level country.

NOTE.—As to the occurrence of other water-birds in the Catskills we can only speculate. Mr. Burroughs speaks* of meeting with a brood of Hooded Mergansers (*Lophodytes cucullatus* Reich.) at the junction of the Beaverkill—east branch—with the Delaware River, and our other Mergansers have been recorded as breeding still farther south in the Alleghanies. Nuttall narrates † the discovery of a brood of the Common Sheldrake (*Mergus merganser Americanus* Ridgw.), on the Susquehanna River, in Pennsylvania, and both this species and the Red-breasted Merganser (*Mergus serrator* L.) have been recorded by the Bairds ‡ as breeding in Perry County, in the same State Undoubtedly others of the Anatidæ than those which have been mentioned occur in the Catskills. It also seems likely that the Pied-billed Dabchick (*Podilymbus podiceps* Lawr.) may breed at some of the small lakes, but it was not found by my brothers, by whom several of the lakes were visited, and Mr. Burroughs writes me that this bird as well as the Great Northern Diver (*Colymbus torquatus* Brünn.) he has failed to meet with on the waters of the Catskill region.

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* Pepacton, p. 39.

† Manual of Ornithology, II, 461–462.

‡ Sillim. Am. Journ., XIV, 1844, 273.