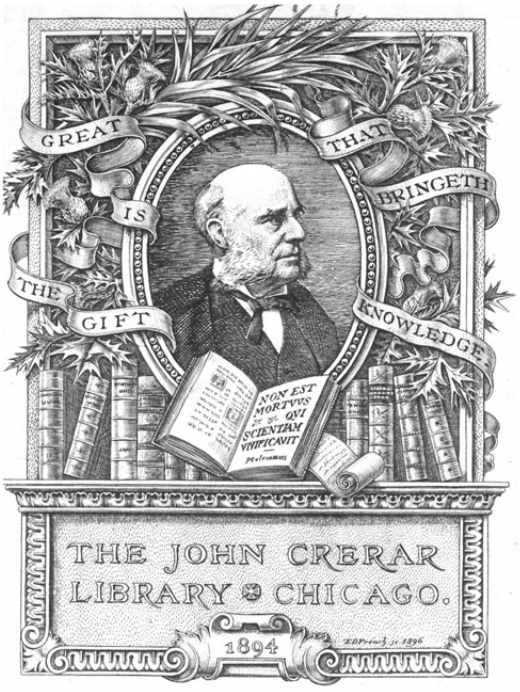
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AMERICAN CERVUS:

PAPER

READ BEFORE THE

Ottawa Academy of Natural Sciences,

MAY 21, 1868.

BY JOHN D. CATON, LL. D.,

LATE CHIEF JUSTICE OF ILLINOIS.

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AMERICAN CERVUS.

Read before the Ottawa Academy of Natural Sciences, May 21, 1868, *by* Hon. J. D. Caton, LL. D.

The study of natural history has hitherto been quite superficial in many of its important branches, while in others it has lately been pursued with a patient care and judicious observation, which promises to be quite exhaustive. Perhaps no branch has been more neglected than the quadrupeds of our own country. This may be attributed to the want of facilities, by those who have written on the subject, for that careful and patient observation which is indispensable for a full comprehension of the organization, habits and peculiarities of the various quadrupeds which should interest us. This must be a divided labor, for it is too great to be accomplished by any one or any hundred individuals. When a thorough interest shall be awakened on this subject: when scientific societies shall comprehend the magnitude of the field thus spread out before them, and address themselves in earnest to accomplish the work; when they shall comprehend that the superficial observations which will merely enable one to classify the different genera and species and furnish a few facts which serve to amuse and interest a mere sportsman, without really instructing the careful student, will not satisfy the demands of science,—then we may hope that a beginning will be made of that patient study which may, to some extent at least, accomplish so great a work.

My own observations upon two species of the Cervus

family, and comparing them with the best published authorities, have led me to appreciate how entirely defective is our scientific knowledge in this department. I have had considerable facilities for the last six or eight years to make careful observations upon the common or Virginia deer and the Wapiti deer or elk, and yet I have made but a beginning in the observations necessary to an exhaustive scientific comprehension of the subject. From this we may appreciate how great is the work to be done before the scientific world shall have accomplished the task of laying before mankind a full knowledge of the quadrupeds of America.

The most approved work we now have on this subject is that by Audubon and Bachman. They accomplished, perhaps, all they promised—that is, a classification of the quadrupeds, with a few anecdotes of the most important to amuse us. Wherever they have attempted to go beyond this, (at least in the cases of the two species I have named,) they have fallen into many errors, some of which, in the course of my remarks, it will be necessary to notice and correct. I do not mention this censoriously. The task they undertook was so great that it was impossible that they should do more than they have done. They have laid the scientific world under great obligations, and have reared to themselves a great and lasting monument.

The superficial marks which assign to each of these species its appropriate classification are properly described. Yet this description is generally from a single specimen, while in fact individuals differ very widely, both in color and form; so much so that even among the few I have in my parks we might almost persuade ourselves we have distinct varieties. Among the fifty or sixty deer which I have there are three distinct shades of color, which also seem to be characterised by a peculiarity of form. The

lightest colored have long legs and long slim bodies; they have the largest horns, do not fatten readily, and are more wild and restless than the others. The next are of a considerably darker shade; in some instances quite black along the top of the neck and down the back, and a black tail, as distinctly so as the California deer. They have frequently other black marks. I have one specimen with a distinct black line over each eye, of a triangular form, pointing towards the ear; and several others in which this mark is quite visible, though not so conspicuous, giving them rather a ferocious appearance. This variety has short legs, rather short, heavy bodies, are very tame, and always the fattest in the park. The smallest variety, both in size and numbers, is of a distinct russet color, and has less white under the throat and belly than either of the former. In one specimen the white is nearly wanting beneath the lower jaw, and there is very little under the neck. They are not so wild as the first class mentioned, but are more timid than the second, and in their disposition to fatten seem also to be intermediate between the other two.

There seem to be distinct classes of the elk, which are as manifestly hereditary as those of the deer, especially so as to form and size. Of these I recognise among those in my parks two classes, varying in form and size, but not materially in color, except one large sized doe, which I consider quite exceptional. When I purchased her, four years ago, she had several large white spots distinctly defined, but of irregular shape. Every year subsequently she has had these white spots, but never since as distinctly marked as then. As she grows older the white hairs have become more evenly dispersed over the whole body, till now she may be called rather a gray than a spotted elk. In none of her progeny have these white spots been

observed. Nine of the twenty-one elk in my parks I have purchased, and from three different sources. One variety is much larger and has longer legs, and is much more graceful in form and carriage than the other. The largest variety seem to be the most hardy and fatten the most readily, and are less vicious.

The most marked difference in physiology between the deer and the elk is found in the coat or outer covering of hair. The deer, unlike most other animals, sheds its coat twice a year; and it is a little remarkable that Audubon and Bachman have neglected to mention this interesting characteristic, which is so well understood by every frontiersman, and must have been well known to them. In the spring, about the time other quadrupeds shed their winter coats, the common deer is divested of the costume of heavy, tubular hairs which has protected it through the winter season, which is succeeded by a thin, rufus colored coat, much firmer, shorter, and more solid than the one of which he has just been divested. As he parts with his winter coat, his fat also leaves him. He has less spirit and vivacity, is more solitary in his habits, and altogether seems to be in poor health. These characteristics are observed while he continues to wear his *red* coat, as it is called. This is not confined to either sex or any age, but is universal, as well with those which have been emasculated as to the perfect animal. It is not attributable to the parturition of the female or the growth of the horns of the male. It is observed equally with the wild deer of the forest and those partially domesticated in parks.

In the month of August the deer begin to improve sensibly, and then they begin to shed the red coat, which, during the month of September, has entirely disappeared, and is replaced by the *blue*, as it is called, which at first is

short and fine, but by winter attains a length of two inches or more, and each hair has more than doubled in diameter; and in our latitude the hairs continue to increase in length and size till the month of February, forming a very dense, heavy coat, effectually protecting the animal from the storms and rigors of winter. Indeed, so perfect a non-conductor is this natural covering, that small bodies of snow, which the animal had failed to scrape off from the leaves in making his bed, remain all night under him without thawing. This blue coat, as the season advances, assumes a sensibly lighter shade. I have observed, also, that, as the animal advances in age, the blue coat grows a shade lighter each year.

I may here remark, that the diversity of colors by which I have ventured to distinguish different classes of deer in my park, is confined almost entirely to the blue coat. But very little difference is observed in the shade of the red. A very light coat of fur is disclosed upon the deer under the long, coarse hair which constitutes his principal dress.

A considerable majority of the deer have more or less white upon the foot, rising up in a narrow strip from between the hoofs for an inch or two, and sometimes extending in a border quite around the hoof. In different animals the amount of white upon the feet is quite diverse, and is not even uniform on the same animal. Some of the feet may have more than others, and in many specimens I have found it entirely wanting. This is more frequently the case with the smallest or rufus colored variety than the others.

