

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

(Read April, 1870.)

Castor, Zibethicus, (Linn., Erxleben, Pallas.)

Mus Zibethicus. (Gmelin, Shaw.)

Fiber, Zibethicus. (Cuvier, Richardson, Dekay, Baird,
Audubon, Bachman.)

Musk Beaver. (Pennant.)

Ondrata.

Mussacus. (Capt. John Smith's Virginia.)

THE MUSKRAT.

FROM this small selection of synonyms by which our familiar muskrat has been honoured, it will appear that Linnæus, and the older naturalists, classed him in genus with the beaver, and from his appearance, his habits, and the domes which he constructs, we may well pardon them, especially as at that time the raccoon and the bear were congeners. He was next degraded back to the murinæ or mice, until Fred. Cuvier formed him into a genus composed of himself alone, but immediately following the beaver. The genus *Fiber*. Here he now remains, but the later American naturalists, in removing him from the *Castorinæ* and placing him after the *Arvicolinæ*, (a sub-family of mice,) have returned somewhat to the views of Gmelin, Bodaet, Shaw, and other naturalists immediately succeeding Linnæus. The specific, *Zibethicus*, still remains to him. When we study his figure we distinctly see that in form of skull, in teeth and tail, he so widely diverges from the beaver that it is impossible to class them together, and that in all these divergences he approaches the mice. On the other hand his constructive habits ally him closely with the beaver. We will have to leave him in, to quote Dr. Dawson, of Montreal, "the present chaos of synonyms afflicting modern zoology."

From a medium sized one before me obtained by my son, at Prospect, Nova Scotia, April, 1870, I got the following measurements.

Length of body	12½ inches.
Length of tail..... .. .	9 inches.
Of hind leg from heel to end of toe claw ..	3½ inches.
From tip of nose to eye..... .. .	1½ inch.
From nose to insertion of fore paw..... .. .	4 inches.

In shape he is round and lumpy, narrow in front, and swelling out wider towards the tail, or rather pear-shaped; the head being the stalk end. The head is small, and nose rather blunt, upper teeth projecting over the under and showing outside the lip; the lower lip also not covering the under teeth. The eye is small near the nose and not expressive. The ear very small, round, and hidden in the fur. There are six horizontal rows of whiskers on either side of the mouth, and a series under the chin and above each eye. The fore feet are very short, the carpal, or wrist bones only projecting outside the hair. There is no thumb, but a flat rudimentary nail. The two middle fingers are much longer than the first and fourth, whose nails reach a little beyond the middle fingers without the claws. There are five tubercles upon the palm, two at the base with a deep groove, and three others at the roots of the toes. The nails are long, gouged out on the inner surface, sharp, and of a rose pink colour when recent. Although the fore foot is placed very forward, still it is so short that the mouth cannot be reached until the head is bent downwards. The palms are naked, but the upper parts covered by fine hairs.

The hind feet are proportionately larger than the fore, with five toes, of which the inner is the shortest, the next longest the outer, the next the second inner, while the two middle are nearly of a co-length, and one-third of an inch longer than the second inner. They are all armed with nails of the same description and colour as the fore feet. The soles are black, naked and having one large callosity at the base, and three smaller tubercles at the roots of the toes. The toes are all beautifully fringed on both sides of their entire length, also the sides of the entire foot to the heel with rows of fine stiff hair ending in a tuft. The whole foot appears also as if it had been twisted, or that its sole presented a plane oblique to the plane of the body, and not at right angles with it. The tail is naked apparently, but when minutely examined, covered with small hexagonal scales, overlaid by short hairs. It is roundish at first, becoming suddenly flattened as it approaches the middle, and ending in a fine point, and appearing somewhat nickle-shaped in life. The teeth are stained yellowish red, as to the incisors, and there are two incisors and six molars to either jaw, that is one incisor and three molars to a side. In looking into the mouth, there is a small valve of mucous membrane dropping down from the palate, and a second one arising from the lower jaws to meet it, and immediately behind them, farther down the mouth a hairy tuft; thus forming a complete valve which allows the muskrat to open his mouth beneath the water, without swallowing it. There is also a small tubercle upon the nostril which may serve to close it under water. The fur covering him is of two kinds, a soft, woolly, interior fur, and long shining black hairs on the outside. The basal colour of both is blueish ash. Beneath, on the belly, the fur is light reddish

brown, the under strata where it is occasionally seen, toning down to ash. Beneath the chin light ash, which colour sometimes runs down the mesian line. On the forehead, back, sides of face, and half way down the sides the long shining hairs of dark sepia brown make it almost black, did not the under colour, shewing through at places, tone it off to brown. This fur in season is shining and glossy to a degree, and very beautiful and lustrous. Its cheapness alone preventing it becoming fashionable wear.

