

ART. IV. ON THE MAMMALIA OF NOVA SCOTIA. BY J.  
BERNARD GILPIN, A. B., M. D., M. R. C. S.

(Read December 11, 1871)

*Cervus alces*, Linnæus, Richardson, Dekay, Audubon.

*Alce americanus*, Jardine, Baird.

*Cervus orignol*, Mons. Derville.

*Cervus lobatus*, Agassiz.

*Alces machlis*, Ogilvy, Sclayter's list, Zoolog. Gardens,  
L'orignol, Cuvier.

THE MOOSE.

THE following description was taken from a very fine bull exhibited at Halifax about six years ago. Supposing he was dropt in May, he was then three years and four months old, and in full summer coat :—

He stood between six and seven feet high from the crest of his withers. His height about the length of his body from tip of moufle to tail. His head about the length of his depth from withers to brisket, and his legs about one and a quarter longer than this depth. It was evident at a glance that his great height was caused, as has long been remarked by writers, by the extreme length of the cannon bones (metacarpal and metatarsal) of the legs. These distances were only judged by the eye, but they were done carefully, and will serve for approximations. Mr. Downs informed me that a young bull owned by himself measured, when nearly completing his second year, five feet three inches at the withers. A cow calf measured by myself, (25th July, 1859,) about two months old, gave three feet six inches from top of withers, and four feet three inches from tip of nose to buttock.

In studying the form of the above-mentioned individual, we found the head very large, owing to the immense overhanging and prehensile upper lip, and huge inflated nostril, hairy with the exception of a naked patch of the size of a crown piece at its extremity. The forehead slightly convex, swelled directly to form a foundation for the horn, which here was the small trifingered third year horn. The ear was large and ovate with a fine tip. A fine bristly mane reached from betwixt the ears to beyond the withers. The back line from the croup to the withers ran nearly straight, but then rose rapidly, forming the withers, and sinking again on joining the head. The older figures give this line as rising rapidly from croup to withers; which is a mistake, as also Capt. Hardy's assertion that croup and withers are nearly equal: I think he means croup and head. In the cow-calf I measured there was three inches difference. Here I should think there was at least six. The loins though short are largely developed, the transverse processes of the

lumbar vertebra being very long. The tail is small and deeply hidden betwixt the buttocks, which are slender and very cervine in their appearance. The hocks are flat but of great depth surmounting a cannon bone of great length. The brisket is of great depth, supported by a very powerful fore arm, which however has its muscle unlike the horse on its posterior rather than anterior surface; the hoofs are small and polished, the animal standing on the tips with the hind tips well off the ground. The neck from the fore shoulder to the head is clothed by a dense coat of hair, which forms a mane from the chest along the neck to the chin, hidden in which and depending from betwixt the angle of the jaws hangs the "bell," a species of wattle, composed of muscle and skin, and covered with long hair resembling the brush of a fox. The eye is dark with little expression and set deep in its bony socket. The color of this bull was in the highest summer coating of deep glossy black, and short as a well groomed horse. The moufle and forehead had a brownish-yellow cast, the cheeks and neck dark balck; the ears were light fawn inside, a little darker outside, the crest yellowish mixed grey and white, and a yellow grey patch upon the croup. The inside of the buttocks and all the legs both inside and outside were bright yellow fawn, the black of the body running down half way, to the hocks and to the knees, and ending with an abrupt line in a point. There was also a black line running from each hock and each knee in front, and widening to join the hoof. This line has heretofore escaped observers. Captain Hardy doubts it, and I can only maintain that it was so in this instance. We have but few opportunities of seeing the summer coating. It was recognized by the Indian chief James Mense when I showed him my sketches, and I have little doubt may always be found. The winter coating is formed of long hair so stiff as to stand bristly outward, and as each hair is lead colored at base, greyish-white in the middle, and black at tip, the whole animal has a greyish appearance. The crest loses its yellowish wash, and the hair on the cheeks and neck is both darker and shaggier than on the body. There is still a yellowish brown wash upon the moufle, and forehead, and the ears are brownish fawn. The beautiful yellow fawn and black stripes of the legs disappear, and mixed grey cover them, hiding the abrupt lines of black and tan. This is the usual color as described by naturalists as he is usually taken in winter, when the bulls are hornless, the cows having none. In the bull calf of the first year two knobs swell out upon the forehead beneath the skin; in the second year the true horn appears, a single prong six or eight inches long; in the third year the new horn is usually trifingered, and a little flattened; and in the fourth year assumes the adult form though small. The Indian and hunters say they increase till the eighth year. The horn of an adult bull springs at right angles from a broad knobby base on the forehead, throws off one, two, or three brow prongs on tines and then rapidly flattening reflects backwards nearly at right angles, forming a broad flattened palm, the anterior convex edge of which is subdivided into more or less numerous tines. There is some analogy between the number of these tines and the age of the owner, but not accurate enough for calculation. About seven or eight tines are the usual number. The largest pair of horns I