The covering of the elk also forms an interesting study. The general characteristics of the hair are almost identical with those of the deer. They are coarse and hollow, and of an elastic, spongy texture. They vary in length from six to eight inches about the neck, where they are

deer is the fact that, while the latter has two coats a year, as already described, the former, like most other quadrupeds, has but one peelage. The fawn of the elk, however, which, when young, has a spotted coat, something like the fawn of the deer, though much less brilliant and beautiful, when about three months old, like the fawn of the deer, sheds this more ornamental coat, and takes on one of the hue which he is always after to wear, except that it grows a shade darker each year, till it is two or three years old.

My observations do not quite agree with those of Audubon and Bachman, that the yellow patch on the rump "is but scarcely perceptible in a specimen two years old, and in one eighteen months old it was not visible." Without an exception, in my parks, the mark distinctly appears with the coat succeeding the ornamental one, so that it can be recognised as far as the animal can be seen, though the contrast with the surrounding hair becomes more marked as the animal grows older; yet this is as much due to the deepening of the darker shade of the one as the lighter shade of the other.

The most remarkable characteristic of the covering of the elk is the heavy coat of fur underneath the hair. The microscope discloses this to be a true fur, as well as that of the deer before mentioned. When compared with the fur of the otter side by side, it is undistinguishable, except in size. It appears to be about half as large again. It has the same rough, knotty surface, and both alike terminate abruptly at the extremities, without any taper at the end. It is difficult for the naked eye to see the extreme point of the hair, while it readily detects the end of the fur. With the elk the greater portion of the hair is first shed while the fur still adheres, which finally peels off in large patches, and may be gathered in bushels from shrubbery in the park. When this peelage takes place, it

almost black near the ends, to two inches upon the back, where they are lightish yellow and grey near the extremities, and of a much lighter color below. This shade varies much in different specimens, in some being a dark brown underneath, while they are a light yellow for half an inch at the extremities.

Under the microscope, the hair of both appears to be as near alike as possible, except in the elk the hair is more crinkled. They have very smooth surfaces, with the slightest appearance of infinitely fine scales or checks. At the outer ends they taper for about one quarter their length, to a point as sharp as a needle. They taper very rapidly for a short distance to the root, which is in length about ten times the diameter of the hair. Assuming the root to be two and a half inches long, which is about the appearance under my instrument, and its diameter an inch below the surface of the skin is a little less than an eighth of an inch, while at the bottom of the root it is nearly twice that size, and is rounded off at the extremity. In form it much resembles the pipe of an ordinary syringe.

The very extraordinary feature of the deer in his eyelashes, I should perhaps never have discovered but by accident. I happened in the park on a frosty day in winter, and was soon surrounded, as usual, by my pets, and was surprised to observe that the eyes of each were covered with a sort of network of hoar frost. Upon examination, I found that each eyelid was provided with a system of very fine jet black hairs, about two and a half inches long, those from the upper lid curving irregularly down, so as to project completely over the eye. These are undistinguishable by the casual observer. They were now covered with frost, presenting a novel appearance, and hence at once attracted my attention.

The most striking distinction between the elk and the

leaves the skin almost naked, the new coat hardly having made its appearance. With his comfortable covering, the elk seems quite indifferent to the most rigorous winter weather or the severest storms of sleet.

I now come to the most interesting feature of the physiology of the Cervus family; for, although I have only had an opportunity of examining critically two members of the family, I have no doubt that the facts I have observed in these will be found to hold good with all the others. I allude to the horns.

Until very recently the horns of the cervine group have been supposed to be distinguished from these of other ruminants by two striking characteristics: first, that the horn is perfectly solid; and second, that it is deciduous. It has been recently proved by Mr. A. D. Bartlett, superintendent of the Gardens of the Zoological Society of London, that we have, in this country, an intermediate link between the solid horned and the hollow horned ruminants. This is the Prongbuck, or Rocky Mountain Antelope, of which I have hitherto been able to procure but one specimen for my parks, which I unfortunately lost after about six months, and before I had time to make those careful observations upon it which are necessary to a proper comprehension of the subject. This beautiful animal has long been known to have a hollow horn, but Mr. Bartlett, by observations upon the buck in the Society's gardens, discovered that the membrane between the shell of the horn and the core, at the proper season, commences to grow, lifting the shell from its seat, till finally it drops off, leaving the pith covered with a thick vascular membrane, coated with a coarse hair, not indeed at all resembling the soft, delicate velvet on the growing horn of the Cervus family, still precisely answering to it. This membrane continues to grow till finally it matures into a new and perfect shell, becoming

divested of its coat of hair and vascular appearance. In London the horns were dropped on the 7th of November. Probably in their native wilds this operation is deferred till the spring, else the frosts of winter would destroy the new growing horn.

But to return to the proper subjects under consideration.

Only the males of the deer and the elk are provided with horns, although, in most specimens of the female elk, there is a sharp, bony protuberance in the place of the horn, which is a sort of rudiment of that appendage. While the horn, with these animals, is the weapon of fierce warfare, it is not usually resorted to, except in cases of slight demonstrations or in real emergency; but this is more strictly the case with the deer than the elk. When all questions of superiority have been settled and acknowledged in the herd, the fore feet are the weapons in use, as well by the bucks as the does. If one attempts to drive another from an ear of corn, and the latter is inclined to resist, instead of locking horns over the coveted morsel, both will rise upon their hind feet, when a few active passes are exchanged in true pugilistic style, always resulting in the success of the aggressor, from which I infer that the real question of superiority has been already settled.

There is a marked difference in the phenomena of shedding the horn between the deer and the elk. With the former there is much less uniformity in the time of shedding than with the latter. In 1866 not one deer in my parks carried his horns through the month of December. Last year not one had lost his horns in December, while most of them were dropped during January, and two of them were carrying them on the 7th of February, 1868, when I caught and sawed off the horns of one, as I shall subsequently mention. They then seemed to be as firmly set upon his head as ever. One of these stubs was shed

on the 27th, which was reported to me by the keeper, when I directed him, if the other was remaining in the morning, to seize hold of it and try and pull it off. I found it on my table the next morning. He reported that it came off with but little resistance, but the animal dashed away as if considerably hurt, and when he came up in the evening the seats of both horns were covered with coagulated blood. One year I noticed that nearly all the bucks carried their horns till February, and quite a number till March. I have sought, without satisfactory results, for the cause of this difference in the time of dropping the horns. The season when they carried the horns the longest, the weather was not remarkably cold, but they were in rather poor condition, having depended principally upon what they could pick up in the parks. At the time when they shed their horns so early, they were in about the same condition as the former, nor had the winter been very cold. This year, when the horns have fallen sooner than the first instance mentioned, but were carried longer than the year immediately preceding, they have been fed very high, and are all very fat. There certainly is a cause for this difference in the times of dropping the horns, either in the temperature, the condition of the animal, the variety of his food, the supply of water, or some other not suspected circumstance, which I hope yet to discover.

Audubon and Bachman state that the new horn of the deer commences to grow as soon as the old one is shed. This is not so ordinarily in our latitude at least, as I shall presently show.