You will now from my somewhat tedious description and from my drawings get a good idea of this large rat, but still small animal, with which our Province abounds,—his thick pyramidal figure, very short, and very far forward set on fore legs, peculiar tail and hind legs. Besides the peculiarity of his valvular mouth, which I have already mentioned, and which is well described by Baird, I would call to your notice the very peculiar hind leg. In swimming, after the stroke the leg and foot are brought forward, with a fine oblique edge cutting the water, the fringes on the toes lying close to the toes, like the feather edge of an oar; but in delivering the stroke each toe is spread wide, and the fringes of all the toes, and of the leg, floating off at right angles with each toe interlace and form a very broad web, and capable of displacing a great volume of water. Thus a temporary web is formed and dissolved at each stroke. This fact is not noticed by any writer before, and must be considered a suggestion of my own. I have said he abounds in our Province, in the neighbourhood of our cities, as well as in our most secluded lake basins. Unlike other wild creatures he shuns not the approach of man on his improvements. At Steel's pond, where for many years there was a house, and at Freshwater, they very lately might be seen. I have also repeatedly seen them in Griffin's pond, where I have noticed them swimming in graceful circles with their tails extended behind them, and round head just appearing above the water, with a heap of fluffy fur floating as their back breaks the surface. In diving the head is arched suddenly, the fluffy back disappears, and the tail whips the water with a loud splash. This is the splash which often startles the patient angler on some far woodland darkened stream,—so patient and motionless that the wary muskrat has ventured on his gambols before him. The night is his special time for seeking his food or his pastime, as well as for repairing his houses or making

his holes. In swimming, I should think from his construction, his fore paws are laid close to his breast, like a frog, and that he propels himself like a duck by alternately using either leg. There is often an appearance of sport or play in his motions. At early eve of a summer day, the surface of a small lake seems constantly broken up by their ceaseless gambols; pursuing each other round and round, stopping to bite off a green rush, diving or throwing themselves entirely on one side, and so floating luxuriously along. In this position they must of necessity use but one leg. Presently some one more aspiring than his neighbour will quickly wriggle himself to the top of some rotten water-sodden stake, snuff about a moment, and then take as scientific a header as the biggest old villain of a bull-frog, on the whole water. As regards food he is a vegetable eater, eating the bullrushes, the various water carixes, the roots of the arrow-head, water lilly, iris and sweet flag, and even, according to some authors, the root of the terrible "arum tryphillum," or Indian turnip, of which too, it is said, the bear is fond. Heaven help them, if their mucous membranes are like ours! He comes afoot also into the fields and eats the imported timothy in preference to the native red top and blue joint, though nibbling at all. He cuts off the young wheat, and sprawls over and tangles up more than he eats. The mouths of his holes are very frequently literally paved with the shells of fresh water clams or unios. Audubon, to test them, put sea muscles and unios into the box in which he kept some domesticated. They immediately showed their fondness for them by taking them between their fore paws—like rats or squirrels—says the great naturalist; but we must beg his pardon, as well as Sir Edwin Landseer's, for rats and squirrels, at least American ones, hold everything with the backs of their paws, whilst our little animal holds things in its palms. However, the speedy disappearance of the flesh and empty shells proved him a flesh eater. A young sportsman watching ducks, up stream, on one of our pleasant streamlets, saw a muskrat coming down stream, pushing before her a raft composed of green bullrushes, and well packed. On my suggesting that she was building her nest, "Oh, it is only summer time, they don't build till fall, she is gathering green food for her little ones." To his shame, be it spoken, the toiling mother was too provocative, and the ready gun covered her, but only to rake