have seen, measured five feet two inches in width, from tip to tip; the heaviest about fifty pounds. Their colour is brown with bright burnt sienna stains, and white edges to the tines. They shed them in February, and I have seen the young velvet horn in April. I have seen the young calves in June when they could not be ten days old; they were a lively fawn color, about two feet six inches in height, their heads small and not indicating future ponderance. They kneeled readily to drink or pick the grass; and I have seen them again between two and three months old, when they had rapidly grown to three feet six inches, their heads still small, but the neck and withers putting on a dark shaggy look, and the fawn tints becoming greyer. They usually all die when taken from their dams, and are scarcely saved by being put to domestic cows.

Such is the description of this great boreal deer, that frequents our pine forests, his most southern range. In early spring the cows seek the densest cover, very usually the islands in our woodland lakes, or the higher spots of our swampy barrens, to bring forth their young, the bulls meanwhile frequenting the shallow lakes and swamps. Here they wallow in the soft mud, feed upon the water lilies and aquatic grasses, and escape the torment of insects. The cool September days find them clothed in their choicest nuptial suits of glossy black and golden tan, with well grown horns; and the sexes again seek each other—the cow now with one or two calves by her side. The most terrific encounters ensue betwixt the males. The approach of two males in the still autumn night is heralded by such loud snorting bellows, and such crashing of branches by each male's horns, as to resemble cart loads of plank thrown violently upon the ground. This bellowing to unseen bellow, this crash of unknown violence swelling upon the night wind, is said to make the heart of the oldest hunter throb to his last pant. Usually, however, the slightest crackle, or the least odor or scent of the hunter, sends this timorous creature back in a retreat so noiseless as scarce to be credited from his loud advance. Towards the end of the rut, some few bulls become infuriated, attacking the cow, equally as the bull—attacking everything. David Eason informed me that, once after calling unsuccessfully a long time, he left his cover and without his gun crossed a little knoll that lay in the open before him. Almost immediately from the crashing in front, he knew that a bull was before him, and he had no time to reach cover or gun. Sinking into some alders he

saw the infuriated beast betwixt two spruce pines, rearing on his hind legs to ten or twelve feet, and shredding every branch from either tree with his horns, as he descended. Again and again did he rear till his huge form was shrouded in a mist of pine leaves, recent branches, bark shreds and dust of the withered dead arms, always hanging on the boles of pines. Many years had passed, when he told me the tale, yet his description of the horrid bristling crest, glaring eyes, and steaming breath from hideous swollen nostrils, was too graphic for me to doubt the truth, or its effect upon him at the time.

Towards November the cold winds and early snows, teach them it is time to yard. So collecting in families of four to seven or eight, usually two or three cows with attendant calves and several bulls, they retreat to some valley betwixt hardwood knolls, for the winter. If the browse is plenty, and the cover good, they wander very little. The various maples, the poplar, ashes, dogwoods, moose-wood, and alders, are their principal food. Seeing one day in the forest some saplings shred away some twenty feet from the ground, I asked Sam Copeland, an expert in all kinds of woodcraft, if porcupines had done it? No, was the answer, "moose browsing." They ride down between their fore legs a young tree, and browse on the top, then allow it to spring up again. If, as I said before, the browse is plenty and they are undisturbed these yards become beaten down almost like a farm yard, and the early spring and melting snows finds them still in the same spot. But now-a-days this rarely happens. Few yards remain undisturbed by the hunters.

But this brings me to the description of their capture. They were formerly taken by snares set in the forest, but this mode is now prohibited by law. Another mode is by calling, that is, during the rut the hunter imitating the voice of the female, and calling the bull within shot. On a frosty evening or at dawn of a September day, with a half filled moon hanging just above the tops of the tall spruces, and giving light enough barely to a narrow horizon, with the cool down wind blowing in your face, is the most favorite time. On such an eve, or day dawn, a party will lie wrapped in their blankets, over their rifles, concealed by a rock or shrub, while an

Indian standing motionless will imitate the cry of a female deer by means of a birch bark trumpet. Presently a wandering bull answers it; faint and far away it floats upon the night wind; but each answer comes louder and louder. More plaintive and pleading are the Indian's wild guttural sobs. Presently he sinks into the ground, as crash after crash, and snort after snort, tells him of the near approach of the deluded bull; and a toss up of his hand gives the sign for the party to fire. Simultaneously their double-barrelled breach-loaders ring out, like platoon firing, as their eyes have long been straining at and their rifles covering a dim shadow in front. The huge shadow turns heavily and slowly fades into darkness, with stumbling crash of branch and limb, and then all know he is mortally hit.