The blood continues to circulate through the horn till pretty near the time when it is shed. After the horn has become quite matured and its blood vessels quite closed, so that the blood can no longer penetrate it, the edges of the seat of the horn manifest a change, com-

mencing to swell out and show imflammatory action, and, around the edges, the horn begins to separate from its seat to a limited extent, and in this seam of separation are deposited several layers of a bluish substance resembling that of the hornet's nest, often seen suspended from the limbs of trees. I think my observations justify me in asserting, that the horn is loosened by the action of the blood below it, which no longer finds admission to the horn itself after it has become fully matured, and that the animal carries his horns but a few weeks at most after it has become thus matured. The horn proper does not commence growing on the deer as soon as the old one is shed, but the seat of the horn remains a bald, naked patch till most of the heavy frosts are over, and they can begin to find a little young vegetation, usually in the month of April in this latitude. When the dormant blood vessels at the seat of the horn begin to assume vitality, a vascular membrane is formed over it, covered with the rudiments of the velvet. This rises up very slowly at first, but presently assumes the form of a column of the full diameter of the perfect horn, rounded at the top like the rising column of mercury in the barometer. Till after this is an inch or two high, the velvet upon it is usually very short, and then showing the bluish purple substance gorged with blood apparently in a high state of inflammation. The growth becomes more rapid as the season advances. For some time the column rises in a single stem; at length the upper end begins to widen, and soon the rudiments of an antler may be seen, which presently becomes distinctly developed, and progresses *pari passu* with the main stem, which again, at the proper time, widens out at the extremities, and then puts out another antler, and then another, till all its branches become completely developed, when all grow on to perfection together. The horn grows only in length.

not in diameter. The velvet of the horn gradually increases in length and thickness up to the very time when the external growth of the horn is completed, when the blood gradually ceases to circulate through it, though it is generally rubbed off by the animal while the vascular covering is still saturated with blood, though sometimes shreds of it continue to adhere through the year. I have a horn before me now, dropped from a perfectly healthy animal three years old, upon three inches of the extremity of which and down to the upper antler, together with that antler two and a half inches long and the broad palm at their junction, the membrane is unbroken, from the lower part of which shriveled shreds are pendent, possessing a considerable degree of tenacity. Where this membrane upon the horn is unbroken, in external appearance it much resembles a thin sheet of gutta percha drawn over the horn. Nearly all the fine hairs constituting the velvet covering are gone, leaving a black, polished surface. No doubt this covering would always remain upon the horn, but for the instinctive habit of the animal to remove it by rubbing against small trees or saplings as soon as it has attained maturity, and while it is completely saturated with blood. I have never observed them at the commencement of this process, but I have noticed them when it was but partially completed, when the membrane was hanging in shreds from the horns, which were all covered with fresh blood, with which the shreds were also saturated. They seem to have a choice in selecting the trees for this exercise—more sugar maples than all other trees are thus peeled and polished, then basswood, and then wild appletree. Of these latter trees there are comparatively few in my grounds, while they rarely use the oaks and birches, though these are the prevailing trees where they range.

The horn, in its early growth, seems to possess a

fever heat, but this gradually diminishes as the horn matures. It also seems to be furnished with a complete nervous system, for the young horn is exceedingly sensitive. It bleeds at the least abraision. This sensitiveness diminishes as the horn matures, till I think it has quite disappeared when the velvet is ready to be detached.

It would be interesting to study the progressive structure of the horn itself, but to pursue this thoroughly would require the destruction of a number of animals, which I have not yet felt inclined to do. I have, however, been able to get considerable light on the subject by observation upon the horns of imperfect animals which have been broken off, as I shall presently notice, and by sawing off apparently matured horns of perfect animals.

Before I proceed to that branch of the subject, I must note the difference between the elk and the deer as to the time of shedding the old horn and growth of the new.

From some cause, not yet thoroughly investigated, there is great diversity among the deer as to the time of shedding the horn, ranging from the first of December to the first of March. It is not so with the elk. They all shed during the month of April, or as soon as they are able to crop a little fresh vegetation, when the new horn immediately commences its growth, scarcely three days elapsing before it has made a suitable start. About the same time, also, the horn of the deer commences its growth. The description of the progress of the one will answer for that of the other, only the horn of the elk usually matures, so far as to disengage the velvet, a few weeks earlier than that of the deer.

In both species the first horn appears when they are about one year old, and usually the first horn is what is called a spike—that is, it has no prong or antler. In specimens which are dropped early in the season, the first

horn attains a considerable size, and so far matures as to shed the velvet before winter sets in, and, in some cases, more commonly with the elk, a prong puts out, frequently four or five inches in length. In the spring of 1867 I had three very fine specimens of elk, with their first horns, from which the velvet had peeled in the November previous. The horns of two of them showed fine prongs. One of these I presented to the Central Park, New York. The other had the longest horns of the three, but no prongs. One of these horns I have now before me. It is twenty-five inches long, following the curve, and weighs thirteen ounces, after seasoning nearly a year. With specimens dropped later in the season the horn is proportionably smaller, and frequently does not peel till later in the winter or spring. I have now two specimens with spike horns, on one of which they are about ten inches long and the other not more than two and a half inches long, which were peeling in the middle of February.

Invariably I have observed that the second set of horns of the elk—that is, the growth when he is two years old past, have the brow and the bez-antlers in perfect form, and one or two antlers above them. So, also, the second horn of the deer nearly always has the brow and the bez-antlers, but very rarely more.

There is nothing reliable in the quite common supposition, that the number of antlers on the horn of the deer will indicate his age, one on a horn answering to each year. It is not uncommon for one of the same age to have twice or three times as many prongs as another, though, as a general thing, the most prongs are formed on the oldest animals. I have never had one in my parks with more than five points to the horn, while I have two sets in my possession from deer killed twenty years ago, one by Mr. Mackey and the other by myself, the former

of which weighs five pounds and one ounce, and has, on the right horn, twelve points or eleven prongs, and on the other eleven points. The other set, which was from a deer killed by myself, weighs five pounds and eleven ounces, and has six points on each horn, also the stub of a prong broken from the left horn. On each of these horns the brow-antlers are pronged. One of the prongs on the brow-antler of the left horn of the largest set is five inches long. Here we see that the largest horns had only about half as many prongs as the smaller ones. Altogether they are the finest specimens I have ever met with. In general appearance they are much alike, and I presume were from animals of about the same age, and fully matured.

Audubon and Bachman say: "In connection with this "subject, it may not be uninteresting to notice the effect "of castration on the horns of the buck. When this ope- "ration has been performed during the season when the "horns are fully grown, it is said they are not dropped, but "continue on the head for many years; when the opera- "tion has been performed after they are dropped, there is "no subsequent growth of horns, and the head appears "ever afterwards like that of a doe."

I quote this to show how imperfect hitherto has been the knowledge of the most eminent naturalists of the physical habits of these animals under certain circumstances. I have experimented in this direction with many specimens of the deer of various ages, and with two specimens of the elk, one four and the other five years old. If the operation be performed on either species when the horn has become hard, whether immediately after the velvet is shed or in mid-winter, invariably the horns drop off within thirty days, and the seat of the horn remains naked till the following spring, when a new horn commences its growth

at the same time when the growth of the horn commences on the perfect animal, and the growth progresses at about the same rate till the velvet is shed from the horn of the perfect specimen, at which time the growth nearly ceases upon the mutilated animal, but with the latter the circulation does not cease in the vascular covering, which does not dry up and peel off. The horn retains its velvet covering, it continues warm to the hand, and is carried by the deer till severe frosts have frozen the horn through, when it *breaks* off quite close to the head as far down as the blood has been congealed, leaving the but of the horn still adhering to its seat, and this never does drop off. This soon heals over even during the winter, the black cuticle covering the wound having but the rudiments of the velvet upon it, frequently showing a raw spot produced by slight abraisions. At the proper time in the spring a new horn shoots out from the old stump, and so is this process repeated year after year in this latitude, where the frosts of winter are always sufficient to freeze through the horn of the deer. If the operation is performed when the animal is young with a small spike horn, the new horn will never exceed the old one in size or length, but will approximately correspond to it; and, if the animal be aged, with horns of several prongs, the velvet horn will correspond both in size and number of prongs very nearly, though rather diminished in perfection of form, and each succeeding year the new horn shows less perfection of form than the one last broken off, although the difference is but slight. Always, when the new horn shoots out from the old stump, that stump enlarges somewhat in diameter, and becomes more and more *warty*, as it is termed, though this is much more the case when the experiment is tried with a young subject than with an old one. The first deer I ever owned, which was as fine a specimen as I ever