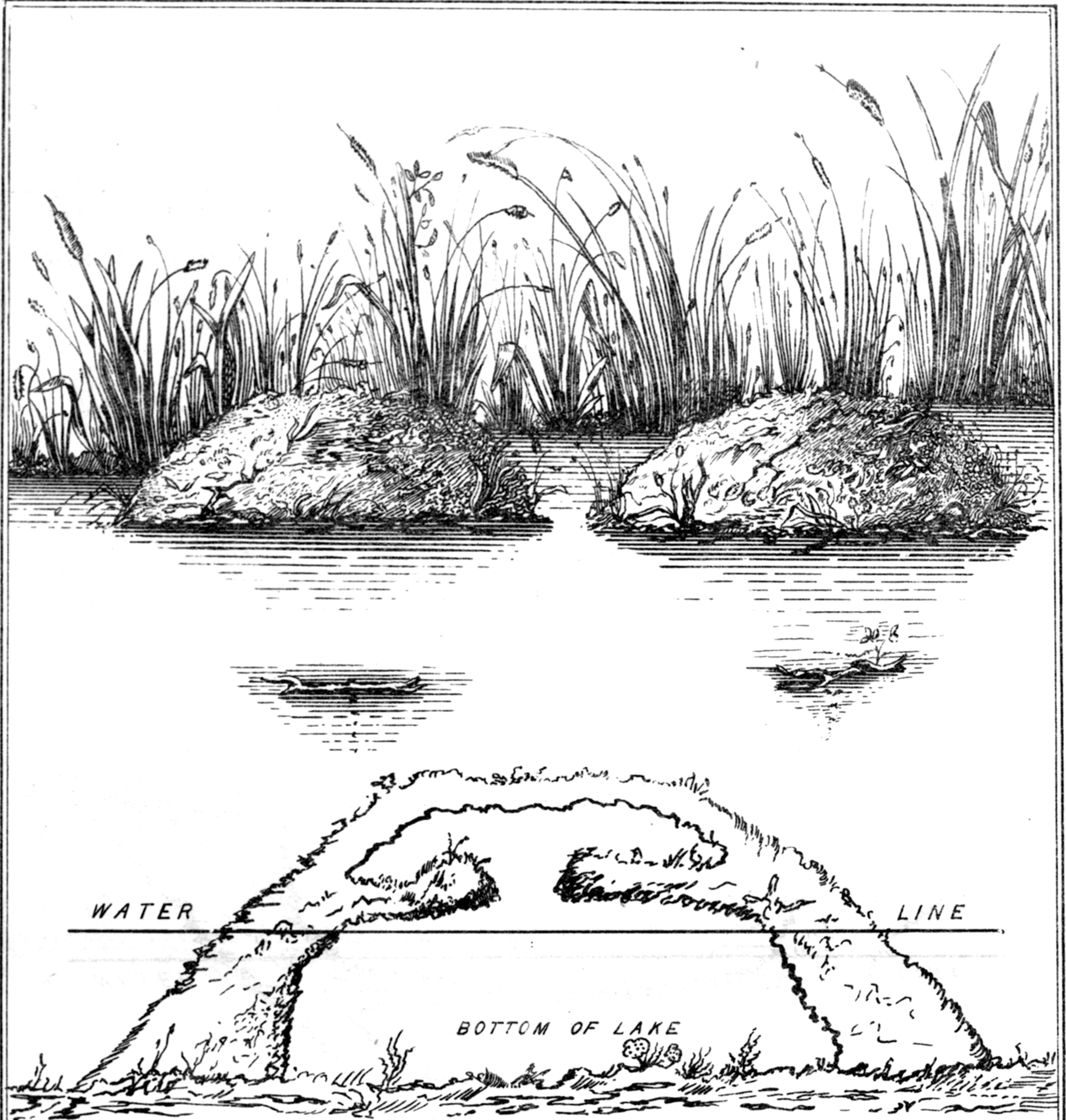
with his shot the water where she swam, and scatter the green raft broad over the whirling waters. Her quick eye caught the flash, though it was a percussion gun, in time to evade the charge.

Towards the fall the muskrats, or at least a portion of them, build houses. It is singular that whilst all have burrowing holes, only a portion construct houses. Allen's River, near Annapolis, running between high clayey banks or artificial dykes abounds with them, yet I never saw a house within twenty miles; whilst at Windslow's lake, near Digby, at least fifteen can be counted within a few acres. Their burrows, according to Audubon, have three or four entrances below the water, all converging in an upward slant to a large hall from which other passages lead inward. The hall is lined with grass, and often filled with sticks, roots and other rubbish. The one he opened was also filled with the stalks of green maize which the rats had plundered from a neighbouring farmer.