“Find him to-morrow morning, this side little brook,” says the Indian. Had he disappeared noiselessly, there would be the chance of his not being hit; but there is no looking now, the moon has gone down. Through the darkness and the night mist, they grope their way to camp, knock the smouldering brands together, light their pipes, and wrapt in their blankets soon defy the hoar frost that is painting their sleeping forms. No description can show the fascination of this sport. But to play the play aright, wood craft, ardour, self denial, endurance of cold and wet, and, above all, prompt and thorough obedience to your Indian hunter, are all so necessary, that there are but few players in this sylvan scene. Above all, it is unsportsmanlike; it is breaking the first law in every code for the preservation of game; it is disturbing the game in their breeding time. To have a close time for all birds, beasts and fishes, for re-production, is the first and fundamental law of all game legislation.

Yet we have time only to touch lightly here, and proceed to the next way of hunting, which is called still-hunting or creeping here in America, but stalking in England, and which calls forth in the hunter the highest qualities of his art. A white man needs a slight snow to track his quarry within shooting distance; but it is marvellous to see an Indian throw himself upon the ground, and just where your heedless foot has passed, spread apart the dead leaves, and show you the impression in the soft earth of a moose's

foot. There it is plain enough now, in all its beauty: two sharp pricks for the toes, two little parallel mounds, moulded by the concave double hoof. Flat upon his face he is noiselessly worming himself around to find its direction; and he presently tells you a large bull has passed an hour ago,—he was going very slowly,—he is about a mile ahead, in a south by west course,—that the wind is right down upon him,—that you must make a long circuit and come upon him against the wind,—that you must put your pipe out, not even whisper, and follow him at a little distance, avoiding every broken branch,—and that he will give you signs by his hand!

Humbled by having such a page of forest lore taught you, from what, to your dull Saxon senses, was rotten bog and dead leaves, you follow your guide, now sliding betwixt the tree boles, with his right shoulder overhanging, his gun carried well forward, and his elastic moccasined foot avoiding every rotten branch. For an hour or two, he carries you through swamps, through barren, over hard-wood hills, and over wet meadows, until with a motion of his hand he tells you that the deer is now half a mile direct to windward, and he points his hand: you look in vain, till almost contemptuously he says, “them branches, move against wind,” and then you see some branches rudely agitated by the unseen deer in browsing. Down on his face he goes again, worming himself like some huge noiseless anaconda, dragging his gun after him; you clumsily follow him till you get within a hundred yards. He beckons you to him, and there you, lying upon your face, see within range a huge antler, tossing up and down, a great yellow ear flopping up, or a grey crest of coarse hair, over the thick alders. Your Indian says, “now!” and you give him one barrel of your breech-loader. “Too high—long range gun, always go high!” he says, as a scud of hair and dry leaves, drifting to leeward, show you have missed; yet the deer is not much alarmed, he sees and smells nothing. Springing up he usually makes water, then goes off in a long trot. As his huge fore shoulder comes out, bang goes your Indian’s muzzle loader, followed by your second barrel; with a frantic bound he breaks cover, and plunges into the forest. Your Indian has reloaded, and springing to the spot, whilst the

smoke of the gun is still lazily floating around, he picks up the flakes of bloody hair, points out the blood spattered leaves, the broad trail and the long slides in the wet moss, of the already yielding limbs, and says in his quaint terse broken English, contrasting so favorably with what I have heard sportsmen call, "white fellows' gab," "got it bad, worse sort." As indeed the bull has this time,—right through the lungs cutting the great blood vessels, have both bullets gone. A half hour's search shows you your victim, sitting like a dog on his haunches, his mighty head all too heavy for his trembling limbs, his tongue thrust out, and bloody foam snorted from mouth and nostril, in convulsive throbs. This is indeed sport of the highest order—yielding indeed in personal danger to tiger hunting in the East; but in endurance, in self-denial, and restraint, in quickness of eye and promptness, and precision of hand, but, above all in wild luxuriance of northern scenery,—either magnificent hemlock or pine, sweet sylvan, lily carpeted lakelet,—whirling rapids caught by a beaver dam,—or vast, purple-berried barren—nobody's home but the owls or the foxes—is second only to the chamois hunting on the Alps.