had, was sent to me by some unknown friend. He had been emasculated before he was sent, but so recently that one horn, a spike about eight inches long, still remained. At the proper time in the spring new horns put out of about the size of the old, which remained in velvet till late in December, when they broke off. From the stumps new horns again put out the next year, not quite so long, but the stumps enlarged so as to quite make up the full amount of new growth, and so this curious process went on year after year, the stumps enlarging and the main stem diminishing, while the nobs or warts on the enlarged stumps had increased in size and length till October 1865, when I presented him to the Commissioners of the Central Park, New York. At that time his head was ornamented with two large protuberances two and a half inches in diamter, covered over with points, some of them nearly one inch long, while on one side two shafts projected nearly four inches long, and on the other was one not more than five inches long. What changes have taken place with this interesting specimen since I do not know, but I am sure it would have been an interesting study for a naturalist to have watched them carefully. This specimen was exceedingly domestic, docile and playful, and was never happier than when two or three children were hanging about his neck, scratching his head or smoothing down his soft, glossy coat. He would never allow me to take a stroll by myself in the park. Yet he was ever a welcome companion; although, if I sat down in the deep shades of the glen to enjoy the silent solitude and the perfume of the wild flowers, he was soon searching my pockets for a bit of cake or a crust of bread, or a nubbin of corn. I have never seen him but once since, and then at a distance, for the *gentlemen in grey uniforms* would not allow me to approach the fence for a near interview with my old

pet, but he still remembered my voice at a distance of sixty feet, and came as near to me as the enclosure would allow. I know not if two years and a half of separation have destroyed his taste for human society. It is to be regretted that his fitness and manifest fondness for it could not have been more indulged than is probably practicable where he now is. It may be I did Billy a great wrong in sending him to the Metropolis, where his many excellences, I fear, have not been duly appreciated. I hope to see thee again, Billy, under more favorable auspices.

If those who can appreciate a certain class of affections and attachments will pardon this little episode, I will return to the dry detail of facts, which may be more interesting in a scientifiic point of view.

I have never, in any other instance, succeeded in obtaining so remarkable a growth of the stump of the horn as this. Yet the same thing is observed in all cases, though in a less degree, and, as before observed, more in the young than in the old.

Another distinction is observed. Generally the younger the subject of the operation is, the higher the apparent state of maturity to which the horn attains through the season. I have one specimen whose horn attains a length of about seven inches, upon which the vascular covering during the month of December dries up upon the new growth, and several inches of the upper part peel off, presenting to the sight the naked horn, with a hard crust on the outside, appearing much like the horn of the perfect animal. This breaks off before the first of January, showing that inside of this hard shell the circulation has been freely kept up, till arrested by the action of the frost. Indeed, in most instances, this imperfect horn has a hardened shell on the outside, from which the velvet may be peeled without a flow of blood from the exposed portion. I have

been anxious to preserve the horns upon the heads of some of those imperfect animals, so as to observe the second year's growth; but I have never yet succeeded in doing so with the deer. There is the most vitality and the freest circulation in the middle of the horn. These diminish towards the outside, where they are almost wanting in the imperfect animal after the time when the velvet peels from the horn of the perfect buck.

I have been more fortunate in carrying the horns of the imperfect elk through the winter. The one which killed Mr. Dimock was operated upon the next day—that is, September 11, 1865. At that time his horns had been in perfect order for some weeks, and were very sharp. As expected, they dropped off in the latter part of October. He was then four years old past. The next spring grew a pair of horns of considerable size, but very imperfect as compared with those grown upon the deer. While the new horns were larger in diameter than the ones which had been shed, they were shorter and deficient in prongs. As was expected, these horns continued in velvet the ensuing winter, and fortunately he carried one through the winter without injury; the other, during January, broke off about four inches from the head. Here is the fragment. You observe that the fracture is not square, as is always the case with the deer's horns which are broken off during winter. I consider this the most interesting specimen which I ever procured, for from a careful study of it I learn more than from any other. It teaches us more than can be learned from the head with the stumps of this and the remaining horn upon it, which I had the honor of presenting to the Chicago Academy when I killed the animal, in December last. A zealous naturalist may, with his microscope, spend days in the study of this specimen, and still leave much to be examined. Here we have the

fine hairs, called the velvet, of about ten months' growth, in some places half an inch long, covering the vascular cuticle, except in a few places where it had been removed by violence. In these places we have this denuded skin covering the horn appearing like a thin sheet of gutta percha. Then, in other places, this skin is peeled up, exposing the naked horn and showing more perfectly the character of this skin. Here, also, we can see the blunt ends of the horn, in strong contrast with the sharp points of the perfect horn; and, most interesting of all, we have the fracture, showing us plainly the internal structure of the imperfect horn. You observe that a conical section of the centre of the horn, an inch in diameter and an inch long, was drawn out of the portion remaining on the head, leaving in the end of the stump a corresponding cavity. This cone, you see, is covered with coagulated blood, while only small patches of blood are observed on the surrounding portions of the fracture. This blood flowed out evidently immediately when the horn was broken and before it had time to congeal, which must have soon occurred, for the weather was freezing cold. You also observe evidence of great violence upon the horn, inflicted, no doubt, at the time it was broken off. The marks of violence upon the horn, the irregular character of the fracture and the unmistakable evidence of a flow of blood at the time, abundantly convince us that this horn was not broken off because it was frozen through, as has been the case in every instance which I observed with the deer. With the frozen horn the fracture is always regular and directly across the horn, and there is not the least evidence of a flow of blood, although the entire cross section always shows the presence of blood. The stag carried the other horn through the winter. I have another stag elk in my parks which has carried his horns in full velvet

through the past winter, with hardly a scratch upon them. I conclude, then, that the volume of the imperfect horn of the elk is such as to resist the frosts in this latitude, which has enabled me to make some interesting observations which I could not make upon the deer, for, as before stated, I never could get one through the winter unbroken.

I observed, with much interest, the stub of the broken horn, and the one remaining unbroken, when the season arrived last year for the commencement of the new growth, and was rather disappointed that it did not meet the expectations which had been excited by my observations of the horns of the mutilated deer. While there was a perceptible increase in the circulation of blood, both through the vascular covering and the body of the horn, there was very little increase in the volume of the horn itself. A new growth partially covered the end of the broken horn, but a new horn was not projected from it, as has been always the case with the deer. This may be owing to the fact that the stump is several inches long, while with the deer they have always been broken off quite close to the head. Upon the unbroken horn some protuberances appeared, and the ends of the prongs gave evidence of a new but stunted growth, not to exceed an inch or two, and I cannot say that the horn sensibly increased in diameter. Altogether but a very few pounds were added to its weight. I cannot express the belief that the horn of the stag elk will grow to any extravagant proportions, though he may carry it for years. I am aware that it is unsafe to deduce a general rule from observations of a single specimen for a single year. Hence I hope to confirm or change my conclusions by observations of the specimen I now have, whose horns are larger and more perfect than the one I sent to Chicago, from which I have been

obliged to make my deductions, which I look upon as unsatisfactory as yet.