The following description of a house or nest was sent me by my son: "There were about twelve nests on Windslow's lake, near Digby. The one I opened was about twenty yards from the shore, and on striking it with a stick I heard the rat leave the upper part, and dive beneath the water with a muffled sound. The depth of water about the nest was two feet three inches. The height of house above water one foot seven inches. The circumference at the water's edge about twelve feet or four feet diameter, but it spread out very rapidly beneath the water. I pulled it all to pieces. The upper room was about six inches below the top, and made of soft dry hay; the house being water tight. The materials of the whole house were flags, rushes, grass, sticks and hay. There were no air holes, but the rats may easily breathe through the hay, as the top is very thin and dented in a little or concave. Had I stepped upon it I should have put my foot through it. Though I kicked it all to pieces the rats will have it rebuilt before morning. On looking down through the nest into the water below, it was all filled with floating sticks and rushes." Thus we have it, a hollow dome, built from the bottom of the lake and standing about two feet above the water, with a shelf or gallery running round about six inches from the top and a foot from the surface of the lake, leaving a large central hole down which he dives and up which he crawls in going from and returning home. It is singular none of the systematic writers

mentions air holes either to the nests or to the burrows, though the burrows must have been begun from the land sides, and pushed towards the water; as it would be impossible for the rat to burrow outside beneath the water, and when the lakes are frozen he must remain in his nest for weeks. He no doubt breathes through the loose material as the beaver must also do. The neighbours about Windslow's lake assert that many during winter burrow beneath the barns and hog-pens, some hundred yards or more from the water; and Mr. Anderson, at Port Piswick, showed me a hole beneath his saw mill in which they burrowed, coming up the mill race. He also told me that a freshet one year covered their nests, and that a large colony of them sought a hay-rick and burrowed into it. It must have been a magnificent dome for them. Lord founds a new species on those facts—the burrowers and the builders, but it cannot hold with ours, as many do both. Still I think the matter needs further research. I surprised one once heaping mud in circles on the ice, in order, as writers say, to rot the ice, and give him breathing holes. This was in New England, and he could easily manage during the soft warm short winter of the Southern Sea coast, beginning after Christmas and ending in early February, to keep his holes open, but in our Province where winter reigns from November till April, and where the two feet water of Windslow's lake is frozen solid, with perhaps a foot of snow ice upon its surface, he can never keep open water. I believe the truth is that, with the beaver, those who resort to their houses hibernate in the severe season of our northern climate. They never breed in their houses but prefer their burrows. In our Province they breed but once a year, having from four to six at a litter. I think it must be a clerical error by which Richardson states them to breed several times a year. The season is too short. In autumn the mother rat is not seldom seen quite afield with four or five little ones after her.

From eight to ten thousand skins are exported annually. The backs serve for muffs either natural or dyed, and were it not for their cheapness their great beauty would have made them fashionable wear in their native lustre. The belly parts plucked, dyed and pressed are so good an imitation of fur seal, that only dealers can detect the difference. The public have long ago accepted it as the genuine article, but I must not betray the secrets of trade.



MUSKRAT HOUSES WITH SECTION.



HIND FOOT IN SWIMMING; MAKING THE STROKE, RETURNING THE FOOT.

This rat inhabits the whole North American continent, westward to the Pacific and southward to Carolina, and so far I believe with the beaver stands alone as a house building mammal. As I before stated, he does not retire from man and his works, but rather increases than otherwise near cities. He is not so sedulously trapped there as in the forest lakes, has fewer enemies, and finding his security in the very publicity of his haunts—he wears the freedom of the city with a charming grace.

More appropriate though to the sluggish sphagnum bordered lakelet, are his cunning circlets and splashy dives; in more accord with the bullrush and its feathery tops are his weather brown domes nestling among their reedy forests, like the lake houses of pre-historic man.

THE CANADA PORCUPINE.

Hystrix, dorsatus. (Linn., Erxleben, Gmelin.)

Erethison, Dorsatus. (F. Cuvier.)

Hystrix, pilosa. (Catesby, Richardson.)

Canada porcupine. (Pennant.)

From these few synonyms it will be seen that this singular animal was first classed by Linnæus in the genus *Hystrix*, containing the European porcupine; in which genus it remained about sixty years, till Fred. Cuvier formed the genus *Erethison* especially for it; although Audubon and Richardson adhered to the old genus, the latter also, after Catesby, using the specific "*pilosa*," yet naturalists have in general admitted Cuvier's reasons to be sound and retained his genus.