There is a third kind of hunting which we will briefly notice—following the deer on snow shoes. When the learned Lescarbot, in 1606, was at Annapolis, he tells us the Indians took him to see a moose pulled down by large dogs about two leagues in the forest. The Indians are gone, the Frenchmen have followed, yet the moose and the big dogs still remain to the Saxon conquerors. From that time this manner of chase has been handed down, and two hundred and fifty years afterwards, I have seen the big dogs pull down a moose on this very ground. From the last week in February to the middle of March, the snows from being heated by the warm suns, and frozen at night, acquire a crust, hard enough to bear dogs, and men on snow shoes, but which the moose breaks through. Whenever this takes place, a party of settlers form a hunting party. Four or five men with eight or ten dogs, (a half Newfoundland crossed by a bull dog is the best, combining the broad soft foot of the one with the courage of the other) leave their homes by the dawn of a bright March morning. Each man carries his gun, an axe, and eight or ten pounds of meat and hard

bread, slung on his back in a bag, with a tin pint mug hanging to it. Perhaps a two hours walk through snow-paths, brings them to where they suspect a moose yard. Each man now laces on his snow-shoes, before dangling at his back, and the ardour of the dogs can scarce be restrained. Some scent the snow, others sitting on their haunches with their noses high in the air, snuff every suspected breeze, others again standing completely upright upon their hind legs. An old bitch will now give a cry, and start straight as an arrow through the underbrush, and disappear. She is followed by the whole, and soon the forest rings merrily with their tongues, as they have struck the track, where some moose perhaps an hour ago has passed, leaving deep holes in the snow. Every one pushes to the front. The forest is one vast white sheet spread before you, losing itself among the tree boles. If the dogs are good, or the moose a young cow, they may rush upon her, and hold at bay, till the hunters come up. But if she ever gets the start of them, they never reach her again, till twenty or thirty miles chase has brought her strength to the last gasp. But this one is a strong and cunning quarry. He has got well away from the dogs, their cries sound fainter in the distance; and the hunters recovering from their spurt, settle themselves to a steady space. There is twenty or more miles before them; night will fall upon their tracks. The dogs now fall in by twos and threes, and follow in the back tracks. The cunning deer keeps now in the soft green woods and fir plantations; the crust is less sharp to his legs. But the going is heavy for the men. Two hours, may be, he baffles them before they push him out of his cover. He tries a swamp now and the whole party comes to a stand. His tracks are lost beside a running brook. He has bounded from the banks into the stream, leaving not a sign. The party breaks into pairs, some hunting up stream, some down stream, till a loud shout soon calls all to where he has sprung from the bed of the stream upon the banks again. The white snow is soiled by the muddy water dripping from his flanks, and the hunters view with pleasure the blood stains from his bleeding hoofs. Yet he is off with renewed vigour, and leads over hard wood hills, down precipitous banks, and coming to one of those forest lakes



stretching, reach after reach, with many a jutting point, for a mile or two, takes the ice. Off goes every snow-shoe, and with moccasined foot, they follow his deep scratches, and a blood red line reaching from beneath their feet, till it loses itself in the far distance. The pursued and the pursuers rejoice on the hard surface, but it comes to an end, and he is again in the soft wood. Many an anxious look is flung at the fading light, the long shadows of the trees, and the red west, and again at his bleeding tracks, smoking dung, great scoups goudged out of the snow by his teeth, and deepening groove made by his tired hock in the snow. They are pressing him hard, but the low wintry sun is leaving them. As they are passing a running brook where water can be had, the captain of the hunt says, "we must camp, and take him to-morrow." A fit spot is chosen,—a square perhaps twelve feet by five, is marked out on the snow,—the snow is shoveld out by snow-shoes till the ground is reached. This is speedily roofed over by uprights stuck in the snow,—cross pieces, and poles reaching from the ground to the cross pieces, and thatched by spruce branches. The back and two sides are covered in, but before the front roars already an immense fire. You line your snow hole with branches, and creep into it, with the fire blazing about three feet above you. In two or three hours it has melted the snow beneath it, and settled down to your level. Had you not dug out your snow hole you would have found yourself on the top of the snow, and before midnight the fire in a deep pit below you. These hardy men now boil their tea in their tin cups, fry a little pork on the end of a ramrod, and, with hard bread, make their supper, and without an extra covering sleep before their camp fire. I have myself passed the night with the bread in my knapsack on which I pillowed my head frozen like a stone, my tin cup frozen to the brim, and my green hide moccasin buried in the branches beneath me, to keep them from the frost. A half mile beyond, as the noise of men and dogs fades in his ear, has the tired deer flung his red and stiffened limbs to rest on the snow. By day light the camp is broken up, the dogs are laid on, and you pass his soiled and bloody bivouac; but his great strength is failing him—his endurance done. Men and dogs push with irresistible ardour to