So far as I am informed, hitherto naturalists have concluded that when the horns of the Cervus family have become divested of the velvet, they have completed their growth and attained their perfection. I am enabled to correct this impression. In April 1867, not long before the time for the elk to shed his horns, I sawed off the horns of the specimen I sent to New York, perhaps two inches from the head, and found the blood to flow so freely from the horn on both sides of the saw as to stain it the whole length used, but the flow was not so copious as to drop from either portion of the severed horn. Now this took place six months after the horn had been entirely denuded of the velvet covering, and had been well polished by being rubbed against the trees. This clearly establishes the fact that the solid horn of this class of ruminants has not, when divested of its sensitive outside covering and become a perfect weapon of offense and defense, become completely matured, with its blood vessels closed, like the shell of the hollow-horned animals; but, like the pith of the latter, the inside of the solid horn remains the seat of active vitality, through which the blood freely circulates, progressing all the time towards perfection in its growth to within a few weeks, at most, of the time when the horn itself is shed. We are so prone to theorise that we are too apt to form theories upon observations too limited; and when theories are once formed and announced, we are inclined to make subsequent observations conform to them, rather than correct our theories by new observations. The theory which I have been inclined to form from the limited observations already made is, that at the period when the velvet peels from the horn, only the outside shell of the horn has completed its growth so

as to arrest the apparent circulation of the blood in it, while within this shell the substance of the horn is open and spongy, like the pith of the hollow horn; that, as the horn progresses towards perfection in growth, the shell increases in thickness, closing up first towards the extremities,—the active circulation extending continually a less and less distance from the head and the section of circulation becoming less and less in diameter, till finally all the blood vessels in the horn proper are closed, and the further circulation of the blood in it shut off, while the blood vessels extending to the but of the horn still remain open and active, thus allowing the blood to impinge, as it were, against the but of the horn, which now absolutely refuses it admission. In the course of time, either longer or shorter, this tends to loosen it from its seat and prepare it to be detached by the least violence, or at last to drop off by its own gravity. In support of this theory is the fact that six months after the velvet had been peeled off, and within less than a month of the time when the horn itself might be expected to fall, I found the blood freely circulating through the centre of the horn, for one-half its diameter and two inches or more from the seat of the horn. I did not, as I should have done, cut the horn up into short sections, in order to determine certainly how far the circulation extended. Another fact in support of the theory suggested is, that always, so far as my observation extends, at the moment the horn is detached, blood flows freely from the seat of the horn, but none from the horn itself. I was once walking in the park, when one of my pets came up and claimed the expected gratuity. He had but one horn; the other had been recently dropped, for the blood was still trickling fresh from its seat. While I fed him with one hand, with the other I grasped the remaining horn, which by a slight force was separated from

the head. The animal jumped back and circled round actively, and shook its head violently, as if it suffered considerable pain. The blood flowed freely from the seat of the horn, so as to run down upon the cheek, and even drop to the ground. It was some minutes before he could be induced to approach me and take corn from my hand. The but of the horn itself was without the least stain of blood, but was as white and clean as the purest snow. Still, in many other cases I have found stains of blood on the fresh end of the horn; not, however, presenting the appearance of it having flowed from the horn. The surface of the horn at the point of separation is not smooth, but presents more the appearance of having been sprinkled with white sand upon a moist face, to which it had adhered.

With the view of throwing more light on this interesting subject, on the seventh of February, when but two out of more than twenty bucks retained their horns, I caught one and sawed one horn off about an inch from the head, and the other as close to the head as I could without injury to the seat of the horn. I confess to some disappointment when the microscope revealed no trace of blood in either of the severed horns. The other buck lost his horns within the week following. This one carried the pieces remaining for twenty days longer, when they were separated, as before stated. Probably he would not have carried the full horn as long, as it would have been liable to accidental violence. I have never yet seen, nor has any of my men, the horn drop from a deer's or an elk's head; but I am inclined to think that the operation is assisted by some slight violence, probably accidental, and I am strengthened in this opinion by the fact that the deer whose horns I sawed off carried the stumps so long. If, as some have supposed, the animal is induced by some degree of irritation to rub them off at a certain stage of

maturity, the same cause must have existed after the horn was sawed off as before, and he would surely have rubbed off the remaining portions.

While it does not destroy, the fact that no blood was detected in these horns tends slightly to qualify, the theory suggested, which would require the circulation to be kept up in the horn till about the time it is ready to be detached. It should also be observed that the principal observations detailed have been made with a young elk, carrying his first horns, and a deer with his fourth set of horns. Whether there is a slight difference in the laws as applicable to the two species, or what influence the different ages may have had, remains to be determined by subsequent observations. Of the structure of the horn itself, in its various stages of growth, my observations are still too limited to enable me to speak with enlightened confidence. In external appearance, at least, in their earlier stages of growth, those upon the perfect and the imperfect animal seem to be identical. At first the outside covering and the internal portion appear to form a homogeneous mass, soft and somewhat elastic, and quite sensitive, so that the most docile object to allow the least familiarity with it. It is warm to the touch, as if highly inflamed. As the growth proceeds the apparent inflammation, as well as the extreme sensitiveness, seems to subside, and we may well suppose that a line of demarcation is gradually established between the vascular covering and the body of the horn. In the meantime the fine hair covering of the former, only the rudiments of which at first appear, establishes itself as a dense coat, the roots of which appear to terminate at the shell of the horn. In the perfect animal this growth proceeds to final perfection, while in the mutilated animal it is at a certain stage, and not long before the horn of the perfect animal has attained

such a degree of maturity as to dispense with its outer coat, at least partially arrested, so as to prevent perfect maturity. Although impeded, the vascular connection between the outer cuticle and the horn proper is not entirely severed, and the circulation between the head of the animal goes on perpetually, and so the horn can never be detached from its seat. Even in the perfect animal, till perfect maturity, when the horn is ripe for dropping off, its union with the head is so perfect that no violence can detach it from its seat. If sufficient violence be used, the horn will break off above the seat, or will tear away a portion of the skull. Nor does the death of the animal in the least weaken this union. The same results will follow extreme violence after the animal has been dead a year and the head bleaching in the weather, as when alive.

Altogether, there are many curious and interesting facts connected with the horns of the Cervus family of ruminants, requiring yet much careful and critical observation before the subject is fully understood.

The habits and dispositions of these animals have also formed an interesting subject of observation and study.

By nature the deer is much more timid, if not more wild, than the elk; although the former, when brought up by hand and perfectly familiarized with man, is tamer than the latter. The deer raised in the park are always shy, and will flee at the approach of man. When the rigors of the season prevent them from finding their necessary aliment while ranging the park, and they are forced to come and take the food distributed to them by their keeper, still they will not allow him to approach within a considerable distance of them; and if a stranger comes in, they all at once raise their white flags and dash off to a safe distance. Some seasons, when I have allowed the does the range of the north park, which is much secluded,

and where the fawns rarely see a human being, the young utterly refuse to come up for food, even when they cannot get enough in their range to sustain life. During one severe winter I lost over twenty fawns from this cause. Since then I have kept the does in the south park during the summer, which is daily frequented by visitors, and where they become accustomed to the sight of man.