A very large specimen examined at Staudigl's saloon, Halifax, measured:—

Total length.....	25 inches.
Length of tail.....	8 inches.
Length of hind paw to tip of nail	3½ inches.
Length of spines.....	3 inches.

This was a very large one, and usually I have noticed they vary much in size. The general colour was black, though a few long coarse hairs, black tipped with white, gave it a greyish hoary appearance. It was covered with spines, from the forehead over the back, the sides, and upper surfaces of arms, legs and tail. The under surfaces of the arms, legs and tail, with the chin, breast and belly, had no spines, but were covered by dusky hairs. These spines were covered and concealed by

dusky hairs, except on the back of forehead, lower third of back and upper surface of tail. In these parts, especially on the back and tail, these spines or quills lay in parallel rows like the teeth of a fine ivory comb. This description is taken from the animal while in repose. When excited hairs and spines, except on the tail, stand in thick perpendicular confusion, the tail being lashed from side to side. These spines are from three inches long to so small a size that you would not know of their existence, unless you stroked the animal backwards or from tail to head. They are white tipped with black. I think he has the power of voluntarily detaching his spines, but not of casting them. His simple defence is striking quick lateral blows with his tail. Every blow leaves some spines sticking to the object it strikes. In figure he has a stout blunt head, ears buried in hairs, a dull eye, yet a sad and expressive one. His neck is short, his back very arched, his arms and thighs muscular, curved and strong. He has four toes and a tubercle or rudimentary thumb on his fore feet, and five upon his hind. Both fore and hind toes are armed with strong nails, and both palms and soles are naked, and fringed by short bristles. The tail is about eight inches long covered by spines upon the upper surface, lying each side the medium line in parallel rows, interspersed by black hairs.

This bristly figure is a solitary one. He dwells in our thickest pine woods. He loves the sterile rocky ridges, crowned with rampikes and dwarfed scrubby pines. Such a ridge runs northeast from St. Margaret's bay, into Hammond's plains. Here in old times one might see half a dozen nailed to the door of the little out-post that covers the highway at Hubleys, on the St. Margaret's bay road. These were the sylvan spoils of the idle lookout. I have both met him in the forest and watched him in confinement. The first time I came upon him we were on the shore of the great Rosignol, our provisions low, our Indians hungry. Three or four wild fellows knocked him over with sticks, scalded, scraped and boiled him in an hour. I accepted a bit of flesh from their dirty fingers to say I had eaten porcupine, but that is all I could say of him. I came upon him again, on the western slopes of the Dalhousie hills, as the setting sun was sending its long beams athwart the pines. To dismount, and after a chase to hold him to the ground by a short stick, and armed with a stout buckskin glove to seize his spiny leg, was the work of a few minutes, and not many more to have him secure in a barrel at a settler's house. He afforded me many happy hours afterwards.

Some years afterwards I met him again in the wild country then, about Liverpool Head, but now traversed by a mail coach

and four. At scarce sunrise of a lovely August morning we came upon a windrow, or where some forgotten hurricane had leveled the forest for acres, leaving the huge and now rotting tree boles overgrown with bush. We stayed our shying horses at the crackling of dead wood and waving of branches, expecting at least to see a bear come into the open. But out came a huge porcupine, going at a slapping pace. I pushed my pony mare into the bush to enjoy, as long as possible, the sight. Over the wind-falls and down the cradle hills he scuttled along,—going well off the ground, head down, tail curled up, with a lift behind in his gallop. Whether it was the morning air or the pace, or the internal feeling of some great business on hand, contrary to usual, his coarse rough hair and spines on his back were erect and horrid. We gave him good speed as his orbicular figure disappeared in the bush. His habits are very solitary. He makes his den beneath logs or stones, going off by day and returning by night. His well beaten road over the snow, from his feeding grounds to his home, I have crossed in winter, and seen young fir trees entirely denuded, standing like skeleton umbrellas out of the deep snow, surrounded by a circlet of their green branches lying on the snow at their base. This is his work. He prefers the tender bark of the hemlock when he can get it, but will take that of other pines. He also loves apples when he can get them, where the trees have sprung up in a forest opening from seeds either dropped by birds or planted by some forgotten settler. He is no fighter, but when he cannot escape, he stands on his simple fence, his head covered by an old tree or rock, his back presented to the foe bristled and spiny, and his tail slowly moving from side to side. However simple, it baffles any carnivorous son of the forest, save the fisher, which is said to run in upon his guard, trip him over and chop his belly, like, I fancy, I have seen a greyhound trip a Shropshire hare on the Longmynde. This is the tradition of the camp-fire as well as the lore of books. The quills barbed at the end with microscopic barbs, never come out, if once fastened into the skin and muscle, but work themselves forward and approach the surface often eight or ten inches from where they entered. I saw one that worked in this way around the back of a child. When numbers are left sticking into the mouth and face of dogs, which is the usual