the front, as every sign portrays his nearness, his dung still smoking, branches vibrating where he passed, and a breast high scent infuriating the dogs. The foremost hunter, (I have seen him bare headed and stripped to his shirt sleeves, with the thermometer at zero,) soon wipes the sweat from his brow, to take sure aim at the huge beast floundering before him, assailed on nose and flank, and ear, and hock by dogs. It is in vain that he makes such enormous bounds, or that he has killed one of his tormentors, cutting his ribs from his spine by a blow of his sharp hoof. Others rush in, and the snow that ten minutes before lay in its virgin purity is for many a yard tramped down by the great deer in his agony, torn up by the rioting dogs in their fury, reddened with blood, and matted with coarse gray hairs. Your victim lies a motionless heap in the centre, perhaps his thirtieth mile stone. This is a faithful chronicle of a successful hunt, and hard enough at that, but when to it are added all the unsuccessful ones, the storms endured, the cold, and especially the heavy rains, it must be confessed the sport is hard. Yet I have known men entirely fascinated with it. William Dargie, now a magistrate, grown old, and cruelly cut up by rheumatism, and Sam Copland, who met a woodman's death, on the snow and alone, were the best captains of the hunt, I knew. This sport is now made illegal by the close season commencing the first of February. It would be entering into a subject foreign to this paper to discuss this matter.

We will turn, then, to the next subject—the identity of our Moose with the Elk of the ancients, and at present habiting Sweden, Norway, and some parts of Northern Russia. Our moose inhabits a belt of forest reaching from Nova Scotia in the east to beyond the Rocky Mountains in the west, and from about 44 N. Latitude to 70 N. Latitude. Linnæus who described him first evidently considered him a variety of the Elk, leaving his specific difference doubtful. Sir John Richardson inclines to consider him distinct, and mentions the Elk as having a broader forehead. The Royal College of Surgeons determined that there was no anatomical difference between them. But lately Capt. Hardy, R. A., a member of this Institute, returning from Nova Scotia to England, with all his recollections of the Moose fresh, and also his measurements

and drawings, compared them with two young Elks from Norway belonging to the Prince of Wales. In his opinion given in the "Field" newspaper they are identical, and there are no specific differences between them. In the absence of all osteological differences by the Royal College of Surgeons, we must admit them identical, as Capt Hardy's opportunities of investigation, and accuracy, as a naturalist, are second to none. (I may here be allowed to deplore the loss our Institute has met with in this accomplished gentleman returning home.) Granting them identical, we must return to the old specific of Linnæus, "*alces*," he being the first describer. Hamilton Smith has recently subdivided the genus "*cervus*," also Linnæus, into various sub genera, and given the name *alces* to that in which the Elk or Moose is placed. This has been allowed by all modern naturalists; and thus, notwithstanding the alliteration, by the rule lately adopted by all nations, we must call him *alce alces*, instead of *cervus alces* of Linnæus. Nomenclature and classification are subjects too profound for field naturalists to do more than follow those whose profound studies and enormous collections entitle them to be heard on the subject.

I have now, as far as one paper would admit, studied this great boreal Deer existing in our forests,—his appearance when young, and adult,—his habits, and his wide spread habitat in America, and his identity with the Elk of the ancients and Europe. I have sketched lightly the various forms of his chase and capture, and in all this shunned authors, and given my own personal experience. We have found him differing from all known forms by the shortness of the neck, and the length of his cannon bones. He has again resemblances to the equatorial forms of the Elephant in the short neck,—to the Giraffe in the length of leg,—and perhaps to the Tapir in the prehensile elongated upper lip: but no affinity to either of them. It is a form adapted to be always wading, and here again he reminds us of the stilts or long legged wading birds. In summer the shallow lakes and swamps are his abode. In winter his long cannon bones are thrust into the snow. In both places they serve him in seeking his food. An anatomical investigation easily shows how the great weight of his horns are so easily

carried,\* as well also that the bones of the vast head are not heavier than those of ordinary deer. The huge nostrils are cavernous and hollow,—and the pendulous lips with no boney base. This elongation of the cannon bones, both makes him straddling in his gait, and diminishes his speed when out of cover. The hind leg must outstep the fore, and hence it must go outside of it, or straddle. The very short cannon bone of the greyhound with the enormous fore arm, and the approximation to it caused by breeding in the race horse, the very opposite to the moose, show that their forms are the best adapted to fleetness. But on the other hand he strides over every obstacle, mounted upon his huge stilts. It is probable this boreal form so existed with many now extinct forms whose fossil bones are found in the post and upper tertiary deposits. American naturalists have found his fossil bones in the upper tertiary formations in Ohio; and as, so far, they have not been found in the old world, we may claim our Moose as the original type.