It is not so with the young elk. Those raised in the park are scarcely more wild than a calf which has had no more familiarity with man. The elk are all raised in the north park, which is visited by comparatively few, owing to the bad reputation of some of the elk for unkindness to strangers, and even their keepers. Still they are never wild. On the approach of a stranger they will trot off from their mothers a little way and then look earnestly around, but they do not flee in fright like the deer; and by fall and during the winter the young are but little more shy than the old, and so far from experiencing any difficulty to get them up to feed, all are on hand, young and old alike, and when the keeper passes through the herd he is treated by all with about the same indifference, except the old bucks, with whom he must settle accounts in the beginning, using a pitchfork as arbiter, and it sometimes takes half a dozen hard thrusts with the fork from behind a tree before he will yield, which he testifies by tearing away at a crashing rate, uttering the most frightful screams. When this mastery is once established it is admitted for that winter, although he must submit to allow the brute to make faces and grate his teeth at him from a respectful distance. There is about the same difference in disposition among the males of both the elk and the deer that is observed among the bulls of the common cattle. Some are by nature very vicious, while others are more docile. The buck elk, however, after he is four years old, is more

vicious and dangerous than the male deer. Some are so wicked that they seem nearly beside themselves at the sight of a human being, from early in September till the middle of December, and even after that they require caution and severity to manage them safely. Others, again, never get so wicked as to render it unsafe for a resolute man to go among them, even at the worst season; though the most gentle during the fall will make threatening demonstrations, which they will follow up on discovering the least signs of fear, which they are quick to detect. The largest elk I ever owned (he stood sixteen hands high on the wethers when five years old) was never really unsafe at any season; while others I have had would make the most terrific charges against the fence, so that it would tremble for a long distance, in order to reach his keeper on the opposite side. When there are several buck elk in the park, the master among them maintains such discipline that the others manifest but little of that wickedness. Remove the master, and his successor in rule will, in three days, succeed to his viciousness, either modified or enhanced by his natural disposition. The male deer is at no time as wicked as the elk in his natural disposition, and his constitutional timidity is so great that I have never in a single instance seen the least demonstration by one raised in the park by the side of its dam. When raised by hand and petted, most of them lose all fear of man, and a wicked disposition shows itself in some, which makes them dangerous to children, and I have seen them make demonstrations to men; and I had one that questioned the right of a clergyman to walk the park so strenuously that he left with much less of his cloth than he wore when he entered. A majority of the petted bucks show more or less wickedness during the fall; and yet I have had several which remained as tame and as

innocent as the does the whole year round. I have one now that a child can be with alone at any time, without the least danger.

There is a wide difference in tastes and habits of feeding between the two species. The elk is a promiscuous consumer and a hearty eater. They require quite as much food as the same number of black cattle, but are much less particular as to its quality. In summer they eat grass and browse, and seem to prefer a large portion of the latter, especially after mid-summer. After the leaves of the oak and hickory become matured and tough they denude all the shrubs and branches within their reach, so that in a few years they clear their range of the undergrowth, by not only removing the leaves, but nipping the twigs to the diameter of a quarter of an inch. They select the most stringent first, preferring the oak, the hickory and the poplar, the wild apple and the plum to the hazel, the maple and the elm; and so of the weeds. They prefer the bitter to the sweet. The burdock is their especial favorite. They dig out the roots so effectually that not one can ever be found in their range the second year. Even in winter they gather the dry oak leaves within their reach on the trees, though they reject those which have fallen. They keep in good order on cornstalks alone, and eat with apparent relish damaged hay, which common cattle would reject, unless severely pressed by hunger. Indeed, quantity is to be considered rather than quality, in feeding the elk.

The deer, too, is fond of browse and prefers the most stringent vegetation. He is, however, a delicate feeder and a small eater. I have often been interested, when sitting in the shade, surrounded by my pets, to observe them select their food. After they despair of getting more from my hand or pockets, they will turn away with

a languid air and commence selecting from the surrounding vegetation. Perhaps first is chosen a single blade of blue grass, then a leaf of white clover, then a wild flower, then a tender weed, and, lastly, the leaf of a shrub and the point of a twig. When a sufficient quantity of this varied vegetation has been selected, mastication is performed. No doubt this fastidious delicacy is more observable when the appetite of the animal has been already satisfied, and he is eating rather as a matter of habit than to satisfy the calls of hunger. Still it shows a trait of character which amuses and interests me much. I cannot help loving them for it.

Dry food the deer do not relish. Even corn they do not relish, after they can get a supply of green vegetation, though they rarely refuse cake or bread. Timothy hay they dislike most of all, and can never be brought to eat the stalk; when severely pressed by hunger, they will only nip the heads and blades. Clover they manage better, especially the second crop or rowen. Hungarian hay they seem to enjoy, but their choice is the weeds among the hay, all of which they first select. In a severe winter corn or other grain is indispensable to keep them in good order. They do not fancy roots of any kind, and eat pumpkins sparingly. They are exceedingly fond of acorns, wild apples and plums. So soon as the former begin to fall they commence to thrive, and in a few weeks get fat. Even hickory nuts are not too hard for them, though they do not make a clean sweep of them, as they do of the acorns.

Both the elk and the deer are as fond of salt as cattle and sheep, and should be salted about as regularly.

They are fond of clear, fresh spring water, of which they consume considerable quantities, and when that is not accessible, they will not reject an inferior article. In

the winter many will eat snow as a substitute, rather than go half a mile to the spring.

But water is not indispensable in the summer season with the deer at least. About the first of August last I purchased and put in the park a pet fawn. She seemed to be afraid of the other deer, with whom, at least for the first two months, she refused to associate, and delighted only in the society of human beings. She never wandered out of sight of the gate, and whenever that was opened by any person she would rush up in the greatest delight. The season was excessively dry, and there was no water nearer than three-quarters of a mile, in the north park, to which the deer only had access through a small opening. She was never seen in the north park till March following, and I much doubt if she ever before that found the spring. I am very confident, at least for two months, she never tasted a drop of water, as there was not a shower of rain, and I expressly forbade any being given her, at least till she should show some symptoms of the want of it, which she never did.

During the winter there has been no water in the south park, and not one-quarter of the deer have been in the habit of going into the north park.

The period of gestation of the elk is seven months, and of the deer five months.

A few observations upon the venison of these animals remain to be presented. The delicacy and fine flavor of the venison of the wild deer are familiar to all. A considerable modification in the flesh of those raised in the park is observed. The meat is not of so dark a color; it is more tender and juicy; the flavor is not so high, but more delicate. Several causes contribute to these results. The muscles are not rendered hard and tough by exercise, of which they take comparatively little. They are not

harrassed by constant apprehension of danger from their natural enemies, which keep the wild deer upon the look-out continually. These circumstances are sufficient to account in a large degree for the difference between the venison of the wild and partially domesticated deer. Again, they are not killed when in a state of high excitement and violent exercise, as is usually the case with the wild deer. The fact, also, that they are as thoroughly bled as a sheep or a bullock in the slaughter-house, contributes, no doubt, to the improvement of the venison.

I am unable to compare, by personal observation, the venison of the elk raised in the park with that of the wild elk; but, from what I learn from others of the wild meat, I think the improvement must be much greater than in the case of the deer.

The most striking peculiarity of the elk venison is its remarkable solidity and extraordinary nourishing properties. One's appetite is satisfied by eating less than half the amount which would suffice of beef or mutton. While it is remarkably firm and solid, it is tender and juicy, exceeding in this latter respect almost any other game meat. It has a flavor peculiarly its own, and which has been much admired by all who have tasted it at my table. The tallow of both the elk and the deer is very white and remarkably hard, much more so than mutton tallow. It is not appreciably softened in a temperature of ninety or ninety-five degrees. In the properties stated it almost resembles white wax.

Both the deer and the elk are destitute of the gall-bladder.

ERRATA.

On page 12, third line from bottom, for "birches" read "hickories."
On page 26, sixth line from top, after "animal" add: "and the horns."

APPENDIX.

As illustrative of the habits and disposition of the male elk at certain seasons, Col. T. Lyle Dickey, at the request of the Society, has kindly furnished it with the following graphic account of an encounter with the one upon which some interesting observations are made in the foregoing paper. The elk was five years old, of moderate size, and of an unusually vicious disposition:

Statement of Col. Dickey.