and most natural place, the poor brute often dies from the inflammation caused. The one I caught upon the Dalhousie hills, I kept in confinement until he escaped. Another which had ventured into the open, and which I rescued from some boys, who were forcing with sticks the position he had taken up beneath a post and rail fence, I also kept. From them I learned they loved the hemlock bark most of all the pines, though lettuce, tender raspberry and young willows were greedily devoured. They eat their food sitting upon their haunches, and use the palms of their fore feet in feeding. Indeed, the fore paws had almost the free circular movement of the bear. Unlike any other mammal they carried the head perpendicularly down, the nostrils presenting downwards. At first I never approached them, but they retired to a corner hiding their heads and erecting their spines; but they soon paid me the compliment of remaining on a peace establishment.

One day Indian Molly peeped over the pen as I was watching my pets. "Indian people keep porcupine, too." "Do they," said I, "and what do they eat?" "I 'spose eat anything, eat bread, eat meat, eat apples, eat potatoes, love soup, and never go so," said Molly, puckering up her mild Micmac face, and holding up her ten fingers and thumbs to show they never lifted their spines, "but run in and out camp like little dog, and never go woods." Many years afterwards I had the opportunity of studying one again. It was about two-thirds grown, and belonged to Mr. James, City Missionary, who kept it at Ainsley's stables. In it were developed, in a much higher degree, the peculiarities I have been endeavouring to show,—the very round back, the head held perpendicularly downwards, and the tail curved upwards. It stood well off the ground, and was very nimble in its actions. It climbed readily, even so small an object as a walking stick or clothes prop, clasping its object with all that beautiful flexibility of fore paw seen in the bear. It amused itself with turning round upon its own axis like a puppy hunting its tail, keeping up a low whimpering cry. It was very fond of being noticed, and I have frequently seen it lying on the neck of a young girl with its curved paws clasped around her throat. It ate bread, apples, potatoes, turnip peelings, in short almost everything, sitting upon its haunches and using its fore paws with the palms upwards.

This little animal will long grace our forests. His only enemy, the fisher, is all but extinct, and the uninviting barrens he loves will never tempt the settler. Seen either winter or summer, his bristly figure accords well with the scene. On a hot August day when crag and moss and rampike, with dwarfed pine on our barren ridges are crackling in the sun's heat, there is nothing drier, nothing so arid as himself, making us think as he does of his African cousin. Or, again, how appropriate to the scene he looks tracking the snow wastes, or sheltering in some snow-loaded spruce, how like a part of the tree he looks, how hard, how spiny, how regardless of the storm that rages over his insensible back, as it does over the insensible tree on which he cowers for shelter.

NOTE.—Of all known animals the porcupine is most infested by tape worm. The intestines are completely filled by them, and this in numerous instances. It is of a different species to the human variety.

ART. VIII. NOTES ON THE MARINE ZOOLOGY OF NOVA SCOTIA. BY J. MATTHEW JONES, F. L. S.

(Read April, 1870.)

I HAVE chosen the above title for the paper I have to bring before the Institute in order that it may be understood that I do not pretend to offer a complete paper on so extensive a subject as the marine zoology of our coast, but merely scattered notes and observations in regard to the several species belonging to separate families and genera, which from time to time I have an opportunity of collecting and identifying. It is better thus to publish these desultory facts as they become known to me than to await the completion of an extended systematic list which can only be consummated by the observations and collections of several years; and more particularly for the reason that the present knowledge of the geographical distribution of marine forms on the north eastern coast of America especially in this northern latitude may be extended with the least delay, for it may be said with truth that the shores of our Province are almost untouched ground. When sufficient species are collected a synopsis may be made, but until that event is accomplished, I will (D. V.) proceed with a system of occasional notes.