With the Caribou it is probable that he was one of the earliest fauna that arrived after the glacial period, and, as far as any existing causes show, he may be one of the last remaining. As in Canada and New Brunswick, he cannot fall back upon back forests. He is surrounded on all sides by cultivation or the sea; and in diminished numbers, he may possibly remain for ages on the shallow lakes, impassable swamps and barrens forming our interior. He can exist on a less range than the caribou; he is less intolerant of the sights and smells of civilization. Nothing but the encroachments of roads, of settlements and railroads, destroying his range, can extirpate him. Our bears trouble him not, nor have we wolves to band in packs to hunt him down; and notwithstanding the Game Protection Society, our settlers do not diminish his numbers. The work is too hard,—there are too few to risk the toil. Now, though coaches do daily run, and taverns fling out their signs

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\*The back of the head being usually carried in a line with the top of the shoulder, or withers, a strong tendon passes between them, thus throwing the weight of the head and horns upon the shoulders. Thus they are not supported by muscular contraction. Otherwise the animal would pass his whole life in adjusting the load, ever varying from nothing to fifty pounds thrown upon his neck.

where a few years ago I could scarcely push my horse,—though a railroad is coming from Yarmouth directly through the centre of the Province,—yet there are places so utterly sterile, so impassable by granite boulder and marshy swamp, as to defy any engineer; so barren as to tempt no one; and here he will make his last hold. He will remain unchanged; and other men, in other garbs, with other governments, will cover with their rifles his fawn colored ears, or branching antlers.

As the princes of Europe follow the urus at the present day in the Black Forest of Germany, so too may an indigenous line of native princes in those days to come, stalk their huge deer in the heart of Queen's or Shelburne.

As with the ruminantia the papers I have had the honor to read before you, on the mammals of Nova Scotia, end, I have thought it well to republish a list of the whole mammals.

I think this list will include all, with the exception of a shrew, or a mouse or two, yet to be added—I know of no other list except my own, and in using the term identified by myself, I only wish to add to it the interest of personal verification. I shall use the classification of Dr. Baird (Smithsonian Institute), with the synonyms of Sir John Richardson when procurable, thus using the best American and English authorities, being satisfied that whilst no one can be but charmed by the accuracy, exactness and minute description of the great English traveller, on the other hand they must equally acknowledge the exhaustive labor of the American naturalist, though they may differ from him in some of his conclusions.

#### CHEIROPTERA,—Bats.

*Vespertilio subulatus*, Say, Richardson,—Say's-bat.

*Vespertilio cinereus*, P. D. Beauvois, 1796, } Hoary Bat.

*Vespertilio pruinosus*, Richardson,

Dr Allen, (Monograph American bats 1846,) puts this last species in the new genus "*Lasiurus*." It is very rare in the Province, whilst Say's bat is very common. Capt. Hardy gave me a bat whose interfemoral resembled "*evotis*" (Allen). I am unwilling, however, to make it this species.

## INSECTIVORA,—Shrews.

*Sorex palustris*, Richardson,—Marsh Shrew.

*Sorex fosteri*, Richardson,—Foster's Shrew.

*Sorex platyrinus*, Baird,—Eared Shrew.

*Sorex thomsoni*, Baird,—Thomson's Shrew

*Sorex acadica* ? Baird,—Nova Scotia Shrew.

*Blarina talpoides*, Gapper, Baird.

*Blarina brevicauda*, Say, Baird.

*Blarina angusticeps*, Baird.

*Blarina cinerea*, Backman, Baird.

*Condylura cristata*, Baird.

*Condylura macroura*, Richardson, } Star-nose Mole.

Of these species *Palustris* would undoubtedly be placed in Baird's new genus, "Neosorex." I have put a mark of interrogation after "*Acadia*," as it is as yet undescribed, except by myself, and may turn out "*Thomsoni*," (see transactions, Nova Scotian Institute, 1864). These long-tailed Shrews are by no means uncommon. Following other authorities, I have distinguished "*Talpoides*" from "*Brevicauda*," and though there is undoubtedly great divergence in colour and size of our "*Blarina*," yet all the typical marks remain the same. I have been fortunate in obtaining a specimen, I believe the second one known of the very rare "*Angusticeps*." Of Moles I have never met with one in the Province. They are represented by the one species of *Condylura* which is common. These Shrews brave the coldest winter—their minute tracks are seen on snow, at least four feet above the frozen ground, beneath which are their holes; through this snow they must penetrate to come to the surface. They are seen swimming in ice-mantled streams. Hunters cutting an ice hole in a frozen stream for a drink have had them darting from below almost into their mouths, and as suddenly plunging in again.

## CARNIVORA,—Flesh eaters.

*Lynx rufus*, Guldensteadt, Baird,—Wild Cat.