In compliance with your request, made in behalf of the Ottawa Academy of Natural Sciences, I will try to put in writing, as illustrative of the habits and character of the elk, the incidents of the death of Mr. Marvin Dimock, caused by injuries inflicted by an elk in Judge Caton's north park, in September 1865. To render the statement intelligible to those not familiar with the ground, it is proper to say that Judge Caton's residence and my own are about two hundred and fifty feet apart, and situated on the brow of the bluff, about a mile north of the Court House in Ottawa, and that Judge Caton's parks lie just north of our residences. The lower or south park contains about forty acres, and the upper or north park about thirty acres. Both were enclosed by a strong picket fence, eight feet high, and the partition fence between them is of the same structure. The north park was surrounded on every side by other enclosures. A public highway from the city passes up a ravine a short distance east of the Judge's house, then turning west separates the grounds about his house and mine from the lower park,

and thence runs northward along the west side of the lower park to within one hundred feet of the upper park, where the road turns west and leaves the park grounds. The parks are woodland, chiefly a second growth of trees from four to twelve inches over, with here and there an old oak of the original forest. The underbrush in both had at that time generally disappeared, but in the upper park there still remained thickets, furnishing places of concealment for the elk and deer. At that season some of the elk had begun to show a disposition to be vicious, and, as had been the custom of the Judge in that matter, the herd had been banished to the upper park, the only entrance to which was through an outside gate (near our houses) into the lower park, and thence through another gate in the partition fence between the parks. Both gates were kept locked, and the keys kept at Judge Caton's house.

Marvin Dimock, a stout old gentleman, say sixty years of age, and perhaps two hundred pounds in weight, had rooms and boarded at the house of Mr. Edward Drew, in Ottawa; and his brother, Rufus Dimock, of the State of Connecticut, a frail, thin looking man, apparently not less than fifty years old, was there on a visit.

Soon after breakfast, on Sunday morning, September 10th, 1865, the two Dimocks and Mr. Drew set out for a forenoon ramble into the country. Passing by our residences and the lower park on the public road, they entered the fields lying west of the upper park and wandered on until they found themselves in the field north of the upper park, and there halted awhile in the shade for rest.

Marvin Dimock at length proposed to cross the fence and come down through the parks, that his Connecticut brother might see the elk and deer. To this Drew objected, suggesting the impropriety of going in without per-

mission. After a short parley, they improvised a ladder and scaled the high fence. The party lingered a while on the grass plat on the bank of the little creek, which passed eastward across that part of the grounds, and amused themselves by feeding crackers to some deer and fawns which came to them. No elk were in sight. Drew then proposed to recross the fence where they had entered and return by the route they had traveled going out. Marvin Dimock insisted on returning through the parks, saying he wanted to have his brother see "these fellows which make these big tracks," pointing to the elk tracks about the stream. Drew suggested the danger of doing so, when Marvin Dimock said to Drew: "If you are afraid, you can go back the way we came, and we will go through the parks and meet you at the south gate." Touched a little by this banter, Drew (who is a strong, active man, in the prime of life) replied that he did not fear to go anywhere where the Dimocks could safely go. So the party started south, mounting the little bluff from the creek, and passed on through the woodland. At about one hundred yards they discovered the herd of elk, near by in a patch of thick brushwood, on their left and a little to their rear. They all stopped and looked at the elk for a few minutes. The elk seemed quiet, with no indication of hostility, beyond the making of ugly faces by the old chieftain of the herd, who stood out in front of the other elk, with head adorned with high and wide-spread antlers. Their curiosity being satisfied, our adventurers set out for home, coming southward. They had traveled but a short way when the herd of elk were observed to be following, with their chief in front. Drew, who was at the rear, stopped and turned round. At this the elk halted. Again the men moved on, at a faster walk,—Rufus Dimock, the Connecticut brother, in ad-

vance, Marvin Dimock next, and Drew still at the rear. The elk followed, gaining on the men rapidly. Drew again turned round upon the leader of the herd, and again the elk halted,—this time not more than thirty feet from Drew. He told his companions to look out for "a circus," and advised them to resort to trees for safety. Marvin Dimock, who carried a small walking staff, got behind a tree about fourteen inches over; Rufus Dimock climbed into the limbs of a small tree, some six inches in diameter; while Drew stood beside another small tree, with one hand firmly grasping a limb as high as he could well reach. His elkship stood there for a while, making ugly faces at Drew. At length his hair was seen to rise and stand on end. Soon the elk suddenly plunged forward with his antlers at Drew. He was an instant too late, for Drew had mounted out of his reach into the little tree. After horning Drew's tree a while the elk turned his attention to Marvin Dimock, who was standing on the ground behind the larger tree. Advancing deliberately upon this tree, the elk butted against it, his antlers standing out on either side. Keeping his head to the tree, he began soon to swing round toward Marvin Dimock, thus bringing the points of the horns on his right nearer to the man, Dimock, keeping time with the elk's movements, (which were not rapid,) moved round the tree, keeping it between him and the elk. At times the elk reversed his movements and swung round to his left, always, however, keeping his head towards the tree. Marvin Dimock seemed amused at the futile efforts of the elk to get at him, and at times would strike with his staff round the side of the tree, and give the elk a rap upon the side of his head. This maneuvering continued some time, Drew and Rufus being interested spectators from their perches in the little trees, the rest of the herd standing near by, apparently taking

little interest in the affair. At length Marvin Dimock, in maneuvering about his tree, fell, (whether from dizziness caused by circling round the tree, or by reason of stumbling when walking one way and looking another, is not known.) The instant he fell the hostile elk moved for him, and Rufus Dimock and Drew each promptly leaped from his tree to rescue Marvin from his impending danger. Marvin Dimock fell on the south side of his tree. The elk was coming down upon him, passing the tree on the west side, when Rufus Dimock, in his leap from his tree, struck the ground so violently that he fell flat, some twenty-five feet south from where his brother lay. The elk bounded over Marvin Dimock and rushed at Rufus Dimock, now on the ground, the long, sharp antlers fortunately passing on each side of his body. Rufus Dimock became somehow entangled in the antlers, probably by frantically seizing the animal round the neck. At all events, the elk lifted him from the ground, and while his body rested upon the elk's brow, his legs flying in front, the elk waived him about in the air. It seems that while Drew's attention was riveted upon the maneuvers of Marvin Dimock and the old chieftain elk about the large tree, a younger elk, unobserved by Drew, had taken position under Drew's little tree; so when Drew leaped from his tree to rescue Marvin Dimock, he came down brushing *this* elk's heels. This elk, much frightened, kicked with both hind legs, throwing Drew some distance prostrate upon the ground, and instantly fled. Drew, uninjured by this accident, rushed to the rescue of Rufus Dimock, who by this time was poised in air on the old elk's brow. Seizing Rufus Dimock by the leg, Drew, by a sudden jerk upward and outward, lifted him from the elk's head, and, as he struck the ground, quickly hoisted him into the branches of a little tree, and, pushing

him up, urged him to get into a fork or crotch of the tree somewhat higher, for he was pale and weak, and Drew feared he would become faint and might fall. Drew had barely got Rufus Dimock started up his second tree, when the hostile elk advanced upon him. Drew retreated among the small trees, baffling the efforts of his pursuer by getting behind first one tree and then another. When Drew would get behind a tree the elk would horn the tree a little while, as if in hopes of removing the obstruction, and then circling around, it would go for Drew, who by this time retreated behind another. Drew kept up this kind of maneuvering, hoping to decoy the furious animal so far from the Dimocks that they could make their escape. Meanwhile Marvin Dimock, for some unaccountable cause, lay upon the ground where he first fell, lying rather upon his side, leaning upon his elbow, and his head raised from the ground, looking at the scene, and made no effort that was observed either to rise or to get away. Whether he was disabled by the fall or by some unobserved injury by the elk, or was paralysed with fear, is not known. The hostile elk soon tired in the fruitless pursuit of Drew, and, abruptly quitting him, returned to Marvin Dimock (who still lay upon the ground) and began to horn him, tearing his flesh and clothes with his antlers. Means of rescue seemed exhausted; the grounds were clean and no club could be found—no weapon. Rufus Dimock told Drew that Marvin was undoubtedly killed, that he (Rufus) was getting very weak and could not hold out long in his tree, and begged Drew to get out of the park and get some help. Drew left the scene, ran west to the fence and, breaking the top of a picket off, got out of the park and ran south by the west line of the parks, over half a mile, to my house. As he rushed into my presence, breathless with violent running and excited by the stirring events

through which he had passed, and earnestly solicitous for the fate of his companions, I found difficulty at first to comprehend the character and extent of the emergency.

The church bells in the city were at that moment tolling the public worshippers of our city to the morning services, at half past ten o'clock. I had just returned from taking some of my family to Sunday school, and had seated myself in my large rustic rocking chair, with my pipe and my newspapers, for an hour's quiet reading, intending to go down to town and bring my folks home after church. My horses, still harnessed and attached to my open buggy, were standing tied in my carriage house, waiting for the trip to town after church. I was alone in the house, except Patrick Carey, a hired man, who was just starting to his (Catholic) church, where the services begun at eleven o'clock. The moment the situation was comprehended, Drew, Carey and myself were on the move. While Drew and Carey took my horses and buggy through the grounds of Mrs. Wallace to the outside park gate, I ran to the houses of Judge Caton and Mr. Leland for help and weapons, and the keys to the parks. I got no help; the men of these households were in the city. I found the key to the outside park gate. We had firearms at each of the houses, but the powder was all burnt the spring before, when we got the news of the surrender of General Lee and his army. The only weapons I could muster consisted of two stable forks about four feet long and an ash pole about nine feet long and the thickness of a heavy hoe-handle, armed at one end with a very small pruning saw. With these weapons I met Drew and Carey at the park gate, in the public road just north of Judge Caton's stable, and, getting through that gate, we drove under whip at a full gallop to the upper end of the first park, and tying the horses to the fence, forced the lock on

the gate to the north park and entered that on foot. Carey and Drew each chose a fork for a weapon, and I took the pole or pruning saw. As we left the gate and moved into the forest in the upper park, we could hear Rufus Dimock hallooing in a tone of distress. We moved on rapidly, abreast, or in line of battle; Carey held the right, Drew the left, and I the centre. We agreed it was best to meet the elk and fight him in the open ground, and *there* whip him if possible, and to do so that we would keep *together*,—all keeping on the same side of his elkship, so that he should not overpower us in detachments. We were very soon on the contested ground. When we first saw the elk he had quit Marvin Dimock, who lay moaning and helpless upon the ground, his clothes very much torn and somewhat bloody. The elk stood about thirty feet from the little tree in which Rufus Dimock was perched, addressing his attention exclusively to Rufus. There he stood, looking fiercely at the man in the tree, his hair standing erect, stamping in a threatening manner, brandishing his antlers, and now and then uttering a squeal of vexation and rage. Hearing our voices talking as we approached, he turned and came to meet us,—not rushing, nor yet with caution or timidity, but with a dignified, firm and steady step, holding his head high in the air, shaking his antlers at times and stamping the ground in a threatening manner. We soon met, and my weapon being the longest, he came in contact with *that* first. Lowering the handle of my pruning saw, with the point raised about the height of his nose, by a pushing movement I raked the upper part of his nose with my little saw, producing a very slight wound, but no doubt on a sensitive point. He seemed greatly surprised and disturbed, and instantly and furiously brought his head to the ground, thrashing the dry, hard ground with his antlers with great violence

and noise. He seemed to make the earth tremble. This mode of protecting his nose presented to us the points of his horns, the top of his head and the back of his neck. At him we went vigorously. With all my power I thrust at him with the end of my little saw, striking him about the back of his neck or his shoulders. I might as well have thrust against boiler iron half an inch thick. At the first plunge my saw was bent and doubled. I then used the pole as a flail, beating him over the back and loins. Meanwhile Drew and Carey were prodding at him with their forks as best they could. The forks being only about a foot longer than the horns, they were compelled to do their thrusting at arm's length, and consequently with less force than if the weight of the body could have been thrown upon the fork. It was soon perceived that so long as the elk kept his face to the ground to protect his nose, his eyes were brought in such position that he could not see directly in front of him. He paid no attention to our assaults but would roll his head to one side and glance forward with one eye, and then plunge forward at us. We kept directly in his front. His plunges were easily anticipated, for the glance of his eye designated the time and object point of his action. Keeping time to his movements when he plunged forward, we gave back far enough to avoid his antlers, and while he was taking another observation for another plunge, we belabored him actively with our weapons, and again went back when he came forward. Our efforts seemed very futile. He never raised his head from the ground; in fact he kept his face almost flat on the ground, with his nose nearly between his fore feet, except when he rolled his head to one side to take a new observation preparatory to a plunge. In rolling his head he necessarily raised it somewhat, because the length and position of his antlers were such that he

could not roll his head without raising the antlers on one side, while on the other they touched the ground. By this process we were driven back regularly some one hundred and fifty or two hundred feet; and then I confess I began to have some misgivings as to the result of the fight. I knew Drew was a man of courage, but Patrick Carey had been in my employment but a few months, and I knew nothing of his nerve; he, however, proved a cool and energetic warrior, and fought vigorously. At length, in the plunging and retreating, as I have described, the elk turned one of his sides towards our line of battle, and one of the men happened to thrust him with his fork just behind the fore leg, where the skin was not so hard. He flinched, with a squeal of pain or vexation, and began to fall back. Encouraged by this, we pitched in more furiously; the blows fell faster and, I think, harder, and he continued to go back. It was no rout, however; he fell back in good order, keeping his antlers to the ground and in his front, and walking backwards. In this way we repassed the same ground over which he had driven us, and forced him back until we came about opposite the Dimocks, perhaps sixty feet south of them. About this point, in trying to increase his speed, he again exposed one of his flanks, when I succeeded in giving a severe scratch with my bent up saw across the belly, pretty well back. At this he kicked and struck the trot, and was soon driven some two hundred feet beyond where the Dimocks were. Even in this part of the retreat he turned once or twice and threatened fight, but yielded before we got in reach of him. As soon as he was driven to a safe distance from the wounded man, Rufus Dimock was called down from his tree, the buggy and horses were brought up, and Marvin Dimock was lifted into the buggy and borne off. While this was going on the elk stood in

sight, stamping in a threatening mode, brandishing his antlers, and now and then giving a squeal, or whistle, a noise peculiar to the elk,—I think more properly a squeal. It consists of one note—is short and abrupt, like a grunt, but is on a high key, not partaking of the chest notes in any degree. Even as the buggy was driven away, the elk followed, at a respectful distance, making these threatening demonstrations, as far as the gate leading from the upper into the south park; and two of us walked in rear of the buggy, with our weapons. to keep him off. Passing this gate, we drove under whip with the wounded man to Ottawa, to get him to a surgeon. When he was first raised up, and afterwards, he asked for water. As we passed Judge Caton's house, we were met in the road by Mrs. Caton and her girls, with water, of which he drank freely. He spoke afterwards once or twice on the way, but died in about thirty minutes after the surgeon saw him. There were several flesh wounds, but the surgeons said none of these could have produced death. My conviction is, that the elk must have crushed him with his head while on the ground, and produced some fatal internal injury.

This story seems a pretty long one when I see it written, and the time seemed long when the events were passing; but I was astonished, on consulting my watch, as soon as the wounded man was in the hands of the doctors, laid in his bed at Mr. Drew's house, to find that but fifty minutes had elapsed since Drew rushed into my house for help.

T. LYLE DICKEY.

To John Paul, M. D.,

President Ottawa Academy Natural Sciences.