*Lynx canadensis*, Geoff, Baird, }  
*Felis canadensis*, Richardson, } Loupcervier.

*Canis occidentalis*, Richardson,—Wolf.

*Vulpes fulvus*, Richardson,—American Fox.

*Mustela pennanti*, Erxleben,—*Canadensis*, Richardson,—Fisher.

*Mustela americana*, Turton, Baird,—*Martes*, Richardson,—  
 Marten.

- Putorius cocognanii*, Bonaparte, Baird,—Small Weasel,  
*Putorius richardsonii*, Bonaparte, Baird,—*Erminea*, Richardson.
- Putorius noveboracensis*, Dekay, Baird,—White Weasel.  
*Putorius vison*, Richardson, Baird,—Mink.  
*Putorius nigrescens*, Audubon, Baird,—little Mink.  
*Lutra canadensis*, Sabine, Richardson,—Otter.  
*Mephitis mephitis*, Shaw, 1792, Baird,—*Americana*, Richardson,—Skunk.  
*Procyon lotor*, Richardson, Baird,—Raccoon.  
*Ursus americanus*, Pallas, Richardson, Baird,—Bear.

Of these fifteen species, we find the Loupcervier, a truly boreal lynx, with its congener the wild cat, a more southern form, and no doubt of much later appearance; the wolf in his white or grey variety, endeavouring in vain to re-habit the Province. During the last sixty or seventy years they have constantly appeared, singly and in pairs, at each extremity of the Province, and then have been unheard of for years. The fox, very numerous, of great beauty and lustre of fur, but subject to nigritism and varying according to its intensity, from the red, to the cross, the silver grey, and black. The magnificent tree weasel, the fisher, its congener, the American marten, only lately separated from the pine marten of Europe, and still more recently classed as a variety of the Russian sable, (*M. zibellina*.) The ermine weasels, (though the common short tailed weasel common in New England is here unknown), the American otter, now separated from the European species, the skunk and raccoon both later in their arrival (almost during our own times), and of a southern form, and the truly boreal form of the American black bear, perhaps our earliest carnivora, and destined to be the latest. His vegetable diet of berries and roots, and his long winter sleep mark him the inhabitant of sterile and frozen lands.

#### RODENTIA.

- Sciurus hudsonius*, Pallas, Richardson,—Red Squirrel.  
*Pteromys hudsonius*, Gmelin, Baird,—*Sabrinus*, Richardson,—Flying Squirrel.  
*Tamias striatus*, Linn. Baird,—*Systeri*, Richardson,—Ground Squirrel.  
*Arctomys monax*, Linn., Baird, Richardson,—Wood Chuck.  
*Castor canadensis*, Kuhl, Baird, Richardson,—American Beaver.  
*Jaculus hudsonius* Zimm., Baird,—*M. labradorius*, Richardson,—Jumping Mouse.

*Mus decumanus*, Pallas,—Brown Rat.

*Mus musculus*, Linn.,—Common Mouse.

*Mus rattus*, Linn.,—Black Rat.

*Hesperomys leucopus*, Rafinesque, Baird,—White-footed Mouse.

*Hesperomys myoides*, Baird,—Hamster Mouse.

*Arvicola gapperi*, Vigors, Baird,—Gapper's Mouse.

*Arvicola riparia*, Ord, Baird,—Meadow Mouse.

*Fiber zibethicus*, Baird, Richardson,—Musk Rat.

*Erethizon dorsatus*, Linn., Baird,—*H. pilosa*, Richardson,—  
Porcupine.

*Lepus americanus*, Erxleben, Baird, Richardson,—Hare.

Of the sixteen species here enumerated we find a tree squirrel, a flying squirrel, and a ground squirrel, all northern forms, two partially hibernating, and laying up winter stores, the other totally disappearing beneath the ground in winter. We find also a marmot peculiarly northern in his hibernation and gross fat. I cannot but think that *Pruinosus* of Richardson will be found only a northern variety of *Monax*. Specimens are found here so very hoary, with the hair on the shoulders so much longer than on rump. I have also seen them flattening themselves on the ground, as Audubon describes *Pruinosus* as doing at the Zoological Gardens, London. To the historical beaver succeeds the sub-family of mice. Of the three introduced species, the common mouse has penetrated everywhere, the brown rat chiefly on the sea-board, and the black rat very rare; I suspect some, if not all, come to us from the West Indies. Our indigenous species so far identified are the very beautiful jumping mouse—the white-footed mouse with his closely allied congener, the hamster mouse, differing only in having a longer tail, and cheek pouches,—and two voles. I think another vole may be added to our list. The jumping mouse and the voles all hibernate, the others but partially, laying up stores of beech mast and grain in hollow trees, and often found lively at mid winter. The musk-rat, porcupine, and varying hare, all northern forms, close the list of our Rodents.

#### RUMINANTIA.

*Cervus alces*, Linn., Richardson,  
*Alces americanus*, Jardine, Baird, } The Moose.

*Alces muswa*, Richardson,  
*Rangifer caribou*, Ham, Smith, Baird, } Caribou, Reindeer.  
*Cervus tarandus sylvestris*, Richardson.

Our list ends with the truly noble, antlered and boreal forms of our two species of deer. Of these the caribou supposed identical with the reindeer of Europe, though not proven, but differing from the barren



ground caribon of the Arctic circle, is becoming extinct the most rapidly. Though following Jardine and Richardson I have given the specific "Americana" and "Muswa" to the moose, there can no longer be a doubt of its complete identity with the Elk of Sweden and Norway.\* Captain Hardy, R. A., a member of our Institute, (than whom there can be no more competent authority,) fresh from studying the moose in the Nova Scotia forest, with all his recollections, drawings, and measurements, has compared him with two young elks from Norway, the property of the Prince of Wales, and pronounces them identical. (See "Land and Water," Aug. 15, 1868, with illustrations.) In Captain Hardy's sketch the forehead appears broader than in the moose. This is the point insisted upon by Richardson as the difference between the two skulls.

In not adding *Meriones (Jaculus) acadica*, (Edn. New Phil. Journal, 1856,) to the list, I owe it to so learned a naturalist as Dawson to explain that the specimens upon which he founded his new species, and which he obtained from Mr. Winton, Halifax, were prepared for myself, and described as the young of *J. hudsonius*, (Zimm.,) in a lecture before the Mechanics' Institute, Halifax, about 1850, and that though being unwilling to differ from him, and still more unwilling to lose a mammal from our Province, I still retain my opinion. Of animals not identified by myself, but sometimes to be found in the Province, I think the Virginian deer (*Cervus virginianus*) will be found in the Cobequid hills, as I personally know they have been taken at Dorchester, N. B., near the boundary line. There is a tradition of a wolverene (*Gulo luscus*) having been taken in the same wild country. A large black squirrel skin (*Sciurus carolinensis*) with nigratism, was given me from Cumberland. Of the Pinnipedia or seals and Ceteæ or whales, I have identified none. From the labours of Dr. Gill we unexpectedly learn that our common seal is identical with the European, (*P. vitulina*,) and the harp (*P. groenlandica*,) and the grey seal (*H. griseus*, Neilson,) are all common to each continent. This identity running through the fish, amphibious mammals, the sea birds, and larger land mammals, seems a good proof of our common glacial period and gradual emergence. Of extinct species, during historic time, we may enumerate the walrus, with its

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\*Since this was in press Sclayter in list of vertebrates, Zoological Garden, 1872, gives *alcea*, *nachlis*, considering them identical.

companion of another class, the great auk. Of prehistoric remains, I only know the solitary gigantic thigh bones of a huge mammal found at Cape Breton. Of those whose early extinction, perhaps in our own times we may reasonably expect, we may enumerate the fisher, (*M. pennanti*), now very rare, and next the marten, (*M. americana*). Both these great tree weasels require dense cover. The beaver, twenty-five years ago nearly extinct, is rapidly recruiting. The less value of his skin since velvet hats have been patented is not sufficient to account for his re-appearance. The few or no Indians now trapping in our forests is perhaps another cause. With these exceptions, allowing the same influence to exist, I see no reason why we should not retain our present fauna for centuries, including the large ruminants. Our last arrival was the wolf, endeavouring in vain to rehabit his old domains, to whom the skunk and the raccoon alone give precedence. All these coming in to us from the wild region of the Cobequid hills. Of introduced species, with the exception of the mice, we have only the horse (*E. caballus*), and the rabbit, (*Lepus cuniculus*). Both these species have been allowed to assume the feral state on Sable Island, a desert island about ninety miles south-east of Nova Scotia, in the Atlantic Ocean. Whilst the rabbits in fifty years have returned to one common silver-grey tint with white collars, it is curious to remark how the horse in one hundred and fifty years, the produce no doubt of the New England stock, has returned to the habits and form of the primal stock, or wild horse of antiquity, and reproduced all varieties of color, not only the bay, black and chestnut, but the rarer colors of piebald, duns, isabellas, blue duns, and duns with striped legs and black lists down the back.

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ART. V. ZONES OF LINES OF ELEVATION IN THE EARTH'S  
CRUST. BY ANGUS ROSS, ESQ.

(Read January 8, 1872.)

ELEVEN years ago I was living on Digby Neck, a prolongation of the North Mountain Range, and a district which with its great